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CineGrid Demonstrates International Networked Collaboration for 4K Motion Picture “Dailies”

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Contact:
Darcy Gerbarg
CineGrid
1-914-772-7684
darcy@cinegrid.org

CineGrid Demonstrates International Networked Collaboration for 4K Motion Picture “Dailies”

Research Consortium Offers a Glimpse into the Future of Distributed Workflows for Digital Cinema

OAKLAND, CA - In a historic proof-of-concept demonstration that could revolutionize the way movies are made, CineGrid, the international media networking research organization,

successfully demonstrated the feasibility of global-scale networked collaboration for even the most compute-intensive, time-sensitive and interactive aspects of 4K digital cinema production and post-production. The demonstration was presented at Barrandov Studios, one of the oldest and largest media production centers in Europe, at GLIF 2007, the Seventh Annual Global LambdaGrid Workshop, on September 17 – 18 in Prague, Czech Republic.

This demonstration, produced by Pacific Interface with the collaboration of numerous CineGrid members and system vendors, took advantage of the 10 Gbps optical networking infrastructure of the Global Lambda Integrated Facility (GLIF) to link a 4K digital cinema production team shooting in Prague, a specialized rendering processor located nearly 10,000 km away in San Diego, and a 4K color correction system in Prague operated by a colorist working 7000 km away in Toronto.

Jan Gruntorad, Director of CESNET (Czech National Research and Educational Network) and host of the GLIF 2007 conference said, “We welcome the ground-breaking work of CineGrid and its members. Their exploration of high-speed optical networks for high-quality global media applications is of great interest to the cinema industry in Prague and around the world facing the challenges of working creatively on a global scale.”

The Technology behind Remote Collaboration for 4K Digital Cinema

To demonstrate the CineGrid prototype 4K workflow for remote pre-processing and color-grading of digital cinema “dailies,” a Dalsa Origin 16 digital cinema camera was used to capture breathtaking 4K motion pictures – four times the resolution of HDTV – of the Vltava River flowing through Prague; the Municipal House, the city’s most prominent Art Nouveau building at night dramatically festooned in lights; and the vintage JHMD steam train barreling down narrow-gauge track on its weekly run.

On location, the day’s 4K recorded images were reviewed as low-resolution QuickTime “thumbnails,” and a number of selects were chosen for immediate color correction. After shooting, the Dalsa CODEX recorder was brought to the CinePOST post-production facility within the Barrandov Studios in Prague and directly attached to a 10 Gigabit per second (Gbps) optical network, which connected to a 30-processor compute cluster at the University of California San Diego’s California Institute for Telecommunications and Information Technology (UCSD/Calit2). Thousands of so-called RAW Dalsa frames, were file-transferred from the CODEX recorder to the compute cluster via the CESNET link from CinePost to CzechLight in Prague and then to StarLight in Chicago, continuing on to San Diego via C-Wave, a Cisco research wave deployed on the National LambdaRail. The compute cluster at Calit2 was operated remotely from Prague to convert the camera’s RAW (Bayer pattern) frames to RGB (red green blue, the primary colors used for post-production) in a fraction of the time normally required.

After conversion, the uncompressed 4K RGB frames were file-transferred via the same network back to CinePOST’s screening room in Prague and loaded as industry-standard DPX files onto a FilmLight BaseLight 4 color correction system which has hardware capable of real-time color correction and playback of 4K digital cinema image sequences. For the CineGrid demonstration, the BaseLight system at CinePOST was software-configured to deliver a ¼ resolution (HDTV) proxy image which was sent simultaneously to a Sony SXRD digital projector in the CinePOST color-correction suite and to a second Sony SXRD projector at Ryerson University’s Rogers Communications Centre in Toronto. The proxy image was transmitted in real-time using an iHDTV™ system for immediate viewing by a colorist sitting in Toronto who was remotely controlling the BaseLight system in Prague in consultation with the production team in Prague. In this way, a high-quality shared visual workspace was established in which all team members could see the same output of the color correction system at nearly the same time in both

locations.

