



Media synchronisation in DVB and HbbTV

New sync standards for TVs and tablets

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- DVB specification on inter-device media synchronisation
 - Architecture
 - Protocols
- HbbTV profile on multi-stream and inter-device media synchronisation
 - Profile of DVB sync spec
 - API
 - Application-controlled life cycle
 - Buffer model
- Open issues

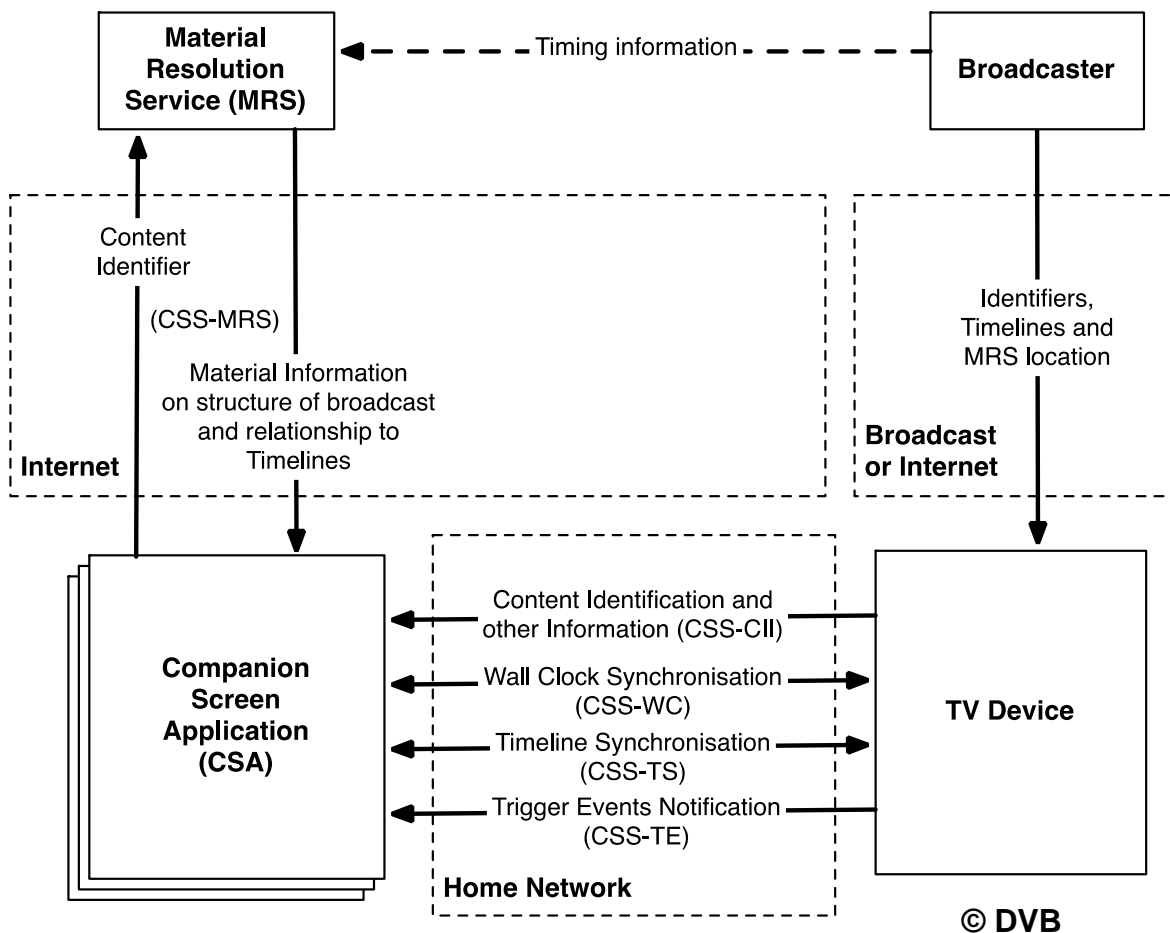


- DVB CSS: Companion Screens and Streams
- Spec: DVB A167-2, a.k.a. ETSI TS 103 286-2
- Use case: companion-screen content synchronised to TV programme



