

Wi-Fi 7 Non-Signaling Solutions

Measurement integrity ensures accurate, consistent results from R&D to production

Challenge

Meeting the requirements of regulatory standards in the face of ever improving wireless solution performance presents new challenges. Thus it is important to test using high-performance products that meet the new standards and regulations to perform at a high capacity.

Therefore, one must understand the new parameters for the Wi-Fi 7 standard, the wireless signals these new rules cover, and what type of test software would help you resolve new and unforeseen challenges.

While in the early development stage, 802.11be holds great promise, both in terms of increased throughput and support for real-time applications. These features include 320 MHz transmission bandwidth, the use of 4096 QAM modulation, and enhancements to MIMO with more spatial streams. Like 802.11ax, 802.11be will also operate in 2.4, 5, and 6 GHz frequency bands.

Keysight provides solutions for WiFi 7 development and testing for each step, from prototyping to design validation to production. Having solutions under the same umbrella ensures measurement consistency to maximize the benefit of the investment.

Effectively Test Your Prototype Designs

Designers can now test the latest wireless signals with Keysight PathWave Vector Signal Analysis (89600 VSA) software for 802.11n/ac/ax, and 802.11be modulation analysis. Software options provide an advanced troubleshooting and evaluation toolset designed to manage the challenge of analyzing legacy and new wireless LAN signals.

This solution covers technologies such as multi-user, multiple input, multiple output (MU-MIMO), and orthogonal frequency-division multiple access (OFDMA) used in the latest standards. PathWave 89600 VSA software supports 802.11 standards and over 75 other signal modulation types.

PathWave VSA enables more advanced testing features such as Cross-Correlated EVM (ccEVM) to improve the EVM sensitivity of the test system. ccEVM is a technique used to extend the dynamic range of a receiver for best EVM performance. Two receivers are used to capture and demodulate the same signal independently. Performing a cross-correlation on the error vectors cancels out uncorrelated noise added by the receivers, resulting in a much lower EVM. This technique causes the ccEVM value to primarily contain just the noise and distortion coming from the device under test or in the case of an amplifier, noise coming from signal source plus device under test.

Figure 1 shows a measurement result of a ccEVM compared with EVM of individual receivers. In this measurement setup, a loop back configuration was used, involving one signal generator feeding two receivers. Our ccEVM measurement shows a 6 dB EVM improvement of 802.11be WLAN signal. Clearly the measurement system is much more sensitive now, and able to measure low EVM signals.

