S7 DPU Products

High Performance Programmable DPU 1/10/25/40/50/100/200GbE Controller

Enables several offloads, programmable compute, encryption, virtualization over a single wire.

Chelsio Communications
Accelerate

Highlights

- Full suite of Storge features
- Full suite of Cloud features
- Full suite of data center networking features
- Full suite of data streaming features
- Full suite of encryption functions
- Embedded programmable DPU
- Integrated Ethernet switch
- Software Compatible with T4, T5, and T6

Applications

Datacenter Networking

- Scale out servers and NAS systems
- Consolidate LAN, SAN, and cluster networks (run InfiniBand and FibreChannel applications on Ethernet)
- Enhanced network and server security

Cloud Computing

- Virtualization features to maximize cloud scaling and utilization
- Cloud-ready functional and management features
- Secure Sockets offload
- Full support for overlay products

Networked Storage

- Develop high-performance shared-storage systems providing both file and block level services
- Integrated encryption support
- NVMe Fabrics (iWARP & RoCEv2)
- NVMe/TCP
- Very high data-integrity
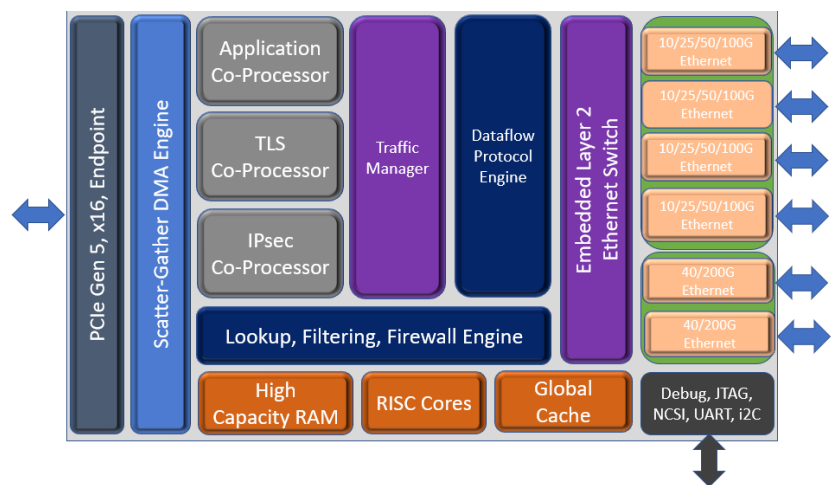
High Performance Computing

- Very low latency Ethernet
- High performance RDMA support
- Increase cluster fabric bandwidth

Streaming Applications

- Internet attack protection
- QoS and Traffic Management
- Video streaming

Edge Products

- Micro Servers
- Gateways
- 5G Appliances
- Firewalls

Overview

Chelsio's S7 is a quad port 1/10/25/50/100Gb or dual port 40/100/200Gb Ethernet Unified Wire DPU ASIC with a PCI Express 5.0 host bus interface, optimized for storage, cloud computing, HPC, virtualization and other datacenter networking applications.

The seventh generation S7 ASIC technology from Chelsio provides the highest performance and efficiency, with dramatically lower host-system CPU communications overhead thanks to on-board hardware that offloads TCP/IP, UDP/IP, iSCSI, FCoE, Unified RDMA (RoCEv2 & iWARP), TLS/IPsec, NVMe-oF, and NVMe/TCP processing from its host system and frees up host CPU cycles for user applications. As a result, the system benefits from higher bandwidth, lower latency, and reduced power consumption.

S7 runs the predecessor T4, T5, & T6 silicon software without modification so as to enable leveraging of the user's existing software investment.

S7's architecture is Chelsio's 7th generation DPU technology road-tested across several tier-1 OEMs over the years and has evolved to support all offloads using host memory. As a result, S7 technology can now enable a full featured DPU technology in a small memory-free package to address server and cloud applications at an aggressive price point.

The Memory-free Operation

S7's architecture allows using the host memory for performing various offload functions, removing the need for card memories. The system can benefit from host CPU savings, with no additional cost compared to regular stateless offload NIC, resulting in an extremely lower cost bill of materials. Up to 2048 offload connections can be cached on S7 concurrently, making it an ideal choice for Client/Initiators. It uses the exact same firmware and software that runs on T7 (with card memory).

