NEXSAN

INTRODUCING HIGH-SPEED ASSUREON® WITH RDMA OVER CONVERGED ETHERNET (RoCE)

WHAT IS RDMA?

RDMA (Remote Direct Memory Access) enables server-to-server data movement directly between application memory with zero to minimal involvement of the operating system, CPU and the main memory path of TCP/IP Ethernet. This results in a boost to overall system performance with lower latency, lower CPU load and higher bandwidth. In contrast, TCP/IP communications typically require multiple copy operations during the data transfer process, which add latency and consume significant CPU and memory resources.

For example, in a typical TCP/IP data transfer, application X on server A sends data to application Y on server B. As part of the transfer, the operating system on server B must: receive the data, decode the packet headers, determine that the data belongs to application Y, wake up application Y, wait for application Y to acknowledge the request; and finally copy the data from its own internal memory space into the buffer provided by application Y. This multi-step process requires network traffic to be copied across the server's main memory bus at least twice, and it also means the server must execute a number of context switches to switch between operating system and application. Both of these things impose extremely high CPU loads on the system when network traffic is flowing at very high rates, resulting in diminished system performance.

RDMA communications differ from normal TCP/IP communications because they bypass operating system intervention in the communication process, and thus greatly reduce the CPU overhead normally needed to process network communications.

RDMA accelerates data retrieval by bypassing the CPU and OS

ASSUREON ARCHIVE — Memory | CPU | Ethernet Port

ASSUREON EDGE — Ethernet Port | CPU | Memory
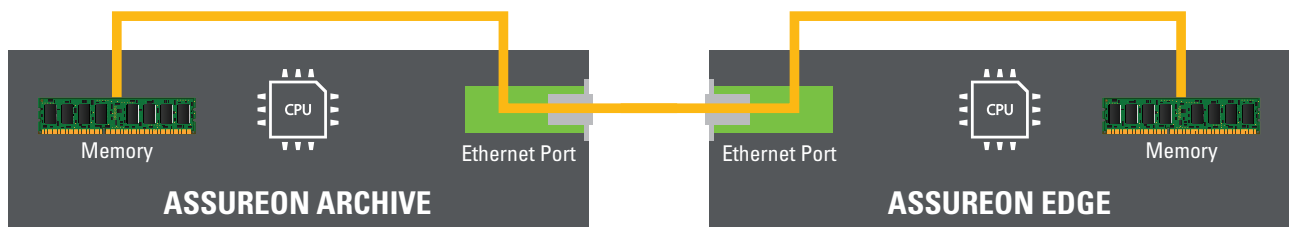
AND SO, WHERE DOES RoCE FIT IN?

RoCE (RDMA over Converged Ethernet) is a network protocol that enables passing RDMA traffic over an Ethernet connection using RDMA-enabled Network Interface Cards (NICs). In a nutshell, RoCE is basically RMDA technology running in a Converged Ethernet environment.

RoCE is a standard protocol defined in the InfiniBand Trade Association (IBTA) standard. It is the most broadly-supported RDMA implementation by network equipment vendors, as well as end users and solution providers (including many cloud-based service providers) deploying RDMA.
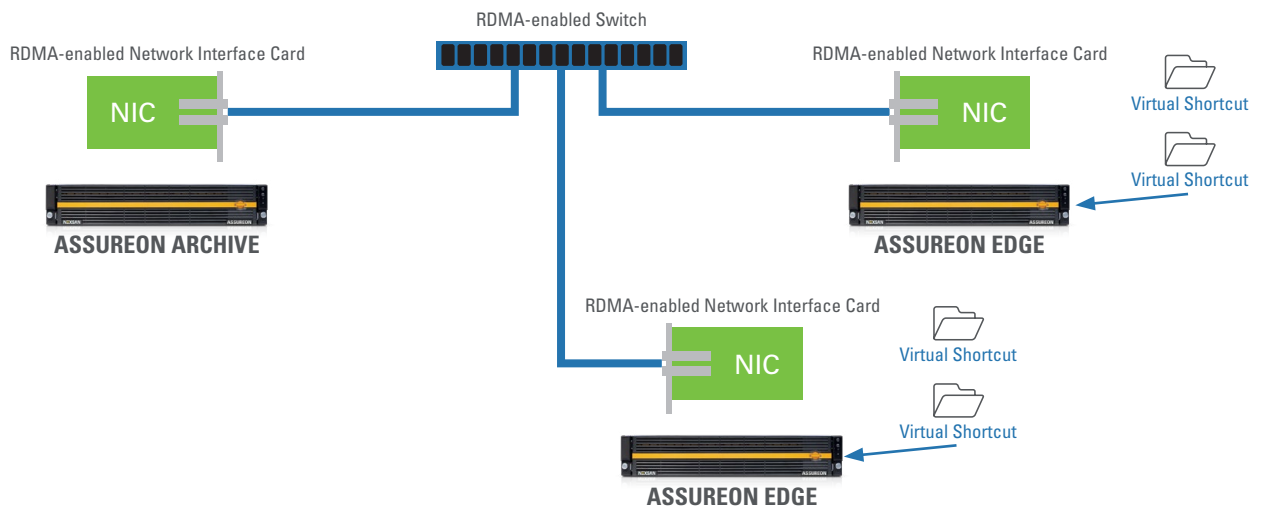
ASSUREON AND RoCE

With the release of Assureon Version 8.3, Nexsan now offers an optional high-speed, end-to-end RoCE implementation for blazing-fast retrieval of data from the Assureon archive.

