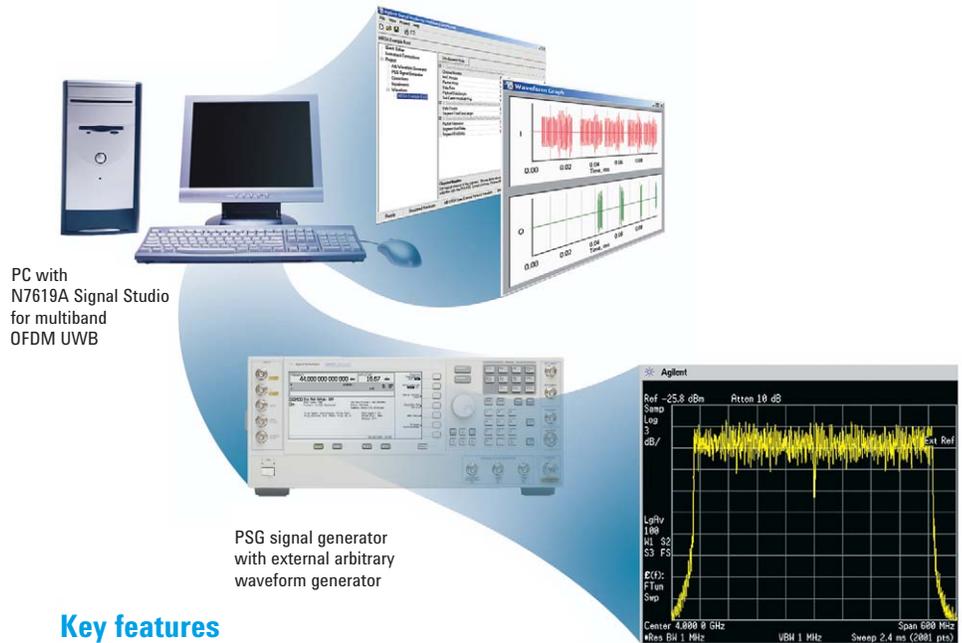# Agilent N7619A
Signal Studio for
Multiband OFDM UWB

Technical Overview

PC with
N7619A Signal Studio
for multiband
OFDM UWB

PSG signal generator
with external arbitrary
waveform generator

UWB waveform

Signal Studio for Multiband OFDM UWB

Agilent N7619A Signal Studio for Multiband Orthogonal Frequency Division Multiplexing (OFDM) ultra-wideband (UWB) provides flexible, fast waveform creation for design and verification of OFDM UWB transceivers and components. The software helps increase design confidence by generating accurate UWB waveforms based on the WiMedia ultra-wideband (UWB) Common Radio Platform.

Signal Studio for UWB produces a digital version of the baseband I and Q waveforms that get loaded into test equipment to generate UWB radio frequency signals. The easy-to-use interface lets you get started quickly, enabling you to focus on the evaluation of the UWB transceiver and perform key measurements, such as sensitivity and interference rejection.

Key benefits

- Quickly and easily create standard-compliant UWB waveforms
- Configure signals to meet your individual test needs

Key features

- Generate multiband OFDM UWB waveforms based on WiMedia UWB specifications
- Generate accurate golden waveforms
- Create baseband I/Q waveforms from a digital file loaded into an N6030A or N6031A wideband arbitrary waveform generator
- Generate full RF waveforms by driving Agilent E8267D PSG wideband inputs with the baseband I/Q signal
- Build individual waveform segments each with unique parameters; combine them to create one waveform with packets that have varying parameters like different data rates
- Create custom packets for testing specific receiver functions
- Test sub-carrier omission for narrow band receiver interference reduction
- Add waveform impairments like frequency offsets and I/Q phase and amplitude imbalance
- Trigger an external frequency hopping device

Try before you buy

Go to, **www.agilent.com/find/signalstudio** and download the Signal Studio for multiband OFDM UWB software to your PC. The signal configuration and graphing capabilities can be evaluated by navigating the user interface prior to purchase. Detailed user information can be found in the help file within the software. To generate the configured signals, a license key is required to load the baseband waveforms created by the software into the vector signal generator for playback. 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**

Agilent Technologies

Quickly create multiband OFDM UWB waveforms

Signal Studio for multiband OFDM UWB enables designers to generate accurate and standard-compliant UWB signals when used with the Agilent E8267D PSG vector signal generator and a wideband N6030A arbitrary waveform generator. The software's wide range of easily produced signal configurations provides designers with the test signals needed for thorough receiver performance verification.

