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Cyber performances, technical and artistic collaboration across Internet

Jiri Navrátil
CESNET, Czech Republic

CESNET is a research organization with research focused on networking and video processing. We also play a role of the National Research and Educational Network (NREN) providing e-infrastructure (high-speed network, computing services and data storage facilities) to academic users in the Czech Republic. The CESNET network is a part of the pan European network GEANT, which connects all academic networks in Europe and provides many links to Asia, Africa, South America and the US. It creates an ideal environment for collaboration in many directions of science or culture.

CESNET over the years has developed two technologies that allow transmission of HD video over a network - UltraGrid as a software-based solution and 4K Gateway as hardware-accelerated FPGA-based solution.

The 4K Gateway was originally designed for 4K video contribution. Due to its very low added latency, it can be used for a much wider range of applications such as remote access to scientific visualizations, for medical sessions connecting operating theatres with lecture halls and conference venues and for eCulture events and collaboration. It has been successfully used in various applications, which need high quality and low latency transmissions.

In the last several years we presented several joint chamber concerts in 3D vision or concerts with remotely playing musicians together with local performers and also demonstrated interactions with remote control of 3D models to access the national cultural heritage.

In this conference we will show several examples how real-time collaboration among countries can be organized that results in cultural cyber performances.

The first example is a performance named "Dancing beyond Time" that involved approx. 100 people in three continents. The event took place at the 36th APAN Meeting held in Daejeon, Korea on 21 Aug 2013. The team included network engineers and researchers, audio-visual technicians, programmers, musicians, dancers, scene designers and choreographers, with some people spanning multiple areas. The event began simultaneously in Salvador, Brazil (BR), Prague, Czech Republic (CZ), Barcelona, Spain (ES) and Daejeon, Korea (KR). The music performance was captured by a 4K camera and delivered from HAMU to KAIST by a pair of FPGA-based 4K Gateway devices, which also provided a backward HD channel from KR to CZ for stage monitoring. Audio channels were transferred embedded in the video channel, which guaranteed a perfect video to audio sync in KR. The 4K video was sent uncompressed to preserve high quality.

The second example is a performance presented at the APAN meeting in Nantou (Taiwan). In this performance participated teams from CZ, US, ES and TW. The challenge of this performance was in synchronization of contributions of all performers. With experiences of this we could continue with such events on major international events, celebrations and conferences. The latest event was a join organ concert of famous Norway and Czech organists from Trondheim and Brno presented on TNC16 in Prague.

Biography

Jiri Navratil received his PhD in Computer Science from Czech Technical University at Prague in 1984. He worked for 30 years at Computing and Information Center of CTU in different positions linked with High Performance Computing a Communications. During his several sabbatical leaves he worked in Switzerland, Japan and USA in the field of networking. Since 2006 he started work for CESNET - Czech Education a scientific Network as leader of group supporting special research applications using high speed Internet. In last years he participated on several multimedia performances organized in frame of large international cooperation in different fields.

jiri@cesnet.cz

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