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Intelligent Technologies in Smart Electric Grids

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1. Abstract

Application of *intelligent technologies* in modern electric grids is an important issue in *smart grid* design and operation; and is becoming more significant today due to the increasing size, changing structure, introduction of renewable energy sources, distributed micro grids, environmental constraints, and complexity of electric power systems.

The electric grids of tomorrow which should handle complex multi-objective regulation optimization problems characterized by a high degree of diversification in policies, control strategies, and widely distribution in demand and supply sources surely must be *intelligent*. The core of such intelligent system should be based on flexible intelligent algorithms, advanced information technology, and fast communication devices.

The smart monitoring frameworks including wide area measurement system (WAMS) with phasor measurement units (PMUs) provide key technologies for state estimation, system protections and control of widely spread power grids. A direct, more precise and accurate monitoring can be achieved by the technique of phasor measurements and global positioning system (GPS) time signal. Proper grasp of the present state with flexible supervisory control and data acquisition (SCADA) address significant elements to maintain wide-area stability in the complicated grid with the growing penetration of distributed generation and renewable energy sources.

In response to the existing challenge of integrating advanced metering, computation,

communication and control into appropriate levels of smart grid synthesis and operation, this speech provides a brief coverage for applications of intelligent technologies in smart grids. Due to the speaker background, the speech is mainly focused on the application examples of intelligent technologies in Japanese electric system utilities. Artificial intelligent applications in power system planning and control/restoration are addressed; next steps and future implementations are explained.

2. Speaker (short biography)



H. Bevrani received PhD degree in electrical engineering from Osaka University, Osaka, Japan, in 2004. Since 2004, he has worked as a post-doctoral fellow, senior research fellow, assistant professor,

visiting professor, and professor with Kumamoto University (Japan), Queensland University of Technology (Australia), Kyushu Institute of Technology (Japan), Osaka University (Japan), Ecole centrale de Lille (France) and University of Kurdistan (Iran). He is author/coauthor of 4 books, 10 book chapters, and about 200 journal/conference papers. His current research interests include smart/micro grid operation and control, intelligent/robust algorithms and methods. He is a senior member of Institute of Electrical and Electronics Engineers (IEEE). More information is available in: www.bevrani.com.



Session 3- Keynote Speech

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Speaker:

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