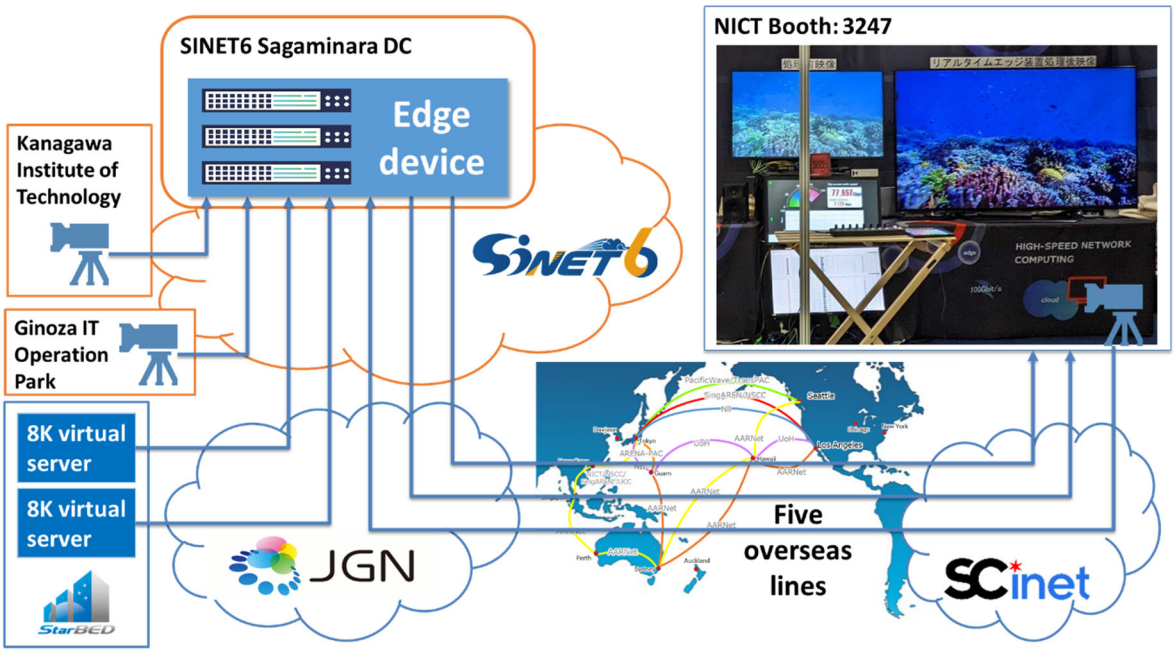
Media Alert Title:

At SC22, Kanagawa Institute of Technology will demonstrate remote video production of 8K uncompressed video between Japan and the U.S. using a 400Gbps edge device.

Leading Text:

Kanagawa Institute of Technology (KAIT) will conduct an experiment to edit and distribute 8K uncompressed video in real-time using edge devices supporting 400 Gbps installed in the network at the National Institute of Information and Communications Technology (NICT) booth (#3247) at SC22 (November 14-17, 2022, Kay Bailey Hutchison Convention Center Dallas).
Video format conversion, which requires high-speed processing, is achieved by chaining software for video processing functions within the edge device.
When the producer requests video switching by pushing the button, the system instantly switches to the format-converted video, and by operating the color adjustment knob, it is possible to adjust the color and create and distribute video with natural connections.
At Interop Tokyo 2022 in June 2022, Kanagawa Institute of Technology has successfully conducted this experiment in collaboration with Daido University, University of the Ryukyus, and Michal Communications Inc. The demonstration at SC22 is the first international experiment.



Article:

Kanagawa Institute of Technology, in collaboration with Daido University, University of the Ryukyus, and Miharu Communications Inc., is developing a practical technology for high-speed network computing, which includes a terminal, edge device, and cloud computing. This enables real-time editing and distribution of 8K ultra-high-definition (UHD) videos without having to use a compression tool and at the same time sacrificing UHD streaming video quality.

When the academic network operated by the National Institute of Informatics (NII), migrated to SINET6 (*1) in April 2022, we constructed an edge device connected to a high-speed network of 400 Gbps in a rack at the Sagamihara DC in Kanagawa for our research project.

At Interop Tokyo 2022(*2), a network technology exhibition held in Makuhari, Japan, from June 15 to 17, 2022, we demonstrated our virtualized video-handling function (VVF) technology by processing uncompressed 8K real-time videos using an edge device configured in the Sagamihara DC mentioned above. The VVF enables the edge computer to execute a single real-time video process, such as video transcoding, without degradation. To adopt multiple video processes, multiple VVFs can be chained.

