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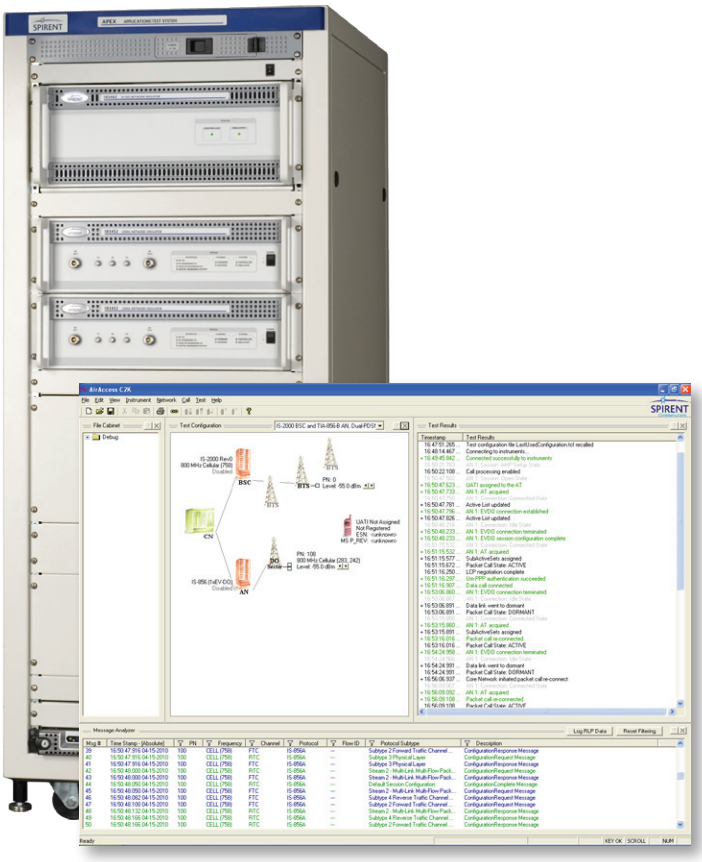
SPIRENT AirAccess®

CDMA/EV-DO Network Emulator

AirAccess' real-time state machine emulates an entire network for testing mobile devices designed for CDMA, EV-DO Rev. 0/Rev. A/Rev. B and evolved High-Rate Packet Data (eHRPD) service. An intuitive GUI makes it easy to set up network scenarios for adversarial testing, data testing, handoff testing, and much more. Message logging and decoding minimizes the time required for analysis and debugging.

APPLICATIONS

- CDMA2000/EV-DO Handset Terminal Design
- Product Development
- Design Verification Testing (DVT)
- Quality Assurance
- Product Evaluation
- Carrier Compliance Labs
- Field and System Performance Analysis
- Data Service and Application Testing
- Adversarial Mobile Testing



This scalable solution ranges from a single channel for R&D or application testing to a multi-sector, multi-BSC network emulation with independent carrier frequencies. This configuration enables testing of true idle, access, soft, softer, hard, inter-generation, and dormant data handoffs, plus pilot pollution.

AirAccess' optional API makes it easy to write higher-level code that controls the instrument and runs automated dynamic scenarios. AirAccess also forms the heart of Spirent's automated test solutions for Minimum Performance, Signaling Conformance, and Location-Based Services (LBS).

BENEFITS

- *Reduced time to market* — An intuitive GUI makes testing trouble-free and efficient, in contrast to program-driven systems which require complex programming or scripting. Most functionality can be accessed with a few simple mouse clicks.
- *Brings the real world into the lab* — Realistic messaging, power control and timing creates realistic test scenarios. A real-time state machine behaves like a live network and supports standard interfaces between network components, so testing is comprehensive and conclusive. Resolve field issues by simulating and debugging in the lab.
- *Streamlined data service rollouts* — AirAccess links the mobile under test to an Ethernet connection for both Simple IP and Mobile IP (MoIP) analysis. Testing against data and application servers is as simple as plugging into the port... directly, through a LAN, or via the Internet.
- *Scalability* — A single-channel (1x/EV-DO) system can evolve into the heart of an automated system or anything in between. Add just the capabilities you need, when you need them.

