WebRTC: Brief Overview

- Web Standard for enabling real-time communication on the Web

- W3C Recommendation since 26 January 2021

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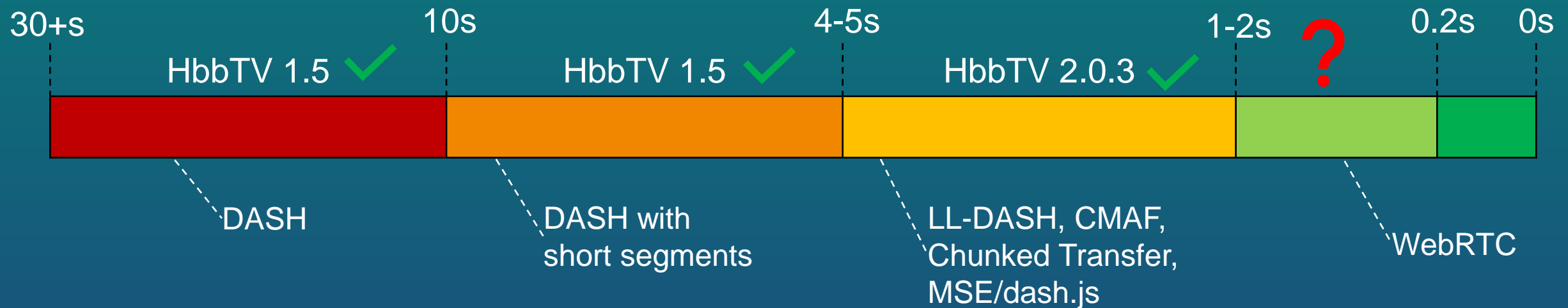

