SAS EXPANDER VIP

GENIE-XP

SAS-EXPANDER VERIFICATION IP

OVERVIEW

The Genie-XP Verification IP Product is the industry's most comprehensive verification solution for SAS based designs. Its intelligent **Verification Engine**, integrated **Interface Inspector** and comprehensive **Compliance Suite** provide the perfect combination of tools to ensure first silicon success.

The **Genie-XP VIP** provides a quick and efficient way to verify any SAS based design – Initiator, Expander or Target. It supports SAS 1.1, 2 and 2.1 specifications and tests all layers of the SAS protocol – Phy, Link, Port, Transport and Application. Genie-XP along with Genie-SAS Verification IP product provides a complete verification solution.

The Genie-XP VIP provides:

- Bus Functional Models
- Frame & Primitive Generator
- Error Injector
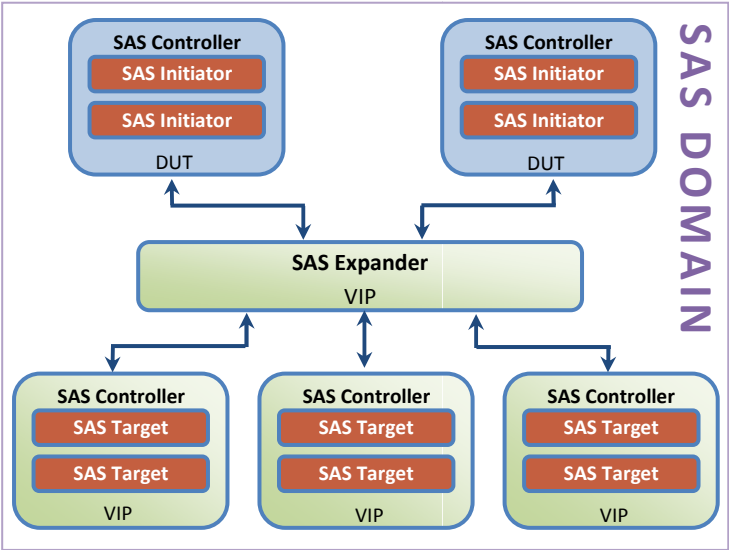- Callbacks
- Monitor/Checker
- Report Generator

Fig 1: SAS Initiator Verification

FEATURES

- ❖ Complete Functional SAS Verification - Initiators, Targets and Expander
- ❖ SAS 1.1, 2 and 2.1 compliant
- ❖ Supports 1.5, 3.0 and 6.0 Gbps speeds
- ❖ Supports rate matching for both SAS and SATA connections
- ❖ Link Power management support
- ❖ Configurable routing table and discovery pages
- ❖ Supports SAS-SAS and SAS-SATA speed negotiation
- ❖ Scalable for multiple instantiations in a testbench to form all standard SAS topologies
- ❖ Configurable test generation for constrained random, directed and error testing
- ❖ Ability to enable or disable specific error checks and violations
- ❖ User configurable reports for logging events and transactions
- ❖ Automatic and user configurable Callback capability

- ❖ Verification of all layers: Phy, Link, Port, Transport and Application
- ❖ System level and block level testing
- ❖ Full support for SSP, SMP and STP
- ❖ Number of Phys can be configurable from 2 to 128 Phys
- ❖ Wide Port & Narrow Port Support
- ❖ Protocol Checker – functionality at all layers
- ❖ Ability to integrate SATA Device into SAS domain
- ❖ Auto Discovery process feature allows to configure routing tables through test files
- ❖ Ability to control and change packet value during transmission through each layer
- ❖ Programmable parameters through configurable Knobs
- ❖ Multiple Language Interface – SystemVerilog, Verilog, VHDL, C/C++, SystemC, 'e', VERA

PRODUCT DETAILS

Phy Layer Features

- Supports serial (1 bit) and parallel (10/20/40 bit) interface
- 8b/10b encoding and decoding
- Configurable OOB signals
- Phy multiplexing support
- Optional DC-IDLE pin
- Single or multi-bit error injection
- Automatic detection of SAS and SATA device connections

Link Layer Features

- Support for all primitive sequences
- SAS Link Power Management support
- Ability to corrupt primitive sequence as well as transmit custom primitive sequences
- Ability to enable/disable scrambling on the fly
- Programmable Connection Rate independent of physical rate which enables rate matching without expander
- Applies Arbitration fairness rules
- Randomized or Directed error injection

Fig 2: SAS Verification Environment

Expander Function Features

- Contains Expander Connection Manager (ECM), Expander Connection Router (ECR) and Broadcast Primitive Processor (BPP)
- User configurable routing tables and discovery pages
- Simultaneously manage multiple connections
- Follows ECM Arbitration requirements
- Programmable timers-arbitration wait, maximum connection timeout
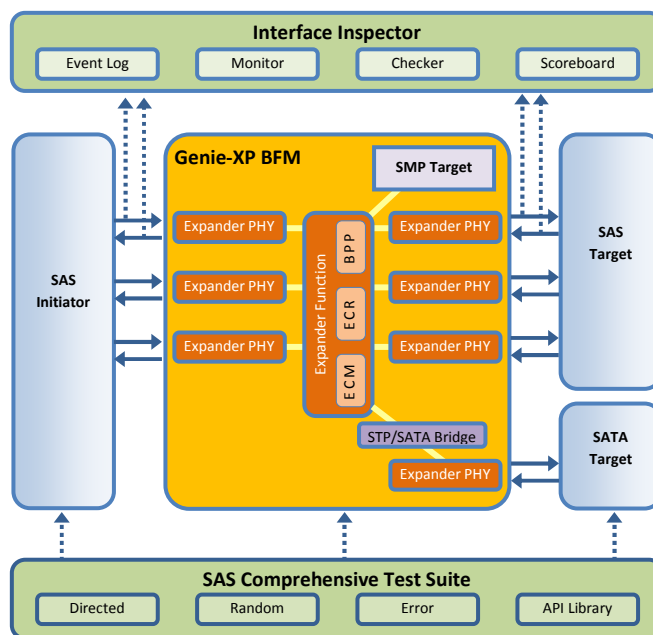
STP/SATA Bridge Features

- Contains STP target port, SATA Host port and functions to bridge them
- Uses SATA link layer state machine in SATA Host port
- Supports all SATA primitives including HOLD, CONT.
- Supports Rate matching through ALIGN and HOLD primitives
- Follows all STP flow control rules
- Supports single affiliation policy

SUPPORTED SIMULATORS	ALDEC CADENCE MENTOR SYNOPSYS

SAS COMPLIANCE SUITE	SAS SOLUTIONS
Developed by PerfectVIPs to thoroughly exercise SAS designs, the compliance suite is a comprehensive verification test suite that provides hundreds of test cases. - Verifies all layers of SAS designs - Provides comprehensive design coverage targeted at Phy, Link, Transport, Port & Application layers - Identifies all protocol violations - Provides directed and constrained random regression testing capability - Developed with actual customer designs	Developed by PerfectVIPs to address different system level SAS architectures, the following SAS solutions are available. Verification IP: - SAS Initiator VIP - SAS Target VIP - SAS Initiator/Target VIP - SAS Expander VIP Compliance Suites: - Initiator Compliance Test Suite - Target Compliance Test Suite

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