What's Hot in R&D

Terminal, Software Technologies

Terminal technologies for ubiquitous services and software technologies related to solution businesses.

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As high-definition video applications like terrestrial digital broadcasting become more popular, a need is arising for systems that can compress video data more efficiently than before. Video data conforming to the H.264 video coding standard can be transmitted and recorded more efficiently than MPEG-2 video data because H.264 enables twice as high a compression ratio as MPEG-2. Although several H.264 video cameras have already been put to practical use, they do not have the functions and performance necessary for professional broadcasting usage. To fill in this usage gap, we have developed a professional H.264 video CODEC chip set (SARA) and HDTV CODEC equipments.

SARA is the first CODEC chip set that can support the High 4:2:2 profile for broadcasting materials transmission. Various functions optimized for H.264, such as advanced motion estimation/compensation, rate control algorithm, and pre-analysis processing, are implemented with our original LSI architecture technologies. With these functions, SARA provides high image quality and low latency needed for broadcasting infrastructures. We also developed compact (postcard size) CODEC modules for various high-end and low-power CODEC systems. This CODEC equipments, including a transcoder that can convert MPEG-2 streams into H.264, can be used in distribution transmission systems of next generation network (NGN) video services and in the professional broadcast infrastructures such as contribution transmission systems and interruption transmission systems.

We will develop more economical CODEC systems and study the system configuration technology for future super-high-resolution video communications.

*1 MPEG-2: Moving Picture Experts Group-2 (A standard of coding high-quality video including HDTV, and it is used on DVDs and in digital television broadcasting services.)
*2 CODEC: COder and DECoder. (A signal processing technology having both an encoder (coder) for compressing audio and/or video data into a certain stream and a decoder for extracting audio and/or video data from a compressed stream.)
*3 SARA: Super Advanced Real-time CODEC Architecture for H.264 professional implementations
*4 HDTV: High Definition Television
*5 High 4:2:2 profile: A set of CODEC definitions in the H.264 standard that applies the High profile of H.264 to the 4:2:2 color space. The High 4:2:2 profile is indispensable for professional broadcasting use.

Professional H.264 CODEC LSI (SARA) and HDTV Video CODEC systems
The spread of optical fiber and ADSL*1 broadband access networks has led to a rapid increase in IP-based telephony services. For next-generation IP telephony services, NTT Laboratories have developed a scalable wideband speech coding, UEMCLIP*2, which provides high-quality speech communication on a 7-kHz frequency bandwidth and interoperability with conventional telephones equipped with ITU-T*3 G.711 codecs.

For deployment of wideband speech communication, NTT Laboratories have taken the initiative in standardization of a new wideband speech coding based on the same concept as UEMCLIP in ITU-T. We proposed a coding algorithm in which the technologies from four other organizations are merged. The algorithm met the quality requirements of ITU-T and was approved as ITU-T standard G.711.1 in March, 2008.

The advantages of the G.711.1 are as follows:

(1) Clear and real-sounding voice can be transmitted by using a wideband speech (50 Hz - 7 kHz) capability with twice the bandwidth of telephone-band speech (300 Hz - 3.4 kHz).

(2) To connect terminals equipped with the G.711 codec and those with the wideband speech codec, it is necessary to transcode the bitstream of the wideband codec into that of the G.711. (The transcoding includes both decoding and re-encoding.) However, since the G.711 bitstream is involved in the G.711.1 bitstream, the transcoding only extracts the G.711 bitstream part and it causes no quality degradation.

NTT Laboratories will implement the standard in VoIP*4 chips and PC software phones and provide it in our customers. It will also continue to participate in standardization activities on the 14-kHz bandwidth and stereo extensions to G.711.1 at ITU-T.

*1 ADSL: Asymmetric Digital Subscriber Line
*2 UEMCLIP: mU-law Embedded Coder for Low-delay IP communication
*3 ITU-T: International Telecommunication Union-Telecommunication standardization sector
*4 VoIP: Voice over Internet Protocol

UEMCLIP is a registered trademark of Nippon Telegraph and Telephone Corporation.