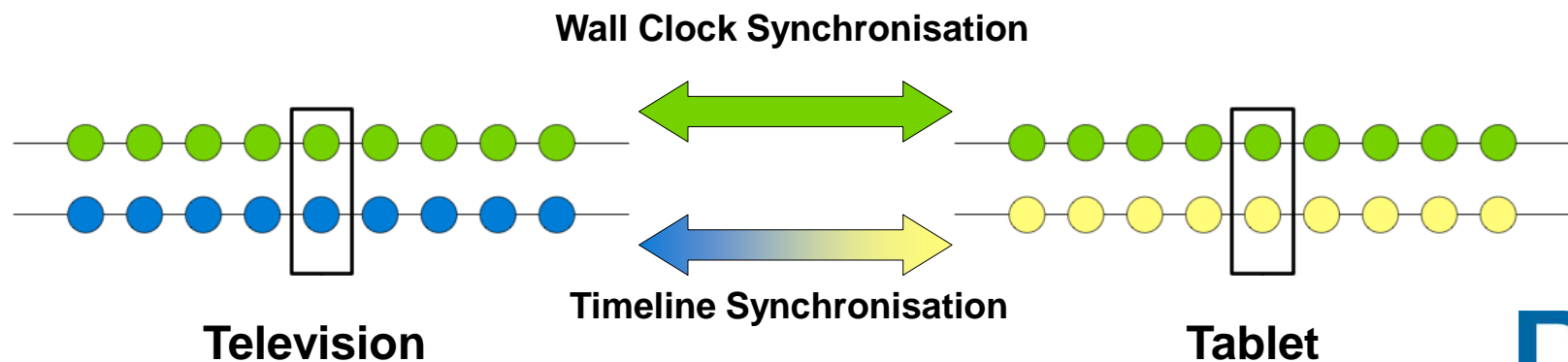
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Architecture and protocols



DVB spec on inter-device media sync

- Content identification
- Intrinsic and extrinsic timelines
 - MPEG-TS PTS: Presentation Time Stamp
 - ISOBMFF: Composition Time
 - TS Adaptation (TSAP or MPEG TEMI)
 - MPEG DASH: Period Relative Timeline
 - ... extensible
- Correlation timestamps in CSS-MRS protocol to translate between timelines



