Information & Telecommunication Systems

IT Solutions and Cloud Computing
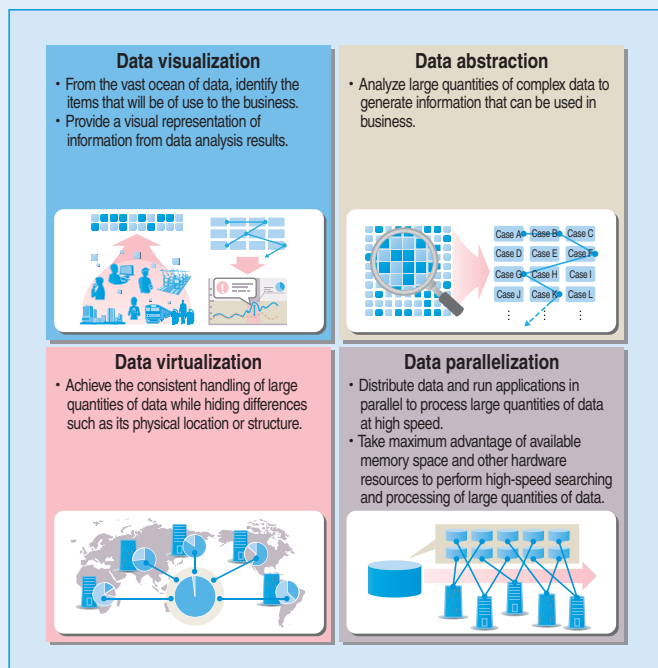
■

IT Platform

■

Network Systems

Data Analysis Service for Utilization of Big Data

As the sources of corporate competitiveness shift toward innovation and the creation of new value, many companies are stepping up their efforts to take advantage of big data. Hitachi has launched a big data analysis service that identifies customers' issues and objectives, and uses IT to conduct numerical analyses that enable the extraction of valuable information from big data so that it can be used for real business innovation. In this article, three analysts working at the front line of this field of creative collaboration describe the service and the technologies that underpin it.

Data visualization
- From the vast ocean of data, identify the items that will be of use to the business.
- Provide a visual representation of information from data analysis results.

Data abstraction
- Analyze large quantities of complex data to generate information that can be used in business.

Data virtualization
- Achieve the consistent handling of large quantities of data while hiding differences such as its physical location or structure.

Data parallelization
- Distribute data and run applications in parallel to process large quantities of data at high speed.
- Take maximum advantage of available memory space and other hardware resources to perform high-speed searching and processing of large quantities of data.

Technologies for utilization of big data

Big Data Analysis Service

Through its involvement in social infrastructure, Hitachi has experience in the collection of extensive data from industrial machinery and other large plant, and its application to tasks such as maintenance. Even before the term "big data" came to prominence, Hitachi was promoting the importance of providing services that extract knowledge and other forms of added value from large quantities of actual data and information technology (IT) resources. The aim of the big data analysis service is to work with customers to generate new value from big data by taking full advantage of these resources.

To undertake this work, Hitachi has assembled an organization of more than 200 people, including consultants who deal with system configuration and operation, researchers and engineers on data analysis, and analysts who specialize in the utilization of big data and combine knowledge of numerical analysis with IT and real-world business skills.

Collaborative Processes Drawing on Proprietary Methods and Templates

A key point in the utilization of big data is how to improve the efficiency of experimental trials that seek to determine the relationship between business and the results of big data analysis.

Our job as analysts includes proposing ways of achieving the desired results (hypotheses) based on sharing a clear vision with the customer and having an adequate understanding of their business. We then collect the required data, use numerical analysis to test the hypothesis, and finally implement it on operational systems once its validity has been demonstrated.

A key feature of this work is that we utilize business dynamics and other proprietary Hitachi techniques at each phase to ensure that these collaborative processes proceed smoothly. In some cases, our proposal involves starting on a small-scale basis that is easy to implement, and then progressively scaling up in parallel with monitoring of the project's cost-benefit.

Technologies behind Big Data Service

We have consolidated the Hitachi IT behind the big data analysis service based on human perceptiveness and knowledge and put it into an organizational structure. This consists of arranging the Hitachi IT platform technologies involved with the utilization of big data into four categories: visualization, virtualization, abstraction, and parallelization. One example is the newly developed ultra-high-speed data search engine that dramatically increases the speed of existing batch processing to support things like data warehouses (DWHs) or high-speed searches without a data mart. Another is an on-memory analysis engine that can perform advanced processing of a wide range of information produced from sources such as sensors or social networks based on its specific data characteristics.

