Chapter 9
Networked Multimedia Communication Systems

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ABSTRACT

This Chapter simply contains multimedia - an integrated and interactive presentation of speech, audio, video, graphics and text, has become a major theme in today's information technology that merges the practices of communications, computing and information processing into an interdisciplinary field. The challenge of multimedia communications is to provide services that integrate text, sound, image and video information and to do it in a way that preserves the case of use and interactivity. A brief description of the elements of multimedia systems is presented. User and network requirements are discussed together with the pocket transfer concept. About Multimedia communication standards a general idea is also given. Multimedia transport over ATM and IP networks discussed in brief. The issues pertaining to multimedia digital subscriber lines are outlined together with multimedia over wireless, mobile and broadcasting networks as well as digital TV infrastructure for interactive multimedia services.

INTRODUCTION

The precedent years have seen an expansion in the usage and the field of digital media. Industry is making considerable investments to deliver digital audio, image and video information to consumers and customers. A novel infrastructure of digital audio, image and video recorders and players, on-line services, and electronic commerce is quickly being deployed. Abreast major corporations are converting their audio, image and video archives to an electronic form. Digital media offers several discrete advantages over analog media: the quality of digital audio, image and video signals is higher than that of their analog counterparts. Editing is easy because one can access the exact discrete locations that should be changed. No loss of fidelity happens while copying. A copy of digital media is alike to the original. Digital audio, image and videos are easily transmitted over networked information systems.

These advantages have opened up numerous new possibilities. Multimedia consists of Multimedia data and set of interactions. Multimedia data are casually considered as the collection of three M's: multi-source, multi-type and multi-format data. The interactions among the multimedia components consist of intricate relationships without which multimedia would be a simple set of visual, audio and other data. Multimedia and multimedia communication can be seen worldwide as a hierarchical system. The multimedia software and applications offer a direct interactive environment for users. Whenever a computer in need of information from far-off computers or distant servers with that scenario, multimedia information must travel through computer networks. As the amount of information involved in the transmission of video and audio can be significantly huge, the multimedia information must be compressed before it can be transported through the network in order to lessen the communication delay. Limited delay and jitters like constraints are used to make sure a reasonable video and audio outcome at the receiving end. That is why, communication networks are undergoing constant up gradation and improvements in order to provide multimedia communication capabilities. In order to connect local terminal computers and other equipment with each other, Local area networks are used and wide area networks and the Internet connect the various local area networks together. Improved standards are constantly being developed in order to provide a worldwide information expressway over which multimedia information will travel. Multimedia communications is the field referring to the representation, storage, retrieval and dissemination of machine-process able information expressed in multiple media, such as text, image, graphics, speech, audio, video, animation, handwriting, data files. With the advent of high capacity storage devices, powerful and yet economical computer workstations and high speed integrated services digital networks, providing a variety of multimedia communications services is becoming not only technically but also economically feasible. In addition, the broadband integrated services, digital network (BISDN) has been given special attention as a next generation communication network infrastructure which will be capable of transmitting full motion picture and high speed data at 150 and 600 MB/s and voice as well as data throughout the world (Mouftah, 1992). At first, the concept of multimedia communication modeling will be described, together with user and network requirements, packet transfer concept as well as multimedia terminals. The second part deals with multimedia communication standards. Finally, we will concentrate on multimedia communications over networks. Multimedia transfer over ATM networks is described. This is followed by multimedia over IP networks. Special issues relating to multimedia over wireless will be discussed.

Improvement in the quality of video and audio is always being demanded. The increasing demands pose great challenges in developing multimedia applications in the areas of content creation, usage and sharing of media experiences. Additional challenges come from communication systems; handovers between different networks are especially challenging in mobile devices. We identify and analyze the requirements that a distributed multimedia application may enforce on the communication network. Due to the vastness of this field, we do not claim that this list is exhaustive, but we have tried to include all the important aspects (from our view point) that have significantly impacted the enhancements to the basic Internet architecture and its associated protocols. Recent advances in communications technologies have witnessed a growing and evolving multimedia content delivery market based on information gathering, manipulation, and dissemination. It is a fact that personal communications, computing, broadcasting, entertainment, etc. have turned into streams of multimedia content, and the various communication and network technologies have become the means to carry that content to a wide variety of terminals. Unlike traditional communication systems, a fundamental challenge for present and future communication systems is the ability to transport multimedia content over a variety of networks energy-efficiently at

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