SeaMicro SM15000 Fabric Compute Systems

Unprecedented Computing Efficiency for Virtualization, Cloud Computing and Big Data

System Overview

- **CPU Options**
  - 64 AMD Opteron™ processors with up to 64 GB DRAM and eight "Piledriver" cores per CPU
  - 64 Intel® CPUs ("Ivy Bridge" or "Sandy Bridge" microarchitecture) with up to 32 GB DRAM and four cores per CPU
  - 256 Intel® Atom™ x86-64 CPUs

- Up to 4 Terabytes of DRAM (AMD Opteron processors only)

- Freedom™ Supercompute Fabric providing bandwidth of 1.28 Terabits/sec

- Up to 16 10 GbE uplinks or up to 64 1 GbE uplinks

- Integrated Layer 2 switching

- **Fabric Storage up to five petabytes**
  - Up to 64 internal drives SATA solid-state drives or hard-disk drives
  - Up to 1,408 SFF or LFF drives with external Freedom™ Fabric Storage arrays

- Optional Hardware RAID 0, 1, 5, 6, and 10

- Massively fault tolerant with in-service serviceability software upgrades

- Runs off the shelf OS, Hypervisors, and applications

- 3.2 KW Average power consumption

Highest Density, Most Energy-Efficient and Built for Tomorrow's Data Center

AMD's SeaMicro SM15000™ family of Fabric Compute Systems delivers a revolutionary data center platform that brings together compute, networking, and storage in a single unified 10 Rack Unit (RU) energy efficient system. It significantly reduces the total cost of ownership (TCO) by eliminating the need for IT organizations to acquire and manage a disparate set of servers, network adapters, network switches, storage platforms, and console servers. The SeaMicro SM15000 family also delivers unparalleled density and flexibility with offerings based on AMD and Intel processors. Fabric Servers can be provisioned on-demand through a unified management console and right-sized with needed storage and network resources to best meet application demands.

CITRIX® ready

The new SM15000 is Certified Citrix Ready

Features and Benefits

Fabric Servers – Range of Offerings from AMD and Intel Allowing Customers to Match Servers to Application Workload

The SeaMicro SM15000 family of Fabric Compute Systems offers a choice of multiple energy efficient CPUs to best meet application workloads. The platform supports both small core and large core servers. It can be configured with 256 Intel® Atom™ x86-64 microprocessors for scale out workloads typically found in Web Front End and Big Data applications. The SM15000 also can be configured with 64 AMD Opteron™ or Intel® Xeon® processors ("Ivy Bridge" or "Sandy Bridge" microarchitecture) for Cloud, intense Java and PHP applications.

SeaMicro SM15000 CPU Configuration Options

SM15000-OP:
64 Octal Core Servers with AMD Opteron™ processors (2.0/2.3/2.8 GHz, 8 "Piledriver" cores)

SM15000-XN:
64 Quad Core Servers with Intel® Xeon® processors E3-1265Lv2 ("Ivy Bridge" microarchitecture) (2.5/3.1/3.5 GHz, 4 cores/8 threads)
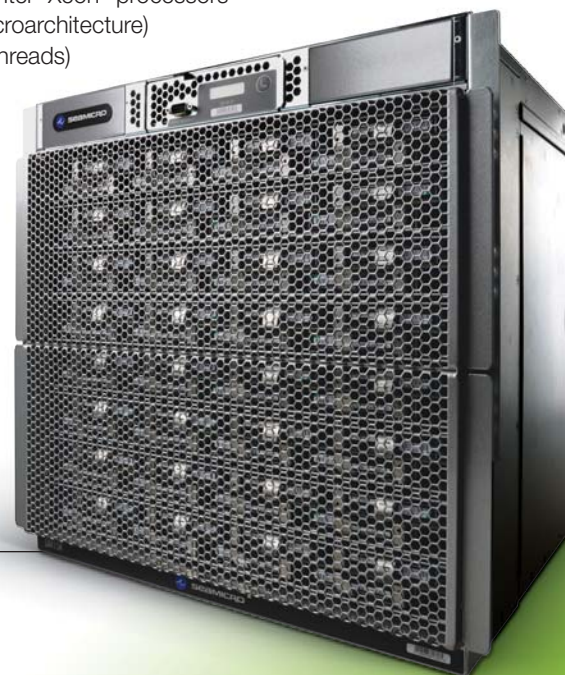
SM15000-XE:
64 Quad Core Servers with Intel® Xeon® processors E3-1260L ("Sandy Bridge" microarchitecture) (2.4/2.5/3.3 GHz, 4 cores/8 threads)

