A Critical Look at Standards and Specifications

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Introduction

- Goal is to help focus on certain core topics within and across standards
- Examples given are only illustrations
  - No rat holes!
- Hind sight is particularly excellent
  - this is not trying to minimize earlier work
- What can we learn from previous work?
- How to apply what has been learned

Primary Goal of a Standard

- Define all the requirements clearly
- Ensure that all users end up with the same result when using a given procedure
- Define the uncertainty
- Minimize the risk of bad interpretations
- Remain relevant throughout the standard's lifetime

Standard Definition Reality

- It is easy to fall prey to using double specifications on critical issues.
  - Define what is needed.
  - Define a specific mechanism or device that does meet the need.
- It is a challenge to ensure a balance that allows for advances in technology while ensuring the integrity of the standard.
- For all standards there is a pull between integrity and flexibility (consider IEEE Std 1597).

IEEE Std 1597 Background

- Validation of Computational Electromagnetic Models
  - Was prepared for a very dynamic field
  - Needed to focus on the basics and ignore the specific technologies
  - It was assumed to be outside of the technology curve
- Used ‘new’ comparison techniques
  - Carefully defined the use
- Standard was well accepted

C63 Standard Examples

- OATS Specification
- Antenna use to 1 GHz
- Antenna use above 1 GHz
- Site evaluation above 1 GHz
- Antenna calibration site requirements

OATS Specification

- We specify that antennas should be no closer than 25 cm from any alternate test site wall
  - Good in principle
  - Essential for proper antenna behavior in the presence of absorber or a wooden wall
  - However, even a thin plastic sheet is sufficient to define an alternate site and so require the volumetric NSA measurements
- The key question is: what is being influenced and how much perturbation is allowed?

Antennas to 1 GHz

- We should define the antenna properties needed or the antenna design, but not both.
- Logs that cover 200 MHz to 1 GHz vary from 0.5 m to over 1.25 m in boom length.
- Logs that go down to 80 MHz are over 2 m in boom length.
- The ‘traditional’ bicon is fine, but no other geometries are excluded.

Antennas above 1 GHz

- Horns of all sorts are acceptable.
- Log periodic arrays are/were not.
- Again, we need to specify the antenna properties that are wanted.
  - Example; beam-width
    - LPDA can be designed to have a constant beam-width over its operating range
    - Horn antenna patterns are frequency dependent

Antenna Summary

- We must specify exactly what is needed.
- Any antenna can be poorly designed.
- If we require a specific type of antenna, that must be stated – ideally with a reason.
- In many cases there are multiple antenna types that will properly meet the need of the standard.
- If we have to specify the antenna design, we are probably missing something critical.

Test Sites to1 GHz

- NSA is the key qualifying characteristic.
- OATS is the primary/reference site.
- In reality, most sites are alternate in some detail.
- Volumetric NSA is the norm.
- A pure OATS is actually the exception that permits a reduction in the qualification requirements.

Test Sites above 1 GHz

- Use of absorber on the groundplane assumes horn antennas, or does it?
- Can the site requirements be separately specified?
  - NSA, VSWR, Time Domain reflections
  - Can it be independent of the antennas?
- Goal is to define what is needed independent of the antennas etc.

Antenna Calibration Site

- Tighter NSA requirement: 2 dB vs. 4 dB
- Are there other requirements?
- Clearly, emission measurements using the calibrated antennas on that site are a conflict.
- Is there more to specify other than the 2 dB NSA?
  - If not, then requiring an OATS is an unnecessary restriction.
  - If so, what is missing from the standard?

Summary

- Fully specify what is needed.
  - Examples and/or explanations can be put in an informative annex.
- Avoid double definitions.
  - Usually done to clarify, but backfires.
- Avoid definition by example.
  - Usually not a problem at the time, but get left behind with advancing technology.