

Modular Tester Performs 5G Channel Sounding

By employing modular test instruments, this measurement system packs many instruments and a great deal of functionality for evaluating the propagation capabilities of 5G wireless systems.

MODERN COMMUNICATIONS CUSTOMERS are driving for continual advances in wireless-communications system technology and performance, demanding the erection of fifth-generation (5G) wireless systems. But first, effective means of testing those 5G systems are needed.

Keysight Technologies has developed a test system for channel sounding, with the capability of generating the different waveforms and measuring propagation effects that will represent the performance levels experienced by 5G waveforms. The 5G Channel Sounding Reference Solution test system incorporates a number of multichannel wideband PXI and AXIe test-instrument modules to optimize speed and accuracy.

The 5G Channel Sounding Reference Solution (see figure) blends advanced signal-generation resources with high-resolution analysis capabilities to study Doppler shifts, channel loss and distortion, and other propagation effects. It packs both PXI and AXIe function modules into a mainframe enclosure, including a model M9703A AXIe wideband digitizer and model M9362A PXI quad downconverter module.

The several PXI and AXIe instrument modules within the 5G Channel Sounding Reference Solution provide full-sized performance levels in a fraction of the size of conventional benchtop instruments. For example, the model M9703A AXIe receiver/digitizer processes input signals from dc to 2 GHz at sampling rates to 3.2 Gsamples/s. The eight-channel digitizer features 12-b resolution, armed with four Virtex-6 field-programmable gate arrays (FPGAs) from Xilinx (www.xilinx.com).

The digitizer, which is well-suited for analyzing multiple-input, multiple-output (MIMO) channels and components, is

scalable to more channels. It can process real-time bandwidths as wide as 1 GHz.

The model M9362A PXI quad downconverter module operates from 10 MHz to 26.5, 40.0, and 50.0 GHz. The model M8190A arbitrary waveform generator provides 14-b resolution at sampling rates to 8 Gsamples/s and 12 b resolution at sampling rates to 12 Gsamples/s. It can operate at sampling rates from 125 MSamples/s to 8 or 12 Gsamples/s. It provides a spurious-free dynamic range (SPDR) of typically -90 dBc and harmonic distortion of typically -72 dBc.

The channel sounder also includes an N5183B MXG microwave analog signal generator and E8267D PSG 100-kHz-to-44-GHz vector signal generator (VSG), with a generous assortment of measurement software, including the model 89600 VSA software and the model M9099 Waveform Creator software. With its collection of signal sources, the test system can handle generation and analysis of systems with wide channel bandwidths at carrier frequencies to 44 GHz.

The M9099 Waveform Creator is a modular software application that employs a drag-and-drop graphical user interface (GUI). It creates the complex baseband and vector signals that will be used 5G. Engineers can also use Keysight's SystemVue simulation

software platform to calculate channel parameter estimations and perform link-level simulations and validation of new 5G designs with the imported channel models (see p. 75 for more information). **tmw**



The 5G Channel Sounding Reference Solution test system incorporates PXI and AXIe measurement modules, along with flexible signal generation and analysis software, to tackle the challenges of characterizing 5G communications network channels.

KEYSIGHT TECHNOLOGIES, 1400 Fountaingrove Pkwy., Santa Rosa, CA 95403; (707) 577-2663, www.keysight.com