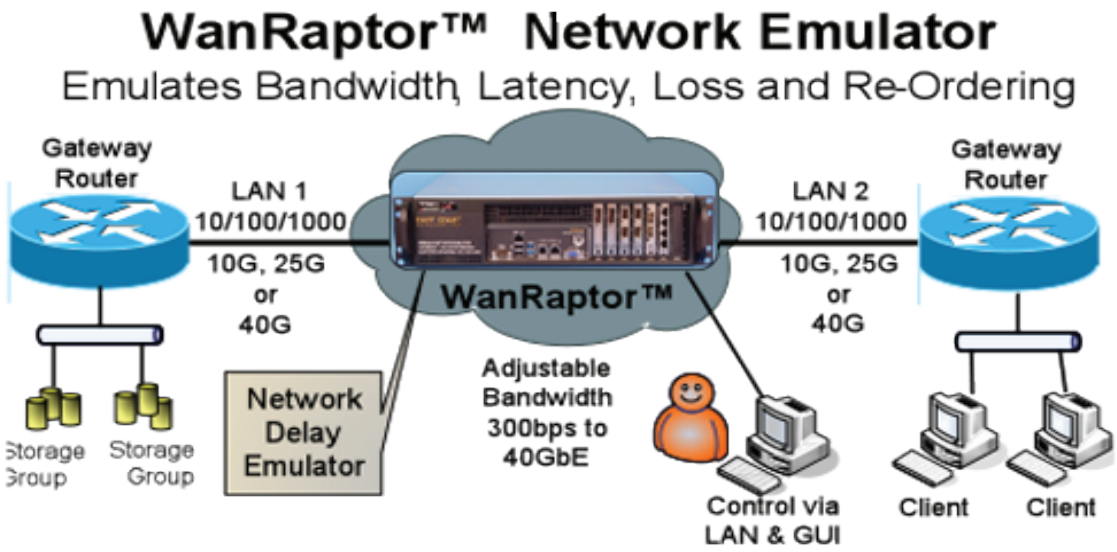
COTS Compliant WanRaptor™ Network Emulator emerges with new INTEL© Technology

Executive Summary

High end FPGA Network Emulators cost the tax payers and government contractors millions of dollars each year in custom hardware and maintenance contracts. The main reason an FPGA based tester is purchased is for line rate throughput packet performance on 10/100/1000, 10G and 40G test beds. This type of equipment costs between $40k-$125k per purchase, excluding costly yearly maintenance contracts. Unfortunately, the government has had few choices for this type of test equipment.

Now, with the advent of new INTEL© XEON© multicore processors, INTEL's newly released 10/40GbE Ethernet NIC Cards and the fast I/O Netmap framework, design engineers can for the first time obtain the throughput performance of an FPGA design with affordable COTS hardware. This technology has allowed East Coast Datacom, Inc. to design a COTS based WAN Emulator with line rate performance at a cost well below FPGA based systems. Further, the use of the Intel XEON processor allows far greater flexibility in add-on impairment functions and custom functions than a FPGA based system.



The Challenge

While we understand that certain test criteria require very high end network emulators, it is our experience that many user application test cases can promote less costly systems. We propose a Commercial Off The Shelf (COTS) hardware solution that is highly flexible for

10/100/1000, 10G and 40G test beds and is designed with Intel hardware. Our proposed solution provides Line Rate performance in 95% of test cases, is repeatable and accurate within +/- 50µs for network delays. The hardware is based on Intel multicore processors, an ATX server motherboard and new Intel 10/40GbE NIC cards. The software is based on a cutting edge userspace WAN Emulator application, and uses the popular Open Source Netmap framework that provide Line Rate performance on COTS equipment.

