

Social Infrastructure Systems and Industrial Systems

In the social infrastructure systems and industrial systems field, Toshiba is developing new technologies that support the foundation of society aiming at comfortable, secure and safe lives for all. We offer social infrastructure systems for communication facilities, new environmental business, broadcasting and communication, radio application, and also offer energy-saving and environment-conscious industrial systems such as equipment for power distribution, measurement, railway rolling stock, public offices overseas, an elevator using universal design, a thin type space-saving moving walk way and so on.

Development of Spotlight Prototype Device for Visible Light Communication



Spotlight type core device for visible light communication

A visible light communication system, that is, a new communication technology system using visible light has been attracting attention recently.

By utilizing this visible light communication technology, Toshiba has developed a prototype device which uses a spotlight as a tag of light.

The prototype device can modulate information and transmit it as a light signal by a LED spotlight, and the light signal can be demodulated to the original information by a special terminal.

This prototype device has the following features.

- It can be used as a light source and communication device simultaneously.
- It has good directivity, so we can recognize an information spot easily.
- Its electromagnetic waves have less effect on the human body.

Wireless Indoor Temperature and Humidity Sensor with a Built-In Solar Cell

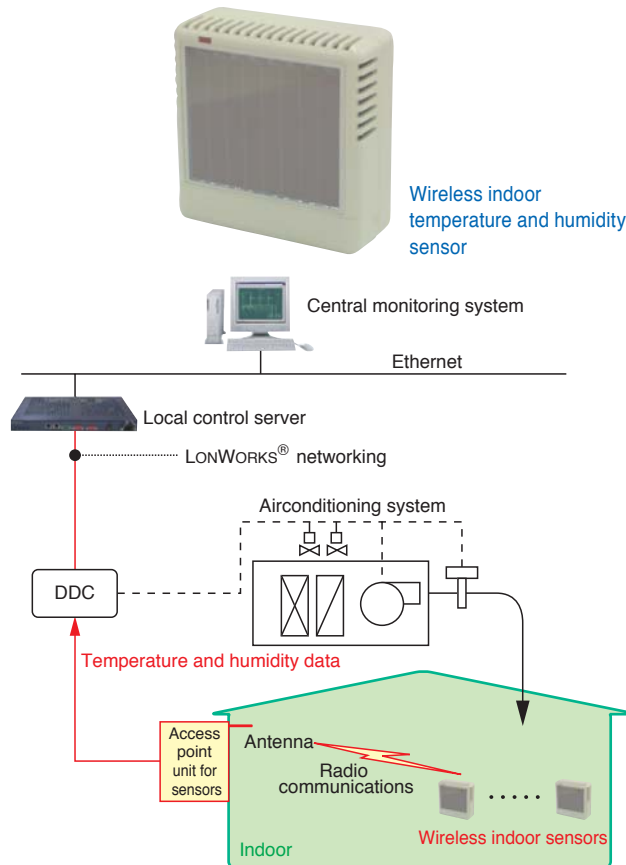
Toshiba has developed the first wireless indoor temperature and humidity sensor with a built-in solar cell in Japan^(*).

The sensor achieves long battery life through the use of the solar cell, which can utilize interior illumination effectively, and the sensor makes wiring work unnecessary and allows free installation of facilities.

Since an access-point-unit is connectable with a maximum of 16 sets of sensors, we can make a flexible system configuration for precise indoor environment management and data from sensors can easily be sent to a central monitoring system and air handling unit through a LonWorks[®] network system.

(*) As of November 2006 (as researched by Toshiba)

"LONWORKS" is a trademark of Echelon Corporation.



DDC: Direct Digital Controller for airconditioner

Application example of wireless indoor sensor

Biodesulfurizer for Food Factory Wastewater Treatment

Toshiba has delivered a bio-desulfurization system which effectively removes harmful hydro-sulfur (H_2S) components from biogas produced in the organic wastewater treatment process at a potato starch factory in Hokkaido.

Toshiba's microbial desulfurization technology is a process that removes H_2S by transforming it into sulfur or sulfate ions and water through a microbial bed.

This system makes it possible to use low-cost treated water obtained from an aerobic treatment process. It shows the remarkable progress of desulfurization technology to realize a very effective way to save on costs for desulfurization in biogas systems.

Compared to a typical conventional method using iron desulfurization agents with a high running cost, this new system reduces cost by 1/5 to 1/10.

This system, operating for three month every year in the autumn season in the potato starch factory, is one of the largest capacity^(*) industrial organic wastewater treatment plants in Japan.

