JGNⅡ四国ワークショップ

つくばRCの最新情報

2006年6月30日

つくばリサーチセンター　古賀達蔵

研究テーマと人員

「GMPLSネットワーク運用管理技術の研究開発」

拠点研究員2名、特別研究員10名（筑波大、慶応大、産総研、農研機構、防災研、NEC基礎・環境研、KDDI研、NTT－未来ねっと研）

「高度HCI技術を活用した適応型サービス制御の研究開発」

拠点研究員1名、特別研究員14名（筑波大、筑波技術大、産総研、農研機構、NTT－MI研、つくばマルチメディア）

GMPLSに関する研究連携事例

スタッフミーティング・GMPLS分科会から発展

→ GMPLSセミナーを開催：

つくばRC、産総研グリッドRC共催

→ iGRID2005、SC2005でGMPLSの実用性デモ：

NICT、産総研、KDDI、NTTの連携

JGN II、つくばWANを利用

→ 国際連携への展開進捗中：

empowered networks. GLIF is building more than a network; it is building an integrated facility in which broad multidisciplinary teams can work together. StarLight in Chicago and NetherLight in Amsterdam are two important examples of persistent GOLEs.

A GLIF GOLE was constructed for the iGrid 2005 Workshop at Calit2, University of California, San Diego, in September 2005. To feed into this experimental GOLE at iGrid2005, National Research & Education Networks (NRENs), countries, consortia, companies, institutions and individual research initiatives provided the heterogeneous equipment and circuits. IGrid 2005 demonstrated global application experiments running a new generation of shared open-source LambdaGrid Services supporting: scientific instruments, high-definition video and digital cinema streaming, visualization and virtual reality, high-performance computing, data analysis, and the control of the underlying lambdas themselves. Such services support very-large-scale e-science applications such as astronomy, bioinformatics, environmental, geoscience, and high-energy physics that study very complex micro- to macro-scale problems over time and space. IGrid2005 specifically featured very advanced media and network services, a quantum leap from delivering the web's kilobyte texts and megabyte images to interactively visualizing gigabyte datasets as well as streaming HDTV and 4K resolution motion imagery.

GLIF's larger mission is to create and sustain a global-scale facility that supports leading-edge capabilities based on new and emerging technologies and methods related to advanced optical networking. GLIF provides leadership in advanced technologies and pre-production services on behalf of NRENs, NREN consortia, or pan-continental Research and Education Networks, creating new models that they can implement. As such services become available from NREN consortia, GLIF will refocus on emerging methods to support its communities.

Biography: Thomas A. DeFanti, PhD, at the University of Illinois at Chicago, is a director of the Electronic Visualization Laboratory (EVL), a distinguished professor and a distinguished professor emeritus in the department of Computer Science, and the director of the SoftwareTechnologiesResearchCenter. At the University of California, San Diego, DeFanti is a research scientist at the California Institute for Telecommunications and Information Technology (Calit2). DeFanti is an internationally recognized expert in computer graphics since the early 1970s. DeFanti has amassed a number of credits, including: use of EVL hardware and software for the computer animation produced for the 1977 "Star Wars" movie;contributor and co-editor of the 1987 National Science Foundation-sponsored report "Visualization in Scientific Computing;" recipient of the 1988 ACM Outstanding Contribution Award; and appointed an ACM Fellow in 1994.He shares recognition along with EVL director Daniel J. Sandin for conceiving the CAVE virtual reality theater in 1991. Striving since then to connect high-resolution visualization and virtual reality devices over long distances, DeFanti has collaborated with Maxine Brown of UIC to lead state, national and international teams to build the most advanced production-quality networks available to academics, with major NSF funding; he is PI of the TransLight/StarLight IRNC Award which provides two 10Gb/s connections to Amsterdam's NetherLight, and he is a founding member of the Global Lambda Integrated Facility (GLIF). Domestically, DeFanti established the 10 Gigabit Ethernet CAVEwave research facility over the National LambdaRail between WashingtonDC, Chicago, Seattle, and San Diego as a model for application-driven future high-end science and engineering collaboration infrastructures.

S-2.Operation and research on GMPLS optical network testbed of JGN II

Shuichi Okamoto, NICT and Tomohiro Otani, KDDI Labs.