When you are in the specification-compliant mode of operation, you can adjust the physical (PHY) layer parameters within the ranges allowed by the WiMedia PHY layer specification. The software also enables you to define the packet parameters, such as length, data rate, and scrambler initialization, as well as the number of packets. Packets can use a default MAC header, or you can completely define the MAC header. The transmission mode is selectable to the standard or streaming modes defined in the specification.

Generate accurate golden waveforms

The 500 MHz bandwidth of the multiband OFDM UWB symbol presents a serious challenge for accurate waveform generation. Signal Studio for multiband OFDM UWB uses the Agilent N6030A or N6031A arbitrary waveform generator and the Agilent E8267D PSG vector signal generator to produce RF test signals with minimal phase and amplitude distortions. The software downloads waveforms to the arbitrary waveform generator and controls the setup of the test equipment for waveform generation. The "golden" test signal produced enables designers to be confident they are measuring the effects of intended degradations on the performance of their receivers and not the effects due to hardware imperfections.

To verify that multiband OFDM UWB receiver designs meet specifications, you need test signal sources that accurately produce specified modulations. Signal Studio for multiband OFDM UWB provides the accurate waveforms required for receiver performance verification, enabling you to focus more on your design.

Create baseband I/Q waveforms

The Signal Studio software produces a digital representation of the multiband OFDM UWB baseband I/Q waveforms. Use the software user interface to easily load the digital baseband waveforms into an arbitrary waveform generator which converts the digital versions of the I/Q signals to create real analog baseband waveforms. The baseband I/Q waveforms that are output from the arbitrary waveform generator can be used as test signals for designers creating the analog and digital baseband sections of multiband OFDM UWB receivers. These signals are also useful for transmitter designers who need a baseband signal to test their circuits.

The reference baseband test signal provided by Signal Studio for UWB is also a valuable troubleshooting tool in project integration stages in which RF and baseband receiver components are combined, allowing the location of problems to be quickly identified and demonstrated. This capability is valuable for quickly and efficiently completing product development. Having access to the baseband waveforms allows the analog and digital baseband sections of receivers to be developed and tested without the need to wait for RF front-end hardware to be completed.
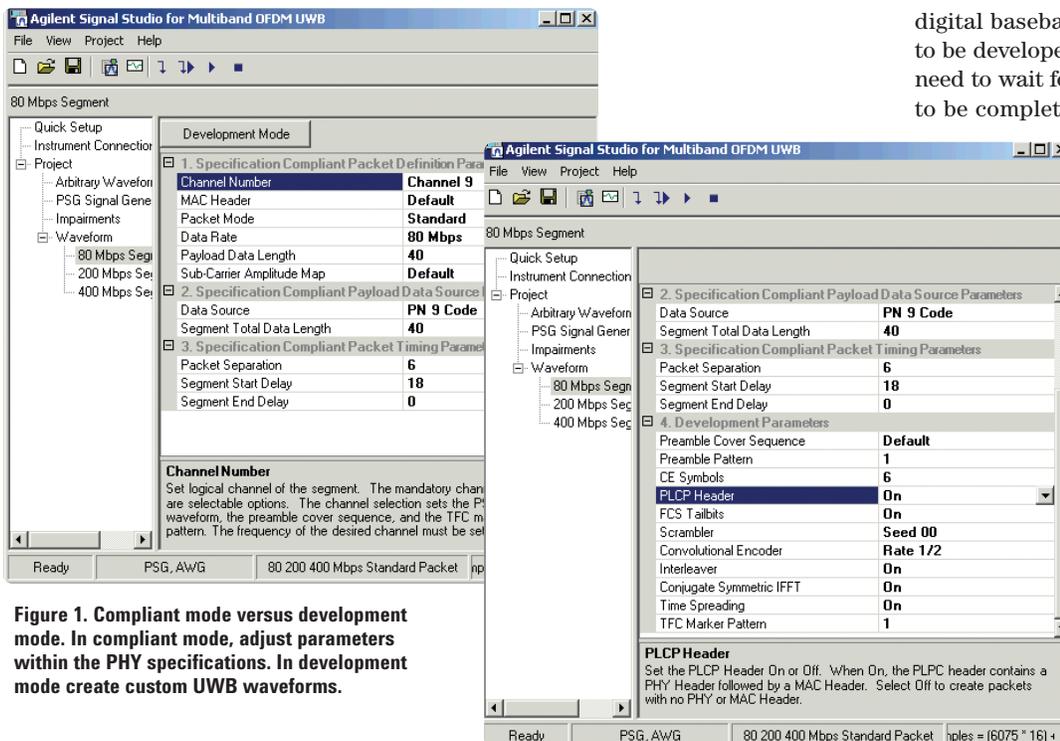

Figure 1. Compliant mode versus development mode. In compliant mode, adjust parameters within the PHY specifications. In development mode create custom UWB waveforms.