Using high-speed Assureon with RoCE, you can now configure an Assureon Edge server to replace files archived to the Assureon archive with virtual shortcuts, instead of physical shortcuts or stubs. Virtual shortcuts over RoCE consume no disk space on the Assureon Edge server and reside purely in memory as reference points to the files in the Assureon system.

When a user or application reads a virtual shortcut on the Assureon Edge server, the corresponding file is instantaneously retrieved from the Assureon and presented to the user or application as if it was the actual file. This retrieval is achieved using a 40Gb/s Ethernet connection between the Assureon server and Assureon Edge servers.

High-speed Assureon with RoCE

RDMA-enabled Switch

RDMA-enabled Network Interface Card

RDMA-enabled Network Interface Card

NIC

NIC

Virtual Shortcut

Virtual Shortcut

ASSUREON ARCHIVE

ASSUREON EDGE

RDMA-enabled Network Interface Card

NIC

Virtual Shortcut

Virtual Shortcut

ASSUREON EDGE

BENEFITS OF HIGH-SPEED ASSUREON WITH RoCE

- **Virtual shortcuts** reside purely in memory as reference points to physical files in the Assureon. Virtual Shortcuts consume 0 disk space, thereby reducing the need for additional storage requirements on the Assureon Edge server, since physical files are replaced with reference points once the files get archived to the Assureon. In addition, there is 0 recovery time in case the Assureon Edge server goes down; you need only bring up another computer, install the Assureon Client on it and the files appear instantaneously.

- **40GbE connectivity** provides blazing-fast retrieval of data from the Assureon using a 40GB/s Ethernet connection between the Assureon server and Assureon Edge servers.

- **Zero-copy** applications can retrieve data from the Assureon without involving the network software stack. Data is sent directly to the application buffers without being copied between the network layers.

- **Operating system bypass** applications can perform data retrievals directly from user-space without OS involvement.

- **Minimal CPU involvement** applications can access remote memory (on the Assureon server) to retrieve files while consuming minimal CPU resources on the server.

FUTURE-PROOF YOUR DATA PROTECTION AND ARCHIVAL NEEDS USING HIGH-SPEED ASSUREON WITH RoCE

Nexsan has a history of creating products that capitalize on advances in data archiving, data protection and data retrieval. In fact, Nexsan paved the way with blazing-fast data retrieval with our initial high-speed Assureon offering using InfiniBand. InfiniBand with RDMA is the original technology that is still prevalent in the High-performance Computing industry where it connects the world's biggest and fastest server clusters. Now, RDMA is being deployed in Converged Ethernet (RoCE) networks to eliminate the performance-robbing layers of the network stack. RoCE and Nexsan are leading the way to ensure your regulatory compliant and archival storage is future-ready.

When you purchase the high-speed Assureon with RoCE implementation, you get a complete end-to-end active archive solution including RDMA-enabled Network Interface Cards (NICs) on the Assureon server and all Edge servers, as well as an optionally available 100GbE Ethernet Switch System for larger deployments.

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	Private Blockchain	Protect and secure digital assets with the immutable data structure utilizing cryptography to secure transactions. Automated integrity audits and redundant sites maintain data integrity and transparency.
	Regulatory Compliant	Assureon complies with governmental regulatory requirements including HIPAA, GDPR, CCPA, GLBA, Sarbanes-Oxley, Federal Rules of Civil Procedure (FRCP), CJIS, SEC 17A-4 and PCI DSS.
	Storage Optimization	Transparently offload inactive unstructured data from Tier-1 or cloud storage for a more cost effective solution that's easily retrieved.
	Backup Elimination	Assureon-protected data does not need to be repeatedly backed up during weekly full or daily incremental backups, dramatically reducing the size, time and cost of the backup process.
	Cloud Transfer	ACT transfers data to or from cloud applications. Reference any or all archive files from AWS, Azure or windows servers for cloud data portability - eliminating cloud vendor lock-in.
	Remote Replication	Two active Assureon systems can continuously replicate to each other to protect against failure.
	Failover/Failback	Native active/active replication protects against site disasters with automatic read failover and manual write failover.
	Scalable Capacity	Scale capacity up to multiple petabytes and add performance by using multiple Assureon archive storage systems together.
	Performance	Optional RoCE (RDMA over Converged Ethernet) connectivity delivers blazing-fast 40GbE read functionality for virtual shortcuts.

DATA INTEGRITY

	Fingerprints	Each time a file is saved, a unique fingerprint is generated using both an MD5 and SHA1 hash of its contents and metadata, so history and contents cannot be altered after the fact (WORM storage).
	Serial Numbers	Each file is assigned a serial number which is used to ensure no files are missing or inappropriately added.
	Secure Time	Tampering with the system time clock is prevented by using a global, redundant, secure time source (Stratum Level I hardware time sources).
	Two Copies	Each file and its fingerprint are stored twice in the Assureon. The second copy is either stored in a separate RAID disk set in the same Assureon or on a remote Assureon.
	Data Verification	Files are continually verified against their fingerprints, repaired using their copies and safeguarded by RAID disk arrays for days or decades.
	Chain of Custody	Self-healing integrity checks and file availability audits along with digitally signed metadata files and third-party secure time stamps work together for the utmost protection of files within Assureon. Together, this applies a verifiable chain of custody to each data set throughout the retention period.

ABOUT NEXSAN

Nexsan® is a global enterprise storage leader since 1999 delivering the most reliable, cost-effective and highly efficient storage solutions. Nexsan's solution portfolio empowers enterprises to securely store, protect and manage valuable business data with a broad product line of all-flash NVMe, unified storage, block storage, and secure archiving. Nexsan is a proud member of the StorCentric Family. www.nexsan.com