FIDVR Events

- Transmission FIDVR events recorded for decades
- Evolution of FIDVR unknown
- Distribution FIDVR impacts unknown

http://fidvr.lbl.gov/
Valley PQ Meters in Distribution System

- Installed 25 PQ meters at Valley Distribution system
  - Middle of line
  - End of line
  - Different phases
  - Different distribution circuits
PQ Meters Installation

- Voltage trigger recording events (V ≤ 80%)
  - Sinusoidal waveform (V, I, P, Q)
  - RMS waveform
- Trend recording (V, I, P, Q)
  - 1 minute resolution
- Not synchronized
- Recorded in memory cards
Localized FIDVR Events

- There were many localized FIDVR events that were not shown in the transmission system PMUs
- Typical air conditioner stalling behavior
- Voltage depressed for many seconds below 75% at various distribution circuits
- Overvoltages 114%
FIDVR Events

• There were some FIDVR events that were recorded by transmission system PMUs
• Subtransmission depressed voltage 80%
• Distribution depressed voltage 55~65%
• Overvoltages 115%
VRT Recommendation

- Recorded distribution FIDVR events helped proposing voltage ride through (VRT) parameters
  - California Rule 21
  - IEEE 1547
- NERC, FERC, WECC voltage ride through standards need to be revised to tolerate FIDVR events
VRT Recommendation (cont..)

- Zoomed RMS voltages are between 30~40%
- Low depressed voltages
Conclusion

• There is the need of advanced distribution PQ meters
  – Synchronization (e.i. GPS)
  – Record RMS, sinusoidal, phasor, harmonics
  – High sampling trend data at steady state
  – Friendly GUI that can display multiple points
  – Heavy duty (withstand deserts temperatures 40F~150F)
  – Easy, safe, inexpensive to install (up to 600V)
  – Easy communications (cell modem, radios, etc)

• Advanced PQ meters future applications
  – Dynamic impedance calculation
  – Support system protection
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