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FEATURES

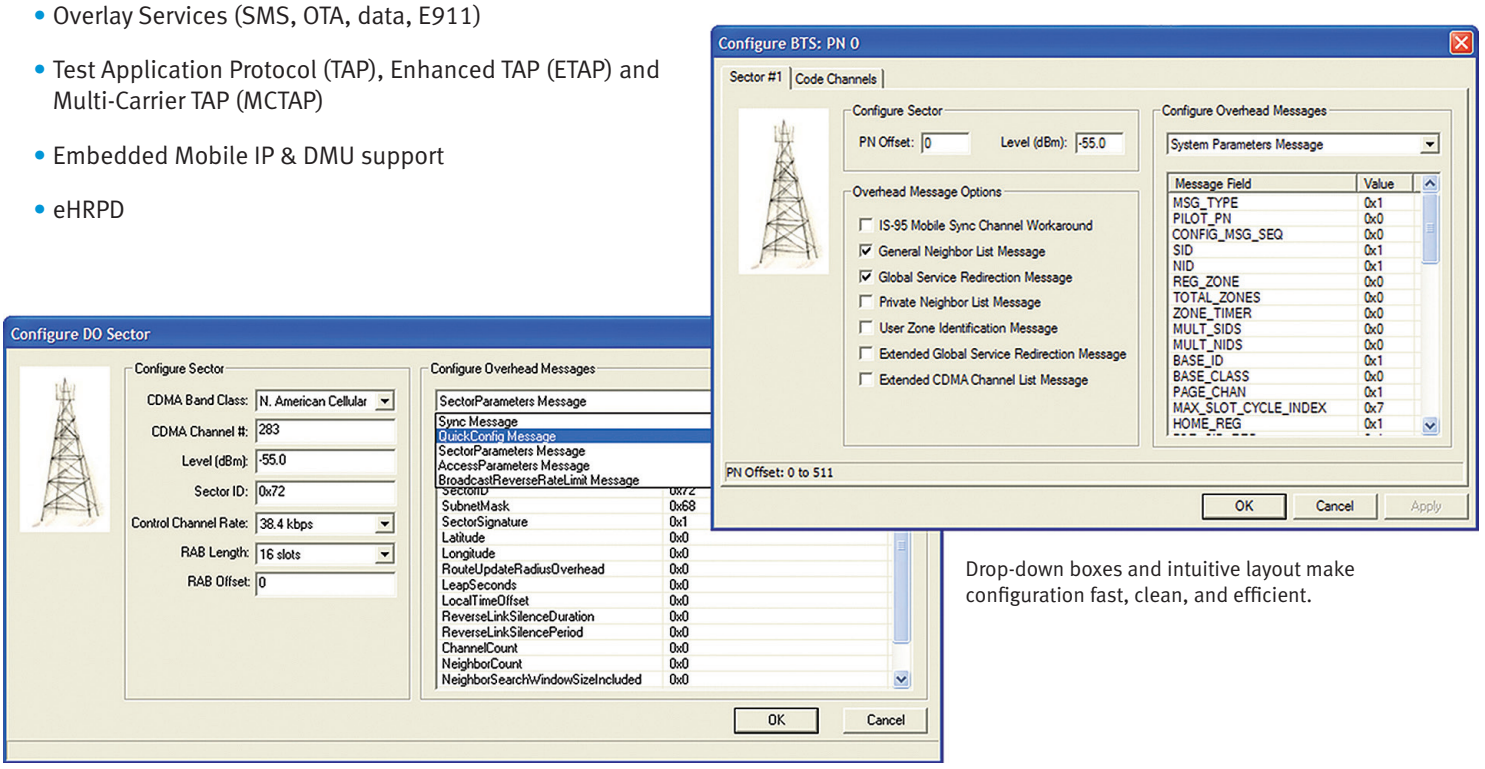
- 2G, 3G/EV-DO Rev. 0, Rev. A and Rev. B network emulation with inter-generational handoff
- The only complete and realistic Evolved Packet Core (EPC) emulation.
- Real-time state machine for realistic messaging and message timing
- Powerful GUI for easy test scenario creation without script generation or software programming
- Multi-sector, multi-BSC emulation and two independent carrier frequencies for true soft, softer and hard handoffs, dormant handoffs between CDMA2000 1X and 1xEV-DO systems, plus pilot pollution testing
- Instrument API for integration with automated Minimum Performance, Signaling Conformance, and Location-Based Services systems
- In-depth Fast Forward Power Control (FFPC) testing
- Real-time message and event analyzer displays and logs Layer 2 and Layer 3 messages
- Other
  - EV-DO Rev. A QoS support
  - Overlay Services (SMS, OTA, data, E911)
  - Test Application Protocol (TAP), Enhanced TAP (ETAP) and Multi-Carrier TAP (MCTAP)
  - Embedded Mobile IP & DMU support
  - eHRPD

