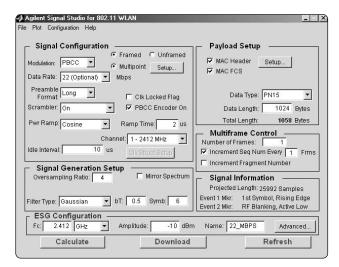# Agilent
Signal Studio for 802.11 WLAN

Option 417
Technical
Overview

Signal Studio for 802.11 WLAN is a powerful software tool for creating various WLAN baseband I/Q waveforms for use with the Agilent E4438C ESG or E8267C PSG vector signal generators.
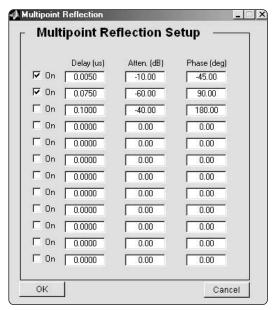
Main features
- Easily configure 802.11a/b/g frames from the intuitive user interface.
- Simulate channel impairments by adding multipoint reflections to the waveform.
- Create multiple frames with an incrementing sequence control field.
- Add a user-defined file of FIR coefficients as your baseband filter.
- Choose a user file as the payload data type.
- Selectable framing includes preamble and header.

Try before you buy!
Download Signal Studio to a PC and evaluate the waveform creation capabilities of the software by navigating the user interface prior to purchase. Use the built-in Help File to view application information and examples. To locate the software start at **http://www.agilent.com/find/signalstudio**, first select the preferred signal generator, and then select Option 417.

Each E4438C ESG or E8267C PSG vector signal generator must be licensed separately in order to use the signals created by the software. 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**.

Benefits
Component test
- Determine performance characteristics of 802.11 WLAN components
- Modify signal parameters to meet customized test needs
- Generate statistically correct signals to properly stress components

Receiver test
- Fully-coded 802.11 WLAN frames enable FER, PER, and BER for testing receiver sensitivity
- Verify demodulation capability of 802.11 WLAN receivers

I/Q waveform generation
Signal Studio for 802.11 WLAN software is a Windows®-based utility that simplifies the creation of 802.11a/b/g WLAN waveforms. It is intended for use with the E4438C ESG or E8267C PSG vector signal generators' baseband generator operating in arbitrary mode. Configure and build 802.11 WLAN waveforms quickly with Signal Studio's easy-to-use graphical interface. The configured waveform is computed by the PC with Signal Studio and downloaded to the ESG or PSG, which automatically begins generating the modulated RF waveform.

Agilent Technologies

Signal Studio for 802.11 WLAN software features[1]

WLAN formats supported	802.11a, 802.11b, and 802.11g
Framing	Framed: bursted framed data includes preamble and header fields Non-framed: non-bursted continuous data
Modulation formats	DBPSK, DQPSK, BPSK, QPSK, 8-PSK, 16-QAM, 64-QAM
Data rates	1, 2, 5.5, 6,9, 11, 12, 18, 22, 24, 33, 36, 48, 54, custom
Data source	1s, 0s, 01s, 10s, PN9, PN15, user file
Payload data length	Maximum: 2346 bytes (with MAC header and MAC FCS) Minimum: 0 byte
Encoding rates	1/2, 2/3, 3/4
Idle interval	0 to 100,000 µs
Oversample ratio	2 to 9
Baseband filtering	None, Gaussian, root cosine, ideal low pass, and user defined
Windowing for OFDM modes	Raised cosine windowing for each OFDM symbol
Power ramping for DSSS modes	None, linear, cosine Ramp time: 0 to 100,000 µs
Scrambler	On, off, preamble only
Subcarrier setup for OFDM modes	Subcarriers are individually selectable
Service field	0 to FFFF Hex (16 bits: First 7 LSB are masked to 0)
Scrambler seed initialization value	0 to 7F Hex
Multipoint reflection	Paths: 12 Delay: 0 to 10 µs (Resolution: .1 ns) Attenuation: 0 to –60 dB Phase: ± 180º
Multiframe	Maximum no. of frames: Up to 2000, depends on data rate, OSR, idle interval, and payload length Segment field: 0 to 15 Sequence field: 0 to 4095

Recommended configuration

E4438C ESG (requires firmware C.03.10 or later) with the following options:

E4438C-506	6 GHz frequency range
E4438C-UNJ	Improved phase noise
E4438C-602*	64 MSa baseband generator
E4438C-417*	Signal Studio for 802.11 WLAN
E4438C-005	6 GB internal hard drive

E8267C PSG (requires firmware C.03.60 or later) with the following options:

E8267C-520	20 GHz frequency range
E8267C-UNR	Improved phase noise
E8267C-602*	64 MSa baseband generator
E8267C-417*	Signal Studio for 802.11 WLAN
E8267C-005	6 GB internal hard drive

* Required options. The baseband generator option may be any of the following:
E4438C-001, -002, -601, -602, or E8267C-002, -602

Upgrade kits

If you currently own an E4438C ESG or E8267C PSG vector signal generator and are interested in obtaining an upgrade kit only (license key), order E4438CK and Option E4438CK-417 for the ESG or E8267CK and Option E8267CK-417 for the PSG.

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1. Features subject to change.

Specifications

E4438C ESG Vector Signal Generator

EVM	< 1% (typical)	@ 5.8/2.4/0.9 GHz	≤ -1 dBm

Instrument and software settings are listed below.

The EVM was measured with an 89641A vector signal analyzer with Option B7R.

Software settings

Data rate	54 Mbps
Modulation	64 QAM
Encoder	3/4 rate
Scrambler	active
interleaver	active
Scrambler initialization	5D
Support carrier setup	all channels active
Idle interval	100 µS
OSR	≥ 2
Window length	≥ 8
Data type	PN15
Data length	1024

Source settings
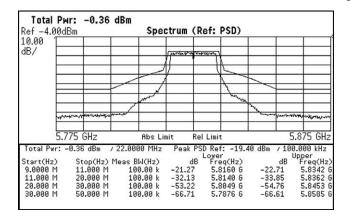
Frequency	5.8/2.4/0.9 GHz
Output power	≤ -1 dBm
Reconstruction filter	thru
ALC	on
RF blanking	off
Modulator Attenuation	8 to 10 dB

89641A settings

Frequency	5.8/2.4/0.9 GHz
Span	20 MHz
Range	optimal
RMS video average	20

802.11a spectral mask typical performance (E4438C ESG)
(0 dbm, at 5.805 GHz, OSR: 4, window length: 16)

E8267C PSG Vector Signal Generator

EVM	< 1.0% (typical)	@ 2.4 GHz	≤ 2 dBm
	< 0.6% (typical)	@ 5.8 GHz	≤ 5 dBm
	< 0.7% (typical)	@ 11.0 GHz	≤ 5 dBm

Instrument and software settings are listed below.

The measurement data was collected with an 89640A vector signal analyzer with Option B7R. An E4400A spectrum analyzer was used to down-convert the PSG under test's output to 321.4 MHz.

Software settings

Data rate	54 Mbps
Modulation	64 QAM
Encoder	3/4 rate
Scrambler	active
Interleaver	active
Scrambler initialization	5D
Support carrier setup	all channels active
Idle interval	100 µS
OSR	≥ 2
Window length	≥ 8
Data type	PN15
Data length	1024

Source settings

Frequency	11/5.8/2.4 GHz
Output power	as shown above
Reconstruction filter	thru
ALC	on
RF blanking	off
Modulator Attenuation	8 to 10 dB

89640A settings

Frequency	321.4 MHz
Span	20 MHz
Range	-15 dBm
RMS video average	20

E4400A settings

Frequency	11/5.8/2.4 GHz
Span	zero span
Phase Noise Optimization	F>50 kHz
Attenuation	optimal for input level

Additional Resources

Web

www.agilent.com/find/psg

www.agilent.com/find/esg

www.agilent.com/find/signalstudio

Literature

PSG Signal Generator, Brochure
Literature number: 5988-7538EN

E8267C PSG Vector Signal Generator, Data Sheet
Literature number 5988-6632EN

E8267C PSG Vector Signal Generator, Configuration Guide
Literature number: 5988-7541EN

E4438C ESG Vector Signal Generator, Brochure
Literature number 5988-3935EN

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

E4438C ESG Vector Signal Generator, Configuration Guide
Literature number 5988-4085EN

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Printed in USA December 11, 2003
5988-8618EN

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