- Supported in all modern browsers on desktop and mobile. Most probably also on TV browsers built on top of desktop browser code bases like Chromium or WebKit
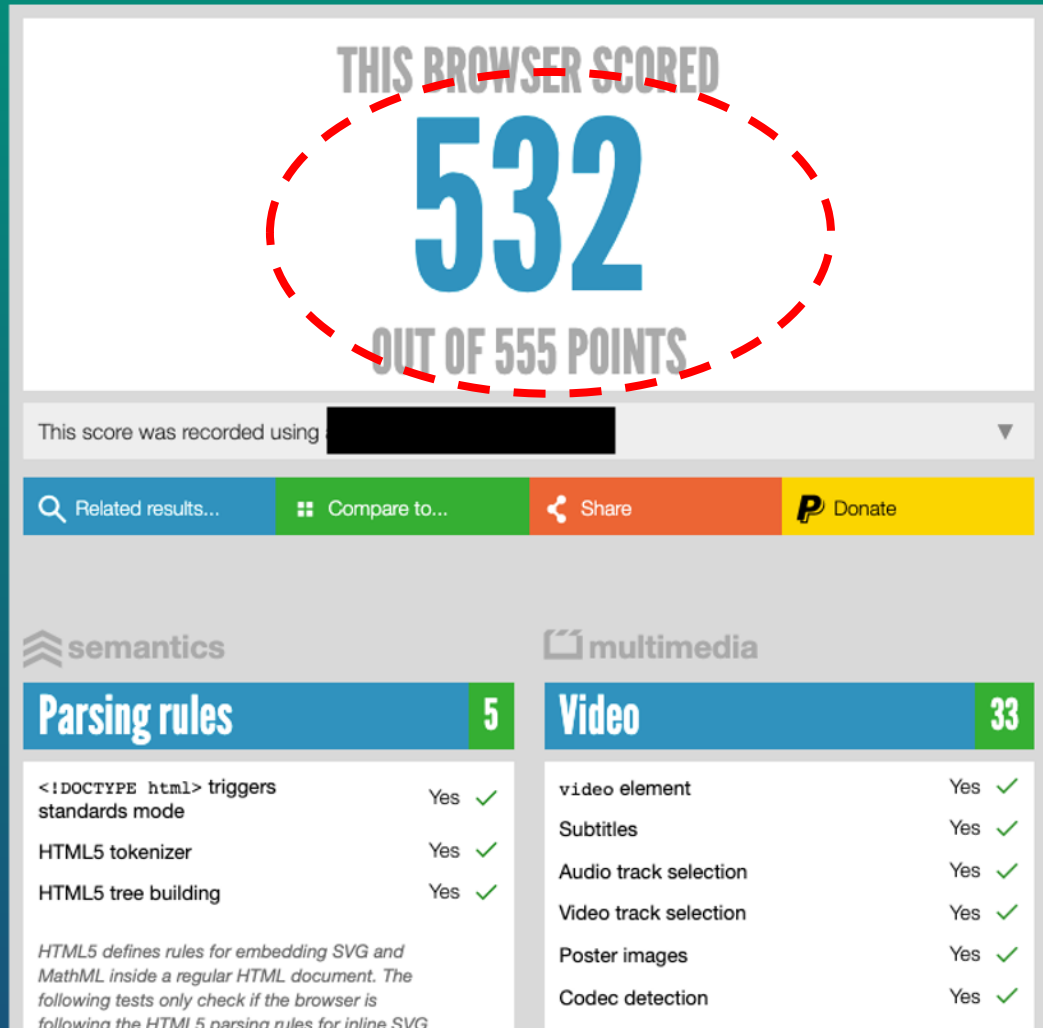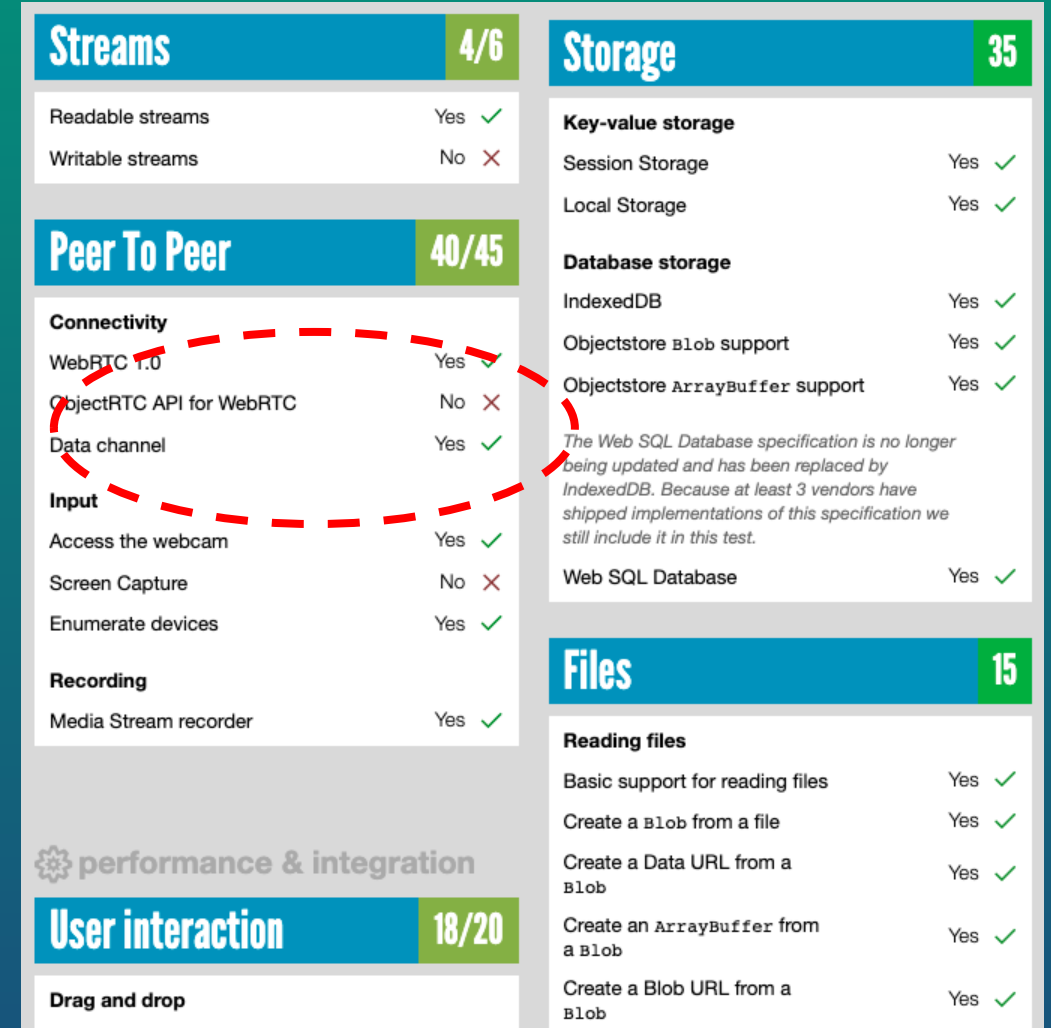
https://www.w3.org/TR/webrtc/

