

The DAVIC APIs for Interactive TV

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Overview

- Focus and target applications
- Range and Scalability of Solutions
- MHEG-5
- Relationship with UK Digital Terrestrial and DigiTAG
- MHEG-6
- Java Centric Solutions
- Common Java APIs
- Relationship with the DVB MHP

Focus and Target Applications

- DAVIC has done a lot of work on APIs to enable broadcast of interactive TV applications.
 - The focus of this work is MPEG-2 broadcast networks. Some of the APIs can work on IP networks but that isn't the primary focus of most of them.
- The applications give a possibility for the service providers to provide added value in the digital broadcasting environment compared to traditional analogue broadcasting
- The possibility to transmit applications in addition to audio and video makes also completely new types of broadcast services possible
- Some example application types include:
 - Electronic Program Guides (EPG)
 - Enhanced teletext -type information services
 - Applications supporting television services
 - Interactive services using a return channel

Example Applications

- Electronic Program Guides (EPGs):
 - present the user with information about the programs
- Information services
 - e.g. enhanced teletext type of services
 - may include textual information, pictures, audio-visual content, etc.
 - easier navigation compared to analogue teletext
- Applications supporting television services
 - information components giving additional information to the viewer
 - local interaction with the television program, e.g. interactive game shows where the viewer can play along
 - sports events with multiple video feeds and an application enabling the viewer to choose the desired video feed
- Interactive services using a return channel
 - transactional services using the return channel for the transaction
 - on-line interactive services

Range and Scalability of Solutions

- DAVIC describes a scalable set of solutions for APIs for interactive TV
 - This set is backwards compatible and allows growth in a market
- MHEG-5 is a simple content decoder (“presentation engine”)
 - ideal for digital teletext equivalents (as used in UK digital terrestrial).
- MHEG-6 extends this with a small piece of Java
 - allows extra flexibility and the ability for applications to process information in the receiver.
- Java centric solutions include Java presentation APIs for richer, more flexible and more expressive applications.

MHEG-5 and DAVIC

- MHEG-5 is a specification from ISO which can be used in a wide variety of application areas.
- DAVIC uses MHEG-5 as a format for transmitting page oriented content.
 - Ideal for “digital teletext” content.
- MHEG-5 allows very precise control of content presentation by the content developer.
- MHEG-5 maximises inter-operability between content and receivers for horizontal markets.
 - This imposes some limits on application expressiveness.
- DAVIC extends MHEG-5 for a digital TV system by specifying the following ...
 - Systems integration including interfacing with network protocols
 - Content formats and other details
 - Extensions for utilities and service information.

MHEG-5 Content Formats and Other Details

- MHEG-5 from ISO doesn't specify any particular content formats.
 - It does specify how to identify different content formats.
- DAVIC defines content formats for a number of MHEG objects ...
 - Font, Palette, Bitmap, Text, Hypertext, Video, Audio, Streaming Graphics (subtitles)
- Also defined by DAVIC are ...
 - Mapping to DSM-CC for network transport
 - Usage of various MHEG-5 options
 - Various environment details
 - A model for user input events

Extensions to MHEG-5

- DAVIC defines two sets of extensions to MHEG-5 (known as resident programs).
- One set of extensions provide general utility features.
 - The ability to retrieve and manipulate date information
 - The ability to request a random number
 - The ability to manipulate strings
- A second set of extensions provide access to DVB service information...
 - available services
 - current and following events for each available service
 - the program schedule for each available service

Relationship with UK Digital Terrestrial and DigiTAG

- MHEG-5 is now being broadcast on digital terrestrial in the UK.
 - The specification for this includes many features from the DAVIC MHEG-5 specification.
 - The UK specification adds many details which only become apparent when you really use a specification.
 - It also adapts it for the specific circumstances of digital terrestrial TV in the UK.
- A group within DigiTAG is working on a “EuroMHEG” specification.
 - This refines the UK digital terrestrial specification for wider use.
 - It provides various extensions including access to a return channel from MHEG.

MHEG-6

- MHEG-5 trades some flexibility in applications to ease inter-operability.
- MHEG-6 adds a Java virtual machine and some APIs to an MHEG-5 system.
 - This allows more flexible decision making than can be expressed in MHEG-5.
- The added value of a small piece of Java in an MHEG system is ..
 - Decision making
 - Information Processing
 - Flexibility
- Specific examples of this use of Java include ...
 - Extracting application specific data from a transport stream and presenting it.
 - Detailed manipulation of service information (e.g. descriptors)

Java Centric Solutions

- In the Java centric solutions, the applications may be written fully in Java
- A Java centric solution may co-exist with MHEG on the receiver, or the receiver may include only the Java centric solution
 - You can even write an MHEG engine in Java for a Java centric receiver.
- Java centric solutions include Java presentation APIs which can address the same underlying presentation functions as can be accessed with MHEG but with more flexibility.
- For presenting graphics, DAVIC uses the subset of Sun's java.awt user interface API with extensions for transparency.
- For presenting streamed audio-visual content, DAVIC uses the Java Media Framework specified by Sun Microsystems and defines a number of extensions to address digital TV features.
- DAVIC has also specified an extensive set of specific broadcast related APIs to access features specific to the broadcast environment

