SIM Card Verification IP

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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 SIM Card provides an efficient and simple way to verify the SIM Card protocol. The SmartDV VIP for SIM Card is fully compliant with the SIM Card Bus Specification and provides the following features:

Features

- Implemented in **Unencrypted OpenVera, Verilog, SystemC, SystemVerilog and Specman E.**
- Supported RVM, AVM, VMM, OVM, UVM and non-standard verify env.
- Compliant with ETSI-TS-100-977-V8.14.0 Standard.
- Complete **SIM Card** commands supported.
- Complete SIM Card Master/Slave functionality.
- Supports READ/UPDATE/INCREASE Command General Procedures.
- Supports list of procedures at the SIM/ME interface in GSM network operations, including
- -> SIM management procedures
- -> SIM Initialization
- -> GSM session termination
- -> Emergency call codes request
- -> Extended language preference request
- -> Language preference request
- -> Administrative information request
- -> SIM service table request
- -> SIM phase request
- -> CHV related procedures
- -> CHV verification
- -> CHV value substitution
- -> CHV disabling
- -> CHV enabling

- -> CHV unblocking
- -> GSM security related procedures
-   -> GSM algorithms computation
-   -> IMSI request
-   -> Access control information request
-   -> Higher Priority PLMN search period request
-   -> Location Information
-   -> GPRS Location Information
-   -> Cipher key
-   -> GPRS Cipher key
-   -> BCCH information
-   -> Forbidden PLMN information
-   -> LSA information
- -> Subscription related procedures
-   -> Dialling Numbers (ADN, FDN, MSISDN, LND, SDN, BDN)
-   -> Short messages (SMS)
-   -> Advice of Charge (AoC)
-   -> Capability Configuration Parameters (CCP)
-   -> PLMN Selector
-   -> HPLMN Selector with Access Technology
-   -> User controlled PLMN Selector with Access Technology
-   -> Operator controlled PLMN Selector with Access Technology
-   -> Investigation Scan request
-   -> CPBCCH information
-   -> Cell Broadcast Message Identifier (CBMI)
-   -> Group Identifier Level 1 (GID1)
-   -> Group Identifier Level 2 (GID2)
-   -> Service Provider Name (SPN)
-   -> Voice Group Call Service (VGCS)
-   -> Voice Broadcast Service (VBS)
-   -> Enhanced Multi Level Pre-emption and Priority (eMLPP)
-   -> Depersonalisation Control Keys
-   -> Short message status reports (SMSR)
-   -> Network's indication of alerting
- -> SIM Application Toolkit related procedures
-   -> Data Download via SMS-CB (CBMID)
-   -> Data Download via SMS-PP
-   -> Menu selection
-   -> Call Control
-   -> Proactive SIM
-   -> Mobile Originated Short Message control by SIM
-   -> Image Request
- -> MExE related procedures
-   -> Reading of MExE_ST
-   -> Reading of root public keys on the SIM (ORPK, ARPK,TPRPK)
- Supports all types of error insertion and detection.

- -> Illegal command error
- -> Illegal response error
- -> Timeout error
- -> Oversize error
- -> Undersize error
- Monitors, detects and notifies the testbench of significant events such as transactions, warnings, timing and protocol violations.
- Supports constraints Randomization.
- Status counters for various events on bus.
- Callbacks in transmitter, receiver and monitor for user processing of data.
- SIM Card Verification IP comes with complete test suite to test every feature of SIM Card specification.
- Functional coverage for complete SIM Card features.

Benefits

- Faster test bench development and more complete verification of SIM Card designs.
- Simplifies results analysis.
- Integrates easily into **OpenVera, SytemVerilog, Verilog, Specman E, and SystemC.**
- Runs in every major simulation environment