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.

30+s   10s   4-5s   1-2s   ?   0.2s   0s

| HbbTV 1.5 ✔ | HbbTV 1.5 ✔ | HbbTV 2.0.3 ✔ | | |

DASH

DASH with short segments

LL-DASH, CMAF, Chunked Transfer, MSE/dash.js

WebRTC

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HbbTV Browser HTML5Test Score (Example: HbbTV 2.0.2 Terminal)

THIS BROWSER SCORED

532

OUT OF 555 POINTS

This score was recorded using

| Related results... | Compare to... | Share | Donate |

semantics

Parsing rules — 5

`<!DOCTYPE html>` triggers standards mode	Yes	✓
HTML5 tokenizer	Yes	✓
HTML5 tree building	Yes	✓

HTML5 defines rules for embedding SVG and MathML inside a regular HTML document. The following tests only check if the browser is following the HTML5 parsing rules for inline SVG

multimedia

Video — 33

video element	Yes	✓
Subtitles	Yes	✓
Audio track selection	Yes	✓
Video track selection	Yes	✓
Poster images	Yes	✓
Codec detection	Yes	✓

Streams — 4/6

Readable streams	Yes	✓
Writable streams	No	✗

Peer To Peer — 40/45

Connectivity

WebRTC 1.0	Yes	✓
ObjectRTC API for WebRTC	No	✗
Data channel	Yes	✓

Input

Access the webcam	Yes	✓
Screen Capture	No	✗
Enumerate devices	Yes	✓

Recording

Media Stream recorder	Yes	✓

Storage — 35

Key-value storage

Session Storage	Yes	✓
Local Storage	Yes	✓

Database storage

IndexedDB	Yes	✓
Objectstore `Blob` support	Yes	✓
Objectstore `ArrayBuffer` support	Yes	✓

The Web SQL Database specification is no longer being updated and has been replaced by IndexedDB. Because at least 3 vendors have shipped implementations of this specification we still include it in this test.

Web SQL Database	Yes	✓

Files — 15

Reading files

Basic support for reading files	Yes	✓
Create a `Blob` from a file	Yes	✓
Create a Data URL from a `Blob`	Yes	✓
Create an `ArrayBuffer` from a `Blob`	Yes	✓
Create a Blob URL from a `Blob`	Yes	✓

