AD HOC NETWORKS
Technologies and Protocols

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Edited by

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Preface

Wireless mobile networks and devices are becoming increasingly popular as they provide users access to information and communication anytime and anywhere. Conventional wireless mobile communications are usually supported by a wired fixed infrastructure. A mobile device would use a single-hop wireless radio communication to access a base-station that connects it to the wired infrastructure. In contrast, ad hoc networks does not use any fixed infrastructure. The nodes in a mobile ad hoc network intercommunicate via single-hop and multi-hop paths in a peer-to-peer fashion. Intermediate nodes between a pair of communicating nodes act as routers. Thus the nodes operate both as hosts as well as routers. The nodes in the ad hoc network could be potentially mobile, and so the creation of routing paths is affected by the addition and deletion of nodes. The topology of the network may change randomly, rapidly, and unexpectedly.

Ad hoc networks are useful in many application environments and do not need any infrastructure support. Collaborative computing and communications in smaller areas (building organizations, conferences, etc.) can be set up using ad hoc networking technologies. Communications in battlefields and disaster recovery areas are other examples of application environments. Similarly communications using a network of sensors or using floats over water are other applications. The increasing use of collaborative applications and wireless devices may further add to the need for and the usage of ad hoc networks.

During the last few years, numerous papers and reports have been published on various issues on mobile ad hoc networks. Several tutorials and survey reports have been also published on specific aspects of the mobile ad hoc networks. In fact, conferences and symposiums that are dedicated to ad hoc networking have emerged. However, a "one-stop" resource for overviewing or summarizing the knowledge and progress on ad hoc networking technologies is currently unavailable. Our co-edited book is primarily motivated by these lines of thought.

We have put together a set of interesting chapters that deal with various interesting focal aspects in ad hoc networks. The first chapter is a forerunner for things to come. It primarily motivates the need for ad hoc networks and

discusses the evolution of these networks and projects future directions and challenges. The second chapter primarily looks at contention based medium access control in ad hoc networks. Most of the research in ad hoc networks assume the use of either the IEEE MAC protocol or variants thereof and this chapter enuniciates by means of both discussion and analyses the nuances of such MAC protocols. The third chapter provides an in-depth discussion of routing in ad hoc networks. Next, we provide a discussion of multicasting in ad hoc networks, the issues that arise and the technologies that have emerged. We follow with a discussion of transport layer issues and the protocol designs thus far in the fifth chapter. Since ad hoc networks consist of wireless battery operated devices managing energy / power consumption is of paramount importance. The sixth chapter deals exclusively with issues related to power management. Lately, in order to increase the achievable capacity in ad hoc networks there has been a lot of interest in the use of directional antennas and we deliberate various protocols that have emerged for use with such antennas in Chapter seven. Various issues related to the provision of quality of service and mechanisms for dealing with these issues are presented in the eighth chapter. Finally, we have a chapter on security, a vital component that will determine the successful deployment and emergence of ad hoc networks.

PRASANT MOHAPATRA AND SRIKANTH KRISHNAMURTHY

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