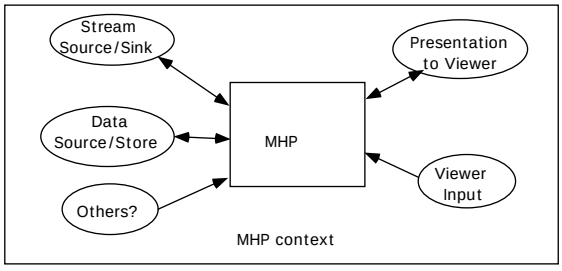
Multimedia Home Platform (mhp)

An overview of the norm

Referencias normativas

Context

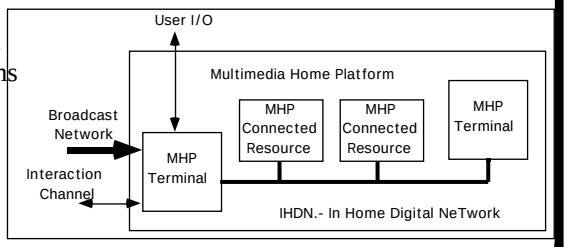
- The software of MHP has access to flows of streams and data, and may write some data to storage. The platform may be able to route streams and data outwards to a sink or store.
- The platform will receive inputs from Viewer input devices, and output communications trough a screen or loudspeakers.
- The platform may have access to communications with remote entities.



MHP context

Scope of the MHP norm

- "The Multimedia Home Platform (MHP) consist of an MHP viewer terminal, including all possible low to high funcionality implementations, its associated peripherals and the in home digital network
- The final DVB-MHP solution is intended to cover the whole range of implementations including Integrated Receiver Decoders (IRD's), integrated TV sets, multimedia computers and local clusters of such devices connected via the in home digital network(IHDN).
- This first release focuses on single MHP terminals and does not include such local clusters.
- DVB Network is a collection of MPEG-2 Transport Streams multiplexes transmitted on a single delivery system. ex. All digital channels on a specific cable system.

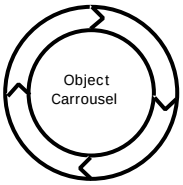


Set-Top Box Requirements to Run MHP

- 16 MB of RAM and 16 MB of Flash
- and a 255+ MHz CPU to run properly.
- This is beyond the capabilities of all but the most advanced set-top boxes deployed today.
- OpenTV expects that by the end of 2001, chipset prices will have decreased sufficiently to make the deployment of MHP-capable set-top boxes economically feasible,
- but there some 20 million boxes will remain in the field that cannot run MHP. A solution for bringing interactivity to these "legacy" boxes is required.

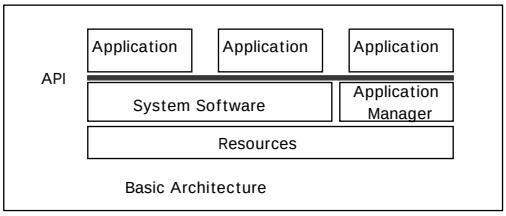
Miscelanea

- Navigator
  - A resident application, typically provided by the manufacturer, which the end user can activate at any time. The navigator can be used to select services, applications, and initiate interoperable applications.
- Object Carousel
  - A repetitively broadcast file system
  - The App.Objects are sent continuosly
- DSM-CC
  - The encapsulation protocol to send data
- Profile
  - A description of a series of minimun configurations,defined as part of the specification, providing different capabilities of the MHP.
  - It maps a set of functions wich characterise the scope of service options
  - The number of profiles is small.
  - The mapping of functions into resources and subsecuently into hardware entities is out of the scope of the specification and is left to manufacturers



Basic Architecture

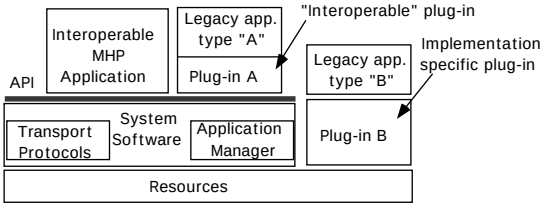
- System software
  - Software implementation below the API for a specific platform entirely under control of the manufacturer.
- Application manager
  - The application manager is the entity in the MHP that is responsible for managing the lifecycle of the applications in the MHP. It manages both the DVB-J applications and non DVB-J applications
- API
  - Application Program Interface. An interface between an application and a particular feature, function or resource of the MHP.



