Application Discovery over Broadband Explained

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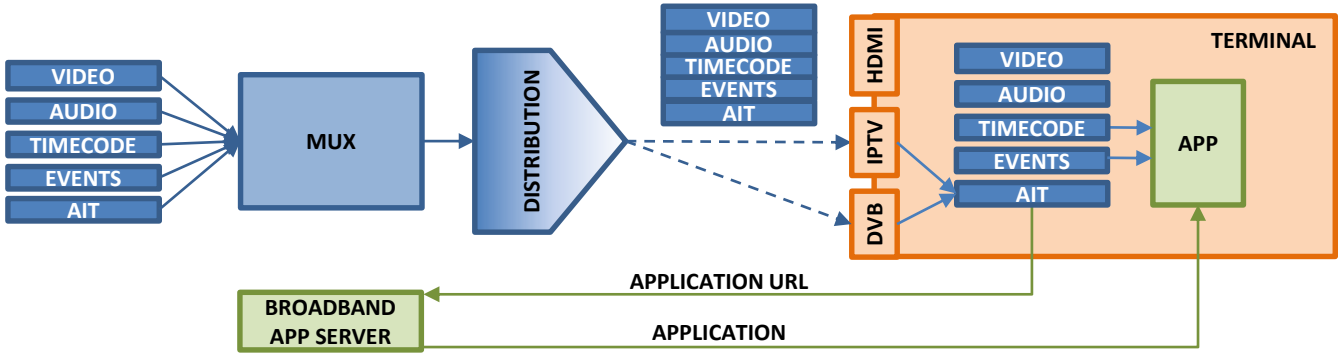
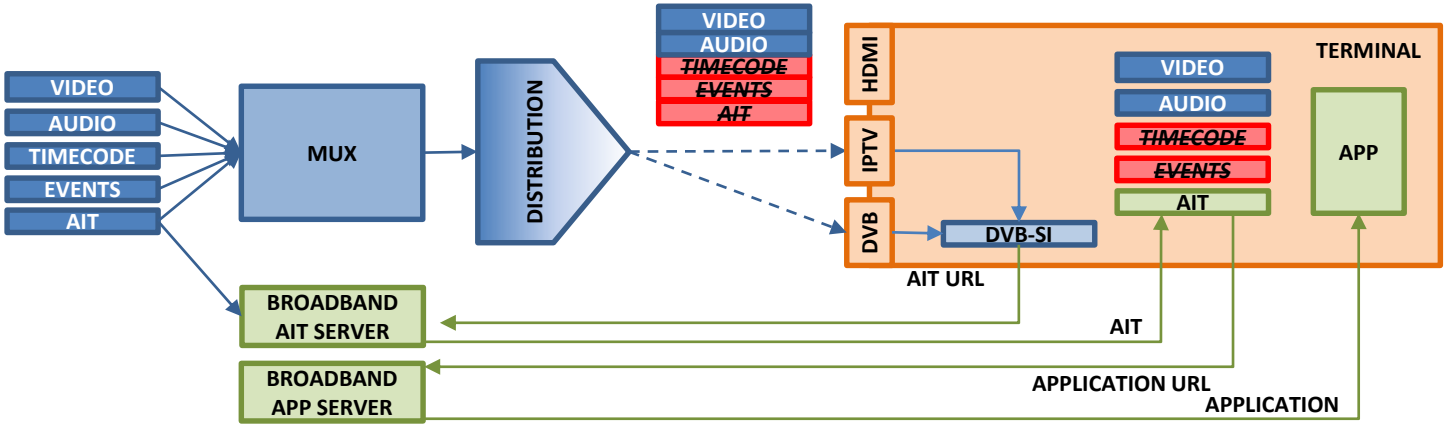
Application Discovery over Broadcast

- Traditionally, HbbTV Terminals “discover” applications using an Application URL carried in an Application Information Table (**AIT**) received via broadcast
- Timecode and stream events are found multiplexed into the broadcast stream
- This is supported in the **HbbTV Core Specification** (and referenced DVB specs)

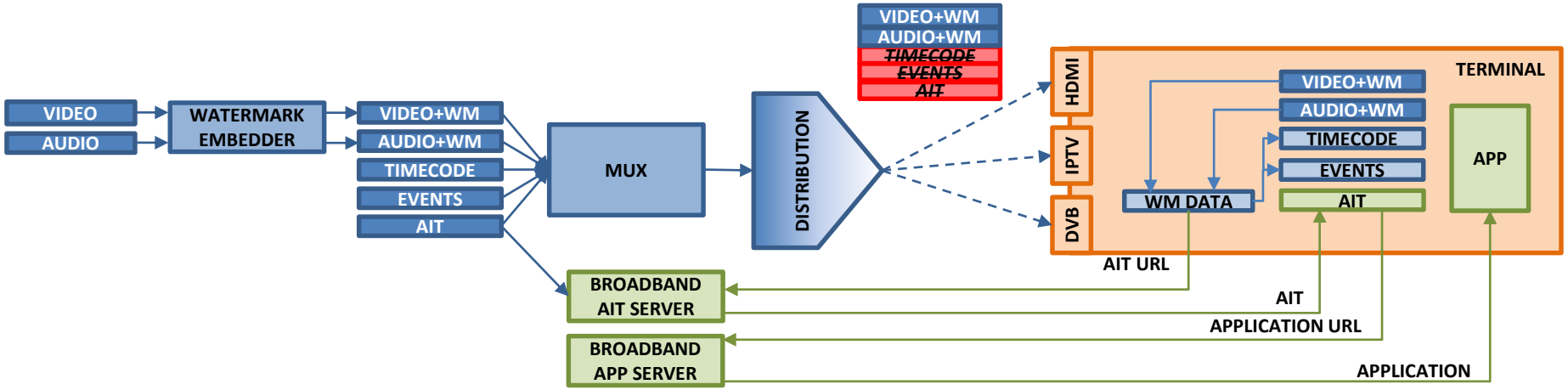


Application Discovery over Broadband
Phase 1 – DVB-SI

- Some broadcast multiplexes don't include the AIT, timecode, or stream events
- The **Application Discovery over Broadband** specification enables HbbTV Terminals to obtain the AIT and application from broadband in this case using the **DVB Service Information** (DVB-SI) that is always present in a DVB transmission



