

## IEEE 802.15.4 / ZigBee Test Solution



member of



# IEEE 802.15.4 ZigBee Test Solution

## WiPAN Test Solution

SeaSolve's WiPAN Test solutions are designed to test ZigBee devices in the 2450/868/915 MHz bands according to the IEEE 802.15.4 standard.

The **WiPAN LVSG** solution is designed to generate IEEE 802.15.4 compliant signals in the 2450/868/915 MHz bands. WiPAN LVSG gives full control over PHY and MAC parameters and facilitates the user to define a delay between packets with options to save and load MPDU configurations. WiPAN LVSG facilitates the generation of frames by customizing the MAC settings or building a sequence of frames. Customizing MAC settings can be done in three flexible options (Load MPDU data, Advanced Configuration, Default settings) WiPAN LVSG also allows modeling of various impairments for simulation purposes.

The **WiPAN LVSA** solution is designed to capture, measure and analyze IEEE 802.15.4 compliant signals. WiPAN LVSA yields both raw and detailed measurements with complete MAC information and allows the user to take advantage of high-efficiency testing and measurement by defining a suitable span, trigger, attenuation, and reference levels. WiPAN LVSA is capable of capturing signals, performing symbol and frequency synchronization, and neutralizing frontend non idealities. WiPAN LVSA lets user to save acquired IQ and MAC data.

### ZigBee Frame Generation

#### Modulation Formats Supported

- O-QPSK modulation with half sine pulse shaping
- BPSK modulation with raised cosine spectrum

#### MAC Frames Supported

- Data Frame
- Beacon Frame
- MAC Command Frame

#### Generate frames with same/varying sequence number

#### Import Options

- Load MPDU
- Load Payload data (MSDU)

#### Save Options

- Save MPDU
- Save Payload data (MSDU)

#### Encryption Algorithm

- AES-CCM-128 security suite

#### Generate multiple frames or sequence of frames in one shot

#### Mode of Transmission

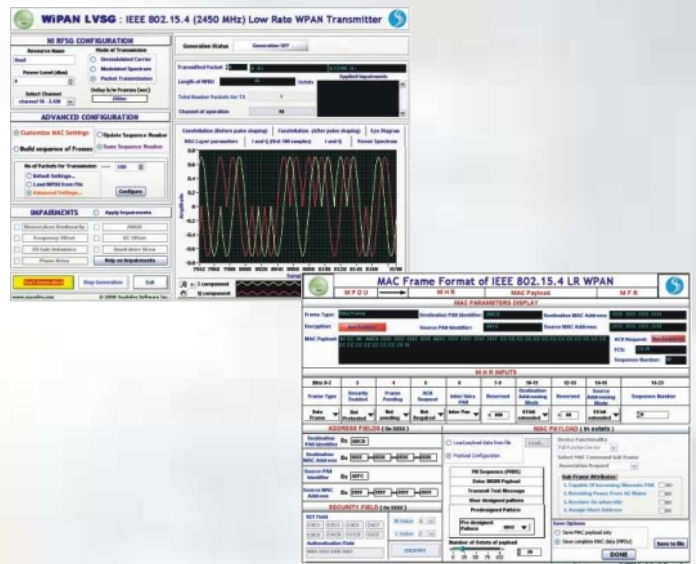
- Continuous mode transmission
- Modulated Spectrum
- Unmodulated Carrier
- Burst mode transmission
- Packet transmission with User defined delay between packets

#### Supported Data Configuration Patterns

- User defined Pattern
- Predefined Pattern
- Text
- PRBS
- MSDU payload (user configured)

#### Configurations

- Delay between frames
- Output power level
- Enable/Disable Impairments Configuration
- Acknowledgement Request
- Transmissions to Inter or Intra PAN
- Addressing modes as 16 bit or 64 bit
- Frame Sequence number
- Frame Security