performance & integration

User interaction — 18/20

Drag and drop

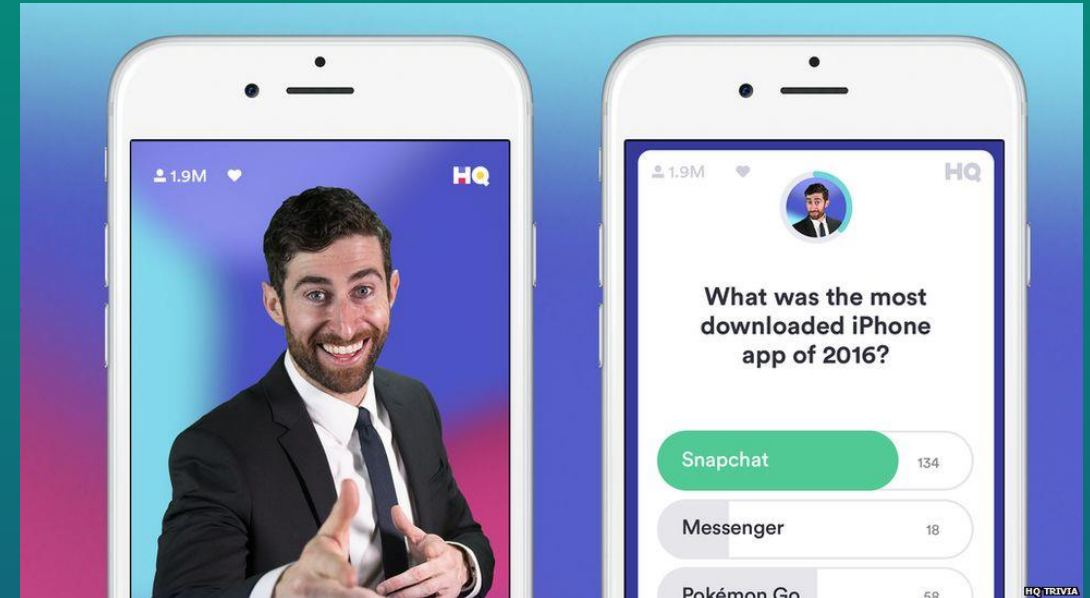https://html5test.com/

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Interactive Live Streaming - Use Cases

