

5G Channel Sounding Challenges

Submitted by [Keysight Technologies](#)

Achieving the aggressive goals set out for 5G cellular communications, including over-the-air data rates up to 10 Gbps, requires utilization of new cm or mmWave frequencies for wireless access. Today's mobile channel models, however, were developed for frequency bands below 6 GHz and are not adequate for cm or mmWave frequency bands.

Channel sounding is a technique used to measure and characterize new potential air interfaces for the development of channel models for 5G communications systems. Characterization of the air interfaces need to accommodate for time-varying measurements and multi-path propagation in new frequency bands in order to capture the channel impulse response (CIR) for each given frequency. Once the CIR is acquired, research engineers can extract the estimated channel parameters via post processing for the creation of new 5G channel models.

In order to achieve the desired 5G data rates, new spectrum, at cm and mmWave frequency bands, with ultra-broad bandwidth and use of MIMO technology will be required. High performance test instruments and software are needed for development of a channel sounding measurement system. Modular instruments are a natural fit for channel sounding measurement systems because they offer scalability to higher frequencies, wider bandwidths and more channels to support MIMO.

Several techniques can be used for characterizing the air interface. To start, using a measurement system that incorporates wide-band, auto-correlation with MIMO to capture the entire bandwidth and multi-path propagation properties in few measurements is a great advantage. A key part of the measurement system includes a high performance wideband DAC (Digital Analog Converter) and ADC (Analog Digital Converter) with sampling rates fast enough to support the needed bandwidth, and enough resolution to produce the dynamic range to capture the received sounding signal and multi-path signals. Important channel characteristics and parameters are extracted from the received signals using complex algorithms and used for development of 5G channel models that can be imported into system level simulation and emulation tools for product designs.

For more information on 5G Channel Sounding see application note "Defining a Channel Sounding Measurement System for Characterization of 5G Air Interfaces" <http://literature.cdn.keysight.com/litweb/pdf/5992-1064EN.pdf?id=2652612>