Basic Architecture

Plug-in software/hardware

- The plug-in application may stay resident where the design of the platform implementation allows. The MHP including the plug-in must behave, once the plug-in is loaded and operational, in the same way as a platform supporting the legacy system alone, and be conformable in the legacy system.
- Plug-in Options



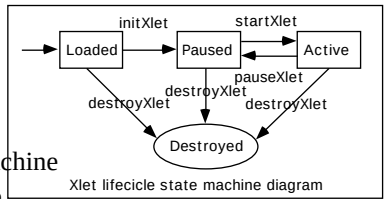
Illustrative plug-in implementation options

Xlet and Autostart app

- Xlet
  - Xlet.- Interface used for DVB-J application life cycle control
  - Events.- Asincronous communication between app and the MHP on wich they are being executed.
  - Trigger.- A trigger is an event that may cause a change in the behabiour of a DVB-HTML application that registers interest in such events.
  - Triggers may come from many sources eg. The broadcast stream, or may be generated by other data (such as the system clock) or may be generated as a resoult of user interaction.
- Autostart application
  - DVB-J autostart app is an app that is automatically loaded and executed by the app.manager as soon as the user selects a service on wich the app is signaled as autboot.
  - DVB-HTML app can be signaled as autostart app but it does not start providing service until it receives a start trigger

DVB-J and Xlet

- DVB-J
  - DVB-J.- The Java platform defined as part of he MHP speciication
  - DVB-J API.- One of the Java API's standarized as part of the MHP specification
  - DVB-J Application.- A set of DVB-J classes that opperate together and need to be signalled as a single instance to the App Manager so that it is aware of its existence and can control its lifetime througt a lifecycle interface.



Xlet lifecicle state machine diagram

- Xlet diagram State
  - DVB-J Application Lifecycle State Machine
  - The Xlet state machine ensures that the behabiour of an Xlet is close to the behabiour that television viewers expect.
  - Multiple app environment suport-> Rules for the DVB-J app to share the resources of the MHP, and in particular to share the Input and OutputFocus.
- DVB-J Apps and Service Selection

Application Boundary and Signaling

- App Boundary
  - A concise general description of the data elements (HTML documents, code files, images…) used to form one appand the logical locator of the entry point.
  - The app boundary is described by a regular expression over the URL language.
  - Where no such boundary is drawn, the default boundary shall be the entire set of documents that the MHP platform can access.
- App Signaling
  - The minimum signaling in the PMT associated with data broadcast components is the value of the PMT stream_type field required by the DVB data broadcasting specification for the transport protocol.
  - Inclussion of Data broadcasting id descriptors enables receivers to start mounting the file system that delivers applications concurrently with adquiring the AIT that identifies wich applications are of interest.
  - Enabling this concurrent operation may allow receivers to accelerate their activation of an interactiva application

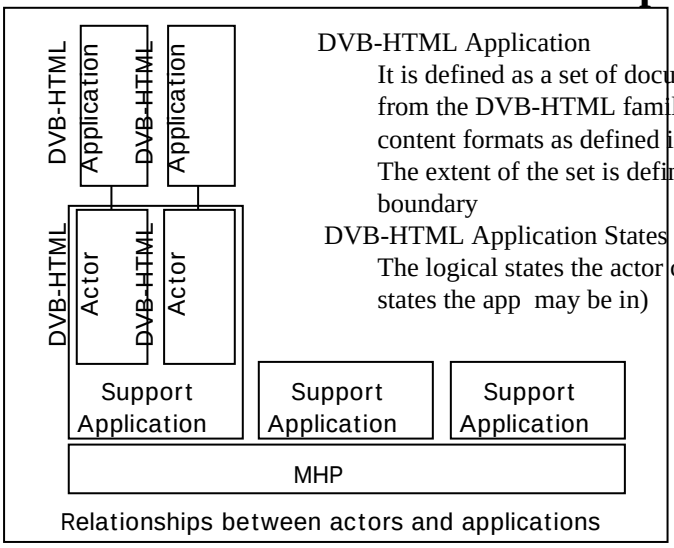
Domain of an application

- The domain of an Xlet characterizes the ‘space’ within the Xlet is able to execute. This includes both the ‘connection’ where the Xlet is delivered and other ‘connections’ where an already executing Xlet is allowed to continue executing.
- An app can not run outside its domain.
- The maximun lifetime of an app extends from the moment the user navigates to its domain until the moment the user navigates away from its domain.
- In the broadcast case a ‘connection’ corresponds to a DVB service.
- Broadcast signalling indicateswich services can load an app and wich services allow an already active app to continue.

DVB-HTML

- DVB-HTML Actor
  - It is defined as the locus of activity or process involved in running the specific set of DVB-HTML documents for some DVB-HTML app, plus any instantiated context for that data.
  - The actor runs inside a support app (native, plug-in or downloaded)
  - The nature of the process is not defined explicitly as it depends on the nature of the support app itself.
  - More than one such locus of activity may be present in any given support app
- DVB-HTML States
  - Loading.- Instantiation of an actor. Waiting for documentsto be available and loading documents without rendering them
  - Active.- Gathering and parsing durrent documents and related resources, rendering documents...
  - Paused.- DVB-HTML actor should minimise its use of resources
  - Destroyed.- Loading and rendering documents. Interact with the user. No longer able to access to content resources
  - Killed.- Termination of the DVB-HTML application

DVB-HTML relationships



Relationships between actors and applications

DVB-HTML Application
It is defined as a set of documents selected from the DVB-HTML family of elements and content formats as defined in the specification
The extent of the set is defined by the app boundary

DVB-HTML Application States
The logical states the actor can be in (= the states the app may be in)

Multimedia Home Platform (mhp)