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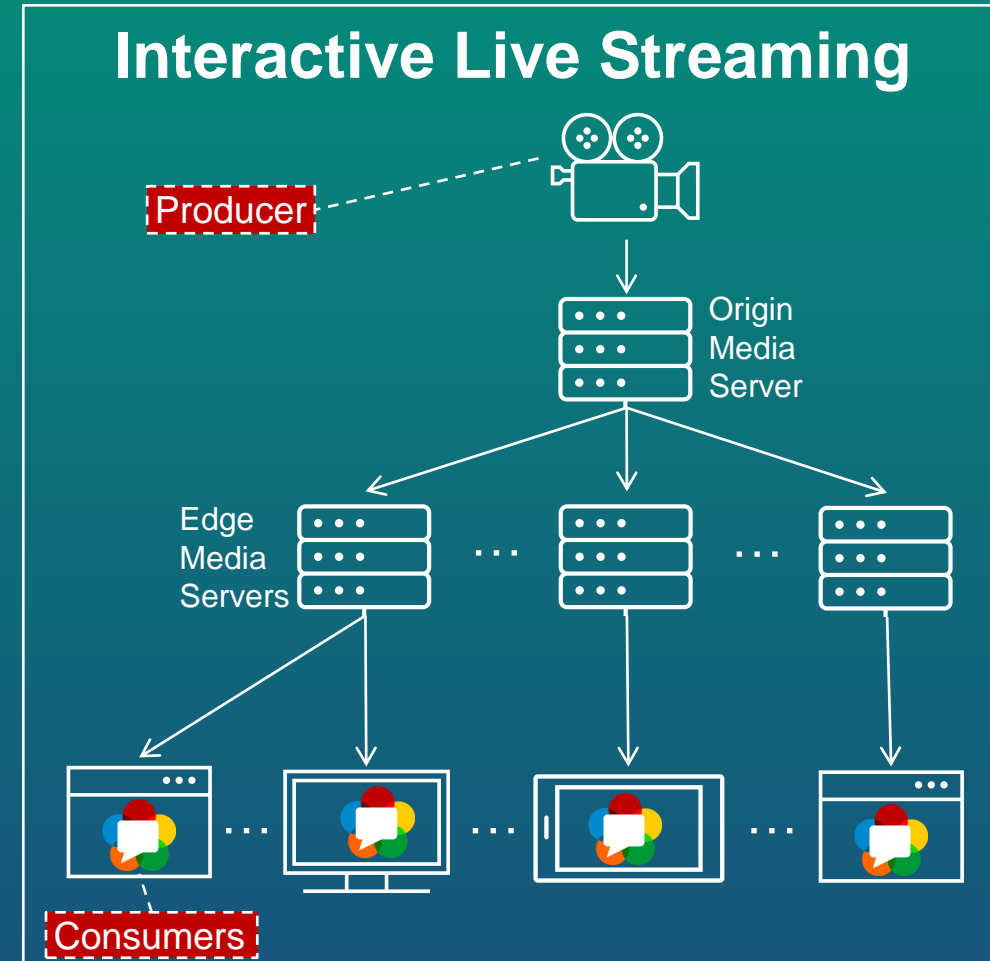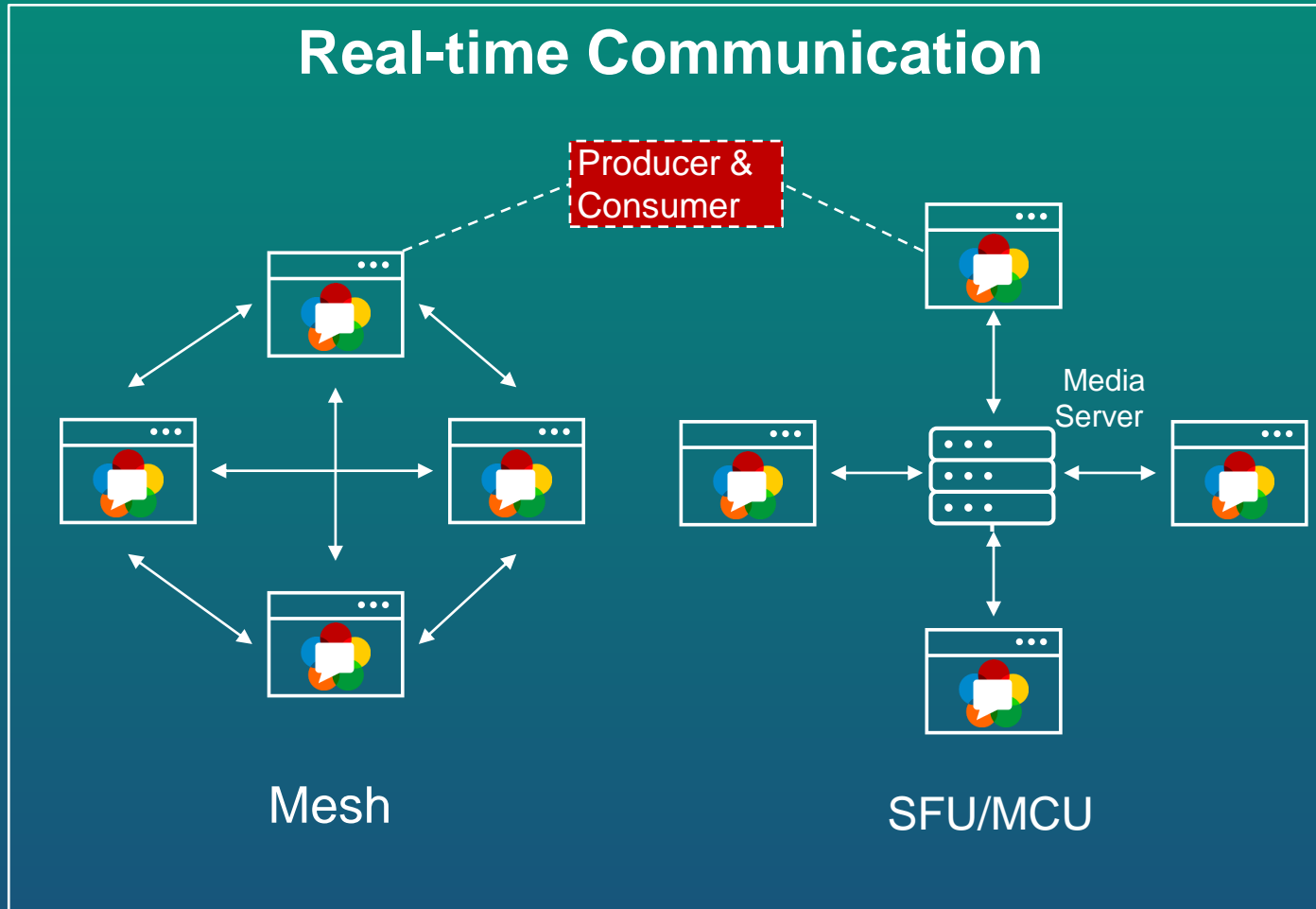- Trivia games
- Live Sports betting
- Cloud game streaming