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Understanding the market and the emulator design

East Coast Datacom, Inc. designs and manufactures Network Latency Emulators for the military, government contractors and commercial markets. We have been manufacturing latency emulators also known as delay simulators since 1999. Our products originated from the requirements for serial network delay emulation in legacy systems. Our RDS-PLUS serial/Telco delay simulator product remains very popular and is in use all over the world. We entered the Ethernet WAN Emulation market in 2011 with the EDS-1G Ethernet Delay Simulator for 10/100/1000 networks.

In 2012 the "end user application level testing" market for 10GbE was fast approaching and we investigated several potential avenues for designing a 10G delay emulator. The top tier is of course an FPGA design, expensive to develop, totally proprietary and very costly to end users. Further, right behind 10G you have40G in the data center and 100G right behind that. Due to the continuous shrinking of budgets from federal and Fortune 500 customers, and the FITARA law, we felt that we should design and propose products that would be a better match for the resources of our clients.

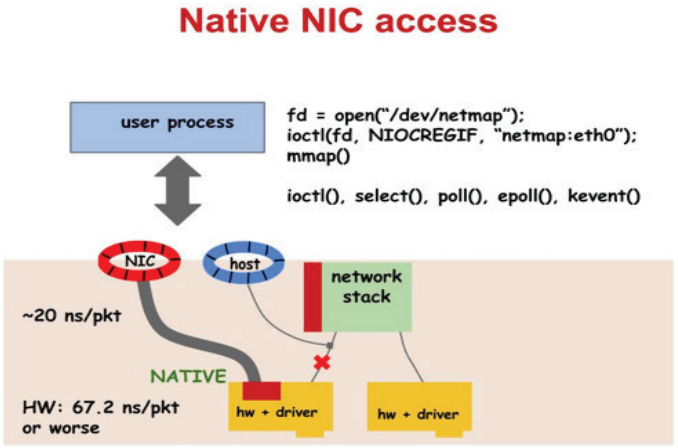
After several discussions with our majors clients we determined the need for an economical network delay emulator that would facilitate 10/100/1000, 10G or 40G in one chassis using commodity hardware from Intel. The design would allow clients to install one type of NIC card or install any combination of the NIC cards for maximum flexibility. We also noted that in the last 5 years Intel had made amazing progress with the price/performance of their XEON processors and 10/40G NIC cards. The game changer was Intel purchasing Wind River® who owned DPDK userspace drivers which allowed line rates on commodity hardware and moving the code to Open Source. It was a brilliant move for Intel and a game changer for the data centers of tomorrow. The userspace driver concept was key in our thought process moving forward with industry acceptance of such technology.

East Coast Datacom, Inc. also felt that with the right design, we could find a niche in the Telco markets. A nice product below the big names with performance and a price that would allow us to compete. The Telco market is a tough battle ground because of the throughput .

Our engineering goal was simple- build the fastest Network Delay Emulator on the market based on commodity hardware. That sounds like an oxymoron statement, " The Fastest Network Delay Emulator". However, we are talking about maintaining high Packets Per Second(PPS) throughput while inducing delay or impairments such as packet loss and Jitter. In the end, the WANRAPTOR™ core delay emulator design was based on a completely new application called , "WANRAPTOR™" and integrated with the Netmap framework for Intel Network Interface Cards (NIC's). on a completely new application called , "EDS-10/40G" and integrated with the Netmap framework for Intel Network Interface Cards (NIC's).

