

# Cloud Service Provider Delivers Better, More Reliable Service Levels Using Mellanox InfiniBand Products



Mellanox InfiniBand dramatically reduces hardware acquisition costs and improves the delivery of cloud services, permitting higher application scalability and performance.

## Background

Atlantic.Net, a leading cloud hosting provider that operates an industrial-grade, massively scalable, secure, and robust cloud hosting platform, delivers higher application performance at the lowest latency by utilizing Mellanox QDR 40Gb/s InfiniBand interconnect solutions.

Atlantic.Net explored multiple server and storage interconnect options prior to making the decision to invest in Mellanox InfiniBand. Through their research, Atlantic.Net network architects realized that 10GbE interconnect solutions cannot scale effectively to meet the performance demands of Atlantic.Net customers. This is a common problem with many cloud services and can cause customers to overpay for high-performance computing resources and remain bounded by interconnect latency and bottlenecks, especially in cases of high virtual machine (VM) density per physical server. These applications typically have a database-intensive load on at least one of their virtual machines (VMs), resulting in high levels of interconnect congestion. Leveraging Mellanox's interconnect technology, Atlantic.Net cloud servers deliver extremely fast disk performance over a 40Gb/s infrastructure, and deliver the following capabilities through the Atlantic.Net cloud:

- **Accelerated Storage Access:**  
By utilizing Serial attached SCSI disks, Atlantic.Net can deliver higher Service Level Agreements (SLAs).
- **Transparent Consolidation of I/O:**  
By transparently consolidating Local Area Network (LAN), Storage Area Network (SAN), live migrations and other traffic, Atlantic.Net can reduce both capital and operational expenses, as well as the need for inverse multiplexing.
- **Faster Handling and Longer Spikes in Traffic:**  
With simple cabling and less switching ports required, Atlantic.Net can better serve a growing customer base.

Atlantic.Net chose Mellanox's industry-leading QDR 40Gb/s InfiniBand adapters and switches because of their enterprise-class performance and availability. Mellanox's InfiniBand interconnect solutions provide end-to-end server and storage connectivity, allowing Atlantic.Net to extract the highest performance from its virtualized, multi-core CPU infrastructure – drawing customers away from other public cloud providers. The solution that Atlantic.Net network architects implemented utilizes the following hardware and software components:

- Linux Kernel-based Virtual Machine (KVM) software on computing nodes



## OVERVIEW

*Atlantic.Net is a global cloud hosting provider that offers high performance support for customers through their platform. By leveraging Mellanox InfiniBand solutions, Atlantic.Net can now offer customers more robust cloud hosting services through a reliable, adaptable infrastructure, all at a lower cost in comparison to traditional interconnect solutions.*

based on Intel Xeon Processors

- Mellanox QDR 40Gb/s InfiniBand adapters and switches to connect the server and storage infrastructure
- High performance storage initiator and target software
- Custom designed storage hardware solution to further maximize efficiency
- Customized storage replication and high availability solution

Mellanox's solutions also provide Atlantic.Net with support for I/O virtualization, transparent NIC, and storage interfaces to VMs. This has enabled Atlantic.Net to deliver the performance and scalability needed to support CPU-intensive, high data volume applications at a lower cost.

## Solution

### 1. Price and Cost Advantage:

Expensive hardware, scaling, overhead costs, as well as administrative costs and increased interconnection costs can be avoided with Mellanox's interconnect technologies. Resources are not wasted with 40Gb/s connections, as opposed to typical overhead loss where more resources are needed to combine the smaller Ethernet connections. The optimization of resources by Mellanox InfiniBand leads to huge cost savings.

### 2. Faster Storage Access:

Because of the high density and random I/O patterns involved, traditional storage systems cannot cope with the load, causing decreased performance and slower response time. However, a cloud computing node can be responsible for dozens of VMs, each generating independent I/O storage transactions, making it **possible for faster storage access.**

### 3. Lower Latency:

By utilizing the iSCSI RDMA Protocol (iSER) implemented in KVM servers over a single converged InfiniBand interconnect adapter, iSER delivers lower latency and is less complex than FC/iSCSI, resulting in lower costs to the user – 32% lower cost versus GoGrid and 43% lower cost versus Joyent. By leveraging Mellanox's interconnect solutions, Atlantic.Net now provides the fastest storage performance – 2x faster, on average, than GoGrid, Amazon and Joyent.

