WebRTC meets HbbTV

HbbTV Symposium 2021

Louay Bassbouss | Paris | 25.11.2021
WebRTC: Brief Overview

- Web Standard for enabling real-time communication on the Web
- W3C Recommendation since 26 January 2021

**WebRTC 1.0: Real-Time Communication Between Browsers**

W3C Recommendation 26 January 2021

- Initially designed for peer-to-peer communication between browsers → audio, video and data channels are supported

- Supported in all modern browsers on desktop and mobile. Most probably also on TV browsers built on top of desktop browser code bases like Chromium or WebKit

https://www.w3.org/TR/webrtc/
WebRTC and HbbTV

- The main purpose of HbbTV is to complement non-interactive broadcasting services with interactive applications over broadband.
- It seems natural that HbbTV also supports the necessary APIs for interactive live streaming.
- WebRTC has become the standard solution for real-time communication on the Web, but is also increasingly used for interactive live streaming with sub-second latency requirement.
HbbTV Browser HTML5Test Score (Example: HbbTV 2.0.2 Terminal)

Streams
- Readable streams: Yes
- Writable streams: No

Storage
- Key-value storage: Yes
- Session Storage: Yes
- Local Storage: Yes
- IndexedDB: Yes
- Objectstore also support: Yes
- Objectstore ArrayBuffer support: Yes

Database storage
- IndexedDB: Yes

Peer To Peer
- Connectivity
  - WebRTC v1.0: Yes
  - MediaStreamConnection: Yes
  - ObjectRTC API for WebRTC: No
  - Data channel: Yes
- Input
  - Access the webcam: Yes
  - Screen Capture: No
- Enqueue devices: Yes
- Recording
  - Media Stream recorder: Yes

Files
- Reading files
  - Basic support for reading files: Yes

User interface
- Drag and drop: Yes

https://html5test.com/
Interactive Live Streaming - Use Cases

- Interactive Live Concerts/Music events
- Auctions and gambling
- Trivia games
- Live Sports betting
- Cloud game streaming

Example: HQ Trivia
More than 2.3 million concurrent players at its peak
WebRTC Topologies: Real-time Communication vs. Interactive Live Streaming

Real-time Communication

- Mesh
- SFU/MCU

Interactive Live Streaming

- Producer
- Origin Media Server
- Edge Media Servers
- Consumers
Virtual Live – Hybrid Live-Concert with Interactive Live Stream

Live concert on December 11, 2021 08:00 PM
Details → https://www.fokus.fraunhofer.de/go/virtual_live

Performs together
<30ms round-trip latency

360° Video/3D Audio
Interactivity/Feedback

https://www.fokus.fraunhofer.de/go/virtual_live

Billy Andrews
The Dark Tenor

Audience Feedback
Audience Stream

Studio Berlin
Kesselhaus Berlin
Planetarium Bochum

https://www.fokus.fraunhofer.de/go/virtual_live
Virtual Live – Interactive Live Stream for Audience

- Virtual Live Interactive Live Web Player
- Watch live stream with friends
- Send feedback to friends and stage
- Request to join stage via video
- Low Latency is key for all these interactive features
- A German public broadcaster showed great interest in bringing this experience to HbbTV

https://www.fokus.fraunhofer.de/go/virtual_live
Interactive Live Streaming on HbbTV (Ideas)

HbbTV Live stream with sub-second latency

Watch with friends

Simple interactions via the TV remote control

HbbTV Terminal

Companion Device
DASH-IF Report on WebRTC-based Streaming and DASH Aspects

- Identify synergies between DASH-based streaming and WebRTC-based real-time streaming for professionally-produced content.
- Interactive Live Streaming Use Cases
- Define baseline Architecture and KPIs for Interactive Live Services
- How can WebRTC-based Streaming be integrated into the DASH ecosystem
- Define baseline architecture, and KPIs for live and interactive services
- Discuss requirements & challenges:
  - Latency & Interaction delay
  - Formats, bitrates and compression efficiency
  - Network efficiency and scalability
  - Robustness to bandwidth variations and errors

https://dashif.org/webRTC/
Thank you for your attention

Contact

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