Generate full RF waveforms

The Agilent E8267D PSG signal generator's wideband external I/Q baseband inputs are driven by the output from the arbitrary waveform generator. The PSG signal generator's wideband quadrature modulator produces the multiband OFDM UWB symbols with 500 MHz of RF modulation bandwidth. This very accurate source provides you with the test signals needed to verify your designs.

The RF signals produced by the Agilent E8267D PSG signal generator can drive a transmit antenna, allowing the performance receiver to be tested with over-the-air transmitted signals. The ability to test in real-world environments provides confirmation of actual receiver performance.

Build complex waveforms with user-defined packet parameters

Multiband OFDM UWB transceivers, in real-world applications, may transmit a series of packets in which the parameters used to produce the packet change quickly from one packet to the next. For example, a lap-top computer may rapidly switch between sending packets to a PDA and to a printer. Signal Studio for UWB provides the ability to produce waveforms consisting of groups of packets with varying signal parameters. You can define the packet parameters for multiple waveform segments and then combine the segments into a single waveform.

Signal Studio for UWB provides you with the flexibility to define the complicated waveforms to meet a wide variety of test requirements. You can decide which cases need to be tested and quickly assemble test signals for those cases. The ability to test a wide variety of scenarios makes realistic verification of receiver performance possible.

Create custom packets for testing specific receiver functions

Packet parameters can be quickly configured to produce required test signals. To test more advanced receiver functions, waveforms can be created from multiple groups of packets with each group having different parameter settings such as packet length, data rate, or MAC Header values. The N7619A gives you full control of parameters for waveforms that are compliant to the specification. This is valuable for performing many receiver verification tests, such as sensitivity and immunity to impairments and interference.

A waveform consisting of only continuous packet synchronization symbols can be produced to test the synchronization and coarse frequency estimation functions of a receiver. Waveforms consisting of only packet preambles, channel estimation symbols, or data payload symbols can easily be generated as well. Other receiver tests may require bypassing of data scrambling, interleaving, and error correction coding functions. The software is designed to give you extensive control to create development waveforms with custom characteristics.

Having a source for the custom waveforms needed to test design functions is a key tool for successful timely development of multiband OFDM UWB receivers. Signal Studio for UWB gives you access to the development waveform tests you need.
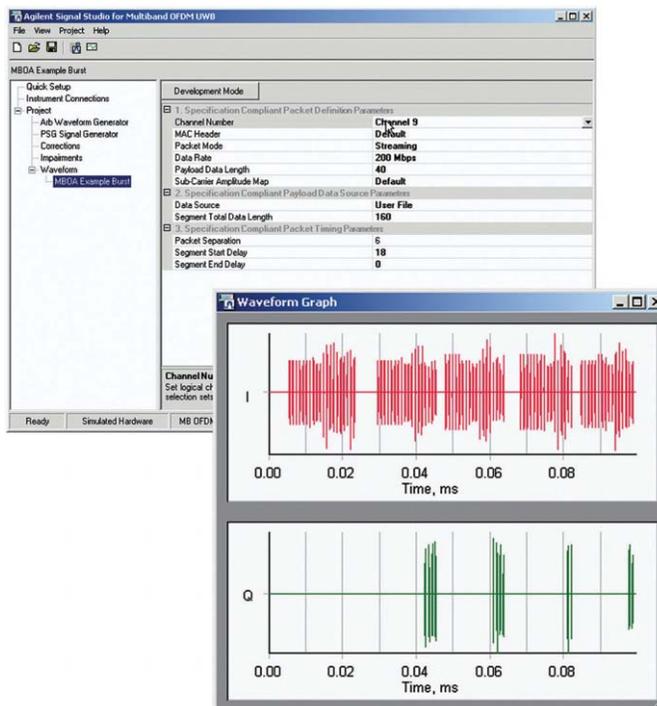

Figure 2. Modify parameters and then plot resulting waveforms.

