



EV-DO Automatic Test System

EV-DO ATS

Industry's only integrated solution for EV-DO Minimum Performance Testing

High-speed wireless packet data technologies such as 1xEV-DO introduce new testing challenges for mobile devices. With the introduction of higher-order modulation types (8-PSK and 16-QAM) on the forward link and additional channels on the reverse link, it is now more important than ever to verify the receiver and transmitter performance of EV-DO devices.

EV-DO ATS is a performance analysis solution for EV-DO device manufacturers who need to:

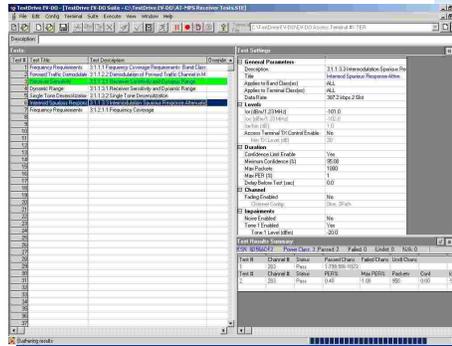
- Minimize time to market for their new products
- Maximize the efficiency of their valuable engineering resource
- Successfully pass through industry-standard testing procedures
- Optimize mobile device performance to gain a competitive advantage
- Minimize deployment problems in the field

EV-DO ATS is also for network service providers who need to carry out evaluation of EV-DO devices and compliance testing to industry standards such as TIA and 3GPP2.

Test campaigns must effectively evaluate the receiver and transmitter performance of EV-DO devices, with the

ability to operate in multiple band classes. These test plans can be daunting, involving very substantial numbers of test cases. The traditional approach to running these test cases involves use of a test bench implementation that requires a very high level of user intervention.

By contrast, EV-DO-ATS is a fully integrated test system that is dramatically easier to use than any available alternative. The system's TestDrive test executive software automates test execution to enable a large number of test cases to be run in a relatively short time, reducing the required level of valuable engineering resource dedicated to test strategy execution. The TestDrive software includes pre-defined suites for key industry standard tests: TIA-866 (AT-MPS).



EV-DO ATS delivers a complete, automated test solution for parametric performance analysis of EV-DO mobile devices

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Major Features:

- Single turnkey system for parametric performance analysis of EV-DO mobile devices
- Provides pre-defined test suites for TIA-866 (aka AT-MPS or 3GPP2 C.S0033)
- Automatic Performance Characterization determines mobile performance breakpoints
- Powerful test executive drives test procedure automation
- Enhanced GUI provides full control over test parameters
- Optimized test execution dramatically reduces test time
- Integrated data collection and results reporting

Applications:

- Product Development
- Design Verification
- Product Qualification
- Conformance/Compliance Test
- Competitive Analysis
- Performance Analysis



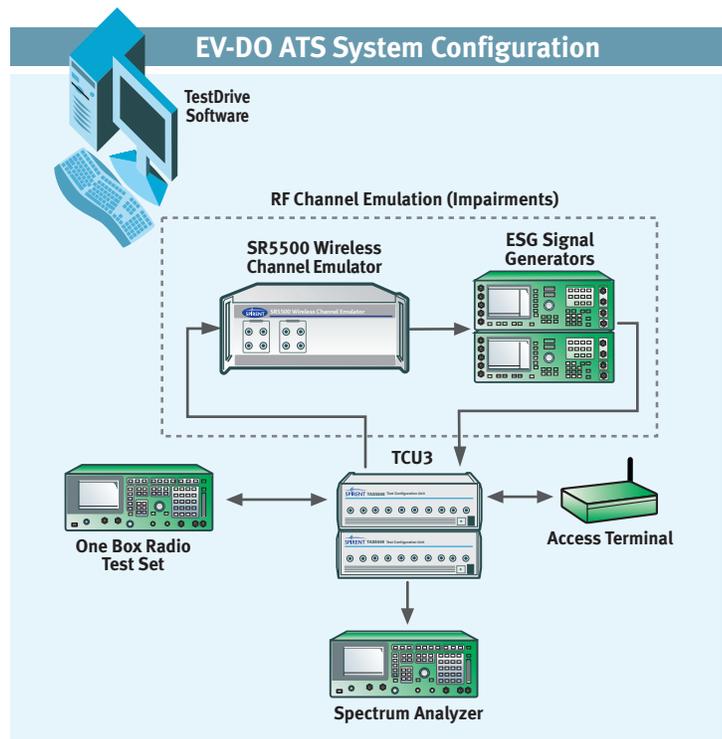
Analyze | Assure | Accelerate™

EV-DO ATS System Architecture

EV-DO ATS provides a complete test bed for the evaluation of EV-DO mobile device performance. The system is equipped with a powerful software application that enables automated, closed-loop device testing. The TestDrive EV-DO test application software configures the system, executes tests, and collects test results.