Java Media Framework Extensions

- Java Media Framework is a generic media player framework specified by Sun Microsystems
- DAVIC has defined the necessary additional details necessary for using the Java Media Framework for playback of broadcast services
- Modelling broadcast sources of data
- Playing content from RAM
- Resource management
- Access to A/V already running when the application started.
- Synchronisation of application code ...
 - To a specific position in time inside some content
 - To an event embedded in the content
 - To start of media presentation
- Control of language (audio, subtitles)

Common Java APIs

- DAVIC defines a number of different sets of Java APIs usable in both MHEG-6 and Java centric systems.
- Digital TV APIs include
 - DVB Service Information API
 - MPEG-2 Section Filtering API
 - Tuning API
 - Conditional Access API
- Supporting APIs include
 - Basic MPEG APIs
 - APIs and Data Formats for Referencing Content
 - Resource Notification

DVB Service Information API

- Provides the applications a high level interface for accessing the DVB Service Information and MPEG-2 Program Specific Information (PSI)
- Provides access to all the information transmitted in all SI tables
- Object-oriented design consistent with normal Java style
- API concepts abstracted from the transport mechanisms of SI
- Dedicated high-level methods for accessing all the fields in the body of the tables as well as for a few most commonly used descriptors
- Application can retrieve those descriptors that don't have dedicated methods in binary form
- High abstraction level
 - Independent of the mechanism how the SI information is possibly cached
 - Application can give hints for caching — how or if these hints are used is completely up to the implementation

DAVIC MPEG-2 Section Filter API

- To provide a way for applications to access data held in MPEG-2 private sections. Intended uses include:
 - Access to application specific soft real time data
 - A route to add future soft real time data protocols
 - Data sharing between existing legacy applications and DVB-Java applications.
- Several different ways of filtering for information are provided.
 - Filter for the first section matching the specified filter parameters and then stop.
 - Filter for a complete MPEG table in one operation without requiring real time behaviour from Java.
 - Filtering for a continuous stream of sections.

Tuning API

- The tuning API provides a high level interface for tuning to broadcast transport streams
 - Tuning in this context means really physical tuning, i.e. selecting the transport stream - not selecting services within a transport stream
 - Tuning based on a Locator
- Independent of the delivery system (satellite, cable, terrestrial)
- Package provides also a register of known transport streams
- Scalable design capable of supporting multiple tuners (both local and remote)
- Resource management handled using the resource notification API

Conditional Access API

- Provides the application a basic interface to the CA system
- Independent of the Conditional Access system
 - The API can be directly mapped to the functions of the DAVIC CA0 (DVB Common Interface) or the DAVIC CA1 interface
- Provides a generic set of basic functions needed for EPGs such as inquiring if the user has entitlements to access a given service or event
- Applications can use the generic functions without needing to be aware of the CA system that is used
- In addition to the generic functions, the API includes a part that the applications can use for communicating with a CA system by exchanging CA system dependent messages
- This message communication part can be used by applications that know the particular CA system. Using these functions the application can performing more detailed actions with the CA system that are not covered by the generic functions
- Provides support for multiple CA systems in the same receiver (e.g. multiple Common Interface modules)

Basic MPEG APIs

- MPEG Components API provides classes that act as "handles" for commonly used MPEG concepts:
 - Transport stream
 - Service (Program)
 - Elementary stream
- These classes are common components that are used in the other APIs that use these concepts
- This is not intended as a stand-alone API, but a common set of MPEG related classes between other API packages
- It also allows an application to identify the elementary streams within its service and hence to find data elementary streams for use in APIs like the section filter API.
- It also allow a cleaner design with less dependencies between the other API packages

APIs and Data Formats for Referencing Content

- The DAVIC APIs use so called Locator objects for referencing content
- The Locator objects encapsulate the parameters needed for referencing the content
- The Locator objects can be constructed using URL strings
- DAVIC has defined a URL format for referencing elements in broadcast networks, i.e. for referencing transport streams, services, event and components

DAVIC Resource Notification API

- Provide for notification of applications when resources are removed for any reason.
 - Could be because the resource becomes 'unavailable'
 - Could be because the resource has been removed by some mechanism and 'given' to another application.
- A small API intended to be used by other APIs.
- Includes a standard Java event model for reporting changes in resources.
- Used by all the DAVIC APIs using resources in order to provide a common and consistent approach for developers.

TV Anytime APIs

- Currently DAVIC is working on Java APIs to support TV Anytime applications
- These APIs will enable Java applications to register recordings to be made on storage devices.
- An application may later play back the recorded content from the storage device
- These APIs will also provide access to metadata about content to support decision making about recording and playback.

Relationship with the DVB MHP

- DVB is currently working on a specification for the DVB Multimedia Home Platform
- The DVB MHP will be based on a so-called DVB-Java platform which will include the Java virtual machine and a set of needed API packages
- There are many similarities between the Java centric solutions in DAVIC and the specification for DVB-Java being developed at the moment.
- The Java APIs from DAVIC have been proposed to DVB and reviewed there.
- For many system functions, the DAVIC APIs are the only ones proposed.
- We hope that these Java APIs together with others will form part of the DVB MHP.