S7 Block Diagram

Features

Host Interface	S74	S72
PCI Express Gen5 x16	✔	✔
MSI-X, MSI, legacy pin interrupts	✔	✔

Wire Interface	S74	S72
2x1/10/25/40/50/100		✔
4x1/10/25/50/100	✔	
2x40/100/200	✔	
56Gb PAM4, or 25Gb NRZ	✔	✔
IEEE 802.3bj (100 GbE over copper/backplane)	✔	✔
IEEE 802.3cd (50/100/200 GbE)	✔	✔
IEEE 802.3ba (40/100 GbE)	✔	✔
IEEE 802.3ae (10 GbE)	✔	✔
IEEE 802.3az Energy Efficient Ethernet	✔	✔
IEEE 802.3z (1GbE)	✔	✔
IEEE 802.1p Priority	✔	✔
IEEE 802.1Q VLAN Tagging	✔	✔
IEEE 802.1Qbg EVB/VEPA	✔	✔
IEEE 802.1BR Bridge Port Extension	✔	✔
IEEE 802.1Qau Congestion Notification	✔	✔
IEEE 802.3x Flow Control	✔	✔
IEEE 802.3ad Load-balancing and Failover	✔	✔
Ethernet II and 802.3 encapsulated frames	✔	✔
Multiple MAC addresses per interface	✔	✔
Jumbo Frames up to 9.6 Kbytes	✔	✔
ITU-T G.8262, Sync-E	✔	✔

Stateless Offloads	S74	S72
TCP/UDP checksum offload for IPv4 & IPv6	✔	✔
TSO, LSO, and GSO for IPv4 & IPv6	✔	✔
VLAN filtering, insertion & extraction	✔	✔
Packet filtering and attack protection	✔	✔
Nanosecond granularity 64b timestamping	✔	✔
Ethernet Routing (packet header rewrite)	✔	✔
Packet Tracing and Packet Sniffing	✔	✔

Storage	S74	S72
iSCSI initiator and target mode stack	✔	✔
Full FCoE offload (Initiator or Target)	✔	✔
Open FCoE offload (Initiator)	✔	✔
T10 DIF/DIX support for iSCSI	✔	✔
NVMe-oF Offload (iWARP or RoCEv2)	✔	✔
NVMe/TCP Offload	✔	✔
iSER	✔	✔
Data-at-rest encryption	✔	✔

Security	S74	S72
AES 128/256 and SHA1/SHA2 offload	✔	✔
TLS and IPsec support	✔	✔
Inline & co-processor modes	✔	✔
Inline IPsec & TLS for all Offload Traffic	✔	✔
Integrated Block or inline encryption	✔	✔
True Random Number Generator	✔	✔
Secure firmware update	✔	✔
Hardware Root of Trust support	✔	✔

Cloud & Virtualization	S74	S72
Inband Telemetry	✔	✔
NVGRE, VXLAN and GENEVE support	✔	✔
PCI-SIG SR-IOV, 256 VF, 8 PF	✔	✔
264 port virtual switch	✔	✔
EVB, VEPA, Flex10, VNTag	✔	✔
512 MAC addresses	✔	✔
NAT Offload	✔	✔

Streaming	S74	S72
Integrated Traffic Management	✔	✔
Advanced QoS support	✔	✔

TCP & UDP Offload	S74	S72
Full TCP stack including IPv4 & IPv6	✔	✔
Extensive RFC compliance, fully featured	✔	✔
VLAN support up to 4096 VLAN IDs	✔	✔
Load balancing and failover capabilities	✔	✔
UDP Sockets API	✔	✔
Low user-to-user latency	✔	✔
Multicast replication on ingress or egress	✔	✔
Patented Seamless Failover	✔	✔
Proxy Switching	✔	✔
High capacity offload without card memory	✔	✔

High Performance RDMA	S74	S72
Native RoCEv2 support	✔	✔
Native iWARP support	✔	✔
All to All support	✔	✔

Data Center Features	S74	S72
Internet Attack Protection	✔	✔
PFC, DCB, CEE	✔	✔
Time stamping support	✔	✔

Embedded Processors	S74	S72
RISC Cores	4	2
400Gb DPU Core	1	1

Management and Other Interfaces	S74	S72
UART	✔	✔
NC-SI	✔	✔
SPI Flash	✔	✔
I2C, MDIO, GPIO, JTAG	✔	✔
PLDM, MCTP (SMBus or PCIe), RBT	✔	✔

Boot Facilities	S74	S72
iSCSI, FCoE, PXE, UEFI	✔	✔
Secure Boot	✔	✔

Ordering Information

	S72ASIC	S74ASIC
Card Memory	No	
Conn. Capacity	Up to 500k	
Cached conns.	2k	
400Gb Typ Power*	NA	22W
400Gb WC Power*	NA	29W
200Gb Typ Power*	8W	14W
200Gb WC Power*	15W	19W
Package Size (0.8mm pitch)	21mm	21mm

* Configuration dependent

Physical & Environmental

- Fully RoHS Compliant
- Operating Temp: -40º to 55º C or -40º to 131º F
- Operating Humidity: 5 to 95%