Ultra Low Latency GDN-Search
150 Million searches/second Key-Value Store
Advanced

Description:

Key-Value Store (KVS) is an essential service for multiple applications. Telecom directories, Internet Protocol forwarding tables, and de-duplicating storage systems, for example, all need key-value tables to associate data with unique identifiers. In datacenters, high performance KVS tables allow hundreds or thousands of machines to easily share data by simply associating values with keys and allowing client machines to read and write those keys and values over standard high-speed Ethernet.

Examples:	**Key**	**Value**
	Company	Phone #
Directory	Algo-Logic	(408) 707-3740
	IP Address	Interface : MAC Address
Forwarding Tables	204.2.34.5	Eth6 : 02:33:29:F2:AB:CC
	Content Hash	Storage Block ID
Data De-duplication	XYZ	948830038411
	Order ID	Symbol, Side, Price
Stock Trading	ATY11217911101	AAPL, B, 126.75
	Virtex	Edge List
Graph Search	v140	v201, v206, v225

Algo-Logic's KVS leverages Gateware Defined Networking® (GDN) on Field Programmable Gate Arrays (FPGAs) to perform lookups with the lowest latency (less than 1 microsecond), with the highest throughput, and the least processing energy. Deploying GDN solutions save network operators' time, cost, and power resulting in significantly lower Total Cost of Ownership (TCO).

Applications and Use-cases:

o Telecom ESN and SIM key value tables
o IPv4 or IPv6 Internet addresses
o Block store caching
o Keyword search
o NoSQL database acceleration
o N-Tuple lookups
o World Wide Web cookie keys
o User identifiers (UID, SSN, logins)
o Stock market order IDs
o Pattern matching

Key Features:

o Search rates of up to 150 MSPS (Million Searches Per Second)
⊖ Estimated under 550 ns latency using fast tables for 100% of packets
o 40 Gbps Ethernet line rate support
o Low cost per search ($/search operation)
o Easy to integrate with client software via free, open-source multi-language APIs

Hardware Platform

o Pre-programmed gateware application on a half-height or full-height expansion card that fits into any standard server
o Portable gateware supported on most commercially available FPGA card platforms

Software Controller API Options

o Free, open-source client software API compatible with C/C++, Java, Python, and other programming languages

GDN-Search Reference Design Metrics:

KVS Search Rate	Up to 150 MSPS per QSFP+ port
Table Depth	12K for fast tables using on-chip memory
Key Size	96 bits (12 Bytes) default. Customizable interface allows for variable and larger size keys
Value Size	96 bits (12 Bytes), or larger
Latency	Estimated under 550 ns (~76x less latency than with sockets)
Throughput	Line-rate network interface speeds of 40 GbE
FPGA Devices Supported	Altera Stratix V A5, A7, AB, Arria 10
Overall GDN Gain vs. Software	Gains between 100x to 1000x for datacenters, storage, ISPs/HSPs & security industries

GDN-Search Block Diagram:
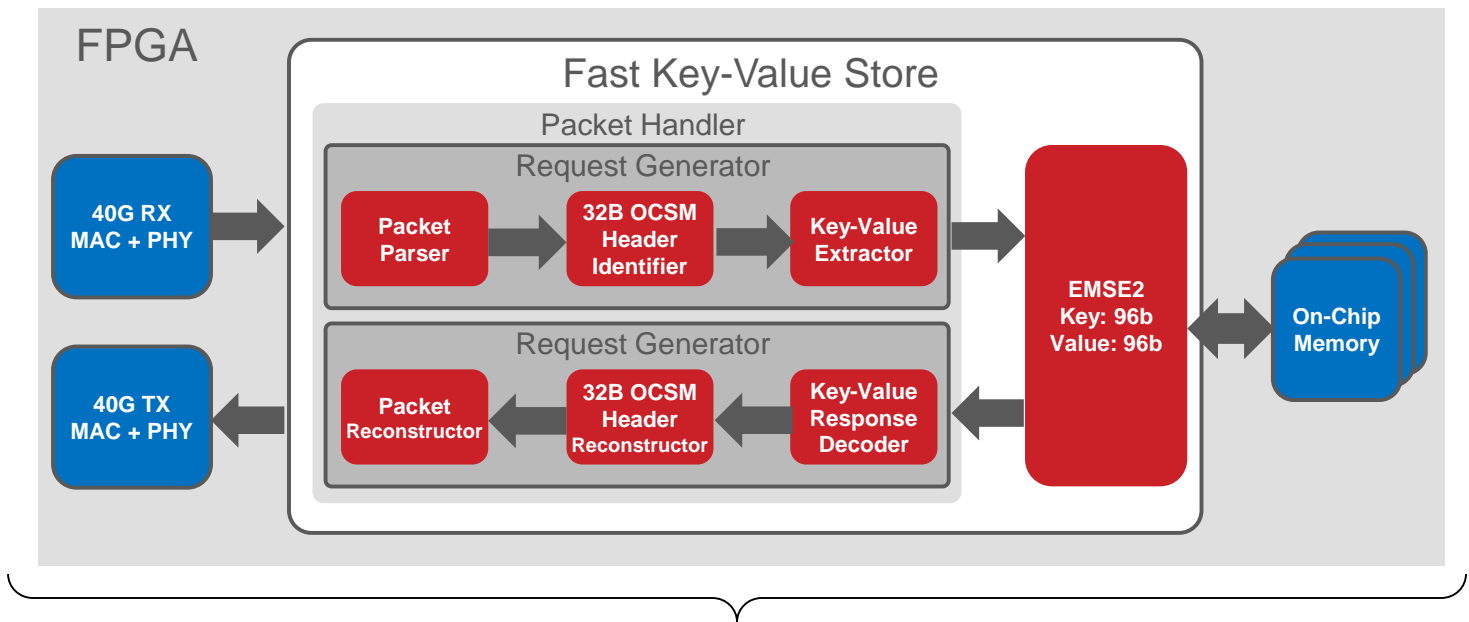
ReFLEX XpressGX5-LP QE

ReFLEX XpressGX5-LP HE