Social Infrastructure Systems

In the social infrastructure systems field, Toshiba is developing technologies for monitoring and controlling the support social infrastructures to achieve a society where people can lead a secure life. We supply integrated monitoring systems for huge complexes of facilities, wireless control systems for air conditioners, Japan's first remediation facility for PCB-contaminated soil, and so on.

Expansion of Wireless Network of Controllers for Individual Air Conditioning System

Toshiba has developed a new wireless control product enabling radioization of the higher rank network for the first time[*1] in the industry in addition to wireless control products for automatic individual air-conditioning fan coil unit (FCU) and variable air volume (VAV) between controllers and setting machines.

The access point will be used as a relay point, and is capable of cooperating with a central monitoring system or other air-conditioning controllers (DDC) through a LONWORKS® network, so flexible systems can be easily built by using these products.

The access point is also capable of calculating the quantity of air needed between an air-conditioning controller and VAV controllers and choosing the maximum or minimum temperature form of the VAV controllers.

DDC : Direct Digital Controller
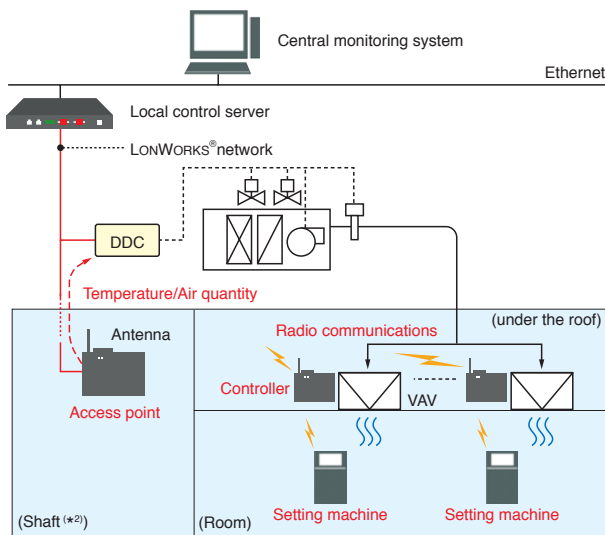
Example of wireless controller application

(*1) As of November 2007 (as researched by Toshiba)

(*2) Spaces provided in buildings for wiring in the vertical direction

Building Automation System for Tokyo Midtown

Tokyo Midtown and view of control room

Tokyo Midtown, which is a huge complex of facilities including offices, hotels, residences and shops, opened in March 2007 on a site that once belonged to the old Defense Agency.

Toshiba has developed a server BUILDAC™ which is capable of controlling more than two buildings.

The BUILDAC™ watches and controls about 40 000 points, and is structured as a dual system in the important facilities. Installing local servers on every floor reduces risks and improves reliability. This system uses the BACnet[*] protocol and simplifies communication with other facilities.

(*) A data communication protocol for building automation and control networks developed by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) in 1995.

The First Plant for Remediation of PCB-Contaminated Soil in Japan

In recent years, problems related to polychlorinated biphenyl (PCB)-contaminated soil have increased, so safe and dependable remediation technology is required to reduce the environmental burden on future generations.

Toshiba has developed a technology called "geosteam technology" for the remediation of PCB-contaminated soil. This technology reliably destroys PCBs by a chemical reaction using steam. Following step-by step verification of this technology by public tests, Term Corporation, in cooperation with Toshiba and Konoike Construction Co., Ltd., has built Japan's first commercial plant for remediation of PCB-contaminated soil in Kitakyushu City. Term Corporation concluded an agreement on environmental protection with Kitakyushu City in March 2007, and started practical remediation in August 2007.

We intend to continue developing remediation technology to reduce the future environmental burden.

Remediation facility for PCB-contaminated soil

## Starting a CDM Project in Vietnam

Existing lagoon of tapioca starch processing company

Toshiba signed a contract for a CDM (Clean Development Mechanism) Project with a tapioca starch processing company, located in Tay Ninh province of Vietnam.

Wastewater from the starch manufacturing process of this company is currently treated in simple open lagoons. Because of the high concentration of organic remains in the wastewater, methane gas is generated and emitted to the atmosphere from open lagoons due to natural fermentation of the organisms. In this project, methane gas emissions have been reduced by encouraging methane formation and collecting it by improving the existing wastewater treatment facility of this company.

The captured methane is converted to thermal energy for use in the factory and thus saves energy, and also reduces greenhouse gas emissions from coal combustion.

This co-benefit project is expected to help reduce global warming while benefiting the rural economy, as well as to improve the local area environment.
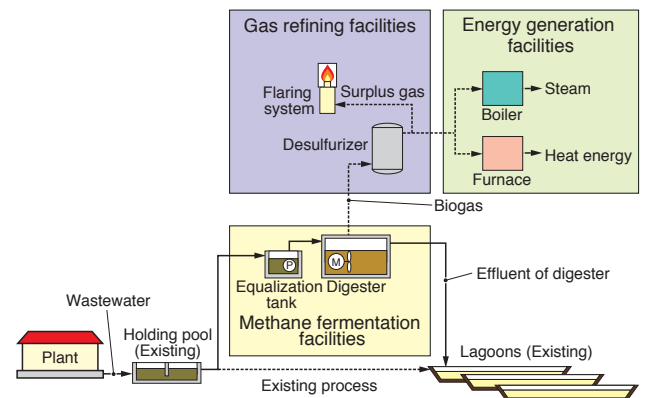
Process flow of CDM project facilities

Program Playout Server System Using Flash Memory Video Server

Toshiba has developed a program playout server system that records and plays program material in television broadcasting.

The system uses Toshiba's flash memory video server VIDEOS™ (the name ON-AIR MAX™ is used worldwide).

