

TOSHIBA REVIEW

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Special Reports-1

Visual Communication

Rapidly Spreading Multimedia Communication Applications

URUI Kiyoshi

Evolving Visual Communication System Market Demand

HINO Fumio

In the field of communication systems, telephone systems that have conventionally specialized in voice-data communications have begun to shift to Internet Protocol (IP) telephone systems as a result of innovations in IP technology and the spread of broadband networks in recent years. Due to IP technology, visual communications involving the collaboration of real-time voice and video communications have become more familiar.

Toshiba has launched a visual communication system on the market that realizes videoconferencing using a telephone, PC with web camera connected via the network, as an application of collaboration between the telephone system and video communication employing IP technology in the office environment. The use of this visual communication system is expected to reduce the limitations of physical location in conventional office business operations, leading to major improvements in the effectiveness and range of remote operations between offices in the future.

Visual Communication System

FUKAZAWA Shigeru / SHIMA Koji

The Strata_{TM} VCS visual communication system allows a user to communicate with someone located in a remote office or to telecommute with video and application sharing by means of a simple telephone call, as easily as if the communication was in person. In this system, a video window that displays the other party opens automatically on the desktop of the user's PC when the user establishes voice communication, by making a call to the other party using a Toshiba business telephone system. The system provides network address translation (NAT) traversal so that users can install every Internet Protocol (IP) network environment.

Server Application Software for Visual Communication System

SASAKI Yasumasa / MATSUKAWA Fumikazu

Toshiba has developed the Strata_{TM} VCS visual communication system, which can be easily used simply by making a call from a telephone. A telephone-synchronized visual communication system is realized by server application control. This system solves issues related to supporting visual communication between distributed branch offices, and allows value-added visual communication to be provided.

Visual Communication System Client Software

KASHIMOTO Shinichi / ERI Michiaki / KANDA Tomohiro

Toshiba has developed its Strata_{TM} VCS visual communication system for close collaboration with its business communication systems, which have been launched in overseas markets as Internet Protocol (IP)-based telephone systems and are gaining increasing popularity in the field of business communications. For the call control, transport control, and codec of the Strata_{TM} VCS including its VCS clients, we incorporated basic standards and expansion technologies into our products and applied them within the scope of their standards taking future system extensibility and addition of functions into consideration.

Screen Image Transferring Technology for Application Sharing

MURAI Shinya / KAWAZOE Hiroshi

The Strata_{TM} VCS visual communication system has an application sharing function that enables users to send screen images of application programs running on their personal computer to other users they are talking with via Strata_{TM} VCS. A major feature of this function is that it can correctly transfer images that change with high frequency; for example, animations on presentation slides, handwriting on slides, and so on. This improves the effectiveness of application sharing when used in areas such as presentations.

Multipoint Control Unit for Videoconferencing

KAWAMURA Takuya / SHIBUYA Naohisa / FUNATO Yasuo

A visual communication system with high-quality video improves the efficiency of business.

Toshiba has realized multipoint videoconferencing by introducing a newly developed multipoint control unit (MCU) into its Strata_{TM} VCS visual communication system. The MCU can distribute different mixing video streams to each VCS client. Moreover, each user of a VCS client can optimize the video mixing layout by freely changing it.

Special Reports-2

Ultrahigh-Speed Wireless Communication Technologies

Why Is R&D of High-Speed Wireless Networks Important?

KAMATANI Yukio

Ubiquitous World Realized by Superhigh-Data-Rate Wireless Systems

SHOKI Hiroki / OBAYASHI Shuichi / SHOBATAKE Yasuro

Superhigh-data-rate wireless systems with a capacity exceeding 100 Mbits/s, such as the IEEE802.11n wireless local area network (WLAN) system and ultra wide band (UWB) systems, will be standardized and widely used within several years. Moreover, wireless systems with significantly higher rates of more than 1 Gbit/s may be in operation from 2010 onwards.

This paper first introduces the trends in standardization of wireless systems such as cellular, metropolitan area network (MAN), local area network (LAN), and personal area network (PAN) systems. Next, the real benefits for users of these wireless systems are explored. Applications for audio-video transmission and high-rate data transfer will be very attractive for future users. Finally, Toshiba's approach to research and development in this field is described.

Wireless LAN Technologies Realizing Throughputs Exceeding 100 Mbit/s

TAKAGI Masahiro / TAKEDA Daisuke / ADACHI Tomoko

The IEEE802 LAN/MAN Standards Committee of the Institute of Electrical and Electronics Engineers is now developing the next-generation wireless LAN specifications (IEEE802.11n), aiming to achieve throughputs exceeding 100 Mbit/s. With the higher throughput and robustness brought about by IEEE802.11n, the application areas of wireless LAN are expected to be extended to the audio, visual, and handheld areas in addition to the current applications such as notebook PCs.

Toshiba has proposed technologies relevant to multiple input multiple output (MIMO), the aggregation technique, and expansion of channel bandwidth, which are important to IEEE802.11n, and has actively contributed to this standardization.

Wireless USB Technology

MATSUMURA Masafumi / NAKAGAWA Hideyuki / KOKUBO Takashi

Short-range wireless technologies suitable for connecting devices have become popular in recent years. Among these, ultra wide band (UWB) has been coming under the spotlight as a wireless technology that meets the needs of the times. Although UWB is a short-range data communications technology, it features very high-speed data communications due to the use of a wide frequency band. In addition, Universal Serial Bus (USB) 2.0, a high-speed serial cable that has become popular with consumers, is regarded as one of the leading applications of UWB technology.