INTUITIVE GUI FOR FAST, ERROR-FREE SETUP

DVT, debugging and testing should not be bottlenecks in achieving your time-to-market goals.

AirAccess' graphical software lets you zoom in on low-level parameters without having to pore through manuals or specifications. Designed by engineers for engineers, the GUI's clean interface makes it easy to "dive deep" and control the fine details of emulating a complete network.

With AirAccess, details are coded into drop-down boxes and laid out so that the most complex network configuration can be set up in a few minutes, with just a few mouse clicks. Once a configuration has been set, it can be saved and stored for future use.



Drop-down boxes and intuitive layout make configuration fast, clean, and efficient.

REAL-TIME STATE MACHINE

AirAccess uses a real-time state machine rather than a script-driven simulation. All overhead, Layer 2 and Layer 3 messages are delivered with the same timing and with the same real-life responses as a live network.

Never again miss a timing bug because a script-driven state machine wasn't capable of catching it. Never miss a protocol bug because a "call box" or "one-box radio test set" in the lab did not fully implement real-world network/packet core responses.

OPTIONAL API FOR CUSTOM AUTOMATION

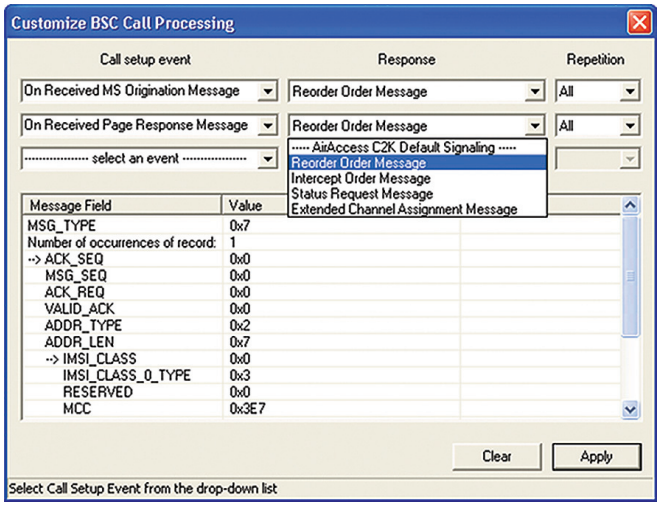
The available AirAccess Instrument Applications Programming Interface (I-API) is the same powerful API used to integrate AirAccess C2K into the industry's most trusted automated test systems. The AirAccess I-API is accessed as a COM object, affording very efficient code development. Drop-down boxes and sample code make software control of the AirAccess nearly as straightforward as using the GUI. In fact, the AirAccess I-API offers code control of all the same functionality found in the AirAccess C2K GUI.

