

ONFI Verification IP

Datasheet March 2012 – Version 3.0

Overview

The process of verification is getting complex with every passing year; this is due to the fact that complexities of chips are increasing. With such an increasing design complexity, verification tends to consume up to 60-80% project resources and often represents a bottleneck. Having all this in mind, SmartDV has developed number of Verification IP's, which has been created by verification engineers with decades of experience in verifying complex chips.

The SmartDV Verification IP (VIP) for ONFI provides an efficient and simple way to verify the ONFI protocol. The SmartDV VIP for ONFI is fully compliant with ONFI 2.3/3.00 Specifications and provides the following features:

- Supports ONFI host, slave and monitor.
- It has a rich set of configuration parameters to control ONFi functionality.

Features

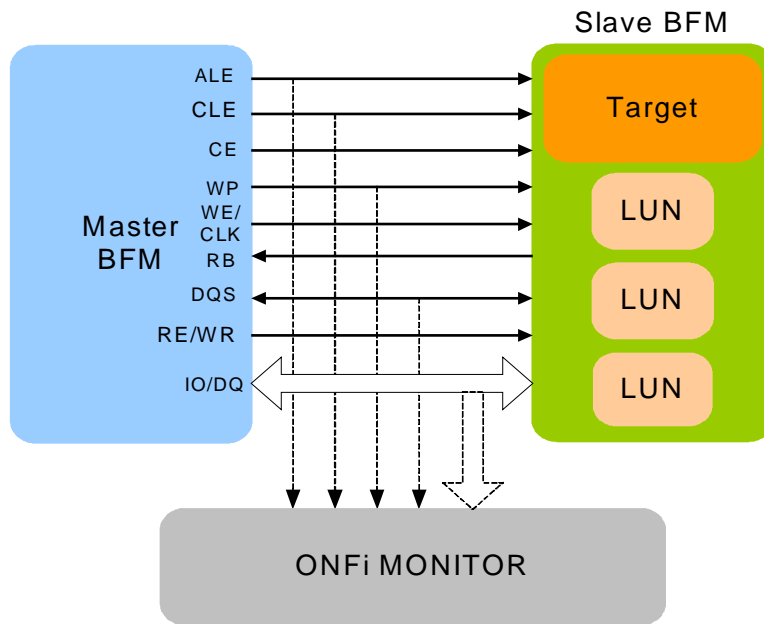
- Implemented in **Unencrypted OpenVera, Verilog, SystemC and SystemVerilog**.
- Supported RVM, AVM, VMM, OVM, UVM and non-standard verify env.
- Compliant with ONFi 2.3 /3.00 specifications.
- Supports Source Synchronous and Asynchronous data interfaces.
- Supports all mandatory and optional commands.
- Supports 16 bit bus width operations
- Multiple LUN Operation support.
- Multi-plane commands support.
- Configurable timing modes for Source Synchronous and Asynchronous data interface.
- Supports Read ID commands.
- Supports Synchronous reset commands.
- Interleaved commands support.
- Reset LUN command support.
- Supports Partial Page programming and copy back programming.
- Source Synchronous data interface supports Clock Stop feature.
- Supports dual data bus.
- Detects and reports the following errors.
 - Page address error
 - CRC error

- Command not support error
 - Illegal command error
 - Synchronous reset error
 - Read ID error
 - Reset LUN error
 - Read cache error
 - Read UID error
 - Lun address change error
 - Copyback program error
 - Change row address error
 - Read status enhanced error
 - Interleave page address error
- Supports Small Data Move command for both Program and Copyback operations.
 - Ability to generate Vendor Specific Commands and Block Abstracted NAND Commands.
 - Rich set of configuration parameters to control ONFi functionality.
 - Supports constrained randomization of protocol attributes.
 - On-the-fly protocol and data checking.
 - Monitors, detects and notifies the test bench of significant events such as transactions, warnings, timing and protocol violations.
 - Status counters for various events on bus.
 - Callbacks in host, slave and monitor for user processing of data.
 - ONFI Verification IP comes with **complete testsuite** to test every feature of ONFI specification.
 - Protocol Checker fully compliant with ONFi Specifications 2.3/3.0 compliant.
 - Functional coverage for complete ONFi features.

