MOBILE INTERNET ACCESS

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20.1 INTRODUCTION

The first half of this century has seen the development of a public wireline network that allows reliable and affordable communication of voice and low bit-rate data around the globe. There is also a multiplicity of specialized wired networks optimized for special purposes such as high-speed communications in the local networks. Since the mid-eighties, the Internet (a wireline data network of computers connected across the globe) has seen considerable growth in the number of hosts. Estimates are that 30-40 million users world-wide are connected to the Internet, with this total doubling every year. An increasing number of these users are mobile, as evidenced by increasing sales of laptop/notebook computers. While this increase in the user base is welcomed, it adds the increasing burden of providing mobility across the Internet. Even when the physical infrastructure for the ubiquitous network connectivity will be available, there are several problems the mobile users must overcome to make full use of it. The mobile hosts must be able to move seamlessly between networks in different administrative domains as they move around the network, and they must also be able to change between different networks to achieve the best possible connectivity wherever they are located.

Therefore, a major goal of network/service providers must be to allow users access to the capabilities of the global network at any time without regard to location or mobility, independent of location or the access network. An important guiding principle should be to seek general-purpose solutions that work for all network technologies and not special-purpose hardware-specific solutions. However, the real challenge for supporting future universal personal communications is to allow a mobile user to roam to and from different networks (wireline or wireless), while still maintaining connectivity, giving the user the illusion that there is only one big (virtual) network. The enabling concepts for this may be terminal, personal or service mobility. To meet this challenge, during the last 20 years, cellular telephony has been one of the largest growth areas in
the telecommunications market [1]. While this method provides global connectivity, it is limited mainly to voice and low-bit rate data. Furthermore, it is limited to a single, cellular-based approach.

At present Internet access is possible by connecting to an Internet access provider's point-of-presence (PoP) via dial-up lines (PSTN or ISDN), leased lines or by using a cellular phone with a laptop computer (as depicted in Fig. 20.1) [2]. The first two approaches essentially provide fixed access as well as remote access or 'portability' — hosts are transported and connected from a fixed remote location without any 'handover' or automatic data forwarding capability [3]. Only the third approach gives full 'roaming mobility' — where users can access the Internet from anywhere and change their point of attachment to the (cellular) network during the communication session. However, it should be noted that the roaming mobility without service interruption is restricted to the cellular network infrastructure only.

Fig. 20.1 Accessing the Internet.

In this chapter an additional alternative, namely Mobile IP which supports node mobility (at network layer 3) across the global (fixed) Internet, independent of the network technologies and access mechanisms, will be discussed in detail. Mobility based on the fixed network, restricted over a limited coverage area, can