

HOW TO STREAM UHD LIVE

STAATSOPERLIVE.COM

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What is UHD TV

- * “Ultra High Definition”
- * UHD TV (2160p) - 4K
- * 4 x resolution of HD (1080p) - 3,840 x 2,160
- * Other types of UHD (8K, cinema, etc.)
- * Still very early days
- * Device availability and know-how limited

Staatsoper Live - History

- * **Launch:** Oct. 2013, 17 live performances streamed so far
- * **Streaming:** Live (4Mbit) & VoD (6Mbit) streaming, HLS with variable bit-rates (web), selectable bit-rates (Smart TV)
- * **Web Portal:** Django, DB, CMS, API, Live + VoD Streams, My Profile, Payments Integration, Stream Archive, etc.
- * **Samsung Smart TV App:** Live + VoD, My Profile, Device Pairing
- * **2nd Screen, Android + iOS:** Live Streams, Subtitles & Score, Device Pairing
- * **Subtitle Web Server:** Rx and Tx of live triggers for subtitle & score

NABUCCO - LIVE UHD - MAY 7, 2014
PLÁCIDO DOMINGO



THE NEXT CHALLENGE:

STREAM UHD LIVE FROM THE OPERA TO SAMSUNG 2014 UHD SMART TV'S

What did we need for UHD?

- * **Balls!** World's first live UHD TV stream across the internet; unproven technology; unforgiving time-frame; high expectations!
- * **Expert Partners:** Ooyala, Elemental, Akamai, 4K camera operators
- * **Hardware @ Staatsoper:** 4K camera, SDI + optical cabling, 4K encoder, dedicated internet connection

Strategic Approach

- * Build on **existing infrastructure** with **minimal changes**: DB, CMS, API, time-shifting, scheduled jobs, Ooyala streaming backend
- * **No branching** into multiple Smart TV Apps
- * Work with **known partners**
- * Work with **known technology** as far as possible: HTML + JS + CSS + Samsung Smart TV API's
- * **Real-world testing**: no case studies available

Technology Choices

- * **Encoding:** HEVC H.265 (High Efficiency Video Coding)
- * **Streaming:** MPEG DASH (Dynamic Adaptive Streaming over HTTP)
- * **Fixed bit rate:** 12 Mbit
- * **Target devices:** 2014 Samsung UHD Smart TVs
- * **No Subtitles:** No audio watermarks
- * **1 Perspective:** only 1 camera

The Aftermath

- * Some playback stability issues (dropouts, buffering, memory corruption)
- * Awesome picture quality @ 12 Mbit
- * Testing absolutely necessary, but it was tight (no test devices or UHD gear)
- * Working with known technology & partners was critical
- * Happy Samsung & Staatsoper

Future of UHD

- * Next Staatsoper UHD Stream: September 2014
- * UHD is getting bigger: Netflix, World Cup, etc.
- * Device availability is increasing
- * Other suppliers: Sony, LG, Toshiba, etc.
- * Nurture streaming partners (Ooyala, Elemental, Akamai)
- * 8K!

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THANK YOU!

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