Toshiba will continue to actively pursue such wireless technologies and develop related application products.

MIMO Receiving Algorithms Appropriate to System Requirements

TANABE Yasuhiko / AOKI Tsuguhide / Magnus Sandell

Multiple input multiple output (MIMO) transmission has recently been attracting attention in the field of wireless communication systems, and various transmission methods have been proposed. Spatial multiplexing, where two or more different signals are transmitted in parallel using multiple transmitting antennas, is one of the MIMO transmission methods available to realize high-speed transmission. A receiver has to recover this mixture of signals in the air, and its performance greatly depends on the receiving algorithm. On the other hand, system requirements may differ and high performance is not always demanded; sometimes the priority might be placed on reducing the computational load.

In response to these diverse requirements, Toshiba has developed a number of receiving algorithms with different features appropriate for the respective systems.

Antenna Technologies for Next-Generation Wireless Systems

AMANO Takashi / SEKINE Shuichi

The demand for high-speed data communication in the mobile environment is increasing. In order to realize high-speed and high-quality radio communication, high-performance antennas are required. High-speed radio communication systems require a high-performance diversity antenna, while attractively designed products require a small-sized antenna.

Toshiba has developed a multiple input multiple output (MIMO) antenna, an ultra wide band (UWB) antenna, and a multiband antenna for applications such as personal computers. We have also developed a radio propagation measurement technique to optimize the design of high-performance antennas.

Ultra-Low-Loss Silicon Carbide Super Schottky Barrier Diodes

NISHIO Johji / SHINOHE Takashi

Toshiba has applied the floating junction structure, which has been confirmed to be effective in reducing the on-resistance of silicon power devices, to silicon carbide super Schottky barrier diodes (SiC super-SBDs). Optimization of the device parameters, derived by making improvements in the device simulator, and development of the fabrication process have enabled super-SBDs with a breakdown voltage of 2,427 V and a specific on-resistance of 3.03 mΩcm² to be realized. These values correspond to the world record of 7,762 MW/cm² for Baliga's figure of merit (BFOM), which is widely used for power devices.

The newly developed SiC super-SBDs will help to reduce both energy loss and equipment volume of inverter units.

Feature Articles

1 Gbit/s Optical Real-Time Ethernet Module for Railroad Trains

SUGIYAMA Atsushi / TAKAHASHI Hideyuki / KIMURA Katsuhiro

With the progress of information technology, general-purpose transmission technology has been proactively applied to the communication systems employed on railroad trains in recent years. Both 10 Mbit/s and 100 Mbit/s Ethernet LAN connections have already been developed and applied to actual trains. Today, broadband LAN connections are required to facilitate powerful communication.

Toshiba has developed a 1 Gbit/s optical real-time Ethernet module for railroad trains to meet this requirement. This module ensures stable rerunning of the LAN by light intensity monitors as well as real-time control, a redundancy system, and easy access to peripheral equipment. The newly developed module is also expected to be helpful in saving labor for preventive maintenance and periodical checkups.

50 Hz Large-Capacity Water-Cooled Generator and Hydrogen-Cooled Generator

YAMAKAWA Masayuki / KAKIUCHI Mikio / KATAYAMA Hitoshi

Demand has recently been increasing in Southeast Asia for 800,000 kW-class generators to be used in coal-fired power plants and for 500,000 kW-class generators to be used in 1,500 □C gas turbine combined-cycle power plants.

Toshiba has developed a large-capacity water-cooled generator for coal-fired plants and a large-capacity indirectly hydrogen-cooled generator for combined-cycle plants. Applying these technologies, we have manufactured and shipped a 934,000 kVA generator of the former type and a 563,334 kVA generator of the latter type.

NEOBALL-Z Real_{TM} Self-Ballasted Fluorescent Lamps

IKADA Kunihiko / KUBOTA Hiroshi

In 2005, Toshiba launched the NEOBALL-Z Real_{TM} lineup of compact self-ballasted fluorescent lamps, which can replace 60 W incandescent lamps. These lamps are the smallest self-ballasted fluorescent lamps in the world. They fit naturally into most incandescent lamp luminaires because of their shape, and their lighting distribution is almost 100 % identical to that of incandescent lamps.

We have now introduced the following new technologies to further downsize these lamps: (1) The discharge bulb is constituted of three thin U-shaped tubes connected together, a system that has not been adopted before. (2) Complementary paired metal-oxide-semiconductor field-effect transistors (MOSFETs) within one small package have been developed, allowing the inverter circuit to be vertically inserted in the lamp base. In addition, another type of NEOBALL-Z Real_{TM} that can replace a 40 W incandescent lamp is now available.

Superconducting Band-Pass Filters for Digital Terrestrial Broadcasting Relay Stations

KAYANO Hiroyuki / FUKE Hiroyuki / HASHIMOTO Tatsunori

Digital terrestrial television broadcasting (DTTB) relay stations are required to utilize adjacent channels because the system uses the same UHF band as that for the existing analog system. Conventional filters cannot attenuate adjacent channel power, with the result that the transmitting signal of the adjacent channel produces interference in the receiver.

Japan Broadcasting Corporation (NHK) and Toshiba have developed high-temperature-superconducting (HTS) sharp-skirt band-pass filters with low group delay deviation for DTTB relay stations, in order to reduce this adjacent channel interference. These filters allow only the channel signal to pass through, making it possible to separate adjacent channels.

Frontiers of Research & Development

Hydrogen Production System with High-Temperature Steam Electrolysis