We have therefore succeeded in an experiment in which several 8K video sources were switched freely via a network using the edge device, and color conversion was performed and distributed. Specifically, it instantly switches between 8K uncompressed videos (*3) in different formats (8K dual green: 8K-DG 24Gbps, 8K full resolution 48Gbps, etc.) from multiple locations, including cameras in the booth, an 8K camera at KAIT, an 8K camera at Ginoza, Okinawa, and two 8K stored video materials in StarBED in Hokuriku. At the same time, the system provides format conversion of the switched 8K video without degradation and performs color correction (color correction) in real-time.

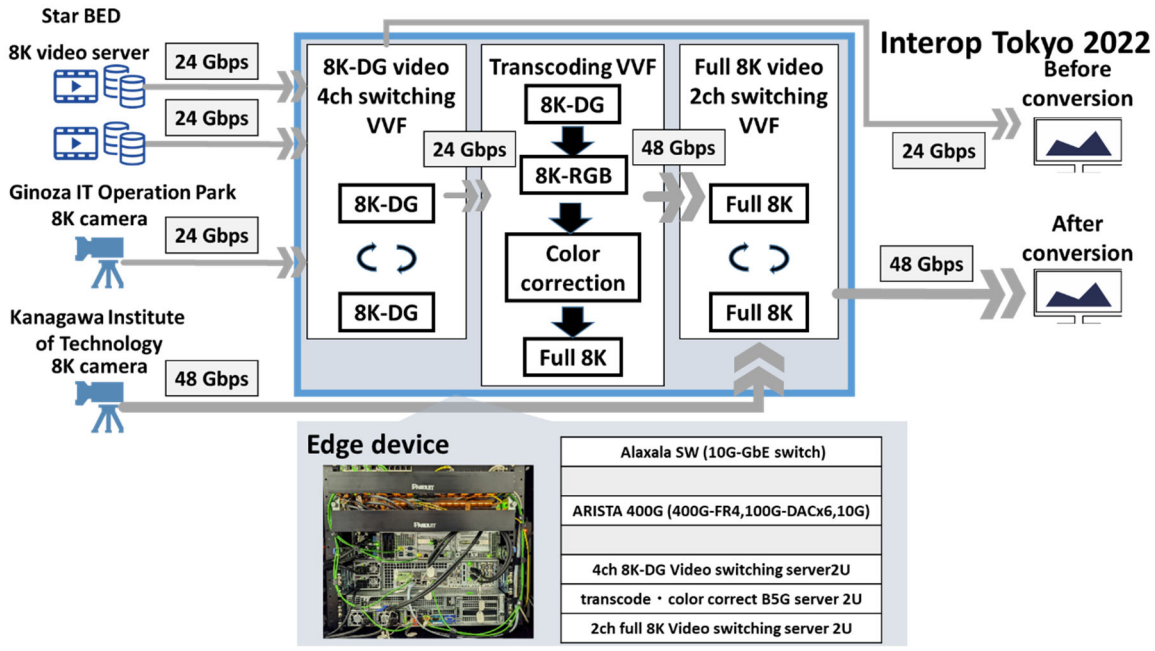


Figure 1 Realization of uncompressed 8K UHD video workflow by chaining multiple video processing functions with the 400Gbps edge device at Sagamihara DC, Japan

