2009-2010
HITACHI TECHNOLOGY

Information & Telecommunication Systems

- Solutions and Services
- Software
- Hardware
- Network Systems
- Information & Control Systems
- Hard Disk Drives
- Semiconductors

Green IT Measures for Building IT Infrastructure that Takes Account of Environment

As an all-round IT vendor supplying products ranging from IT equipment such as servers and storages through to system solutions and services, Hitachi is working to reduce the burden that IT places on the environment and to help build a sustainable society. Rather than viewing IT simply as a means to achieving lower costs and higher productivity, Hitachi promotes the concept of Green IT whereby it aims to take a comprehensive view of IT infrastructure development that includes its role in contributing to the environment.

Hiroshi Go (left), Department Manager, Energy-saving Center Promotion Department, Outsourcing Data Center, Outsourcing Services Division; Mitsukiyo Tani (right), General Manager, Environment Control Department, Environment Policy Division, Information & Telecommunication Systems

Multifaceted "Green of IT" Measures Aim to Save Power

Green IT measures to reduce the burden on the environment are becoming more commonplace in the IT (information technology) sector as various industries accelerate their actions against global warming such as improving energy efficiency. As a provider and user of IT, we promote Green IT through both "Green of IT" which involves reducing energy use by IT systems themselves and "Green by IT" whereby efficiency improvements achieved through the use of IT to reduce energy consumption in other areas.

Through "Green of IT," we aim to improve the energy efficiency of the full range of IT products including at the components, instruments, and operational levels. In the area of datacenters in particular, which are growing in size, we are working on an eco-friendly datacenter project that aims to reduce power consumption by up to 50% by fiscal year 2012 through a multifaceted range of different power saving measures including air conditioning. In addition to working on modular datacenters that make efficient use of energy and space, the project is also aiming to reduce energy consumption at a datacenter due to open in Yokohama, Kanagawa Prefecture in 2009 to 80% of previous levels and achieve a PUE (power usage effectiveness)[1] of 1.6 that is a top rank value as an energy efficiency indicator for datacenters.

Visualization of Effects as Key to "Green by IT"

"Green by IT" can provide a range of different environmental benefits, including our objective of utilizing IT in the social infrastructure systems we supply to reduce the burden on the environment. One of the issues faced by "Green by IT" is that, while it can be expected to help reduce the burden on the environment in a wide range of fields outside the IT sector, these benefits can be difficult to identify. For this reason, we have developed a method for quantitatively evaluating the extent to which our solutions reduce the burden on the environment. The method, which conforms with the guidelines of the Japan Forum on Eco-Efficiency[2], is called "SI-LCA (system integration-life cycle assessment)" and is applied to system, software, and service products to calculate the burden they place on the environment over their entire life cycle from design and development through to equipment recycling or disposal. The assessment represents the environmental impact of the products in terms of CO_2 emissions. SI-LCA is applied to various Hitachi solutions to assess and evaluate their benefits. For example, an agricultural information management system developed by Hitachi Software Engineering Co., Ltd. has been assessed as being able to provide an annual reduction in CO_2 emissions of approximately 30% by optimizing work through the use of satellite images and geographic information.

Green IT at Hitachi with Broad-based Perspective

In addition to working hard on incremental improvement, Green IT also requires that we come up with innovative measures by taking a step back and looking for ways to bring together technologies across a range of different fields. For example, the eco-friendly datacenter project optimizes the air conditioning environment through the use of sensor network technologies and by working with air conditioning experts employed within the group as well as through the adoption of our products such as state-of-the-art inverter-based air conditioners and low-loss transformers. In this way, cooperation and collaboration between different areas delivers new benefits.

At the Green IT Award 2008 run by the Green IT Promotion Council, in which Hitachi is an active participant, the eco-friendly datacenter project won the Jury's Special Award for "Energy Saving in IT" and the agricultural information management system won the Green IT Promotion Council Chairman's Award for "Energy Saving in Society by IT." By promoting environmentally friendly business operation throughout the group, we will use our comprehensive strengths in Green IT to work proactively on leading-edge examples of this technology to ensure that IT contributes to the building of a sustainable society.

[1] A smaller PUE value represents greater efficiency in the use of electric power. According to a survey by the Japan Electronics and Information Technology Industries Association, the average value of PUE for datacenters in Japan is 2.2.

[2] Administered through the Japan Environmental Management Association For Industry, the forum provides a means to exchange information through reviews, surveys, and research on the spread and development of environmental efficiency based on trends in this field in and outside Japan.

Hitachi Adaptable Modular Storage 2000 Series to Deliver Ease-of-use with Lower Administration Costs

Hitachi is proud to introduce its new Hitachi Adaptable Modular Storage 2000 Series to a market for mid-range storage that continues to grow year by year. One unique feature of the new series is the integration of the Hitachi Dynamic Load Balancing Controller which significantly reduces the total cost of ownership. The series is also highly regarded for being the first to meet the challenge of both supporting SAS disk drives and combining SAS and SATA disk drives in the same cabinet.

Tetsuya Abe (left), Engineering Manager, Products Planning Department, Strategic Business Planning; Atsushi Ishikawa (middle), Engineering Manager, Disk Array Software Development Department III; Mitsuhide Sato (right), Engineering Manager, Disk Array Hardware Development Department II, Storage Systems Development, Disk Array Systems Division, Information & Telecommunication Systems

Drastic Simplification of Installation, Operation, and Administration Work

Server virtualization and infrastructure integration are increasingly being adopted in small- to mid-range systems as well as in large-scale systems as a way of improving the operational efficiency of the system. This trend is boosting demand for mid-range storage with high cost-performance that can adapt flexibly to use in a wide range of different system environments.

In response to this growing demand, we developed the Hitachi Adaptable Modular Storage 2000 Series for the mid-range storage market, incorporating excellent features that are not seen in competitors' products. The development concept was to target ease-of-use with the aim of reducing the workload associated with pre-installation design and other configuration work.

For example, the Hitachi Dynamic Load Balancing Controller function balances the load between the two internal controller boards dynamically and automatically. This delivers significant savings in effort and cost because tasks such as path setup, pre-installation performance design, and post-installation tuning no longer need to be performed manually. The support for non-disruptive online firmware upgrade provides higher up-time and allows optimization of overall system performance.

The new series supports Hitachi Dynamic Provisioning that brings cost savings, automated performance optimization, and easy provisioning to mid-range customers. This function creates virtual disk pools that can be over-allocated to provide thin provisioning, and can also spread wide-stripe data across all available drives in the pool for performance improvement through parallelization.

World-first Support for 480 SAS Disk Drives in Mid-range Storage System

The greatest challenge in developing the Hitachi Adaptable Modular Storage 2000 Series was the change from FC (fibre channel) to SAS [serial attached SCSI (small computer system interface)] for the back-end interface. However, we were able to utilize know-how and technology accumulated through past experience to become the first in the world to succeed in overcoming this major hurdle. Because the new series allows up to 480[1] high-speed, high-reliability SAS disk drives and high-capacity, low-cost SATA (serial advanced technology attachment) disk drives to be contained in the same cabinet, the ability to adapt flexibly to the user's system environment can be combined with excellent cost-performance. More than doubling the capacity of the standard tray, the High Density Storage Expansion Tray installs up to 48 SATA disk drives in 4U. This provides even better space efficiency for installation at sites such as data centers.

The Hitachi Storage Navigator Modular 2 administration tool developed with the aim of significantly reducing the volume of GUI (graphical user interface) operation compared to previous systems was one of the challenges faced in the pursuit of making the system easy to use. In addition to being able to use a wizard to perform all the necessary setup at installation, a menu of specific operations is also available to allow configuration settings and operational management to be performed without requiring any special skills.

World-leading Figures Recorded in Benchmark Tests

Since its release on the market, the Hitachi Adaptable Modular Storage 2000 Series has developed an excellent reputation in the global market including winning a Products of the Year Bronze Award for 2008 in Storage Magazine and Search Storage.com. This is the top prize awarded to a mid-range storage system. When tested using SPC (Storage Performance Council) Benchmark-1, a benchmark for mid-range storage products, the system recorded the top-class results for data I/O (input-output) processing speed and response time[2], which made those of us involved in development feel very proud.

As a product category with a growing band of users, mid-range storage systems need to face up to a number of challenges including how to respond to the era of thin provisioning, energy efficiency, and cloud computing. At Hitachi, we are working hard to respond to these challenges and our promise is to continue providing the users of the world with ease-of-use and unique functions not available from competing products.

[1] When using Hitachi Adaptable Modular Storage 2500
[2] As of March 23, 2009

Advanced Electrical Control System and Large Capacity IGBT Inverter Drive for Global Steel Market

New steel plants are under construction in several countries, backed by the growth in the global demand for crude steel. Hitachi has extensive experience and has acquired technology over many years through the supply of advanced electrical control systems to steel manufacturers to achieve high-quality and highly efficient production. A newly developed inverter drive has significantly improved maintainability, control performance, and efficiency.

Katsuyoshi Murakami (left), General Manager, Electrical Control Systems Division;
Hiroshi Nagata (right), Senior Engineer, Drive System Center, Power Electronics Division,
Information & Control Systems Division, Information & Telecommunication Systems

Delivering the Reliability and High Quality Required by Large Plants

Global production of crude steel grew by about 50% over the past five years and during this time Japanese manufacturers expanded their markets internationally with high-quality products. Even in these circumstances, building a new plant is a very large investment for a steel manufacturer. The total cost including the electrical equipment, systems and the mechanical equipment used in the production plant can reach billions or tens of billions of yen. Therefore, steel manufacturers want to commission new plants on schedule and achieve stable operation as quickly as possible. We have responded to these demands by supplying products with improved reliability and quality, including plant controllers, motors, drives, and large electrical control systems such as those used in rolling mills. More recently, we have developed equipment for use in large-scale systems such as hot rolling mills, including variable-speed AC (alternate current) induction motors rated at 10 MW or higher to replace traditional DC (direct current) motors and inverter drives that use large-capacity IGBTs (insulated gate bipolar transistors) rated at 15 MVA or more to drive these motors, and have achieved improved product quality with strip thickness control down to the micrometer level by combining these with advanced electrical control system technologies that utilize the latest control theory and control equipment.

Flexible Drive by Using "Cell Design"

A feature of this drive is that the same model can be used to drive motors with a wide range of different capacities. With rolling mills using motors with various different capacities, the ability to operate these using fewer types of drive brings benefits in the form of simpler equipment configuration and easier equipment maintenance through shared spare parts.

This is achieved by the "cell design" concept used in the drive. Motors used in rolling mills cover a wide range of capacities from several kW to more than 10,000 kW. However, by designing the main drive circuit formed by the IGBTs as a unit and then treating each of these as a "cell," drives able to power motors with various different capacities can be configured flexibly by selecting the appropriate IGBTs and number of parallel and serial cells to match the voltage and current of the motor. If a fault does occur, it can be repaired quickly by replacing the faulty cell. The introduction of the "cell design" concept has also improved work efficiency at the site where drives are assembled and contributed to faster delivery.

Pursuit of High Quality and High Efficiency Helps Protect Environment

An inverter is a device used to convert the electric power to drive an electric motor. Accordingly, the most important considerations for a drive are how efficiently it can convey power to the motor and to what extent it can reduce energy losses. In a large plant such as a steel mill, small improvements in efficiency can translate into considerable differences in annual costs. Although inverters already achieve conversion efficiencies of about 98%, we are working on achieving even greater efficiency through measures such as minimizing losses in the IGBTs by optimizing the switching frequency and lowering circuit losses by reducing the number of components. As a manufacturer, we see our role as being the pursuit of higher efficiency, even if it is only by 0.1% at a time.