(*) As of July 2006 (as researched by Toshiba)



Biodesulfurizer for food factory wastewater treatment

Digital TV Transmitters for KBS, Korea

Korean Broadcasting System (KBS), a public broadcaster in Korea, awarded a contract to Toshiba Corporation in November 2005 for the supply and installation of 72 digital terrestrial TV transmitters for their nationwide digital television network coverage. This is one of, if not the largest package contract in the supply history of digital TV transmitters ever in the worldwide market. Toshiba won this sizeable and symbolic project by outbidding the world-renowned competitors in Europe and the US.

The project had been planned for completion in time for the live coverage of the FIFA World Cup soccer games in Germany from May 2006, and Toshiba was able to successfully deliver all the 72 transmitters to various sites in Korea by overcoming unexpected difficulties and problems arising one after another within the very limited time frame.

Our current product line is expected to be in great demand in the forthcoming startups of digital TV broadcasting services in several regions of the world, such as the Americas and Asia. We are committed to the supply of even better quality transmitters on the basis of our abundant field experiences and the latest radio frequency technologies.

FIFA: Federation Internationale de Football Association



Hot stand-by type 2 kW digital TV transmitter

ON-AIR MAX™ Flash Memory Video Server for Overseas Markets

Toshiba has developed the ON-AIR MAX™, a video server for digital broadcasting in North America, deploying flash memory for data storage. It is a new model of VIDEOS™, the best-selling video server series as a spot server system for digital broadcasting in Japan.

Instead of Toshiba's original control protocol, the ON-AIR MAX™ supports VDCP (Video Disk Control Protocol) — commonly used communication protocol for video file server, and can be controlled from popular automation systems and video disk controllers on overseas markets.

The ON-AIR MAX™ is designed to be environment-conscious, and is in compliance with the RoHS Directive.

Employing a 16 Gbit flash memory chip, the memory unit achieved a huge 512 Gbyte recording capacity per memory unit. And by employing a low-cost MPEG-2 codec device, a low cost video codec was achieved.

In addition to the high reliability and performance achieved by deploying flash memory for data storage, the ON-AIR MAX™ realizes high cost performance and long recording duration by using a big capacity flash memory unit and a high compression MPEG-2 codec.



ON-AIR MAX™

IP-Based Exchange System for Telecommunications Network Operators

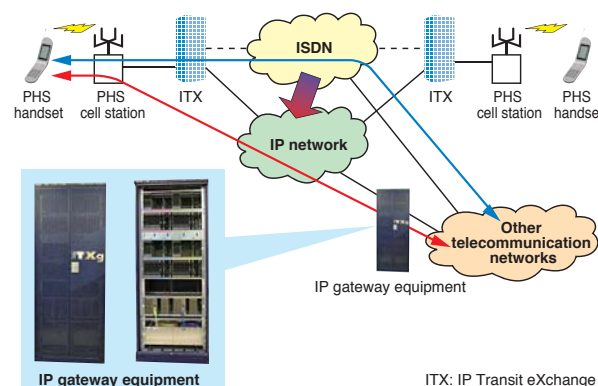
Toshiba has developed IP (Internet Protocol) gateway equipment, which enables a PHS(*) network operator to connect to other telecommunication network operators via an IP network.

Although communication between a PHS handset and another operator's phone had been via the existing ISDN network, the IP gateway equipment realizes network cost reduction by bypassing the existing ISDN network.

The main features are as follows:

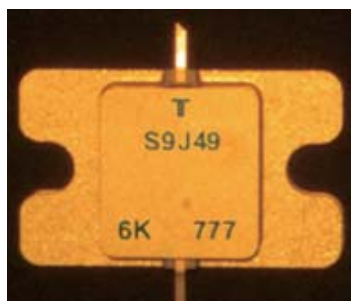
- **High reliability**
Highly reliable design is achieved by adopting duplex redundancy technology for the common control part and N+1 redundancy technology for line control part.
- **High performance**
Processing capability is 20 times higher than that of the existing equipment by adopting a high speed CPU (Central Processing Unit) and parallel processing technology.

(*) PHS (Personal Handy phone System): A type of mobile communication system developed as a Japanese Radio Standard and adopted by a number of countries including China, India, Thailand and so on.



