

Tutorial I: Internet Support for Wireless and Mobile Networking

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Tutorial Abstract

Wireless and mobile hosts are the fastest growing segment of the personal computer market but are not well supported by current network protocols including those in use in the Internet. Wireless networks have fundamentally different properties than typical wired networks, including higher error rates, lower bandwidths, nonuniform transmission propagation, increased usage costs, and increased susceptibility to interference and eavesdropping. Similarly, mobile hosts behave differently and have fundamentally different limitations than stationary hosts. For example, a mobile host may move and become disconnected from or change its point of connection to the network, and mobile hosts generally operate on limited battery power. These differences in network and host properties produce many new challenges for network protocols.

This tutorial will focus on the solutions for these challenges for wireless and mobile hosts operating in the Internet using TCP/IP. After reviewing some important properties of wireless network transmissions using radio and infrared, we will study protocol support for wireless and mobile hosts in the Internet at the network and transport layers. At the network layer, we will examine the Mobile IP protocol for transparent routing to mobile hosts in the Internet. Mobile IP is currently being standardized by the Internet Engineering Task Force (IETF), the principal protocol standards development body for the Internet; we will look at Mobile IP both for the current Internet Protocol and for IPv6, a new version of IP also being standardized within the IETF. At the transport layer, we will first examine the problems in the operation of TCP when using wireless links or mobile hosts, such as the interaction of the "slow start" algorithm with the hazards present in wireless and mobile communication. We will then look at several proposed solutions to these problems, including "indirect" TCP and "snoop" TCP.

Speaker Bio

David B. Johnson is an Assistant Professor in the School of Computer Science at Carnegie Mellon University. He

also holds a courtesy appointment as an Assistant Professor in the Electrical and Computer Engineering Department at CMU, and is a member of CMU's Information Networking Institute. His research interests include network protocols, distributed systems, and operating systems. Prior to joining the faculty at CMU in 1992, he was on the faculty at Rice University for three years as a Research Scientist and Lecturer in the Computer Science Department. He received a B.A. in computer science and mathematical sciences in 1982, an M.S. in computer science in 1985, and a Ph.D. in computer science in 1990, all from Rice University.

Professor Johnson is currently leading the Monarch Project at CMU, developing adaptive networking protocols and protocol interfaces to allow truly seamless wireless and mobile host networking. Related to this research, he is active in the Internet Engineering Task Force (IETF) and is one of the principal designers of the IETF Mobile IP protocol. He has served on the Program Committee for numerous conferences and is currently Program Chair for the Third ACM/IEEE International Conference on Mobile Computing and Networking (MobiCom'97). He is an Area Editor for the ACM/Baltzer journal on Mobile Networks and Applications (MONET) and the ACM SIGMOBILE magazine Mobile Computing and Communications Review (MC2R). He is a member of the IEEE Computer Society, IEEE Communications Society, ACM, USENIX, Sigma Xi, and the Internet Society.