Lanner

White Paper

# Intel® Ethernet Controller XL710 Reshapes Networking Landscapes

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## Background

The launch of Intel® Xeon® processor E5 v3 series platform indicates that IT management is heading into a new generation of processing capabilities. The new Intel® Xeon® server-based platform presents a great leap in CPU performance, RAM efficiency, PCH connectivity, and networking modules to deliver unprecedentedly low latency, high bandwidth and relatively lower power consumption. By integrating Intel® Xeon® v3 processors, DDR4 memory, the most up-to-date Intel® QuickPath Interconnect (Intel® QPI) , Intel® Virtualization (Intel® VT) technologies, and the unparalleled networking Intel® Ethernet XL710 family (codenamed Fortville), the Intel® Xeon® processor E5 v3-based server platform (codenamed Grantley) is architected to address today's data center challenges. These features support enterprise virtual machine consolidations, virtualization off-loads, network cryptographic security operations, data centers, and converged networks. Among the new features, networking plays an integral part in addressing these challenges. With the determination of unparalleled network throughput, Intel® Ethernet Controller XL710 is packed with new network virtualization technologies delivering increased performance optimized for Intel® Xeon® E5 v3 private and public cloud environments.

The new Intel® Ethernet XL710 revolutionizes virtualization technology by extending networking capability up to 40GbE. This upgrade delivers hardware optimization, network provisioning, integrates advanced traffic steering capabilities with Intel® Flow Director, and is Data Plane Development Kit (DPDK) optimized enabling higher packet processing for network appliances and Network Functions Virtualization (NFV) applications like firewalls and load balancers. A broad array of physical interfaces, hardware optimizations, intelligent offload capabilities, and unified networking strategies contribute to delivering unparalleled flexibility in virtualized servers and transforming networking and storage in the data center.

## Overviews of Lanner's Fortville Driven Solutions

Lanner adopts Intel® Ethernet Controller XL710 to come up with two network modules: NCS2-IQM201 and NCS2-IXM407. Both are 40GbE capable and utilize PCI Express 3.0 x 8 gold fingers for connection with the system motherboard (recommended for Lanner network appliances with Intel Grantley platform). The introduction of the two Intel® Ethernet Controller XL710 based Network Interface Card (NIC) modules are determined to reshape networking landscapes and optimize hardware accelerations in virtualized networks.

Lanner's NCS2-IQM201 NIC module comes with two 40GbE QSFP fiber connectors. Designed with Intel® Ethernet Controller XL710-AM2, the QSFP connector can be treated as an Ethernet LAN port with 40Gbps performances. With PCIe Gen 3.0 x 8 interface, the NIC module can be installed onto a network appliance or server to deliver 2 x 40Gbps transmission capability (recommended for Lanner network appliances with Intel Grantley platform). This will provide an expanded throughput up to 80Gbps.

## Benchmark Report of NCS2-IQM201

### Test Setting

Test Mode: throughput %

- IP version: IPv4
- Pattern: Backbone (pair)
- Direction: two-way directional
- Protocol: IP
- Frame size: 64, 128, 256, 512, 1024, 1280, 1518 bytes
- Duration: 30 seconds
- Loss tolerance: 0%
- Benchmark (Mb/s) – (Throughput/100) x 1000 (GibaLAN) x 2 (Bi-directional)

Test Environment - Lanner's FW-8896

| | |
|---|---|
| Motherboard | MB-8896 V0.2 |
| CPU | Intel® Xeon® Processor E5-2680 v3 |
| DRAM | Transcend* 16GB DDR4 2133 REG x 16 |
| Operating System | Lanner Test-bed |
| BIOS | MB-8896 Ver.160 |
| Kernel | 3.10.0 |
| Driver | i40e-1.1.23 |
| NVM | 4.26 |

NCS2-IQM201 LAN Port Allocations

| | | | |
|---|---|---|---|
| Slot 3 | Slot 4 | Slot 7 | Slot 8 |
| LAN 5 LAN 6 | LAN 7 LAN 8 | LAN 13 LAN 14 | LAN 15 LAN 16 |
| Slot 1 | Slot 2 | Slot 5 | Slot 6 |
| LAN 1 LAN 2 | LAN 3 LAN 4 | LAN 9 LAN 10 | LAN 11 LAN 12 |

NCS2-IQM201 Ethernet Throughput Test Results

| Frame Size / Type | 64 | 128 | 256 | 512 | 1024 | 1280 | 1518 |
|---|---|---|---|---|---|---|---|
| | Throughput % | | | | | | |
| 2-port pair | Protocol: IP / Cable length: 1.8m | | | | | | |
| LAN 1 to LAN 2 | 1.57 | 2.79 | 5.21 | 10.06 | 19.56 | 24.37 | 28.13 |
| LAN 7 to LAN 8 | 1.58 | 2.78 | 5.19 | 9.99 | 19.59 | 24.42 | 28.87 |
| LAN 11 to LAN 12 | 1.55 | 2.73 | 5.08 | 9.82 | 19.59 | 23.99 | 28.43 |
| LAN 15 to LAN 16 | 1.51 | 2.66 | 4.97 | 9.60 | 18.73 | 23.67 | 27.57 |
| LAN 1 to LAN 3 | 1.92 | 3.37 | 6.29 | 11.67 | 23.79 | 29.61 | 35.04 |

