![Chelsio Communications — Accelerate]

Terminator 4 Unified Wire Engine

10GbE Quad Port, PCIe Gen2, SR-IOV, TCP/IP and UDP/IP, iSCSI, FCoE, RDMA Offload

Features

- PCI Express Gen2 x8 host bus
- 4 ports of 100m/1G/10G
- Integrated KX4, CX4, KX, KR, SGMII support
- I^{2}C, SMBus, IPMI 2.0 management interface
- Comprehensive Stateless Offloads
- Full TCP Offload and TCP Chimney
- Low latency UDP Offload Engine
- Full Multicast Offload Engine™
- Full or PDU iSCSI Offload
- Full or PDU FCoE Offload
- Low latency iWARP RDMA Offload
- Line rate Firewall Offload™
- Chelsio Stream Engine
- iSCSI Routing Offload™
- TCP Proxy Offload™
- Integrated Ethernet switching and routing
- Extensive virtualization support
    o 128 VF, 8 PF SR-IOV support
    o Integrated 140-port virtual switch
    o VEB support
    o VEPA support
    o Flex10 support
    o VNTAGs support
- DCB (CEE) support
- Packet tracing and sniffing
- Fine grain timestamps
- 27 x 27mm FCBGA
- 7-10W depending on ports and offloads
- Single-chip LOM solution

Benefits

- Scalable to 1 million connections
- 'Unified Wire' interconnect solution for server networking, storage networking and clustering on a single platform
- Designed for low latency, high packet rate and high bandwidth
- Enables 4-port I0GbE or 4-port 1 GbE solutions
- Reduces host CPU utilization by up to 95%
- Highly programmable & manageable solution
- Robust, stable and proven fourth generation architecture

Applications

- Networking – TCP & UDP Offload
- Storage – iSCSI & FCoE
- High performance computing – RDMA
- Security and firewalls
- Web 2.0 and load balancing
- Virtualization and SR-IOV
- Network traffic management
- Rich media streaming
- Application servers
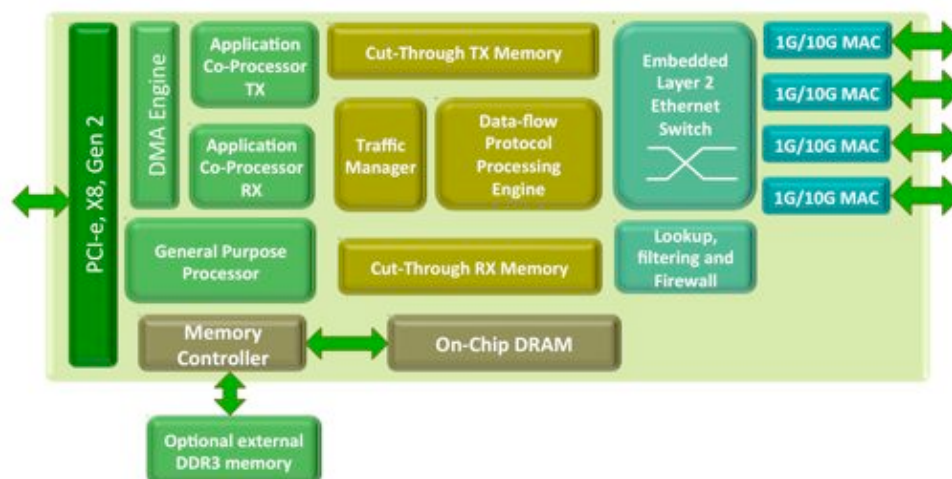
Terminator 4 Block Diagram

Specifications

Host Interface
- PCI Express Gen2 x8
- MSI-X, MSI and support for legacy pin interrupts

Network Interfaces
- Quad port 100m/1G/10G independently configurable
- Two ports exposed with KX4, CX4, KX, KR, SGMII
- Two ports exposed with KX, KR & SGMII

Ethernet
- IEEE 802.3ae (10 GbE)
- IEEE 802.3z (1 GbE) compliant
- IEEE 802.Ip Priority
- IEEE 802.IQ VLAN tagging
- IEEE 802.3x flow control
- IEEE 802.3ad load-balancing and failover
- Ether II and 802.3 encapsulated frames
- Multiple MAC addresses per interface
- Jumbo Frames up to 9.6Kbytes

Stateless Offloads
- TCP/UDP checksum offload for IPv4 & IPv6
- TCP Segmentation Offload (TSO) for IPv4 & IPv6
- Large Send Offload (LS) for IPv4 & IPv6
- Giant Send Offload (GSO) for IPv4 & IPv6
- VLAN filtering, insertion & extraction
- Receive Side Scaling and packet steering
- Line rate packet filtering and attack protection
- Fine granularity time stamping (down to 4 ns)
- Ethernet Routing (packet header rewrite)
- Packet Tracing
- Packet Sniffing

TCP/IP Full Offload
- Full TCP implementation including exceptions – IPv4 & IPv6
- Extensive RFC compliance, fully featured stack
- Full TCP Proxy between any set of connections (encapsulation, bridging)
- Direct Data Placement
- 1 million simultaneous connections
- 2μsec latency, line rate bandwidth

Media Streamer™
- Multiple transmit and receive queues with QoS
- Simultaneous low latency & high bandwidth
- Per-connection and per-class rate control

Firewall Offload™
- Rule-based packet steering and filtering capability
- Tens of thousands of steering and filtering rules

iSCSI Acceleration
- Full iSCSI initiator and target mode stack
- CRC32 offload generation & verification
- Direct Data Placement
- iSCSI proxy switching based on SCSI CDB
- 800K IOPs

FCoE
- FULL HBA FCoE (Initiator or Target)
- Open-FCoE Offload (Initiator)
- CRC32 offload generation & verification
- Ingress & Egress ACL (Access Control List)
- Direct Data Placement

High Performance RDMA
- 2μsec latency, line rate bandwidth
- iWARP support on Linux OFED
- Network Direct support

UDP & Multicast Offload
- UDP Sockets API
- 2 μsec user-to-user latency
- Multicast replication on ingress or egress

Virtualization
- PCI-SIG SR-IOV, 128 Virtual Functions (VF), 8 Physical Functions (PF)
- 140 port virtual switch, to switch between VFs or external ports
- VEPA/Flex10
- VEB
- VNTAGs
- 336 virtual MAC addresses

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T4PB-030910-B