

2nd International Symposium on Wireless Communication Systems 2005 (ISWCS2005)

Half day Tutorial T1: Scalable Ad Hoc Networks - routing, transport and testability challenges

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Ad hoc networks were first introduced to provide “instant” communications where an infrastructure did not exist, for example battlefield, search and rescue etc. Some of these applications have now become very sophisticated and complex, involving thousands of nodes with various degrees of mobility. The much broader scope poses now a host of new problems from design to evaluation and implementation. The first “challenge” we address is routing scalability in the face of mobility. We present several solutions, some of which actually exploit mobility itself, eg “group” mobility. Then, we move to scalable transport. We show the challenge of maintaining many TCP flows in large ad hoc networks, mobile as well as stationary, and outline preliminary solution proposals. Finally, we must verify that the proposed solutions work in a large-scale testbed. We introduce WHYNET, the NSF funded wireless testbed at UCLA. WHYNET uses an innovative hybrid emulation scheme to scale realistic testability to thousands of nodes.

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Mario Gerla received a graduate degree in engineering from the Politecnico di Milano in 1966, and the M.S. and Ph.D. degrees in engineering from UCLA in 1970 and 1973, respectively. After working for Network Analysis Corporation from 1973 to 1976, he joined the Faculty of the Computer Science Department at UCLA where he is now Professor. His research interests cover the performance evaluation, design and control of distributed computer communication systems; high speed computer networks; wireless LANs, and; ad hoc wireless networks. He has worked on the design, implementation and testing of various wireless ad hoc network protocols (channel access, clustering, routing and transport) within the DARPA WAMIS, GloMo projects. Currently he is leading the ONR MINUTEMAN project at UCLA, and is designing a robust, scalable wireless ad hoc network architecture for unmanned intelligent agents in defense and homeland security scenarios. He is also conducting research on QoS routing, multicasting protocols and TCP transport for the Next Generation Internet (see www.cs.ucla.edu/NRL for recent publications). He became IEEE Fellow in 2002.