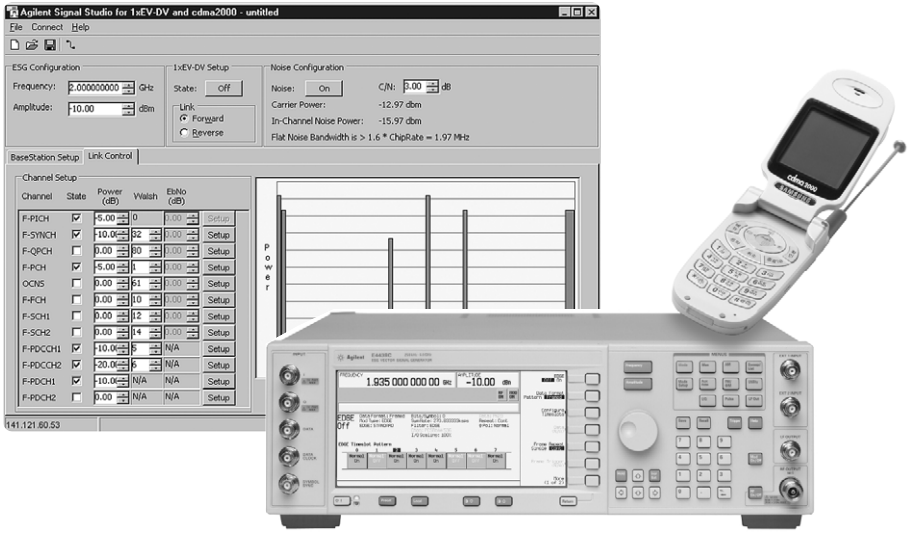
Agilent
Signal Studio for 1xEV-DV and cdma2000
E4438C ESG Vector Signal Generator

Option 414
Technical Overview



Test 3G Designs With Confidence

Signal Studio for 1xEV-DV and cdma2000 is a flexible software application for configuring 3GPP2 standards-based signals. The software works seamlessly with the E4438C ESG vector signal generator to generate RF test signals. The ESG also offers both single-ended and differential I/Q outputs for baseband testing.

Agilent's first-to-market solution enables you to meet your market windows with confidence in your design. You save valuable time using Signal Studio to configure test signals rather than hand-coding your own. You can be confident your designs and devices are tested with standards-based signals, no matter which one of the over 100 possible configurations you choose. The high level of signal coding enables thorough evaluation of receiver demodulation capabilities at various design stages, from baseband to RF.

Try Before You Buy!

Download Signal Studio to a PC and evaluate the user interface prior to purchase. To use the signals created by the software, each E4438C ESG vector signal generator must be licensed separately. The license key can be ordered through your sales engineer or the nearest sales office, which can be found at **http://www.agilent.com/find/assist**

Features

The convenient user interface simplifies signal creation for cdma2000 1x Evolution Data and Voice (1xEV-DV). Voice and packet data channels are configured in a few simple windows.

