



HbbTV (Hybrid Broadcast Broadband TV)

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Agenda

- HbbTV – Background and Introduction
- HbbTV – Market Adoption
- HbbTV – Technology
- HbbTV and Dolby – Enablement
- HbbTV 2.0 – Next Steps

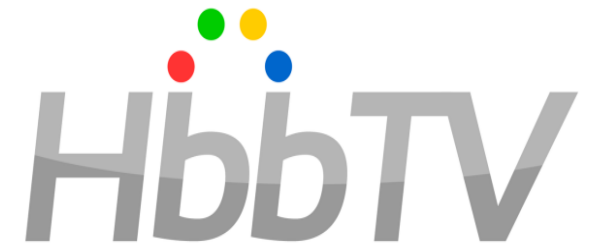


HbbTV – Background and Introduction

Little bit of history...



- Interactive TV Delivered over Broadcast since Teletext in 1970s
- MHEG-5 / MHP – newer digital standards for interactivity.
 - UK, Italy etc – but geographically limited
 - Red Button apps
- Smart TV Portals – apps preloaded onto TV or downloadable via IP
- **Hybrid Broadcast Broadband TV** combines these worlds and takes it further



HbbTV Evolution



- Interactive TV
 - YouView UK service: access to free to air TV and On-Demand based on MHEG-5
 - DVB-MHP (DVB - Multimedia Home Platform): open middleware system for interactive TV: used in Italy
 - Hybridcast NHK (Japan Broadcaster org.): in trial in Japan
- Smart TV App Portals: Inclusion of Internet connection on Receivers
 - Samsung/LG Smart TV, SmartTV alliance SDK
- **HbbTV** – Enables the broadcasters to leverage the above and link to DVB
 - Based on CE-HTML and Java Script (via OIPF) APIs
 - **Enables Media streaming, catch-up, initiate recordings etc.**
 - HbbTV1.5 – Enables monetised content delivery