This presentation describes the overview of the GMPLS-controlled optical network testbed of JGN II and our operational experience and research results on JGN II GMPLS network. JGN II was constructed as an open network testbed for the purpose of promoting R&D activities of advanced networking technologies and network-related applications through collaboration with universities, public and private research institutions, industries, and local communities, and has been operated since April 2004. One of the most advanced features in JGN II is an introduction of GMPLS and optical cross connects (OXCs) technologies to a backbone network for the first time in Japan, in order not only to provide an "OXC path service", but also to conduct the research projects related with GMPLS network control and management.

While we provide a point-to-point connection operated at 1Gbit/s (GbE) and 10Gbit/s (STM-64) to JGN II users as "OXC path service", we evaluated and confirmed that the optical path can be not only immediately provisioned when a user request such a connection, but also effectively reconfigured during network maintenance thanks to the introduction of GMPLS-controlled OXCs. JGN II users now can receive the "OXC path service" with very high quality (whole bandwidth, low latency and jitter), which are especially suited for GRID computing as well as real-time applications. Moreover, by using GMPLS controlled routers, we have successfully transported IPv6 traffic as well as are providing MPLS interconnection to the other research network over JGN II GMPLS network. We will present the initial service strategy of providing the OXC path service through various operational experiences.

Since the GMPLS-controlled network is expected to allow us to more effectively and user-friendly manage optical networks, we are investigating a user-oriented mechanism to provision GMPLS optical paths over JGN II GMPLS network. We have recently developed wavelength on demand system in order to allow JGN II users by themselves to provision "OXC path service" using Web-based GUI. We allocated Linux-based GMPLS servers to some of OXC path service sites, which have GMPLS control plane engine and Web server functions, and evaluated the wavelength on demand system. Once the minimum information such as destination node's address or name and bandwidth was input to one of GMPLS servers, we confirmed that GMPLS servers successfully established the required GMPLS optical path without configuring various GMPLS parameters.

We will present how such a GUI-assisted user-access system is beneficial to the JGN II users as well as operators by indicating the actual system..

In conclusion, we summarize the current operational environment and our research result of operation about JGN II GMPLS network. We expect that JGN II will accelerate the development of GMPLS technologies among the industry and help to develop more enriched networking applications in order to arouse various services over GMPLS networks.

Biography: Shuichi Okamoto received the B.E. and M.E. degrees from Osaka University, Japan, in 2000 and 2003, respectively. He joined KDDI R&D Laboratories, Inc. in 2003. He has been a researcher of the National Institute of Information and Communication Technology (NICT) Tsukuba Research Center since June 2004. Currently he is investigating GMPLS technology from the operational point of view. He received the Young Researchers' Award from the Institute of Electronics, Information and Communication Engineers (IEICE) of Japan in 2006.

S-3.Network service interface for Grid and application users and an experiment over a GMPLS network

Tomohiro Kudoh, AIST

Grid is a technology which provides a single system image to users by virtualization of service infrastructure such as computing, data and network resources of multiple domains. By using Grid technology, users do not have to care about actual resources they are using. Grid middleware (such as planner, broker and scheduler) coordinates resources and provides virtual infrastructure.

To realize such virtual service infrastructure, resource management is one of the key issues. Grid middleware should allocate appropriate resources according to user's request. Since network is among the resources of the service infrastructure, Grid middleware should allocate network resources as well as computing and storage resources.

Most of Grid middleware are implemented as Web Services. Web Services are application components which can be accessed thorough open standard web protocols (XML, SOAP, etc.). Web Services interface enables interaction between application components, and provide very high level interoperability among the components. To realize virtual service infrastructure for Grid, a standard Web Services based open interface between Grid middleware and network resource manager is required, but not yet established.

National Institute of Advanced Industrial Science and Technologies (AIST), KDDI R&D Laboratories and NTT are promoting collaborative project, called G-lambda, to establish such a standard Web Services interface, which is called GNS-WSI (Grid Network Service-Web Services Interface) between Grid and network resources.

At iGrid2005 and SC|05 conferences, which were held in September and November of 2005 respectively, we conducted an experiment where our Grid scheduling system co-allocated computing and network resources with advance reservation through the Web Services interfaces, in cooperation with National Institute of Information and Communications Technology (NICT). The experimental system controls the JGN II GMPLS network test bed, and realizes advance reservation of network paths as well as computing resources from a Grid scheduler.