### 4. Extremely Fast Server Builds, Snapshots, and Backups:

Using Atlantic.Net API, servers can be provisioned in less than 30 seconds, as opposed to other cloud providers that take 10 to 30 minutes. This is a huge advantage to enterprise level clients who are looking to save time and resources, especially when it comes to provisioning hundreds of servers. Snapshots and backups are also built into Atlantic.Net's cloud platform and are done at lightning speeds.

## Cloud Hosting Disk I/O Benchmarks

(Tested by ServerBear) 

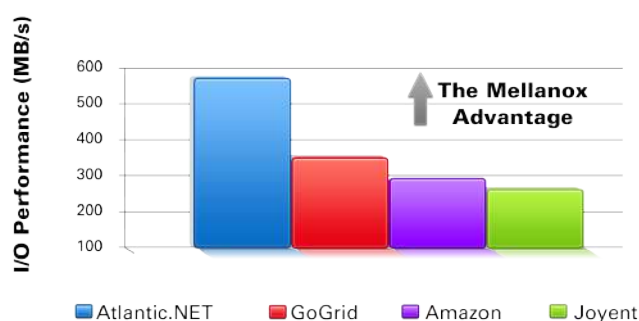


Figure 1. Cloud Hosting Disk I/O Benchmarks Comparison

## Consolidate I/O Transparently

LAN and SAN connectivity for VMs on KVM and Atlantic.Net's management environment is tightly integrated. Mellanox provides multiple vNIC and vHBA interfaces, which are the same as what is available over multiple GbE NICs and FC HBAs from the VM's perspective. InfiniBand is completely hidden as the underlying interconnect, allowing Atlantic.Net to transparently consolidate LAN, SAN, live migrations and other traffic in a transparent fashion which reduces operational costs. Configuration of vNICs and vHBAs can also be accomplished using standard management tools.

## Commodity Hardware and Open Source Software Platforms

In order to further reduce capital expenditure and pass on the savings to cloud customers, Atlantic.Net's solution uses commodity hardware and open source software platforms to the fullest extent possible without compromising customer SLAs. Currently, Atlantic.Net provides a 100% uptime guarantee. The implemented cloud infrastructure, allows to deliver higher performance for the applications running in their VMs. Atlantic.Net is also able to eliminate the need to use expensive and power hungry storage arrays by using commodity hardware and open source software

(for example iSER supported target software), to build highly reliable and high-performance storage targets.

**Conclusion**

By deploying Mellanox’s InfiniBand solution, Atlantic.Net can support high volume and high-performance requirements – on-demand – and offer a service that scales as customers’ needs change and grow. Having built a high performance, reliable and redundant storage infrastructure using off-the-shelf commodity hardware, Atlantic.Net was able to avoid purchasing expensive Fibre Channel storage arrays, saving significantly on capital expenses per storage system.

As a result, Atlantic.Net provides its cloud customers with a competitive service offering at a significantly lower total cost of ownership compared to cloud services that utilize traditional Ethernet and/or Fibre Channel based interconnect solutions.

Provider	Cost Per Hour*
Atlantic.Net	\$0.034
Rackspace	\$0.06
Go Grid	\$0.08

Provider	Cost Per Hour**
Atlantic.Net	\$0.136
Rackspace	\$0.24
Go Grid	\$0.32

Provider	Cost Per Hour***
Atlantic.Net	\$0.27
Rackspace	\$0.48
Go Grid	\$0.64

\*1 Core, 1 GB RAM, 80 GB HDD Instance  
 \*\*2 Core, 4 GB RAM, 320 GB HDD Instance  
 \*\*\*4 Core, 8 GB RAM, 750 GB HDD Instance

**Table 1.** Cloud Pricing Comparison



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