A commercially-available one box radio test set supplies the call processing required to execute a wide range of physical layer transmitter and

receiver parametric tests. Receiver performance is precisely characterized under impaired forward link conditions created by the SR5500 Wireless Channel Emulator. An RF spectrum analyzer enables thorough mobile transmitter evaluation and automated system calibration. The Test Configuration Unit interconnects these instruments and allows the system to be dynamically reconfigured under software control for optimum performance.



EV-DO ATS is a comprehensive test setup that provides the most complete and automated coverage of TIA-866.

Spirent System Components



The EV-DO ATS System is a configuration of Spirent test instruments and software. Each component adds unique value to this complete EV-DO test system.

TestDrive Automatic Test Executive

A Windows-based software test executive that implements tests specified in key EV-DO test standards.

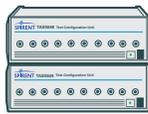
- Automates TIA-866 test execution
- Supports industry standard and custom test cases
- Collects and presents test results



SR5500 Wireless Channel Emulator w/ AWGN

Industry standard for accurate and repeatable fading emulation.

- Accurately emulates multi-path fading, delay spread, and path loss
- AWGN provides extremely accurate C/N ratios
- Dynamic channel models with sliding delay characterize rake receiver performance



TCU3 Test Configuration Kit

Automatically manages the switching of RF connections in the system.

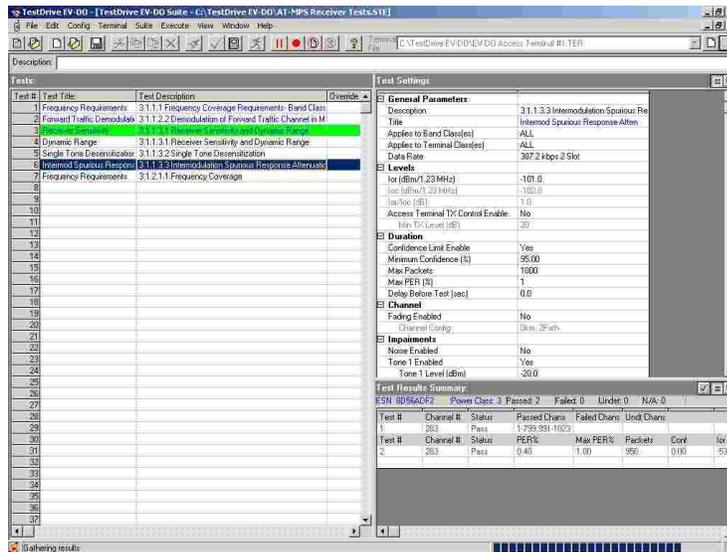
- Integrates system instruments for calibrated levels at device antenna
- Dynamically reconfigures system under software control
- Includes controller and integration hardware

TestDrive EV-DO Test Application Software

TestDrive EV-DO is an advanced application-specific test executive that automates all aspects of test execution, data collection, and results reporting. Test suites are defined and stored in terms of TIA-866 (AT-MPS) test parameters, not instrument-specific settings, making it simple to correlate parameter values to TIA-866 test conditions. TestDrive translates the test standards into the appropriate instrument configurations.

Upon test execution, TestDrive automatically configures all of the instruments in the system and coordinates the test execution required to evaluate mobile performance. TestDrive collects and archives all relevant test conditions and results in an industry-standard MS Access database. Integrated report generation makes it easy to extract and display key performance metrics from the archived data.

The TestDrive test executive provides a structured means to automatically execute a series of test procedures. Test campaigns are organized into a test session, comprised of one or more test suites. Test suites are a collection of individual tests, each designed to evaluate a particular aspect of the mobile device's performance. Any combination of tests, test suites, and test sessions can be saved and recalled, allowing test campaigns to be quickly set up and executed.



