Status quo and future needs in standardization

(Selected CIGRE working groups in detail, present activities at IEC, some future needs)

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Workshop on the Grid Integration of Renewable Energy
Johannesburg, South Africa, 8th August 2017

Joint working group CIGRE/CIRED C4.112
Guidelines for Power Quality Monitoring
(Measurement locations, processing and presentation of data)

- Survey on utilities experiences
  (34 TSO, 73 DSO from all continents)
- Selection of monitoring locations
- Selection of monitoring parameters
  (guidance on VT/CT accuracy)
- Presentation of monitoring results
Working group C4/C6.29

**Power Quality Aspects of Solar Power**

- Survey on utilities experiences (32 responses from 18 countries)
- Considered Power Quality Parameters:
  - Harmonics
  - Supraharmomics
  - Fast Voltage Variations
  - Slow Voltage Variations
  - Overvoltage
  - Flicker
  - Unbalance
- Connection and Disconnection

Most utilities do not have consistent PQ monitoring programs, but apply emission limits for the most common disturbances.

Highest ambiguities with respect to supraharmomics and interharmomics.
Joint working group CIGRE/CIRED C4.42

Continuous assessment of low-order harmonic emissions from customer installations

Scope:
• Review of harmonic emission assessment methods with present background distortion based on the IEC approach (basic definition of emission)
• Evaluation of methods for system harmonic impedance determination (invasive and non-invasive methods, reference impedance)
• Consideration of technical limitations related to harmonics measurements (CTs and VTs) and sensitivity analysis
• Consideration of statistical assessment of results
• Recommendation and specification of a clearly defined methodology with clear instructions for practical implementation

• 5 meetings up to now, next meeting in November in Dresden
• Final report envisaged for December 2018

Revisions to IEC Technical Reports 61000-3-6, 61000-3-7, 61000-3-13, and 61000-3-14

Scope:
• Evaluate the suitability of the general limit allocation process in systems containing distributed resources and develop recommended changes
• Evaluate the suitability of existing indices and limits (e.g., 95th percentile) for use in reconfigurable systems and recommend changes
• Evaluate the suitability of the existing approach for allocating harmonic limits for higher-frequencies (above 2 kHz) and recommend changes
• Assess the effectiveness when fluctuating or unbalanced distributed resources are present and recommend changes
• Review industry experience with the present versions of the reports and recommend changes as needed based on recent usage and experiences

• 7 meetings up to now, next meeting in September in Paris
• Final report envisaged for December 2018
Selected further CIGRE activities

- **JWG CIGRE/CIRED C4.24:**
  - Power Quality and EMC Issues associated with future electricity networks
  - Emission characteristic and possible impact of novel power electronics as well as changing grid infrastructure on Power Quality
  - Chapter on new requirements for measurement

- **CIGRE C4/B4.38:**
  - Network Modelling for Harmonic Studies
  - Evaluate and suggest best practice in the use of available models to modern equipment.
  - Identify any shortfalls with available models and the possible need for further development in this area.
  - Provide clear and concise guidelines on modelling existing (large) nonlinear loads like windfarms and HVDC converter stations

Selected further activities at IEC

- **IEC SC77A**
  - WG1 (Harmonics):
    - Emission limits for the frequency range 2-150 kHz
    - Emission limits for renewables (IEC 61000-3-16/-17)
    - Amendment to IEC 61000-4-7 regarding harmonic phase angle measurement
  - WG8 (compatibility levels):
    - Compatibility levels for the frequency range 2-150 kHz
    - IEC 61000-2-2
  - WG9 (measurement methods):
    - Measurement methods for the frequency range 2-150 kHz
    - IEC 61000-4-30

- **IEC TC38**
  - Report on „The use of instrument transformers for power quality measurements“ (IEC 61869-103)
  - WG47: Evolution of instrument transformers for the modern market
Some future needs

- Extended concept of emission limits for small-sized devices with new equipment topologies, particularly inverters for renewables (test conditions, requirements on impedance characteristics)

- Revision of harmonic emission limit allocation framework accounting for frequency-dependent behaviour of damping, transfer, concurrency and diversity

- Further improvement of reliable and fair methods to monitor the „true“ contribution of customer installations to voltage disturbance levels (continuous assessment)

- Easy-to-use methods to include the uncertainty of the whole measurement chain in the assessment procedure (external sensors, SNR of the measurement inputs, uncertainty propagation for indirect parameters)

Thank you for your attention!

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