ABC – 2019 Oscars Live Trivia Game

source: https://abc7.com/oscars-2019-trivia-contest/5143536/

Example: HQ Trivia

More than **2.3 million** concurrent players at its peak

source: https://en.wikipedia.org/wiki/HQ_(video_game)

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WebRTC Topologies: Real-time Communication vs. Interactive Live Streaming

Virtual Live – Hybrid Live-Concert with Interactive Live Stream
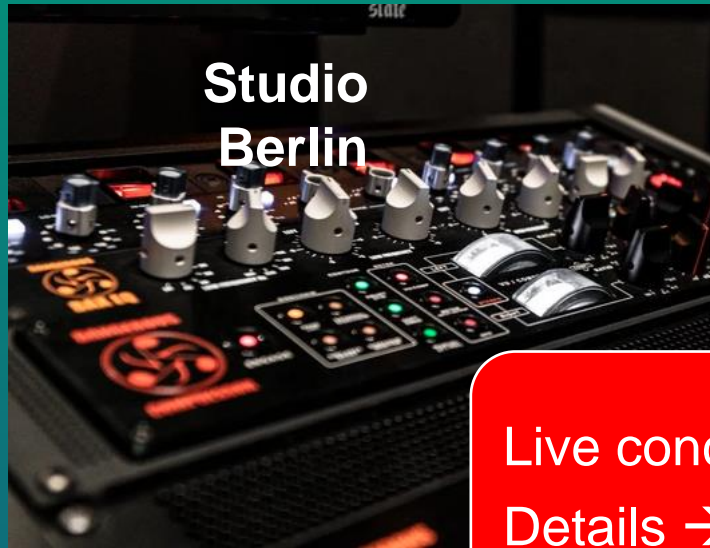
Studio Berlin

Kesselhaus Berlin

Planetarium Bochum

Live concert on December 11, 2021 08:00 PM

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

QUEENZ PIANO
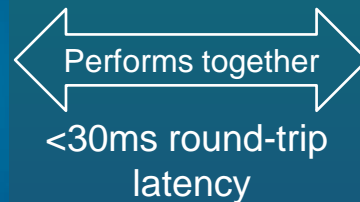
Billy Andrews
The Dark Tenor