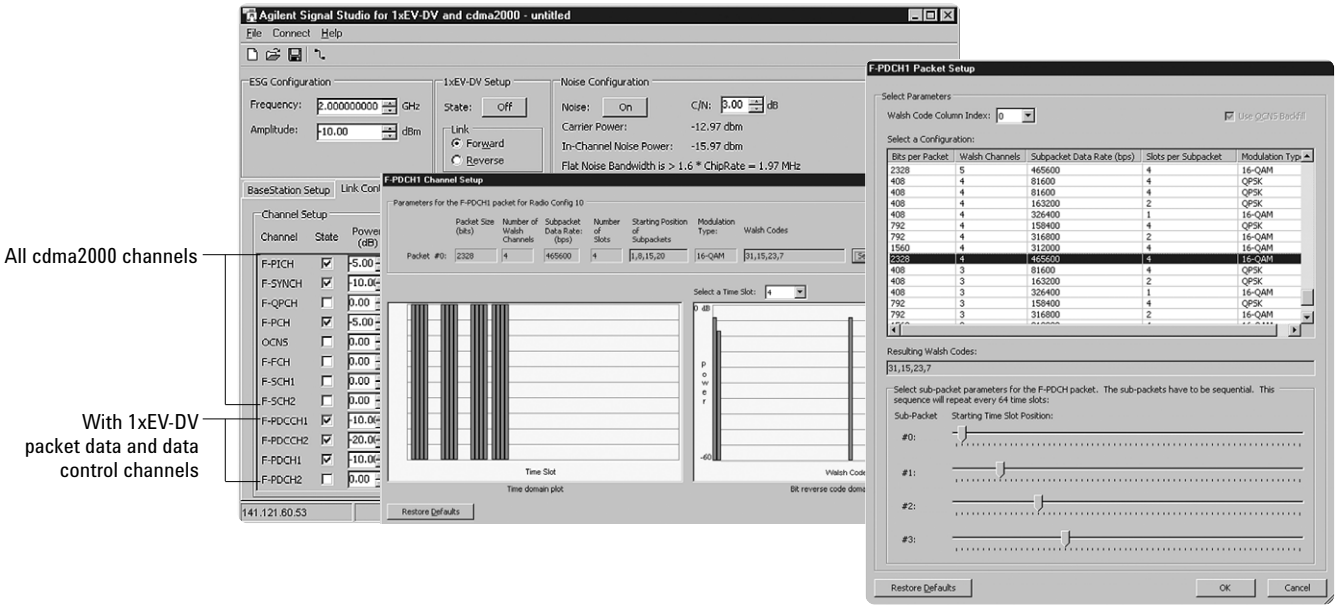
In the forward link, a complete 1xEV-DV solution is provided. The fully-coded test signals will assist you in designing mobile receivers and verifying the functionality of such receiver components as baseband ASICs. In the reverse link, voice-only cdma2000 capability is provided for base station receiver test.

In both the forward and reverse links, Signal Studio for 1xEV-DV and cdma2000 includes all the real-time cdma2000 (IS-2000) functionality of the E4438C ESG Option 401.

Benefits

- Simulate multiple users
  - Transmit multiple cdma2000 channels
  - Emulate concurrent active data channels and subpackets
- Full channel coding enables packet, frame or bit error rate (PER/FER/BER) tests
- Add a noise interferer
  - Set C/N value for calibrated AWGN
  - Monitor Eb/No values in reverse link
- Save setup time
  - Use pre-defined radio configurations
  - Changes to parameters update immediately (in real-time)

Agilent Technologies



Intuitive Setup of Channel Parameters

With the Signal Studio user interface, channel parameters are set in just a few windows. These windows can be viewed at the same time, and when appropriate, updates to lower-level parameters display in the higher-level window.

Code domain plots show the distribution of signal power across the set of code channels. Now you can visually check for code channel power levels and code domain conflicts without a vector signal analyzer. The PDCH display shows both the code domain plot and the subpackets distributed over the timeslots.

Save Setup Time With Radio Configurations

The Signal Studio user interface is set up according to standard radio configurations (RC): RC1 to RC5 and RC10 in the forward link, and RC1 to RC4 in the reverse link. For RC10, the parameters for any of the 127 configurations are automatically set when you choose the subpacket data rate. When you apply the changes, the signal generator is updated immediately without waiting for a waveform to build.

Channels Coded for PER and BER Testing

Use Signal Studio in testing the ability of the mobile receiver to detect packet errors. Signal Studio packets are encoded, interleaved, spread and modulated per 3GPP2 standards, including the frame quality indicator bits and tail bits, so that your receiver can demodulate and decode the packet transmission. You can configure test signals with QPSK (modulaiton order=2), as well as the newer 8PSK (MO=3) or 16QAM (MO=4) symbols. Pseudo-random noise data (PN9 and PN15) and user data are supported as the inputs to the coding process. A graphical bit editor is supplied for the PDCCH data, which enables the user to select from multiple data sources and easily insert error bits (or a percentage of errors) into the data.