MESSAGE AND EVENT ANALYSIS

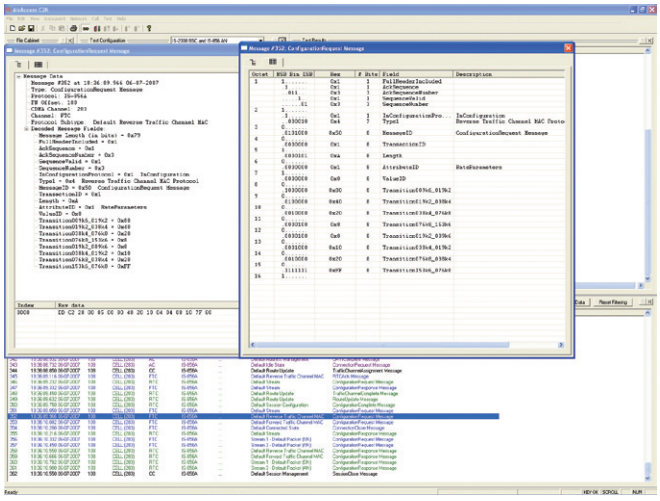
As you work with AirAccess, the software continually parses and logs the Layer 2 and Layer 3 messaging required in the interface between a mobile and a network. Unlike script-based protocol testers, AirAccess' full-featured protocol engine constantly verifies message contents, just as a live network will.

Double-clicking a message in the Message Analyzer window displays a fully parsed and decoded message for "deep-dive" analysis of message fields. Bugs that might otherwise take hours to find (or never be caught) are brought to the forefront in a matter of seconds.

Many AirAccess customers claim that this feature alone has saved them from weeks of lost time, and in some cases from deploying a buggy product.



Real-time network emulation using a dynamic state machine.



AirAccess captures and decodes messaging so it's easy to isolate DUT issues.

TECHNICAL SPECIFICATIONS

The following specifications describe warranted performance over the temperature range 0-40 degrees C and include a 30 minute warm-up time from ambient conditions. All specifications are measured at 892.7 MHz and 1962.5 MHz unless stated otherwise. Supplemental characteristics are in italics and provide useful information by giving non-warranted performance parameters.

RF GENERATOR		
Pilot Relative Level	-63.0 to -0.1 dB (0.1 dB res)	
Sync Relative Level	-63.0 to -0.1 dB (0.1 dB res)	
Paging Relative Level	-63.0 to -0.1 dB (0.1 dB res)	
QPCH Relative Level	-63.0 to -0.1 dB (0.1 dB res)	
FCH Relative Level	-63.0 to -0.1 dB (0.1 dB res)	
SCH Relative Level	-63.0 to -0.1 dB (0.1 dB res)	
OCNS Walsh Code Length	Fixed to 64	
OCNS Relative Level Range	Calculated automatically from the relative levels of the other code channels to provide a composite power level that is equal to the programmed sector power	
CDMA Modulation	Modulation Type:	
	1X:	Parallel BPSK for Pilot, Sync and Paging channels; Complex QPSK for FHS and SCH channels
	1xEV-DO:	BPSK, QPSK, 8-PSK, 16-QAM
Independent RF Carriers	1 RF output per SR3452 V2	
Frequency	Frequency Range:	Band Class 0 (869 MHz to 894 MHz)
		Band Class 1 (1930 MHz to 1990 MHz)
		Band Class 3 (832 MHz to 869 MHz)
		Band Class 4 (1840 MHz to 1870 MHz)
		Band Class 5 (421 MHz to 494 MHz)
		Band Class 6 (2110 MHz to 2170 MHz)
		Band Class 14 (1930 MHz to 1995 MHz)
		Class 15 (2110 MHz to 2155 MHz)
	Frequency Resolution:	500 Hz
	Frequency Setting:	By channel number
Amplitude	RF Output Level Range:	-100 dBm/1.23 MHz to -38 dBm/1.23 MHz
	RF Output Level Resolution:	0.1 dB
	Absolute Output Level Accuracy:	*±1 dB*
CDMA Modulation Quality	Residual Rho › 0.99	
RF RECEIVER		
Independent RF Carriers	1 RF output per SR3452 V2	
Frequency	Frequency Range:	Band Class 0 (824 MHz to 849 MHz)
		Band Class 1 (1850 MHz to 1910 MHz)
		Band Class 3 (887 MHz to 925 MHz)
		Band Class 4 (1750 MHz to 1780 MHz)
		Band Class 5 (411 MHz to 484 MHz)
		Band Class 6 (1920 MHz to 1980 MHz)
		Band Class 14 (1850 MHz to 1915 MHz)
		Band Class 15 (1710 MHz to 1755 MHz)
	Frequency Resolution:	500 Hz
Input Level Range	-50 dBm/1.23 MHz to 25 dBm/1.23 MHz	