Performs together

<30ms round-trip latency

360° Video/3D Audio

Interactivity/Feedback

Audience Feedback

Audience Stream

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

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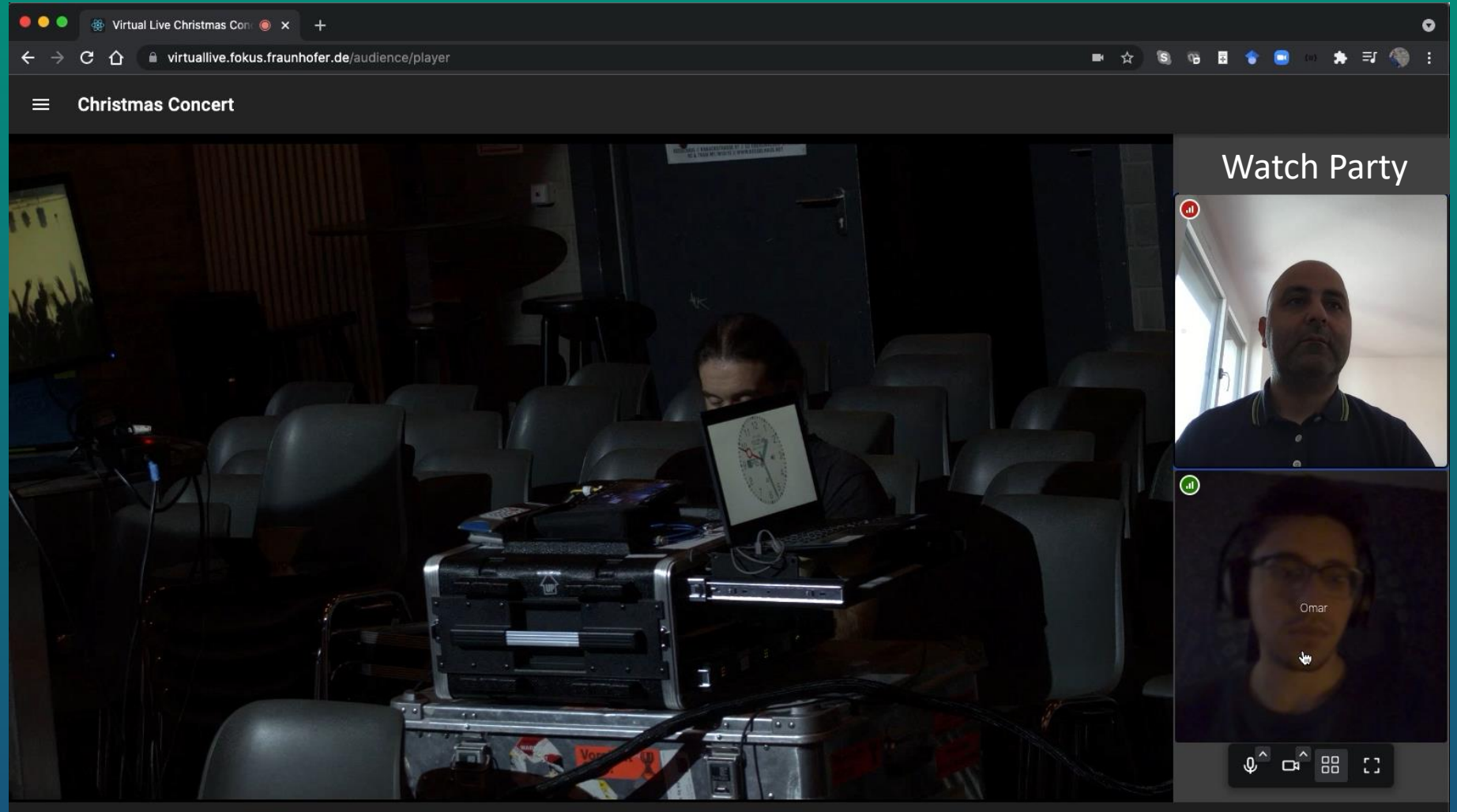
https://www.fokus.fraunhofer.de/go/virtual_live

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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