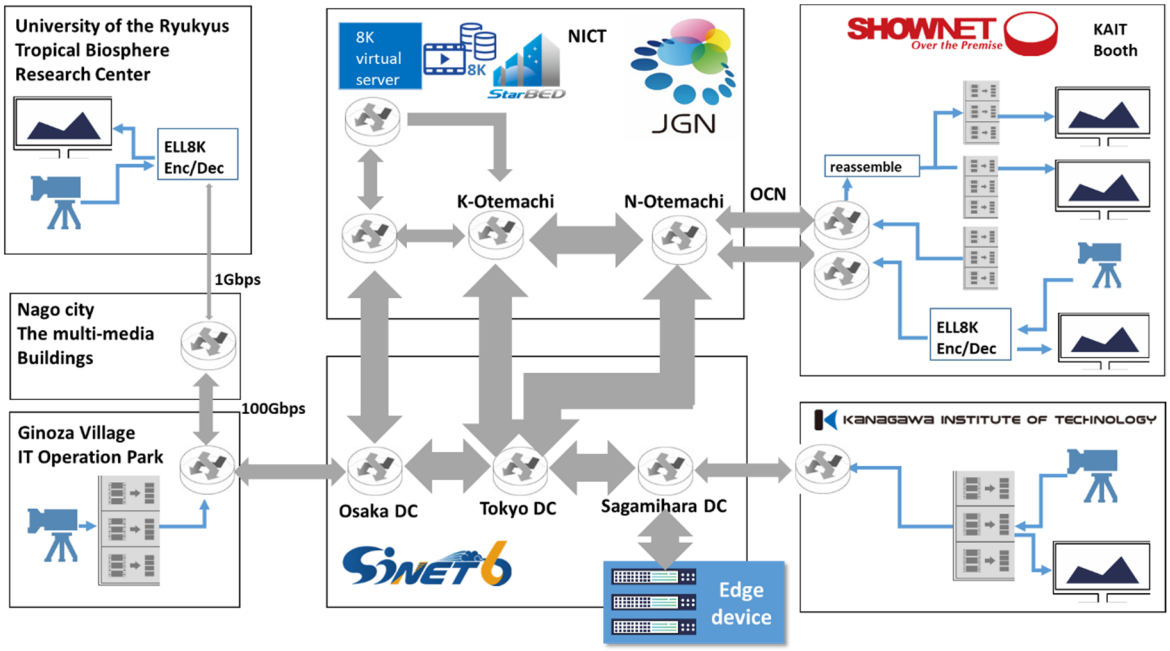


Figure 2 System configuration of 8K video processing system at the Interop Tokyo 2022

What are VVFs?

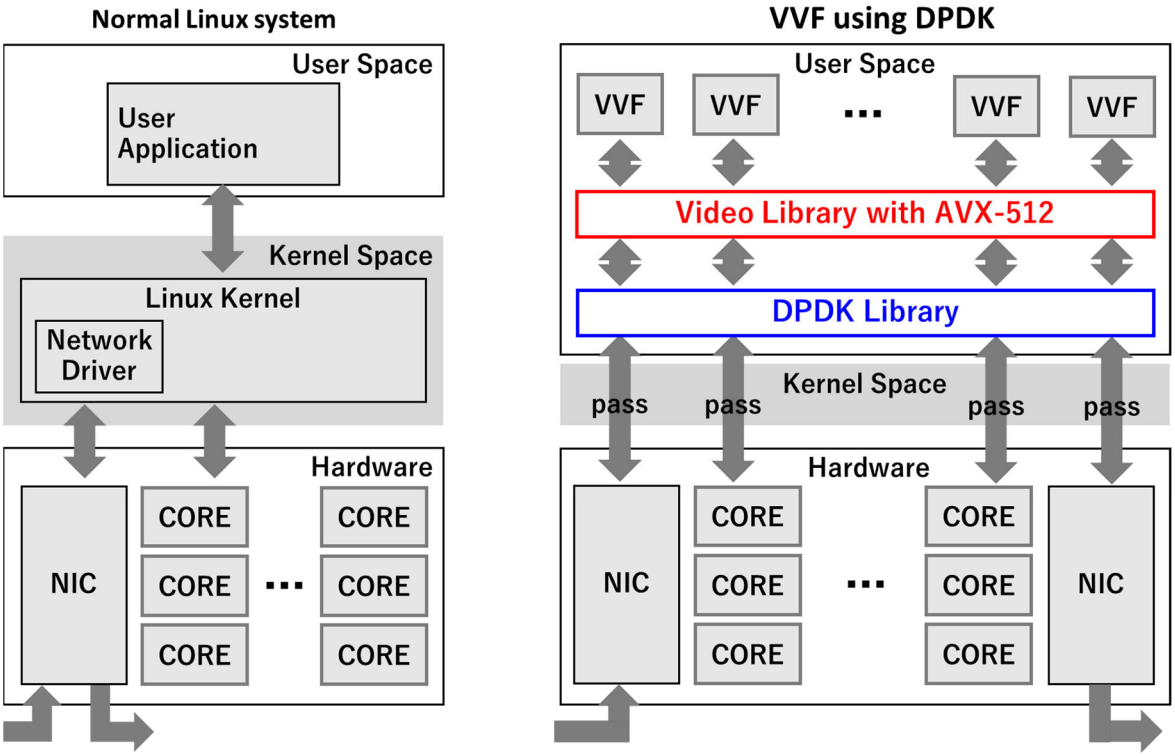


Figure 3 High-speed VVF (Virtualized Video handling Function) using DPDK

VVFs have been developed using the data plane development kit (DPDK) in a software-based framework for edge devices that require high-speed processing. In addition, AVX-512, Intel's single instruction, multiple data parallel processing model, can be used for transcoding and color conversion. By chaining multiple VVFs located at the edge of the network and by performing video processing at high speeds, the local video editing base that was previously essentially becomes unnecessary. We aim to enable 8K video editing and distribution by connecting a computer directly to the network.

