

Abstract

Summary in English

The cognification of the power system enabling more intelligence within system operation will be the approach of PoSyCo to advance operation strategies in the light of the increased intelligence of components from the participants in future and present power systems.

One of the most crucial parts in a power system is its protection and the protection-supporting automation system. While methods and solutions developed in previous and current research projects and related pilots indirectly impact the protection system (by preventing faults that could lead to triggering the protection system on an operational level), a majority of the underlying protection system (e.g. fuses, breakers) do not exhibit any form of intelligence in order to keep complexity and costs low. Although many smart grid concepts have intensively been studied, the area of protection systems in the context of interaction with intelligent network participants has not gained much attention in recent years. This safety-critical field of protection is known to be conservative for good reasons. Nevertheless, a growing backlog can be observed, which is going to be addressed by PoSyCo. It is well known that a number of classic principles for distribution grid protection are no longer applicable in case of bidirectional load flows. A substation-positioned fuse is e.g. not sufficient to break a faulty feeder, if generators along the feeder strongly contribute to the fault current.

The aim of PoSyCo – the Power System Cognification flagship project – is to extend the state of the art protection system with intelligent add-ons. The envisioned ‘SOFTprotection system’ will provide intelligent overload prevention functionality and will allow the power system operators to actively integrate information on faults in their operation and planning processes. As the term ‘add-on’ suggests the system will not replace existing protection systems but rather extend them, leaving the protection system with a fall back variant.

In order to achieve such a system, PoSyCo will investigate the technical solution of an innovative ICT system for automated operation, the roll out process, how to deal with malfunctions as well as how to integrate in the resulting system in established working processes. This includes the human-to-machine interaction to ensure that DSOs employees are supported by trustful and necessary information at the right time in an intuitive way. In order to realize the envisioned system state of the art technology innovations provided from the field industrial IoT will enable a cost efficient and extendable architecture.

Expected results of PoSyCo are a blueprint for implementation of advanced Smart Grid functionalities in general and the SOFTprotection approach and its validation in a laboratory proof of concept. With this, PoSyCo will increase the level of protection of the future power system to allow the penetration of renewable and volatile energy sources as well as volatile demand loads like E-mobility.