CDMA Network Emulation
AirAccess®

Powerful air interface performance analysis solutions for 1X and 1xEV-DO CDMA terminals

CDMA terminal manufacturers face many test hurdles before they can bring a product to market. Network service providers need to carry out terminal evaluation and compliance testing. The demanding scope of these requirements requires lab test solutions with a feature-rich network emulation capability - not available until now.

In clear contrast to real infrastructure equipment, one box radio test sets, or program-driven protocol conformance test systems, Spirent’s AirAccess CDMA Network Emulators have the power and flexibility to perform rapid analysis of CDMA terminal performance as well as being scaleable to complete Minimum Performance, Signaling Conformance or Location-Based Services tests.

All of the AirAccess systems offer a full-featured, highly configurable, real-time CDMA network with a dynamic state machine engine. Unlike program-driven protocol conformance test systems, AirAccess systems can run user-defined test scenarios without any requirement for complex programming or scripting, and with response times representative of a real network.

The AirAccess family of network emulators meet the needs of all CDMA testing requirements:

- **AirAccess C2K** provides multi-cell emulation of a CDMA2000 1X network, including backwards compatibility of 2G air interface specifications.
- **AirAccess 1xPLUS** provides a single integrated solution for both 1X and 1xEV-DO network emulation. This enables the testing of 1X-only devices, 1xEV-DO-only devices, or Hybrid Access Terminals (HATS) with one test configuration.

AirAccess provides simultaneous multi-sector, multi-BSC emulation of cdmaOne, CDMA2000 and 1xEV-DO networks with two independent carrier frequencies, enabling testing of true soft, hard and inter-generation handoffs, plus pilot pollution.

Powerful, easy-to-use GUI software gives comprehensive control over critical network services, parameters and messages, displays real-time messages and event analyses and logs Layer 2 and Layer 3 messages. Custom message generation and call flow modification provide complete control of the testing environment.

When integrated with Spirent’s TASKIT software, the scope of AirAccess’ capabilities and its Instrument API make it a powerful component of an TIA/EIA-898, TIA/EIA-98 or Location-Based Services test solution, allowing a wide range of test cases to be automated.

Major Features:
- Real-time cdmaOne, CDMA2000 1X and 1xEV-DO network emulation with inter-generation handoff
- Powerful GUI for easy test scenario creation, without test script generation or software programming
- Multi-sector, multi-BSC emulation and two independent carrier frequencies for true soft and hard handoffs, plus pilot pollution testing
- Real-time message and event analyzer
- Allows testing of HATs and dormant handoffs between CDMA2000 1X and 1xEV-DO systems
- Includes Test Application Protocol (TAP) for 1xEV-DO terminal testing

Applications:
- Product Development
- Design Verification Test
- Quality Assurance
- Product Evaluation
- Carrier Compliance Labs
- Field and System Performance Analysis

Supports overlay services such as SMS, OTA, data and E91
Embedded Mobile IP and DMU support for testing the latest packet data services
Instrument API for Minimum Performance, Signaling Conformance and Location-Based Services testing
Supports all currently deployed CDMA band classes
Provides in depth Fast Forward Power Control (FFPC) testing
Universal Diagnostic Monitor (UDM) option displays terminal’s real-time performance and parameter data
AirAccess provides programmable, bench-top emulation of cdmaOne, CDMA2000 1X and 1xEV-DO radio access networks and relevant network elements. AirAccess delivers a consistent and repeatable test platform for verification of signaling and messaging conformance. This is accomplished by implementing network entities required for a CDMA network (AN, MSC, BSCs, BTSs and Authentication Center), as well as the additional network entities required to provide overlay services (IWF, PCF, PDSN, IWF, SMS Server and OTA Server).

AirAccess interfaces with the SR5500 Wireless Channel Emulator and the TAS5600 Universal Interference Emulator to emulate air interface impairments present in a CDMA network.

AirAccess emulates complex CDMA radio access networks with full network switching center to mobile terminal antenna coverage.

AirAccess' dynamic state machine and interactive GUI make generation of complex test scenarios, such as handoffs, a simple task.

- No need to write complex programs or scripts
- Real-time emulation with response times representative of a real network
- Multi-sector and multi-BSC emulation with two independent carriers
- Comprehensive control over critical network services, parameters and messages
- Real-time message and event analysis and Layer 2 and Layer 3 message logs
- Custom message generation and call flow modification
Industry Standard Testing — AirAccess C2K and TASKIT/C2K provide the functionality necessary for automated TIA/EIA-98 and TIA/EIA-898 coverage.

