Reference Guide
Clavister ATCA SG6010

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Table of Contents

Preface

Target Audience

The target audience for this guide is the user who has taken delivery of a packaged SG6010 Security Gateway Blade and going through the installation phase. The guide takes the user from unpacking and installation to power-up and initial network connection.

Notes to the Main Text

Special sections of text which the reader should pay special attention to are indicated by icons on the left hand side of the page followed by a short paragraph in italicized text. There are the following types of such sections:

Note
This indicates some piece of information that is an addition to the preceding text. It may concern something that is being emphasised or something that is not obvious or explicitly stated in the preceding text.

Tip
This indicates a piece of non-critical information that is useful to know in certain situations but is not essential reading.

Caution
This indicates where the reader should be careful with their actions as an undesirable situation may result if care is not exercised.

Important
This is an essential point that the reader should read and understand.

Warning
This is essential reading for the user as they should be aware that a serious situation may result if certain actions are taken or not taken.

Chapter 1: Overview

The Clavister ATCA SG6010 (SGB) is a high-performance, single-slot AdvancedTCA (ATCA) carrier-grade processing module based on Intel® architecture. It is designed for high-availability (HA) security gateway solutions providing 99.999% up time. This manual provides information about the SG6010 and serves as a reference for its electrical, mechanical, and environmental aspects.

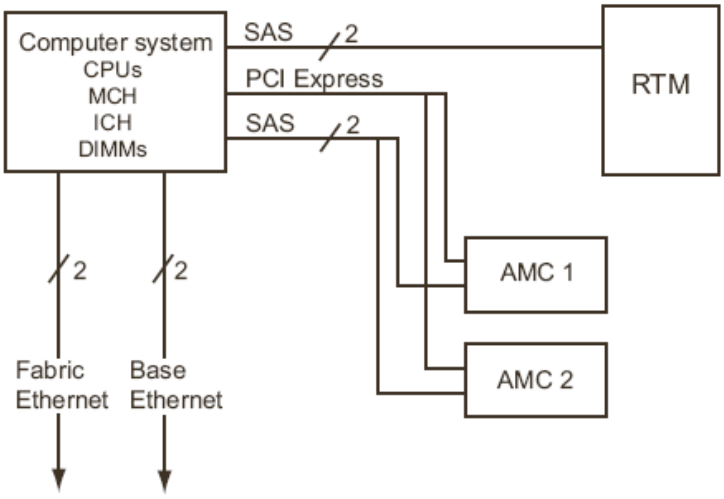
The SG6010 is an Advanced Mezzanine Card (AMC) carrier module that supports up to two AMCs and incorporates Base Ethernet, Fabric Ethernet, and IPMI interfaces. This hot-swappable module has two dual-core CPUs. The SGB has four DIMM sockets that support up to 16 GB of 400-MHz (PC2-3200) DDR2 SDRAM. The SG6010 supports two 10-Gb network interfaces.

The optional rear transition module (RTM) adds connectivity to the SGB by providing SAS (serial attached SCSI) and serial port connections to the backplane. The RTM is designed to provide cross-cabling to another compute module in the shelf's adjacent slot.

The SGB includes AMC bays to hold optional AMC modules, which can be used for SAS and SATA

storage. On the SG6010, the AMC bay 2 Ethernet ports can connect to the CPUs.

The high-level SGB core components, main peripherals, and data flow are shown below.



Dual Processors

The SGB contains two Intel Dual-Core Xeon LV Sossaman processors; these high-performance CPUs are used for processor-based server systems. Features include:

- 1.66-GHz ULV, 2.0-GHz LV core clock frequency in high-frequency mode (HFM).
- 1.00-GHz core clock frequency in low-frequency mode (LFM).
- 667-MHz Source-Synchronous FSB.
- 32-KB on-die L1 instruction and data caches.
- 2-MB on-die, ECC-protected L2 cache shared between the two cores.
- Thermal monitors, TM1 and TM2.
- Digital temperature sensor.

