

# Ultra Low Latency GDN-Search

## 150 Million searches/second Key-Value Store

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

Algo-Logic's KVS leverages Gateway 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:

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

### Key Features:

- Search rates of up to 150 MSPS (Million Searches Per Second)
- Estimated under 500 ns latency using fast tables for 100% of packets
- 40 Gbps Ethernet line rate support
- Low cost per search (\$/search operation)
- Easy to integrate with client software via free, open-source multi-language APIs

### Hardware Platform

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



### Software Controller API Options

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

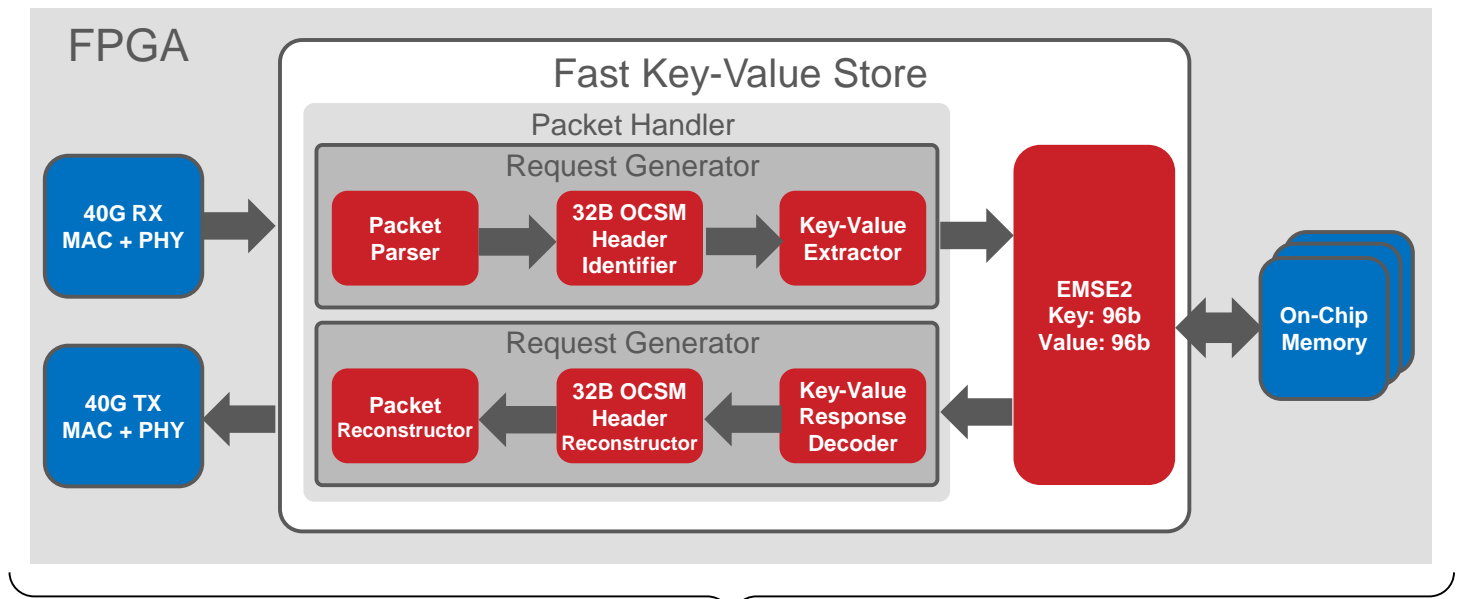
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### GDN-Search Reference Design Metrics:

<b>KVS Search Rate</b>	Up to 150 MSPS per QSFP+ port
<b>Table Depth</b>	12K for fast tables using on-chip memory
<b>Key Size</b>	96 bits (12 Bytes) default. Customizable interface allows for variable and larger size keys
<b>Value Size</b>	96 bits (12 Bytes), or larger
<b>Latency</b>	Under 500 ns (~88x less latency than with sockets)
<b>Throughput</b>	Line-rate network interface speeds of 40 GbE
<b>FPGA Devices Supported</b>	Altera Stratix V, Arria 10
<b>Overall GDN Gain vs. Software</b>	Gains between 100x to 1000x for datacenters, storage, ISPs/HSPs & security industries

### GDN-Search Block Diagram:



BittWare S5-PCIe-HQ