Critical to the commercial launch of a CDMA terminal is the successful completion of industry standard test suites. AirAccess C2K couples with powerful TASKIT/C2K test executive software to provide maximum coverage of TIA/EIA-98 Minimum Performance requirements and TIA/EIA-898 Signalling Conformance tests all in a single system. TASKIT/C2K automates all aspects of test execution, data collection and results reporting.

For TIA/EIA-98 testing, AirAccess complements the functionality typically found in a one-box radio test set by providing multiple BTS operation and advanced control of the CDMA protocol.

For TIA/EIA-898 testing, AirAccess provides the control and flexibility essential for interoperability testing, including evaluation of overlay services such as OTA, SMS and data. In either case, the system integrates the SR5500 Wireless Channel Emulator and the TAS5600 Universal Interference Emulator to create the required channel models and interference.

A comprehensive test setup provides the most complete and automated coverage of TIA/EIA-98 and TIA/EIA-898.

TASKIT/C2K GUI allows easy selection and configuration of tests, and provides real-time progress indication.
Position Location Test System
AirAccess is an integral part of Spirent’s complete location-based services test system. The location-based services market is experiencing explosive growth due to both commercial opportunities and government-mandated requirements. Spirent Communications combines the real-time, multi-cell network emulation of AirAccess with its world-leading GPS simulation products to create the industry’s only integrated position location test system.

Advanced Overlay Services — AirAccess provides essential features for evaluating overlay services
Advanced services overlaid on top of the CDMA air interface protocol supply critical provisioning and value-added features to a CDMA mobile device. AirAccess simplifies testing of these features with built-in, application-specific routines. An intuitive graphical user interface is presented for each feature set to optimize verification of this advanced device functionality.

Intuitive GUI features allow easy testing of advanced services

- Fully integrated Spirent solution
  - single-source high performance instruments
  - synchronized and calibrated
  - application-specific GUI
- Control and repeatability
  - exceeds minimum performance test requirements
  - repeatable test conditions, not possible with field test methods
- Support for IS-801.1 signaling
- Data burst and TCP/IP delivery methods
- Addresses AFLT, GPS and hybrid test requirements
- Allows system testing of PDE and mobile terminals
The AirAccess application software utilizes a high-speed protocol processing engine to create a powerful protocol state machine. This state machine allows real-time evaluation of a CDMA mobile device as if it was interacting with actual network infrastructure. Unlike testing with a real network, though, the AirAccess state machine gives the user complete control over network configuration parameters. Test parameters can be modified in real-time without the need to go off-line to create individual test programs.

Key programmable network parameters include:
- Band classes
- Code channels
- Walsh functions for CDMA code channels
- Radio configurations
- Network elements configured via settable parameters (parameter settings are reflected in CDMA message fields)
- Re-configuration of the upper-layer signaling flow
- All overhead message fields on a per BTS basis
- All forward-link message fields (including reserved fields)
- Forward-link messages, customized and transmitted on-demand

Full configuration of message and fields provides maximum state machine flexibility

AirAccess features comprehensive reporting and logging of messaging and events. Entries are reported within the Windows interface in real-time, and saved to an industry-standard-format log file. All test logs can be recalled and analyzed at a later date, and all entries are time-stamped with system time for precise traceability.

The Message Analyzer window records:
- CDMA signaling messages
- RLP control frames
- RLP data frame headers

The Event Analyzer window records:
- L3 state change (e.g. Conversation → Idle)
- Expiration of a timer
- Detection of preamble
- Test results
- Error messages

Real-time message logging and detailed parsing are a part of AirAccess' powerful troubleshooting toolbox
Handoff Performance Analysis — Create complex handoff scenarios in the lab using AirAccess

AirAccess allows multiple configurations of BSCs and BTSs to support complex handoff scenarios. AirAccess C2K allows operators to select a configuration that provides two BSCs, each with independent selection of frequency and protocol emulation. In addition, an AirAccess 1xPLUS system allows two access points (APs) to be configured on separate RF carriers. This allows independent impairments on 1xEV-DO sectors for testing of an access terminal’s dynamic DRC pointing algorithm.

AirAccess supports the following handoff scenarios:
- Idle handoffs
- Access handoffs
- Soft handoffs
- Hard handoffs
- Inter-generation handoffs (cdmaOne — CDMA2000)
- Dormant data handoffs (cdmaOne/CDMA2000 — 1xEV-DO)

AirAccess architecture allows thorough testing of handoff scenarios.