### ZigBee Frame Analysis

#### Measurements

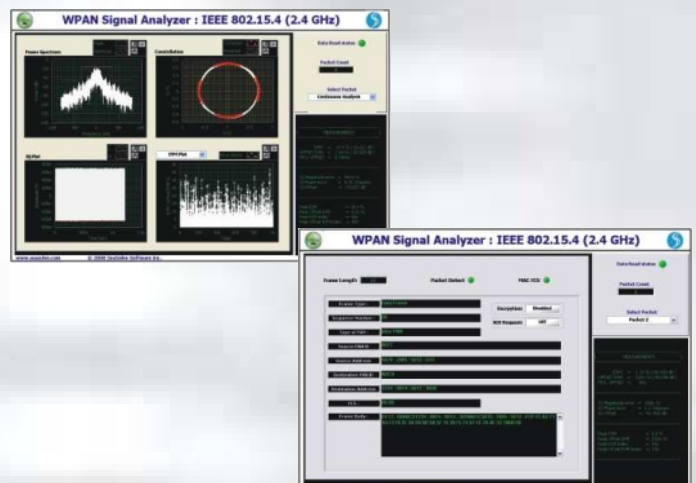
- RF Measurements
- Baseband Measurements
- MAC Frame Decoding

#### Saving Options

- Save IQ data in .bin or .rtf format
- Save MAC data in .rtf format

#### Configurations

- Configure Span
- Configure Trigger level
- Attenuation and Reference Levels
- Acquisition time



## ZigBee aCT

ZigBee aCT is a ZigBee Automated Compliance Testing solution that executes a sequence of Tx and Rx tests to characterize a DUT's compliance and performance in accordance with the IEEE 802.15.4 standard and generates detailed test reports.

ZigBee aCT enables the testing of ZigBee DUTs with minimal user input, requiring only configuration parameters for each test. The tests provided are optimized for speed to reduce test times and are verified for their accuracy with various RF Chipsets from leading manufacturers.

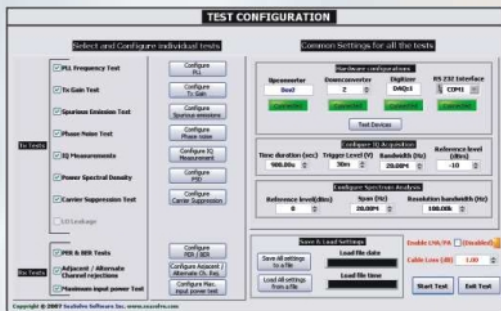
The main advantage of ZigBee aCT includes test automation with minimal user input and the ability to save test results in easy-to-read report formats. With the help of the DUT's firmware, the control of the DUT is handled by ZigBee aCT through RS-232 communication. The user can perform a number of Rx tests including BER/PER tests with ease without requiring external DUT-controller software.

### Salient Features

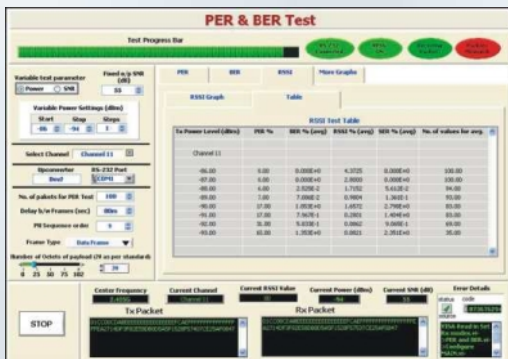
- Automation of multiple compliance tests
- Run All or Selected Tx/Rx tests
- Detailed reports for each test
- Save reports in .html or .xls formats
- Configure individual Tests
- Load and Save test configurations
- Configurable test limits
- Optimised for Speed to target manufacturing industry

### Transmitter Tests

- PLL Frequency Test
- TX Gain Test
- Spurious Emission Test
- Phase Noise Test
- IQ Measurements
- Power Spectral Density
- Carrier Suppression Test
- LO Leakage