How We Do It

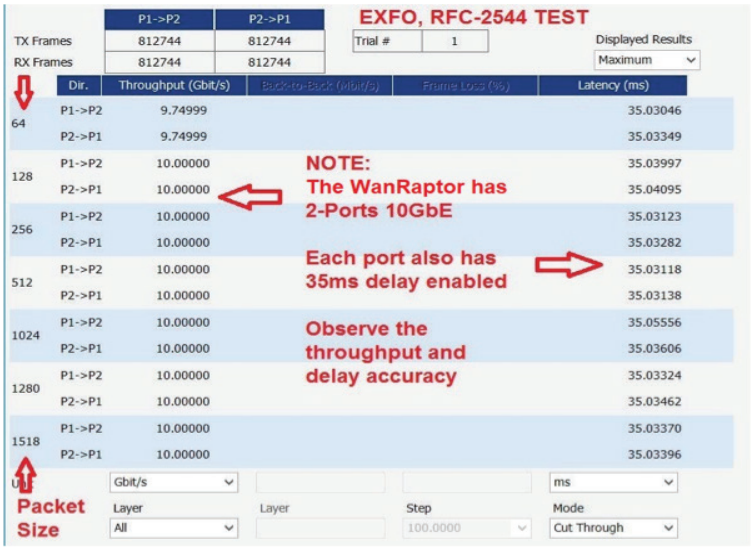
The WANRAPTOR™ uses a pipelined software architecture, which exploits the power of Intel multicore processors. Fast network I/O is provided by high performance Intel NIC cards, the Netmap framework, and careful tuning of the Linux operating system. Stages of the processing such as input, traffic selection, shaping and delay emulation, packet manipulations and output are assigned to different cores, according to speed requirements and the complexity of the processing. This allows the WANRAPTOR™ to scale performance as the number and speed of the LAN ports grow. At the same time, the pipelined architecture inherently preserves the ordering of all traffic.



Let's compare the WANRAPTOR™ throughput numbers to other popular Open Source delay simulator applications such as Netem or Dummynet utilized on a Linux system with 10GbE NIC Cards. The industry standard for throughput is based on Packets Per Second or PPS. Open Source simulator systems can provide users with 64 byte throughput of roughly 500Mbps on a 10GbE interface while inducing delay accuracy of 2-5ms.

An expensive FPGA based emulator will allow full 10Gbps throughput with 64 byte packets. The EDS-10/40G WAN Emulator consistently delivers in excess of 9.5Gbps or 14 million PPS for 64 byte packets per 10GbE port. Additionally, for 10GbE leased line delivery service of a typical North American Telco, an anticipated network delay of about 35ms on each 10GbE interface will be experienced. To compare, we duplicated this delay in the WANRAPTOR™ test bed. Our test results are verified with the EXFO® IQS-8830 test equipment, set to the familiar industry standard RFC-2544 throughput test.

This test utilizes seven different frame sizes ranging from 64 to 1518 bytes ramping up to 10GbE line rates for the equipment under test. The WANRAPTOR™ can maintain over 9.5Gbps for 64 byte packets on each of the two 10GbE lines while maintaining extreme accuracy with the emulated 35ms delay to +/- 50µs accuracy on each 10GbE port. That equates to over 28 million PPS for 2-Port aggregate throughput. This is an amazing engineering software feat using COTS hardware that was never before possible without the help of Intel hardware and the Netmap framework.



Business Benefits

Companies and government entities are no longer trapped into spending millions of dollars on custom hardware and costly yearly maintenance contracts for FPGA network emulators. The WANRAPTOR™ solution allows 10/100/1000, 10G and 40G network latency testing and end user application level testing at cost levels of 80% less than some custom FPGA hardware solutions. As well, our COTS hardware solution is FITARA hardware compliant, easier to maintain, expand and replace. The WANRAPTOR™ is managed via an intuitive Web GUI interface or our well-structured command line interface. The product has a 3-year warranty that includes technical support and standard software upgrades.

Call To Action

Innovative technology fuels the American economy and we have created the WANRAPTOR™ Network Emulator utilizing Intel Technology with the Open Source code Netmap. As the federal government and commercial customers continue to move towards COTS hardware purchases, we believe the WANRAPTOR™ Network Emulator can play an important role in reducing budgets without sacrificing performance.

East Coast Datacom, Inc. sells our products direct to the US Government under our GSA Contract GS-35F-0187X. We also sell through select distributors within and outside of the USA. The WANRAPTOR™ is available now at discounted price levels.

See Web site for further details http://ecdata.com/network-latency-simulators.html

Further Information

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