Data Performance Analysis — AirAccess exercises a mobile’s circuit-switched data, high speed 1X packet data, and high data rate 1xEV-DO packet data performance

Data is one of the key features driving the wireless market to third generation services. AirAccess implements Packet Control Function (PCF) and Packet Data Serving Node (PDSN) functionality to support high-speed packet data services. An Inter-Working Function (IWF) with AT command interpreter is also emulated to provide circuit-capability. These features allow testing of the most current data requirements.

AirAccess provides the following data functionality:
- Supports CSD, HSPD and 1xEV-DO packet data
- RLP1, RLP2 and RLP3
- Asynchronous data and facsimile transmission
- RLP, PPP and TCP/UDP monitoring points
- Functional testing via popular software applications
- Ethernet data port for connection to external servers or test equipment

Data stacks implemented with AirAccess provide circuit-switched and packet data functionality.

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<td>RLP</td>
<td>Ethernet</td>
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<td>IS-95/IS-2000/1xEV-DO</td>
<td>Soft Modem</td>
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<td>BTS/BSC</td>
<td>PDSN/IWF</td>
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System Configurations
AirAccess provides scalable hardware to support different testing requirements. Two configurations are available based on the air interface technology of the device under test.

**AirAccess C2K**
AirAccess C2K provides robust, multi-sector emulation of cdmaOne and CDMA2000 1X wireless networks. AirAccess C2K utilizes one or two SR3452 CDMA Network Emulators, allowing AirAccess C2K to provide support for CDMA2000 1X mobile device software development through conformance/compliance tests. When equipped with two SR3452s, dual RF transmit and receive paths enable interfrequency testing and independent channel impairment scenarios, with support for all currently deployed CDMA band classes.

**AirAccess 1xPLUS**
AirAccess 1xPLUS combines the feature set of AirAccess C2K with EV-DO network emulation for a single, integrated system. This system provides the ability to perform thorough testing of all varieties of CDMA2000 1X and 1xEV-DO terminals, including Hybrid Access Terminals. AirAccess 1xPLUS utilities the baseband capabilities of two SR3452 CDMA Network Emulators and the TAS3460 1xEV Network Emulator, along with the embedded dual RF carriers within the SR3452s to provide simultaneous emulation of both CDMA2000 1X and 1xEV-DO networks.
AirAccess Ordering Information

### AirAccess C2K

- **AAC2K-RF-BX** AirAccess C2K Single Channel RF Network Emulation:
  - SR3452 CDMA Network Emulator
  - Main Application Software
  - Custom-configured computer with pre-installed software
- **AAC2K-RF-CX** AirAccess C2K Dual Channel RF Network Emulation:
  - Dual SR3452 CDMA Network Emulator
  - Main Application Software
  - Custom-configured computer with pre-installed software
- **AAC2K-CSD** Circuit-switched Data Software Module (option)
  - Provides the software emulation of RLP and IWF necessary to perform asynchronous data testing
- **AAC2K-HSPD** High-Speed Packet Data Software Module (option)
  - Provides the software emulation of RLP, PCF and PDSN necessary to perform high-speed packet data testing
- **AAC2K-OSVC** Overlay Services Software Module (option)
  - Provides the software emulation of an SMS server and an OTA server necessary to perform two-way SMS, OTASP and OTAPA testing
- **AAC2K-95B** IS-95-B Software Module (option)
  - Provides air interface support for the IS-95-B specification, including Medium Speed Packet Data on Fundamental Channels
- **AAC2K-MIP** Mobile IP Software Module (option)
  - Provides Home Agent (HA) and Foreign Agent (FA) emulation necessary for Mobile IP testing
- **AAC2K-DMU** Dynamic Mobile IP Key Update Software Module (option)
  - Provides emulation of DMU functionality to verify a mobile's over-the-air Mobile IP key exchange capability

### AAC2K-APISDK
- Instrument API Software Development Kit (option)
  - Documentation of Instrument API function library
  - Example scripts written in Visual Basic
  - Instrument API runtime license
  - First year of Instrument API SDK Annual Support Agreement

### AAC2K-APIRUN
- Instrument API Runtime License (option)
  - Required for execution of I-API scripts

### AirAccess 1xPLUS

- **AA-1XPLUS** AirAccess 1xPLUS Network Emulation:
  - Dual SR3452 CDMA Network Emulators
  - TAS3460 1xEV Network Emulator
  - Main Application Software
  - Custom-configured computer with pre-installed software
  - AAC2K-CSD, -HSPD, -OSVC, -95B and -MIP Software Modules
  - Universal Diagnostic Monitor

### Accessories

- **AA1X+-RACK** Rack for AirAccess systems

Complete Annual Service Agreements are available for all hardware and software components. Upgrade packages are available to convert an AirAccess C2K to an AirAccess 1xPLUS system. Please contact your sales representative for pricing information.