TestDrive EV-DO automates all aspects of test execution, data collection, and results reporting

Industry Standard Test Suites

TestDrive EV-DO is a simple to use solution for testing a mobile device to key industry standards. Pre-defined test suites can be quickly loaded and executed at the touch of a button. TIA-866 test cases are available for TestDrive.

TIA-866 tests define the minimum parametric performance of CDMA mobile devices. Utilizing TestDrive test suites eliminates the need to comb

through test standards and attempt the mapping of test conditions to instrument settings. Industry standard tests are regularly updated and Spirent makes available the corresponding software updates.

Pre-defined tests can be easily modified via TestDrive's graphical user interface to create an unlimited number of custom test conditions.

Test #	Test Title	Test Description	Override
1	Frequency Requirements	3.1.1.1 Frequency Coverage Requirements: Band Class	
2	Forward Traffic Demodulation	3.1.1.2.2 Demodulation of Forward Traffic Channel in M	
3	Receiver Sensitivity	3.1.1.3.1 Receiver Sensitivity and Dynamic Range	
4	Dynamic Range	3.1.1.3.1 Receiver Sensitivity and Dynamic Range	
5	Single Tone Desensitization	3.1.1.3.2 Single Tone Desensitization	
6	Intermod Spurious Response	3.1.1.3.3 Intermodulation Spurious Response Attenuati	
7	Frequency Requirements	3.1.2.1.1 Frequency Coverage	

By providing pre-defined test suites, TestDrive EV-DO makes it easy to assure compliance with industry standards

TIA-866 Minimum Performance Test Suites

Spirent offers comprehensive test suites covering the TIA-866 Recommended Minimum Performance Standards for CDMA2000 High Rate Packet Data Access Terminal (3GPP2

C.S0033). Test suites are provided for transmitter and receiver performance analysis. These suites include test cases for multiple band classes and channel numbers.

Test suite features include:

- Multi-band testing from a single test session
- Ability to specify multiple test channels in a single test suite

Mobile Settings		Test List				
		#	Forward Freq (MHz)	Forward Loss (dB)	Reverse Freq (MHz)	Reverse Loss (dB)
E) General Parameters		1	800	1.0	800	1.0
Description	EV-DO AT	2	850	1.0	850	1.0
System Type	IS-866	3	900	1.0	900	1.0
Channel Number	450	4	900	1.0	900	1.0
Channel Number(s) for Test	25,500, 450, 750	5	1700	1.0	1700	1.0
Reverse for Call Setup Channels	Off	6	1800	1.0	1800	1.0
Call Setup Channels	Off	7	1900	1.0	1900	1.0
Band Class	1-PCS	8	2000	1.0	2000	1.0
ISN		9				
Antenna Gain (dB)	0.5	10				
Terminal Class	Auto	11				
E) Data Connection Setup		12				
Minimum Connect Setup Level (dBm)	-90.0	13				
Connect Retry	4	14				
Connect Retry Delay (sec)	1	15				
Connect Retry Max	5	16				
Connect Timeout (sec)	30	17				

TestDrive EV-DO's powerful test suites make it easy to execute tests at multiple RF channels

Programmable Test Parameters Enable Custom Test Scenarios

In addition to providing standard test cases, TestDrive EV-DO offers the user the ability to customize test conditions by exposing all key test parameters.

Performance conditions can be readily accessed and customized using TestDrive's GUI interface. TestDrive EV-DO uses the same parameter labels specified in TIA-866 so parameters are defined per the industry standard. In addition to allowing TIA-866 test

conditions to be customized, TestDrive permits an individual user to optimize test settings according to his own needs. All test parameter fields have range-checking, assuring that only valid values will be used during performance analysis.

Built-in macros allow the user to quickly create a sweep of test conditions. Global test case edits are also possible through the GUI.

