MPEG-4 Systems and Applications

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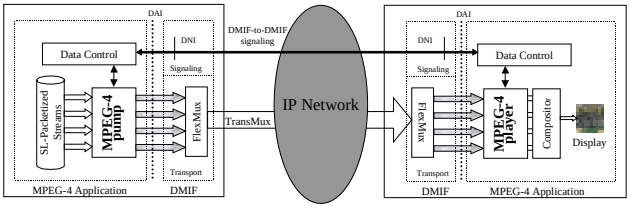
1. INTRODUCTION

MPEG-4, under the auspices of the ISO, is specifying tools to enable object-based audio-visual presentations [3]. These include tools to encode individual objects, compose presentations with objects, store these object-based presentations and access these presentations in a distributed manner over networks. The main distinguishing feature of object-based audio-visual presentations is the scene composition at the user terminal. The objects that are part of a scene are composed and displayed at the user end as opposed to encoding the composed scenes as is done in the case of MPEG-2. Such object-based representation and presentation has several benefits including compression efficiency and interaction with individual objects.

The MPEG-4 Systems specification [2] defines an architecture and tools to create audio-visual scenes from individual objects. The systems part of the MPEG-4 standard has the tools that enable interactive object-based audio-visual applications. The driving principle behind the systems specification is the separation of data and meta-data. The scene description and object descriptor framework are at the core of the systems specification. The MPEG-4 scene description, also referred to as BIFS, is based on VRML and specifies the spatio-temporal composition of objects in a scene. BIFS update commands can be used to create scenes that evolve over time. The object descriptor framework is an extensible model for describing the objects and inter-object synchronization. A generic server command structure is specified to enable application specific user interaction. DMIF or the Delivery Multimedia Integration Framework is a general application and transport delivery framework specified by MPEG-4 [1]. In order to keep the user unaware of underlying transport details MPEG-4 defined an interface between user level applications and the underlying transport protocol called the DMIF Application Interface (DAI). The DAI provides the required functionality for realizing multimedia applications with QOS support. This architecture allows creation of complex presentations with wide-ranging applications.

2. MPEG-4 SYSTEM



MPEG-4 Server MPEG-4 Client

Our MPEG-4 system consisting of an MPEG-4 terminal and a server communicating over an IP network. The client implements the MPEG-4 Systems specification and can handle JPEG images, MPEG-1 video and audio. The server is designed to deliver objects to the client upon request and supports user interaction. The scheduler at the server paces the object delivery to meet the buffer and bandwidth constraints of the session. With MPEG-4 systems functionality and server interaction, an MPEG-4 terminal becomes a programmable terminal for programming the audio-visual objects in a scene; the scene description and scene updates become instructions in the program with object descriptors and objects constituting the program data. We intend to demonstrate the MPEG-4 Systems functionality along with a few MPEG-4 applications including interactive TV. A detailed description of the system can be found in [4].

3. REFERENCES

[1] ISO/IEC 14496-6 "Delivery Multimedia Integration Framework, DMIF," March 1999.

[2] ISO/IEC/SC29/WG11, "Generic Coding of Moving Pictures and Associated Audio (MPEG-4 Final DIS) ISO/IEC 14496-1," International Standards Organization, March 1999.

[3] A. Puri and A. Eleftheriadis, "MPEG-4: A Multimedia Coding Standard Supporting Mobile Applications" ACM Mobile Networks and Applications Journal, Special Issue on Mobile Multimedia Communications, Vol. 3, No. 1, June 1998, pp. 5-32 (invited paper).

[4] H. Kalva et.al., "Implementing Multiplexing, Streaming, and Server Interaction for MPEG-4," IEEE Transactions on Circuits and Systems for Video Technology (to appear).