HbbTV - Proposition

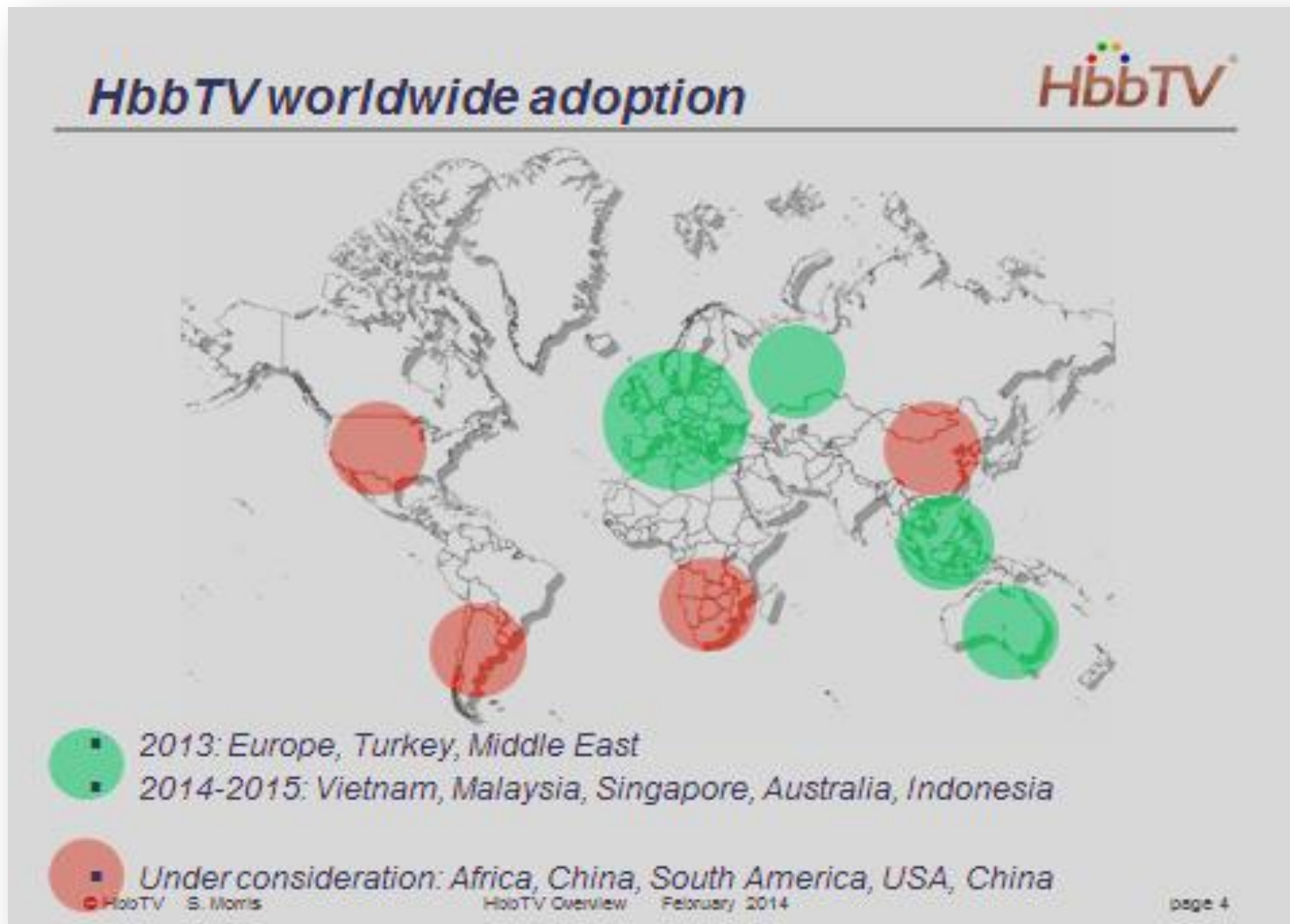


- HbbTV – An initiative by the broadcasters to leverage connected devices
 - A business neutral technology platform
 - Applicable to all kinds of broadcast and broadband networks
 - Signal and download interactive applications (voting, red button..)
 - Provides access to additional non-linear content
 - Seamless integrity with broadcast content (overlays etc.)
 - Enables monetization of additional content
 - Specifies terminal behavior only



HbbTV – Market Adoption

HbbTV Worldwide Adoption



- High level of adoption in Germany and related markets
- Many HbbTV 1.5 services on French DTT and satellite Fransat
- Many HbbTV 1.5 services launched in Spain
- HbbTV services launched in Poland, Austria, Czech Republic, Netherlands, Turkey, Switzerland
- Pilot services in Denmark, Russia, Hungary ...

HbbTV Adoption – Services Deployment



- Portal Services – Additional non-linear content by the network operator or device maker
- Advanced EPG – Linear and on-demand combined, 7 days in to the past ..
- Catch-up services
- Next generation Video Text – combining teletext and the internet
- Advanced accessibility – Sign language as an additional stream, Different font sizes
- Interactive advertising
- Interactive/Augmented information screen with sports ...



