State of the art of Streaming today?
The standards HTML5 and MPEG-4/H.264/H.265/AAC/MP3 are appropriate for cross-device distribution of content over the open internet. Nevertheless, suitable combinations of container formats, transport protocols and media coding schemes need to be defined, which ensure interoperability and maintain perceptive quality. IP-based delivery mechanisms need to follow the multimedia transport with the consumers’ internet connection and their individual network access. Special requirements emerge with High Definition-Formats from UHD and HDR, HFR to 360° Video.

Multimedia-Transport at a glance
While transmission may be download, pseudo streaming or live streaming through different protocols (RTP, RTMP/E, HTTP), bottlenecks need to be compensated by load balancing and caching of Content Delivery Network-Providers (CDN) or via client based transport mechanisms like Adaptive Streaming. What are the benefits of HTTP Adaptive Streaming and Peer to Peer (P2P) compared to the classic Progressive Download and traditional streaming protocols? What are the differences between MPEG-DASH and Adaptive Streaming implementations of Apple, Adobe and Microsoft? What is the Common Media Application Format (CMAF) compared to the ISO Base Media Fileformat (ISOBMFF) and how could DASH versus HLS benefit?

Experience for application developers, engineers and video technicians
The Seminar gives you an overview of the state of the art, identifies problems and shows results of IRTs’ streaming tests for PC, HbbTV and mobile devices. Practical examples for interoperable and cross-device streaming workflows over the CDN will be shown based on open source tools and professional products from different manufacturers. Various media players for web browsers will be discussed. Can MPEG-DASH or CMAF satisfy the needs for an adaptive, scalable cross-platform and cross media streaming solution for future OTT-Services in the exploding world of end user devices? What is the status-quo of standardization bodies like DVB (IPI), DASH Industry Forum (DASH-IF) or the Web Application Video Ecosystem (CTA-WAVF). We are looking forward to share our insights and discuss these issues with you!
SEMINAR PROGRAMME

Day 1: Wednesday, November 29, 2017, 10:00 – 16:00 h

Video codecs, audience and devices
- Target audience and broadband coverage fixed and mobile
- Distribution of operating systems and screen resolutions
- Encoding profiles, levels & quality of H.264/H.265 and UHD

Lab: Transcoding of DVB-Recordings with ffmpeg in SD for HbbTV, Tablet

Multimedia Transport
- Progressive Download vs. Adaptive Streaming
- Apple HLS, Adobe HDS und MPEG-DASH flavors

Lab: Playback of IRT Reference Clips on Tablet, PC and HbbTV

MPEG-DASH
- Standardisation, testing and services with MPEG-DASH
- Scope of DASH, multimedia transport and client architecture
- Media Presentation Description, Adaptation Sets and Representations
- DASH descriptors, segment alignment and timeline

Lab: Playback and debugging of a DASH Livestream with PC and HbbTV

- DASH Profiles, ISO8MFF container-structure and MPEG-TS format
- Segment indexing, referencing and initialization
- DASH Migration, Playback, Testing und Encoder, Server and Network assisted DASH
- DASH und HLS in Common Media Application Format (CMAF)

Lab: Segmenting of transcoded videos for HbbTV using mp4box

Invitation to a social event in downtown Munich

Day 2: Thursday, November 30, 2017, 10:00 – 16:00 h

Constraints and Capabilities in HbbTV and PC
- MPEG-DASH in HbbTV for Live-Events with UHD and DVB-T2/ILS
- Capabilities, Supported media-formats and DASH Profiles in HbbTV 1.5 and 2.0
- Webplayers and Codec Support for MPEG-DASH on HTML5/MSE for PC
- Subtitles for PC, HbbTV and Mobile with MPEG-DASH/CMAF and HLS
- DASH, CMAF and HbbTV in the Web Application Video Ecosystem (CTA-WAVE)
- Code-Review: DASH-Playback with MSE in HTML5 vs. HbbTV App

CDN-Workflow and Encoders
- Encoding-Profiles, Pre-Processing and workflows for Webdistribution at ARD
- Adaptive Media Delivery with HLS, HDS and DASH mit Akamai, NGINX undKaltura
- Streamswitching in MultiCDNs and Peer to Peer (P2P) assisted DASH with WebRTC
- MPEG-DASH Pass-Through for Live, Re-Packaging and Transcoding
- DASH-Encoders, Cloud Services and Monitoring for HbbTV 1.5
- Quality of Experience of Adaptive Playback with HLS, HDS and MSS

Lab: Segmentation and Delay of Adaptive Services, Best Practices

Quality, Monitoring and Delay
- Quality of Service (QoS) Metrics for Live-Events and Catchup-TV
- Privacy aspects, Beacon concept and Server performance

Online-Registration: [https://www.irt.de/registration](https://www.irt.de/registration)  |  Location: [www.irt.de/en/irt/directions](http://www.irt.de/en/irt/directions)

Conditions of participation: For participation a registration is required. Please note that the number of participants is limited to 17 persons.

Participation fee (per participant; net, plus applicable VAT): Both days standard rate: € 1.390,- (Affiliates of IRT: € 1.190,-)

Registration deadline: Monday, November 20, 2017.

From November 21, 2017 the full fee is payable in case of the cancellation of the participant. Any replacement participant is welcome without additional cost.