Memory Controller Hub

The SGB uses the Intel E7520 memory controller hub (MCH) to interface with the memory channels via PCI Express. Features include:

- Two registered DDR2-400 memory channels operating in lock-step or single-channel.
- 3.2-GB/s data bandwidth per channel at DDR2-400.
- Maximum memory size of 16 GB of x72, ECC, registered DDR2 DIMMs.

I/O Controller Hub

The SGB uses the Intel 6300ESB I/O controller hub to interface with peripheral input/output devices. Features include:

- Two USB 2.0 host controllers, providing two USB 2.0 ports.
- LPC bridge.
- SMBus 2.0 controller.
- Real-time clock (RTC).
- Two 16550-compatible UARTs.
- Two serial advanced technology attachment (SATA) ports.

Intelligent Platform Management Controller

The SGB uses the Renesas H8S/2166 microcontroller for the Intelligent Platform Management Controller (IPMC). This device manages commands and data throughout the hardware management system. Features include:

- System event log (SEL).
- Remote executable flash and microcontroller software upgrade support.
- Electronic keying support for Fabric interface, synchronization clocks, and update channels.
- Serial-over-LAN (SOL) support via the Base Ethernet controller.
- Local hardware sensors for the SGB and RTM.
- Local output actuators.
- IPMC, which comprises a microcontroller and an FPGA.
- IPMBs.
- Nonvolatile RAM.
- AMC and RTM control and management.

Ethernet Controllers

There are three Ethernet controllers on the SGB. Two provide backplane Ethernet connectivity, and the other provides dual gigabit copper interfaces for front panel connectivity. Features include:

- Dual copper MAC/PHY interfaces supporting 10BASE-T, 100BASE-TX, and 1000BASE-T applications, which are used for the Base interface.
- Dual SerDes interfaces supporting 10GBASE-BX4, which are used for the Fabric interface
- Four-lane (x4) PCI Express interface.
- Front-panel Ethernet access.

Front-panel Interface

The SGB front panel provides AMC bays, port connectors, and LED indicators. Features include:

- Two mid-height AMC bays.
- One USB connector.
- Dual Ethernet ports.
- An RJ-45 connector for the RS-232 serial port.
- A reset button.
- LEDs.

Backplane Interfaces

The SGB provides backplane interfaces for Base and Fabric ports, AMC ports, the update channel, synchronization channels, and the IPMB interfaces. Features include:

- Two 10/100/1000 copper ports, Base interface.
- Two 10GBASE-BX4 ports from the CPUs, Fabric interface.
- AMC port-12 connection to ports 0 & 1 of the update channel.
- Two –48V power rails.
- Two IPMB interfaces.

AMC Bays

The SGB uses dual Advanced Mezzanine Card (AMC) bays which accept midsize form-factor modules. One of the functions of an AMC is to provide on-board hard drive storage. Features include:

- Compliance of both bays with AMC.0, AMC.1, AMC.2, and AMC.3 specifications.
- Bay 2 supports two 1000BASE-BX connections through an Ethernet controller to the CPUs.
- Four-lane (x4) PCI-Express interface to each bay.
- Support for a single midheight double-wide AMC.

Rear Transition Module (RTM)

The RTM is an optional device that provides additional Zone 3 connectivity to the SGB. Features of the RTM include:

- Four SAS ports.
- IPMC I2C bus.
- IPMC hot-swap control signals.
- Serial port (3.3V signals).
- Eight high-speed differential ports (ports 17–20 on each AMC bay).

Chapter 2: Theory of Operation

The SG6010 Security Gateway Blade provides the general-purpose security gateway processing capability for the Clavister ATCA platform. It includes two processors, each with two processing cores, in a symmetric multiprocessing (SMP) configuration.