In this presentation, I will briefly introduce Grid and Web Services technology, and discuss about requirements for the network service for Grid and applications. Then, I will introduce the G-lambda project and the experiment we conducted, and talk about future issues of the network service for Grid.

Biography: Tomohiro Kudoh received his Ph.D. degree from Keio University in 1993. He joined National Institute of Advanced Industrial Science and Technology (AIST) in 2002. He currently serves as the leader of the Cluster Technology Team of Grid Technology Research Center, AIST. In the past few years his research has focused on network as a Grid infrastructure. His recent work also includes the GridMPI project, which focuses on development of high performance MPI executed over Grid environment, and GbE/10GbE hardware network

JGNII

iPOP2006, Jun 23-24

Special Session

Invited Speakers:

- T. DeFanti, Univ. of Illinois at Chicago
- S. Okamoto, Tsukuba RC
- T. Kudoh, AIST; Tsukuba RC fellow

GMPLS・成果と今後の展望

1. 世界初：グリッドと超広帯域光ネットワークの連携実験に成功。
2. 世界初：4kデジタルシネマ非圧縮伝送とGMPLSによる切替制御の連携実験に成功。
3. 今後の発展：国際共同研究への積極的参加。

HCIに関する研究連携事例

コアテーマ：ミラーインタフェースの研究開発

→ 研究開発→ プロトタイプ→ 実証実験へ

→ つくば市との連携強化

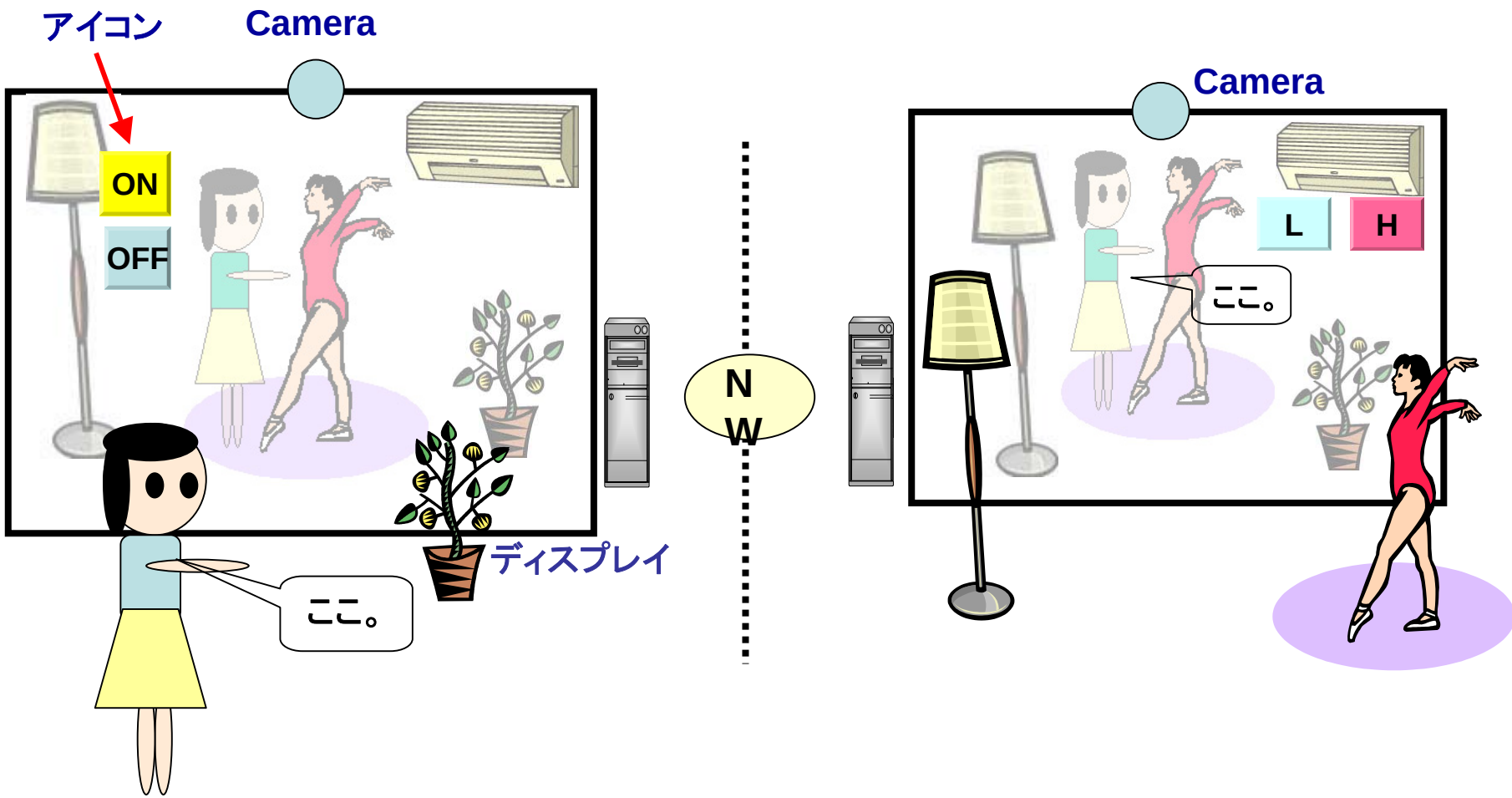
サブテーマ：コアテーマから派生・発展、裾野拡大

・ハイパーミラー：遠隔抱擁システム

・テレイマージョン：遠隔VR融合

→ JGN II、つくばWAN利用

ミラーインタフェース



提供：小野澤 晃特別研究員（NTT-MI研）

「地域住民の健康増進行動のためのSAT遠隔カウンセリングシステム研究」

高齢者健康運動行動遠隔カウンセリング支援（運動中断予防カウンセリング）

子育て中の地域住民の心と身体の遠隔支援

JGNII

提供：宗像恒次、橋本佐由理特別研究員（筑波大）

「ギガビット回線でのハイパーミラー対話の研究」

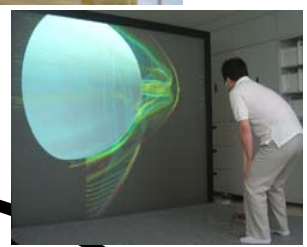
提供：森川 治特別研究員（産総研）