IP-based exchange system for telecommunications network operators

X-Band GaN HEMT with 50 W Class Output Power

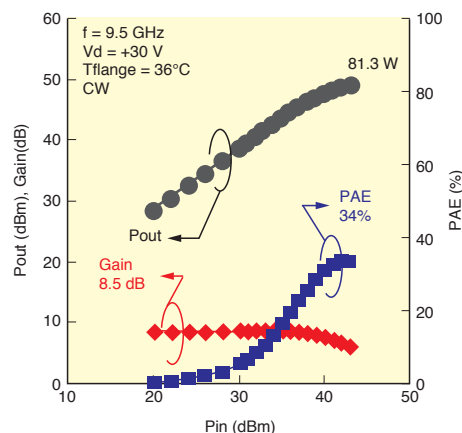


Gallium nitride (GaN) high electron mobility transistor (HEMT) made into a package

Toshiba has developed a gallium nitride (GaN) high electron mobility transistor (HEMT) with a 50 W class output power in the X-band (8 GHz to 12 GHz) frequency range designed for radar and satellite communication applications.

Gallium arsenide (GaAs) FETs have generally been used for microwave solid-state power amplifiers (SSPAs) in this high frequency range. The newly developed GaN HEMT achieves an output power of 81.3 W (49.1 dBm) at 9.5 GHz, the highest level of performance yet reported at this frequency and its power density is more than five times that of a GaAs FET.

Toshiba has realized this breakthrough performance enhancement by optimizing the epitaxial layer and the chip structures. This will enable our customers to increase the output power of SSPAs with smaller size.



PAE: Power Added Efficiency

Input-output characteristics of newly developed GaN HEMT

Radio Source Visualizing System

By the very virtue of the rapid growth in the widespread use of radio technology in our daily lives as typified by mobile-phones, wireless LANs, etc., this amenity in our society has reached a point of deadlock where it is endangered by a handful of illegal radio stations.

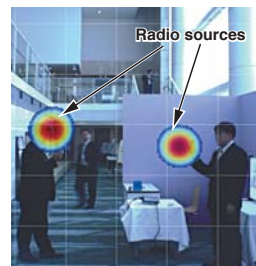
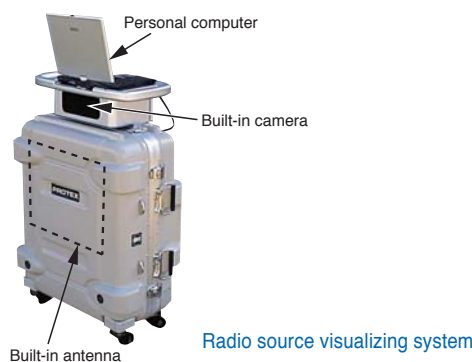
The Ministry of Internal Affairs and Communications of Japan assumes responsibility for monitoring and governing such illegal radio usage.

We have developed this radio source visualizing system as new equipment capable of plotting any radio-wave source position in real time onto a video image display, which we believe to be of effective assistance for the governmental radio-wave administration.

Our recent success in downsizing its antenna has made it feasible to containerize the system into a small suitcase, and thus, to strengthen the system's transportability and deployability for more effective surveillance of radio-wave emissions even in confined spaces like crowded business streets or underground malls.

Enhanced system performance in the frequency-range of 800 MHz to 6000 MHz is expected to enable the system to cope with such booming wireless services as advanced mobile-phones, wireless-LAN, WiMAX, and so forth.

WiMAX: Worldwide Interoperability for Microwave Access



Example of radio source visualization (In the case of mobile phone)

Environment-Conscious Air Insulated Switchgear

Toshiba has released a series of 7.2 kV air insulated switchgear units in consideration of the ever greater seriousness of environmental problems. This new type of switchgear realizes a 45% reduction in volume and 20% reduction in mass, in comparison with our previous products.

The concept of this product is based on the 3R environmental initiative, namely “Reduction of hazardous substances”, “Reuse of waste”, and “Recycling of resources”.

As for the reduction of hazardous substances, the use of lead-free materials, halogen-free materials and materials treated with galvanized trivalent chromate in the switching board is effective in minimizing the values of six particular hazardous substances restricted by the RoHS Directive^(*).

As for reuse and recycling, the use of a weld-free frame enables compartments to be reused. Recycling has been promoted by releasing documents in which recycle processes of materials used for switchgear are described.

Additionally, this is the first high voltage switchgear product in Japan to acquire the “EcoLeaf” Type III environmental label classified by ISO, and our company supplies quantitative information on the environmental load caused by products.

(*) The RoHS Directive (2002/95/EC) stands for “the restriction of the use of certain hazardous substances in electrical and electronic equipment”.