SM15000-64:
256 Dual Core Servers with Intel® Atom™ processor N570 (1.66 GHz, 2 cores/4 threads)

SeaMicro Freedom™ Fabric Storage – High Capacity Storage Reducing the Need for Expensive SAN/NAS

SeaMicro SM15000 Fabric Compute Systems integrate shared block storage, allowing storage resources to be dynamically provisioned and connected to any server across the high bandwidth, low latency Freedom™ Fabric. Physical disks are combined into volumes and optionally protected with Hardware RAID from which virtual disks are created and shared across one or more servers. With Freedom™ Fabric Storage a high performing Hadoop solution with 64 Intel Xeon- or AMD Opteron-based servers, over two Petabytes of storage capacity and 160 Gbps of network bandwidth out of the rack can be deployed in a standard 42 RU data center rack without the need for hundreds of cables and top of rack switching. This sets apart the SeaMicro SM15000 from other rack mount and blade servers that only provide direct attached storage or access to storage networks, thereby reducing the need for expensive HBA, RAID, SAN, and NAS.

Fabric Switch – Integrated High Performance Layer-2 Networking

With integrated high performance Layer-2 Ethernet switching, the SeaMicro SM15000 server eliminates the need for a pair of Top of Rack (TOR) switches. The fabric interconnects servers via a high bandwidth, low latency 1.28 Tbps fabric. Traffic can be ingressed/egressed to the fabric with up to 16 x 10 GbE or 64 x 1 GbE programmable network processor uplink cards. The uplink cards are shared across servers and connect directly into the Freedom Fabric enabling customers to configure in increments of 2 x 10 GbE or 8 x 1 GbE.

Freedom Fabric – High Bandwidth, Low Latency, Reliable Supercompute Interconnect

At the heart of the SeaMicro SM15000 is a low latency fabric with 1.28 Tbps bandwidth, interconnecting server, storage, and networking resources. It eliminates the need to manage separate data and storage devices, reducing complexity and operational cost. Freedom Fabric seamlessly transports network and storage traffic on independent classes of service, thereby minimizing congestion and providing robust loss protection required for block storage transport. Freedom Fabric uses a patented Torus architecture which connects resources in 3-dimensions providing multiple redundant paths between resources and eliminating single points of failure.

Freedom™ ASIC 2.0 – Industry's only Second Generation Fabric Technology

The Freedom™ ASIC is the building block of SeaMicro Fabric Compute Systems, enabling interconnection of energy efficient servers in a 3-dimensional Torus Fabric. The second generation Freedom ASIC includes high performance network interfaces, storage connectivity, and advanced server management, thereby eliminating the need for multiple sets of network adapters, HBAs, cables, and switches. This results in unmatched density, energy efficiency, and lowered TCO. Some of the key technologies in ASIC 2.0 include:

- **SeaMicro Input/Output Virtualization Technology** (IOTV™) eliminates all but three components from SeaMicro's motherboard—CPU, DRAM, and the ASIC itself—thereby shrinking the motherboard, while reducing power, cost and space.

- **SeaMicro new TIO**™ (Turn It Off) technology enables SeaMicro to further power-optimize the mini motherboard by turning off unneeded CPU and chipset functions. Together, SeaMicro's I/O Virtualization Technology and TIO technology produce the smallest and most power efficient server motherboards available.