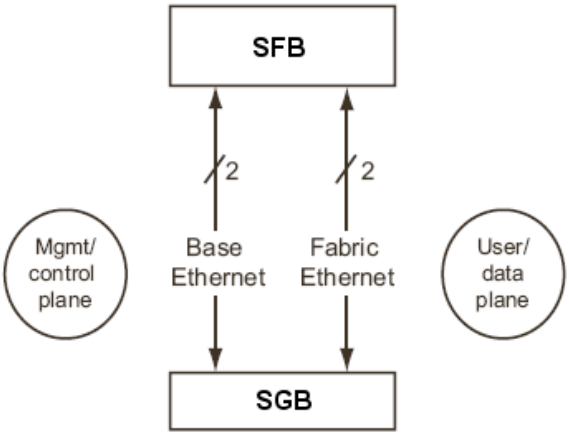
The SG6010 is a self-contained computing element and provides its own local memory, storage, as well as network and I/O connections. The optional RTM provides additional I/O connections to the SGB through the back side of the Clavister ATCA chassis.

The SGB is a hot-swappable single-slot node module that integrates into the Clavister ATCA platform. The main core of the SGB comprises the dual-processor, dual-core CPUs, and the chipset containing the memory controller hub (MCH) and the I/O controller hub (ICH). The CPUs communicate with other blades in the ATCA system through the Base and Fabric Ethernet interfaces. Peripheral I/O expansion is provided via two AdvancedMC (AMC) mezzanine sites. Communication to AMC sites is provided via PCI Express, SAS/SATA, and Ethernet interfaces. (On the ATCA-4310, Ethernet connectivity is provided to AMC bay 2 only.)

There are four SAS interfaces; two connect to the RTM, and one connects to each of the two AMC sites. For redundancy purposes, it is typical to have the local CPU access both the local storage disk and a remote storage disk on another SGB. To link redundant pairs, one SGB is cabled to another SGB through the RTM and the backside of the chassis. This setup can be used to create a 1+1 RAID array between a pair of SGBs, each with its own AMC storage module. When data is written and stored on the active storage disk, the image is mirrored and written to the standby storage disk as well. In the event one storage disk fails, then the application in its entirety will fail over to the backup storage disk.

Each SGB backplane has two Base Ethernet and two Fabric Ethernet channels. These channels interface with the switch modules in the chassis. Typically the Base Ethernet is used for the management/control plane and the Fabric Ethernet is used for the user/data plane. These channels interface to other elements in the chassis through the Ethernet switches on the SF6090 Switch Fabric Blade.

The drawing below illustrates the management/control and user/data planes.


SFB
2
2
Mgmt/
control
plane
Base
Ethernet
Fabric
Ethernet
User/
data
plane
SGB

Chapter 3: Hardware Management

Backplane and AMC interface control (E-Keying)

Electronic Keying (E-Keying) control is used to verify interface compatibility, prevent damage to hardware, and prevent misoperation. The Shelf Manager collects E-Key records that describe the Fabric, Base, update channel, and synchronization clock Interfaces implemented by the chassis and other boards in the system. The PICMG 3.0 Revision 2.0 AdvancedTCA Base Specification requires the SG6010 to support E-Key control by describing its backplane interfaces to the Shelf Manager. For some interfaces, the SG6010 can respond to Shelf Manager commands by isolating the interfaces from the backplane.

The SG6010 does not support isolation of the Base Ethernet ports or of some Fabric Ethernet ports; however, SG6010 ports operate as expected only if the corresponding ports that connect to them through the backplane are enabled. The SG6010 supplies point-to-point records for all its backplane ports.

