

RBS Protocol Test System

Multi-purpose test generation and analysis tool for base station interface protocols during the entire development cycle.

The new and revolutionary Radio Base Station Protocol Test System from Sarokal allows stimulation and tracing of the digital interfaces in all fronts of a modern radio base station, in Radio Equipment Control (REC) and Radio Equipment (RE) modules, also known as Baseband Unit (BU) and Remote Radio Head (RRH). Digital interface

protocols between the REC and RE include CPRI, OBSAI RP3, and 10G Ethernet. Furthermore, 10GbE and similar variants, such as CPRI over OTN, are used in the REC - core network boundary. JESD204 is a standard that is widely used between AD/DA converters (in antenna interfaces) and logic devices (RE/RRH).

Test Systems Philosophy

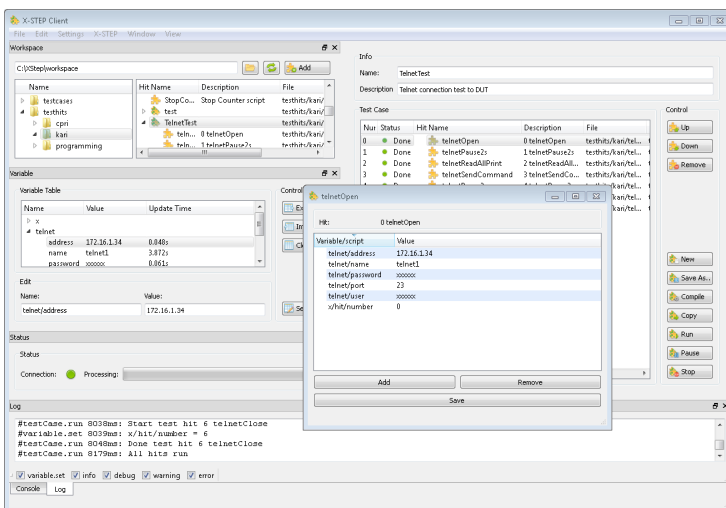
Same tester platform for all digital interface protocols in Base Station components

Paradigm Shift for test equipment – do more in SW, avoid complex and costly HW

Highly re-usable test cases, all the way from RTL simulations to post-production

Short development time for new protocols, standard revisions, and customizations

Open SW architecture allows tailoring and integrations of customer specific code



Easy and intuitive Graphical User Interface for test case build-up, control, and reporting. Alternative batch modes are also supported.

The Radio Base Station Protocol Test System product integrates in RTL simulations and HW emulation, and also works with FPGA prototypes, full-speed post-silicon debug boards, final products, and anything in between. This means that the same platform covers every phase in a Base Station product development cycle, ranging all the way from very first RTL

simulations to post production. Re-usability of test cases is high since every test case can be run without modifications in simulation, HW emulation, and on real-time ASIC/FPGA boards. Also, thanks to the parameterized test case building block architecture, the porting of test cases from one project to another is easy.



The Radio Base Station Protocol Test Systems' key to the affordability, flexibility, and quick turn-around times of the supported interface protocols is that the protocol support is mostly implemented in SW, instead of custom HW with plenty of parallel logic required for high-bandwidth data processing. This is possible through smart design choices and test case optimizations, all aiming at providing the same functional testing coverage with significantly simpler HW. Furthermore, the open-source nature of the SW side ensures good customizability and makes it possible to bring customer's own test SW and scripts into the Radio Base Station Protocol Test System.

The HW architecture of the Radio Base Station Protocol Test System is highly flexible, since all Base Station interface protocols share the same underlying HW designed with modularity as key driver. Hence, an unlimited amount of links can be supported by simply stacking more hardware to introduce more links and memory in the test setup, knowing that all hardware units will co-operate in terms of timing synchronization and triggering. A single client workstation and UI handle the tester and test case control, making the number of actual HW boards invisible to the user.

Benefits for different user groups

Activity	Typical tasks	RBS Protocol Test System Benefits
HW module and top level verification	<ul style="list-style-type: none"> •Protocol testing •Module testing 	<ul style="list-style-type: none"> •Full System Verilog OVM VIP •Accelerate runs with emulator when needed •Use emulator ICE mode for more testing
Top level HW validation	<ul style="list-style-type: none"> •System bring-up •Datapath functional and performance testing 	<ul style="list-style-type: none"> •Re-use module level tests to create test cases •Merge test cases into a fully automated test suite. •Use emulator or FPGA for system validation •Re-use the same cases in the post silicon bring-up in real Gbit speeds
Software development	<ul style="list-style-type: none"> •Driver development •SW development 	<ul style="list-style-type: none"> •Gain early access to real design with emulator or FPGA prototyping •Use same tests in all platforms •Same look and feel in all platforms
System integration and validation	<ul style="list-style-type: none"> •HW system testing 	<ul style="list-style-type: none"> •Re-use tests from other groups •Trigger-controlled data capture •Extraction of user data for further analysis
Product test development	<ul style="list-style-type: none"> •Product test development 	<ul style="list-style-type: none"> •Easy to create automated functional test pattern for production
Production testing	<ul style="list-style-type: none"> •Functional production test 	<ul style="list-style-type: none"> •Automation of functional tests



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