Building Technologies Research & Integration Center

Science Research Seminar Series

Buildings to Grid Integration:

Retrofit Control Techniques for Peak Reduction and Energy Efficiency Improvements

Thursday, Jan. 30, 2014
1:00 PM – 2:00 PM
Bldg 4500N, Wigner Auditorium

Small and medium commercial buildings are a significant, but untapped source of ancillary services like demand response, spinning reserve, voltage regulation, and frequency control. This talk will focus on opportunities for using energy end-use components to provide ancillary services to electric power systems. Particularly, a low-cost retrofit technology that uses collective control of multiple rooftop air conditioning units to reduce the peak power consumption of small and medium commercial buildings. Over 27% of the energy used by most small and medium sized commercial building is dedicated to air conditioning units, and most of these units continue to rely on simple, uncoordinated controls that independently maintain the temperature for their assigned sections within the building.

The retrofit technology uses a model predictive control to select an operating schedule for the air conditioning units that maintains a temperature set point subject to a constraint on the number of units that may operate simultaneously. A prototype of this new control system was built and deployed in a large gymnasium to coordinate four rooftop air conditioning units. Based on data collected while operating this prototype, we estimate that the cost savings achieved by reducing peak power consumption is sufficient to repay the cost of the prototype within a year. This reduction in peak demand benefits the utility company by reducing the need for expensive peaking plants and their associated infrastructure, and it benefits the building owner by reducing electricity costs.

Dr. Teja Kuruganti

Dr. Teja Kuruganti is R&D staff member at ORNL since 2003. His research interests include wireless sensor networks, propagation modeling, control systems operating over communication networks, cybersecurity of process control systems, and application of wireless networks for improving energy efficiency in buildings. He earned MS and PhD degrees in Electrical Engineering from University of Tennessee, Knoxville and BE in electronics and communication engineering from Osmania University, Hyderabad, India.

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