

Anthony Vetro, *Mitsubishi Electric Research Labs*
Charilaos Christopoulos, *Ericsson Research*, and
Touradj Ebrahimi, *Swiss Federal Institute of Technology—EPFL*

Universal Multimedia Access

Access to information, until recently, has only been possible through dedicated infrastructures and in a rather rigid way. Television and radio sets, connected to a limited number of broadcasters through terrestrial, cable, or satellite channels, allowed users to access programs and news mostly produced in a generic manner. The Internet and the World Wide Web (WWW) brought a new dimension to information access and a fundamental change: content democratization. Thanks to the Internet and the WWW, it has become possible to be both a producer and a consumer of content at the same time. Problems and challenges such as access to quality information, search and retrieval, as well as ownership rights have also appeared and constitute some of the challenges in future.

In parallel to these challenges, advances in signal processing combined with the appearance of heterogeneous networks are paving the way for users to enjoy services wherever they go and on a host of multimedia capable devices. Such devices include PCs, TVs, and mobile devices. Each may support a variety of formats and multimedia content. The networks they are connected to are often characterized by different conditions, and the terminals themselves vary in display capabilities, processing power, and memory capacity. Additionally, user preference, personalization, and other factors of the usage environment must also be accounted for. Given this complex and

dynamic usage environment, it becomes necessary to consider methods of adapting the content accordingly. This framework, where information is accessed in a suitable form and modality, is referred to as universal multimedia access (UMA).

The UMA framework forces us to study the functionality of every component in the end-to-end delivery chain in the context of various use cases. This articles in this issue have been put together to present the state-of-the-art in multimedia adaptation and to provide an overview of the standards that will support the UMA framework. It also provides readers with a road map toward UMA applications and discusses its future trends.

First, it is important to understand the content representation format, i.e., how the content is compressed and coded. Scalable representation formats allow for simple scaling of the content, but it is also necessary to consider efficient methods for adapting non-scalable content formats. These topics are covered in the first two articles. For video, “Video Transcoding Architectures and Techniques: An Overview” is presented by Vetro et al., and audio is covered by Homayounfar in “Rate Adaptive Speech Coding for Universal Multimedia Access.”

The description and management of content is another critical aspect within the UMA framework. An efficient way to describe multimedia content is provided by metadata standards such as MPEG-7, which support efficient search, filtering, and browsing applications, as well as

means to represent content summaries and variations. “Metadata-Driven Multimedia Access,” by van Beek et al., provides an overview of these relevant techniques, describing how they support the UMA framework.

Bormans et al., in “MPEG-21: The 21st Century Multimedia Framework,” presents the vision of the MPEG-21 standard to enable transparent access to multimedia content. The various aspects of this standard are expected to play a key role in realizing the UMA framework. One important aspect of this effort is to develop a standardized description of usage environments to enable, for example, negotiation of device characteristics and QoS parameters. A key component of MPEG-21 to this respect is digital item adaptation, which is under development.

This issue concludes with an article by Pereira and Burnett that takes a step back to analyze existing trends in the related areas of communication and multimedia access and leads us through some future directions. In “Universal Multimedia Experiences for Tomorrow,” the migration from today’s universal multimedia access to tomorrow’s universal multimedia experiences is presented.

In closing, the guest editors would like to thank all the contributing authors for their very timely contributions, the reviewers for their invaluable comments to ensure high-quality papers, and the editorial board for their engaging support. Please enjoy the articles in this issue!