



Chapter XIX

Mobile Multimedia over Wireless Network

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In the last few years the rapidly growing Internet has pushed new multimedia applications in the field of entertainment, communication and electronic commerce. The next step in the information age is the mobile access to multimedia applications: everything everywhere any time! This tutorial chapter addresses a key point of this development: data transmission for mobile multimedia applications in wireless cellular networks. Addressed networks are existing standardized terrestrial wireless systems such as GSM, D-AMPS, IS-95 and PDC, including their evolutions HSCSD, GPRS, HDR, IS-136+ and IS-136HS. Furthermore, proprietary satellite networks like Orbcomm, Globalstar, ICO, Ellipso and Courier are considered. Finally, future high bandwidth terrestrial/satellite third-generation systems based on the UMTS standard, as well as future proprietary systems like Astra-Net, Skybridge, Teledesic and Spaceway, are discussed. For each of these networks, an overview on the data channels is given with respect to their capacity, temporal organization, error characteristic, delay and availability. Further, the architecture, the functions and the capacities of the mobile terminals are reviewed. Having studied this chapter, the reader is able to answer questions like:

- Which network will be capable to transmit real-time video?
- Does a rainfall interrupt my mobile satellite Internet connection?
- When will high bandwidth, wireless networks be operational?
- How to tune existing multimedia applications to be efficient in wireless networks?

The chapter is closed by a glossary of terms, a reference list to in-detail literature and a list of Web sites of companies and organizations providing useful information.

INTRODUCTION

In the last years, the rapidly growing Internet has pushed new multimedia applications. The next step in the information age is mobile access to these multimedia applications: everything everywhere any time!

Out of office will no longer mean out of touch: remote employees can access the same data and can use the same tools, thanks to mobile phones or wireless connected personal digital assistants (PDAs). Consumers can demand multimedia services whenever they want and wherever they are. Email, home banking and e-commerce are the first services that have left the Internet to enter wireless terrestrial communication networks such as GSM (ETSI, 1999a) in Europe, D-AMPS (USDC, IS-54) and IS-95 in the USA or PDC in Japan. The number of users of mobile terrestrial services will grow from 430 million in 2000 to 940 million in 2005 (ETSI, 1999a). Among these, in 2005 more than 50 million people will use mobile infotainment appliances, according to the UMTS Forum (2000).

What is needed to make mobile multimedia happen? Three components have to be realized: multimedia services, multimedia networks and multimedia terminals.

Multimedia services are offered by service providers in the field of:

- broadcast (TV and audio channels, editors);
- information on demand (video, audio, weather, documents);
- communication (voice and video telephony);
- commerce (banking, electronic commerce, publicity); and
- industry (collaborate work, VPN).

These services are nowadays tuned to run on PCs or PDAs either independently or connected via the Internet or an intranet. To get them mobile, they have to be adapted to the characteristics of multimedia networks and multimedia terminals.

The main concern of this chapter is the cooperation between multimedia services and wireless cellular global networks. For network developers, the question is what constraints impose multimedia transmission on wireless networks? For example, which network delay is tolerable for a real-time video/audio transmission from USA to Europe? For multimedia experts, the question is rather which constraints impose the existing or foreseen wireless network standards on multimedia applications? For example, which error rate should expect a three-dimensional virtual travel agent application serving a mobile user at the left lane of a German highway?

This tutorial chapter follows the multimedia expert's view of the problem. The section FROM FIXED TO WIRELESS NETWORKS introduces the existing and future wireless cellular global networks. Furthermore, the network's data channels are presented focusing on their capacity, their temporal organization, their error characteristics, their delay and their availability. The following section MOBILE NETWORK TERMINALS outlines the architecture of terminals that receive, process, display and retransmit multimedia content over such channels. The adaptation of multimedia applications to the constraints of data channels and mobile terminals is then discussed in the section MOBILE MULTIMEDIA APPLICATIONS. The chapter closes within the section CONCLUSION AND FUTURE TRENDS, followed by a glossary of this chapter's terms and a list of references.

FROM FIXED TO WIRELESS NETWORKS

Networks connect terminals (computers, phones, pagers) among themselves and/or with servers (WAP, World Wide Web or broadcast server) for communication purposes.

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