

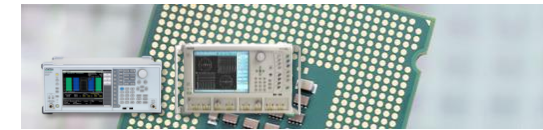
# Test and measurement over the entire ecosystem

- 5G changes impact everything from device level to conformance testing to installation and maintenance (I&M).
- Bringing in mmWave capabilities at usable costs.

Mobile Technology R&D



Component / Antenna



Device/Module Production



Conformance / Acceptance



Access Network I&M



Data Center / Computing



Core Network



Service Assurance/ Big Data Analytics

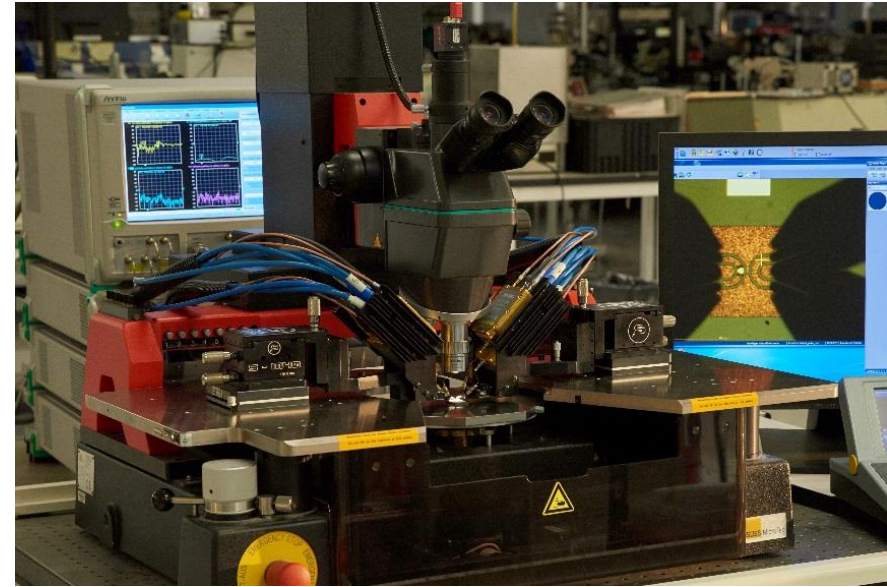


OTA and I&M? Interference hunt ideas

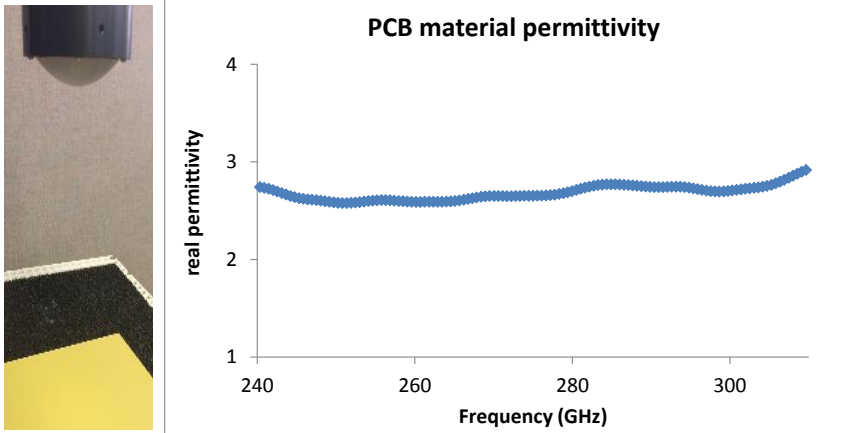


# Device modeling and design development

- Higher frequency tools exist for (quasi-) linear characterization to include AM-PM, intermodulation distortion, etc...
- How critical is harmonic characterization from a design (not modeling) perspective at higher frequencies?
- Will the PA continue to be a performance-defining element?



*4-port 70 kHz-145 GHz Vector Network Analysis for device/model development*



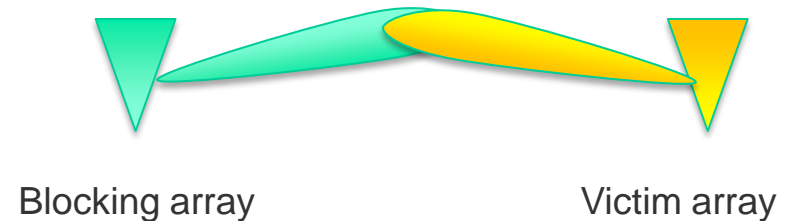
Materials measurement methods exist to the THz range. Adequate?

# Radio measurements and the integration question

- Some waveforms place more demands on measurement equipment (less of a concern) but can reduce achievable EVM (uncertainties?).



- OTA blocking: the best way to test efficiently? Channel-specific steering and traffic generation?



- Not just the analog-digital split, but where is the network split? How much data reduction happens before an access point?

