

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Sorting Category: 03.3 (T)

Synchronization in Noisy Networks with Multiple Time Delays¹ DAVID HUNT, GYORGY KORNISS, BOLESŁAW SZYMANSKI, Rensselaer Polytechnic Institute — We expand our previous work of uniform time delays in stochastic, linearly-coupled synchronization problems² by including descriptions of networks with multiple delays. Non-uniform time delays can arise when there are multiple sources of delay, e.g. the time to transmit and the time to process information. In this particular two-delay case³, the primary limitation on the network to synchronize without any centralized direction does not come from restrictions in the transmission of a node's state to its neighbors; rather it depends on the ability for each node to process and respond to the information about itself in the context of its local environment. Furthermore, given a network's structure, there are optimal transmission delays for which the network remains synchronizable for longer processing delays. As a result, synchronization is not always improved—and in some cases it can be totally destroyed—by minimizing the transmission delays. For special cases we also study the scaling function that quantifies the synchronization of the system. This shows the limitation of synchronization in a noisy network

¹This research has been supported in part by DTRA and ONR.

²D. Hunt, G. Korniss, B.K. Szymanski, Phys. Rev. Lett. **105**, 068701 (2010)

³D. Hunt, G. Korniss, B.K. Szymanski, Phys. Lett. A **375**, 880 (2011)

Prefer Oral Session
 Prefer Poster Session

David Hunt
hunt3@rpi.edu
Rensselaer Polytechnic Institute

Date submitted: 19 Dec 2011

Electronic form version 1.4