Combining drives with electrical control system technology to meet customer needs for high-quality products and highly efficient production also has the consequence of lowering energy use and this would help reduce the burden on the environment, something that is an issue throughout our society. We also wish to contribute to the growth of overseas steel markets including China, India, and Brazil by utilizing Hitachi's highly accurate electrical control technologies that we have inherited from those who have gone before us.

Finger Vein Authentication

As IT (information technology) takes on a larger role within the social infrastructure, greater demands are being placed on users to authenticate their identity in order to gain access to information using mechanisms such as requiring them to carry a smart card or remember a complicated password. Unfortunately, security measures such as these have many practical problems, including loss or theft, or the user lending their identification to another person or forgetting their password. This potential for unauthorized access by impersonation places company's assets under increased risk. For this reason, a high level of expectation is being placed on the use of biometric authentication as a more convenient means of identification that eliminates impersonation and other security risks.

Hitachi chose finger vein pattern as its preferred method of biometric authentication because of its high accuracy and ease-of-use. Although fingerprinting is a well-known form of biometric authentication, users have found it to be a difficult method to use in practice because it is influenced by environmental factors such as humidity. Also, people leave copies of their fingerprints on everything they touch making this a less-than-secure form of identification. An example of illegal entry at a Japanese airport using copied fingerprints has already occurred. Finger veins, in contrast, have a high authentication rate because they are not influenced by the external environment and, being located inside the bodies, are not something that can be inadvertently left behind.

This finger vein authentication method has already been adopted at a major Japanese bank where it is used in finance applications. The system is well regarded by users and has an overwhelming 80% share of the Japanese ATM (automated teller machine) market.

Hitachi has also been marketing a finger vein access control system for physical security in Asia since September 2008. The system not only prevents unauthorized access, it also operates as an attendance management system. Company managers have found the system to be very valuable and a means of improving profitability because it provides accurate authorization of employees entering and leaving the office. The smoother operation and greater accuracy compared to fingerprint authentication means it has also been welcomed by employees. The design of the access control system makes full or partial retrofitting easy in any existing system that has a Wiegand interface (a widely used interface in smart card systems in particular). Also, because the access control system also supports smart cards (MIFARE* and iCLASS*), systems can be designed flexibly to suit the user's budget and security design.

Hitachi also provides login authentication for PCs (personal computers) and a decision approval system for use in companies. It is hoped that Hitachi's finger vein technology will find use in a wide range of applications in the future such as wallet-less shopping transactions that are secure, safe, and convenient.

* See "Trademarks" on page 87.

Finger vein access control system
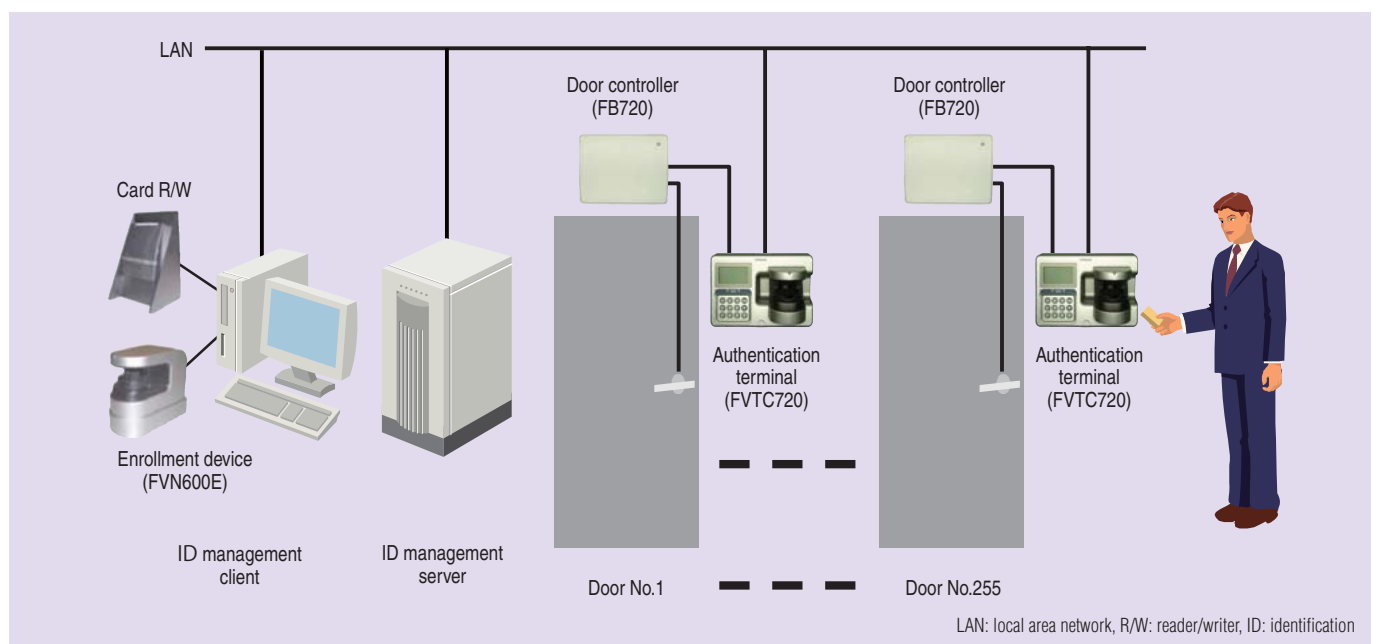
System configuration of finger vein access control system

Financial Applications of Finger Vein Technology

[Features of finger vein biometrics]

(1) High availability

Suitable for a very wide range of the user population, regardless of factors such as occupation, living habits, and environmental conditions

(2) High security

The chance of false acceptance is extremely low.

In-house testing found a false acceptance rate of only 0.00002%.

(3) Ideal for:

User populations with a wide variety of ages, occupations, living habits, ethnic backgrounds, and so on

Sites where environmental conditions are hard to control

Applications such as the public sector and financial services

[Impact on crime rates]

Many financial institutions in Japan enjoy the benefits of vascular biometric systems for authenticating banking transactions.

In 2004, The Bank of Tokyo-Mitsubishi, Ltd. adopted vascular biometrics for ATMs (automated teller machines). In 2005, Japan Post Bank Co., Ltd., Mizuho Bank, Ltd., Sumitomo Mitsui Banking Corporation introduced finger vein readers to their ATMs. Since then, the number of criminal cases has been falling. As a consequence, the amount of stolen money has also been decreasing as shown in Fig. (a).

[Finger vein application products]

Hitachi-Omron Terminal Solutions, Corporation produces various financial terminals equipped with finger vein biometric authentication products. The biometric products are supplied either as standalone terminals or embedded modules. In addition to use in Hitachi's own terminals, these modules have also been adopted for use in the partners' security products.

Biometric technology has also been used in non-financial sectors such as biometric kiosk terminal and other typical biometric products.

The high availability and security of the finger vein biometrics offer scope for further expansion in the range of applications.

(Hitachi-Omron Terminal Solutions, Corporation)
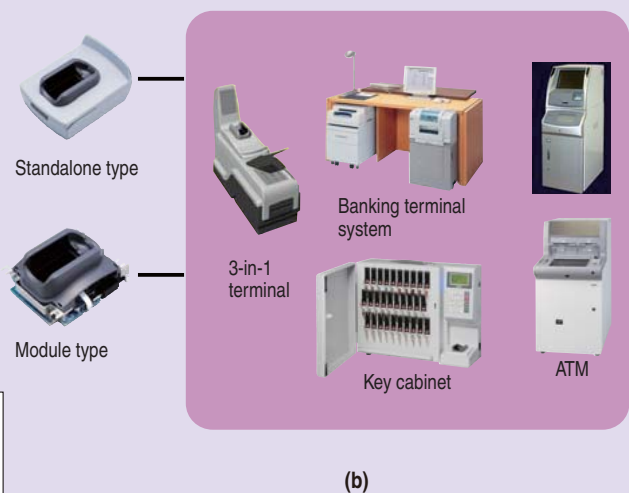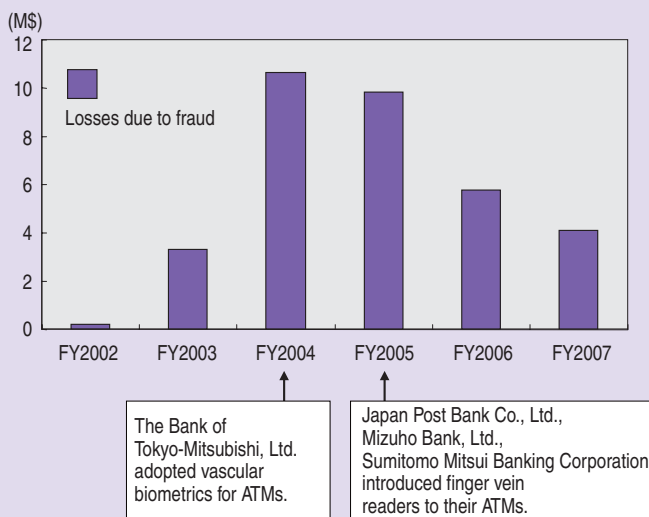
Money withdrawn by illegal transactions (a), products for financial sector (b), and kiosk and other non-financial products (c)

Ubiquitous Library with Use of μ-Chips

A library system ("LOOKS21/P" public library integrated information system) that is the first in the industry to use μ-Chips as IC (integrated circuit) tags for library book management commenced operation at City of Kita Library in Tokyo in June, 2008. The IC tag is a Sumitomo 3M, Ltd. product that integrates μ-Chips into 3M*'s Tattle-Tape* Security Strips & Applicators. Because the IC tags are small and are attached to the books in such a way that they will rarely be touched by the reader, they should have good durability. In addition to book management, the IC tags are also aimed at supporting user functions including a self-reference function and automatic book checkout. The self-reference function helps users choose books by displaying a description of the book on a screen when a book containing an IC tag is held over a scanner. The automatic book checkout function improves convenience, particularly when the library is busy, by allowing users to checkout their own books using only their library card and the books they wish to borrow.

The LOOKS21/P system product range will be further enhanced

A user holds a book over the scanner to display its description on-screen.

Attaching an IC tag to a book
The tag will rarely be noticed by the user.

Library reference scanner (left) and IC tag application (right)

and developed to improve user convenience and operational efficiency.

* See "Trademarks" on page 87.