Benefits

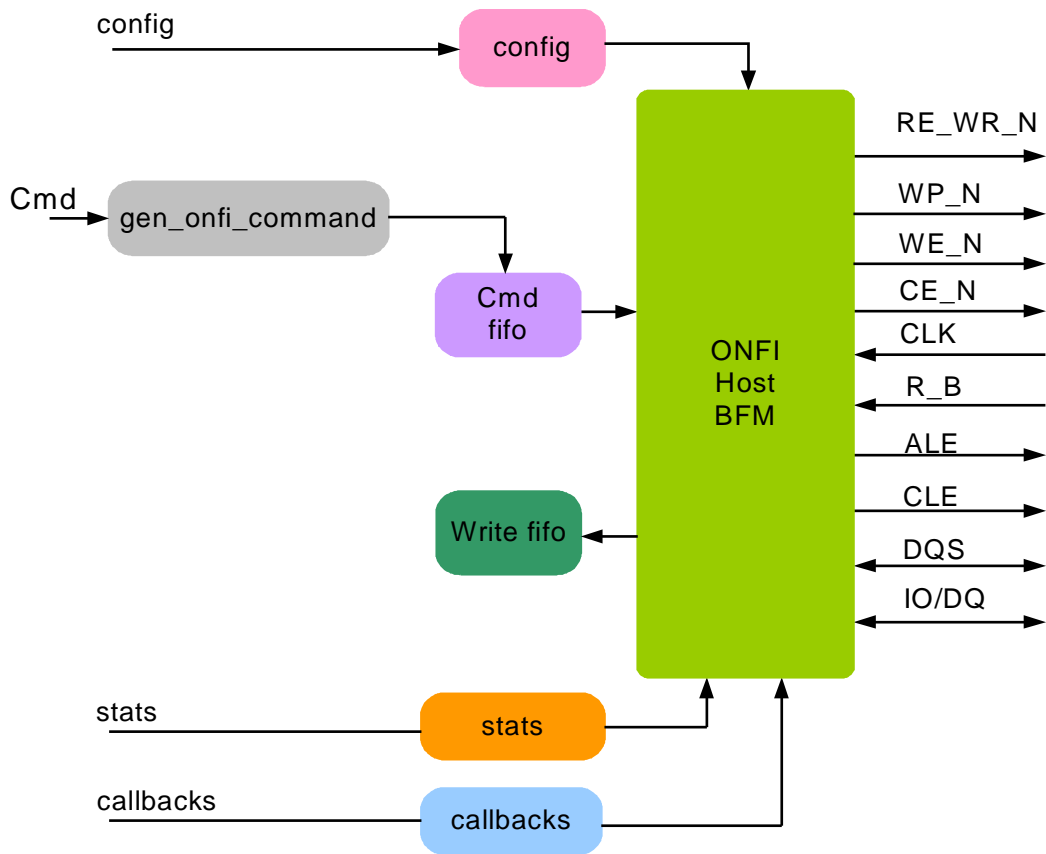
- Faster testbench development and more complete verification of ONFI designs.
- Simplifies results analysis.
- Easy to use command interface simplifies testbench control and configuration of slave and host.
- Runs in every major simulation environment.