Test Configuration window – users can select and define limits for tests



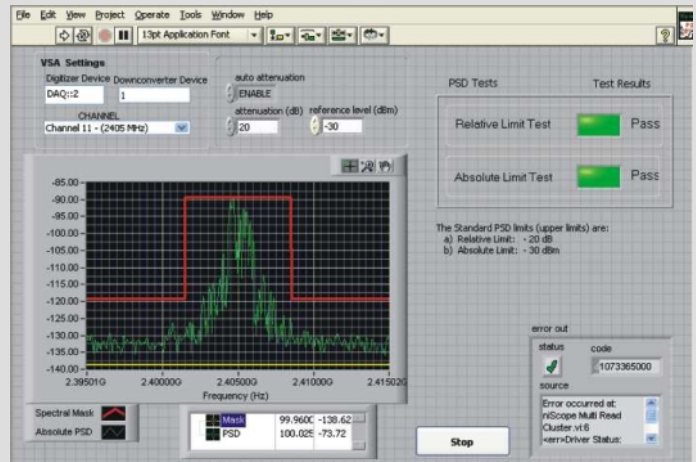
Receiver Sensitivity is tested with PER/BER performance

### Receiver Tests

- PER and BER Tests
- Adjacent/Alternate Channel
- Rejections
- Maximum Input Power Test

## ZigBee Toolkit - Overview

SeaSolve's ZigBee Toolkit provides a set of individual, reconfigurable LabVIEW VIs for various transmitter and receiver tests. The tests verify the standard-conformance of wireless devices aiming to comply with the IEEE 802.15.4 standard. The test VIs can be integrated into the manufacturing process or utilized in the design validation of these wireless devices. The toolkit is designed to be used as .dll/.lib libraries that integrate seamlessly with industry-standard test solutions such as NI TestStand to create automated test sequences for DUTs. The APIs are optimized for execution time / functionality and are best suited for a Production/ Manufacturing Test Environment. In an Automated Test Environment, toolkits work with minimal user intervention.



The modularity of the test APIs allows them to be incorporated into end-user programs

## ZigBee Toolkit VIs

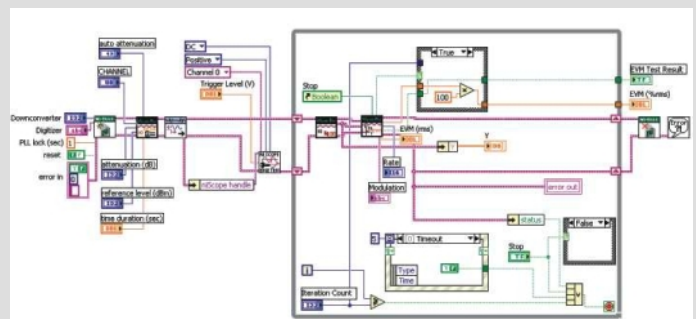
### Supported Tests

#### Transmitter Tests

- Spectrum PSD Mask
- Error Vector Magnitude
- Transmit Center Frequency Tolerance
- Maximum Transmit Power

#### Receiver Tests

- Receiver Sensitivity
- Maximum Input Power
- Adjacent Channel Jamming Resistance
- Alternate Channel Jamming Resistance



LabVIEW developers can build their own code and programs around SeaSolve's ZigBee test APIs



**SeaSolve Software Inc (SSI)** is a leading supplier of Intellectual Property Cores and Test and Measurement Solutions for IEEE 802.16e/d (Mobile and Fixed WiMAX), MIMO, IEEE 802.15.4/ZigBee (WPAN) and IEEE 802.11a/b/g (WLAN).

SeaSolve is headquartered in San Jose, CA with regional offices in Europe and Asia.

SeaSolve solutions are exclusively used by:

- Certifying Labs / Test Houses who need to assure product conformance to standard specifications
- Wireless SoC Developers who embed IP Cores in their design to develop Proofs of Concept
- Wireless Chipset Manufacturers for Precertification, Manufacturing and Production Testing
- Equipment Manufacturers and Vendors to precertify products and benchmark their performance
- R&D organizations, Universities, Defense and Government organizations that research on WLAN, WPAN and WiMAX technologies and devices

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