# SIM Card Verification IP Topology
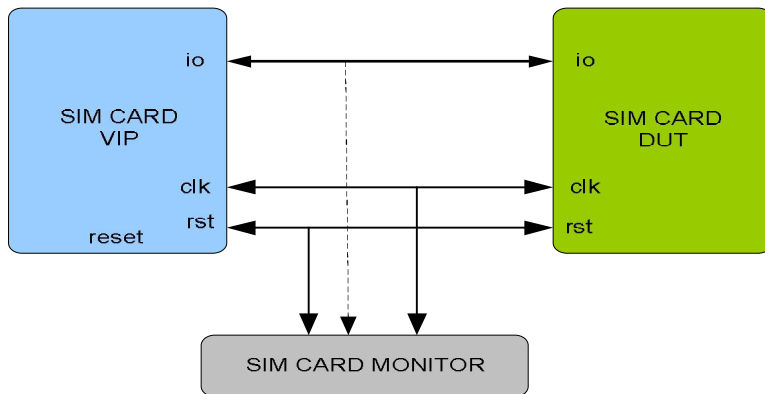
Master Behavior

SIM Card master is first configured with different configuration parameters. SIM Card BFM initiates the possible frames based on the various SIM Card commands from the testbench. User uses the rich set of methods for sending frames on master transmit path of BFM. At each stage of sending frame, callbacks are executed for giving control to user to processing the frame. Status counters are updated at the end of transmission of frame.
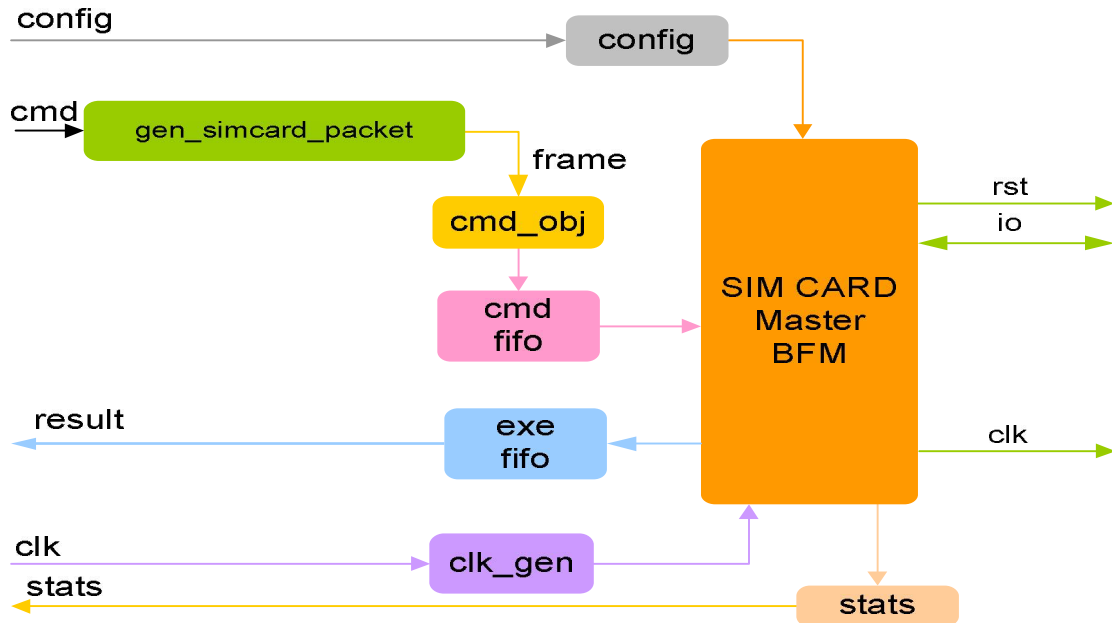
Slave Behavior

SIM Card Receiver is first configured with different configuration parameters. A Receiver device monitors the bus to determine the data transaction. At each stage of frame collections, callbacks are used for give control to the user to process the frame. At the end of frame reception, status counters are updated.
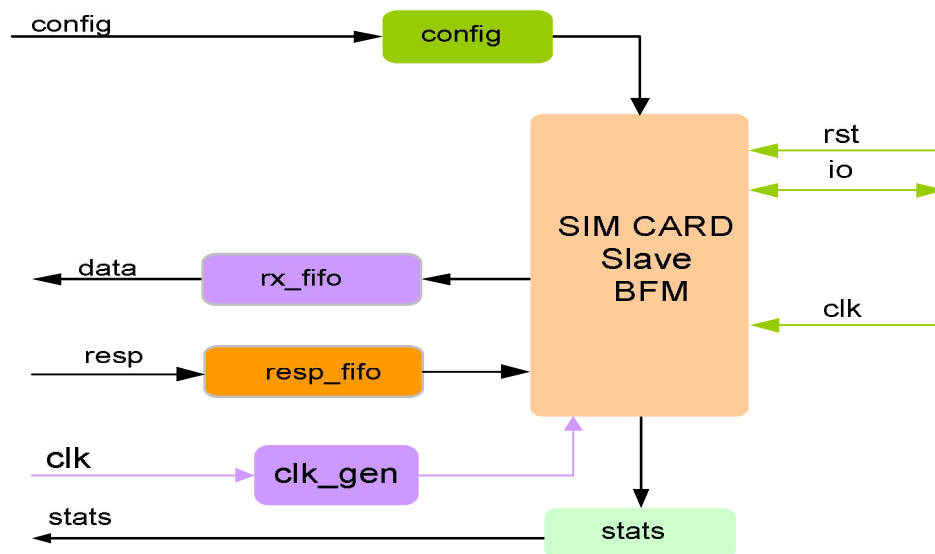
Monitor Behavior

Monitor is first configured with different configuration parameters. A monitor monitors the SIM Card bus for protocol errors and timing errors. Monitor also keeps track of all the accesses on bus, updates the status counters. These statuses can be accessed any time during simulation. Monitor also implemented the functional coverage points which user can extend to add or remove new functional coverage points.
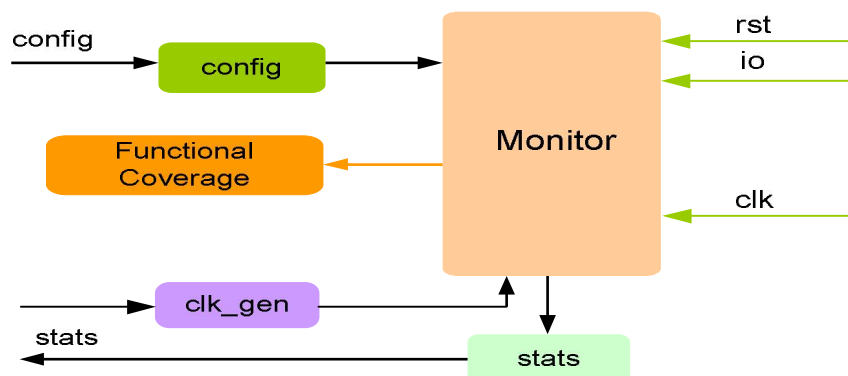
Supported Simulators

- VCS
- NC-SIM
- ModelSim
- Questasim