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Incisive Assertion-Based Verification IP for OCP

Part of the Cadence VIP Catalog

Cadence® Incisive® Assertion-Based Verification IP (ABVIP) for OCP builds upon the speed and efficiency of the Cadence powerful formal and/or dynamic verification engines to increase quality and productivity and provide a predictable path to verification closure. When used together with Incisive Formal Verifier the Incisive ABVIP enables design engineers to immediately verify OCP functionality and protocol compliance since no testbench is needed nor must any stimuli be created.

OCP International Partnership

Incisive ABVIP

Incisive Assertion-Based Verification IP (ABVIP) is available for OCP and AMBA® AHB and AXI protocols. Incisive ABVIP maximizes end-product quality, predictability, and resource utilization while minimizing verification environment bring-up time. It helps designers catch bugs early in the design cycle, well before a testbench has even been constructed. Incisive ABVIP contains complete and optimized constraint and assertion models for standard protocols. It supplies preverified PSL properties and cover checks usable for interface monitoring in simulation and exhaustive formal analysis of compliant implementations with Incisive Formal Verifier. These included compliance checks and cover checks allow designers to efficiently explore interesting protocol scenarios, and the supplied examples make Incisive ABVIP easy to learn and use. Incisive ABVIP can be used to either formally prove or dynamically simulate the design under test. For formal analysis, Incisive ABVIP integrates with the Incisive Formal Verifier. For dynamic simulation, the Incisive ABVIP integrates with either the Incisive Design Team Simulator or the Incisive Enterprise Simulator to perform block, chip, or system-level verification.

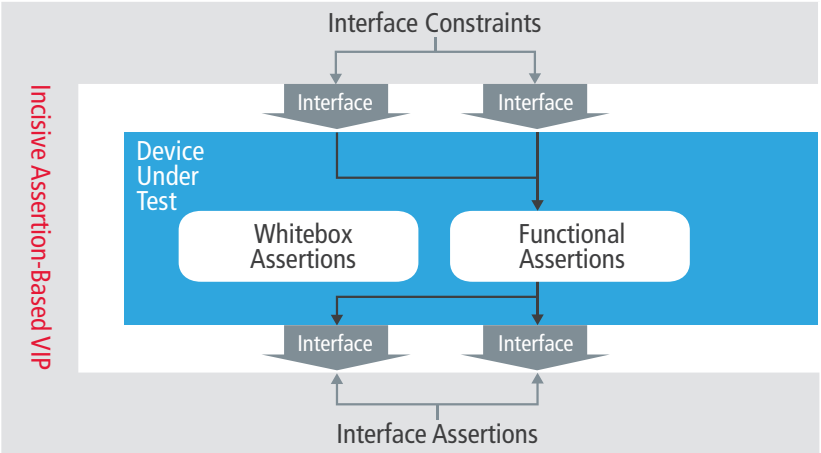

Figure 1: Incisive ABVIP's assertions and input constraints enable push-button OCP formal analysis

Incisive ABVIP for OCP

Since it eliminates the need for a testbench or test stimulus, Incisive ABVIP for OCP allows design engineers to immediately leverage the Incisive Formal Verifier engine to validate OCP functionality and compliance. Its unique Auto-Configurator creates the RTL configuration (rtl.conf) file automatically using a GUI-based interface. Auto-Configurator also builds the full formal analysis environment by generating run scripts and other needed files. Default rtl.conf file parameter values can be loaded from existing configuration files or set to OCP specification defined values. Auto-Configurator also checks for

invalid values and invalid parameter combinations. This reduces the number of iterations necessary to reach an error-free configuration file.

Benefits

- Delivers a predictable and low-risk path to verification closure
- Enables engineering teams to immediately verify OCP functionality and compliance without creating a testbench or test stimulus
- Allows engineers to catch bugs at the earliest stage in the design cycle
- Provides an easy-to-use verification solution for design engineers
- Automated configuration provides rapid bring-up and ensures the VIP accurately models the design