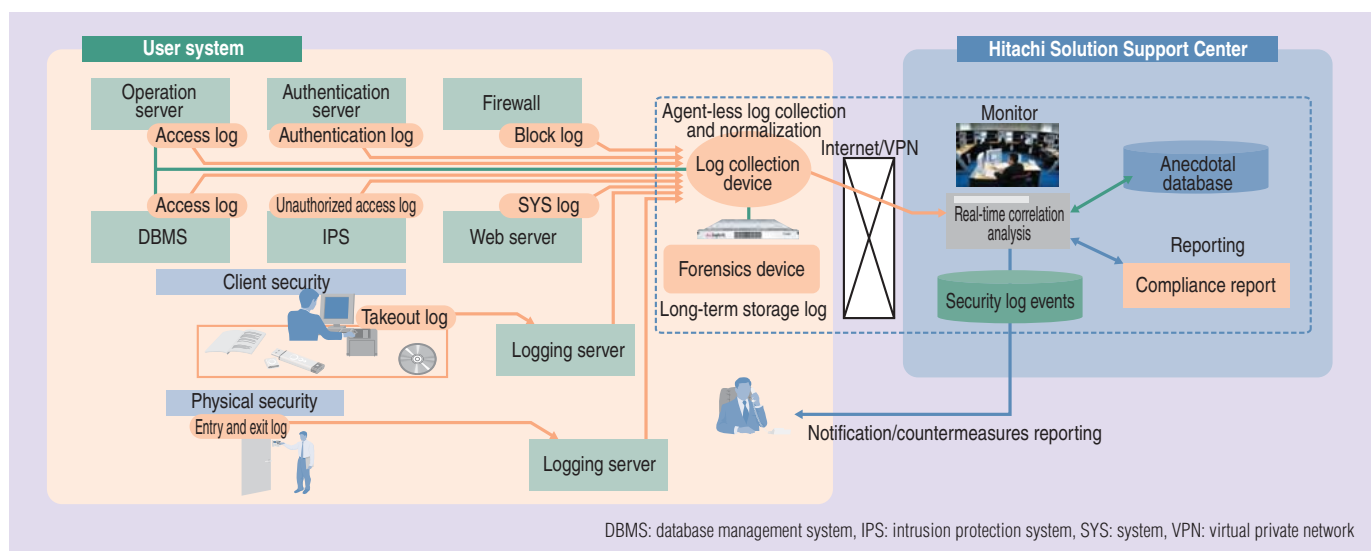# Integrated Security Log Management Solution

With growing demand for internal controls and protection against information leaks, information security has become a critical issue for corporate management.

The integrated security log management solution has realized comprehensive data collection and analysis capabilities about the approximately 300 different logs generated during corporate activity. As the solution can collect logs generated by servers, security device, and network device without the need for any additional software on the target systems, and can perform analysis in realtime, it significantly reduces the time required to analyze logs compared to checking each machine log independently. Automatic generation of audit reports from this enormous quantity of logs to verify IT (information technology) system integrity also reduces the workload associated with system auditing. These functions provide integrated support for the essential tasks of corporate security monitoring and management.

Further, operational efficiency can be maximized by using Hitachi Solution Support Center for remote management, operation, and reporting. Because this solution eliminates the need to configure or install the infrastructure for log collection and analysis, it also dramatically reduces the initial investment and provides a quick and low-cost answer to the issues of log management.

(Hitachi Electronics Services Co., Ltd.)

DBMS: database management system, IPS: intrusion protection system, SYS: system, VPN: virtual private network

Services configuration

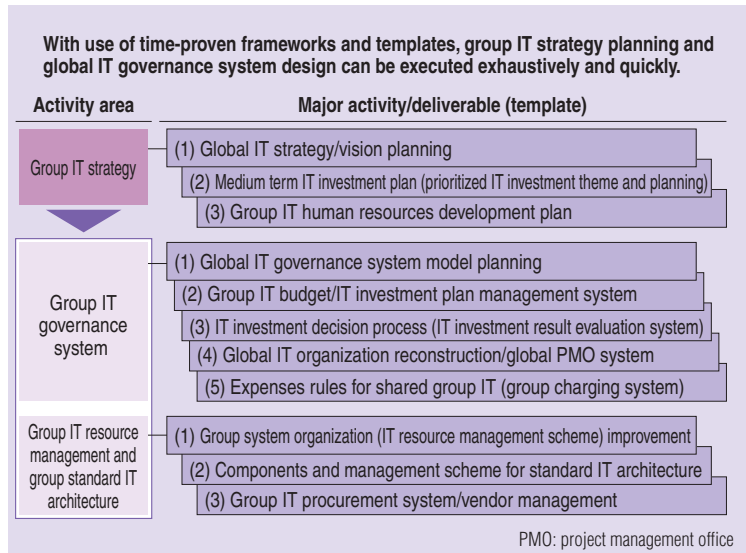# Consulting Service "Global IT Governance Framework"

Amid the recent trend toward global and consolidated group operation, global-level reconstruction of IT (information technology) governance has been recognized by many companies as an issue. However, experience at Hitachi Group companies has shown that it is not easy to integrate IT and IT organizations that have operated separately in different countries and regions for many years. In order to align the interests of IT organizations in different countries with different backgrounds, it is important that globally standardized management rules based on clear and simple policies are adopted and that programs are put in place to ensure communications with the key personnel at overseas IT departments.

The organizational capability to perform IT management with a single group-wide IT strategy that is standardized globally should be the essence of global IT governance. This organizational capability is systematized in the form of a global IT governance framework that formulates a template for organizational and administrative design. Hitachi Consulting Co., Ltd. will use this template to introduce time-proven know-how quickly and contribute to global IT organizational change.

In these changes can be seen the future image of IT departments at Japanese companies that are active in the world.

(Hitachi Consulting Co., Ltd.)

With use of time-proven frameworks and templates, group IT strategy planning and global IT governance system design can be executed exhaustively and quickly.

Activity area	Major activity/deliverable (template)
Group IT strategy	(1) Global IT strategy/vision planning
	(2) Medium term IT investment plan (prioritized IT investment theme and planning)
	(3) Group IT human resources development plan
Group IT governance system	(1) Global IT governance system model planning
	(2) Group IT budget/IT investment plan management system
	(3) IT investment decision process (IT investment result evaluation system)
	(4) Global IT organization reconstruction/global PMO system
	(5) Expenses rules for shared group IT (group charging system)
Group IT resource management and group standard IT architecture	(1) Group system organization (IT resource management scheme) improvement
	(2) Components and management scheme for standard IT architecture
	(3) Group IT procurement system/vendor management

PMO: project management office

Framework for establishing global IT governance

Hitachi IT Operations Analyzer for Smart and Simple Data Center Performance and Availability Monitoring

Simultaneous demands for greater efficiency, availability, and performance in the data center are commonly expected but rarely achieved within the typical constraints of IT (information technology) resources. Hitachi understands these challenges and has developed a smart solution to help simplify data center management and reduce IT time, cost, and effort.

Hitachi IT Operations Analyzer is software for comprehensive performance and availability monitoring across heterogeneous servers, networks, and storage. IT Operations Analyzer delivers unmatched, fully featured monitoring tools through a single unified interface for smart, simple data center management for medium and large businesses with up to 250 server, switch, and storage nodes.

[Features]

(1) Agent-less architecture: allows easy deployment and maintenance.

(2) Unified interface: monitors all IT components in a single console.

(3) Simple network view: improves visibility of infrastructure and network health.

(4) Root cause analysis: reduces downtime with quick recovery.

(5) Pro-active alerting: identifies potential problem areas prior to failure.

(6) Multi-vendor support: decreases the number of monitoring tools.
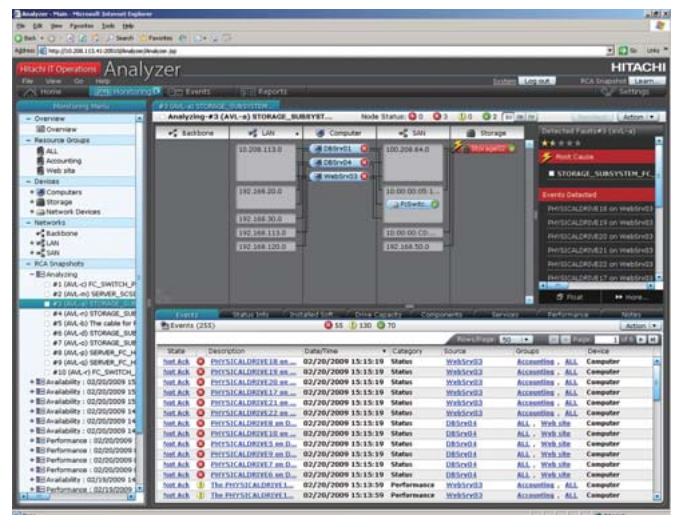
Intuitive graphical user interface

Designed to help users streamline IT operations, improve customer service levels, reduce total cost of ownership, and boost efficiencies, Hitachi IT Operations Analyzer is easy to deploy and manage across the IT systems without specialized training or knowledge.

(Web site: http://itoperations.hds.com)

Integrated Systems Management Software, JP1 – Client Security from Four Perspectives
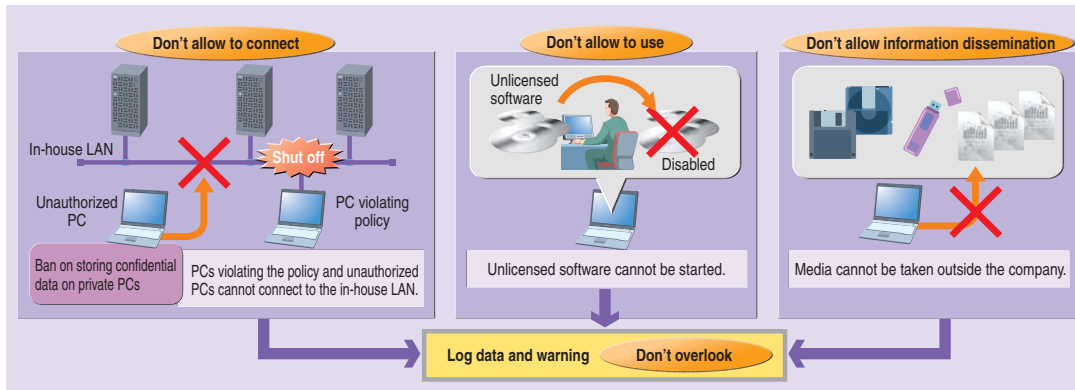
Client management from four perspectives

Companies are implementing tighter internal controls to protect themselves against illegal actions, comply with regulations, prevent fraud, and eliminate errors.

To establish IT (information technology) compliance, the management of client PCs (personal computers) in accordance with IT policy is imperative. JP1* implements effective security measures to suit different ways of using systems and provides corporate information systems with appropriate protection from various threats that could affect business activity. As information leaks have become increasingly common, various problems have been identified. Appropriate precautions for dealing with the risks of taking critical data out of the company, using private PCs for business purposes, and virus infection are all absolutely necessary.

To help keep organizations and their data safe and secure, JP1 manages all clients from four perspectives: "Don't allow to connect," "Don't allow to use," "Don't allow information dissemination," and "Don't overlook."

* JP1 is an acronym for Job Management Partner 1.

Hitachi Server Platform Overview

Hitachi offers a variety of computer products ranging from client systems and PC (personal computer) servers to mainframes and supercomputers and environmentally friendly modular data center systems, using the experience gained over more than 40 years in computer manufacturing.

Hitachi super technical servers deliver a high level of computing performance for HPC (high performance computing) applications such as weather forecasting, crash test analysis, and environmental simulation.

Enterprise server customers who use the AIX* OS (operating system) can run their mission-critical applications on Enterprise UNIX* server series machines.

The advanced server product line based on Intel* Itanium* processors runs HP-UX* and scales from two cores to large 128-core SMP (symmetric multi processor) servers. The mainstream PC server series uses Xeon* or Pentium* processors and runs Windows* or Linux*.

BladeSymphony is a highly scalable, performance-oriented blade server platform that supports multiple operating systems on Intel Xeon and Itanium processors to address the needs of the modern data center.

The secure client solution consists of thin clients connected to PC hardware in the security of a data center.

