Chapter 6
Routing Issues in Opportunistic Networks

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6.1 Introduction

The opportunistic networking idea stems from the critical review of the research field on Mobile Ad hoc Networks (MANET). After more than ten years of research in the MANET field, this promising technology still has not massively entered the mass market. One of the main reasons of this is nowadays seen in the lack of a practical approach to the design of infrastructure-less multi-hop ad hoc networks [186, 185]. One of the main approaches of conventional MANET research is to design protocols that mask the features of mobile networks via the routing (and transport) layer, so as to expose to higher layers an Internet-like network abstraction. Wireless networks’ peculiarities, such as mobility of users, disconnection of nodes, network partitions, links’ instability, are seen—as in the legacy Internet—as exceptions. This often results in the design of MANET network stacks that are significantly complex and unstable [107].

Opportunistic networking constitutes a medium-term application of general-purpose MANET for providing connectivity opportunities to pervasive devices when no direct access to the Internet is available. Pervasive devices, equipped with different wireless networking technologies, are frequently out of range from a network but are in the range of other networked devices, and sometime cross areas where some type of connectivity is available (e.g. Wi-Fi hotspots). Thus, they can opportunistically exploit their mobility and contacts for data delivery [185]. Opportunistic networks [657] thus aim at building networks out of mobile devices carried by people, possibly without relying on any pre-existing infrastructure. Moreover, opportunistic networks look at mobility, disconnections, partitions, etc. as features of the networks rather than exceptions. Actually, mobility is exploited as a way to bridge disconnected “clouds” of nodes and enable communication, rather than a drawback to be dealt with. More specifically, in opportunistic networking no assumption is made on the existence of a complete path between two nodes wishing to communicate. Source and destination nodes might never be connected to the same network, at the same time. Nevertheless, opportunistic networking techniques allow