

Special Reports

Innovative Technologies for Audiovisual Notebook PC with Digital Terrestrial TV Function for Japanese Market

Prospects for Digital Convergence and Future PC Technologies

SANADA Tsutomu

Trends in AV Notebook PC and Digital Terrestrial Broadcasting

MATOBA Tsukasa/TOKORO Tsuyoshi /SENO Tomonori

High-definition TV broadcasting and video and music contents distribution services are becoming popularized throughout the world due to the penetration of digital broadcasting and broadband Internet. The ratio of households that can receive digital terrestrial TV broadcasting in Japan will reach 80% at the end of 2006.

Toshiba has released the Qosmio G30 audiovisual (AV) notebook PC, which allows the viewing and recording of digital terrestrial TV broadcasting using proprietary high-definition video processing, digital tuner, and contents protection technologies. This AV notebook PC offers the advantages of advanced Internet connectivity as well as high-performance, flexible software processing. The Qosmio G30 can be connected with various AV contents and services, enabling it to play the central role among digital AV appliances for personal use in the home.

Qosmio G30 AV Notebook PC with Digital Terrestrial TV Reception

IWATA Takeshi/SUZUKAWA Hajime

Toshiba has released the Qosmio G30 audiovisual (AV) notebook PC equipped with digital and analog tuners for the reception of terrestrial TV broadcasting. We developed a small tuner with high sensitivity comparable to that of digital TV sets, proprietary contents protection technology, a full high-definition LCD offering high brightness and high color saturation, a 1-bit digital amplifier, and a remote controller that is as easy to use as that of consumer AV equipment. With these features, the Qosmio G30 represents another major step forward in AV quality from the previous models in the Qosmio series.

Computer Architecture for Digital Terrestrial Broadcasting in AV Notebook PC

NISHIGAKI Nobutaka / TAKEZAKI Satoshi /TOMIYASU Yuichi

The Qosmio G30 audiovisual (AV) notebook PC is Japan's first notebook PC offering the feature of receiving, viewing, and recording digital terrestrial broadcasting. To realize this feature, the Qosmio G30 employs a small-sized digital terrestrial TV tuner and is powered by an extremely high-performance processor and graphics controller that are capable of decoding and displaying high-definition video contents encoded with Moving Picture Experts Group-phase 2 (MPEG-2). The Qosmio G30 also incorporates Toshiba's newly developed original content rights protection mechanism, to ensure that open-architecture equipment such as PCs complies with the standards set by the Association of Radio Industries and Businesses (ARIB).

Technology of ISDB-T Tuner for AV Notebook PCs

NAGAE Akihito/WADA Naoyuki/SHINGU Koji

Toshiba has developed high-quality TV tuners and implemented them in the Qosmio series of audiovisual (AV) notebook PCs. We have also developed the industry's first integrated services digital broadcasting-terrestrial (ISDB-T) tuner for notebook PCs, to achieve even higher quality.

In order to implement the ISDB-T tuner in the Qosmio PC, a number of challenges had to be resolved including size minimization, lower power consumption, and restriction of the tuner location. Toshiba succeeded in overcoming these severe conditions in the development of ISDB-T tuner, which has accomplished good performance comparable to that of competitors' desktop PCs with a built-in ISDB-T tuner and to that of digital TV sets.

User Interface Technology for AV Software

SAKAI Masato/KUBOTA Hidetoshi/SUGITA Kaoru

Notebook PCs are playing a vital role in the personal use of digital contents in various situations. A convenient and user-friendly interface is important for the further diffusion of notebook PCs providing audiovisual (AV) functionalities, such as analog and digital high-definition TV broadcast reception and home networking. Qosmio AV Center software is bundled with the Qosmio G30 AV notebook PC, which was released in March 2006. It integrates AV functionalities to achieve a user-friendly digital appliance with the unique convenience of a notebook PC.

Streaming Technology for AV Software

HAYAMA Tatsuya/TADA Masahiro/KANAYA Kenryo

Qosmio AV Center is an audiovisual (AV) software bundled with the Qosmio G30 AV notebook PC, which was launched in March 2006. On top of the existing analog TV functionalities such as the viewing and recording of live TV and playback of recorded programs, Qosmio AV Center has been enhanced with the addition of support for digital terrestrial broadcasts. One of the key features of digital terrestrial TV is higher resolution video. Such high-definition video decoding requires significantly more CPU resources than the standard-definition video in analog TV broadcasts. To achieve this, Toshiba has refined video processing and contents protection technologies with Qosmio AV Center by optimizing the software decoding performance without integrating a specific hardware video decoder.

Feature Articles

Fully Silicided Gate Technology Compatible with LSI Fabrication Process

TSUCHIYA Yoshinori/YOSHIKI Masahiko

Fully silicided (FUSI) gate technology is a promising candidate for metal gate electrodes because the work function, which determines the threshold voltage of a field-effect transistor (FET), can be easily controlled with impurity doping. However, the physical mechanism has not yet been fully understood.

Toshiba has elucidated that the pileup position of impurities at the interface determines the modulation directions, by developing a new impurity incorporation method and utilizing the SPring-8 synchrotron radiation facility. On the basis of these results, we have proposed a comprehensive model and provided a guideline for the design of FUSI gate interfaces.