Simulate Real-World Conditions

Turn on several traffic channels along with the packet data channels, all with various power levels to simulate a real-world transmission. The built-in software Help guide shows how to emulate the four active channels used for packet data in a realworld mobile station.

Add Noise to Data and Voice

For tests such as sensitivity, you can subject your device to voice, packet data and noise simultaneously. With the optional Calibrated Noise Personality for the E4438C ESG, an additive white Gaussian noise (AWGN) interferer can be configured in the same window as the cdma2000 and 1xEV-DV channels. The user is able to set the carrier-to-noise ratio (C/N). In the reverse link, Eb/No updates automatically whenever new C/N or channel power values are applied.

Features

BTS/mobile setup

Spread rate	SR1
Chip rate	1 kcps to 1.3 Mcps
PN offset	0 to 511
Even second delay	0.5 to 128 chips
Trigger (reverse link)	Trigger advance: 1 to 2457599, rising or falling edge
Long code state	0 to 3FF FFFF FFFF Hex
Phase polarity	Normal or invert
ESG baseband generator reference	Internal or external
Input/output	[BNC]: Event 1 out, Event 2 out, Pattern trigger in, Single-ended Analog I/Q out, Differential Analog I/Q out [AUX]: Data out, Data clock out, Symbol sync out, Alt power in, Event 3 out, Event 4 out
Filters	IS-95, IS-95 with equalizer, IS-95 modified (MOD), IS-95 MOD with equalizer, Rectangular, Nyquist, Root Nyquist, Gaussian

Forward link

Forward link channels	Pilot (F-PICH), synchronization (F-SYNC), quick paging (F-QPCH), paging (F-PCH), fundamental (F-FCH), supplemental 1 and 2 (F-SCH1, F-SCH2), orthogonally coded noise simulator (OCNS), packet data 1 and 2 (F-PDCH1, F-PDCH2), packet data control 1 and 2 (F-PDCCH1, F-PDCCH2)
Channel power	Voice channel power: –40 dBm to 0 dBm PDCH and PDCCH channel power: –60 dBm to 0 dBm

	Bit rate	Walsh code	Data	System time
F-PICH:		0 [non-adjustable]		
F-SYNCH:	1.2 kbps	0 to 127		0 to F FFFF FFFF Hex
F-QPCH:	2.4 or 4.8 kbps	0 to 127		
F-PCH:	4.8 to 9.6 kbps	0 to 63	Default paging message or user file	
F-FCH:	RC1: 1.2, 2.4, 4.8, or 9.6 kbps RC2, RC5: 1.8, 3.6, 7.2, or 14.4 kbps	0 to 63 [RC1, RC2, RC3, RC5], 0 to 127 [RC4]	PN9, PN15, 4-bit pattern, user file, or external serial data	
F-SCH1 and F-SCH2:	RC3: 19.2, 38.4, 76.8, 153.6 kbps RC4: 19.2, 38.4, 76.8, 153.6 or 307.2 kbps RC5: 28.8, 57.6, 115.2, or 230.4 kbps	0 to 631, 0 to 15, 0 to 7, 0 to 3 [RC3, RC4, RC5], 0 to 63 [RC4]		
OCNS:		0 to 63	Spread PN [uncoded]	
F-PDCCH1 and F-PDCCH2:	RC10: 29.6, 14.8, or 7.4 kbps	0 to 63	Continuous PN9/PN15, 4-bit pattern, user file	Set to first slot in PDCCH transmission
F-PDCH1 and F-PDCH2:	RC10: 81.6 kbps to 3.0912 Mbps [subpacket data rates]	0 to 31	80-ms repeating PN9/PN15, 4-bit pattern, user file	Set to first slot in PDCCH transmission

More channel parameters: Please see the built-in software Help guide.