In addition, Hitachi offers Hitachi modular datacenter, which provides power and space saving in data center environments.
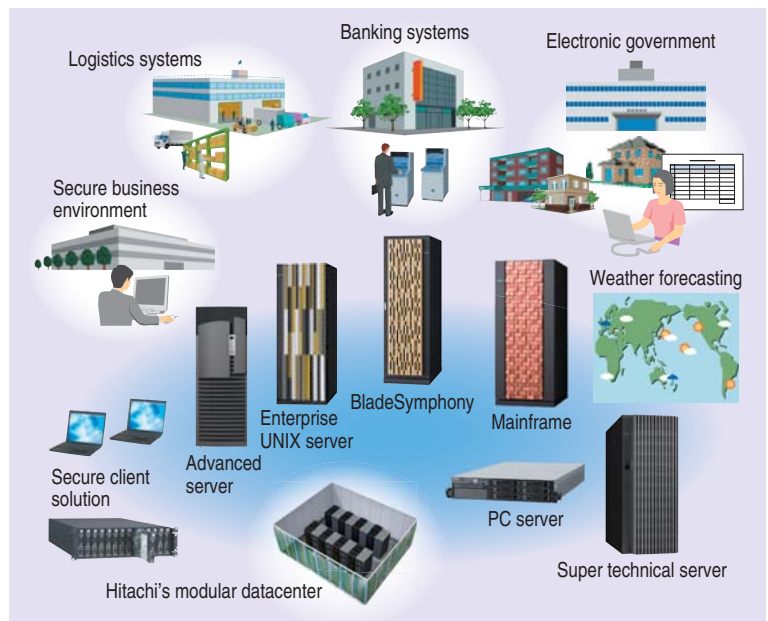
Hitachi server platform for IT (information technology) infrastructure

Overall, whatever the user requires, Hitachi has the appropriate server platform solution.

* See "Trademarks" on page 87.

Hitachi's BladeSymphony Integrated Service Platform

Designed for maximum performance and scalability, BladeSymphony is a highly integrated next-generation IT (information technology) platform for managing not only servers but also storage and network resources. The BladeSymphony Management Suite allows central management of system configurations that include multiple chassis and racks of blade servers. It also allows the various system resources to be managed through a unified dashboard. This provides customers with reduced complexity through integrated management, lower total cost of ownership, and an improved return on investment.

Customers can select the appropriate model according to their specific business needs. For enterprise-class capabilities in mission-critical applications, Hitachi provides the 10-U (about 444.5-mm) high-end blade server (with Intel Xeon or Intel Itanium processors). For remote office or branch office workloads, Hitachi provides the 6-U (about 266.7-mm) high-density blade server (with Intel Xeon processors). Hitachi also offers many features to help customers meet the challenge of Green IT. These include Hitachi's unique server virtualization feature for efficient server consolidation and Hitachi's world-class 80 PLUS* GOLD certified power supply for lower energy costs.

BladeSymphony integrated service platform

* See "Trademarks" on page 87.
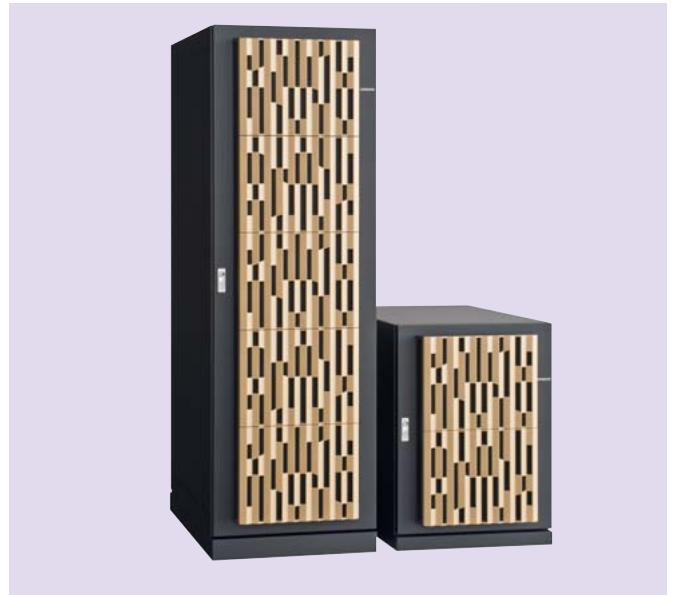
Environmentally Friendly Data Center Solution "Hitachi's Modular Datacenter"
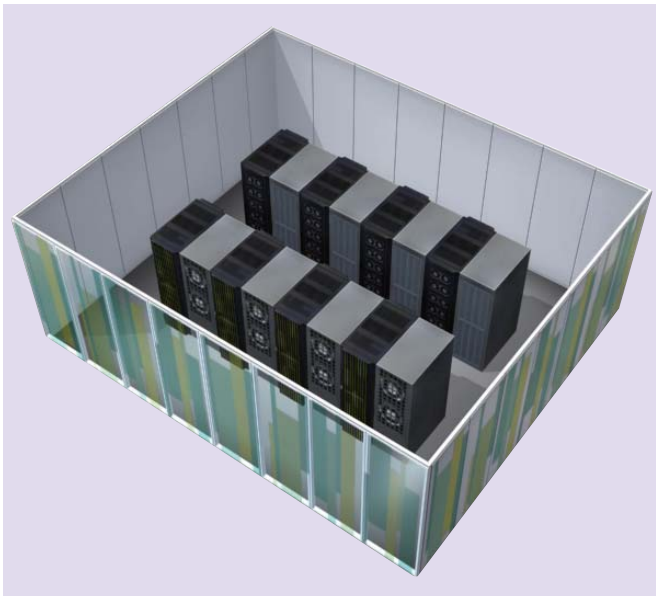
Modular datacenter

Hitachi offers modular datacenter as an environmentally friendly data center environment for data center providers and corporate IT (information technology) departments.

Modular datacenter achieves power and space saving by optimal layout of cooling systems and IT equipment. This is achieved through air conditioning environment consulting service which helps users locate each cooling system in the optimum position. Power consumption is reduced by up to 27% compared to conventional equipment. High-density racks allow equipment to be packed in more tightly and provide a 75% reduction in footprint compared to conventional layouts.

Additionally, modular datacenter can start from a small module with a size of only about 22 m^2 which makes it suitable for use in data centers that are initially small-scale. The time required to construct a modular datacenter is around 67% shorter than for comparable ordinary data centers. This makes modular datacenter suitable for users installing a data center for the first time. Because modules can be expanded and added as needed, diverse user requirements can be met.

These advantages help modular datacenter reduce TCO (total cost of ownership) for a wide range of users, from corporate IT departments through to data center providers.

Hitachi Universal Storage Platform V and Hitachi Universal Storage Platform VM Disk Array Subsystems with Advanced Virtualization Features

The Hitachi Dynamic Provisioning volume capacity virtualization feature of the Hitachi Universal Storage Platform V and Hitachi Universal Storage Platform VM enterprise disk array subsystems can define large volumes independently of the physical storage capacity. This eliminates the need for complex volume capacity design and dramatically reduces the time and effort required for storage capacity planning. Also, because additional physical capacity can be added to meet data capacity requirements without requiring a system shutdown or any changes to server settings, the size of the initial storage installation can be reduced and the optimum timing selected for adding additional storage. By maximizing storage efficiency, this improves the user's return on investment and reduces power consumption and running costs.
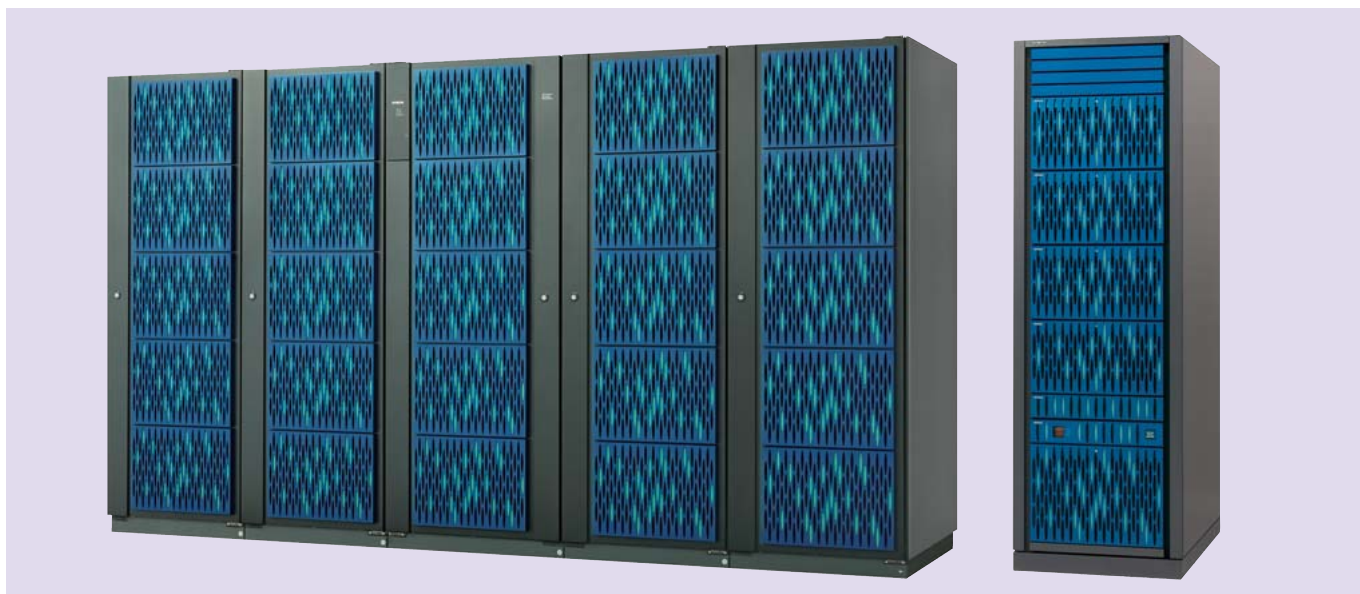
Hitachi Universal Storage Platform V and Hitachi Universal Storage Platform VM disk array subsystems

Mid-range Disk Array Subsystem "Hitachi Adaptable Modular Storage 2000" Series

Mid-range disk array subsystem Hitachi Adaptable Modular Storage 2000 series is a successor of conventional Hitachi Adaptable Modular Storage Series as well as a new mid-ranged storage which sought its easier introduction and operation. Newly developed dynamic load balanced controller not only simplifies the volume configuration design but also balances the controller loads automatically to have achieved its optimized performance. A new storage management tool Hitachi Storage Navigator Modular 2 has improved the usability with the wizard feature and on-line help support and supports the management by copy feature GUI (graphical user interface). Moreover, newly employed back-end SAS (serial attached small computer system interface) interface technology has achieved mixed SAS disk drives in a same chassis. This technology also achieves high failure detectability with point-to-point protocol and uninterrupted firmware update feature and contributes to system reliability and availability improvements.

Mid-range disk array subsystem Hitachi Adaptable Modular Storage 2500

Hitachi Essential NAS Platform Enhancement

"Hitachi Essential NAS Platform" has facilitated integrated file servers under user environment with NAS (network attached storage) virtualizing feature. Scrap-and-build of multiple servers within office or data center as well as external servers such as backup servers, anti-virus servers and authentication servers has become easy to achieve lower power consumption across the office and data center.

Integration of file servers in the past had an issue of simplification of servers as well as external servers. Virtualization of NAS allows taking over the user authentication to the virtual NAS after the transfer without modification. The external servers shared among file servers can also be integrated to achieve flexible environmental transfer. In addition, virtual NAS can also be transferred between multiple physical NAS nodes. This enables operation with minimum hardware after the integration by effectively realizing load balance to each NAS node.

Further power saving measure will be provided based on the virtual NAS feature.

