

# Windows TCP/IP SR-IOV in Virtual Environments

## Line Rate Performance with Chelsio T6 100GbE in Virtual Environments

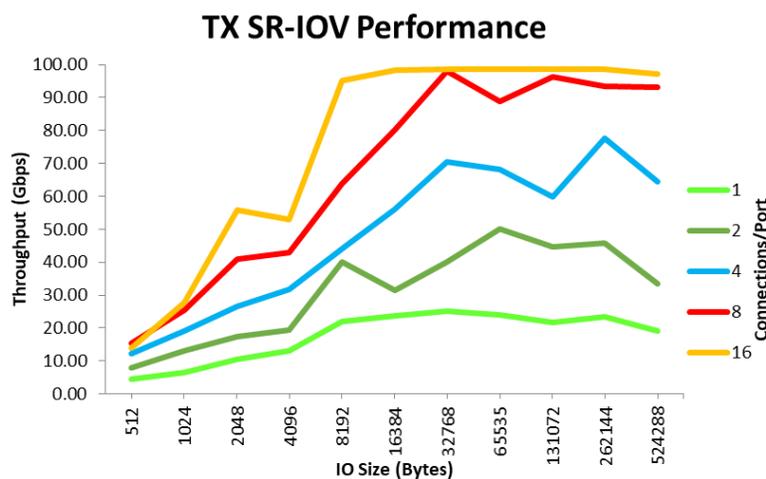
### Executive Summary

Since Single Root I/O Virtualization (SR-IOV) was introduced, it has become a de facto requirement for virtual machines and Chelsio, as a leading supplier of network adapters, was there from the beginning to implement it into its product offerings. Windows SR-IOV functionality allows for more efficient application execution and lowers costs associated with hardware, space, power, and cabling. The Chelsio T6 adapters employ hardware SR-IOV capabilities and functionality to improve I/O performance in virtualized environments, achieving line rate performance in virtual machines. Chelsio T6 adapters support up to 32 Virtual Functions utilizing an embedded virtual switch. Additionally, Chelsio T6 users enjoy in-boxed drivers in Windows Server 2012 R2, 2016, and now Windows Server 2019. As a leader in networking hardware, Chelsio is proud to continue its leadership in providing TCP/IP SR-IOV networking solutions for Windows Virtual environments to bring high performance, low cost solutions for our customers.

### Test Results

The following graphs present the observed throughput between a VM and a PEER host server, all running Windows Server 2016. The results were generated using the **ntttcp** tool varying the numbers of connections from 1 to 16 and a sweep of IO sizes from 512 bytes to 512 Kbytes.

The results show that, using TCP/IP NIC transfers with 16 connections per port, the virtual machine was able to achieve 100 Gb/sec in both transmit and receive directions using the Chelsio T62100-CR Unified Wire Adapter.



**Figure 1 – TX NIC TCP/IP SR-IOV performance – 1 100G port @ MTU 9000**  
 Preliminary: Performance tuning is continuing

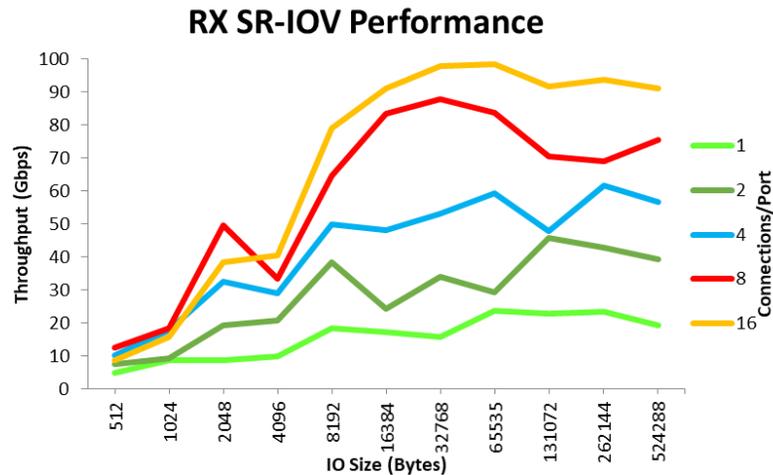


Figure 2 – RX NIC TCP/IP SR-IOV performance – 1 100G port @ MTU 9000  
Preliminary: Performance tuning is continuing

## Test Setup

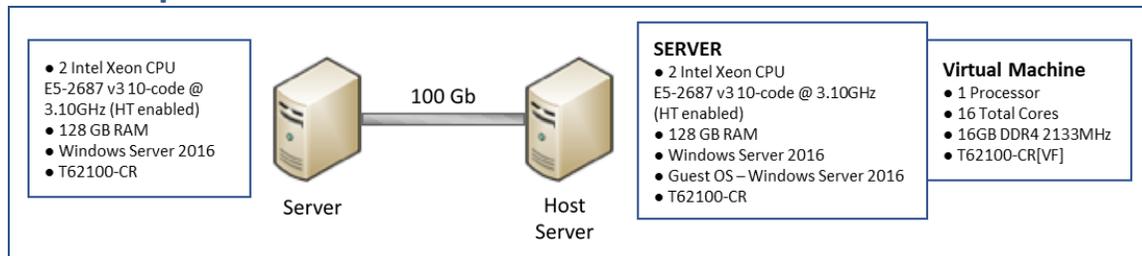


Figure 3 – Test setup

The setup consists of two machines connected back-to-back using a single port. The Host Server is running Hyper-V with a VM running Windows Server 2016. Latest Chelsio Unified Wire in installed on both machines. The following are the commands used:

### Server:

```
ntttcp.exe -r -m <Connections>,*,<IP address> -p 20001 -rb 128k -t 20 -l <512 to 512K>
```

### Client:

```
ntttcp.exe -s -m <connections>,*,<IP address> -p 20001 -sb 512k -t 20 -l <512 to 512K>
```

## Conclusion

This paper showcases the performance capabilities of SR-IOV Virtual Functions in Windows Server 2016 using NIC TCP/IP data and the Chelsio T62100-CR adapter. A VM with a vSwitch was able to reach line rate of 100 Gb/sec using multiple TCP connections.

## Related Links

[Microsoft Windows Unified Wire and CNA Solutions](#)

[Top 10 Networking Features in Windows Server 2019: #5 Network Performance Improvements for Virtual Workloads](#)