Characterization of Power Quality Events

Charles Perry, EPRI Chair, Task Force for PQ Characterization

E. R. "Randy" Collins, Clemson University Chair, Working Group for Monitoring Electric Power Quality

2008 IEEE T&D Conference, Chicago IL, April 23, 2008











1159 states that there are additional waveform attributes

Steady state phenomena:

- Amplitude
- Frequency
- Spectrum
- Modulation
- Source impedance
- Notch depth
- Notch area

Non-steady state phenomena:

- Rate of rise
- Amplitude
- Duration
- Spectrum
- Frequency
- Rate of occurrence
- Energy potential
- Source impedance

Additional Waveform Characteristics not identified in 1159

- Ideal (Nominal) Waveform
- RMS Magnitude
- Fundamental RMS Magnitude
- Phase Angle Shift (jump) using zero crossings
- Phase Angle Shift using the DFT fundamental
- Missing voltage
- Residual voltage
- RMS of residual voltage



















Scope

"Methods for measurement and interpretation of results for power quality parameters in a.c. power supply systems."

This recommended practice will establish the data acquisition attributes necessary to characterize the electromagnetic phenomena listed in Table 2 of IEEE Std.1159-1995 (R2001). This recommended will include definitions, instrumentation categories and technical requirements that are related to the type of disturbance to be recorded. The disturbances will be characterized by converting suitably sampled voltage and current data set into specific power quality categories and with specific attributes within each category.



The purpose of this project is to provide a single recommended practice for acquiring and interpreting the attributes of power quality disturbances. There are two components to this work. One objective of this recommended is to describe the technical measurement requirements for each type of disturbance in Std 1159-1995 (R2001) to avoid confusion and interpretation of levels or limits specified in other IEEE standards. The second objective is to provide methods for interpreting these measurements into a quantifiable set of descriptors. The draft international power quality measurement standard IEC 61000-4-30 covers some of these issues, but is limited in scope. This project will use the IEC 61000-4-30 draft standard as a core, and expand upon it by adding the work already done by the P1159.1 Task Force and the P1159.2 Task Force. IEEE Std 1159-1995 (R2001) defines disturbances in 24 categories of typical characteristics of power system electromagnetic phenomena. Each category is discussed in several other standards in terms of emission limits, severity levels, planning levels or immunity levels.

Measurement requirements are not currently covered by standards. Therefore, levels or limits may be subjected to interpretation. This adds confusion in the rationale for which standards were drafted. Furthermore, equipment which operates on the ac power system does not respond solely to the phenomena listed in 1159-1995 (R2001). Studies have shown that attributes not commonly quantified by measuring equipment may have a significant impact on the equipment's ability to operate during power quality variations. This standard will provide a set of attributes that are important to equipment connected to the ac power system and provide recommended methods of arriving at these attributes from the measurement devices.

Why coordinate?

- PQ Monitors should always give meaningful answers.
- PQ Monitors using IEEE Standard definitions should not give different results from those using IEC Standard definitions.
- Where are we now?