(NAS virtualizing feature "File Service Partitioning": Sold from May, 2008)
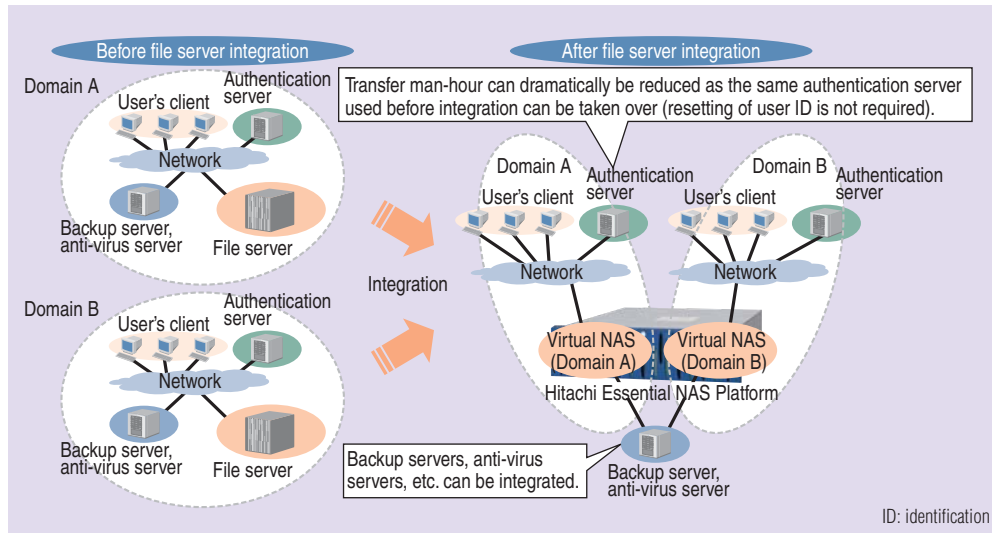
Realizing effective integrated file server with virtual NAS

Hitachi Storage Command Suite that Reduces Costs, Simplifies Management, and Improves Resource Utilization

The current economic environment demands that businesses find ways to decrease costs and increase efficiency at every level of the organization–from staffing all the way through to their technology infrastructure. In the field of data storage, a number of innovations point the way to improved resource utilization and greater simplification of formerly complicated processes, helping bring down the overall cost of storage.

The Hitachi Storage Command Suite consists of integrated software that allows businesses to reduce storage infrastructure complexity, costs, and risk while maintaining service levels and dynamically aligning IT (information technology) resources to business needs. It supports mainframe, open, and mixed heterogeneous storage environments with integrated interfaces.

A good storage management implementation that reduces administrative costs and improves application performance justifies its own cost of investment through hard dollar reductions in storage total cost of ownership. Storage management helps administrators manage greater volumes of storage, makes better use of existing storage capacity, and defers additional purchases. By helping to improve the performance and availability of revenue generating business applications, storage management delivers valuable benefits to the bottom line.
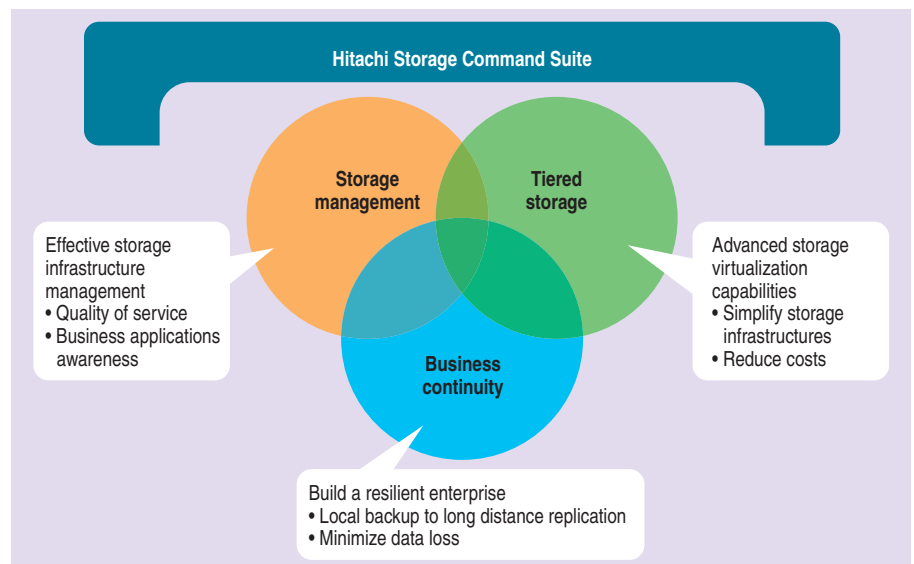
Hitachi Storage Command Suite with three key building blocks

Hitachi Service Delivery Platform Initiatives for Carriers

The SDPs (service delivery platforms) deployed by mobile network operators are mainly used for non-voice services, particularly content, messaging, and location information services. Hitachi supplies not only communication systems, but also ICT (information and communication technology) products, solutions, and services. Using this advantage, it has been involved in the development and provision of total solutions for the network operator SDP industry which demands knowledge of carrier networks, operation of mission critical systems, and strict cost performance. With NGNs (next-generation networks) having entered commercial operation, services such as voice, Internet access, mobile access, and broadcasting that had previously been developed separately are now starting to be integrated using IP (Internet protocol) technology. High-speed wireless access technologies such as HSPA (high-speed packet access), WLAN (wireless local area network), WiMAX* (worldwide interoperability for microwave access), and LTE (long term evolution) are gradually establishing a "ubiquitous broadband technology network." From a business perspective, the convergence of network carrier services and Internet services has been accelerated by the entry of MVNOs (mobile virtual network operators) who offer Internet services funded by advertising income.

These changes in the business environment offer significant opportunities for companies like Hitachi that have operations covering a wide range of fields, including not only communications and computers, but also finance, government, manufacturing, transport, and consumer businesses. Hitachi's next-generation SDP envisages the following expansions:

(1) Support for diversified broadband access networks and provision of voice, non-voice, broadcasting, and network control value-added services to a variety of user terminals

(2) Exposure of network functions to third parties using web service technology as a means of offering new value to Internet applications across a range of industries

(3) Further integration of separate networks such as voice, non-voice, and broadcasting and the merging of services at the media level to achieve convergence between media and services linked at the application level

(4) Combination of services and databases specific to network operators with Internet web services, and the realization of advanced telecommunications and Internet integration

In the new generation of communication networks, Hitachi will continue to work on research and development in the SDP market and will contribute to global society through the creation of valuable new services with cutting-edge technologies.

* See "Trademarks" on page 87.
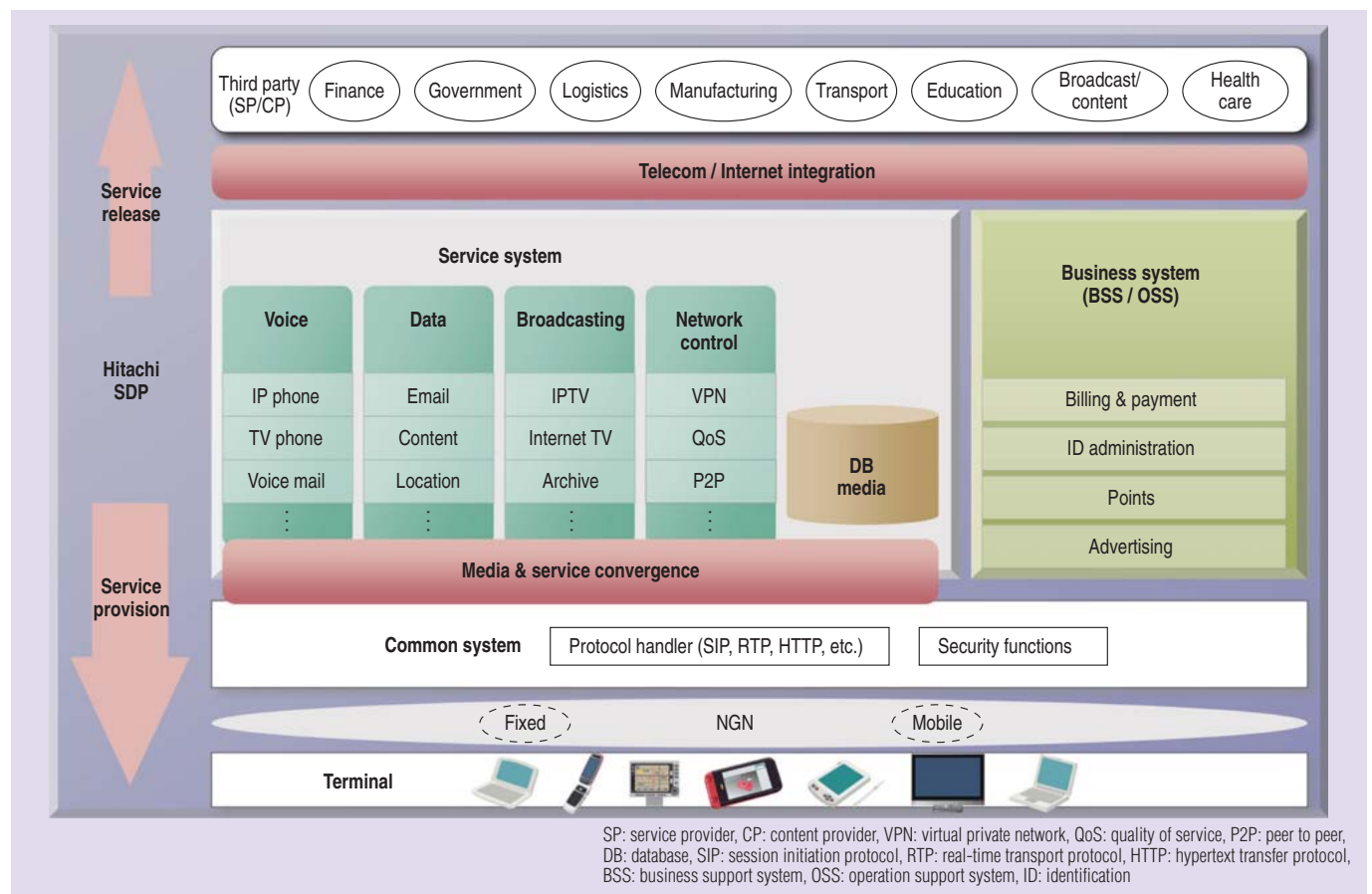
Scope of Hitachi SDP

Next-generation Transport System Based on MPLS-TP

This article describes a new packet-based transport system suitable for constructing integrated transport networks able to support new packet-based services as well as existing services.

Most recent telecommunication services use the IP (Internet protocol) and are Ethernet*-based to support rapidly growing broadband applications for residential and business users. At the same time, the transport technologies used to provide these services are also evolving towards the use of IP and Ethernet technologies. MPLS-TP (multi-protocol label switching–transport profile) is a new transport technology for packet-based transport networks defined by the IETF (Internet Engineering Task Force) and ITU-T (International Telecommunication Union–Telecommunication Standardization Sector) standards bodies to implement secure and reliable packet-based transport networks. In this technology, the routing control function is separated from the packet transfer function for network providers to achieve better path management than conventional IP-based MPLS technology. This makes it possible to guarantee end-to-end QoS (quality of service) and reliable path management by managing the network resources centrally from the network providers' network operations systems.

Hitachi's MPLS-TP transport system is based on the newly defined MPLS-TP technology and provides network providers with highly reliable IP/Ethernet-based transport networks. The system has various carrier-class OAM (operation, administration, and maintenance) functions such as connectivity verification, forward and backward path defect indication to connected equipment, path connectivity check by loopback test, fast failure detection, and automatic path protection switching. Because these extensive OAM functions are similar to the OAM functions traditionally used in ATM (asynchronous transfer mode) networks, network providers can provide IP/Ethernet-based leased line services to enterprises who require services that are highly reliable and easy to manage.

