

Validation at the Edge: Lab



As AI scales, data rates rise, and system complexity increases, validation must connect simulation, measurement, and manufacturing at scale across the entire engineering life cycle.

[Learn More in the Engineering at the Edge Webinar Series](#)

Pre-Silicon

Lab

Network Traffic

Manufacturing

Industry Advancements Driving Shifts in Lab Validation

Wireless, radar, satellite, and optical systems are pushing into mmWave and sub-THz: 6G at FR3, wideband radar, coherent optical beyond 200 GBd. At these frequencies, signal loss rises, phase noise compounds, and small measurement errors become indistinguishable from device behavior.

Today, lab validation requires instrumentation built for signal purity and phase stability where measurement pushes its limits. Here's how to evolve your workflows.

1 Generate Wideband Signals with Ultra-Low Phase Noise

5G, 6G, and advanced radar are moving into wider bandwidths and higher frequencies. More complex RF signals with extremely high spectral purity are essential to accurately validate system performance.

The Keysight Solution

[XG5-class MXG Vector Signal Generator](#)

Delivers ultra-low phase noise for wideband signal generation across 5G, 6G, and advanced radar systems

2 Characterize Complex Nonlinear Device Behavior

Millimeter-wave devices require precise measurement of S-parameters, nonlinear behavior, and frequency conversion in a single test setup to maintain phase stability.

The Keysight Solution

[XN8-class PNA-X Vector Network Analyzer](#)

Integrates four phase-coherent sources and eight receivers for complex nonlinear characterization to 50 GHz

3 Validate Optical and High-Speed Digital at Multi-TB Speeds

Optical interconnects beyond 200 gigabaud toward 1.6T push traditional oscilloscopes past their limits. Signal bandwidths extend beyond instrumentation capabilities, and small measurement errors obscure link performance.

The Keysight Solution

[SX2-class DCA-M Sampling Oscilloscope](#)

Provides 224G measurement capability with integrated clock recovery to 120 GBd for next-generation 1.6T optical link validation

[XR8-class Oscilloscope](#)

Enables 12-bit ADC precision for 8-33 GHz SerDes and AI data center applications

4 Extend Measurement Range into mmWave and Sub-THz

Advanced applications require measuring signals far beyond traditional microwave frequencies. Fully calibrated S-parameter measurements across wide frequency ranges enable mmWave wireless, radar, and high-speed communications development.

The Keysight Solution

[Frequency Extenders for PNA/PNA-X](#)

Expands measurement range up to 250 GHz with fully calibrated S-parameter measurements for mmWave systems

Find out how Nokia Bell Labs achieved record 260 GBaud coherent transmission over 100 km, demonstrating net bitrates beyond 2 Tbit/s per wavelength and advancing long-haul optical infrastructure.

[Learn More](#)