Chapter 3.35
Wireless Technologies for Mobile Computing and Commerce

David Wright
University of Ottawa, Canada

INTRODUCTION

At the time of writing (1Q06) most countries have a small number (2-6) of major cellular operators offering competing 2.5G and 3G cellular services. In addition, there is a much larger number of operators of WiFi networks. In some cases, a major cellular operator, for example, Deutsche Telekomm and British Telecom, also offers a WiFi service. In other cases, WiFi services are provided by a proliferation of smaller network operators, such as restaurants, laundromats, airports, railways, community associations and municipal governments. Many organizations offer WiFi free of charge as a hospitality service, for example, restaurants. Cellular services offer ubiquitous, low data rate communications for mobile computing and commerce, whereas WiFi offers higher data rates, but less ubiquitous coverage, with limitations on mobility due to business as opposed to technology reasons.

Emerging networks for mobile computing and commerce include WiMAX and WiMobile (Wright, 2006), which offer higher data rates, lower costs and city-wide coverage with handoff of calls among multiple base stations. These new technologies may be deployed by the organizations that currently deploy cellular and WiFi networks, and also may give rise to a new group of competitive wireless network operators.

This article identifies the capabilities needed for mobile computing and commerce and assesses their technology and business implications. It identifies developments in the wireless networks that can be used for mobile computing and commerce, together with the services that can be provided over such networks. It provides a business analysis indicating which network operators can profitably deploy new networks, and which network operators need to establish business and technology links with each other so as to better serve their customers. The resulting

range of next generation service, technologies and network operators available for mobile computing and commerce is identified.

WIRELESS NETWORK ARCHITECTURES

Figure 1 illustrates the network architectures for WiFi, Cellular, WiMAX and WiMobile, including the radio access network on the left and the wired core network on the right.

The cellular architecture is the most sophisticated in that the core network includes a circuit network (for legacy circuit switched voice calls), a packet network (for data calls) and an IP Multimedia Subsystem, IMS (for migration of all traffic onto the Internet).

These three networks essentially allow the cellular operator to maintain control over all calls to and from the mobile device, and hence derive revenue from them. In particular the IMS network contains servers for establishing voice and video calls over IP, authenticating users, maintaining records of the current location of a mobile user, accounting, and security. Cellular operators are migrating traffic from their circuit and packet networks onto the IMS.

By contrast, WiFi (IEEE, 1999a, 1999b, 1999c, 2003), WiMAX (IEEE, 2006; Ghosh et al., 2005), and WiMobile (IEEE, 2006; Lawton, 2005) are simply radio access technologies and do not specify a core network. They therefore allow more direct access from a mobile device to the Internet. In particular, the WiMobile specification, which is under development at the time of writing, emphasizes that its design is being optimized for operation with IP. This more open access to the Internet allows a mobile user to set up, for instance, a VoIP call using a third party

Figure 1. Wireless network architectures