Hitachi's MPLS-TP system has both Ethernet and ATM interfaces. The system is also able to emulate ATM paths over MPLS paths and this allows ATM paths to be encapsulated by MPLS and transferred over the MPLS-TP network. These features make it easy to migrate from conventional ATM-based networks to Ethernet-based networks while accommodating both traditional ATM traffic and growing IP/Ethernet traffic. Therefore, network providers can deploy transport systems that are able to respond to the growing demand for IP/Ethernet services while still retaining existing ATM services on the same network. This simplifies network operation because it avoids the need to operate several types of network at the same time.

Because of the features, applications for the MPLS-TP transport system include networks that provide packet-based leased line services, service migration to MPLS networks that must support existing ATM, and also IP/Ethernet services such as premium Ethernet, IPTV (IP television), mobile backhaul, wholesale access, and next-generation VPLSs (virtual private line services). Therefore, the system can help network providers offer new IP/Ethernet-based network services while reducing their operational expenditure by continuing to support existing services.

* See "Trademarks" on page 87.
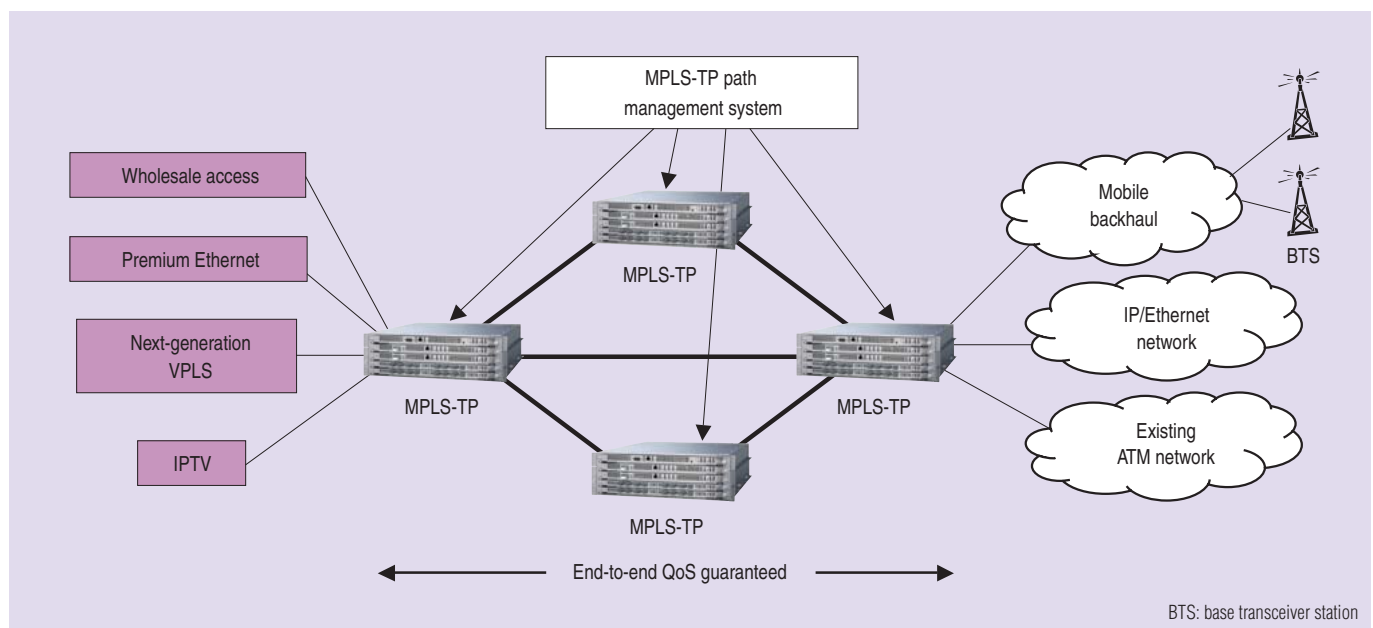
Integrated transport network using **MPLS-TP**

Next-generation Broadband Wireless System

A new wireless communications technology standard called mobile WiMAX (worldwide interoperability for microwave access) has become available, and has been implemented in Japan by UQ Communications* Inc. This service started in early 2009 as a free trial and is scheduled to become one of the first such commercial services anywhere in the world in the mid-year. Mobile WiMAX is one of the next generation of broadband wireless systems that are increasingly being adopted by worldwide telecommunication markets. It has a transfer rate of up to approximately 75 Mbit/s using a bandwidth of 20 MHz.

Hitachi is developing an ASN-GW (access system network gateway) for mobile WiMAX and a GW for LTE (long term evolution) on a common platform based on the company's past development experience in mobile gateway equipment such as PDSNs (packet data serving nodes) which are IP (Internet protocol) packet terminals developed for the CDMA (code division multiple access) 2000 1xEV-DO (1x evolution–data only) system. Maintaining seamless interoperation with the next generation of broadband wireless systems is achieved simply by replacing the system-specific software. In addition, Hitachi can take advantage of its past development experience and know-how to develop software such as radio management functions quickly.

By adopting methods that separate call process control (C-plane) from the bearer process (U-plane) that establishes virtual connections between radio segments, Hitachi has chosen a hardware configuration optimized for each plane in the ASN-GW. With this configuration, the hardware can be configured in a flexible manner according to the traffic needs ranging from the small capacity of regional bands to the large capacity of national bands.

The multicore CPU (central processing unit) adopted for the U-plane features lower power consumption despite processing performance that is at least 10 times faster than that of existing mobile gateway units. Also, the development time for the C-plane software has been shortened by reusing know-how from existing equipment such as the PMIP (proxy-mobile IP) system that processes mobile IP and the RADIUS (remote authentication dial in user service) protocol for certification, accounting, and operation monitoring systems for network equipment. Better software stability is also accomplished by using an open platform. In addition to its support for multicore processing, the U-plane software inherits the GRE (generic routing encapsulation) protocol for tunneling from existing equipment and the IP-in-IP encapsulation/decapsulation software technology.

Hitachi has also worked on the development of an ASN-GW and MCBCS (multicast and broadcast service) server which includes a function to distribute sets of program data simultaneously to multiple wireless service areas via mobile WiMAX. Another function allows the target area for data distribution to be changed dynamically on an hourly basis. One potential application for the MCBCS function is the distribution of location-based and time-dependent advertisements to railway commuters.
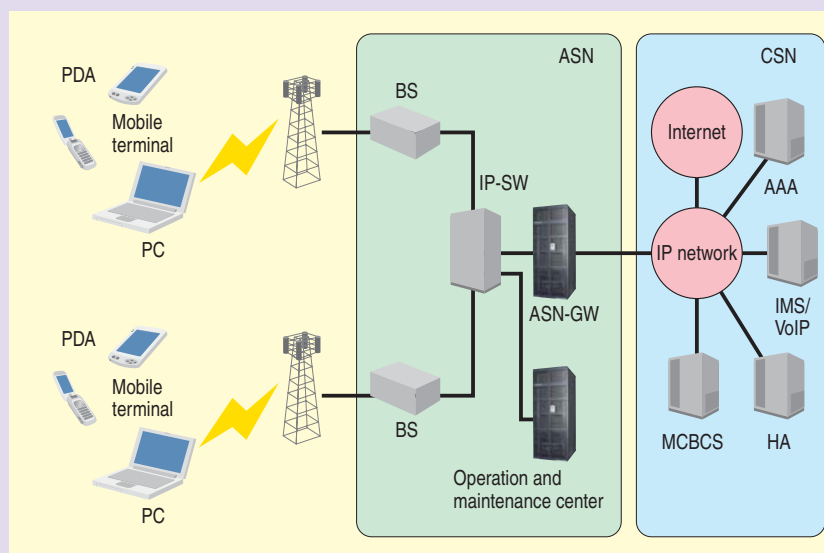
Leveraging its accumulated technologies and experience, Hitachi will continue to contribute to the further development of mobile telecommunications.

* See "Trademarks" on page 87.

Hitachi's mobile ASN-GW can be reconfigured flexibly depending on the traffic.

(a)

Interfaces to ensure interoperability are specified for various terminals (MS), ASN, and CSN components. Interoperability between BSs and ASN-GWs is specified by the R6 interface.
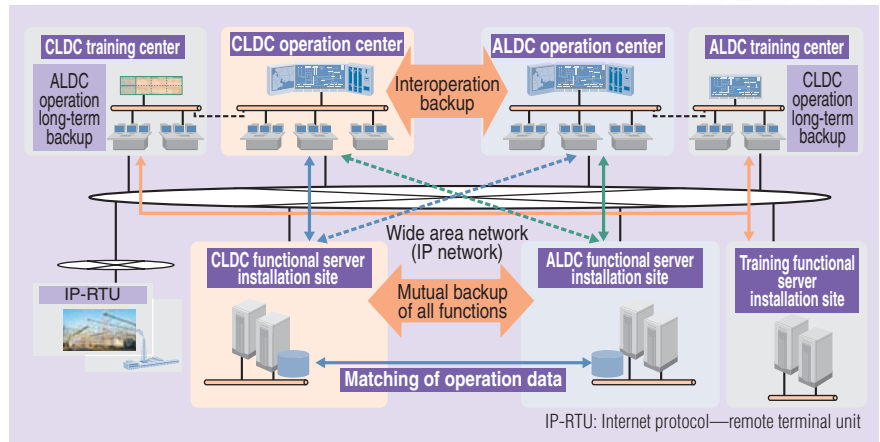
(b)

PDA: personal digital assistant, PC: personal computer, ASN: access system network, BS: base station, IP-SW: IP switch, CSN: connectivity service network, AAA: authentication, authorization and accounting, IMS: IP multimedia system, HA: home agent, MS: mobile station, VoIP: voice over IP

Hitachi's mobile WiMAX ASN-GW (a) and example mobile WiMAX system configuration (b)

Start of Operation of Central Load Dispatching Center and Area Load Dispatching Center of The Kansai Electric Power Co., Inc.

Hitachi delivered a distributed SCADA (supervisory control and data acquisition) system that operates over a wide area network to the Central Load Dispatching Center (CLDC) and the Area Load Dispatching Center (ALDC) of The Kansai Electric Power Co., Inc. The functional servers used by SCADA system are installed in separate locations to the operating sites. Following on-site commissioning, the system started operation in July 2008.

In this system, devices installed at the operating centers are connected to functional servers via a wide area network. Although the servers were traditionally installed at the center of operation in a distributed manner, they are now integrated on a function-by-function basis, reducing the total number of servers. This also has the benefit of minimizing the impact on the functional servers when operating centers are separated or merged, or when the equipment layout is changed. This reduces the cost of implementing changes to the operational organization in response to the changing power distribution environment. In addition to that, an operator authentication system in connecting to functional servers realizes not only sharing information about the power system, but also a location-independent SCADA system in operating

the power system. Additionally, it has become possible during system disturbance or night to support or substitute operations. Also, installing the functional servers in multiple locations means that backup is available if a site is affected by an earthquake or other disaster.

In the newly developed wide area network distributed SCADA system for the CLDC and ALDC, the functional servers of the CLDC and ALDC provide mutual backup for each other and each set of servers can operate as either ALDC or CLDC.

Configuration of wide area network distributed SCADA system

Participation in New Metering System Trial at The Kansai Electric Power Co., Inc.

A new metering system uses new power meters with communications and load-switching functions installed at the consumer's home to allow meter reading and other similar operations to be performed from the power company office or other remote location. In addition to using remote meter reading to improve operational efficiency, the system can also measure household power

use in 30-min blocks. Use of this data allows detailed energy consulting and provides the information needed to recover quickly from power outages. Hitachi, Ltd. is participating in a trial to demonstrate the new metering system conducted by The Kansai Electric Power Co., Inc.

