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Programmable hardware for distributed performances

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Network Performing Arts Production Workshop 2019

- Why programmable hardware for performing arts?

- Examples of practical use
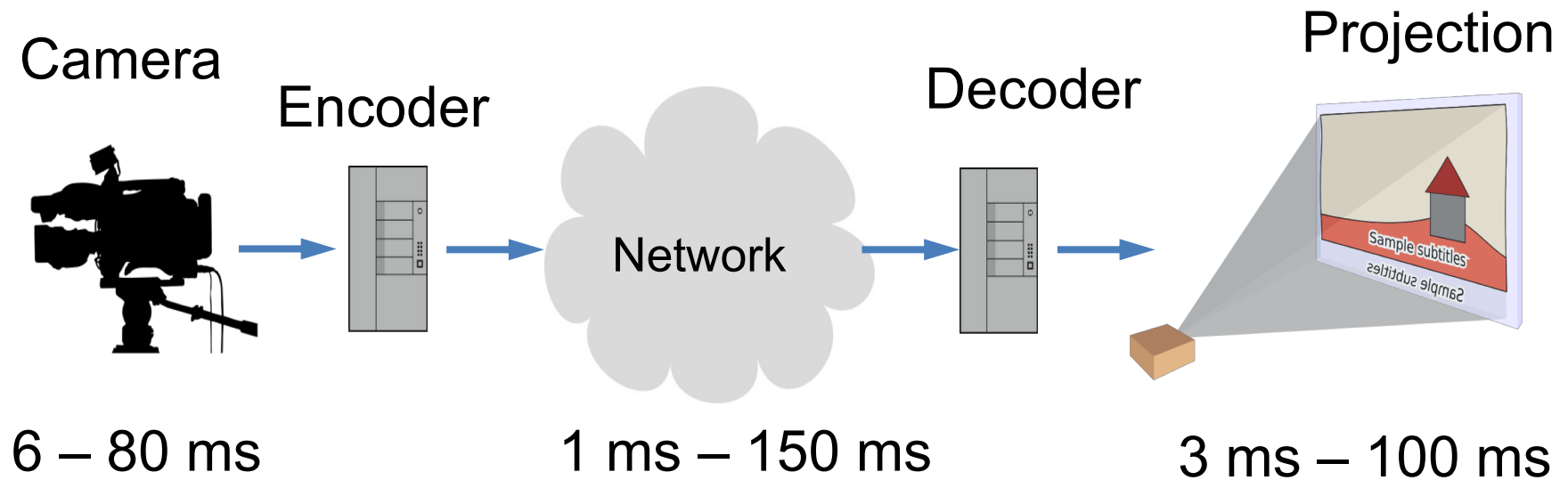
- How to test network paths?

- NPAPW19 performance

Technical requirements:

- Low latency audio and video transmissions

- High quality multiple camera video for audience

Camera

Encoder

Network

Decoder

Projection

6 – 80 ms

1 ms – 150 ms

3 ms – 100 ms

- Most electronics now includes programmable hardware

- Elementary hardware components are „organized" by specification in FPGA or ASIC

- For true real-time, low and constant latency

- Ultra-low latency under 1 ms

- Dual-channel high quality video

- No PC, simple setup and use

- Small, lightweight, easily portable

- Cost comparable to a high-end PC

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USB camera:

- Very limited picture quality (small chip and lens)

- Normally one camera only per location

- Fixed view, difficult to zoom, refocus and pan live

SDI/HDMI camera:

- Large selection of studio quality cameras

- Multiple cameras per location easily possible for live coverage

- Easy to pan, zoom, refocus live – television production

- Example: Blackmagic URSA approx. 6 ms latency

For instance to see the musician body and hand movements

- Commemoration of 20 years anniversary of CESNET

- Prague (Senate Building) – Ancerlovo Quartet, strings

- Copenhagen (DKDM) – Bogdan Nikola, piano

- Antonin Dvorak, Piano Quintet No. 2 in A major, Opus 81, 1st or 3 rd movement

- "A Tribute to the Brave" concert
- In association with the award of the Vaclav Havel Prize for Human Rights in 2018
- Musicians and audience in Prague (church of St. Anne, Prague Crossroads) and Bratislava (Performing Arts Academy)
- Vaclav Havel Library, AMU, VŠMU and CESNET
- 8 cameras, 3 live edits production, national TV broadcast

- Network performance measurement tools – iperf, Speedtest, etc.
- Nothing replaces an end-to-end test transmission with real equipment

- Reflects packets to specified IP address

- 100% line-rate, zero packet loss

- Very small, lightweight, easy to mail

- Automatic configuration

- Available under research collaboration or for purchase

- "I wish I would dance well under the stars"
- Based on Marek Orko Vácha book
- Three organs – in the venue and in two churches in Prague
- Dance – in the vanue and in Konic Thtr Barcelona
- „Holographic" telepresence from Barcelona
- 10 cameras, 3 live edits production

Sts. Simon and Juda church

St. Laurence church

Thank you for your attention

Questions?

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