With DPDK (l2wd_loss_rate_0.01%)

| Frame Size / Type | 64 | 128 | 256 | 512 | 1024 | 1280 | 1518 |
|---|---|---|---|---|---|---|---|
| | Throughput % | | | | | | |
| 2-port pair | Protocol: IP / Cable length: 1.8m | | | | | | |
| LAN 1 to LAN 2 | 30.84 | 49.98 | 59.90 | 60.83 | 60.66 | 60.69 | 60.38 |
| LAN1 ~ LAN8 | 37.01 | 64.95 | 77.99 | 87.34 | 95.74 | 94.82 | 93.57 |

Another major launch of Lanner's Ethernet NIC module line is NCS2-IXM407. Also Intel® Ethernet Controller XL710 driven and with PCI Express Gen 3.0 x 8 interface, this port-expansion module delivers four 10GbE SFP+ fiber connectors. When installed onto a network appliance, NCS2-IXM407 is capable of expanding network connectivity up to 4 x 10GbE throughput.

## NCS2-IXM407 Benchmark

### Test Setting

Test Mode: throughput %

- IP version: IPv4
- Pattern: Backbone (pair)
- Direction: two-way directional
- Protocol: IP
- Frame size: 64, 128, 256, 512, 1024, 1280, 1518 bytes
- Duration: 30 seconds
- Loss tolerance: 0%
- Benchmark (Mb/s) – (Throughput/100) x 1000 (GibaLAN) x 2 (Bi-directional)

NCS2-IXM407 LAN Port Allocations

| Slot 3 | Slot 4 | Slot 7 | Slot 8 |
|---|---|---|---|
| LAN 9 ~ 12 | LAN 13 ~ 16 | LAN 25 ~ 28 | LAN 29 ~ 32 |
| Slot 1 | Slot 2 | Slot 5 | Slot 6 |
| LAN 1 ~ 4 | LAN 5 ~ 8 | LAN 17 ~ 20 | LAN 21 ~ 24 |

Test Environment - Lanner's FW-8896

| | |
|---|---|
| Motherboard | MB-8896 V0.2 |
| CPU | Intel® Xeon® Processor E5-2680 v3 |
| DRAM | Transcend* 16GB DDR4 2133 REG x 16 |
| Operating System | Lanner Test-bed |
| BIOS | MB-8896 Ver.160 |
| Kernel | 3.10.0 |
| Driver | i40e-1.1.23 |
| NVM | 4.26 |

NCS2-IXM407 Ethernet Throughput Test Results

| Frame Size / Type | 64 | 128 | 256 | 512 | 1024 | 1280 | 1518 |
|---|---|---|---|---|---|---|---|
| | Throughput % | | | | | | |
| 2-port pair | Protocol: IP / Cable length: 1.8m | | | | | | |
| LAN 13 to LAN 14 | 6.25 | 11.31 | 21.07 | 41.03 | 79.68 | 100.00 | 100.00 |
| 4-port | | | | | | | |
| LAN 1 to LAN 4 | 6.14 | 10.84 | 20.20 | 38.92 | 76.30 | 95.12 | 100.00 |
| LAN 9 to LAN 12 | 5.87 | 10.36 | 19.61 | 36.94 | 72.79 | 90.36 | 100.00 |
| LAN 13 to LAN 16 | 5.78 | 10.28 | 18.87 | 36.19 | 72.32 | 90.65 | 100.00 |
| 8-port | | | | | | | |
| LAN 21 to LAN 28 | 5.12 | 9.04 | 12.50 | 33.03 | 63.68 | 79.01 | 93.20 |

With DPDK (l2wd_loss_rate_0.01%)

| Frame Size / Type | 64 | 128 | 256 | 512 | 1024 | 1280 | 1518 |
|---|---|---|---|---|---|---|---|
| | Throughput % | | | | | | |
| 4-port | Protocol: IP / Cable Length:1.8m | | | | | | |
| LAN 1 to LAN 4 | 61.84 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| 8-port | | | | | | | |
| LAN 1 to LAN 8 | 61.81 | 98.41 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

## Conclusion

With the availability of 10 GbE and 40 GbE network capability, Intel® Ethernet XL710 family is reshaping the networking technology. With higher port density, lower latency, higher port efficiency and enhanced bandwidth, Intel® Ethernet Controller XL710 driven networking modules are assisting network appliances not only in fastening data flow but also providing the necessary boost for cryptographic securities and virtualization off-loads.

## About Lanner Electronics Inc.

Founded in 1986 and publicly listed (TAIEX 6245) since 2003, Lanner Electronics, Inc. is an ISO 9001 certified designer and manufacturer of network application platforms, network video platforms and applied computing hardware for first-tier companies. Lanner's expertise also extends to include driver and firmware support, enabling customers to optimize hardware and software communication to achieve faster time to market. With headquarters in Taipei, Taiwan and branches in the U.S. and China, Lanner is uniquely positioned to deliver custom technical solutions with localized, value-added service.

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