Title	**Power System Design - Basis for Efficient Smart Grid Initiatives**

SUMMARY

Nowadays the big picture of future power system development is driven by intelligent automation of electrical distribution networks. This might lead to a paradigm change in network design and it will definitely lead to paradigm change in network operation.
Looking to smart or intelligent grid initiatives the whole issue can be divided into three main topics:

- smart generation,
- smart grid and
- smart customer.

The “smart” grid as the connecting system has to consider developments in smart generation and smart customer technologies as well as to force the right investment.
On the one hand it will be expected that smart technologies will lead to reduced investment in primary equipment and it will lead to higher availability of power supply. On the other hand decentralized generation in low and medium voltage networks and an increasing number of potential electrical consumers will lead to a more complex operation in future, and adequate control centers are strongly needed.

A well structured medium and low voltage network has been taken to analyze the impact of smart technology into the grid. Smart components which are needed to operate a smart grid will be specified. The specification will be done for generation, loads and control function taking into account visions of future requirement. On the basis of these assumptions and the actual network design the paper describes the challenges in network planning. The paper shows the effects of smart grid technology for the extension scenarios of the electrical networks. It will be shown how distribution automation with intelligent functions helps to reduce investment in primary equipment and increase network reliability. The clear structure of the power system leads to simple control function und clear rules. It can be shown that the structure of the network can stay the same and the utilities can follow different possibilities to operate the network. The paper describes the scenarios for network planning under consideration of new parameters to control load and generation.
Up to now the key driver / factor for new investment in the grid was the equipment loading under (n-1) or other reliability-based contingency scenarios. The network condition could easily be calculated out of the few measured values in the control center. Based on the results planning scenarios lead to the necessary measures. In future the maximum equipment loading measured in today’s control centers are not enough to derive any measurements and planning scenarios will increase. The paper shows simple key drivers for action in network development.