Hitachi developed and delivered the communications unit used in the new household power meters and also a meter data management system that performs monitoring and control of the power meters and collects power use data sent from the meters at 30-min intervals. The communications device is the outcome of a joint research project with The Kansai Electric Power Co., Inc. and other related companies. It establishes wireless connections between the new power meters and transmits metering data from individual power meters to an aggregator using a bucket-brigade type network.

Hitachi will utilize the results of the trial to make further improvements with the aim of fully commercializing the new technology.
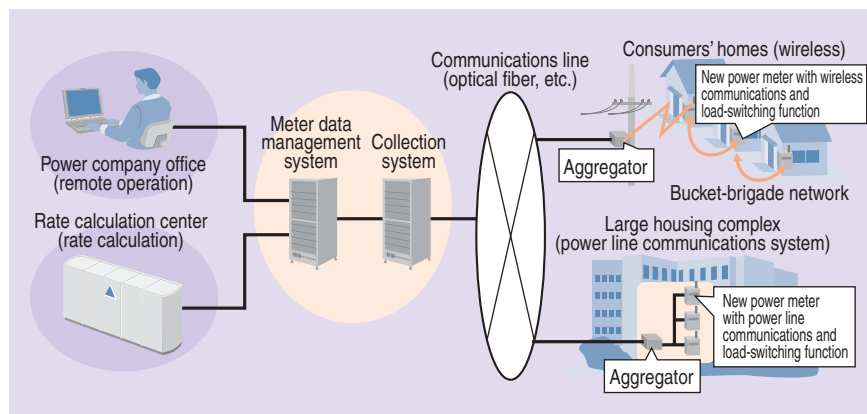
New metering system for The Kansai Electric Power Co., Inc.

HF-W2000 Model 20 Industrial Computer

The HF-W Series of industrial computers are long-life computers with high reliability, availability, and maintainability and have been used in applications such as monitoring and control systems, semiconductor and liquid crystal manufacturing equipment, and inspection systems. More recently, their use has extended to include embedded applications in communication, broadcasting, and medical equipment and use as information terminals in call centers.

Against this background, Hitachi has developed a new small long-life model called the HF-W2000 Model 20 whose features enhanced its reliability, availability, and maintainability.

[Key features]

(1) Cooling design allows 24 hours a day uninterrupted operation for 7 years.

(2) Careful selection of components including use of ECC (error check and correct) memory

(3) Uses a RAID 1 (redundant array of independent disks, level 1) function for HDD (hard disk drive) redundancy.

(4) Hot swap function allows a faulty HDD to be replaced without a downtime.

(5) Internal hardware monitoring function and digital LED (light

Long-life design

Designed for an uninterrupted operation for 24 hours × 7 years. On the basis of 24-hour uninterrupted operation, the HF-W2000 Model 20 has 4 times the life of a typical OA PC (which has a life of 5 years when used 8 hours a day).

ECC memory

Uses ECC memory designed for industrial applications to improve data reliability.

Built-in on-line maintenance function

In addition to the RAID 1 function, the hot swap function allows replacing a faulty HDD without a downtime.

Digital LED status indicator

The digital LED status indicator facilitates debugging and maintenance in embedded applications where the computer is used without a monitor, for example.

OA: office automation, PC: personal computer

HF-W2000 Model 20 industrial computer

emitting diode) status indicator

Hitachi aims to build on its existing base in monitoring and control system and semiconductor and liquid crystal manufacturing equipment applications to expand the use of the computer into areas such as information technology and communications.

Upgraded Plant Commences Operation with Inverter-driven Turbocompressor

Hitachi delivered a high-voltage direct inverter as part of a project to fit 83KT-301 with an electric motor drive system at the Kawasaki Plant of Nippon Petroleum Refining Company, Ltd. The inverter commenced operation in October 2008.

The project to convert to electric motor operation involved changing the drive mechanism for the turbocompressor from a steam turbine to an inverter-controlled electric motor. The numerous advantages of switching to "inverter + motor drive" operation include: (1) environmental improvements [reduction in CO_2 (carbon dioxide) emissions, energy savings], (2) shorter equipment maintenance time through improved maintainability, (3) improved operability such as easy startup, and (4) lower operational cost across the plant through more stable boiler operation.

To deal with concerns that use of inverter control may cause machine axis vibration during motor acceleration, realtime simulation was used in the design phase to get a good understanding of the situation and preventive control logic was incorporated. On-site trials demonstrated that the turbocompressor could operate under inverter and motor drive without any problems by adjusting the control parameters to suppress the predicted machine axis vibration.

[Main inverter specifications]

(1) Output capacity: 3,000 kVA

(2) Output voltage: 6.6 kV

(3) Cell inverter 8 stages/phase

(4) Direct high-voltage output method without step-up transformer
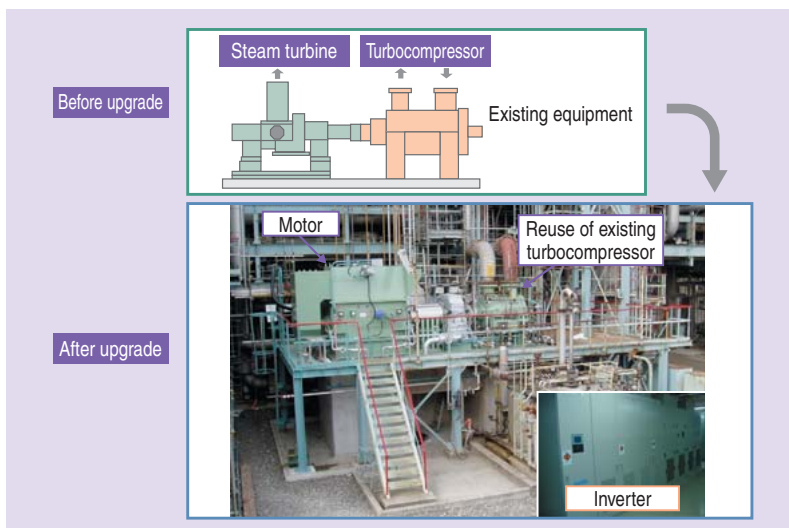
Overview of upgraded turbocompressor

Operation of High-voltage Large-capacity IGBT Drive System at NKK Tubes

The small diameter tube mill at NKK Tubes was the site to install the first of Hitachi's new high-voltage large-capacity IGBT (insulated gate bipolar transistor) drive system for hot rolling applications. The drive system is used on the main piercer unit and is working well.

The drive is aimed at use in hot rolling plant used in the production of seamless steel tube where it is intended as a replacement for aging synchronous motors and as a way of reducing energy consumption through the use of variable-speed drive. The upgrade to variable-speed drive combines the high-voltage large-capacity IGBT drive system (converter capacity: 10.2 MVA) with the excellent low-maintenance characteristics of squirrel-cage induction motors.

[Key features]

(1) The drive uses general-purpose 3.3-kV/1.2-kA (2.4-kAp) IGBTs to ensure long-term availability of supply.

(2) Higher inverter capacity is achieved through an increased output voltage made possible by connecting two IGBTs in series [maximum converter capacity: 15 MVA (or 30 MVA using a two-bank configuration)].

(3) A range of drive system models with different capacities to suit different user needs can be produced by connecting the main circuit units in parallel.

(Timing of plant upgrade: June 2008)

10.2-MVA inverter/converter

Parameter	Specifications				
Circuit type	NPC three-level inverter				
Motor type	3-terminal			6-terminal	
No. of IGBT panels	1	3		3 × 2 banks	
No. of cell units connected in parallel	1	2	3	2 × 2 parallel cell units	2 × 3 parallel cell units
Rated capacity (MVA)	5.4	10.2	15	20.4	30
Rated output voltage (Vrms)	4,090				
Cooling system	Water cooling (deionized water)				
Overload specification	150% for 1 min				
Conversion efficiency	98% or more (converter + inverter)				

NPC: neutral point clamped

High-voltage large-capacity IGBT drive system (top) and basic specifications (bottom)

Start of Commercial Operation at Continuous Annealing Line at Baosteel in China

The B5CAL continuous annealing line supplied to the No. 5 Cold Rolling Mill at Baoshan Iron & Steel Co., Ltd. in China has started commercial operation.

B5CAL continuous annealing line delivered to Baosteel in China

The line was built to supply the rapidly growing demand for high-grade automotive sheet steel in China. The target product range covers various different types of steel strip, including high-grade wide and medium-thickness sheet for use in car bodies, with a minimum strip thickness of 0.3 mm and maximum width of 1,630 mm. With the required quality and accuracy standards becoming stricter year by year, the line achieves high quality and stable operation in the furnace and elsewhere through the use of R700 series plant controller and optical network to provide high-speed processing and communications, along with IGBT (insulated gate bipolar transistor) drives and Hitachi's proprietary tension control system.

This was also the first project in which software development, including on-site commissioning, was handled by Shanghai Baoli Automation & Engineering Co., Ltd., a joint venture between Hitachi, Ltd. and Shanghai Baosight Software Co., Ltd.

(Start of commercial operation: June 2008)

Electrical Equipment for Continuous Pickling Line and Cold Rolling Mill Supplied to Shougang Jingtang United Iron and Steel Co., Ltd. in China for High-grade Sheet Steel Production

Hitachi has supplied state-of-the-art electrical equipment for a continuous pickling line and cold rolling mill at Shougang Jingtang United Iron and Steel Co., Ltd. in China. The equipment was supplied as part of a project managed by Shougang Jingtang United Iron and Steel, a new company set up in partnership with Tangshan Iron & Steel Co., Ltd., involving the Beijing-based company Shoudu Iron & Steel Group relocating its plant from Beijing to Caofeidian in Tangshan City of Hebei Province in response to environmental pollution and other concerns. The line is very efficient and can operate non-stop. Its main products are high-grade cold-rolled steel sheet used in automobile production and as feedstock for the production of galvanized, color-coated, and printed sheet steel for home appliances and buildings.

In response to the ongoing trend towards greater energy savings in recent years, the plant uses IGBT (insulated gate bipolar transistor) drives with high power factor and high conversion efficiency for all the line motor drives. Combining these quick-response drives with the high-speed computing performance of R700 PLCs (programmable logic controllers) and the latest plate thickness and shape control systems achieves a high level of quality along the entire strip length while also improving product yield. The plant also features a newly developed "high capacity plant data trace system" that collects plant data

over a long duration and includes playback functions, and a "drive remote maintenance system" that allows centralized adjustment and maintenance of all the IGBT drives in the system. These systems shortened the plant commissioning time and facilitated maintenance work by plant staff once the plant entered full-scale operation.

Pickling line during construction

Start of Operation of Ten New Reversing Cold Rolling Mills in China Using Latest Technology

A series of new reversing cold rolling mills with the latest technology are commencing commercial operation in China. Hitachi has received orders for 14 rolling mills from major steel manufacturers in China including Maanshan Iron & Steel Co., Ltd. in

Control room during operation (upper left) and a view of the reversing cold rolling mill (lower right)

Anhui Province. 10 of these mills have already completed commissioning and have commenced full-scale operation.

