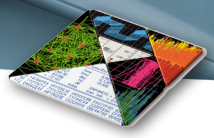
APPLICATION BRIEF

Accelerate Development of Next Generation 802.11ac Wireless LAN Transmitters- Overview



Challenge the Boundaries of Test
Agilent Modular Products

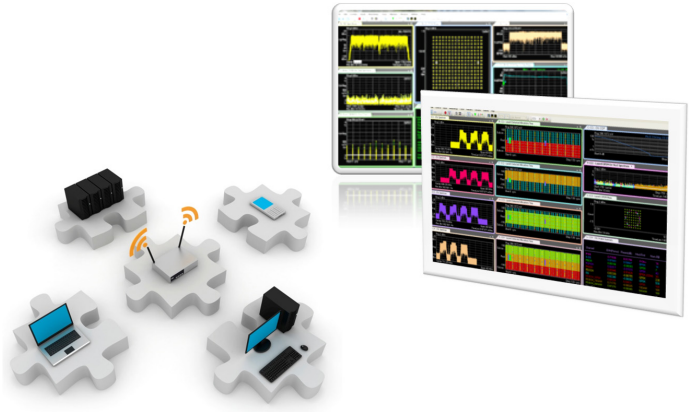
Achieve increased insight into chipsets and modules for enterprise wireless set top boxes, mobile computing, and medical devices with measurement solutions for R&D and design verification test (DVT) of 802.11ac transmitters

Abstract

Wireless video and wireless data networking are driving demand for standards, such as 802.11ac, which enable higher throughput. Design validation engineers must ensure their 802.11ac designs will perform well under the most demanding modulation schemes, including MIMO spatial multiplexing configurations.

To validate MIMO transmitter performance, a multi-channel signal analyzer can be used to demodulate the multi-stream waveforms and measure EVM and other physical layer parameters. Agilent's PXI signal analyzer solutions enable MIMO 802.11ac R&D and test engineers to validate their designs with a mixture of measurement accuracy, fast speed, flexibility and scalability in a small form factor.

For measurements you can trust, with a modular, scalable design for easy upgradability, Agilent's PXI modular software and hardware solutions make 802.11ac validation easy.



Anticipate ___Accelerate ___Achieve

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Introduction

Increased use of wireless video and high-speed wireless data networking in homes and offices is driving higher throughput standards. Several standards emerged that address these new use models, including 802.11ac, which builds upon the high throughput (HT) capabilities of 802.11n to accomodate these new "Very High Throughput (VHT)" uses.

802.11ac operates in the 5 GHz 802.11a/n bands, and builds upon the high throughput enhancements of 802.11n with key advancements:

- Increased bandwidth (up to 160 MHz)
- Higher-order MIMO (up to 8x8)
- Multi-user MIMO (up to 4 users)
- Higher-order modulation (up to 256 QAM)

Application overview

Design validation engineers must ensure their 802.11ac designs will perform well under a variety of conditions, validating that their devices meet performance requirements even for the most challenging MIMO spatial multiplexing modes. To validate MIMO transmitter performance, a multi-channel signal analyzer can be used to demodulate the multi-stream waveforms and measure EVM and other physical layer parameters.

Design and validation of 802.11ac MIMO transmitters requires making EVM measurements of multi-channel MIMO spatial-multiplexing signals. A test solution should be able to make these measurements rapidly, and with a high degree of confidence. The higher-order modulation formats and wider bandwidths proposed in the 802.11ac standard require better EVM, and the test solution's residual EVM should be able to exceed these requirements and enable future modifications to the designs as they evolve, from single- and dual-channel 40 MHz to 3- and 4-channel 160 MHz MIMO designs.

Many test solutions today do not support the wide band-widths or multi-channel capabilities required by 802.11ac designers. They may also lack a full-featured analysis pack-age that includes hardware control and standards-based 802.11ac modulation quality measurements.