- **SeaMicro Freedom Supercompute Fabric** built of multiple Freedom ASICs working together, creating a 1.28 terabits per-second fabric that ties together 64 of the power-optimized mini-motherboards at low latency and low power with massive bandwidth.

- **SeaMicro Freedom Fabric Storage** technology allows the Freedom supercompute fabric to extend out of the chassis and across the data center linking not just components inside the chassis, but also those outside as well.

Unified Management – Easily Provision and Manage Servers, Network, and Storage Resources on Demand

The SeaMicro SM15000 implements a rich management system providing unified management of servers, network, and storage. Resources can be rapidly deployed, managed, and repurposed remotely, enabling lights-off data center operations. It offers a broad set of management API including an industry standard CLI, SNMP, IPMI, syslog, and XEN APIs, allowing customers to seamlessly integrate the SeaMicro SM15000 into existing data center management environments.

Redundancy and Availability – Engineered from the Ground Up to Eliminate Single Points of Failure

The SeaMicro SM15000 is designed for the most demanding environments, helping to ensure availability of compute, network, storage, and system management. At the heart of the system is the Freedom Fabric, interconnecting all resources in the system, with the ability to sustain multiple points of failure and allow live component servicing. All active components in the system can be configured redundant and are hot-swappable, including server cards, network uplink cards, storage controller cards, system management cards, disks, fan trays, and power supplies. Key resources can also be configured to be protected in the following ways:

Compute – A shared spare server can be configured to act as a standby spare for multiple primary servers. In the event of failure, the primary server's personality, including MAC address, assigned disks, and boot configuration can be migrated to the standby spare and brought back online – ensuring fast restoration of services from a remote location.

Network – The highly available fabric ensures network connectivity is maintained between servers and storage in the event of path failure. For uplink high-availability, the system can be configured with multiple uplink modules and port channels providing redundant active/active interfaces.

Storage – The highly available fabric ensures that servers can access fabric storage in the event of failures. The fabric storage system also provides an efficient, high utilization optional hardware RAID to protect data in case of disk failure.

The Industry's First
Data Center in a Box

AMD's SeaMicro SM15000 family of Fabric Compute Systems provides the equivalent of 32 1RU dual socket servers, massive bandwidth, top of rack Ethernet switching, and high capacity shared storage, with centralized management in a small, compact 10RU form factor. In addition, it provides an integrated server console management for unified management. The SeaMicro SM15000 dramatically reduces CAPEX and significantly reduces the ongoing OPEX of deploying discreet compute, networking, storage, and management systems.

10 RU
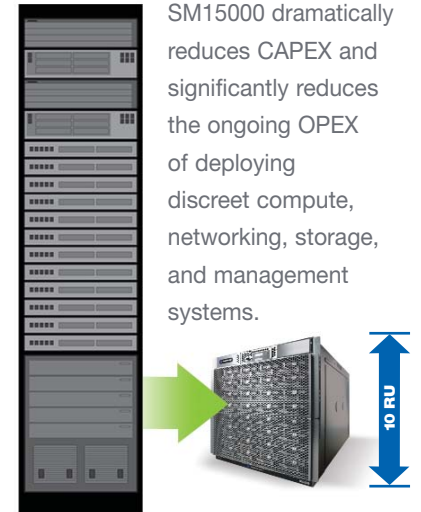
SeaMicro SM15000 Family CPU Server Options

**Server CPU
Specifications**

Model	SM15000-OP	SM15000-XN	SM15000-XE	SM15000-64
CPU per System	64	64	64	256
Socket Model	AMD Opteron™ processors 2.0/2.3/2.8 GHz, 8 "Piledriver" cores	Intel® Xeon® processors E3-1265Lv2 ("Ivy Bridge" microarchitecture) 2.5/3.1/3.5 GHz, 4 cores/8 threads	Intel® Xeon® processors E3-1260L ("Sandy Bridge" microarchitecture) 2.4/2.5/3.3 GHz, 4 cores/8 threads	Intel® Atom™ processor N570 1.66 GHz, 2 cores/4 threads
DRAM/CPU Socket	8, 16, 32, or 64 GB DDR3 ECC SODIMM	8, 16, or 32 GB DDR3 ECC SODIMM	8, 16, or 32 GB DDR3 ECC SODIMM	4 GB DDR2 SODIMM

