Broadcast Delivery Multimedia Integration Framework – a New Approach of MPEG-4

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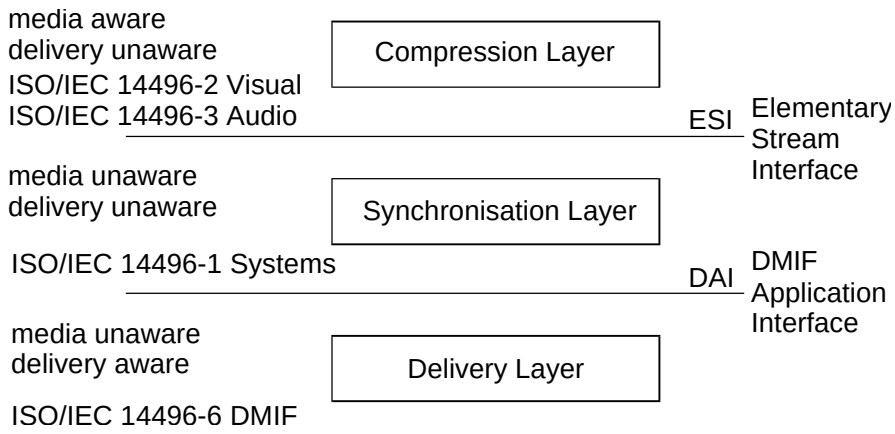
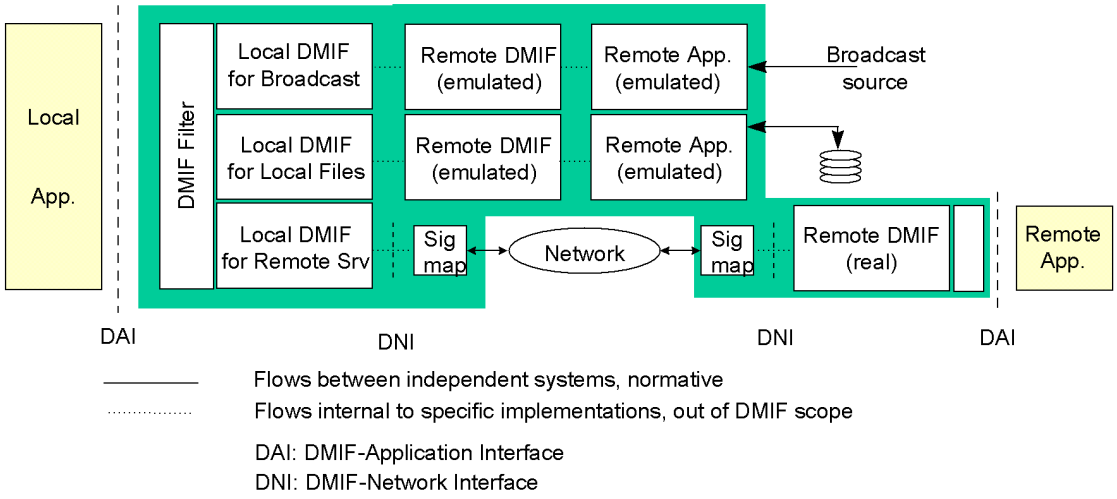
The Moving Pictures Expert Group (MPEG) is about to finish the new standard MPEG-4. Audio-visual applications, the very common standards MPEG-1 and MPEG-2, especially concerning their well-tuned compression algorithms for digital video and audio bitstreams are well known by many customers. MPEG-4 is in fact much more than a new smart combination of audio-visual multimedia objects with different encoding techniques.

This contribution is based on Delivery Part of the new ISO/IEC standard 14496 (MPEG-4) Part 6. This part deals exclusively with matters of suitable transports of MPEG-4 data streams (*Delivery Multimedia Integration Framework – DMIF*). The idea behind the definition of a *Delivery Multimedia Integration Framework* will be explained in this contribution.

The following figure illustrates the architecture of the MPEG-4 standard according to the Delivery of multimedia content.



A pattern for the transport interface which enables multimedia communication over different networks and makes the application becoming independent to the delivery architecture was defined. The next figure shows the architecture of an MPEG-4 communications solution for different network structures.