HbbTV profile for media synchronisation

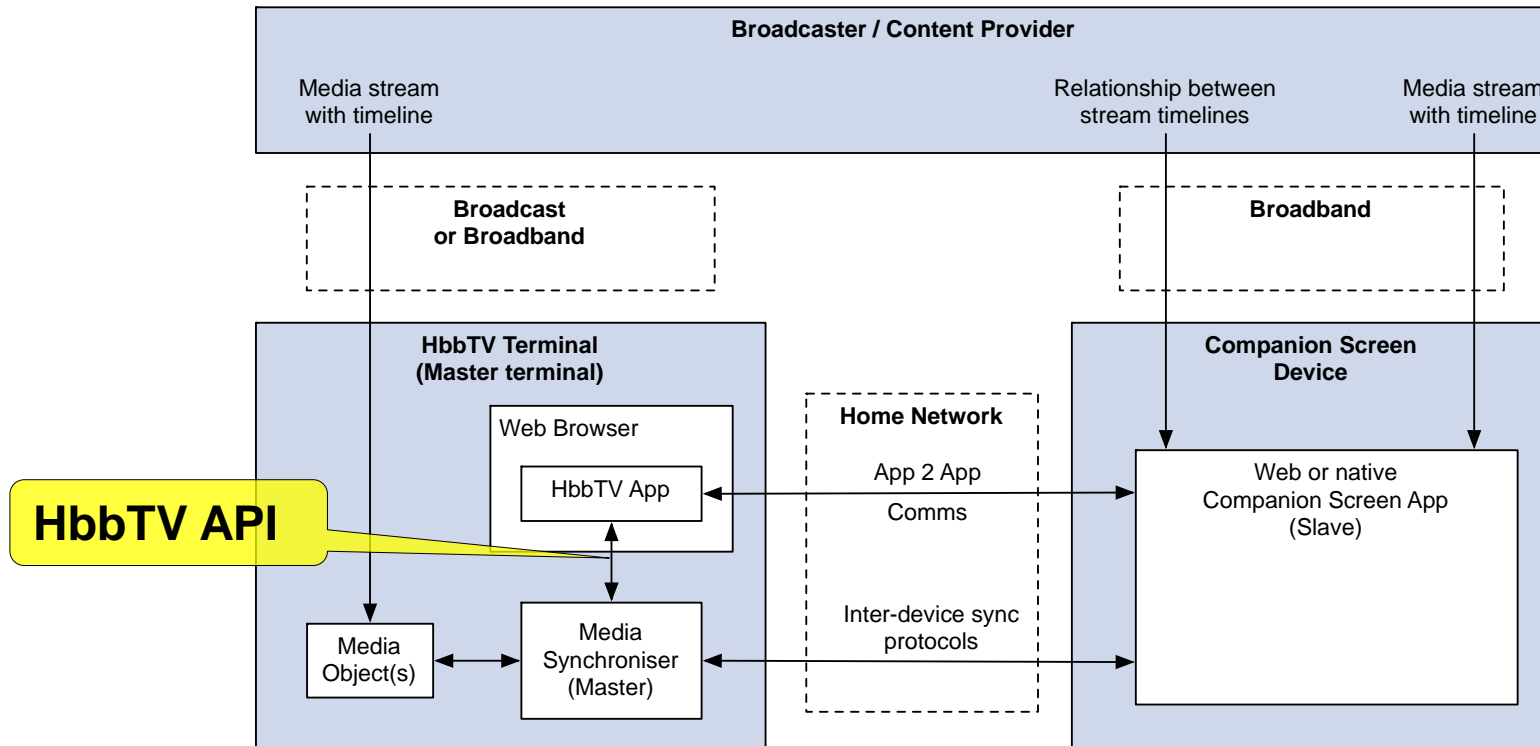
- HbbTV 2.0, to become ETSI TS 102 796 v1.3.1
- Both multi-stream and inter-device
 - Use cases: alternative audio, sign language, subtitle, ...



The screenshot displays a video player interface for a news broadcast. The main video area shows a male news anchor in a suit, with a background image of a building and a sign that reads "Urteil zum Handel mit Saatgut". A smaller inset video in the bottom-left corner shows a sign language interpreter. The player includes a progress bar at the top showing a timestamp of 0:02:37.360. Below the video, there are four buttons: "Sign-Language", "Subtitle", "QRCode", and "Advertisement". The copyright notice "© FP7 HBB-Next" is visible in the bottom-left corner of the player area.

HbbTV profile for media synchronisation

- Timelines and protocols from DVB spec
- Common API for multi-stream and inter-device
- Terminal can be both "master" and "slave"



- **Accurately control play-out for synchronization**
 - HDMI 2.0 offers limited control
 - Use cases: multiple screens, 3D audio, ...
- **Control timing across various domains**
 - DVB and HbbTV assume single network segment
 - Use cases: tablet connected via 3G/4G, social TV, large scale synchronisation
- **Synchronising and orchestrating multiple sources**
 - DVB and HbbTV assume single broadcaster domain
 - DVB already has some “hooks” in Material Information
 - Use cases: user-generated A/V streams at live events

- DVB and HbbTV standards for media sync
 - DVB: protocols between TV and tablet
 - HbbTV: API for TV, also multi-stream
- Lots of open issues

THANK YOU!

Additional slides

■ Buffer model

- Optional buffer of minimally 30 MB in TV for all types media sync
- Ancillary content to be pre-loaded on CDN
 - (or editorial delay of broadcast TV)
- MPEG DASH shall be buffered on CDN



- **API and life cycle of MediaSynchroniser object**
 - void initMediaSynchroniser (Object mediaObject, String timelineSpecification)
 - void initSlaveMediaSynchroniser (String css_ci_service_url)
 - void addMediaObject (Object mediaObject, String timelineSelector, CorrelationTimestamp correlationTimestamp, Number tolerance)
 - void removeMediaObject (Object mediaObject)
 - void updateCorrelationTimestamp (Object mediaObject, CorrelationTimestamp correlationTimestamp)
 - void enableInterDeviceSync (function callback)
 - void disableInterDeviceSync (function callback)