Product Specifications

Network Uplink Cards

Up to 8 hot-swappable network uplink cards
per SeaMicro SM15000 chassis

Model	Description
EM-1GE-8T	8-port 10/100/1000 BaseT Ethernet
EM-10GE-2P	2-port 10 GbE SFP+

Internal Storage

Max. No. of Internal Physical Disks	64
Max. No. of Storage Cards	8 Hot-swappable
Max. No. of Disks per Card	8 Hot-swappable
Type of Disks	2.5" HDD or SSD
Supported Disk Types	SAS/SATA

External Storage Expansion Interfaces

Max. No. of Expansion Ports	16
Expansion Port Type	x4 - 6 Gbps SAS
Max. No. of Ext. Storage Enclosures	16
Max No. of Ext. Disks per SM15000	1344

2.5" Disk Drive Options

Enterprise 7200 RPM SATA	500 or 1000 GB
SATA eMLC SSD	80, 160 or 300 GB
Enterprise SAS eMLS SSD	800 GB
Enterprise 10K RPM SAS	600 or 900 GB
Enterprise 15K RPM SAS	300 GB

Power and Cooling

Power Supplies	Up to 10 1100W Power Supplies
PSU Configurations	4+1, 5+0, 5+1, or 5+5
AC Input	100-240V AC Single Phase
DC Input	40-74V DC
Average Power	3200W (fully loaded system)
Cooling Fans	Dual Hot-Swappable Fan Trays
Air Flow	Front to Rear

Chassis Enclosure

Dimensions (H x W x D)	17.5 (10 RU) x 19 x 30"

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

System Management and Software

Management Redundancy	Dual Redundant Active/Passive
In-band Management	Yes
Out-of-band Interface	1 10/100/1000BaseT + 1 Serial RJ45 + 1 Serial DB9

Embedded Management
    Industry-standard Command Line Interface
    IPMI
    SNMP v1/v2c
    Syslog
    Telnet
    SSH v2
    TFTP, SCP
    NTPv3
    RADIUS/TACACS+ Authentication
    XEN XML API

Management RFC Compliance

RFC768	UDP
RFC793	TCP
RFC854	Telnet
RFC1350	TFTP
RFC3164	Syslog

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

General L2/L3 Protocols
    Layer 2 Switching with MAC Learning
    Up to 4K VLANs

RFC791	IPv4
RFC 2460	IPv6
RFC792	ICMP
RFC826	ARP
RFC1027	Proxy ARP
RFC1035	DNS (Client)
RFC1519	CIDR
RFC1542	BOOTP (PXE Client and Relay)
RFC4541	IGMP Snooping

SNMP MIB Support

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

Warranty Information

Hardware	3 year limited warranty

RoHS

All SeaMicro components are EU RoHS compliant.

Fabric Storage Enclosure Summary Specifications

Model	Height	Disk Count	Disk Type
FS 5084-L	5 RU	84	3.5/2.5" SAS/SATA
FS 2012-L	2 RU	12	3.5" SAS/SATA
FS 2024-S	2 RU	24	2.5" SAS/SATA

2.5" Disk Drive Options

Enterprise 15K RPM SAS/SATA	300 GB
Enterprise 10K RPM SAS/SATA	600 or 900 GB
Enterprise 7200 RPM SAS/SATA	1 TB

3.5" Disk Drive Options

Enterprise 7200 RPM SATA/SAS	4, 3, 2 or 1 TB