TECHNICAL SPECIFICATIONS (CONT'D)

TIMEBASE SPECIFICATIONS		
Internal System Reference		
Frequency	10 MHz	
Accuracy	± 0.05 ppm	
Stability	Temperature	± 0.015 ppm
	Aging	± 0.001 ppm/day
Phase Noise @ 1 kHz offset	-165 dBc/Hz	
Output	Connector	BNC-type, female
	Impedance/Coupling	50 Ω/AC
	Level	1 VPP
	Impedance/Coupling	
	Level	
TRIGGER/CLOCK/SYNC INTERFACES		
CDMA Trigger Output (1X)	Connector	DB-25, female
	Signals	Frame boundaries (1.25, 20, 26.67 and 80 ms)
		PPS2 (even-second pulse)
		PN-1 and PN-Q (I and Q channel pseudorandom Noise)
		1x (1 times chip rate) clock – 1.2288 MHz
		2x (2 times chip rate) clock
		(frame boundaries and PPS2 are active-high, 50ns Wide pulse)
		Band Class 15 (1710 MHz to 1755 MHz)
	Level	LVTTL
Clocks (1X)	Connector	BNC, female
	Signals	CHIPx16 Out (16 times chip rate output)
		CHIPx16 in (16 times chip rate input)
	Level	LVTTL
Sync	Connector	BNC, female
	Signals	PP2S Out (even second pulse output) active high, 100ns wide pulse
	Level	LVTTL

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ADVANCED OVERLAY SERVICES

AirAccess uses built-in application-specific routines to simplify testing of advanced services overlaid on the CDMA air interface protocol. An intuitive graphical user interface aids in verifying Authentication, Encryption, Voice Privacy, OTASP/OTAPA, and Two-way SMS (including broadcast SMS).

DATA PERFORMANCE ANALYSIS

AirAccess was the first network emulation solution with a full-bandwidth IP connection between the emulated network and networked equipment. A simple Ethernet cable is all that's required to connect a mobile under test to data servers, file servers, and even Internet-hosted web sites and servers.

This industry-leading focus on data testing means that AirAccess provides much more than just a "pipe" to data servers. AirAccess also includes the network entities (IWF, PCF, PDSN, IWF, SMS Server and OTA Server) required to provide overlay services and high-speed packet data services for complete mobile performance testing.

AirAccess' data-testing capabilities include:

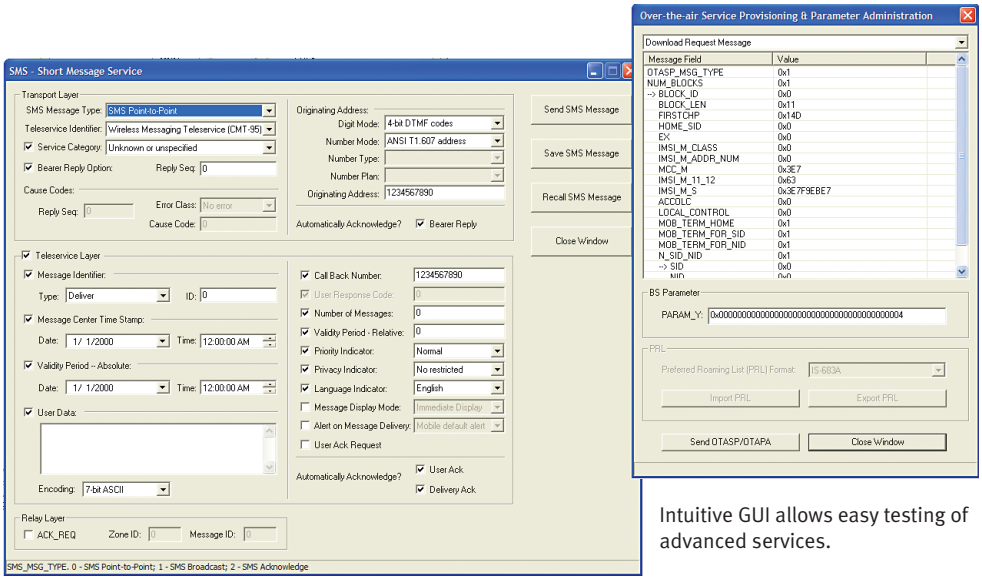
- EV-DO packet data using the Default Packet Application and Multi-Flow Packet Application
- RLP1, RLP2 and RLP3
- Asynchronous data and facsimile transmission
- RLP, PPP and TCP/UDP monitoring points
- Functional testing via popular software applications
- Ethernet data port for connection to external servers or test equipment