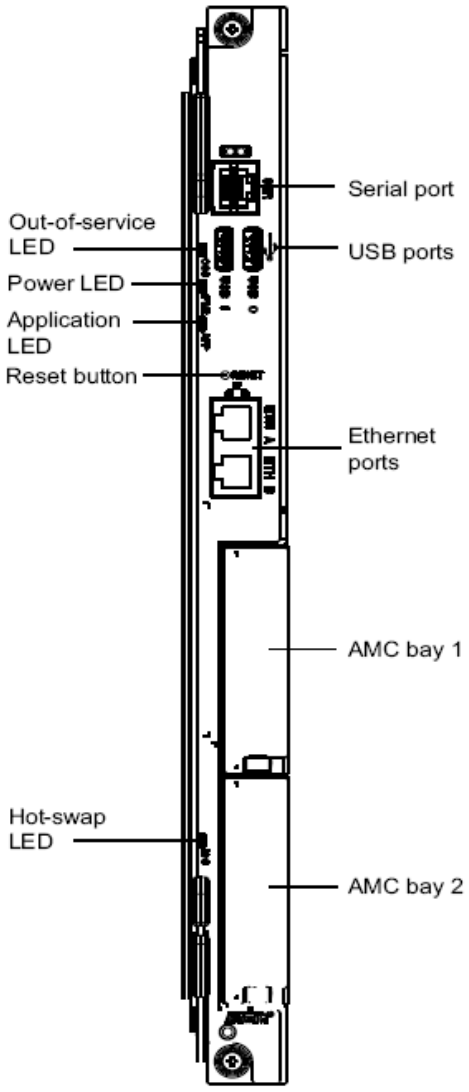
For the chassis Fabric interface, both 10-Gb Ethernet channels are always enabled.

The update channel connections between the AMC bays and the Zone 2 connector can be disabled by the IPMC, which uses GPIOs to disable the LVDS buffers. The update channel is considered to be a high-speed connection between SG6010 AMC bays in adjacent slots in the backplane.

The IPMC and CPUs can disable the CLK3 connection between the SG6010 and the CLK3A and CLK3B buses on the backplane.

Chapter 4: Physical Interfaces

The illustration below shows the front panel interfaces of the SG6010.



Chapter 5: Maintenance

Installing the SG6010

For details on installation, see the Clavister SG6010 Security Gateway Blade installation guide.

Removing the SG6010

The steps for removal are as follows.

1. Disconnect all cables from the SG6010 front panel.
2. Loosen the SG6010 retaining screws at the front of the chassis.
3. Release only one ejector latch—either the right latch or the lower latch—and then stop.
   - If the blade is oriented vertically, release only the lower ejector latch.
   - If the blade is oriented horizontally, release only the right ejector latch.
4. The blue hot-swap LED starts flashing. When the hot-swap LED turns solid blue it is safe to remove the SG6010.
5. Release the second ejector latch—either the left latch or the upper latch.
6. Simultaneously pull both ejector latches to disengage the module from the backplane.
7. Pull the blade out of the slot.
8. Place the blade on a flat, static-free surface.

Important

The appropriate ESD procedures should be followed for the above steps.

Chapter 6: Specifications

General

- **Temperature (ambient)**

State	Value
Operating (with maximum one fan fault)	+5° C to +45° C
Short-term Operating (maximum 96 hours operation)	–5° C to +55° C 30° C/hr rate of change
Storage	–40° C to +70° C

- **Relative humidity**

State	Value
Operating	5% to 85% RH non-condensing
Short-term operating (no fan faults, maximum 96 hours operation)	5% to 90% RH non-condensing at +30° C
Storage	5% to 90% RH non-condensing at +40° C
Short-term storage	5% to 95% RH non-condensing at +40° C

- **Altitude**

  Operating:

  - Up to 5,905 feet (1,800 meters), +55°.
  - > 5,905 feet up to 13,123 feet (4,000 meters), derated linearly to +45° C.

- **Shock (drop)**

State	Value
Unpacked (free fall, corners & edges)	0 to < 10kg = 100 mm drop
Packaged, Unpalletized (free fall, corners & edges)	0 to < 10kg = 750 mm drop

- **Vibration**

  (In each direction for each of three mutually perpendicular axes.)

State	Value
Operating	0.1g, 5 to 100 Hz and back, 0.1 octave/min sine sweep
Transportation (packaged)	0.5g, 5 to 50 Hz and back, 0.1 octave/min sine sweep 3.0g, 50 to 500 Hz and back, 0.25 octave/min sine sweep

- **Seismic**

State	Value
Operating	Per Zone 4 test method, GR-63-CORE

Safety

The safety specifications are measured with ambient temperature approximately 25° C and relative humidity between 30% and 50%. Testing has been performed in partnership with a nationally recognized testing laboratory (NRTL) accredited to provide the required certifications.