VIDEOS™ is capable of handling up to 8 inputs and 15 outputs simultaneously in HDTV or SDTV format. After the start control is accepted, VIDEOS™ can be accurately played in 2 seconds.

VIDEOS™ uses a 16-Gbit flash memory chip as the recording medium, and is capable of recording MPEG-2 (Moving Picture Experts Group-phase 2) compression HDTV video material of 50 Mbps on one memory board for about 19 hours. The maximum material recording time by one system is about 400 hours.

The system has a virtual editing function that modifies the video/audio level and start/end point of the program. Moreover, at the time of recording, upconverting of SDTV material to HDTV and insertion of closed caption data into the content are possible.

SDTV : Standard Definition TV
HDTV: High-Definition TV

Program playout server system using VIDEOS™

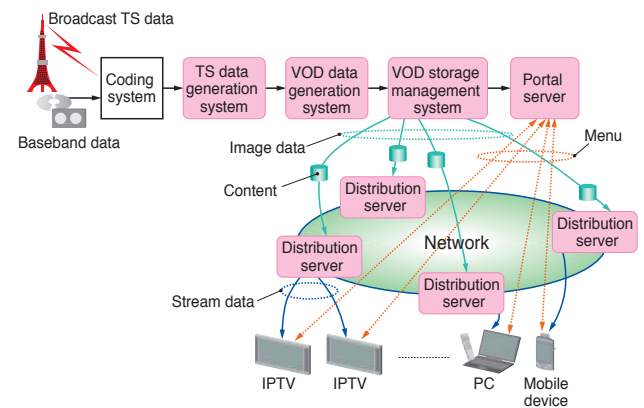## Video-On-Demand System for IPTV

The demand for Internet Protocol (IP) TV service using IP networks to distribute high-definition (HD) pictures to digital televisions (DTV) etc. is increasing.

Toshiba has developed a video-on-demand (VOD) system in conformity to the Japanese IPTV standard. It supports MPEG-2 and H.264 as an image codec and MPEG-2 AAC as a voice codec.

This system offers a variety of high-performance functionality, with advanced technologies such as structure check and data conversion of image material data, data generation at forward and reverse scan, and decentralized administration equipped for intensive access to a specific picture.

The performance of the total system including IPTV, personal computer (PC), mobile terminal equipment, etc. has been successfully verified. Consequently, the system has contributed to the smooth introduction and operation of the IPTV service.

AAC: Advanced Audio Coding


TS: Transport Stream

Video-on-demand system for IPTV

Ku-Band GaN HEMT with 50 W Class Output Power

Toshiba has succeeded in developing a Ku-band gallium nitride (GaN) high-electron-mobility transistor (HEMT) with output power of over 50 W, expecting it to be used in solid-state power amplifiers (SSPAs) for satellite communication (SATCOM) systems etc.

The newly developed Ku-band GaN HEMT achieves peak output power of 65 W (48.15 dBm) at 14.5 GHz, the highest level of performance yet reported at this frequency. The power density of the HEMT is more than four times as high as that of GaAs FETs. The key to our success is the improved process for forming via-holes on a GaN substrate.

The new HEMT is expected to enhance the performance of SATCOM systems in terms of higher output power and smaller size.
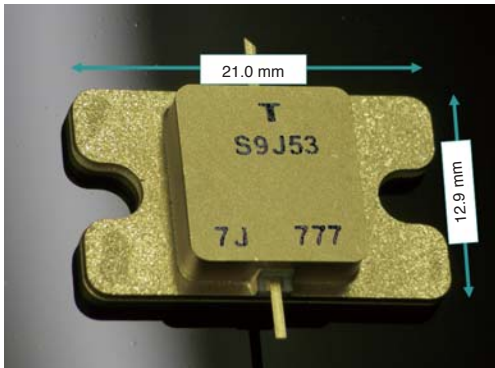
External view of Ku-band GaN HEMT
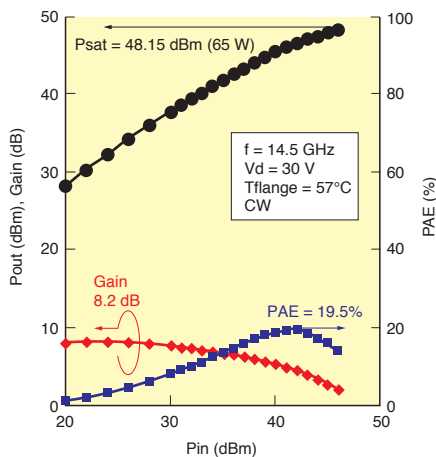
PAE: Power Added Efficiency

Input-output characteristics of Ku-band GaN HEMT

Pinpoint Weather Prediction System

Image of the local weather prediction service for cellular phones

Toshiba has developed a fine, highly precise three-dimensional (3D) pinpoint weather prediction system with enhanced performance by introducing additional weather radar observation information, and has started offering a local weather prediction service for cellular phones all over Japan.

The 3D pinpoint weather prediction system has become feasible by using high-speed PC-cluster parallel operations, enabling pinpoint weather analysis as fine as less than 1 km square mesh. This means that localized weather phenomena like thunderstorms accompanied by fast-growing cumulonimbus clouds can be properly examined and predicted. The system employs Toshiba's data assimilation technology and algorithm, which uses the data differences between current radar-scan data and previously computed data for prediction, thus delivering agile but precise predictions of rapidly changing weather.

The 3D local weather prediction system can be flexibly customized to various users' needs such as 3D distributions of precipitation, wind speed and so forth, as well as detailed weather prediction information over the area of interest. Toshiba may also incorporate the system into customer-owned weather radar or Toshiba's newly developed solid-state compact weather radar to build a fine, highly precise weather observation and prediction system.

Newly developed solid-state compact weather radar