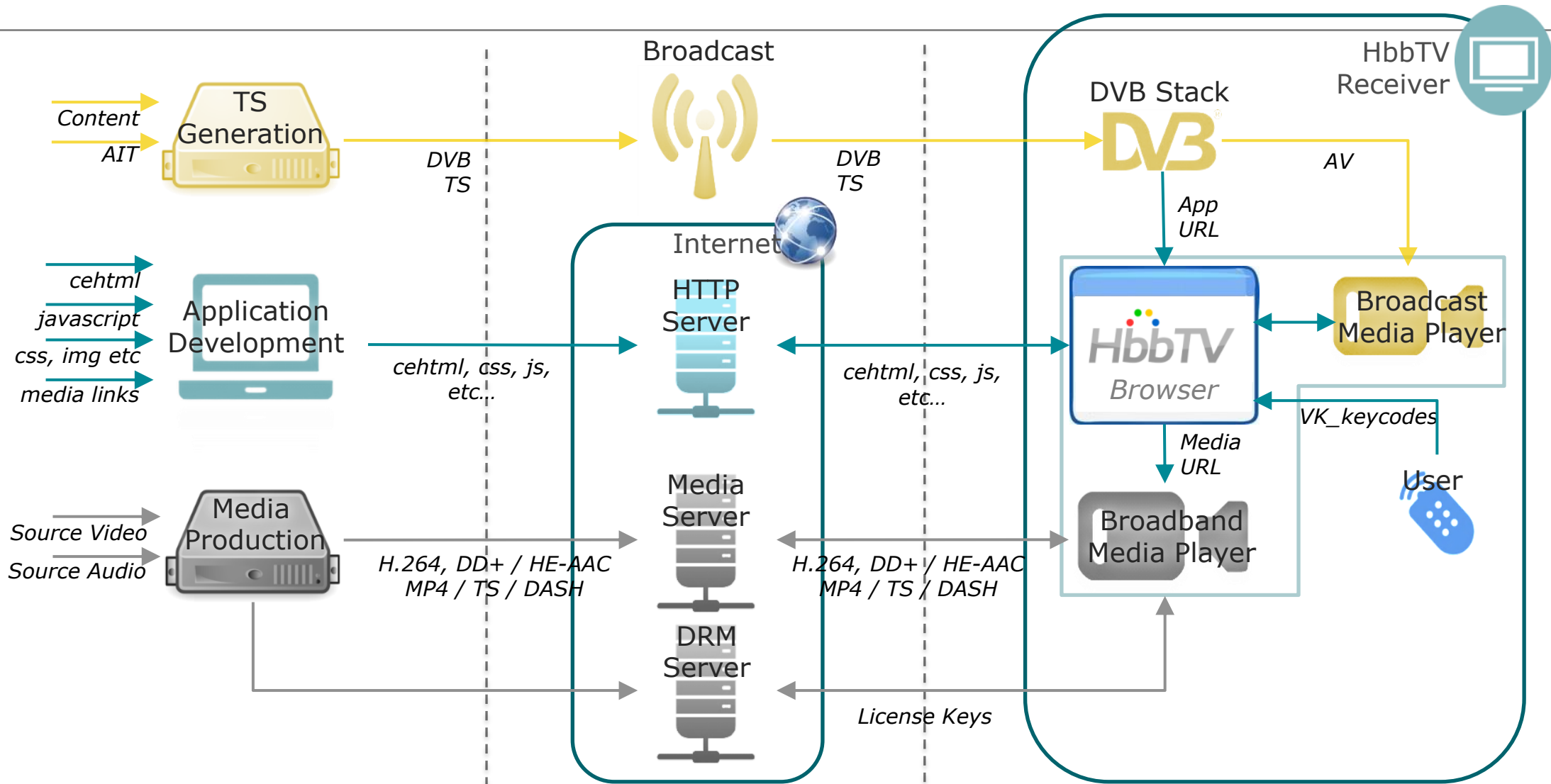
HbbTV – Technology

HbbTV Technology - Overview



- **Hybrid Broadcast Broadband TV**: built to coexist across broadcast and broadband
Standardized in **ETSI TS 102 796**
- **Broadcast Launching mechanism**: AIT (application information table) defined by DVB (ETSI TS 102 809)
- Connected TV **application framework**
 - Standard web technologies (W3C, CE-HTML)
 - JS APIs from OIPF (Volume 5 (DAE), Release 1.2)
- **Broadband Media Delivery**: defined by OIPF (referencing DVB) and MPEG-DASH
 - Streaming → MP4/TS/ MPEG-DASH
 - DRM → MPEG-CENC; PlayReady, Marlin DRM/ Nagra etc (not directly referenced)