アバタ通信用ネットワーク環境

Immersa Desk
岩手県立大学

CS Gallery
筑波大学「

CAVE
北陸先端大

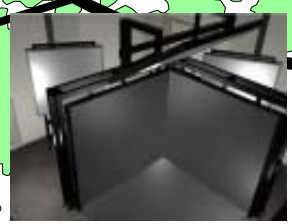


C.C. Wall
筑波大学

JGN2

Immersa Desk
東和大学

CC Room
つくばJGNIIセンター



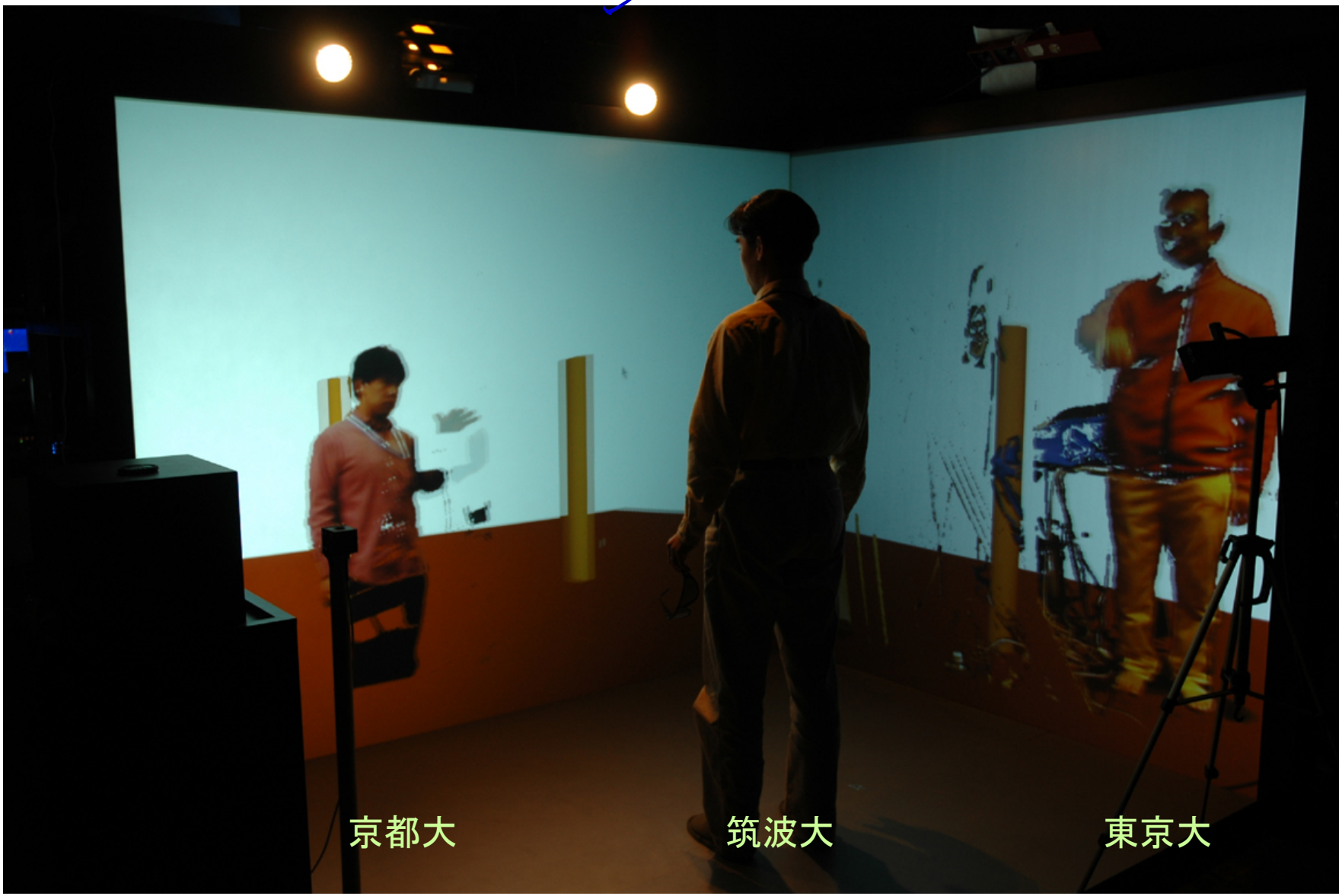
CAVE
京都大学

CABIN
東京大学

回転スクリーン
東京大学

提供：小木哲朗特別研究員（筑波大）

ビデオ・アバタ・コミュニケーション



提供：小木哲朗特別研究員（筑波大）

HCI・成果と今後の展望

1. ミラーインタフェース・プロトタイプ → 実証実験
2. 実証実験：つくば市と共同研究、市民参加型
3. 実証実験：ネットワーク研究へのフィードバック
4. サブテーマでHCIの裾野を拡張
5. JGNII活用で地域連携から広域・国際連携へ

・国際会議CollabTech'06への協力、会場提供・デモ

Appendix

RCの組織確立と地域連携の促進

スタッフミーティング：

・毎月１回開催　→　研究・情報共有、連帯感高揚

・GMPLS分科会、HCI分科会

・拠点研究員、特別研究員、芝・小金井本部、つくば市、関係企業

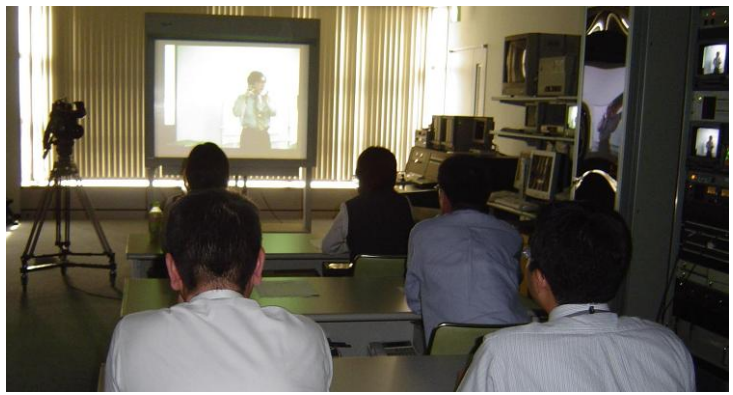
セミナー：

・毎月１回、スタッフミーティングと同日開催

・公開形式　（JGN IIIによるマルチキャスト配信を試行）

「イベントDV映像のマルチキャスト配信」

遠隔会場のセミナー参加風景



岩見沢市

岐阜SOFTPIA

宇都宮大学

北九州RC

九州工業大学戸畑キャンパス