The iHDTV™ system, developed at the University of Washington in partnership with ResearchChannel, enabled real-time, low-latency transmission of uncompressed HD-over-IP at a data rate close to 1.5 Gbps. This traffic ran over 10 Gbps fiber optic networks from CinePOST to CzechLight, then via CESNET to StarLight in Chicago, continuing on to Toronto via CANARIE CA*net4.

In parallel, using additional lightpaths on the same networks, a full-duplex HD-over-IP videoconferencing system with stereo audio was implemented using Panasonic DVCPRO HD camcorders and Qvidium 1394/IP Gateway technology in both the Prague and Toronto studios. This system helped create a shared telepresence so all team members could continuously see and hear each other while collaborating on the color correction process.

Using this prototype CineGrid networked collaboration environment, the uncompressed 4K images loaded on the BaseLight color correction system at CinePOST in Prague were interactively color-corrected over the network by a colorist in Toronto receiving real-time instructions and creative feedback from a cinematographer in Prague. After the colorist in Toronto completed trimming and color correcting the picture remotely, control of the BaseLight system reverted to Prague so that the resulting picture could be projected locally on a large screen at full 4K resolution with synchronized sound for the cinematographer’s final approval.

“This is a giant step forward. Directors rely upon the creative talent of both digital colorists and cinematographers,” observed Paul Hearty, Director of the Rogers Communications Centre at Ryerson University. “In today’s world, these highly-paid professionals must be brought together physically in the same room to collaborate. CineGrid has now shown that optical networks can be used to transcend geographic separation even for 4K digital cinema ‘dailies’ production and post-production.”

CineGrid

CineGrid is a non-profit membership organization whose mission is to build an interdisciplinary community focused on the research, development and demonstration of networked collaborative tools, enabling the production, use and exchange of very high-quality digital media over high-

speed photonic networks.

GLIF

GLIF, the Global Lambda Integrated Facility, is an international virtual organization that promotes the standard of lambda networking, dedicated high-capacity circuits based on optical wavelengths, terminating at exchange points known as GOLEs (GLIF Open Lightpath Exchanges).

CESNET

The CESNET association was founded by all the universities and the Academy of Sciences of the Czech Republic. The association deals with the research and development of information and communication technologies, building and developing the national gigabit optical network, CESNET2, designed for research and educational purposes.

Ryerson University, Rogers Communications Centre

Ryerson University is Canada's leader in career-focused education, offering more than 95 PhD, master’s, and undergraduate programs . Part of Ryersons’ Faculty of Communication and Design, the Rogers Communications Centre is one of Canada’s premier venues for instruction, research, and creative activities in advanced media.

ABOUT:

CineGrid

http://www.cinegrid.org

CinePOST

http://www.cinepost.cz/

DALSA

http://www.dalsa.com/dc/

FilmLight

http://www.filmlight.ltd.uk/

Pacific Interface, Inc.

http://www.pacific-interface.com

Ryerson University, Rogers Communications Centre

http://www.rcc.ryerson.ca/

http://www.ryerson.ca

Sony Electronics (Canada)

http://www.sony.ca/view/homepage.htm

Qvidium

http://www.qvidium.com/

University of California at San Diego, California Institute of Information and Telecommunications Technology (USCD/Calit2)

http://www.calit2.net/

University of California at San Diego, Center for Computing and the Arts (USCD/CRCA)

http://crca.ucsd.edu/

University of Illinois at Chicago, Electronic Visualization Laboratory

http://www.evl.uic.edu/

University of Washington, ResearchChannel (UW/RC)

http://www.washington.edu/iHDTV

http://www.researchchannel.org/

***Networks and network exchanges*:**

CANARIE CAnet*4

http://www.canarie.ca

http://www.canarie.ca/canet4

C-Wave, part of the National LambdaRail (NLR)

http://www.nlr.net/

CENIC

http://www.cenic.org/

CESNET

http://www.ces.net/

CzechLight

http://czechlight.cesnet.cz/en/index.php

Global Lambda Integrated Facility (GLIF)

http://www.glif.is/

Pacific Northwest GigaPOP

http://www.pnw-gigapop.net/

Pacific Wave

http://www.pacificwave.net/

StarLight

http://www.startap.net/starlight/

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