KDB Publication 662911 (MIMO) Updates - Measurement Option

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Directional Gain of devices’ antenna system becomes relevant to compliance testing when:

- Limits on output power (density) becomes dependent on directional gain
- Conducted measurement (plus directional gain) is used to demonstrate compliance with radiated limits

KDB Publication 662911 describes a method to calculate directional gain of a multi-antenna system

However, the method may overestimate the actual gain as it calculates the maximum directional gain that is theoretically possible

We are proposing to permit alternative method to use appropriate antenna gain measurement results in lieu of theoretical calculations to demonstrate compliance

- A complementary (to KDB 662911) guidance document will be published to address appropriate measurement options
- Approval is on a case by case basis and it is subject to PAG
Directional Gain Calculation

Calculating directional gain, as provided in KDB Publication 662911, may overestimate the actual gain for the following reasons (among others):

- Mutual interaction between radiating elements are not taken into account
  - Mutual coupling can impact radiation pattern of an antenna system
    - Especially in small irregular-placed elements
- Impedance mismatch, between radiating elements and drivers, matching networks, etc. is not accounted for
Antenna Gain Measurement

- Alternatively, for compliance purposes, actual gain of an antenna system, when properly measured, may be used in lieu of calculation.
- However, given the complexity of advanced antenna systems, characterizing radiation pattern of such systems becomes more and more challenging.
- Hence, a well defined procedure must accompany measurement results for review.
When submitting antenna gain measurement results the following items should be sufficiently addressed:

- **Measurement Environment**
  - Types of chambers, their effective operating range, measurement limitations, etc.

- **Measurement Method**
  - Far Field, Near Field, Absolute Gain Measurement vs. Gain Comparison Method, etc.

- **Measurement Quantity**
  - Gain, Directivity, Radiation Efficiency, Polarization, etc.
Antenna Gain Measurements, Requirements and Expectations

In case of antenna systems with beamforming capability,

– The configuration(s) that represent the beam(s) with maximum directivity (gain) shall be identified and measured

In case of antenna systems with beam steering capability,

– Multiple configurations shall be identified and measured to verify
  • The (steered) beam with maximum gain
  • The extent of Steering capability