SINGLE-CHANNEL OPTION

The single-channel version of the AirAccess CDMA/EV-DO Network Emulator is a single-carrier bench-top network emulator. This scalable solution is just right for mobile device R&D, testing data application performance or protocol implementations.

The single-channel AirAccess is also the smart choice when you need professional emulation now and have plans that may grow your needs in the future. As requirements and business opportunities evolve, this bench-top solution can develop into a multi-carrier emulator or even to a large-scale automated device test system.

This configuration can be used as either a CDMA, EV-DO Rev. 0, or EV-DO Rev. A network emulator. It includes integrated PDSN emulation, so data application testing can begin as soon as you add the application server.



Intuitive GUI allows easy testing of advanced services.

eHRPD OPTION

AirAccess' new Evolved High-Rate Packet Data (eHRPD) option helps CDMA/EV-DO wireless network operators and device makers prepare for the transition towards the 3GPP's Long-Term Evolution (LTE) technology.

eHRPD will enable seamless mobility between the existing 3G network and LTE services which are currently being launched. The resulting overlay network has to offer nation-wide EV-DO service, pockets of LTE service and a transparent linkage between the two. This all introduces a new level of complexity in software and signaling protocols, and that means there is a new level of complexity in DVT and testing.

Since the long-term success of this complex transition will depend largely on the subscriber's first experience, the industry needs mobile devices that work right the first time. Proper mobile device testing requires a network emulator that accurately emulates new functional elements as well as legacy elements, and can deliver their outputs to the DUT in real time

AirAccess' excellent interactive bench-top capabilities are especially beneficial when you are developing new technology. The intuitive easy-to-use GUI alone shaves weeks off of time-to-market schedules.

Message and Event Analysis

Any new protocol such as eHRPD introduces new places for bugs to hide. AirAccess' renowned event analysis, real-time message decoding and logging help you uncover bugs quickly and painlessly. With AirAccess' real-time state machine, you won't miss bugs related to timing or unimplemented/reserved message fields. AirAccess is indispensable for the DVT and debugging cycles of eHRPD device development.

Rich Protocol Implementation Aligned With carrier Requirements

AirAccess roadmap is designed per information from cutting-edge network operators. Development is ongoing so you'll always have the protocol and signaling functionality you need to meet carrier requirements for the foreseeable future:

- Improved Extensible Authentication Protocol Method for 3rd Generation Authentication and Key Agreement (EAP-AKA')
- Vendor-Specific Network Protocol (VSNP) and the associated Vendor-Specific Network Control Protocol (VSNCP)
- PDN Connection Control Messages (PCCM) for PDN to assign IPv4 (for legacy applications) or IPv6 IP addresses to the mobile.
- "Always-on" IPv6 as well as IPv4 on demand
- Proxy Mobile IP (PMIP) – network-based mobility management performed network based
- Enhanced Multiflow Packet Application (EMFPA), including Radio Link Protocol (RLP), Location Update Protocol (LUP), Flow Control Protocol (FCP)
  - Negotiation of EMFPA attributes and logging/decoding of EMFPA over-the air signaling messages.

