

TOSHIBA REVIEW

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Special Reports

Evolution of the Wireless Network Society

Pursuing the Realization of a Ubiquitous Wireless Network

URUI Kiyoshi

Wireless Network Society Becoming Reality

SAKURAI Shuichi / BABA Shinichi / ADACHI Katsumi / OGASAWARA Takashi

Due to the dissemination of wireless net-accessible appliances and facilities, we are entering a world where we can obtain any information anywhere and anytime. In fact, the very circumstances foretold by TV animated cartoons a generation ago as features of the 21st century have become a reality with the advent of wireless networking. Although most information that is required is currently sought on Internet websites, the necessary information to build a real ubiquitous society can also be found in the individual home. Toshiba has been incorporating networking functions into home appliances and made them accessible and controllable from outside of the home.

We are planning to lead the way in the ubiquitous network society through the delivery of various net-accessible appliances.

ConfigFree™ Network Utility Optimized for Ultimate User Interface

WATANABE Hiroyuki / TAKATO Hiromasa

ConfigFree™ is a network utility that provides trouble-free, location-based connectivity for wired and wireless networks (802.11 networks and Bluetooth™ devices) in order to make mobility easier and users more productive. Users can capture all the relevant settings for a particular location and then switch easily among location-based profiles as they move from one place to another. ConfigFree™ currently has network diagnosis, profile switching, wireless device search, Q-Connect, and SUMMIT functionalities, and continues to evolve as an all-round network software tool offering easy connection and a useful interface.

Enhanced Wireless Features of GENIO e830W PDA

TOKORO Tsuyoshi

Personal digital assistants (PDAs) have traditionally been used mainly for the management of personal information such as schedules and contact details. In recent years, however, the usage model for PDAs has been extended to network data access through network infrastructure improvements such as the introduction of high-speed wireless networks and improvement of the wireless features of PDAs.

The GENIO e830W is a wireless LAN and Bluetooth™ integrated PDA that has been developed with the product concept of a wireless network terminal. The necessary features for a network terminal, such as connectivity, usability, and security, are implemented so as to provide a ubiquitous-ready device for personal usage.

Collaboration in Pursuit of Connectivity

KATO Katsutoshi / KONO Shigeo / SAKO Ikuo

Wireless connection among various types of IT equipment has become popular, and customers expect that there should be no difference between wired and wireless communication. However, wireless communication has its own technical difficulties that may hinder connectivity with the smoothness offered by wired communication.

Through collaboration with a printer manufacturer, Toshiba has developed a technology for two-way wireless communication between PCs and printers. This new technology ensures user-friendly connectivity comparable to that of wired communication.

MyConnect™ Internet Service Offering Convenient Remote Access

BABA Shinichi / SHIMOTSUJI Shigeyoshi

Toshiba has launched MyConnect™, a new Internet service that provides broadband Internet access outside the office with a single account. MyConnect™ integrates separate services by constructing a flexible backend system based on Internet standard technology. The service enables mobile users carrying a Toshiba notebook PC to access the network easily at remote locations, thereby improving their productivity. MyConnect™ offers a flat fee plan so that small and medium-size businesses can reduce the effort involved in managing the use of remote accesses. Integration with cellular data services is seen as the next step.

Extension of FEMINITY™ Series Home Network System for Toshiba Network Home Appliances

ISSHIKI Masao / KAWAGUCHI Shunro / HIRAHARA Morio

The FEMINITY™ series home network system for network home appliances is developing as expected in tandem with market demand. It is also attracting attention as an element of the social network infrastructure. With the increasing dissemination of the broadband network infrastructure to houses and condominium buildings, residents of newly built apartments are expressing the need for appliances and services that offer a more bountiful and safer life. In this context, broadband network home appliances and services are a form of housing infrastructure that realize a new value; namely, life with real-time information.

This paper introduces the latest system configuration of the FEMINITY™ series home network system, which was launched on the market in April of 2002, as well as the latest features of related appliances. The deployment of the FEMINITY™ system to various types of housing is also described.

Mobile Phone Products with Bluetooth™

IMAMURA Makoto

Toshiba has started to distribute mobile phones with Bluetooth™ technology, making the first delivery of the A5504T model to KDDI Corp. As the original purpose of the introduction of Bluetooth™ technology was to incorporate hands-free functions into mobile phones by wireless communication, many other possibilities were researched and developed in the marketing stage taking advantage of the excellent features of the combination of Bluetooth™ and mobile phone technologies.

It is true that Bluetooth™ technology has made mobile phones more convenient. Even so, many other application concepts are coming into view. We are planning to further increase the convenience of mobile phones in step with their development.

Deployment of Bluetooth™ Technology to AV Equipment

TEZUKA Fumiyoshi / NAKASATO Shigemi

Toshiba has formulated a new application proposal to connect PCs and mobile phones to an HDD&DVD video recorder. We have developed an interactive wireless technology for controlling an HDD&DVD video recorder via PC and mobile phone using Bluetooth™ technology that enables two-way communication. The HDD&DVD video recorder functions as a home storage server for editing picture data from PCs and mobile phones.