Referencias normativas

Génesis del mhp

- El mhp se ha construido aprovechando normas y recomendaciones ya existentes y probadas
  - DAVIC.- Digital Audio Video Council.- Funciones básicas en aplicaciones de audio y vídeo
  - HAVi.- Botones y elementos para la creación de entornos de usuario
  - Java.- Clases Java, Máquina Virtual Java, Java TV...
  - DSM-CC.- Protocolo de encapsulado de ficheros y aplicaciones en un carrousel lineal de datos
- Referencias Normativas
  - Específicas.- Sólo aplica esa norma en esa versión de la misma
  - No específicas.- Aplica la norma en la versión que esté en cada momento. La norma MHP evoluciona con la norma a la que hace referencia no específica

Algunas referencias 1

- Procesos distribuidos
  - CORBA/IIOP (Common Object request Broker:Architecture and Specification, Object Management Group)
- DVB SI
  - EN 300 468.- (DVB) Sound and Data services. Specification for SI in DVB Systems
  - EN 301 192.- Specification for Data Broadcast
  - ETR 211.- (DVB) Guidelines on implementation and usage of Service Information (SI)
- Canal interactivo
  - Referenciado como canal de retorno.
  - ETR 300 800.- DVB Interaction Channel for Cable TV distribution Systems
  - ETR 300 801.- DVB Interaction Channel through PSTN/ISDN
  - ETR 300 802.- Network Independent Protocols for Interactive Services

Algunas referencias 2

- MPEG-1
  - ISO/IEC 11172-3.- Information Technology -Coding of moving pictures and associated audio for digital storage media at up to about 1.5 Mbps- Part3: Audio (known as **MPEG-1 Audio**)
  - ITU-R BT.601.- Studio Encoding Parameters of Digital Television for standard 4:3 and Wide-Screen 16:9 aspect ratios.
- MPEG-2
  - ISO/IEC 13818-1.- Information Technology -Generic coding of moving pictures and associated audio information: (**MPEG-2 Systems)**
  - ISO/IEC 13818-2.- Information Technology -Generic coding of moving pictures and associated audio information: Part 2 video (**MPEG-2 Video**)
  - ISO/IEC 13818-3.- Information Technology -Generic coding of moving pictures and associated audio information: Part 3 audio (**MPEG-2 Audio**)

Algunas referencias 3

- DSM-CC
  - ISO/IEC 13818-6.- Information Technology -Generic coding of moving pictures and associated audio informtion: Extensions for Digital Storage Media Command and Control (**DSMCC**)
- Java
  - Java Class Libraries Vol.1 & Vol.2.- by Patrick Can and others
  - Java Languaje Specification.- by James Gosling and others
  - Java Media Player Specification.- Sun MicroSystems
  - Java RMI.- Sun Microsystems, Java Remote Method Invocation Specification
- Máquina Virtual Java
  - Java VM.- The Java Virtual Machine Specification (2nd edition) ISBN 0-201432943 by T.Lindholm and F. Yellin, Addison Wesley
  - JavaTV.- JavaTV API Specification, release candidate B.1
  - Personal JAE.- Sun Microsystems, Personal Java Application Environment Specification Version 1.2
  - JSSE.- Java Secure Sockets Specification

Algunas referencias 4

- Formatos
  - JFIF.- JPEG File Interchange Format
  - PNG.- Portble Network Graphics. Available at http://www.w3.org/TR/REC-png.html
- Protocolos
  - RFC 1990.- (MP) The PPP Multilink Protocol
  - RFC 2616.- IETF Hypertext Transfer Protocol --HTTP/1.1
  - RFC 1112.- IETF Host Extensions for IP Multicasting
  - RFC 2045.- Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies
- Guidelines
  - TR 101 194.- Guidelines for the use of ETS 300 802
  - TR 101 200.- (DVB) Guideline for the use of DVB specifications and standards
  - TR 101 202.-Guidelines for the use of EN 301 192

Algunas referencias 5

- Entorno de usuario
  - HAVi.- HAVi Level 2 User Interface
  - DAVIC.- Complete DAVIC Specifications
- Codificación de datos
  - ASN.1.- ITU-T X.680 “Information Technology Abstract Syntax Notation One(ASN.1): Specification of Basic Notation” and ITU-T X.690 “Information Technology ASN.1 Encoding rules: Specification of Basic Encoding Rules(BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)”
  - ETS 300 706.- Enhanced teletext Specification
- Encriptado
  - RFC 2313.- PKCS #1: RSA Encryption Version 1.5
  - FIPS-180-1.- NIST, FIPS PUB 180-1: Secure Hash Standard

Algunas referencias 6

- Sist. Operativos
  - POSIX.- IEEE Standard for Information Technology -Portable Operating System Interface(POSIX)- Part 2: Shell and Utilities (Vol.1)
- Directorios
  - ITU-T X.501.- ITU-T Recommendation X.501: Information Technology -Open Systems Interconnection- The Directory: Models, 1993
  - ITU-T X.509.- ITU-T Recommendation X.509: Information Technology -Open Systems Interconnection- The Directory: Authentication framework
  - ITU-T X.520.- ITU-T Recommendation X.520: Information Technology -Open Systems Interconnection- The Directory: Selected Attribute Types