HbbTV Technology - Overview

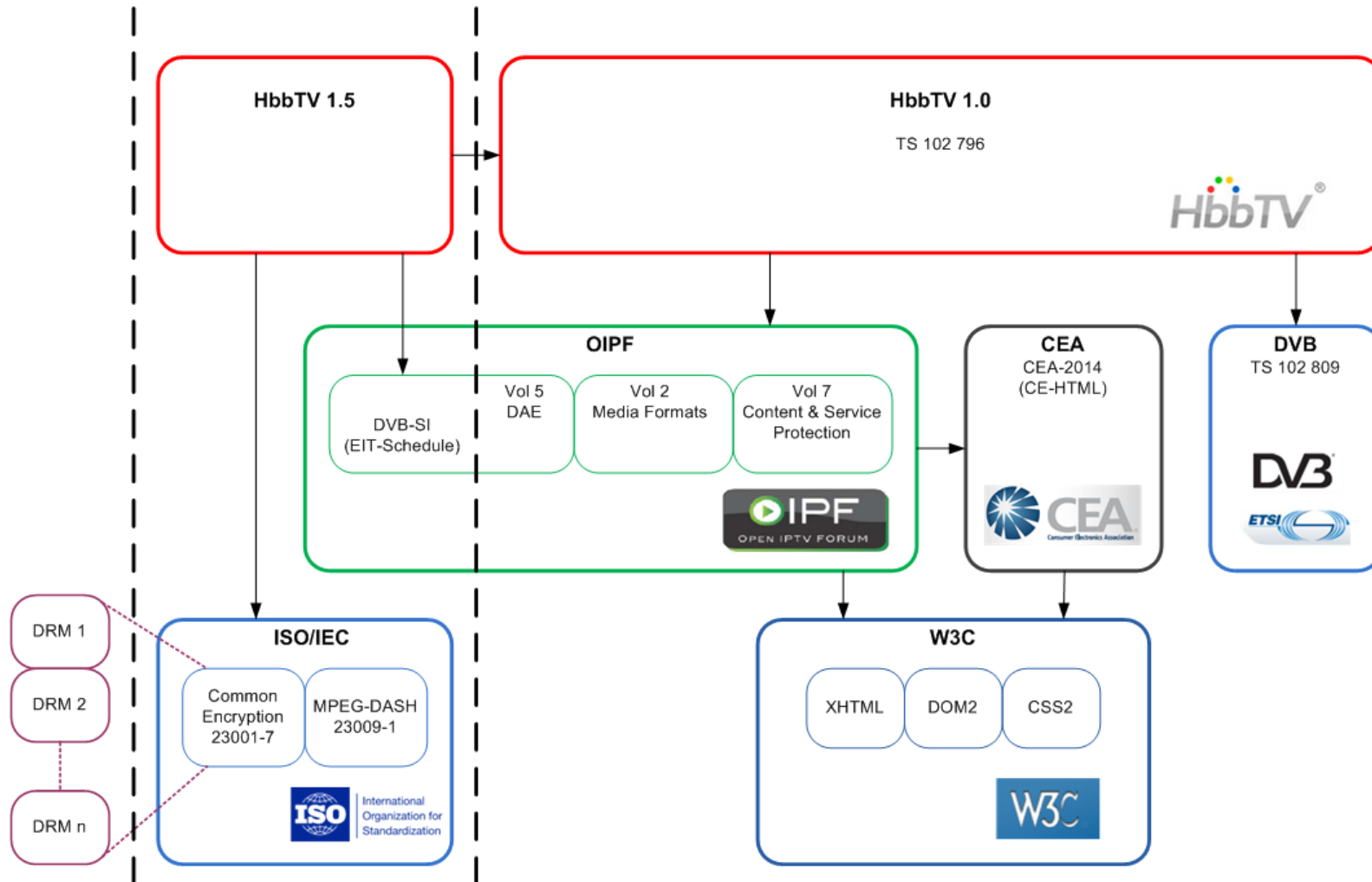


HbbTV Spec overview - Version Numbering



- **HbbTV 1** published June 2010 as **ETSI TS 102 796 v1.1.1**
 - Referred to as HbbTV 1, HbbTV 1.0 or HbbTV 1.1
- Work then began on HbbTV 2 to include DASH, second screen, HTML5 and other functionality
 - TNT2 in France wanted to reference HbbTV for DASH and didn't want to wait
 - So HbbTV focussed just on this input from TNT2 – and published HbbTV 1.5
- **HbbTV 1.5** published November 2012 as **ETSI 102 796 v1.2.1**
 - Usually called HbbTV 1.5, (sometimes also HbbTV 1.2. They are the same thing!)
- **HbbTV 2** work now nearing completion...will be published as ETSI TS 102 796 v1.3.1

HbbTV Spec Overview – Building blocks



HbbTV Technology: Broadcast feed



- Association with traditional broadcast services is major benefit
 - Allows broadcasters to control the content, easily offer value-added services
- Control codes in AIT control launching of applications
- Multiple apps associated with each service
 - Red Button app – very small, quick to load. Launches main app
 - Main application – loaded over IP
 - DSMCC (Digital storage media command and control) fall-back application
 - can carry traditional interactive services (eg weather, lottery, TV schedule) or “Connect your IP” message
- AIT structure defined in ETSI TS 102 809 – agnostic of DVB transmission standard (T/C/S/T2 etc).

