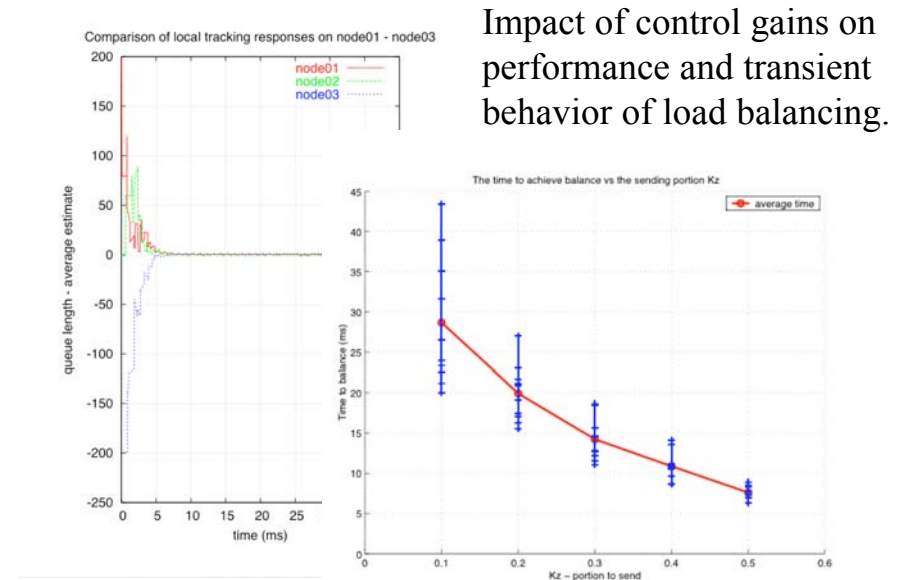


Goals and Potential Impact if Successful

- Improved understanding of limitations imposed by time delays in decentralized control system applications.
- Improved operation of distributed and parallel computing and networking systems, with specific applications in load balancing and dynamic resource allocation.
- Development of modeling and analysis methods for distributed control systems, including performance and stability analysis.

Approach and/or Accomplishments

- Developed several decentralized control methods for load balancing in parallel computing
 - Modeling using continuous state / continuous time models.
 - Proof of stability and model consistency.
 - Experimental work using (a) parallel computing cluster, (b) peer-to-peer wireless networking, and (c) wide area computer networks validates modeling approach.
- Examined dynamic resource allocation strategies in the presence of random time delays -- ongoing work.



Bottlenecks and Open Research Questions

- Modeling approaches include discrete-event, hybrid, and continuous time/continuous state systems. Each has its advantages, but comparison between methods and translation of results from one framework to another is difficult.
- Experimentation is complicated because no single clock exists; data can be gathered, but there are unknown random time skews.
- Time delays in networked systems are random and change on a per-packet basis.