Adversarial Testing

The eHRPD option adds new scenarios to AirAccess' existing adversarial testing capabilities. Easily and intuitively emulate these network conditions:

- PDSN/FA error scenarios (EV-DO)
- PDSN does not send IPCP Configuration Request (EV-DO)
- PDSN does not respond to IPCP message from UE (EV-DO)
- PDSN/FA does not send Agent Advertisement when mobile sends Agent Solicitation (EV-DO)
- HSGW unavailable (two modes)
- IP address pool depletion
- PPP-VSNCP Configuration Reject from HSGW to UE
- No response to VSNCP Configure Request
- HSGW doesn't send Advertisement for IPv6 prefix allocation
- PPP-LCP Protocol Reject from HSGW to UE
- PPP-VSNCP Terminate Request from HSGW to UE
- EAP Failure Packets (AKA-Client-Error, AKA-Authentication-Reject, AKA-Synchronization-Failure)

eHRPD parameter control is built into the AirAccess Instrument Application Programming Interface (I-API) to facilitate custom automation. Exhaustive customized testing can be created and run with complete consistency.

EV-DO REV. B OPTION

AirAccess offers multi-carrier EV-DO Rev B emulation to align with carriers' current large-scale Rev. B rollouts. You can even emulate a 1X or Rev. A signal simultaneously with your multiple-carrier Rev B signal. Advanced features include:

- Multi-carrier Test Application Protocol (MCTAP)
- Bi-directional data throughput at maximum rates (critical for data testing)
- Dynamic adding or dropping of carriers

ORDERING INFORMATION

HARDWARE PART NUMBERS	
AA3452RF-BX-R01	AirAccess C2K Single Channel RF Network Emulation: – CDMA Network Emulator – Packet Core Network Emulator with real-time emulation of multiple PDSN nodes, Mobile IP and Simple IP simulation, Inter-PDSN handoffs – Main Application Software – Custom-configured computer with pre-installed software – AAC2K-HSPD, AAC2K-OSVC, AAC2K-APIRUN Software Modules
AA3452RF-CX-R01	AirAccess C2K Dual Channel RF Network Emulation: – Equivalent to AA3452RF-BX-R01 with two RF channels
AAC2K-TOTAL-HX	AirAccess C2K Dual Channel RF Network Emulation: – Equivalent to AA3452RF-CX-R01 plus software modules AAC2K-MIP, AAC2K-95B, AAC2K-DMU
AA-1XPLUS-EX	AirAccess 1xPLUS Network Emulation – Equivalent to AA3452RF-CX-R01 plus SR3462 EV-DO Rev. 0 and EV-DO Rev. A Emulator – AAC2K-95B, AAC2K-MIP software modules
AA-CFG3-SYS-01	AirAccess Single Channel RF Network Emulation: – SR3452 CDMA Network Emulator – SR3462 EV-DO . 0/Rev. A Network Emulator with internal Core Network Emulator and Switch – Main Application Software – Custom configured computer with pre-installed software – AAC2K-APIRUN Software module Note: This one-channel configuration provides either CDMA or EV-DO RF simulation but not both simultaneously.
AirAccess OPTIONS	
AAC2K-HSPD	High-Speed Packet Data Software Module (option) – Emulates RLP, PCF and PDSN for high-speed packet data testing
AAC2K-OSVC	Overlay Services Software Module (option) – Emulates SMS server and OTA server for two-way SMS, OTASP and OTAPA testing
AAC2K-95B	IS-95-B Software Module – Air interface support for the IS-95-B specification
AAC2K-MIP	Mobile IP Software Module – Emulates Home Agent (HA) and Foreign Agent (FA) for Mobile IP testing
AAC2K-DMU	Dynamic Mobile IP Key Update Software Module (option) – Emulates DMU functionality for over-the-air Mobile IP key exchange testing
AAC2K-SMSC-CLNT	SMSC Client Software Module – SMSC Client interfaces with third-party MMS server for MMS testing.
AAC2K-QOS	EV-DO Rev. A QoS Software Module – GUI-based control of QoS profiles and mapping profiles
AAC2K-APISDK	Instrument API Software Development Kit (option) – Documentation - 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 top execute I-API scripts)
AAC2K-EHRPD	– eHRPD option for AirAccess
AAC2K-DORB	– EV-DO Rev B option for AirAccess

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