

## Review of IEEE Std. 1720-2012:

### “Recommended Practice for Near-Field Antenna Measurements”

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The IEEE Standards Association Standards Board (IEEE-SASB) approved the IEEE Std 1720™ “Recommended Practice for Near Field Antenna Measurements” in 2012 [1]. More than forty dedicated people from industry, academia and other institutions contributed to the creation of this new document. The main motivation for a new standard dedicated to near-field measurements was to complement the existing IEEE Std 149-1979™ “Test Procedures for Antennas” [2].

Near-field techniques started to be used for antenna measurements about three decades ago and there are currently hundreds of near-field antenna test facilities installed around the world. Such test facilities are deployed for three main geometries: planar, cylindrical and spherical. The recommended practice provides a description of the three measurement systems, the probes as well as an analysis of the uncertainty. A given near-field measurement system may have its own specific characteristics for the data acquisition e.g. mechanical or electrical scanning system. Nonetheless, whatever scanning system is adopted, all systems are composed of a radio frequency transmit and receive system with some type of automated scanning, data collection and control system (DCCS) and computerized analysis ability. The calibrated probe used for the measurement of the antenna under test (AUT) should be minimize the distortion of its far field characteristics. Other than paragraphs dedicated to Overview, Normative reference, Background and Summary, The IEEE Std 1720™ “recommended practice for near field antenna measurements” consist of paragraphs dedicated to the following topics: Measurements systems, Planar near-field scanning measurements, Cylindrical near-field scanning measurements, Spherical near-field scanning, Probes, Uncertainty analysis and Special topics

According to the IEEE-SA policies, the existing standard IEEE Std 1720-2012™ “recommended practice for near field antenna measurements” is approaching expiration in 2022. A working group of the APS Standard Committee is needed to review the current document. The current standard is still relevant and useful for individuals designing and evaluating near-field antenna

measurement facilities and other people involved in antenna measurements. However, it should be updated and renewed in some areas as suggested in this paper.

- 1) A special section dedicated to the design of appropriate chambers including recommendations on absorber layout has been suggested. Similar recommendations are being incorporated in the review of the IEEE Std 149™ [2].
- 2) The paragraph dedicated to uncertainty analysis must be renewed and updated. In particular, the new text must follow to the practice of the generally accepted ISO “GUM” document, Guide to the expression of uncertainty in measurement [8].
- 3) Some new techniques, now widely applied in near-field measurement post processing could also merit inclusion or mentioning in the standard. Such techniques include higher order probe compensation, echo reduction techniques and use of non-orthogonal expansion functions in the Near-Field to Far-Field transformation such as equivalent currents.

The objective of the talk is to familiarize potential users of near-field measurement systems about Std 1720-2012™ and initiate the discussion on how the standard should be updated and renewed.

References:

- [1] *IEEE Recommended Practice for Near Field Antenna Measurement*, IEEE Std. 1720-2012.
- [2] *IEEE Standard Test Procedures for Antennas*, IEEE Std. 149-1979.