



October 25, 2004
Nippon Telegraph and Telephone Corp.

NTT Develops Scalable Video Software CODEC that Enables Real-time Processing of Standard TV-Quality video

Achieves a Multi-location Teleconferencing System in which the user can freely
specify
reception bandwidth and viewing region

Nippon Telegraph and Telephone Corp. (NTT; Head Office: Chiyoda-ku, Tokyo; President and CEO: Norio Wada) has developed a scalable^{*1} video software CODEC^{*2} that enables real-time processing of video at a quality level equivalent to that of standard TVs (VGA^{*3}, 30fps^{*4}). This CODEC is capable of processing, in real time, videos with a resolution about four times that of existing scalable CODEC technologies^{*5}, without the need for expensive specialized hardware.

Utilizing this CODEC, NTT has also developed a multi-location teleconferencing system based a server-client configuration. In addition to viewing videos at a level of picture quality selected according to the network bandwidth and terminal capabilities, users can also increase the quality of one segment of the video - a "Region of Interest" (ROI) - and quickly receive the encoded data for other regions, in which the picture quality has been kept comparatively low. In this way, the viewer can watch the segment of the screen that is of most interest in high-quality video, with the highest degree of clarity. Because this technology can quickly process network bandwidth and ROI requirements for each client, it enables simultaneous connections between several dozen persons on a single server.

In the past, multi-location teleconferencing could only be accessed on a single constant bandwidth. Now, by applying this new technology, users can enjoy outstanding, user-oriented multi-location teleconferences. NTT expects that this new system will come to be used in a wide range of fields where multiple users share the same video images in varying communication environments with different bandwidths, such as distance learning and remote monitoring systems.

Background to Development

For years, NTT Cyber Space Laboratories has been developing software CODECs based on MPEG-4 ASP^{*6}, targeting content distribution and interactive communication services using PC clients. MPEG-4 ASP bitstream does not have scalability, so video data can not be transmitted with narrower network band with than encoded bit-rate. In case of multi-location teleconference, narrowest network band width dominates encoding bit-rate. In order to achieve and popularize high-quality video communication among multiple persons in a variety of communication environments, however, there have been demands for the development of server technologies that can effectively handle encoded data and CODEC technologies for generating and decompressing encoded data with a degree of scalability.

Keys to New CODEC Technology

1. Development of real-time CODEC equipped with scalability to accommodate different levels of quality and resolution (See [Attachment 1](#))

Scalable video bit-stream can provide multiple quality of video. Generally, scalable video bit-stream consists of two layers; base layer and enhancement layer. A base layer is the basic information to reconstruct video, while an enhancement layer is the additional information that increase resolution, video quality and frame rate.

This CODEC is in compliance with MPEG-4ASP/FGS^{*7}, a standard scalable encoding method, and also offers processing for shrinking or expanding the original image, to achieve extraction of images at two levels of resolution. It also optimizes data volumes stored in the cache memory thus achieving real-time encoding and decoding of video images at a level of quality equivalent to standard TV, which is about four times the resolution possible with existing CODEC technologies. In this way, it becomes possible to extract video images at varying levels of quality from a single set of encoded data.

2. Creation of multi-location teleconferencing servers that can rapidly process scalable encoded data (See [Attachments 2 & 3](#))

NTT has developed a technology for extracting encoded data of the desired size from a single set of encoded data, thus making it possible to quickly extract video images at the desired level of quality. It has also developed a technology for allocating code volumes to selected segments of encoded data, giving priority to ROI segments. This has made it possible to increase the clarity of regions of particular interest, and quickly create encoded data for other regions by reducing the accuracy there. Because this technology can quickly process scalable encoded data in a server according to the bandwidth and ROI requirements of each server, it enables simultaneous connections between several dozen clients using a single server.

Plans for the Future

In the future, NTT will continue studies aimed at achieving scalable encoding in the same framework using H. 264/ MPEG-4 AVC^{*8} instead of MPEG-4 ASP. By using rapidly expanding IP network-based video communication services as a platform technology and incorporating this new CODEC, NTT will also tie this into even higher-functional resonant video communication services that are not dependent on networks or terminal capabilities.

Then, NTT will apply this CODEC to scalable video distribution server in order to achieve broadcast video to 10 million subscribers using communication network that is studying in the NICT research and development theme.

At last, one of this scalable technologies will be exhibited as a part of "Real-time bi-directional video communication system" in the booth of NTT Communications Co. Ltd, in 'CTIA Wireless I.T. & Entertainment 2004, which will be held in San Francisco, USA, in October 25-27th.

Glossary

*1: Scalable

Able to accommodate a wide range of systems, regardless of the whether they are small-scale or large-scale systems. In the current case, capable of sending and

receiving video data flexibly in keeping with the network bandwidth and the processing capabilities of the terminals being used.

*2: CODEC (COder and DECoder)

A CODEC device contains the functions of both an encoder (or COder), which compresses audio and video data into a local stream, and a DECoder, which decompresses the audio and video data from the compressed stream. Because digital audio and video use huge volumes of data, it is important to use an appropriate CODEC when compressing data.

*3: VGA (Video Graphics Array)

A graphic system developed by IBM, incorporated into IBM's PS/2 PCs. Capable of displaying 16 colors in a 640*480 dot display. VGA has gained broad acceptance as the standard for PC graphic systems. Because it is directly controlled by BIOS, even now that many high-resolution systems have been developed as successors to VGA, it is still used as a default graphic mode, or as an emergency mode in the event of graphic system failures. The term VGA is sometimes used simply to refer to 640*480 resolution.

*4: fps (Frame Per Second)

An index indicating the smoothness of video displays. The smoothness of the video improves as the "fps" value increases.

*5: Previously achieved in CIF size (image size). NTT-Com announced a system using this on March 3, 2004.

<http://www.NTT.com/release/2004NEWS/0003/0303.html> (in Japanese)

*6: MPEG-4 (Moving Picture Experts Group phase 4)

One video data compression method, and a segment of MPEG standards.

*7: ASP/FGS (Advance Simple Profile, Fine Granularity Scalable Profile)

ASP is an extended bandwidth version of the Simple Profile, and FGS is an encoding technology that offers scalability. A combination of these two is referred to as a "Streaming Profile."

*8: H. 264/ MPEG-4 AVC

A next-generation high-compression video encoding method standardized by ITU and ISO. This method is adopted as next-generation DVD standard.

-[Attachment 1 Scalable Real-time CODEC](#)

-[Attachment 2 Multi-location teleconferencing server that enables high-speed processing](#)

-[Attachment 3 Using ROI Scalability](#)

-(Reference)_ [Example of scalable remote lecture](#)

For further information, contact:
NTT Cyber Communications Laboratory Group

Planning Division, PR Section; Sadakata / Yamashita
Tel : 046-859-2032
E-mail : ckoho@lab.NTT.co.jp

NTT NEWS RELEASE 

Copyright (c) 2004 Nippon telegraph and telephone corporation