

## The SM10000 Uses 1/4 the Power and Takes 1/4 the Space of Today's Best in Class Volume Servers and Requires No Changes to Software

### System Overview

- 512 x 1.6 GHz Intel x86 CPUs
- 1 Terabyte DRAM
- 1.28 Terabit per second fabric
- 8 to 64 x 1 GbE uplinks or 2 to 16 x 10 GbE uplinks
- 0-64 SATA SSD or Hard Disks
- Massively fault tolerant with hot serviceability
- Integrated hardware load balancer, Ethernet switching, and terminal server
- Cloud compute optimized security and performance
- Runs off the shelf OS and applications
- Average power consumption < 2 KW

### The SeaMicro SM10000 is the First Server Purpose Built for Scale Out Workloads

Designed to replace 40 1 RU Dual Socket Quad Core servers, the SM10000 integrates 512 Intel Atom low power processors, top of rack Ethernet switching, server management, and application load balancing in a single 10 RU "plug and play" standards-based server. The SM10000 uses 1/4 the power and takes 1/4 the space of the best in class volume server without requiring any modifications to existing software.

### System Highlights:

- Dramatic reductions in TCO: The SM10000 uses 1/4 the power and takes 1/4 the space of the best in class volume server
- 512 1.6 GHz Intel Atom CPUs in 10 RU (2,048 CPUs per rack)
- Drop in adoption: Runs off the shelf OS and applications
- Reduces capital expense by consolidating layers of expensive networking infrastructure
- Provides the unique ability to guarantee performance and security for cloud deployments
- Provides the first server architecture that can support any CPU instruction set

### The Industry's First "Rack in a Box"

As the industry's first Rack in a Box™, the SM10000 server brings together in a single system the computational capability of forty dual socket quad core 1 RU servers, redundant Ethernet rack switches, terminal servers and a load balancer. The SM10000 eliminates both the cost of discreet networking devices and the operational complexity of deploying and managing them.



### Redundancy and Reliability

The SeaMicro system implements redundancy in both hardware and software. At the hardware level, all major subsystems are redundant and hot swappable, including compute cards, disk, network interface cards, power supplies, and fans. At the software layer, customers can configure the system to run active/standby software on two separate management cards. In the event of a failure, standby software will assume the responsibility of managing the system without any manual intervention. SeaMicro software also manages the internal Terabit fabric and has the intelligence to configure the hardware to route traffic around failure using multiple alternative fabric paths (path redundancy).

Seamicro's modular management software provides process isolation and modularity with each major process operating in its own address space – thereby increasing system availability and reliability.



40 1 RU Dual Socket Quad Core Servers + Disk,  
2 Gigabit Ethernet Switches, 2 Terminal Servers, and 1 Load Balancer = **The SM10000 Server**

## Benefits

**Dramatic reduction in TCO through 75 percent less power usage:** Power is the single largest operating expense in the data center center, often in excess of 30 percent of total OP EX. Reports from Google show that if current power trends continue, the cost of energy consumed by a server during its lifetime could surpass the initial purchase cost. ([Power Provisioning for a Warehouse-sized Computer](#)) The SM10000 reduces power consumption and its associated costs by 75 percent in comparison to the best in class servers available today.

**Massive density lowers TCO by reducing server space requirements by 75 percent:** The second leading operating expense in the data center is space. Through its revolutionary architecture, SeaMicro is able to pack 512 CPUs in a 10 RU system (2048 CPUs in a rack). This industry leading density reduces space and the associated costs of space by 75 percent.

**Consolidates functionality reducing CAP EX:** The SM10000 consolidates 512 Atom CPUs, the top of rack switch, the terminal server and the load balancer into a single 10 RU system. This dramatically reduces Capital Expense by eliminating the need for expensive discreet devices.

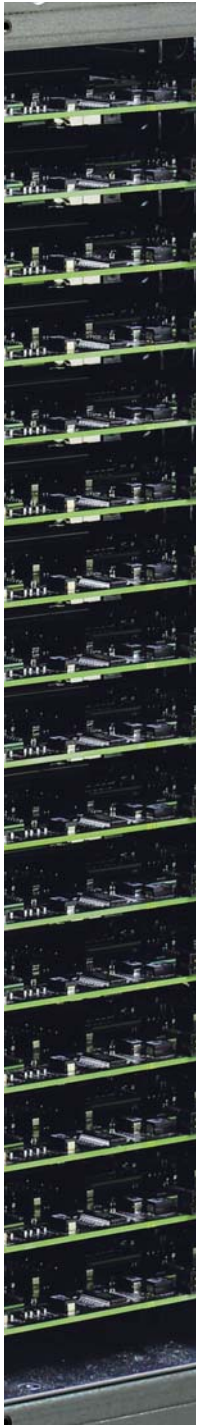
**Guarantees secure performance in Cloud Deployments:** One of the powerful differentiators that SeaMicro brings to cloud and managed hosting is in the SM10000's ability to secure traffic and to guarantee performance. In today's cloud environment CPUs are shared across multiple users, which can lead to contention and uncertain performance as well as questionable security. SeaMicro's system provides dedicated, right-sized compute units eliminating the sharing of CPU resources. Further, with the unique vFabric architecture, Ethernet interfaces and disk interfaces can be securely tied to a particular compute unit enabling the cloud provider to guarantee performance and security.

**Flexibility in the ratio of compute to IO:** The SeaMicro architecture allows customers to choose the ratio of compute to I/O bandwidth allowing systems to be tailored for specific applications. For example, a Web server with backend data store could be configured with zero disk space, while a search system requiring high disk capacity and IOPS could be configured with dedicated high capacity disks and SSDs.