A related exhibition of the results will be held at the NICT booth (# 3247) using NII's SINET6, NICT's JGN (*4), and SCinet at SC 22 (from Nov. 14 to 17, 2022, Kay Bailey Hutchison Convention Center Dallas). In the SC22 venue, we will show an uncompressed 8K live video stream from an edge device in Japan, configured in the SINET6 Sagamihara data center of the NII. The video is processed by chained VVFs in the edge system in Japan before we show it in the venue.

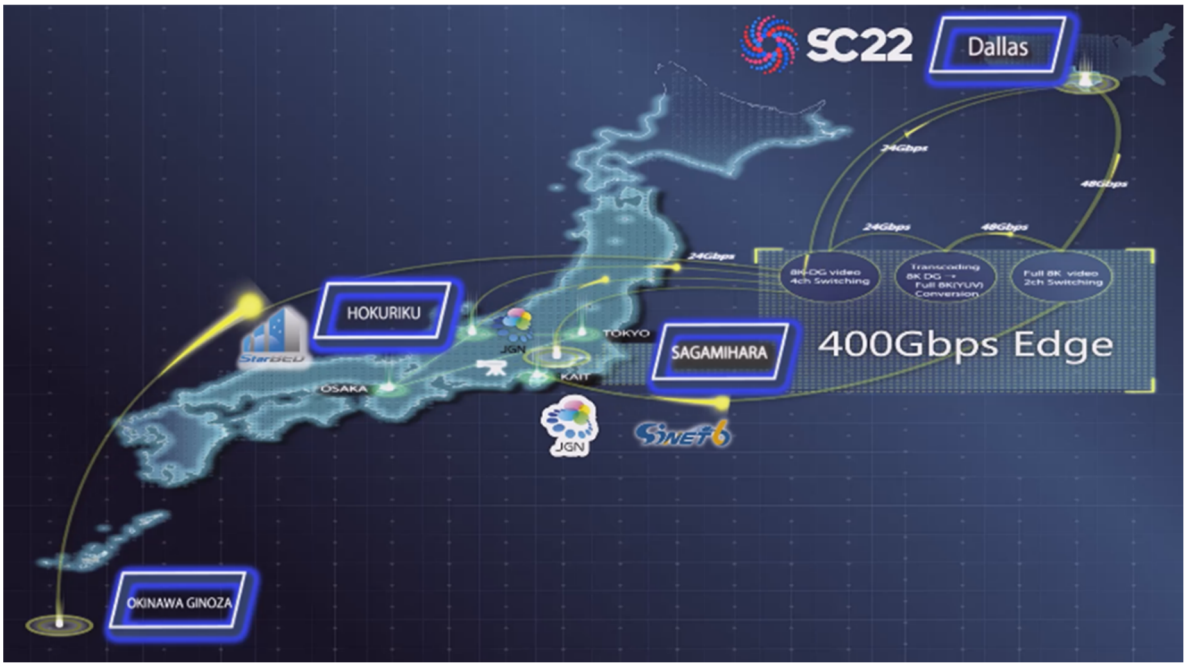


Figure 4 System configuration of 8K video processing system at the SC22

The research results were partially obtained from NICT's commissioned research No.03101.

(＊1) SINET6

A Japanese academic backbone network for about 1000 universities and research institutions constructed and operated by the National Institute of Informatics (NII). In this experiment, SINET6 started its official operation in April 2022 by connecting all prefectures with a 400 Gbps ultra-high-speed network.

(＊2) Interop Tokyo

It was the largest network exhibition in Japan and was held from June 15, 2022, to the 17th. The KAIT held an experimental exhibition in its academic innovation booth.

(＊3) 8K ultra-high-definition uncompressed video

The "8K" has 33 million pixels, approximately 16 times larger than the current full high-definition TV. Various schemes have been proposed. The test used the 8K dual-green (8K-DG) with a 60 fps and 10-bit video stream (24 Gbps) and 8K full-resolution (8K-YUV) with

a 60 fps and 10-bit video stream (48 Gbps).

(＊4) JGN

An R&D testbed network operated by NICT. JGN has been in operation since July 2016 for integrated promotion of technology demonstration and social demonstration. This includes an IoT demonstration test bed in conjunction with wireless test beds, a large-scale emulation base, and a combined service housing infrastructure.

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