We have built an experimental system based on investigations of various possible applications for a product with a concept relevant to audiovisual (AV) equipment, and are currently verifying its usefulness and improving various functions.

Challenging Next-Generation Wireless Technologies: UWB

MATSUMURA Masafumi / NAKAGAWA Hideyuki / MIYASAKA Toshiki

Short-range wireless technologies suitable for connection between devices have become popular in recent years. In particular, there has been a remarkable dissemination of wireless LAN not only in offices but the home environment as well, as the number of devices that can be connected to the network increases. In the personal area network (PAN) area, Bluetooth™, which is mainly used for cellular phones and headsets, is becoming popular. In addition, ultra-wideband (UWB), which is the next-generation wireless technology and has the feature of very high-speed data communications, is expected to replace high-speed cable interfaces and be used for the wireless transmission of moving pictures.

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

Feature Articles

Technology for Performance Improvement of Wireless LAN System and Terminals

MATSUO Ryoko / OBAYASHI Shuichi / KODAMA Toshikazu

With wireless LAN achieving higher speeds, lower-cost availability, and easier usage, its applications have expanded from personal computers to their peripherals and even audiovisual equipment. However, this wide proliferation has given rise to significant problems that must be solved, such as effective radio frequency management with a limited number of allocated channels, and the realization of wireless LAN devices with higher throughput and lower power consumption.

This paper describes two specific examples of Toshiba's new approaches that are applied to both the access point and terminals to solve these problems.

Realization of Ultrathin and Ultralow-Leakage SiON Gate Dielectrics

MATSUSHITA Daisuke / MURAOKA Kouichi / KATO Koichi

Toshiba has developed a gate silicon oxynitride (SiON) film with the world's smallest thickness and lowest leakage current for next-generation CMOS. It has been difficult to realize SiON film with a high dielectric constant and good interfacial properties, because if we oxidize a SiN film, not only oxidation of the SiN/Si interface but also that of the bulk SiN and its surface occur simultaneously due to its low oxidation resistance. We found that oxidation-resistant Si₃N₄ film can be formed by uniformly arranging threefold coordinated N atoms into the Si subsurface layer, and successfully incorporated O atoms into the SiN/Si interface with minimum disruption to the SiN structures.

Using this novel process, we have realized a high-quality ultrathin gate SiON film having an equivalent oxide thickness of 0.7 nm and a leakage current of 95 A/cm² (which is 1/10 or less the conventionally achieved leakage current), with superior suppression of boron penetration ($\Delta V_{th} = 0.04$ V). The mobility is not degraded below 89 % that of the ideal SiO₂ film.

Matrixeye™ Portable 3D Ultrasonic Inspection System

ABE Motohisa / KARASAWA Hirokazu

Toshiba has developed the Matrixeye™ portable 3D ultrasonic inspection system. Matrixeye™ is a new-concept inspection system because it can visualize defects, delamination, and foreign matter within materials three-dimensionally. One of the key devices of the system is an ultrasonic camera, which contains a large number of small piezoelectric elements that have ultrasonic transmission and reception capability. Matrixeye™ synthesizes a three-dimensional image of defects by high-speed processing of ultrasonic echo data collected by electronic scanning performed by the ultrasonic camera. The system is designed for portability and convenience and offers easy operation and speedy inspection.

The Matrixeye™ system has already been launched on the market, and is expected to be widely applied in many industrial fields including automobiles, railroads, plant facilities, and aircraft.

Public Sector Accounting Reform and Solution Technology

MATSUSHITA Kunihiko

The financial status of local governments in Japan is very critical at present, with political decentralization being strongly promoted and local governments acquiring more power as well as greater responsibilities. The current public sector accounting system only manages cash inflow and outflow with a cash-based, single-entry accounting system, but there are increasing demands for the management of assets and liabilities. Accrual-based, double-entry accounting is therefore required in addition to the current accounting system.

To meet these requirements, Toshiba Solutions Corp. has developed an accounting information system that can deploy a double-entry system without changing the operations of local governments. Crucial technical features of this system are single-to-double transformation and information collection.

World's Fastest Elevator (1,010 m/min)

MATSUO Shigenori / HIRAI Masaaki / MIZUNO Sueyoshi

The Taipei 101 Building, the tallest building in the world with a height of 508 m, was opened on December 31, 2004. Toshiba Elevator and Building Systems Corp. supplied 61 elevators for this building, including the world's fastest elevator with a speed of 1,010 m/min, as well as 50 escalators, making a total of 111 elevators and escalators.

In designing these elevators we placed particular emphasis on realizing a high-speed yet comfortable ride, including solving the issues of vibration and noise. The main technique employed in the elevator development process was numerical simulation, followed by verification through acquisition of data at the site using actual machines. Good performance was obtained as a result.

Frontiers of Research & Development

Wristwatch-Style Sleep Stage Sensor for Home Use Fully Enclosed Type Traction Motor