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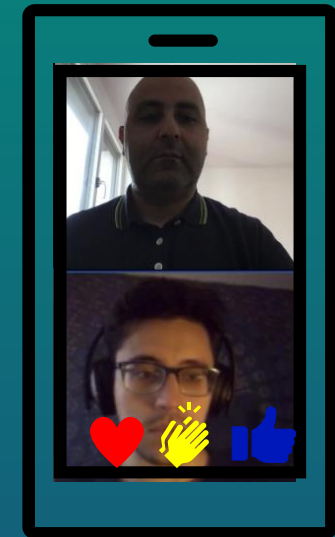
DASH-IF Report on WebRTC-based Streaming and DASH Aspects

- 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/
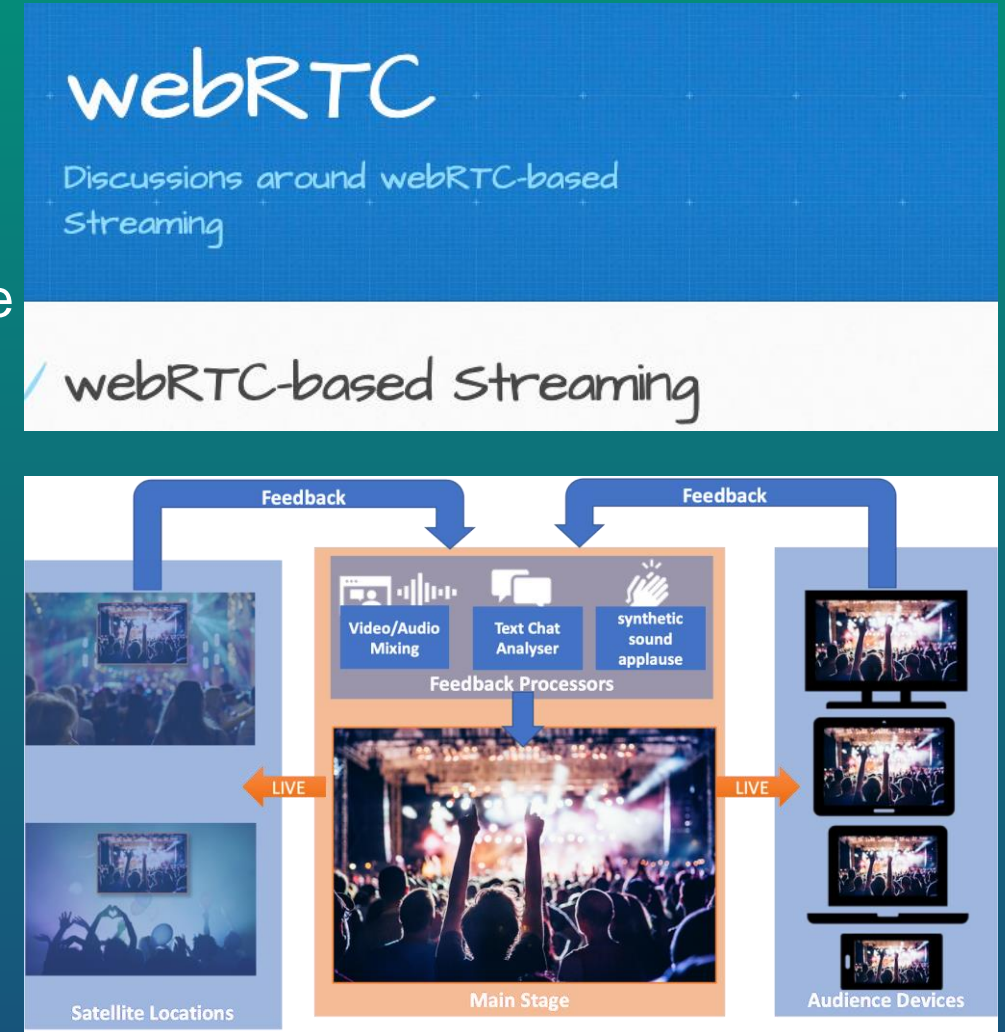
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Thank you for your attention

Contact

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