Broadcast feed: AIT



AIT:

```
....table_id_extension: 0x0010
....common_descriptors:
....applications:
.....Application:
.....organisation_id: 0x00000070
.....application_id: 0x0013
.....application_control_code: 0x01
.....app_descriptors:
.....TransportProtocolDescriptor:
.....protocol_id: 0x0003
.....transport_protocol_label: 0x01
.....HttpUrl:
.....URL_base: "http://streaming.dolby.com/hbbtv_demo/app03_ve02/"
.....URL_extensions:
.....ApplicationDescriptor:
.....application_profiles:
.....ApplicationProfile:
.....application_profile: 0x0000
.....version_major: 0x01
.....version_minor: 0x01
.....version_micro: 0x01
.....service_bound_flag: 0x01
.....visibility: 0x03
.....application_priority: 0x01
.....transport_protocol_label: "\x01"
.....ApplicationNameDescriptor:
.....names:
.....AppName:
.....ISO_639_language_code: eng
.....application_name: "Dolby Test Application"
.....SimpleAppLocationDescriptor:
.....initial_path: "dolby1.html"
```

Org / app ID – unique app identifiers

Control Code: 0x01 = AUTOSTART

Transport Protocol: 0x03 – delivery over IP

Version = HbbTV Spec version

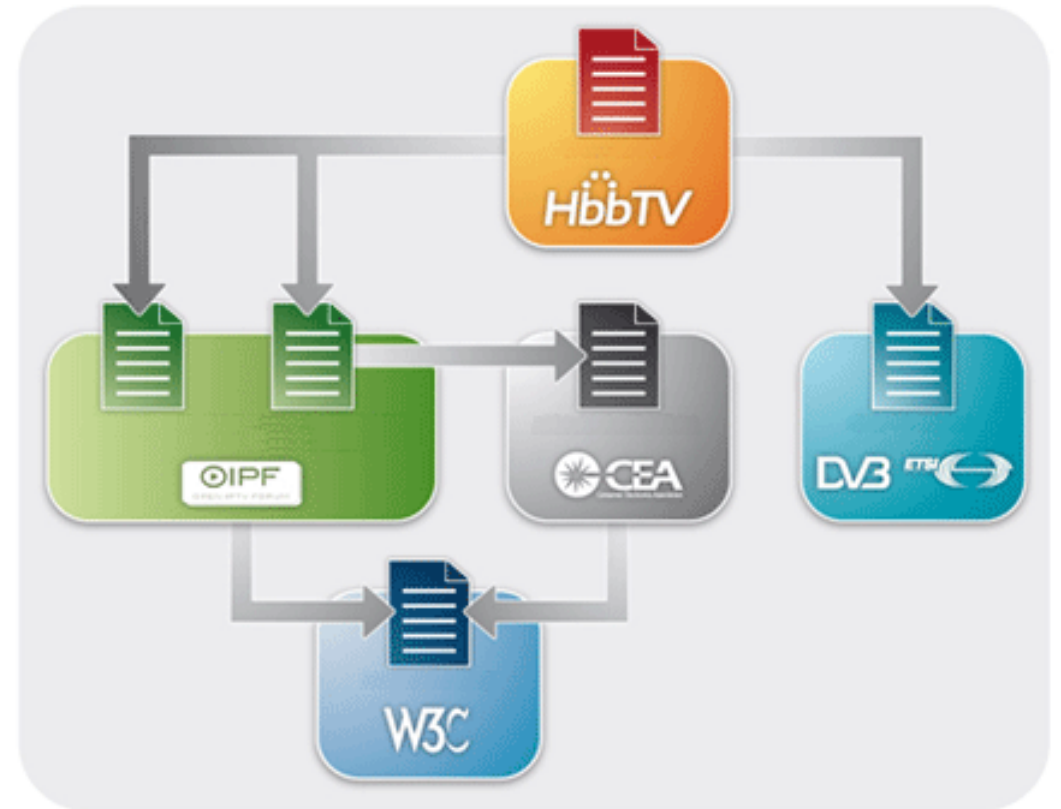
URL base / initial path = location of app