Test sub-carrier omission for narrow band receiver interference reduction

Testing the coexistence of a multiband OFDM UWB transceiver with other receivers that may be located in the same area requires an accurate repeatable UWB signal source. Signal Studio for UWB provides a source with the amplitude, frequency, and waveform definition control that is required for coexistence testing.

One concern in developing regulatory requirements for UWB waveforms is the effect of UWB waveforms on in-band narrow band receivers. The 500 MHz bandwidth of the multiband OFDM waveform is formed combining 122 sub-carriers each with a bandwidth of 4.125 MHz. By turning off sub-carriers selectively, the multiband OFDM waveform can minimize interference with in-band narrow band receivers. The software provides you with the ability to turn-off any desired sub-carriers in the waveform. This capability provides a tool for verifying the effectiveness of sub-carrier omission techniques for reducing interference with in-band receivers.

Signal sources that are fully configurable for requirements of specific interference tests are needed for coexistence testing to gain regulatory approval worldwide. Signal Studio for UWB provides the signal source needed for this testing.

Test waveform impairments

Determining the limits of the specification requirement can be challenging when designing multiband OFDM UWB transceivers. The phase and amplitude accuracy requirements of the quadrature mixing components are important specifications of receiver design. Signal Studio for UWB provides an accurate source of test signals with user-defined I/Q phase and amplitude error for verifying quadrature modulator and demodulator requirements.

Transceiver clock accuracy is another important design requirement. Clock specifications can be verified by using Signal Studio for UWB to produce waveforms with user-defined clock frequency offsets. The software's user-defined impaired waveforms are an important tool for confirming transceiver requirements.

Correctly determining the tolerances of critical design specifications is crucial when creating designs that optimize performance, yields, and costs. Signal Studio for UWB provides the test signals needed to accurately verify requirements and create optimized designs.

Trigger external frequency hopping device

The WiMedia UWB specification uses a frequency hopping technique to spread signal energy of 500 MHz bandwidth symbols across an approximately 1.5 GHz spectrum. Individually, an N6030A wideband arbitrary waveform generator and Agilent E8267D PSG signal generator do not provide a frequency hopping capability. However, combined with Signal Studio for UWB, the trigger outputs of the arbitrary waveform generator can be used to trigger your external frequency hopping device. For each symbol transmitted, the trigger signals can be used to select the local oscillator frequency applied to an external mixer, creating a full frequency hopping test source. Many user tests will require a frequency hopped waveform, and you can produce this hopped test signal much more quickly using Signal Studio for UWB in conjunction with external hardware than would otherwise be possible.

Ordering Information

N7619A Signal Studio for multiband OFDM UWB operates with the E8267D PSG vector signal generator coupled with an N6030A or N6031A wideband arbitrary waveform generator

N7619A Signal Studio for multiband OFDM UWB[1]

Model/option number	Description
N7619A	Software
N7619A-117	License: External baseband generator, N6030/31A

E8267D PSG configuration

Model/option number	Description
Required	
E8267D-015	2 GHz wideband IQ input
Recommended	
E8267D-UNX	Ultra low phase noise performance
E8267D-520	20 GHz PSG vector signal generator

N6030/31A wideband arbitrary waveform generator configuration

Model/option number	Description
Required	
N6030A	Arbitrary waveform generator with 8 MS memory per channel, 15 bit
or	
N6031A	Arbitrary waveform generator with 8 MS memory per channel, 10 bit
Recommended	
N6030A-016	Waveform memory expansion to 16 MSa per channel for N6030A
or	
N6031A-016	Waveform memory expansion to 16 MSa per channel for N6031A

1. Requires external 0dBm, 960 MHz clock source for the N6030/31A arbitrary waveform generator

Related Literature

Agilent E8267D PSG Vector Signal Generator, Data Sheet, literature number 5989-0697EN

Agilent E8267D PSG Vector Signal Generator, Configuration Guide, literature number 5989-1326EN

Agilent PSG Signal Generators, Brochure, literature number 5989-1324EN

Agilent PSA Series Spectrum Analyzers, Brochure, literature number 5980-1283E

Agilent N6030A Arbitrary Waveform Generator 1.25 GS/s, 15 Bit, Technical Overview, literature number 5989-1457EN

Agilent N6031A Arbitrary Waveform Generator 1.25 GS/s, 10 Bit, Technical Overview, literature number 5989-3585EN

Related Web Resources

For more information, visit:
www.agilent.com/find/signalstudio
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Revised: 09/14/06

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