- Watermarking extends use cases for Application Discovery over Broadband to include:
  - Service delivery to the HbbTV Terminal via **HDMI and other non-broadcast interfaces**
  - **Timecode**
  - **Stream Events**



Specification Overview

Independent Specification

- HbbTV has 2 types of specifications
  - The core HbbTV spec itself (ETSI TS 102 796)
  - A set of related independent specs
- Independent specs are for features not (yet) ready for mass-market adoption in TV sets
  - Operator applications (ETSI TS 103 606)
  - IPTV (ETSI TS 103 555)
  - Application discovery over broadband (ETSI TS 103 464)
  - Targeted advertising
- In time, some of these may be adopted widely enough to justify inclusion in the core spec

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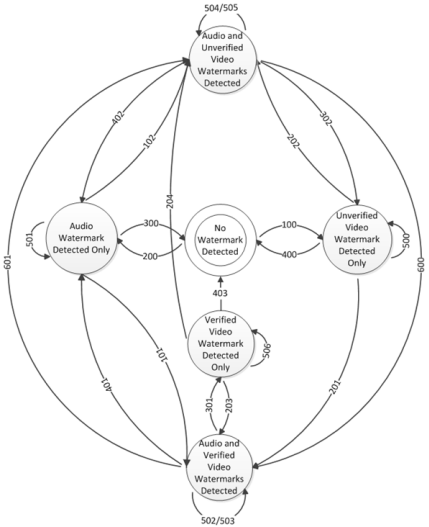
Watermark State Machine

- Application discovery lifecycle follows a state machine based on detection and loss of audio and video watermarks
- An audio watermark must be present for an application to be launched
  - Video watermarks provide supplemental timing and stream event information and enable lifecycle management during audio interruptions (e.g. audio mute)
- The running application is hidden within 2 seconds when watermarks are lost
  - The hidden application is killed when watermarks indicate a channel change or, in any case, after 2 minutes
- Video watermark embedding and detection are not currently mandatory
  - Use of audio and video watermarks in combination enables improved user experience



Timeline

- A frame-accurate **watermark media timeline** is established by the Terminal using timing information conveyed in the audio and video watermarks
- Applications can reference and access the watermark media timeline using the Media Synchroniser
  - The watermark timeline selector is `urn:hbbtv:sync:timeline:wm`
  - This timeline is accessed via `MediaSynchroniser.currentTime()`
  - No synchronisation of other media elements to the watermark media timeline is currently mandated

Stream Events

- Watermarking provides Terminals with two ways of receiving application stream events
  - Stream events can be conveyed in the video watermark
    - Applications “listening” to the `urn:hbbtv:streamevent:a336:video` event stream URL receive stream events sent in the video watermark
  - Event notifications can be conveyed in the audio watermark
    - Applications “listening” to the `urn:hbbtv:streamevent:a336:audio` event stream URL receive a stream event containing the latest audio watermark payload data whenever the broadcaster toggles the “query_flag” bit in the audio watermark payload
    - This provides a “push notification” capability from broadcaster to application

Watermarking & APIs

- Some HbbTV APIs are modified when Application Discovery over Broadband using watermarking is active
- Some existing APIs are not available for use:
  - selectComponent and unselectComponent
  - setChannel / prevChannel / nextChannel
  - Release
- Behavior is extended or changed for some objects and APIs
  - Application
  - Channel
  - getCurrentActiveComponents
  - fullscreen
  - width / height
- HbbTV application developers need to take this into account!

Summary of Application Discovery Methods

	APPLICATION DISCOVERY VIA BROADCAST	*APPLICATION DISCOVERY VIA BROADBAND USING DVB-SI*	*APPLICATION DISCOVERY VIA BROADBAND USING WATERMARKING*
PRIMARY USE CASE	TVs and STBs **directly** connected to a broadcast network carrying HbbTV signaling.	TVs and STBs **directly** connected to a broadcast network ***not*** carrying HbbTV signaling.	TVs connected **via HDMI** to a STB where the STB **does not** support HbbTV.
TERMINAL TYPES	TV STB	TV STB	TV STB
TERMINAL INPUT SOURCES	DVB IPTV	DVB IPTV	HDMI DVB IPTV
AIT DISCOVERY	BROADCAST (DVB)	DVB-SI	A/V WATERMARK
AIT DELIVERY	BROADCAST (DVB)	BROADBAND (HTTPS)	BROADBAND (HTTPS)
APP DELIVERY	BROADBAND (HTTPS)	BROADBAND (HTTPS)	BROADBAND (HTTPS)
TIMECODE DELIVERY	BROADCAST (DVB)	NOT SUPPORTED	A/V WATERMARK
STREAM EVENT DELIVERY	BROADCAST (DVB)	NOT SUPPORTED	VIDEO WATERMARK

Looking Forwards

- Today HbbTV has the spec and 123 approved unit test descriptions
- Next steps
  - Create test suite based on unit tests
  - Review test suite
  - Run test suite on early implementations
  - All of these need resources and / or money!