Reverse link

Reverse link channels	Pilot (R-PICH), fundamental (R-FCH), access (R-ACH), enhanced access (R-EACH), dedicated control (R-DDCH), common control (R-CCCH), supplemental 1 and 2 (R-SCH1, R-SCH2)

Reverse operating modes	Channel
RC1 or RC2 traffic	Fundamental, supplemental 1
RC1 or RC2 access	Access
RC3 or RC4 traffic	Pilot, dedicated control, fundamental, supplemental 1, supplemental 2
RC3 or RC4 enhanced access	Pilot, enhanced access
RC3 or RC4 common control	Pilot, common control

Eb/No values (with additional Option 403)	Minimum: –30 dB + normalized channel power +10 $\log^{10}$ [chip rate/bit rate] Maximum: +30 dB + normalized channel power +10 $\log^{10}$ [chip rate/bit rate]
Reverse link channel parameters	Please see the built-in software Help guide. All radio configurations (RC1 to RC4) are implemented to 3GPP2 standards.

Ordering Information

Signal Studio for 1xEV-DV and cdma2000 is Option E4438C-414 for the E4438G ESG vector signal generator. This option also requires that the ESG is equipped with the optional baseband generator (Option E4438C-001, -002, -601, or -602).

The Calibrated Noise personality, Option E4438C-403 for the ESG, is required to generate a calibrated noise signal. With Option 403 installed in the ESG, the carrier-to-noise ratio (C/N) setting and Eb/No (reverse link only) are enabled inside the Signal Studio user interface.

Signal Studio for 1xEV-DV and cdma2000, Option E4438C-414, includes the cdma2000 capabilities offered by the real-time mode of Option E4438C-401: cdma2000 and IS-95A personalities for the E4438C ESG. However, capabilities offered by the arbitrary waveform (Arb) mode of Option 401, such as multiple carriers and 256 channels, are not supported in Option 414.

Upgrade Kits

If you currently own an Agilent E4438C ESG vector signal generator and wish to order the license key for the software only, order the upgrade kit: E4438CK-414.

Related Literature

E4438C ESG Vector Signal Generator
Data Sheet, 5988-4039EN

Designing and Testing cdma2000 Mobile Stations, Application Note 1358, 5980-1237E

cdma2000 and IS-95A Personalities, Option 401 for the E4438C ESG Vector Signal Generator,
Product Overview, 5988-4430EN

Web Addresses

For more information go to:
www.agilent.com
www.agilent.com/find/esg
www.agilent.com/find/signalstudio

References

Third Generation Partnership Program 2 (3GPP2). Physical Layer Standard for cdma2000 Spread Spectrum Systems, Release C. C.S0002-C. May 2002.

Agilent Technologies' Test and Measurement Support, Services, and Assistance
Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

Our Promise
Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

Your Advantage
Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and onsite education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

Agilent T&M Software and Connectivity
Agilent's Test and Measurement software and connectivity products, solutions and developer network allows you to take time out of connecting your instruments to your computer with tools based on PC standards, so you can focus on your tasks, not on your connections. Visit
www.agilent.com/find/connectivity
for more information.

Agilent Email Updates

www.agilent.com/find/emailupdates
Get the latest information on the products and applications you select.

By internet, phone, or fax, get assistance with all your test & measurement needs

Phone or Fax
United States:
(tel) 800 452 4844
Canada:
(tel) 877 894 4414
(fax) 905 282 6495
China:
(tel) 800 810 0189
(fax) 800 820 2816
Europe:
(tel) (31 20) 547 2323
(fax) (31 20) 547 2390
Japan:
(tel) (81) 426 56 7832
(fax) (81) 426 56 7840
Korea:
(tel) (82 2) 2004 5004
(fax) (82 2) 2004 5115
Latin America:
(tel) (305) 269 7500
(fax) (305) 269 7599
Taiwan:
(tel) 0800 047 866
(fax) 0800 286 331
Other Asia Pacific Countries:
(tel) (65) 6375 8100
(fax) (65) 6836 0252
Email:
tm_asia@agilent.com

Online Assistance:
www.agilent.com/find/assist

Printed in USA, June 12, 2003
5988-9123EN

Agilent Technologies