

TOSHIBA REVIEW

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Special Reports

Mobile Broadcasting System

Beginning of Mobile Broadcasting Service

NAKAGAWA Takeshi

Overview of Mobile Broadcasting System

KIKUCHI Hideo / SATO Nobuyasu / HIRAKAWA Shuji

A large number of viewers enjoyed the Athens Olympic Games on large-screen digital TV receivers last August. Digital TV receivers are gradually penetrating into Japanese households. It seems strange, however, that TV broadcasting services are based on fixed receivers while AM/FM radio services could be enjoyed by users with mobile receivers.

Mobile broadcasting, which was officially launched in October this year, is the first commercial digital broadcasting service designated for use by mobile receivers in Japan. This broadcasting system provides stable reception of image services by mobile receiving terminals, which is impossible using conventional analog television broadcasting. One of the major features of the system is that it will allow the same broadcasting services to be enjoyed in any location in Japan.

Broadcasting Center for Mobile Broadcasting Service

OSAKO Toshiki / HIROSHIMA Junji / OKADA Koji

The broadcasting center is the key site for the provision of mobile broadcasting services by Mobile Broadcasting Corp. It functions not only as the center for broadcasting multichannel services, but also as the center for managing subscribers' data.

Toshiba has developed the main broadcasting system and subscriber management system for the broadcasting center. Moreover, we have supported the integration and testing of the total system including the network for the successful realization of mobile broadcasting.

Satellite System and Gap Fillers for Mobile Broadcasting System

ISHIKAWA Tatsuo / OKA Masaru

The Mobile Broadcasting Satellite (MBSAT) and gap fillers (GFs) are two significant elements of the mobile broadcasting system. MBSAT is a dedicated satellite for the mobile broadcasting service. In order to realize mobile reception with a small receiving antenna, it is equipped with a large deployable S-band antenna and a high-power S-band transponder. There are two types of GF: the regenerative repeater type and the repeater type. The role of this equipment is to relay and rebroadcast the satellite signal to blind spots such as those in the shadow of a building.

Mobile Broadcasting Corp. is offering mobile broadcasting services using MBSAT and GFs.

MTV-S10 Multimedia Receiving Terminal for Mobile Broadcasting

OGAWA Masatoshi / SHINGU Koji / IZAWA Hidehito

Mobile broadcasting offers various features that are not available with conventional broadcasting; namely, a large number of audio services, QVGA (320 x 240 pixel) video services, and accumulated type data services whose stable reception is also possible in a high-speed moving environment. This will permit lifestyles in which audiovisual contents can be accessed in mobile situations such as while commuting, attending school, and outdoors.

Toshiba has developed the MTV-S10 multimedia receiving terminal that can receive mobile broadcasting services, becoming the first company in the industry to commercialize such a product. This terminal fully meets the Association of Radio Industries and Businesses (ARIB) standards for receivers for digital satellite sound broadcasting, and offers various original features.

LSI Chip Set for Mobile Broadcasting Receiver (1): Tuner LSI and CDM/FEC LSI

ABE Masahiro / YANO Motomitsu / ADACHI Toshimasa

The 2.6 GHz mobile broadcasting service commenced in October 2004 operated by Mobile Broadcasting Corp. (mbco). Toshiba and mbco have developed an LSI chip set that is a key component of a mobile receiver for the mobile broadcasting service. The mobile receiver is composed of a front end with a tuner, a code division multiplex (CDM) demodulator LSI and a descrambler LSI, and a back end with an audio-video (AV) decoder LSI.

Toshiba has developed three types of LSIs for the front end: a phase locked loop (PLL) LSI (TB1292FLG), an in-phase signal/quadrature-phase signal (IQ) conversion LSI (TA1374FLG), and a CDM/forward error correction (FEC) LSI (TC90A82XBG). This LSI chip set realizes a mobile receiver that achieves lower power dissipation, compact size, and cost-effective, high-quality performance.

LSI Chip Set for Mobile Broadcasting Receiver (2): Conditional Access LSI and AV Decoder LSI

ISHIKAWA Shoichi / ASANO Atsushi / SHIBA Masue

Toshiba has developed a conditional access LSI (T6NA7XBG) and an audio-video (AV) decoder LSI (TC35280XBG) for a mobile receiver for the mobile broadcasting service. The conditional access LSI is able to descramble the transport stream (TS) transmitted through demodulator LSI output. The AV decoder LSI has functions to demultiplex audio, video, and data signals, and to decode MPEG-4 data and AAC data using the TS after descrambling. The AV decoder has firmware that can be applied to the mobile broadcasting service.

These LSIs are being provided as key components to realize a mobile receiver taking small package size and low power consumption into consideration.

Toward Further Development of New Business Fields for Mobile Broadcasting Service

KATO Akira / YAMAGUCHI Yoshitake

Stable television reception in outdoor environments has finally been realized by the introduction of the mobile broadcasting service. This service may dramatically change people's lifestyles, and it is hoped that it will create a huge new market. The mobile broadcasting service covers the whole of Japan with a dedicated satellite, enabling people to enjoy a variety of programs even when in transit at high speeds using a small terminal that does not require a dish antenna.