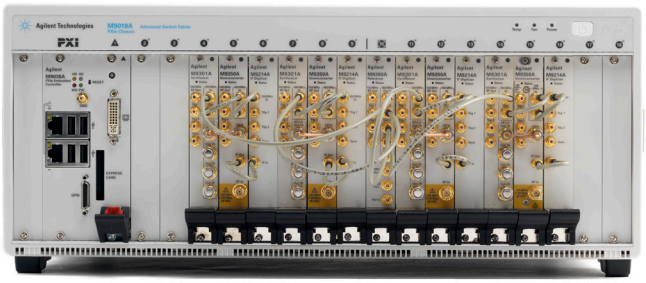

Figure 1. 4-channel M9391A PXIe vector signal analyzer configuration

Solution

Agilent addresses these requirements with the M9391A, a scalable PXI vector signal analyzer enabling up to 4 analysis channels in a single PXI chassis, 160 MHz bandwidth per channel, and fast transfer speeds over the PCIe backplane. Agilent's trusted 89600 VSA software is used to make standards-based 802.11ac physical layer measurements.

The M9391A PXI VSA offers the capabilities required for 802.11ac MIMO transmitter test design validation in a fast, scalable and flexible platform. Physical layer parametric measurements such as EVM and crosstalk can be measured with Agilent's 89600 VSA software using standards-based 802.11ac capability.

Solution details

802.11ac requires wide-bandwidth measurement capability of up to 160 MHz, and Agilent's M9391A PXIe vector signal analyzer can meet the challenge with bandwidth options up to 160 MHz per channel. The 14-bit ADC enables residual EVM which exceeds the 802.11ac standard's -32 dB EVM requirement, with residual EVM of -44 dB (nominal) for 80 MHz bandwidth signals.

The M9300A frequency reference drives the 10 MHz reference on the backplane of the PXI chassis. This 10 MHz reference is then used to synchronize the acquisition timing of multiple M9391A PXI VSAs. With this technique, timing synchronization of better than ± 5 ns can be achieved, allowing for unimpaired MIMO EVM measurements.

The M9391A supports input signals from 1 MHz to 6 GHz, easily covering the 802.11ac frequency bands and enables scalable deployment, with 1 to 4 channels configurable in a single 18-slot PXI chassis. Agilent's 89600 VSA software controls the M9391A PXI VSAs and provides the measurement algorithms for MIMO WLAN transmitter testing. The 89600 VSA software can be controlled programmatically via the .NET interface for fast automation required in many validation test scenarios.

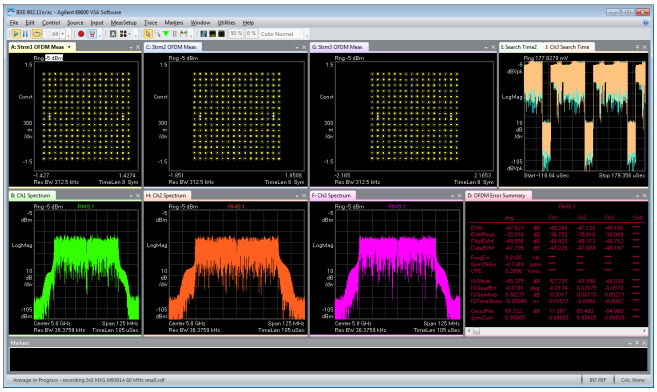

Figure 2. 3-channel 802.11ac analysis using Agilent's 89600 VSA software.

Ordering information

Quantity	Model	Description
1-4	M9391A	PXIe vector signal analyzer 1 MHz – 6 GHz
1	M9300A	PXI frequency reference
Optional		
1	M9018A	PXIe 18-slot chassis
1	M9036A	PXIe embedded controller
1	89601B-200	89600 VSA software, transportable license
1	89601B-300	Hardware connectivity
1	89601B-BHJ	WLAN 802.11ac modulation analysis
1	89601B-B7Z	WLAN 802.11n modulation analysis
1	89601B-B7R	WLAN 802.11a/b/g modulation analysis

Want to know more?

- 802.11 WLAN Test
  www.agilent.com/find/wlan
- Technical Overview: *Testing New-generation Wireless LAN,* publication number 5990-8856EN
- PXI RF Vector Signal Analyzer:
  www.agilent.com/find/M9391A
- 89600 VSA software:
  www.agilent.com/find/89600vsa

The modular tangram

The four-sided geometric symbol that appears in this document is called a tangram. The goal of this seven-piece puzzle is to create identifiable shapes—from simple to complex. As with a tangram, the possibilities may seem infinite as you begin to create a new test system. With a set of clearly defined elements—hardware, software—Agilent can help you create the system you need, from simple to complex.

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Product specifications and descriptions in this document subject to change without notice.

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