App name and language

HbbTV: Application framework



- Based on W3C web standards
- CE-HTML HTML/CSS/JS/PHP/ inc. AJAX
- OIPF DAE (vol 5) – javascript APIs
 - DAE : Declarative application environment
- OIPF Media Formats (vol 2)



HbbTV Media Delivery - **Dolby Digital Plus**



- **HbbTV v1.5 and DD+**
 - Strong support of DD+ with HbbTV in devices.
 - 100% of tested devices support DD+ for HbbTV (and also for broadcast)
- The standard says that **E-AC3 must be supported** for content received over the broadband connection if it is supported for the broadcast connection.

HbbTV Media Delivery – Mandatory Requirements



	HbbTV v1	HbbTV v1.5
Video	H.264	H.264
Audio	HE-AAC v1 DD+ MP3 (radio only)	HE-AAC v1 DD+ MP3 (radio only)
Container	MP4 TS	MP4 TS
Adaptive	-	MPEG-DASH (HbbTV profile)
Encryption	-	MPEG-CENC (DASH only)
DRM	-	Defined by regional specs



Dynamic **A**daptive **S**treaming over **H**TT**P**

- Segments are either fragmented mp4 (ISOBMFF) or ts
- Uses xml based .mpd manifest file (media presentation description) to describe available streams
- Segments are either fragmented mp4 (ISOBMFF) or ts
- HbbTV Spec 1.5 supports “HbbTV DASH Live profile” that is sub-profile of “DASH ISOBMFF Live Profile”
 - MP4 HbbTV profile supports fragmented mp4
 - New Role and Accessibility descriptors related to Broadcast: e.g. descriptors for audio description
- All the adaptive intelligence is in the asset creation and in the client



HbbTV and Dolby - Enablement

HbbTV and Dolby: Enablement



Goal:

- Enable easy deployment of Dolby Digital Plus in HbbTV 1.5 ecosystem and ensure compelling audio experience in (HbbTV 1.5 and above) services with our Broadcast Partners

Key components:

- Interoperability Testing
- Content Creation
- Live Infrastructure support
- Test Apps and Consumer facing Apps

HbbTV v1.5 Ecosystem Enablement



Development activities (Dolby is an active member of HbbTV community)

End2End Dolby Test and Demo HbbTV solution focus on Audio and Dolby Digital Plus use cases
Dolby Marlin DRM solution for HbbTV (and OTT) & Bento4 libraries
UHD/DD+ testing content

Interoperability testing with Key-partners

HbbTV Plugfest and external testing → ~100% DD+ enablement in v1.5
Wowza Media Server and DASH/DD+ enablement
Projects with key device makers

Dolby tools and Kits HbbTV 1.5 Enablement:

ONDEL Kits: Test vectors for Inter-op testing
MS12 SDK: contains Cobalt (test App) and HbbTV test vectors
DMG: Support of HbbTV v1.5 content creation



Dolby HbbTV Consumer facing Services



- Finland DTTV Digita (national transmission and broadcasting networks)

<http://hbbtv.dtv.fi/TV-etusivu/>

- Poland TVP: with Dolby advanced test vectors including HEVC/4K

<http://hbbtest.v3.tvp.pl/testvideo/index.html>

- German DTTV: Mediathek in progress





HbbTV 2.0 – Next Steps

HbbTV 2.0 features: Highlights



- Advert Insertion into VoD Content
- Multi device Sync (2nd screen)
- Support for subtitles
- Support for Mouse and Keyboard Devices (not only classic remote controls)
- Synchronization of multiple content streams (broadcast/broadband)
- Launching a Companion Screen application
- HEVC support for Video
- HTML5 and Associated Technologies