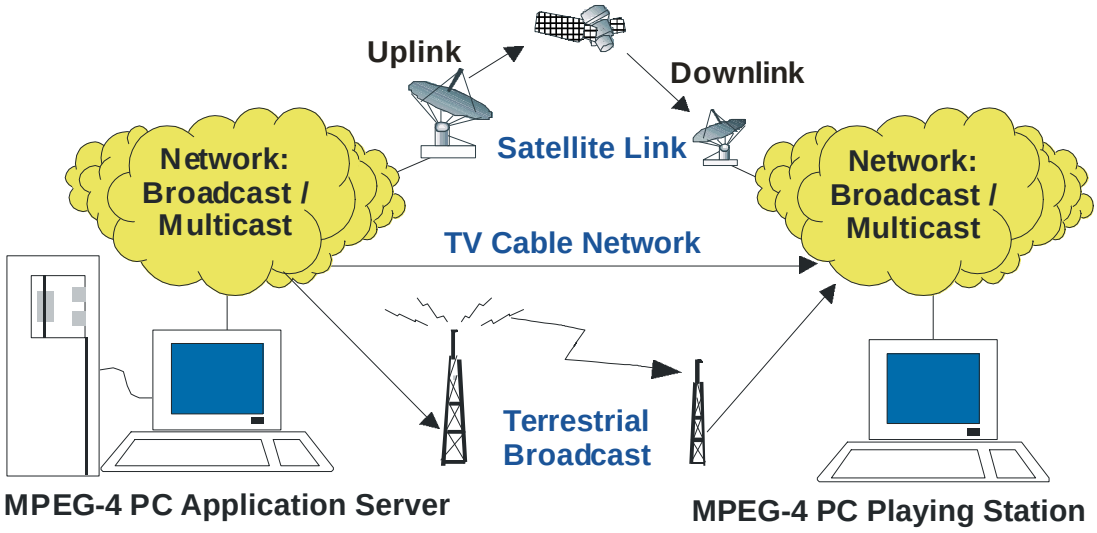
These three different DMIF scenarios are:

- Broadcast Scenario – unidirectional, back-channel emulated by local measurements
- Local Storage Scenario – bi-directional, all data stored locally (e.g. hard disk or CD-ROM)
- Remote-Interactive Scenario – bi-directional, features transparently over networks

The special characteristics of DMIF are: Applications can always use the same *DMIF Application Interface - DAI*, no matter what Delivery service used. Note, this is not limited to MPEG-4 terminals only. All services are acting completely transparent and the actual source of the MPEG-4 content have not to be obvious. The DMIF-Application Interface *DAI* cares for the correct adaptation to the particular network service. This makes DMIF an interesting research and development field according to new multimedia applications.

In the framework of the EU Esprit project *„MPEG-4 PC*“, the FTK - FernUniversität Hagen developed a prototype of a MPEG-4 enabled Delivery mechanism for broadcast. DMIF is more than a transport mechanism (OSI-Layer 4), even in broadcast scenarios. It provides reliable, realtime, point-to-multipoint connections with a preferred Quality of Service (QoS). The lack of bi-directional data flow for signalling in unidirectional broadcast scenarios requires carrousel techniques for the "Late Tuning-in"-feature on client side. This is necessary related to the composition of objects inside MPEG-4. Carrouseling includes knowledge of the current scene (BIFS-Stream), actual Objects (Object Descriptor Stream) and static content (background still images and so on).

The constraints for an implementation of a broadcast DMIF are: unidirectional signalling and maintaining state tables for the currently running Elementary Streams and activated transport channels. These topics will be solved with an example implementation for broadcast DMIF. A possible application example is shown in the following figure.



The direction of the data flow in broadcast environments like Satellite, TV Cable-networks or Terrestrial broadcast is unidirectional from sender to receiver. This unidirectional broadcast scenario is a widespread used distribution technique for content (push-services).

There are two topics related: unidirectional data flow (content) and unidirectional control flow (signalling). In remote-interactive scenarios (network, local file) the data flow (content) is usually unidirectional, too. In opposition to that the control flow is usually bi-directional instead. The lack of bi-directional control flow in unidirectional broadcast scenarios requires the mentioned carrousel techniques enabling "Late Tuning-in" on client side. This carrousel includes knowledge of the current scene (BIFS-Stream), actual Objects (Object Descriptor Stream) and static content (background still images and so on).

The requirements for the implementation of a DMIF broadcast are: unidirectional signalling and maintaining state tables for Elementary Streams, transport channels and similar.

These topics are solved with this DMIF broadcast prototype.