Mobile Broadcasting Corp. is aiming to develop new business fields in long-distance buses, marine vessels, and aircraft by fully utilizing these characteristics of this service.

Feature Articles

User Interface for Wireless Networks Featuring Visualization of Information

YONEYAMA Takahisa / YOSHIHARA Hiroto

Computer networks and resources are now becoming available anywhere and anytime with the growth of wireless network infrastructure and the advent of inexpensive mobile devices. In the near future, when ubiquitous computing is realized, users will be able to use such computer networks and resources without any problematic operations. In the present computing environment, however, networks cannot be said to be easy to use because they require complicated and troublesome setup.

To make wireless networks easy to use, Toshiba has developed a utility for wireless devices called ConfigFree™. With ConfigFree™, we have attempted to achieve an intuitive and calm user interface design by visualizing complicated wireless networks.

Electronic Frequency Converter

OHKI Masayuki / OHTSUKI Midori / NAGAYAMA Noriyuki / ISHIZUKA Tomotsugu

Two electric power frequencies are used in Japan: 50 Hz in the eastern part of the country and 60 Hz in the western part. The Tokaido Shinkansen runs on 60 Hz single-phase electric power. Frequency conversion equipment is therefore required because the frequency changes at Fujikawa. There are many requirements in the construction of such frequency conversion equipment including high performance and efficiency, miniaturization of the equipment, high reliability, and easy maintainability.

We have developed an electronic frequency converter for electric railroads that meets these requirements by making full use of power electronics technology and microelectronics technology. This frequency converter is now contributing to stable power supply and steady services of the Tokaido Shinkansen.

Microwave Links for Digital Terrestrial Television Broadcasting

TAKATSUKI Eiichiro / KOHARA Norikazu

Digital terrestrial television broadcasting commenced in December 2003 in the Kanto, Chukyo, and Kinki regions in advance of its introduction throughout Japan. It has also been relayed from Tokyo to the northern Kanto area since October 2004 using microwave links to construct a single-frequency network (SFN). Digital terrestrial television broadcasting will also be launched in the northern Kanto area.

Toshiba has developed and delivered a transport stream studio-to-transmitter link (TS-STL), a transport stream transmitter-to-transmitter link (TS-TTL), and an intermediate frequency transmitter-to-transmitter link (IF-TTL) for the construction of this broadcasting network.

Radio Over Fiber (ROF) Remote Base Station

YAMAMOTO Seiji / IWATANI Yoichi / SHIMODAIRA Shinichiro

Mobile telephone systems started to provide person-to-person voice communication in the early 1990s. In the following generation, data communications via Internet connection were offered and the number of mobile telephone subscribers increased exponentially. For enhanced mobile communication, the third-generation (3G) system has now been standardized by the International Telecommunications Union (ITU), making multimedia services including streaming video available. New application such as electronic commerce with personal identification are also currently emerging on the business scene.

In view of the importance of maintaining high-quality communications in tall buildings or underground arcades, Toshiba has developed optical distribution systems for mobile telephone systems so as to enable users to communicate anywhere and anytime.

Staware™ Web Application Framework

IMAMURA Daisuke / SAITO Minoru / TSUKADA Makiko

With the widespread diffusion of Internet technology, many types of services are being provided via the Web. Toshiba Solutions Corp. has been developing numerous Web applications as a solutions vendor. Users are demanding higher quality and expandability and faster delivery of applications. To meet these requirements, we have developed a Web application framework called Staware™. This Web application framework has been applied to our own Web application development projects and delivered to customers together with several services.

Applying Model-Driven Architecture to Business Applications Development

HOSOYA Ryuichi / MURATA Naohiko / ZHANG Lan

Model-driven architecture (MDA) is a new set of technologies combining "model-centric" analysis and design concepts and standards for software development.

Toshiba Solutions Corp. is developing an MDA tool and also working on measurement and evaluation of the effects of MDA in business application software development. As a result, we have obtained two evaluation methods: a method based on measurement and analysis of the rate of model transformation, and a method based on the performance of systems development processes.

BHP-M46XS Built-in IH Cooking Heater with Large-Diameter Dual Type IH Coil

ESAKI Takeshi / TAKIMOTO Hitoshi / KONDO Masao

With the ratio of fully electrified houses among newly constructed houses in Japan having reached approximately 10 %, advanced built-in type induction heating (IH) cooking heaters are rapidly disseminating as a cooking appliance that requires no fire. Recognizing the high potential of this type of appliance, Toshiba commercialized the new BHP-M46XS cooking heater in June 2004 featuring high performance, user-friendliness, and an attractive design.

Frontiers of Research & Development

High-Speed Random Number Generation for Network Security Using Si Dot MOSFET

Chemically Recuprated Gas Turbine System Fueled by Dimethyl Ether