Environment-conscious air insulated switchgear

Interconnected Wireless Fire Alarm System for Domestic Use

Toshiba has developed an interconnected wireless fire alarm system for domestic use through joint research with Tokyo Gas Co., Ltd., Toho Gas Co., Ltd. and Hochiki Co., Ltd.

This system is composed of a “master-station” and “slave-stations”. The master-station is composed of a fire and gas alarm and a wireless unit, and each of the slave-stations is composed of a smoke alarm and a wireless unit.

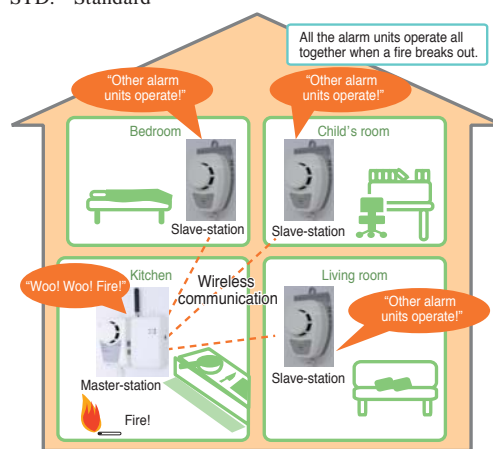
If one of the smoke alarms in this system detects a fire, all the smoke alarms installed in the rooms will generate “Warning (voice messages)” all together by wireless connection between “master-station” and “slave-stations”. The system will allow a quick escape in the event of a fire breaking out.

The main features are as follows:

- Automatic diagnostic function
This system periodically executes a function to check the stations as well as confirming the communication between the “master-station” and “slave-stations”, and generates an alarm when it detects a malfunction.
- Long life
Each slave station can run for five years on one battery because of energy-saving technology^(*).
- High communication quality
This system conforms to the low-power radio station standard (ARIB STD T67), and adopts advanced communication protocol, and a high gain helical antenna embedded in the “master-station”.

(*) Master-station needs an a.c.100 V supply.

ARIB: Association of Radio Industries and Businesses
STD: Standard



Interconnected wireless fire alarm system for domestic use

FS5000 Industrial Server



FS5000 industrial server

Toshiba has developed the FS5000 industrial server, which is characterized by high performance, long term supply, long term maintenance, and long term stable operation. The FS5000 can be used at such temperatures as 5°C to 40°C where a non-industrial server can't be used. The FS5000 is best suited for use as the main computer in a social infrastructure system and various types of industrial systems. It is also best as an embedded server in a high-speed data processing system.

The main features are as follows:

- High performance
High speed CPU [Intel® Xeon® processor (2.8/3.2 GHz, max. 2 CPUs)] and large-capacity memory (max. 8 Gbytes) are capable of achieving high performance for embedded use. The FS5000 achieves small size and high cost-performance ratio by equipping the function of the FS10000 high-end industrial server in the 2U size (about 88 mm) body.
- Long term supply
5-year product availability after release delivers long term supply.
- Long term stable operation, long term maintenance
Redundant power supply and RAID (Redundant Arrays of Inexpensive Disks) 0/1/10/5 function are capable of achieving the high reliability and high availability required in an industrial system. Furthermore these functions are covered by a 7-year maintenance plan after discontinuation of production.

"Intel" and "Xeon" are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Electric Equipment of AC EMU 700 Series for TRA (Taiwan Railway Administration)



TRA series 700 electric train and main converter

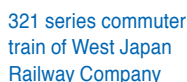
The AC EMU 700 series is a commuter and suburban train for TRA (Taiwan Railway Administration) and operating under the 25 kVac catenary voltage system.

Toshiba has delivered the electric equipment for the AC EMU 700 series (160 cars: 4 cars per train set, 40 train sets) to TRA.

The brief specifications of the electric equipment are as follows:

- Main converter: IGBT (Insulated Gate Bipolar Transistor), Four motor control, Natural air cooling system
- Main transformer: 2560 kVA, With tertiary winding, Forced oil cooling
- Auxiliary power unit: 150 kVA, IGBT, Forced air cooling
- Traction motor: 240 kW, 3-phase induction motor
- Monitoring system: Ethernet, 10 Mbps bus transmission

It should be noted that the traction motor is partially manufactured by a local Taiwan company based on the requirements of TRA.



Additional functions and services will be provided by introducing a broadband type of the on-board digital communication terminal unit.



Printed image of e-Passport

TU-G22 Barcode Reader on the Letter Sorting Machine for Canada Post Corporation

The letter sorting machine has the function of sorting pieces of mail by reading the fluorescent barcode on letters.

