Some Suggested Uncertainty & Risk Evaluation Criteria

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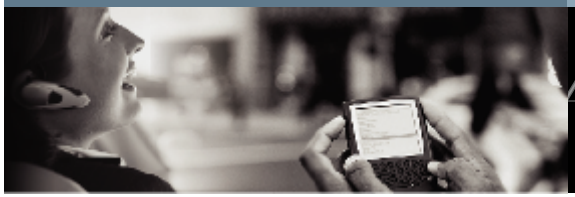

LINEAR TECHNOLOGY

Uncertainty Expectations and 'Risk Floor'

- An important part of a Task Force job is to evaluate risk for various technical decisions
  - Zero risk is not possible
  - 100% certainty is not possible
- *What risk is reasonable and acceptable?*
- *How much uncertainty should we tolerate? (what is our required confidence interval?)*

A Semiconductor Analogy

- Many Semiconductor manufactures aim for 1ppm failure rate over the useful lifetime of the products they sell.
- ABSMAX specifications for voltage and temperature define the allowed limits of operation.
  - Customers that operate outside these limits may
    - Cause the part to fail
    - shorten the lifetime of the parts
  - This is analogous to the supported and unsupported use models for .bt
    - Recall the ‘Y’ cable discussion

A Semiconductor Analogy

- Issues such as failures and/or significant parametric changes beyond ‘useful life’ and other issues that occur many db below this 1ppm level are generally not considered good places to spend time, energy, and money solving.
- PoE has an inherent risk associated with things such as False positive PD detections
  - Due to imperfect PSE technique
  - Network attached devices that inadvertently look like a PD impedance (interestingly, many PSEs can look like PDs)
  - Real world requirements to support legacy devices

Other Inherent Risk and operability Factors

- CAT3 being used
- ‘Y’ cables
- Mis-Wired connectors
- Increasingly ubiquitous PoE++ 4 pair schemes

Undesirable Results of False Detection

- Blown Termination Resistors for Non PoE Equipment being falsely detected
  - Consequence: potential loss of data transition
- Motor boating for improperly classified PDs
  - Consequence: undesirable but not dangerous

Uses for ‘Worst Case Analysis’

- Definition:
  - ALL relevant sources of error are identified
  - Their worst case values are determined “(six sigma values)”
  - These values are added, often without respect to potential correlation.
  - The result is used to see if the system “works anyway”
- This often this leads to a case that is statistically extremely unlikely and well below the Inherent Risk Floor of a system

So why use ‘Worst Case Analysis’

- Although often still a considerable amount of work, it is still easier than determining how to combine error sources
- If a worst case analysis shows acceptable behavior no further work is necessary. It can give a positive indication
- Does not to prove a negative
  - It does not by itself necessarily negate a solution
  - The next step is often to determine the appropriate method for combining error sources

Using rigor when combing error sources

- “RSS” is often the technique ‘thrown around” to combine error sources
- This technique, and others, is only appropriate if the distributions of uncertainty and errors and possible correlation warrant its use.
- Some distributions one should be aware of:
- NORMAL DISTRIBUTION, LOGNORMAL, EXPONENTIAL, QUADRATIC,COSINE, UNIFORM (RECTANGULAR), Round-off, Truncation Uniform, TRIANGULAR, TRAPEZOIDAL, STUDENT’S,UTILITY
- To name a few…

Which distribution to use?

- A sample of thinking about and applying just one type of distribution
  - APPLYING THE UNIFORM Distribution
  - Criteria for Selecting the Uniform Distribution
  - Cases where the Uniform Distribution is Applicable
  - Incorrect Application of the Uniform Distribution