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GPS synchronized digital grid: Full of renewable energy in the future new grid architecture for renewable energy era

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Most of renewable energy has to use inverters to supply their power to the conventional grid; that is a huge synchronous system, composed of numerous numbers of synchronous generators. Inverters do not have a synchronizing mechanism. Therefore, it is said that penetration of renewables will be limited. Digital Grid is a new concept of multiple electrical grids (called "cell"), connecting each other asynchronously. In the cell grid, we are free from conventional electrical constraints and can create a new type of electric power system. In this paper, we propose GPS synchronized grid system. GPS satellite time signal will make very accurate carrier frequency for the inverters, and then all the inverters in the cell will synchronize very accurately. We can acquire rotating inertia for inverters. Inverters behave as a voltage source, and then the power system in the cell becomes a linear system. Digital Grid will be most promising power system for renewable penetration because we can utilize existing infrastructure with plenty of inverters. We can utilize full of renewable energy in the future.

Biography

Rikiya Abe graduated from the Electronics Engineering at the University of Tokyo and received Doctor degree at Kyushu University, working long time at whole sale power company, J-POWER in Japan. He was a Visiting Researcher at Electric Power Research Institute (EPRI). He is now a Project Professor at the University of Tokyo, Graduate Course of Technology Management for Innovation (TMI) from 2008. He developed the Digital Grid concept which represents "Internet of Power". He established a "not-for-profit organization of Digital Grid Consortium" in September 2011 and is working as a CEO. He is a Co-Chair of Presidential Endowed Chair of the "Electric Power Network Innovation by Digital Grid", at the University of Tokyo, from June 2012. He also started a venture company, the Digital Grid Inc., to apply Digital Grid technology in the world. The company has started off-grid solution in Tanzania and is operating 550 solar kiosks to provided minimum electricity requirement.

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