Advantages of ITU-T G.711.1

(1) Clear and real-sounding voice on 7-kHz frequency bandwidth

(2) Easy transcoding with G.711 codec
On-demand VPN (SIP Dial-up System)

The spread of home information appliances is driving the installation of LANs in the home. If these LANs can be connected together, e.g., to share content between home information appliances on different LANs or to facilitate teleworking by connecting a home LAN to an office LAN, then this would have the potential to bring about a major change in lifestyles. VPN*1 technology offers a technique for establishing secure connections between LANs. However, existing VPN technology is mainly oriented towards business applications, and can be quite difficult for customers at home to use since it may, for example, require the user to have specialist knowledge prior to installation, and may always connect to a predetermined destination. On-demand VPN connection technology is implemented with the SIP*2 protocol which is used in NGNs*3 and IP networks, and establishes VPN connections simply and securely by specifying the phone number of the remote LAN. Since caller certification and authorization are performed based on the phone number, there is no need for complex presetting of the system. Also, since it uses the SIP protocol, it is possible to perform flexible connection control.

In the fall of 2007, we developed an SIP dial-up gateway using this on-demand VPN connection technology, and we performed verification trials of this gateway on an NGN trial network using a commercial thin client system. We also demonstrated these achievements at the NOTE*4 exhibition in Otemachi, Tokyo as “Advanced Telecomputing on NGN”. By combining the simple and secure on-demand VPN connections offered by this technology with the QoS*5 guarantee of NGN, we are able to implement stable data communication between LANs with a greater level of reliability.

In the future, we will feed back the results of our verification trials and we will investigate commercializing this technology as an on-demand VPN service on commercial IP networks such as FLET’S Hikari Next.

*1 VPN: Virtual Private Network
*2 SIP: Session Initiation Protocol
*3 NGN: Next Generation Network
*4 NOTE: NGN Open Trial Exhibition (An exhibition space where people can gain hands-on experience of the latest technology that supports NGNs and services implemented with NGNs.)
*5 QoS: Quality of Service

Schema of the on-demand VPN

![Schema of the on-demand VPN](image-url)
Ubiquitous services are characterized by their ability to connect to networks at any time, from anywhere, by anyone and for any purpose. To make these services simple enough for anyone to use, it is important that these connections can be established naturally without the user’s awareness. In our view, this necessitates the implementation of a “human area network” (HAN), which extends as far as an outstretched arm and thus covers a smaller region than wide area and local area networks. Using cables to connect computers together can be a complicated and inconvenient task. On the other hand, it has been pointed out that interception of radio waves can compromise the security of wireless technology. NTT Laboratories have therefore been developing RedTacton technology, which allows HANs to be implemented by using the surface of the human body as a propagation path. With this technology, communication between computers is initiated automatically by forming transmission paths when people come into contact with other things. In this way, people can connect to networks without experiencing any degree of complexity simply by performing natural actions such as touching, sitting or stepping on other objects.

So far we have made a prototype system, and by subjecting this system to verification trials, public exhibitions and the like, we have broken new ground in the application of RedTacton technology. Thus, by reasoning that home and office security are ideal initial fields of application for this technology, we have made progress in the development of custom LSI chips, card-type transmitters, and receivers that can be embedded in parts of the environment such as inside floors and doors. Using our own protocol, we are able to transmit data at 230 kbit/s between a card-type transmitter and an embedded receiver, and the embedded receiver can be connected to a host computer over an Ethernet or serial interface.

Now that these achievements have been publicized and the technology has been exhibited, NTT Electronics Corporation will finish the product development and will begin selling sample products in May 2008. In the future, with a view to incorporating this technology into mobile phones, PCs and PDAs, we intend to make a concerted effort to develop this technology to make it operate faster, consume less power and implement bidirectional communication.

*1 RedTacton: Our name for this technology consists of two parts. “Tacton” is a contraction of “Touch” and “Act on”, which describes how communication is started with the act of touching (Touch), and leads to various different actions (Act on). The color “Red” is added to signify warmth in communication.

*2 PDA: Personal Digital Assistant

RedTacton is a registered trademark of Nippon Telegraph and Telephone Corporation.

Communication principles and device examples