**Flexibility – Dynamically modifies the ratio of compute to storage:** Any CPU can be configured with multiple virtual disks without requiring any hardware/infrastructure changes. A virtual disk can also be shared across multiple CPUs, providing a large shared data cache amongst 512 CPUs. Sharing of a virtual disk enables users to store/update common data, such as operating systems, application software, and data cache once for an entire system.

**Accelerated Deployment:** Tight packaging of CPUs in a 10 RU appliance allows for simple installation. The steps needed to install a SeaMicro system with more than 800GHz of compute are as follows: 1) Install the SeaMicro hardware into the rack, 2) Connect up to 4 power supply cables to a power supply source, 3) Connect uplink cables from the SeaMicro appliance to the core switch, 4) Connect the management Ethernet cable to a management switch, and 5) Configure the management boot parameters for all servers just one time using the SeaMicro management user interface.

**Simplified Operations:** All of the 512 CPUs in a SeaMicro SM10000 can be managed remotely using SeaMicro's redundant management infrastructure. CPU reset and power on/off, installation of new operating system and application software, dynamic modification of load balancer capacity, and system performance monitoring and troubleshooting can be done using a single management API. The management API is built to be integrated into existing operational service systems with minimal effort.



512 Atom processors  
in a 10 RU SM10000

## Specifications

### Processor

|                                    |   |
|------------------------------------|---|
| Total No. of Processors per system | 512   |
| No. of Processors per Compute Card | 8   |
| No. of Compute Cards per system    | 64 Hot-serviceable  |
| Processor Specification            | Intel Z530: 1.6 GHz,<br>Single Core, Dual<br>Thread x86 Processor |
| Memory Capacity                    | 1GB or 2GB  |
| Memory Type                        | SODIMM  |

### Ethernet Uplink

|   |                                      |
|---|--------------------------------------|
| Max. No. of Ethernet Interfaces<br>( 8 cards x 8 ports each card) | 64                                   |
| Min. No. of Ethernet Interfaces                                   | 8                                    |
| Ethernet Interface Type   | 10/100/1000BaseT<br>with RJ-45 ports |
| Max. No. of Ethernet Cards  | 8 Hot-swappable                      |
| No. of Ethernet Ports per Card                                    | 8                                    |

### Storage

|                                |                                  |
|--------------------------------|----------------------------------|
| Max. No. of Physical Disks     | 64                               |
| Min. No. of Physical Disks     | 0                                |
| Max. No. of Storage Cards      | 8 Hot-swappable                  |
| No. of Physical Disks per Card | 8                                |
| Type of Physical Disks         | 2.5" Hot-swappable<br>HDD or SSD |

### Hard Disk Drive Options

|                           |                |
|---------------------------|----------------|
| Standard 7200 RPM SATA    | 320GB or 500GB |
| Enterprise 7200 RPM SATA  | 500GB          |
| SATA MLC Solid State Disk | 80GB or 256GB  |

### Load Balancer

|                                    |                     |
|------------------------------------|---------------------|
| Layer 4 connections per second     | 500,000             |
| Max. No. of concurrent connections | 32,000,000          |
| Layer 4 aggregate throughput       | 64 Gbps (Line Rate) |
| Maximum number of VIPs             | 64                  |

#### Load Balancing Methods

- Round Robin
- Max Connections

#### Server Health Checks

- Layer 3 ping health check
- Layer 4 health checks for TCP ports
- URL based health check for HTTP ports

### Physical Characteristics

|                        |                                    |
|------------------------|------------------------------------|
| Power Supply (AC)      | 3+1 Redundant<br>240V Single Phase |
| Management Console     | Dual Redundant                     |
| Out-of-band Ethernet   | 10/100/1000BaseT                   |
| Cooling                | Dual Redundant Fan Tray            |
| Air Flow               | Front to Rear                      |
| Dimensions (H x W x D) | 17.5 (10RU) x 19 x 30"             |



### System Software

#### Embedded Management

Industry-standard Command Line Interface  
 IPMI 2.0  
 SNMP v1/v2c  
 Syslog  
 Telnet  
 SSH v2  
 TFTP, FTP, SCP  
 NTPv3  
 RADIUS/TACACS+ Authentication

#### Management RFC Compliance

|         |        |
|---------|--------|
| RFC768  | UDP    |
| RFC793  | TCP    |
| RFC854  | Telnet |
| RFC959  | FTP    |
| RFC1350 | TFTP   |
| RFC3164 | Syslog |

#### Integrated Terminal Server

Telnet/SSH access by TCP port, IP address or server name

#### General IPv4 Protocols

|         |                              |
|---------|------------------------------|
| RFC791  | IPv4                         |
| RFC792  | ICMP                         |
| RFC826  | ARP                          |
| RFC1027 | Proxy ARP                    |
| RFC1035 | DNS (Client)                 |
| RFC1519 | CIDR                         |
| RFC1542 | BOOTP (PXE Client and Relay) |
| RFC2131 | DHCP (Server and Relay)      |

#### SNMP MIB Support

RFC1213 MIB  
 RFC1215 TRAP-MIB  
 RFC2863 MIB  
 SNMPv2 MIB  
 SEAMICRO Enterprise MIB  
 SEAMICRO TRAP MIB

### Environmental

|                           |                              |
|---------------------------|------------------------------|
| Operating Temperature     | 50° to 95°F (10° to 35°C)    |
| Non-operating Temperature | -40° to 149°F (-40° to 65°C) |
| Operating Humidity        | 5 to 93% non-condensing      |
| Non-operating Humidity    | 5 to 93% non-condensing      |

### Warranty Information

|          |        |
|----------|--------|
| Hardware | 3 year |
|----------|--------|

### RoHS

All SeaMicro components are EU RoHS compliant.