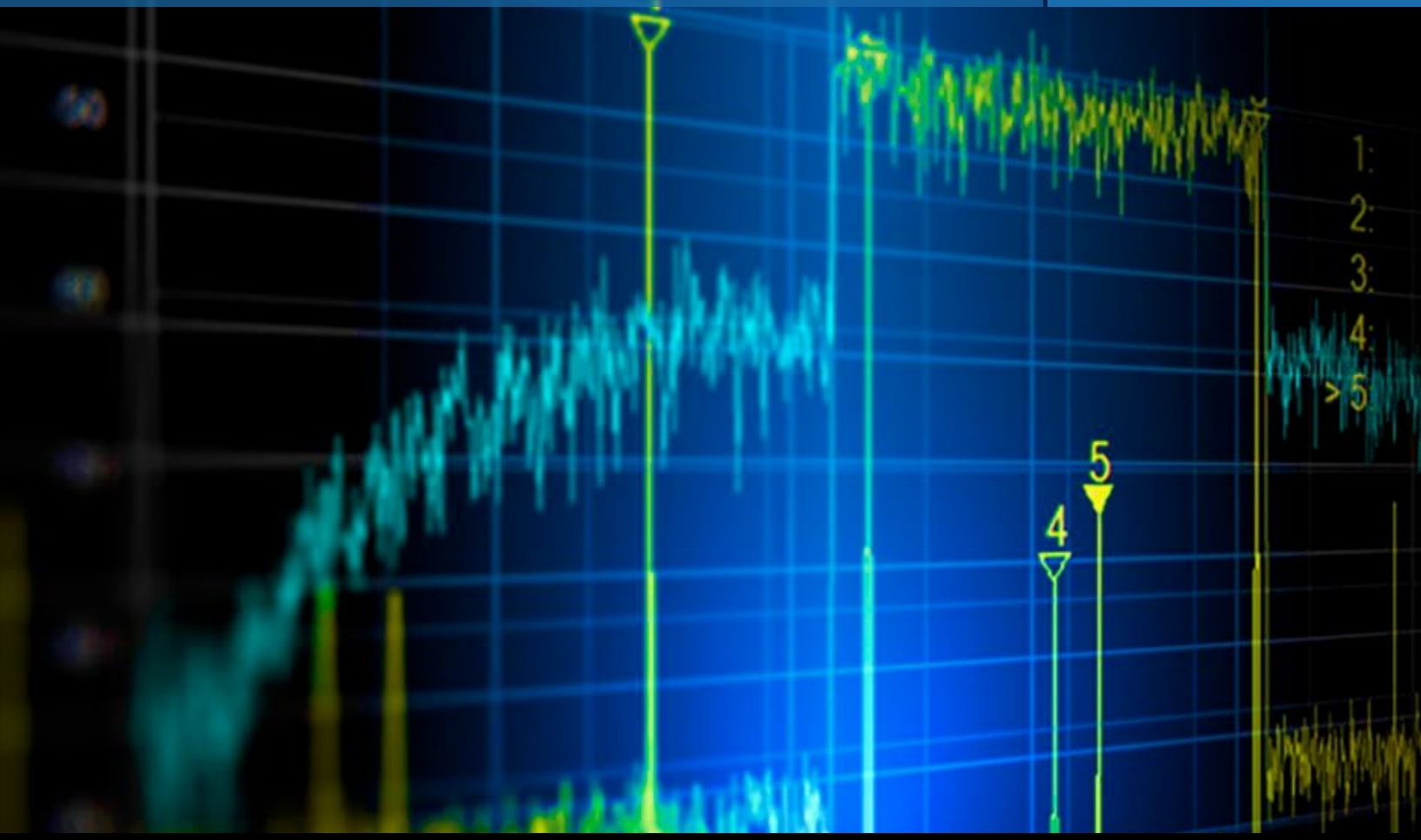
SOLUTION BRIEF



Efficient Digital Wideband Transceiver Characterization

Digital wideband transceiver test solution

KEYSIGHT

Introduction

Next-generation RF front-end architecture relies on miniaturizing every functional block, replacing some hardware elements with software, and eliminating interconnects by integrating the digital baseband and data processing elements. Thanks to technology advancements in RF components and data converters, the digital-integrated RF front end has become a practical design architecture that many future RF communication and sensing systems can achieve. But technologies such as multiple-input / multiple-output and phased-array antennas must bridge RF and digital.

Use Case Summary

A few approaches are available to test digital RF mixed devices based on device types. For transmitter tests, engineers commonly use vector signal analyzers to test transmitters. However, this methodology primarily characterizes the transmitted signal quality rather than the RF front-end performance characteristics. Regarding receiver testing, fully understanding the behavior of digital wideband receivers involves analog signal conditioning and digital signal conditioning with data conversion. Expertise in these two areas resides in different organizations. Loop-back tests used for transceiver characterization enable engineers to check the transceiver function but cannot isolate the performance characteristics and problems between the transmitter and the receiver.

You need solutions that bridge RF and digital domains to ensure that your product specifications are accurate.

Solution Overview

The Keysight digital wideband transceiver test solution compares digital and RF signals between device input and output. It measures the transmitter and receiver responses independently from other test instrumentation. Keysight Device Measurement eXpert (DMX) with cross-domain test capability controls the PNA-X network analyzer and the VXG signal generator.

When testing receivers, DMX sends a digital IQ waveform to the VXG. The VXG generates an RF waveform that the PNA-X's reference receiver measures and sends to the receiver under test. DMX reads the digital IQ waveform from the receiver and then processes the data. When testing transmitters, DMX sends a digital IQ waveform to the transmitter under test and the PNA-X's reference receiver. The PNA-X measures the output RF waveform from the transmitter and processes the data.

This configuration enables receiver, transmitter, and transceiver measurements with a single set of connections.

Learn more at: Digital Wideband Transceiver Test Solution Bridges Digital and RF Domains

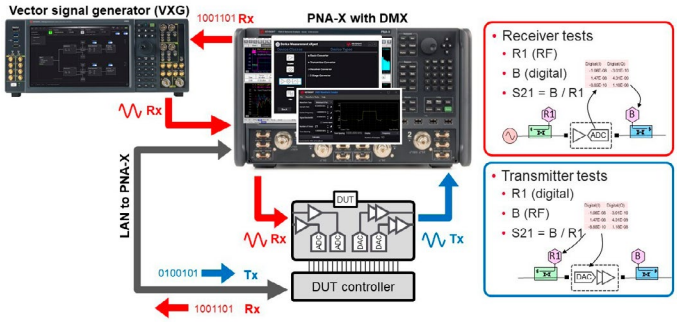


Figure 1. The Keysight digital wideband transceiver test solution

Summary

- Highly integrated RF systems with high-speed data converters and wide operating bandwidths raise design and performance verification challenges.
- Digital signals are highly integrated into the RF front-end architecture of modern antennas, introducing the need for a new measurement methodology for stimulus and response measurements.
- An accurate solution that bridges RF and digital domains is critical for achieving high product quality and delivering the best possible product specifications.

For more information: Digital Wideband Transceiver Test

Digital wideband transceiver test solution

- **Keysight N5247B PNA-X microwave network analyzer**
- **Keysight M9384B VXG microwave signal generator**
- **Keysight S94601B Device Measurement eXpert (DMX)**
- **Keysight S94610B digital wideband transceiver analysis**

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