These mills are used to manufacture sheet steel, one of the key materials required by industry. This includes the cold-rolled sheet used for home appliances, furniture, and construction materials and also the magnetic steel sheet that is an essential component of energy-efficient equipment such as high-efficiency transformers and electric motors.
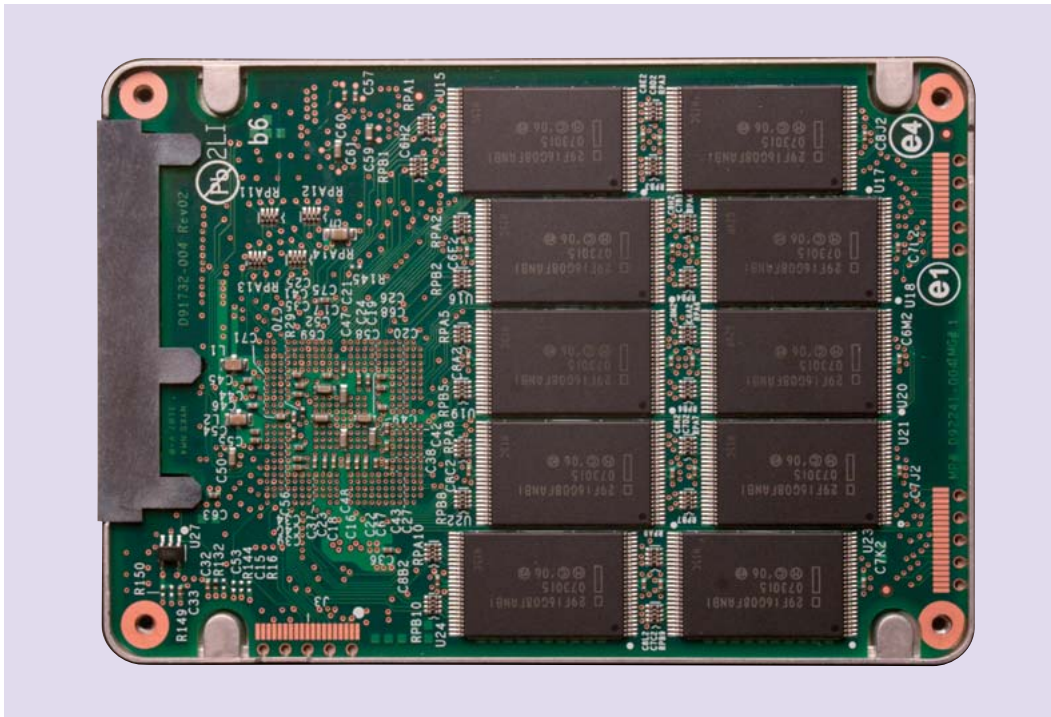
The requirements for cold rolling mills are that they operate reliably and produce improved product quality, and these objectives are achieved through the use of strip thickness and shape control systems that utilize the latest control techniques and through sophisticated high-voltage IGBT (insulated gate bipolar transistor) drives with fast response performance. Also, the capacity of the existing data trace function has been upgraded by doubling the number of numeric data points able to be recorded to 240 and the number of state change data points to 256.

Hitachi has also developed and installed an RMP (rolling monitor playback) function that records important data during rolling in a form that allows it to be played back on a monitor screen if needed. Not only is this useful during commissioning, it is also a valuable tool for analyzing problems once full-scale operation has commenced.

Accelerating Enterprise Data Center Throughput with Energy-efficient SSDs

SSD configuration

formance and throughput, while mission-critical storage and retrieval functionality are handled by conventional high-capacity Hitachi HDDs. The synergistic combination results in a data center environment capable of delivering the highest levels of performance and reliability. This powerful, versatile architecture will eventually be utilized by most companies involved in extensive online transaction processing, such as retailers, airline reservation systems, credit card data centers, Web 2.0 entities, and others with workloads that have high IOPS requirements.

The new Hitachi SSDs are expected to meet skyrocketing performance

These new SSDs (solid state drives) are the first storage solutions from Hitachi Global Storage Technologies to utilize flash memory technology instead of conventional rotating media. Designed to deliver blazingly fast performance and breakthrough increases in power efficiency, the Hitachi SSDs are targeted at deployment in high-end enterprise data centers. A product of the strategic alliance between Hitachi GST and Intel Corporation, the first models of the next-generation storage solutions will be introduced in early 2010 and will offer either SAS [serial attached SCSI (small computer system interface)] or FC (fibre channel) interfaces.

Well-suited for accelerating system performance in transaction-intensive data centers, the new SSDs provide significant reductions in power usage when compared to enterprise 3.5-inch HDDs (hard disk drives). The eco-friendly design also increases space efficiency and reduces cooling requirements in dense server installations. Also, the synergistic relationship between the new throughput-enhancing SSDs and existing HDDs in servers and storage arrays provides an outstanding enterprise-class solution in terms of reliability, compatibility, and system performance.

In contrast to HDDs that typically provide 200 to 500 IOPS (input/output operations per second), the Hitachi SSDs will deliver I/O performance at speeds up to 100 times faster than conventional drives. By connecting several SSDs in parallel to a controller, the SSDs can be used to boost the performance of high-demand, low-latency data centers. Tier Zero financial entities can realize a key competitive advantage in processing performance by front-ending their transactional systems with SSDs.

SSDs are selectively deployed in the data center to accelerate per-

demands while simultaneously reducing space, power, and cooling costs. Hitachi's enterprise-class SSDs will provide the reliability, durability, and performance that can only be achieved by using SLC (single-level cell) NAND flash memory. The design leverages Intel's industry leadership in core NAND and controller technology to reduce cost and enhance reliability. The drives are optimized by a superior wear-leveling algorithm that extends drive life by evenly distributing read/write accesses across the flash.

Offering a more space-efficient solution than the conventional 3.5-inch HDD form factor, compact 2.5-inch SSDs deliver superior performance while generating far less heat. This enables internal chassis density to be increased, reducing the server footprint and the cooling requirements of the data center. Compared to conventional 3.5-inch enterprise HDDs, SSDs can reduce power consumption by 60 to 90% on a per-drive basis. The drives also slash boot times and provide dramatic increases in server performance.

Hitachi is leveraging its leadership position in enterprise-class drive development, qualification, and system integration to ensure full compatibility with existing SAS and FC interfaces. Enterprise clients demand mission-critical solutions, and it is essential that these solutions provide high levels of reliability and seamless interoperability with existing data center hardware. In conclusion, next-generation SSD systems have the potential to transform the future of enterprise computing by dramatically enhancing data center performance, conserving power and cooling resources, and maximizing space efficiency.

(Hitachi Global Storage Technologies)

Fully-integrated High-voltage High-speed Pulser IC for Compact Medical Ultrasound Imaging Applications

A recent trend in the front-end circuits for medical ultrasound imaging applications has been to replace numerous discrete components with ICs (integrated circuits). The maturity of mixed-signal IC design techniques and fabrication capabilities has accelerated this trend, particularly in the transmission circuit, and made it possible to integrate both low-voltage and high-voltage devices onto a single chip.

Hitachi offers fully-integrated high-voltage, high-speed ultrasound pulser ICs for more compact and sophisticated systems.

[Key features]

(1) Compact design: octal channel integration using 250-V SOI (silicon on insulator) MOSFET (metal-oxide semiconductor field-effect transistor) technology is available in an 8 mm × 8 mm 52-lead QFN (quad flat non-leaded) package. Each channel consists of a logic interface, level translator, gate drive buffers with internally-generated floating voltage supplies, and high-voltage P-channel and N-channel MOSFETs. The ICs also feature 4-mode drive current control to reduce power consumption and facilitate use in portable applications.

(2) High performance: the ±100-V, 1.8-A pulsing and active
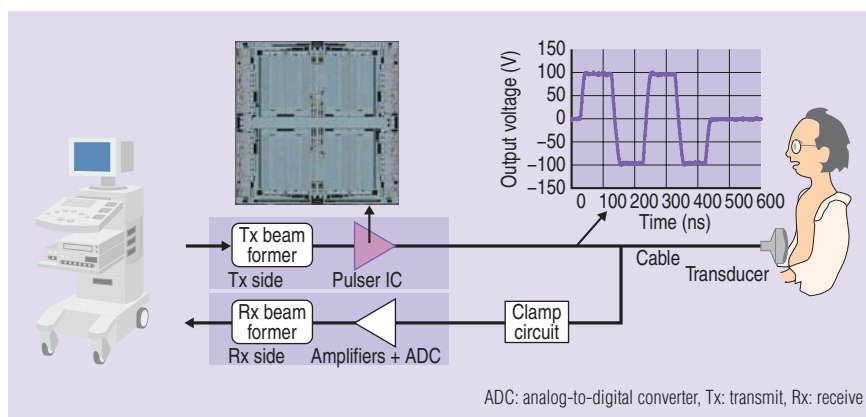
Chip photo and an example output waveform of the pulser IC

ground damping for each channel results in high pulse symmetry and low HD2 (second harmonic distortion). Synchronizing input data with a clock signal also improves HD2, delay mismatch, and delay jitter performance.

(3) Suitable for fail-safe systems: the embedded high-voltage slew rate protection, over-voltage protection, and thermal protection functions prevent IC damage.

(4) Environmentally friendly: RoHS (restriction of hazardous substances) compliant

High-speed LSI Signal Transmission IP
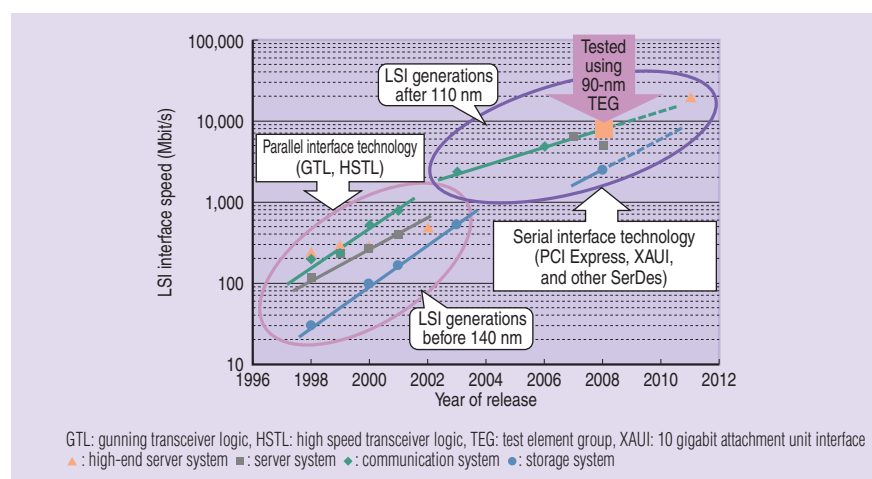
Trends in LSI interface speed

To meet the demand for dramatic increases in processing performance, the mainstream of data transmission method between the LSIs (large-scale integration) for information technology and communication equipment has been shifting from conventional parallel interfaces to high-speed serial interfaces. Having previously used a 110-nm process, Hitachi has already developed a 90-nm process ASIC (application specific integrated circuit) in

November 2008, that integrates high-speed signal transmission IP (intellectual property) including 5.0-Gbit/s SerDes (serialization/deserialization) circuits for inter-LSI communications in the form of eight-lane and four-lane PCI Express* Generation 2 modules (12 modules, 80 lanes in total). With the aim of more speed and less power consumption, Hitachi has also developed a test chip containing 21-lane 8.0-Gbit/s SerDes IP and evaluated its operation and performance. The newly developed IP has power consumption of only 160 mW/(typical) per lane, which is about 20% lower than the previous chip. This facilitates its application in LSIs that need to integrate multiple channels and helps improve the energy-efficiency of information processing devices. The technology has already been included in the existing 90-nm CMOS (complementary metal oxide semiconductor) ASIC design platform and the next step is to add it to the next-generation 65-nm CMOS ASIC design platform currently under development.

* See "Trademarks" on page 87.