Chapter VIII
Multimedia Services Provision in MANETs

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ABSTRACT

This chapter introduces the principal characteristics of MANETs and shows how these particularities may affect both QoS conditions and QoS management/provisioning systems, and therefore the capabilities of MANETs for properly providing multimedia services. After a deep analysis of different QoS mechanisms at different layers, the authors claim that QoS management cannot be handled only at the network layer or by applying some QoS-aware routing protocols. In fact, any end-to-end QoS provision architecture will demand QoS control mechanisms and information exchange among all the layers. A clear understanding of different proposals aimed at coping with QoS requirements at different layers will not only provide researchers with valuable information for designing better multimedia capable MANETs, but will also assist them in evaluating the need for a unified cross-layer approach in order to optimize the performance of analyzed protocols.

INTRODUCTION TO MANETs

Since the 1970s, the mobile ad hoc networks (MANETs) have attracted a lot of interest from both the industry and the research community due to their particular conditions. It is not easy to provide a proper single definition for these networks, since multitude of them have been proposed in today's literature. Nevertheless, we can use the definition made by Internet Engineering Task Force (IETF), the body responsible for guiding the evolution of the Internet:

A mobile ad hoc network (MANET) is an autonomous system of mobile routers (and associated hosts) connected by wireless links. The routers are free to move randomly and organize themselves arbitrarily; thus, the network's wireless topology may change rapidly and unpredictably. Such a network may operate in a stand-alone fashion, or may be connected to the larger Internet.

So, a typical MANET (Maltz, 1999) is a set of potentially mobile nodes that possibly concur to share information. During that exchange of information, different nodes can be continuously moving, so that the network must be prepared to get adapted continuously. Due to the lack of infrastructure, the nodes have to organize by themselves in the network and set up routes among them without any outer help.

In general, the ad hoc networks will make possible the communication between nodes connected indirectly by jumping through other nodes (Figure 1) forming a peer-to-peer connection. In this communication intermediate nodes act like routers, so that nodes can represent both roles: router and host.

MANETs can appear in two forms in real life. The first one consists of a pure wireless ad hoc network where all nodes are mobile and have the same characteristics. The second and most common one is a mixed hybrid network with wireless and fixed nodes. The main function of the fixed nodes is to forward the traffic to the mobile nodes. Therefore, the fixed nodes must have greater capacity and reliability than the mobile ones.

Special characteristics of MANETs constitute a centre of attention for the industry as for the research community. Since they don't need any infrastructure they promote collaborative work in areas where it was unthinkable before (conferences, for the reestablishment of the communications in areas desolated by natural disasters, in the battlefield, etc.). Furthermore, there have recently arisen other new scenarios that suggest the need for reliable MANETs, such as vehicular or sensor networks and new videogames portable platforms. In addition, the evolution of PDAs, videogames, and multimedia devices in vehicles demand both higher and more stable QoS requirements from the network.

Figure 1. Mobile ad hoc network