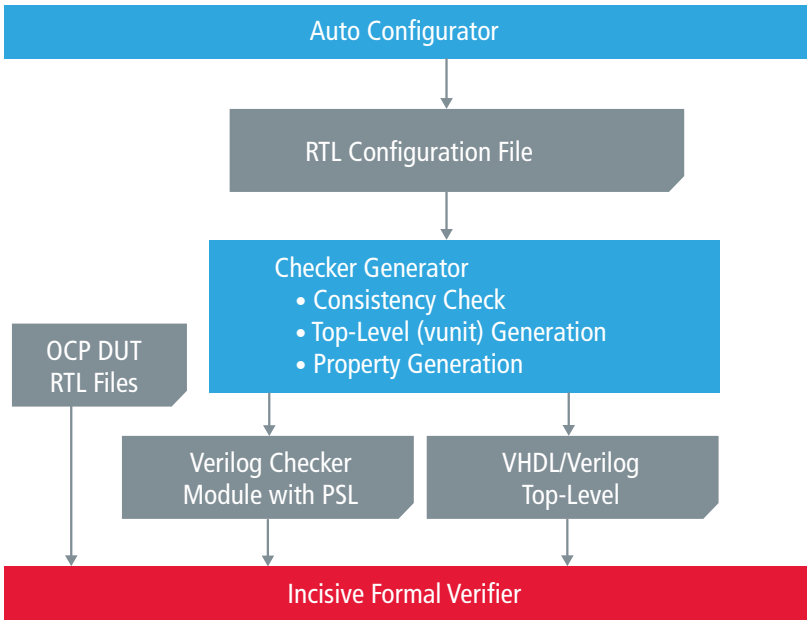

Figure 2: Incisive ABVIP for OCP features automatic configuration and environment generation

Features

Exhaustive protocol properties

- OCP 2.0, 2.1, and 2.2 support
- All signal-level checks
- 16 phase-level checks
- 28 transaction-level checks
- 12 transfer-level checks
- 12 sideband checks
- 22 latency checks
- 105+ functional cover checks
- 90+ debug constraint checks

Comprehensive protocol support

- SRMD and MRMD bursts
- Arbitrary pipelining across phases
- Compliance to phase-ordering rules
- RDEX and RDL/FAIL tracking
- Multi-threading
- Transaction integrity across threads
- Multi-tagging
- Two-dimensional bursts
- EnableClk
- Modified ThreadBusy behavior
- Configuration compliance checks

RTL configuration (rtl.conf)

- Comprehensive checking of rtl.conf parameters and syntax
- HDL and rtl.conf consistency checks

Push-button environment generation

- Generation and selection of checks based on OCP RTL configuration file
- Generated checks and logic optimized for the specific configuration
- VHDL or Verilog® top-level module (vunit) generation for automatic environment setup
- Automatic setup of constraints and assertions for master/slave interfaces

Powerful lint and debug capabilities

- Automatic lint checks including structural and synthesizability
- Automatic dead-code checks generated by Incisive Formal Verifier
- Counter-examples produced for each property failure
- Witness waveforms provided for each passing property
- Replay formal analysis failures in simulation and/or acceleration

Specifications

Incisive ABVIP for OCP provides a push-button solution to formally and/or dynamically verify OCP 2.0, 2.1 and 2.2 implementations and compliance. It includes the following features and functions:

- Fully compliant with OCP FVWG compliance checklist
- Compliant with OCP FVWG recommendation to use an RTL configuration file to configure VIP
- Environment Generator
  - Generates property set per RTL configuration
  - Automates bring-up process by creating top-level environments in VHDL or Verilog language
- Generated properties and logic optimized for efficient formal analysis
- Pipeline depths for response and data-handshake phases
- Configurable intraphase latencies
- PSL and auxiliary code optimized for fast and accurate analysis

- Eventuality (liveness) properties to detect deadlocked states
- Latency checks for static performance analysis (e.g., to determine whether requests were accepted within n clock cycles)
- Completely reusable parameterized checker modules
- Multiple OCP interface support
- Multi-threaded interface support
- Comprehensive user documentation and usage examples
- Support for Verilog, SystemVerilog, and VHDL flows
- Compliant with Incisive Formal Verifier Methodology Guidelines

Cadence Services and Support

- Cadence application engineers can answer your technical questions by telephone, email, or Internet—they can also provide technical assistance and custom training
- Cadence certified instructors teach more than 70 courses and bring their real-world experience into the classroom
- More than 25 Internet Learning Series (iLS) online courses allow you the flexibility of training at your own computer via the Internet
- Cadence Online Support gives you 24x7 online access to a knowledgebase of the latest solutions, technical documentation, software downloads, and more

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