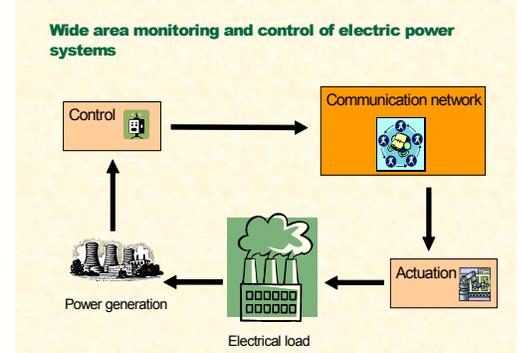


## Toolkit for Hybrid Systems Modeling and Evaluation

### Thyme: Simulating Networked Physical Systems

#### Control Over Communication Systems

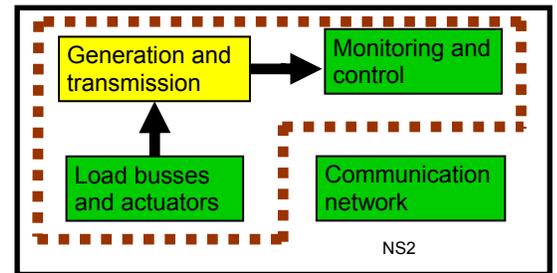
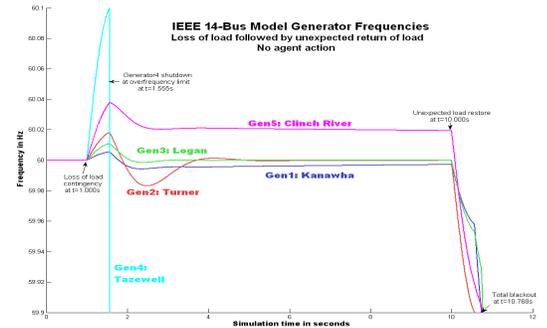
Due to recent advances in communication, a new generation of large scale, geographical distributed systems are beginning to emerge in which actuation, sensing, and control processes are separated by data communication networks. Working examples of these systems are found in electric power grids, automotive controls, and manufacturing processes. Modeling and simulation is essential for successfully designing next generation systems of these communications dependent systems.



#### Technology Pathway

Oak Ridge National Laboratory (ORNL) is developing the Thyme modeling and simulation toolkit. Thyme is an extensible, open source framework for integrating continuous and hybrid system models into NS2 simulations. It includes a small set of numerical integration schemes for solving ordinary differential equations and can be easily extended by end users who require specialized or especially robustness continuous system simulation algorithms. Thyme is

- for simulating network-centric systems with continuous and discrete event sub-components.
- for building comprehensive, integrated modeling of networked controllers and plants.
- designed for easy extension by end users who require specific continuous system simulation algorithms
- based on the NS2 and ADEVS open source simulation packages



#### Point of Contacts

Teja Kuruganti: [kurugantipv@ornl.gov](mailto:kurugantipv@ornl.gov)

Ph: 865-241-2874

James Nutaro: [nutarojj@ornl.gov](mailto:nutarojj@ornl.gov)

Ph: 865-241-1587