ONFI Verification IP Topology



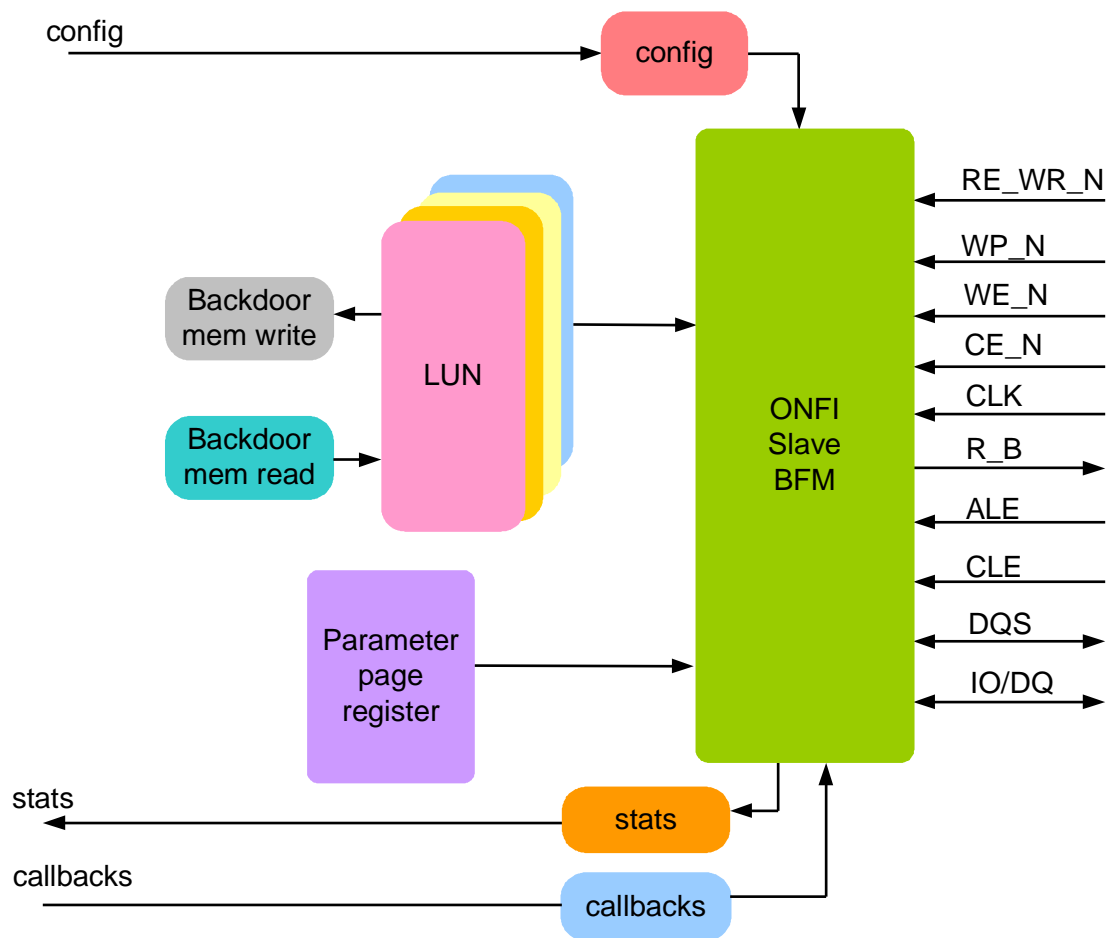
Host BFM Behavior

ONFI Host is first configured with different configuration parameters. ONFI Host BFM initiates the possible requests based on the various ONFI commands from the testbench. User uses rich set of methods for sending commands on the bus. At each stage of sending commands, callbacks are executed for giving control to user for processing the commands. Status counters are updated at the end of transmission of command.



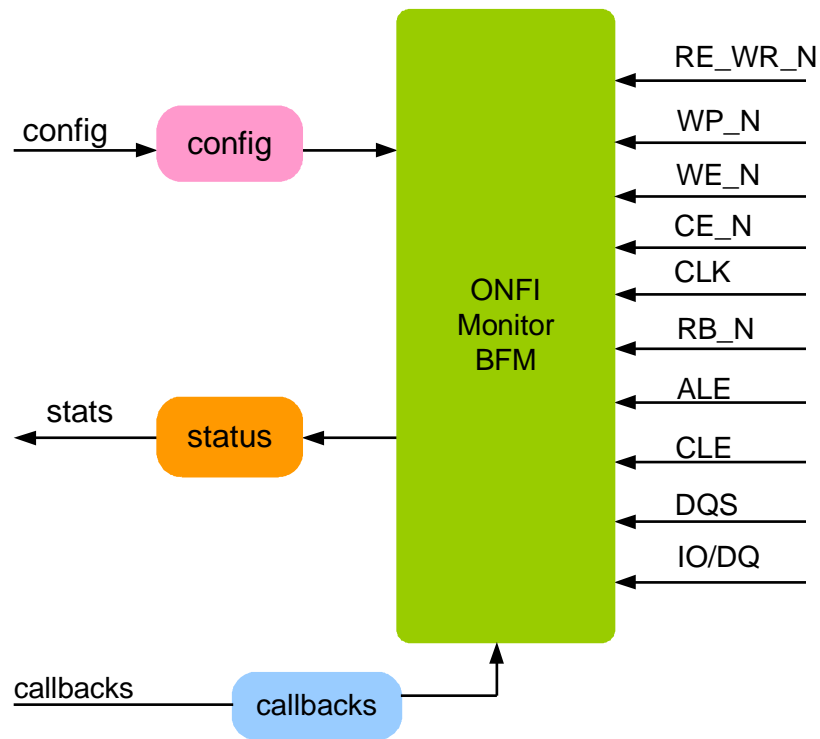
Slave Behavior

ONFI Slave BFM is first configured with different configuration parameters. Slave BFM monitors the bus to determine if the valid command has been detected. Slave responds to read requests by sending data from Page/LUN for the address received from the host. For write requests, Slave receives data transmitted by the host and writes into the page/LUN, which was addressed by the host. At each stage of command collections, callbacks are used for give control to the user to process the command. At the end of command reception, status counters are updated.



Monitor Behavior

Monitor is first configured with different configuration parameters. A monitor monitors the ONFI bus for protocol errors and timing errors. At each stage of command collections, callbacks are used to give control for the user to process the command. Monitor also keeps track of all the accesses on bus, updates the status counters. These statuses ONFi are accessed any time during simulation.



Supported Simulators

- VCS
- NC-SIM
- ModelSim
- Questasim

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