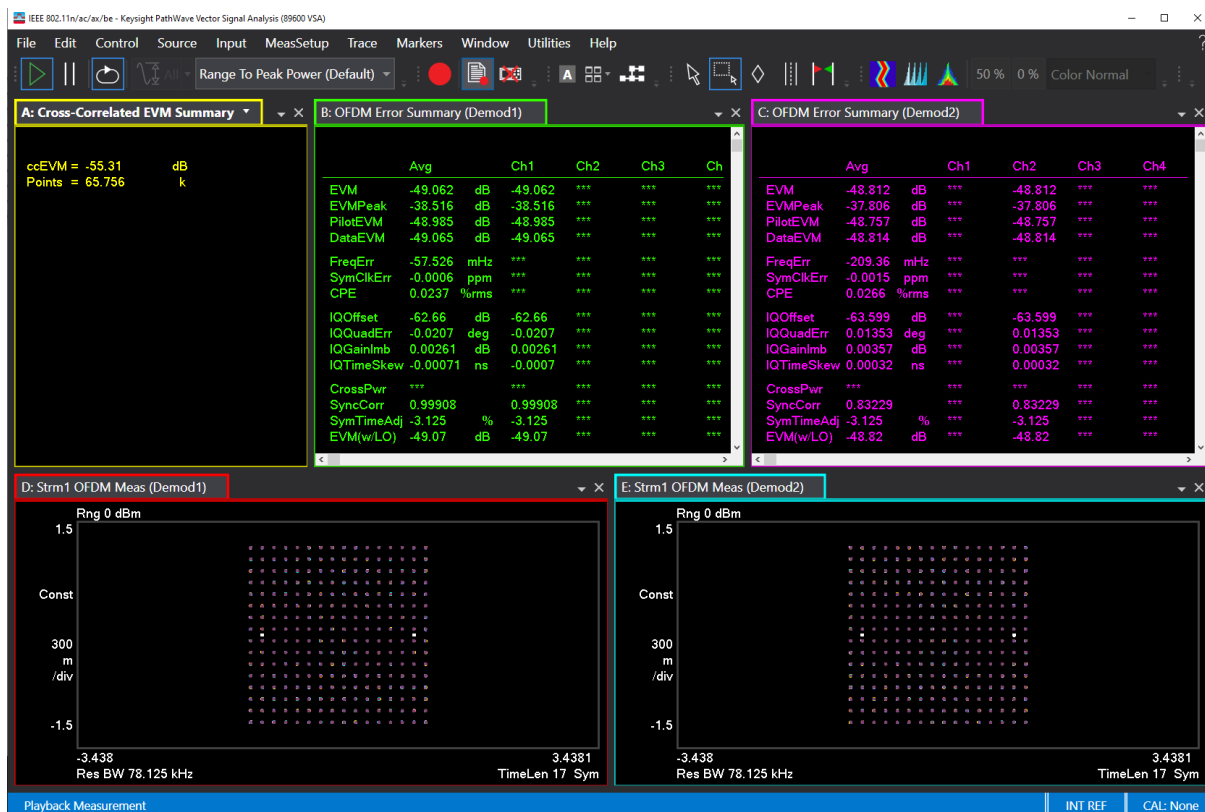


Figure 1. Cross-correlated EVM results (Trace A) compared with EVM results of the individual receiver (Traces B and C)

The new Keysight M9484C VXG signal generator solution enables the highest signal fidelity for wide bandwidth test applications with advanced direct digital synthesis (DDS) technology. The fully integrated, calibrated, and synchronized signal generation helps minimize measurement uncertainty.

Meet your signal generation demands today and tomorrow

- Generate complex test signals up to 2.5 GHz of bandwidth (5 GHz with channel bonding) for wider bandwidths.
- Cover higher frequency ranges from 9 kHz to 54 GHz (up to 110 GHz with Keysight V3080A signal analyzer frequency extender).
- Support up to four synchronized and phase-coherent channels in a single chassis and more than 32 channels across multiple chassis with multichannel applications.

Accelerate your time to market

- Ensure your designs meet the latest standards and test requirements for wireless and radar applications using comprehensive software.
- Enable eight virtual RF generators simultaneously per RF channel for complex test scenarios.
- Simplify your test workflow using a graphical user interface (GUI), pre-defined compliance test setups, and auto-configuring signal analysis applications.

Design Validation

Identifying and resolving problems while developing a new product certainly comes with challenges. Reduce the time required to resolve wireless problems and get to market first with the cost-effective Keysight SJ001A WaveJudge wireless analyzer toolset. It is the first modular, scalable, and customizable over-the-air monitor (OTA) solution that provides real-time visibility into the interaction between protocol and physical layers in wireless transmissions.

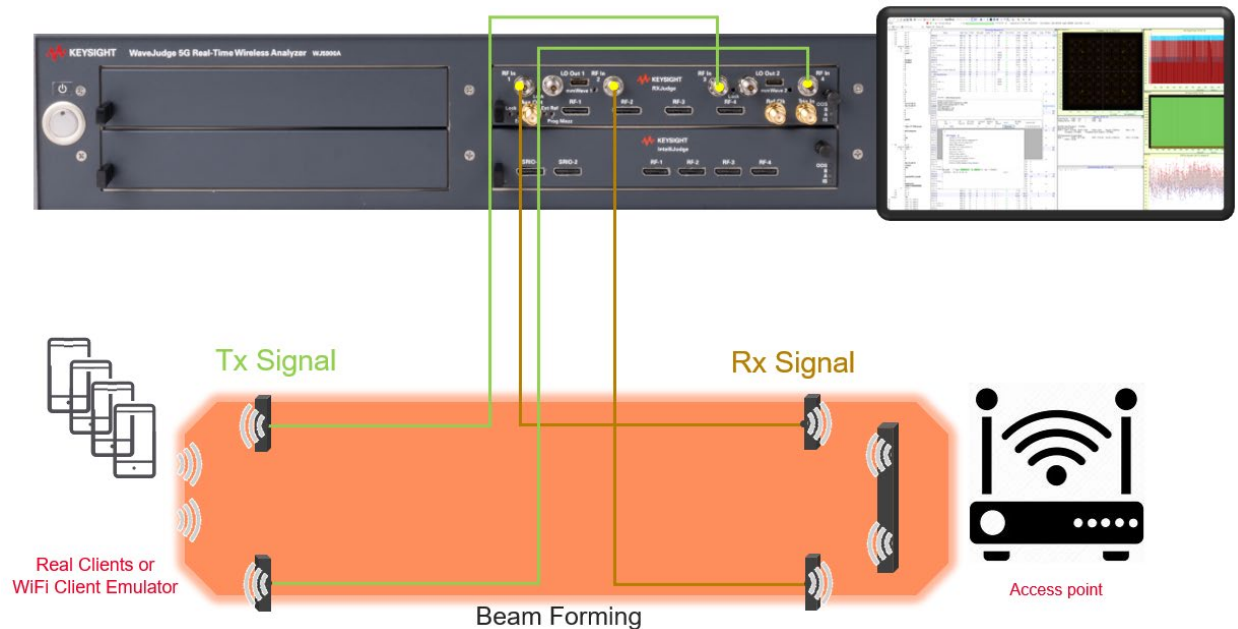


Figure 2. WiFi Test Configuration with WaveJudge 5900 Solution, OTA test topology

Independent physical and protocol analyzer

- Get visibility into the real 5G stack of your modem.
- Troubleshoot logs according to 3GPP compliance specifications.