Tunable Antenna Technologies

MINEMURA Takashi/SUZUKI Hiromichi/OHBA Isao

The frequency range allocated to mobile applications is expanding with the diversification of customer uses and the progressive development of wireless communication technologies. Devices are now being equipped with convenient features including electronic money, mobile "Suica" services, digital radio and TV, wireless LAN, Worldwide Interoperability for Microwave Access (WiMAX), multiple-input multiple-output (MIMO), and ultra-wideband (UWB) capabilities, with the result that the frequency range extends from 13.5 MHz to 5 GHz. On the other hand, information devices, especially cellular phones, are required to be thin and compact but with full consideration given to design. In terms of space, integrating the necessary number of antennas is becoming a difficult issue. Antenna design technologies thus need to be developed to realize multiple wireless systems that occupy less space.

Toshiba has been developing tunable antenna technologies for multiple wireless systems. The use of active components has made it possible to overcome the bandwidth limitation and realize antennas such as a UHF/VHF band switching antenna and an internal UHF band antenna with 50 % bandwidth coverage.

Cellular Phone Head End System to Increase Coverage Area

IMOTO Noriyuki/KIJIMA Toru/DOI Toshinori

Toshiba has supplied a radio over fiber (ROF) system and booster amplifiers so that the communication area can be expanded for the 2 GHz-band cellular phone system. On the other hand, the Ministry of Public Management, Home Affairs, Posts and Telecommunications newly approved three mobile communication carriers in November 2005 after an interval of 12 years, to activate the cellular phone market. The ministry decided to additionally allocate the 2 GHz band to one of the newly entering carriers, and a new 1.7 GHz band to the other two new entrants.

To support expansion of the coverage of the new and existing frequency bands, we have developed a radio frequency (RF) head end system corresponding to the 1.7 GHz band including such devices as a linear power amplifier (LPA) and tower mounted amplifier (TMA) in addition to the ROF system for the 2 GHz band.

KnowledgeMeisterSucceed™ Knowledge Transfer Software

KOBAYASHI Kenji

The recent increase in the mobility of employment has prompted businesses to focus on the transfer of knowledge among employees. Effective knowledge transfer requires not only a good understanding of "what" is created in the business, but also "why" and "how" it is created – such as discussions between stakeholders, and the way information is handled to create new output.

Toshiba Solutions Corp.'s KnowledgeMeisterSucceed™ software makes the accumulation of such information possible by providing a means of recording the contents of individual work as it flows through the business process. The data are recorded in a structured manner, making it easy to identify and pass on the knowledge that is used in each stage of the process.

Web-Based Wide Area Measurement and Fault Locator System

TAKANI Hideyuki/MIYOSHI Tetsuya/FUJITA Yasunobu

Fault and disturbance recording systems are widely used for analysis and maintenance work in the field of power system protection and control. Such fault and disturbance recording systems using the latest communication and information technologies can provide innovative solutions to a wide range of power system problems.

Toshiba has developed a Web-based wide area measurement system to realize a fault location function and a fault and disturbance analysis function using one server. This system is applicable to multi-terminal transmission lines and multiple power systems. The proposed network devices, server, and browser in the system communicate to share information that can enhance the overall fault and disturbance analysis. Various services using a network have been proposed and their practical use has been made possible by the diffusion of the Internet.

Introduction of this system has progressed in Japan, and it has been applied as a standard system.

Technologies for Improving Data Traffic Accommodation Efficiency of All-Optical Network

DOBASHI Kyosuke/IBE Hiroyuki/OHSHIMA Shigeru

With the tremendous increase in Internet Protocol (IP) packet traffic in recent years, there are expectations for the realization of all-optical networks that can efficiently accommodate large volumes of data traffic. On the other hand, an optical transceiver for wavelength conversion is required in the system that converts wavelengths at intermediate nodes in the optical network, resulting in high equipment costs.

Toshiba has proposed an all-optical network architecture offering high data traffic accommodation efficiency and cost effectiveness, and has developed a spectrally efficient modulation technology for optical signals as well as a precise and fast wavelength control method.

Integrated Control System Using Industrial Controller for Hydroelectric Power Plants

YABUTA Keijiro/KONNAI Tadashi/NOGUCHI Tetsuya

Microprocessor-based digital control systems have been generally applied in various fields, and integrated control systems with a variety of functions such as sequence control, automatic voltage regulation, governor control, and protective relays have also been applied to hydroelectric power plants.

Toshiba has developed an integrated control system using an industrial controller to achieve improved economy, and supplied this system to the Murota Hydroelectric Power Station of The Tokyo Electric Power Co., Inc.

Equipment for Higashi-Fukushima Substation of Tohoku Electric Power Co., Inc.

SATO Yoshimasa/IMOTO Taisuke

The Higashi-Fukushima Substation of Tohoku Electric Power Co., Inc. is being constructed to secure a stable supply of electric power for Fukushima Prefecture. Toshiba has just supplied the main facilities for this substation, including a 275 kV-450 MVA advanced site assembly (ASA) transformer with phase shifter employing Inergen gas as a fire extinguisher, a downsized and lightened 300 kV gas-insulated switchgear (GIS), and a 168 kV GIS featuring a high-position long bus bar with advanced analysis of earthquake and thermal behavior.

These facilities can be expected to reduce the substation area, shorten its construction period, and ensure high reliability of operations, thus contributing to the rationalization of services.

Frontiers of Research & Development

Fast and Accurate Face Detection Technology