endesa power quality

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CIGRÉ C4.112 – Work in Progress

CEER-EURELECTRIC Workshop about Voltage Quality Monitoring

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Guidelines for power quality monitoring - measurements locations, processing and presentation of data

WG Timeline

- Start Date: January 2011
- Expected Completion Date: March 2014

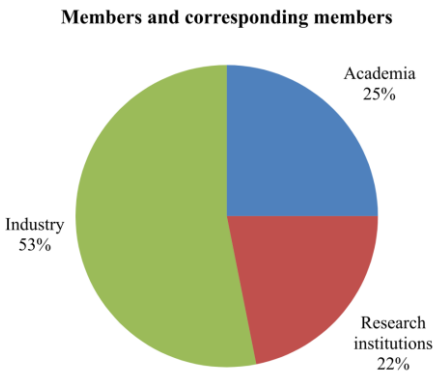
Highlights of Recent Activity

- 4 Meetings, 2 Conference papers, 1 Panel session
- PQ monitoring questionnaire sent to utilities around the world, almost 100 responses received by June 2012
- First drafts of all Chapters ready

Future Activity

- Analysis of the results of survey
- 3 meetings per year
  - next meeting in October 2012,
  - following meetings planned for January and May 2013
- Final drafts of most chapters should be ready by May 2013
- Conference panel sessions to be organised at PowerTech 2013 (Grenoble) or CIRED 2013 (Sweden) and IEEE PES GM 2013
- Continue with writing papers for international conferences and journals

WG Composition



- 25 Full members and 6 Corresponding members
  - 42% Industry, 33% Academia, 25% Research institution
- 21 Countries represented
- Convenor: Prof J. V. Milanovic (UK)

- Regarding PQ monitoring, it must answer:
  - How it is already.
  - How it could or should be.
  - Straightforward procedures for skilled personnel.
- Main chapters:
  1. Introduction and Main Objectives.
  2. Overview of existing PQ monitoring practices.
  3. Selection of Monitoring Locations.
  4. Selection of Monitoring parameters and future trends.
  5. Presentation and Processing of Measured Data.

Objectives

- Provide critical overview of existing methodologies and practice on PQ monitoring.
- Identify clearly their advantages and disadvantages.
- The type of data collected, the measurement duration, data processing, aims of monitoring, e.g., trouble-shooting, verification of requirements, long-term or permanent monitoring, standard compliance, etc.

Goal of monitoring ➔ PQ methodology

- Compliance verification.
- Performance analysis.
- Site characterization.
- Troubleshooting.
- Advanced applications and studies.
- Active PQ-management.

PQ survey / questionnaire

- The aim of the survey is to establish current level of power quality monitoring practices and effort put in power quality monitoring by the utilities around the world
- ca 100 replies from every continent
- Feb, Mar, Apr 2012
- 1/3 transmission; 2/3 distribution
- Network monitoring - ¾ yes, ¼ no
- Further analysis performed – results will be published 2013

- How to place monitors in a efficient way.

Power system	Monitoring Locations
Classic Generation Renewables/DG Transmission Distribution Customer	Substation (Transmission) HV/MV Along the feeder (Distribution): Overhead MV Underground MV Point of delivery (DG) MV/LV PCC/Point of delivery (Customer) MV/LV

- Use not only PQ devices but also new IEDs.
- Communication links are part of the equation.

IEDs

- New approach using devices present on the grid:
  - LV : meters
  - MV: relays, RTUs, controllers, meters.

Substation

Overhead Feeder

Customer PCC

Main topics to be answered

- Parameters to be recorded and how.
- Storage and handling of data.
- Suitable data formats.
- Future trends.

Monitoring Approach

- PQ monitoring will depend upon four main variables:
  - Goal of monitoring.
  - Total amount of sites.
  - Available resources.
  - Storage approach.

Monitoring strategy

- A proper campaign will be defined by four main factors:
  - Parameters to be monitored.
  - Data averaging window.
  - Storage.
  - Data format.

Future trends

- Distributed storage.
- Flat/tabular formats.

t1	t2	var1	var2	var3	var4	var5	var6	...	varX
A	b								
B	c								
C	...								
...	x								

Numeric id	Definition
100	Mean rms voltage, phase-to-phase voltage A-B
101	Mean rms voltage, phase-to-phase voltage B-C
102	Mean rms voltage, phase-to-phase voltage C-A
103	Mean rms voltage, phase-to-neutral voltage A-N
...	...
120	Min rms voltage, phase-to-phase voltage A-B
121	Min rms voltage, phase-to-phase voltage B-C
...	...
1120	Pst value, phase-to-phase voltage A-B
...	...

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Chapter 4 - Selection of Monitoring parameters and future trends (cont.)

Case studies

- Specific examples to skilled personnel and enginners in order to deploy a proper PQ program:
  - Industry which can potentially produce flicker.
  - Small DSO: deploy a PQ system from scratch.

Why?

- Different ways of presenting the results of monitoring are needed for different types of application and decision making, in order to cover the whole, or a large part, of the service area.

Factors

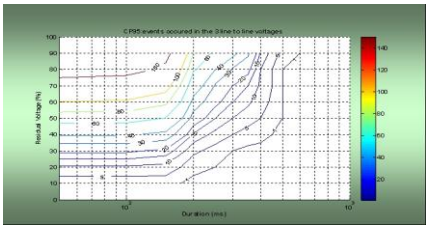
- Presentation approaches depend on many factors:
  - scope of monitoring
  - standards compliance (and /or connection rules compliance) regulation policy
  - monitoring duration
  - monitoring locations and their numerousness
  - security requirements (confidential nature of some kind of data, ...)
  - power system under monitoring (what, how and where monitoring)
  - …other (data acquisition or communication technologies for results presentation,…)

Approaches

- Statistical-probabilistic approach to network performance assessment.
- Statistical-probabilistic approach to manage customer relationships.
- Sites-characterization approach.

Avg. number of MV dips for equivalent point of measure within the selected interval (EN50160)

Residual V. [%]	Dips duration				
	20-200 ms	200-500 ms	500-1000 ms	1-5 s	5-60 s
80…90	34.9	7.5	2.0	0.6	0.0
70…80	17.1	5.3	0.6	0.2	0.0
40…70	28.2	5.3	0.6	0.1	0.0
5…40	9.9	1.7	0.2	0.0	0.0
1…5	0.2	0.0	0.0	0.0	0.0



- For each approach the following features are to be defined:
  - monitored parameters and other quantities to be evaluated (indices)
  - correlation of interest between parameters
  - non conventional kind of analyses
  - requested level of automation for the analysis of large amount of data
  - reporting intervals, tools and ways
  - advantages and disadvantages

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light · gas · people