

# **“A Framework for Analyzing the Impact of Data Integrity/Quality on Electricity Market Operations”**

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## **Abstract:**

This talk examines the impact of data integrity/quality in the supervisory control and data acquisition (SCADA) system on real-time locational marginal price (LMP) in electricity market operations. Measurement noise and/or manipulated sensor errors in a SCADA system may mislead system operators about real-time conditions in a power system, which, in turn, may impact the price signals in real-time power markets. This research serves as a first step to analytically investigate the impact of bad/malicious data on electric power market operations. The first part of this talk studies from a market participant's perspective a new class of malicious data attacks on state estimation, which subsequently influences the result of the newly emerging look-ahead dispatch models in the real-time power market. We propose a novel attack strategy, named ramp-induced data (RID) attack, with which the attacker can manipulate the limits of ramp constraints of generators in look-ahead dispatch, leading to financial profits while being undetected by the existing bad data detection algorithm embedded in the state estimator. In the second part, we investigate from a system operator's perspective the sensitivity of locational marginal price (LMP) with respect to data corruption-induced state estimation error in real-time power market. We present an analytical framework to quantify real-time LMP sensitivity subject to continuous and discrete data corruption via state estimation. The proposed framework offers system operators an online tool to identify economically sensitive buses and transmission lines to data corruption as well as find sensors that impact LMP changes significantly and influentially.

## **Bio:**

Dae-Hyun Choi received the B.S. in electrical engineering from Korea University, Seoul, Korea in 2002, and the M.Sc. in Electrical and Computer Engineering from Texas A&M University, College Station, in 2008, where he is currently working toward the Ph.D. From 2002 to 2006, he was a Researcher with Korea Telecom (KT), Seoul, Korea where he worked on designing and implementing home network systems. His research interest includes power system state estimation, electricity markets, cyber-physical security of smart grid, and theory and application of cyber-physical energy systems. He received the Best Paper Award at the Third IEEE International Conference on Smart Grid Communications in November 2012.