Protecting the LVDC last mile: translating concepts to technologies

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Concept: Multi-function LVDC protection scheme

Features

- Communicaton-assisted
- Fault detection and locations are based on DC current directions and magnitudes, and DC voltages
- Using multiple IEDs
- Using solid state circuit breakers for interrupting DC faults

Offered Functions

- Fast detecting and locating DC faults
- Good level of selectivity
- Fast interrupting DC faults at low level
- Blocking reverse DC fault current
- Fast reclosing function
From concept to realisation of technologies

Concept
- T&T Technical report
- CIRED paper

Prove of concept in simulation
- UoS-LUT (Finland) first meeting

Prove of concept in experiment
- KEPCO LVDC international workshop
- EU DCFORWARD

Company engagement
- IEEE Trans
- IEEE SG4 IET LVDC CoP
- UoS-LUT LVDC workshop
- UK LVDC community
International collaborations

- Invited talk: LVDC international workshop 2013 by KEPCO South Korea (29-30th Oct 2013)
- Ustrath (UK)-LUT (Finland) LVDC workshop (29th Nov 2013)
- DCFORWARD consortium across EU (2014) (good LVDC networking opportunity)
Supporting standards and policy (IEC SG4 and IET CoP)

- Set up in 2009
- Title: LVDC distribution systems up to 1500V DC
- The objective

Presented last mile LVDC work in Milan 16-17/April/2014
- Issues with existing IEC61660 (reported in the minutes)
- Last mile LVDC has been added to the SG4 LVDC roadmap
- More companies joined DCFORWARD

- Joined the IET TC2.4 on LVDC power systems
Industrial engagement

- New company engagement
  - Collaboration with Moixa Technology (testing DC RCD <500mA on the rig)

- Winning other EPSRC fund

Moixa Battery-LVDC sub-systems: MASLOW
Conclusions

What has the Top and Tail demo used for?

- Informing relevant standards (IEC & IET CoP)
- Appraisal by industrial colleagues and cooperation with international researchers
- Stronger validation of the simulation models
- Specifying the requirements for a higher TRL demonstrator

Demo → Publications → Collaborations → Fund → Demo

Publications

Collaborations

Fund

Demo

Stronger validation of the simulation models

Specifying the requirements for a higher TRL demonstrator

Informing relevant standards (IEC & IET CoP)

Appraisal by industrial colleagues and cooperation with international researchers
LVDC testing facilities
Thank you & any Q?