Characteristic	Certification	Standard and test criteria
US	Accessory Listing	UL 60950-1 "Safety for Information Technology Equipment"
Canada	Approval	CSA 22.2 #60950-1 "Safety for Information Technology Equipment"
EU	Conformance with the Low Voltage Directive	EN 60950-1 "Safety for Information Technology Equipment"
Other	CB Report	IEC 60950-1 "Safety for Information Technology Equipment"

Dimensions and Weight

Characteristic	Value
Dimensions	322.25 x 280.0 mm +0/–0.3 mm (12.687 x 11.023 in +0.0/–0.012 in)
Board thickness	2.05 mm ±0.2 mm (0.0807 in ±0.008 in)
Board weight (includes 2 DIMMs + AMC)	2.95 kg

NEBS

The SG6010 is designed to meet the following Telcordia NEBS standards.

Standard	Description
GR-63-CORE	NEBS Requirements: Physical Protection
GR-1089-CORE	Electromagnetic Compatibility and Electrical Safety
SR-3580	Network Equipment – Building Systems (NEBS) Criteria Levels Level 3, indoor contaminants levels

Electromagnetic compatibility (EMC)

The ESD, EMC, and Immunity specifications are measured with ambient temperature between 20° C and 30° C and relative humidity between 30% and 50%.

- **Emissions**

Characteristic	State	Standard and criteria
Radiated emissions	Operating	FCC Part 15, Class B EN 300 386, Non-Telecom Centre
Conducted emissions	Operating	FCC Part 15, Class B EN 300 386, Non-Telecom Centre

- **Immunity**

Characteristic	State	Standard and criteria
ESD	Operating	EN 61000-4-2 8KV direct contact, performance criteria A 15KV air discharge, performance criteria A
Radiated	Operating	EN 61000-4-3 10 V/m, 10kHz – 10 GHz, 80% AM Performance Criteria A
Fast transient/Burst	Operating	EN 61000-4-4 0.5kV, 5/50 ns, 5kHz repetition frequency Performance criteria B
Surge voltages	Operating	EN 61000-4-5 Data ports: 1kV, 1.2/50 µs or 8/20 µs DC power port: 0.5kV, 1.2/50 µs or 8/20 µs Performance criteria B
Conducted	Operating	EN 61000-4-6 0.01–80 MHz ***Frequency (MHz) --- Min Calibration Current*** *0.01–0.27 --- 89 dBµA (rms)* *0.27–0.8 --- 77.6 dBµA - 20 log10 f* *0.8–30 --- 79.5 dBµA* *30–80 --- TBD* Performance criteria A
Magnetic field immunity	Operating	EN 61000-4-8 50 Hz / 1 A/m Performance criteria A

Mean Time Between Failures

The calculation results were generated using the references and assumptions listed. This specification and its associated calculations supersede all other released mean time between failures (MTBF) and failure in time (FIT) calculations with earlier dates. The reported failure rates do not represent catastrophic failure.

- Calculation Type: *MTBF/FIT rate*.
- Standard: *Telcordia Standard SR-332 Issue 2*.
- Methods: *Method I, Case I, Quality Level II*.

Reliability Estimate Data

Failure Rate (FIT)	6944 failures in 109 hours
MTBF	144,000 hours

Environmental Assumptions

- Failure rates are based on a 35°C ambient temperature.
- Applied component stress levels are 50% (voltage, current, and/or power).
- Ground, fixed, controlled environment with an environmental adjustment factor equal to 1.0.

General Assumptions

- Component failure rates are constant.
- Board-to-system interconnects are included within estimates.
- Non-electrical components (screws, mechanical latches, labels, covers, etc.) are not included in estimates.

General Notes

- Method I, Case I = Based on parts count. Equipment failure is estimated by totaling device failures rates and quantities used.
- Quality Level II = Devices purchased to specifications, qualified devices, vendor lot-to-lot controls for AQLs and DPMs.

Where available, direct component supplier predictions or actual FIT rates have been used.

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