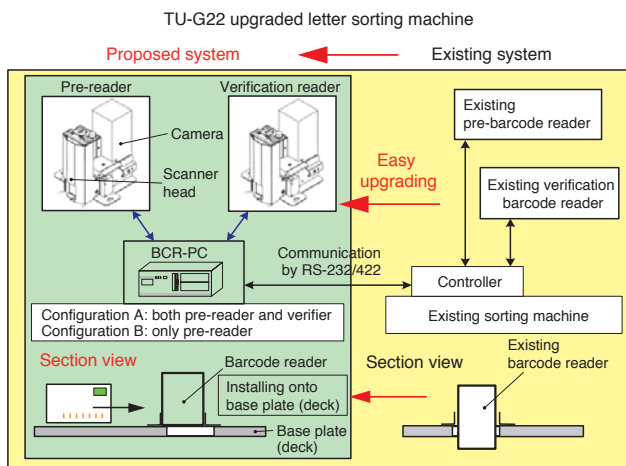
Toshiba has developed this barcode reader to replace the existing barcode readers of the letter sorting machine.

The letter sorting machine is capable of reading the new format barcode or reading at a better reading rate by replacing the barcode reader unit.

The main features are as follows:

- High reading rate by using original image processing
- High reading performance (more than 52,000 pieces of mail per hour)
- PC based system configuration for easy replacement and remote maintenance via LAN

We found a new market for our products replacing the barcode units for letter sorting machines using these features.



BCR: Barcode Reader

TU-G22 upgraded letter sorting machine

GB-5600 Medium-Speed Banknote Processing Machine for Foreign Central Bank

Toshiba has developed the GB-5600, a medium-speed banknote processing machine for foreign central banks.

The function of the GB-5600 is as follows:

- Counting of banknotes
- Authentication of banknotes
- Check of condition of banknotes (Fitness for recycling)
- Banding of 100 banknote bundles
- Decommissioning of dirty banknotes by on-line shredder

The GB-5600 with a process speed of 1200 notes/min is the smallest machine of this speed range. The GB-5600 achieves a 35% reduction in the installation area compared with that of other brands. Therefore, the installation of a medium-speed machine even in a small branch becomes possible. Furthermore, since the GB-5600 was designed based on a low-speed banknote processing machine, the FS-810, which won the German design award (iF design award) in 2005, its outstanding operability is superior to that of other brands.

iF: international Forum

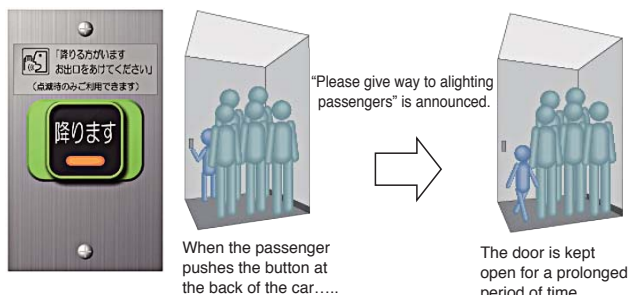


GB-5600 medium-speed banknote processing machine

SPACEL-EX™ Safe and Secure Standard Elevator

Toshiba Elevator and Building Systems Corporation has developed a new model SPACEL-EX™ and started shipping in July 2006. The features of the SPACEL-EX™ include “emergency rescue operation”, “automatic recovery operation” and “restart operation” in compliance with the Elevator Earthquake Disaster Prevention (draft new guideline) issued by the Land, Infrastructure and Transportation Ministry.

Universal design was also applied in this model, such as the “attention” door sensor to remind passengers not to jam their hands in the doorway, and the “alert” button at the back of the car for alighting passengers when the car is crowded. With these features, it has won favorable notices as a product offering kindness and hospitality. We will continue our effort to develop safer and more secure elevators in the future.



Alert button for alighting

Thin Type, Space-Saving Moving Walkway

Toshiba Elevator and Building Systems Corporation installed thin type, space-saving moving walkways at Terminal 2 of Tokyo International Airport in January 2007.

The pallets of the walkways are driven endlessly from over-to under-floor spaces with chains and chain wheels. Using chain wheels of smaller diameter and with fewer teeth for driving the pallets, the under-floor pit depth can be decreased from the conventional max. 1050 mm to a space-saving 500 mm.

To reduce pulsation by compensating for the polygon effect inherent to driving chain wheels having less teeth, a guide mechanism that diverts the chains by several millimeters is used to improve riding comfort.

The noise of driving pallets has also been reduced by minimizing impacts accompanying the above diversion operation and the transmission of vibration.



Thin-type moving walkway