Accelerate time to market

- Resolve complex interoperability issues that expand into multiple layers.
- Eliminate multi-vendor discrepancies.
- Future-proof for Release 16 criteria.

Multiple spectrum allocations at higher frequencies can support wider bandwidths that provide a faster data rate, and regulators are setting new standards to address this need. Although increasing signal bandwidth offers an excellent way to achieve faster data rates, it also introduces a new challenge to meet the signal quality requirements at higher frequency ranges.

Verify Wi-Fi 6E and 802.11be Designs Approaching Production

Two key changes introduced within the physical layer (PHY) for 802.11be are signal bandwidths up to 320 MHz — twice the bandwidth of 802.11ax signals — and 4096 QAM. The Keysight E6680E wireless test set helps you to verify Wi-Fi 6E and 802.11be devices, with bandwidth up to 800 MHz and 7.3 GHz frequency. Keysight PathWave signal generation and Keysight X-Series measurement application software can generate and analyze 1024 QAM and 4096 QAM signals.



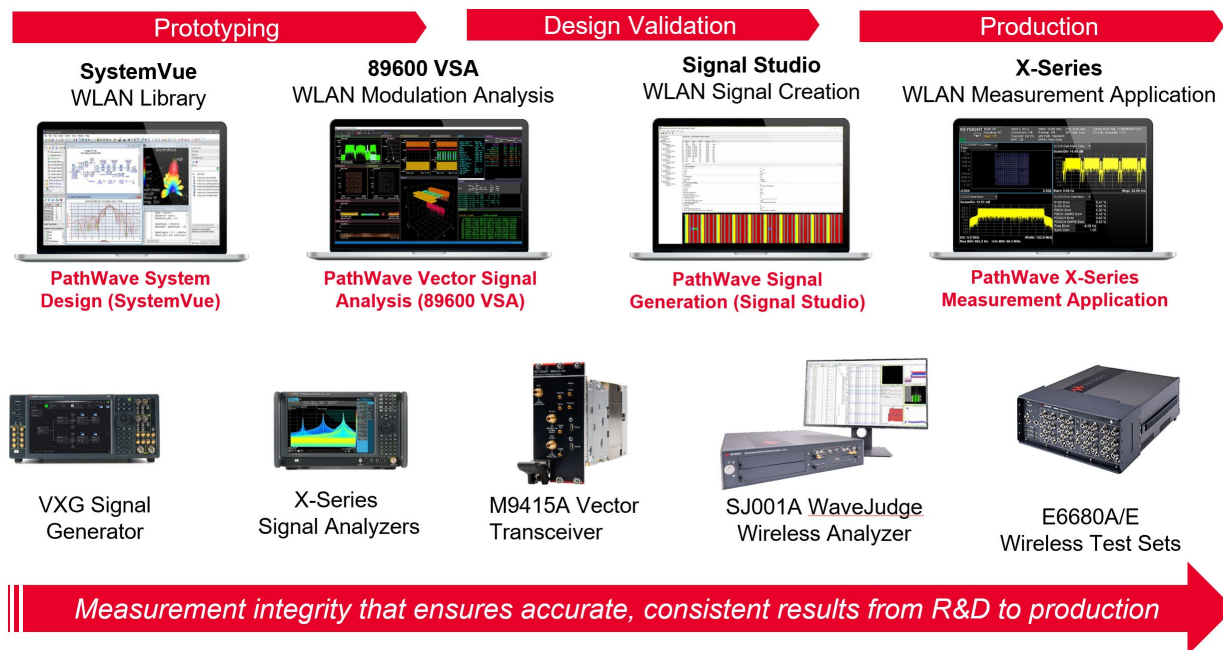
Figure 3. Test multiple devices and multiple antennas

Use the E6680E wireless test set to verify your WLAN designs. Speed your test development, design verification, and manufacturing test with the right capability and flexibility.

- Be ready for the future with bandwidth up to 800 MHz and 7.3 GHz frequency.
- Get the flexibility you need to optimize your test cases with up to 16 ports.
- Simplify your test system configuration with internal switching between ports.
- Analyze performance using industry-proven application software.

Summary

Accelerate your Wi-Fi 7 deployment with a suite of Keysight solutions to use across prototyping, design validation, and production phases of product development.



Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at www.keysight.com.



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