5G AS A NEW OPTION FOR PRODUCTION TOOLS IN CONTENT AND EVENT PRODUCTION
AGENDA

- What is 5G?
- Live Audio production as a 5G Vision
- 360° video production as a 5G Vision
- Get in Contact
WHAT IS 5G?

- 5G is next mobile network generation, not only a wireless technology

- Technical requirements based on use-cases (eMBB, URLLC, mMTC)

- 5G as a tool in content and event production? Sensor / Function / Network / Screen
LIVE AUDIO PRODUCTION

- Use-Case example for technological challenges when adapting mobile networks for content production
- Audio round-trip (mic to in-ear) should not exceed 4ms based on human physiology
- High reliability demand (99,9999%) for data transmission
- Data is mainly uplink, not downlink (what mobile systems are designed for)
- We developed a 5G based live audio production vision
Live Audio Production

- Today: Each device (Mic, IEM) has own box for handling radio resources
- Microphone produces up to 4.61mbit/s unicast uplink
- Setups can be up to 50 microphones
Live Audio Production

- Coding is co-located at the sensor
- Mixing is a central function usually realized with special equipment
Live Audio Production

- Distribution of mixed signal via special protocols and/or analog audio
- Further audio processing possible via special interfaces
Live Audio Production

- Playback via In-Ear monitor (IEM) Full chain should not exceed 4ms delay
- Specialized playback channel per application
Live Audio Production

- PMSE-xG Project Demonstrator (HHI & Sennheiser)
  pre 5G: IP based 1ms OTA transmission of synchronous audio

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Live Audio Production

- The 5G Vision includes:
  MIC, IEM as a 5G User Terminal
  (sensor and playback are 5G wireless participants)

- Splitting the functions
  between sensor and network
  (coding & mixing are virtual functions running in the cloud)

- Distribution via 5G network, which is aware of the usage (service awareness)
Live Audio Production

- 5G as a technology which may support live audio production
- Still some technical question need to be sorted out – part of current R&D
- IP based audio production and distribution changes the mindset of what’s possible (automatic configuration of network resources (wireless and wired) while maintaining reliability and latency requirements)
360° VIDEO PRODUCTION

- OmniCam as example for a new way of content production
- Technical challenging not only for 5G
OmniCam-360 Content Production

- XGames, ESPN, München, 2013
- Bon Jovi Concert, Brisbane, 2013
- FIFA World Cup Final, Rio, 2014
- Berlin Philharmonics, Anniversary Concert, 2014
- Berlin Philharmonics, Mauerfall Konzert, 2014
- MirrorSys Teaser Film, Berlin, 2015
- Lärmcafe, Deutsche Bahn, 2015
- Herbert Grönemeyer, Berlin, 2015
- Lover, Rundfunkchor, Berlin, 2015
- Human Requiem, Rundfunkchor, 2015
- State Parliament Visitor Center, Düsseldorf 2015
- Berlinale Reception Party, Berlin, 2015
- Porsche Press Conference, IAA, 2015
- BMW Commercial, Los Angeles, 2015
- Helicopter Flight, Los Angeles, 2015
- Mittendrin, Konzerthaus Berlin, 2015
- Berlin Philharmonics, Mahler Symphonie No. 6, 2016
- Vodafone live transmission @CEBIT 2016
OmniCam-360 @ Extreme Situations

- helicopter flight over LA
- motocross at X-Games
- car mounting
- outdoor mounting at skyscraper
360° Video current production chain

- OmniCam has 10x 1080p60 Cameras and one 4K camera generating 14 HD-SDI streams
- Current datarate: 30gbit/s raw video data
360° Video Production

- Real Time Stiching Engine (RTSE):
  - Real-time acquisition of 14 HD-SDI streams
  - Running on a single PC exploiting GPU processing
  - Warping, stitching, blending and rendering
360° Video Production

Distribution is here a local network for bringing the processed content to the next stage or directly to end-user consumption.

- OmniCam Sensor
- RTSE Function
- Distribution Network
- Screen(s) Playback
New Technologies

- ARRI Prototype
  All IP Camera
  result of PMSE-xG Project

- Integration of IP based services
  (BBC IP Studio / SOMA) into the Multi-access edge computing infrastructure (MEC)
GET IN CONTACT

- German national project:
  - PMSE-xG (http://pmse-xg.research-project.de/)
  - LIPS (http://lips-project.de/)

- Fraunhofer HHI
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