TestDrive EV-DO allows test suite parameters to be modified for custom test development

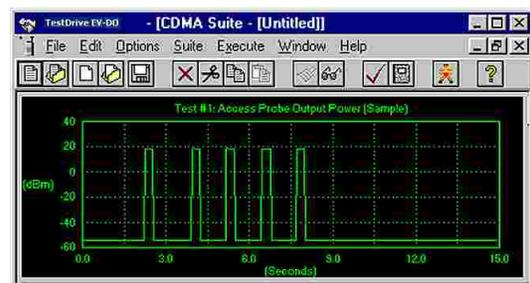
Test Settings:	
General Parameters	
Description	3.1.1.2.2 Demodulation of Forward T
Title	Forward Traffic Demodulation
Applies to Band Class(es)	ALL
Applies to Terminal Class(es)	ALL
Data Rate	307.2 kbps 2 Slot
Levels	
Tot (dBm)/1.23 MHz	-53.0
Totc (dBm)/1.23 MHz	-54.0
Tot/Totc (dB)	1.0
Access Terminal TX Control Enable	Yes
Min TX Level (dB)	20
Duration	
Confidence Limit Enable	Yes
Minimum Confidence (%)	95.00
Max Packets	1000
Max PER (%)	1
Delay Before Test (sec)	0.0
Channel	
Fading Enabled	Yes
Channel Config	1000m_3Pskh
Impairments	
Noise Enabled	Yes
Tone 1 Enabled	Yes
Tone 1 Level (dBm)	-20.0
Tone 1 Offset (kHz)	300
Tone 2 Enabled	Yes
Tone 2 Level (dBm)	-20.0
Tone 2 Offset (kHz)	1700

Comprehensive Test Results

TestDrive EV-DO makes it easy to collect and analyze mobile device test results and over-the-air message logs. All test parameters and results are stored in an MS Access database for post-processing. Storing a complete set of test data ensures the traceability of test results. This data includes detailed information describing the identity and characteristics of the device under test. TestDrive is equipped with a flexible report generation feature that uses the data to deliver results in a variety of user-friendly, meaningful formats.

Results formats have been added to TestDrive that reflect those used by service providers and test labs to compare mobile device performance.

Since the data is archived with an industry standard tool, results can be exported to a host of third party formats such as MS Excel, MS Word, Crystal Reports and HTML. For measurements that benefit from a graphical results format, TestDrive captures, archives, and displays detailed measurement trace data.



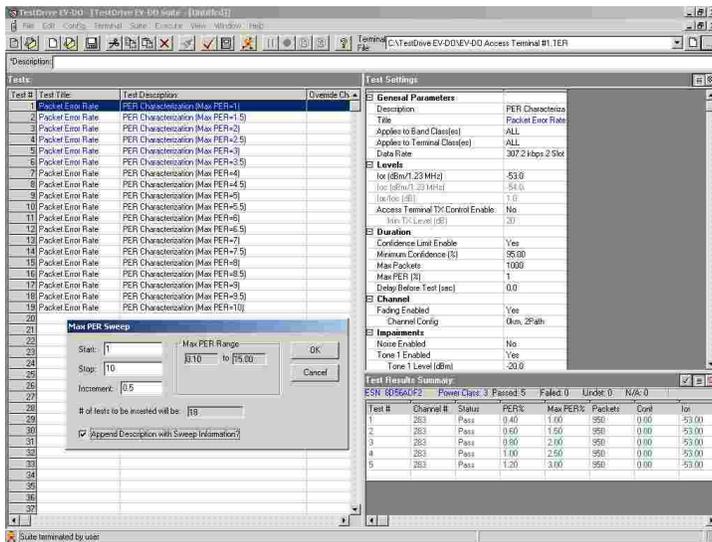
TestDrive EV-DO logs results for easy comparison against past performance

Automatic Performance Characterization Identifies Performance Breakpoints

Industry standard tests define minimum performance specifications. A thorough evaluation of a mobile device requires going beyond these baseline test scenarios to identify performance breakpoints. This test methodology is used to determine the device's operating margin or to perform a competitive evaluation. It is crucial to

characterize the worst-case conditions the mobile device can tolerate while still meeting a user-defined performance threshold. Since these tests involve evaluating the device versus adverse radio channel conditions, they are focused on parametric receiver evaluation. TestDrive EV-DO enables the user to characterize performance breakpoints versus an array of dynamic fading scenarios, receive signal levels, and co- and adjacent channel interference conditions.

TestDrive EV-DO utilizes an intelligent search algorithm to seek out performance thresholds. Using Automatic Performance Characterization (APC), the user specifies the end points of the range to be evaluated and the corresponding minimum performance criteria of the device. APC automatically executes only the tests necessary to reveal the most severe conditions under which the performance threshold is satisfied.



TestDrive EV-DO can be configured to automatically seek and identify receiver performance breakpoints

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