We have already received considerable feedback from customers about this two-pronged approach of combining a data analysis service with these high-added-value IT platforms. We intend to develop further the templates and other tools used in analysis to provide a more extensive response to the expectations for big data utilization.

Masashi Egi (left), Senior Researcher, Platform Systems Research Department, Central Research Laboratory; Jun Yoshida (middle), Senior Manager; Shuntaro Hitomi (right), Senior Manager, Emerging Business Laboratory, Smart Information Systems Division, Information & Telecommunication Systems Company, Hitachi, Ltd.

Hitachi Unified Compute Platform (UCP) An Integrated Platform that Rapidly Responds to Changing Business Environments

Possibilities for the utilization of IT have been expanding along with the development of virtualization technology and cloud computing. At the same time, however, systems have grown more complicated, and both the burden and cost of operational management have been increasing year after year. This is why Hitachi developed the vertically integrated Hitachi Unified Compute Platform (UCP), which unifies components including highly reliable servers, storage, network devices, and software. The UCP makes possible the implementation of an "aggressive IT strategy" to deal with a continuously changing business environment through the rapid construction and modification of services, as well as by reducing operating costs through automation.

LAN: local area network, SAN: storage area network
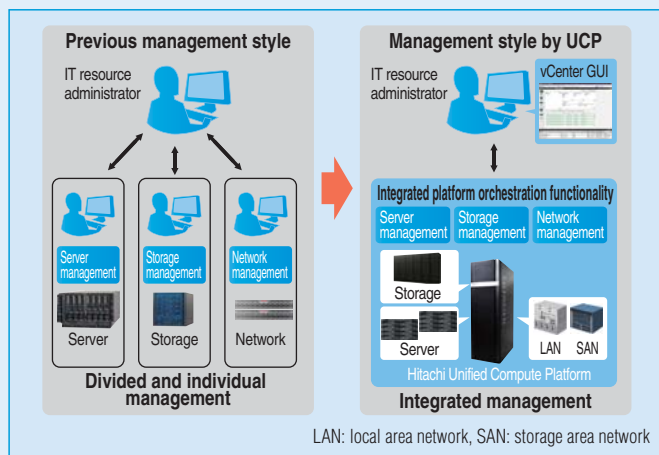
Seamless hardware management with the VM management software

IT Costs Increasing along with Development of Virtual Environments

Virtualization technology provides benefits in that it reduces the number of physical servers while decreasing power consumption. A sharp increase in the number of virtual machine (VM), however, has led to additional new layers that must be managed, and the use of devices from multiple vendors and multiple management software applications has increased the complexity of both system design and verification operations. As a result, the burden and operating costs incurred by administrators have increased, rather than decreased.

In order to meet these challenges, Hitachi has been working on the development of a new information technology (IT) platform that satisfies the four requirements of efficient IT resource utilization, readiness in response to changes, ease of operation, and service level securement. Proof of concept (POC) projects were implemented with customers deploying large-scale data center services, and feedback from these projects was used to complete Hitachi Unified Compute Platform (UCP).

High Business Agility Combined with Cost Reductions

With UCP, the servers, storage, network devices, and management software that make up the system platform are all provided by a single vendor, and the settings required for system operation are all made before the product is delivered. Another key feature of UCP is that since Hitachi provides one-stop maintenance and support services, any problem that might arise in the system can be rapidly resolved.

UCP is based on a concept of combining a high level of business agility with reduced cost. Managers are currently focusing not on how to construct IT platforms, but on how quickly they can use IT platforms to build new businesses. In order to satisfy this need, UCP enables the rapid construction or modification of services in the midst of a continuously changing business environment, thereby improving business agility. At the same time, corporate IT costs are reduced through the automation of system operations, thanks to Hitachi's extensive cloud operation and know-how from its system integration experience.

Ideal Platforms for Each Business Application

UCP is available in two models, depending on the application. One is the "UCP Pro for VMware vSphere*" infrastructure as a service (IaaS) model, which is designed to meet the requirements involved in efficiently running a data center or other large-scale cloud platform. This model offers VMware vSphere set up on Hitachi's highly reliable hardware, and includes proprietary integrated platform orchestration functions (UCP Director). UCP Director, which is a VMware vCenter* plug-in, can be used for the unified management of both hardware and VM with the vCenter graphical user interface (GUI). When a new VM is created in response to a request from an operations department, a single VMware administrator can easily set up and allocate hardware resources including servers, storage, and network devices. This capability shrinks the previously required 15-day deployment time for a VM to a scant 15 minutes.

The other model is the "UCP with OpenMiddleware" platform as a service (PaaS) model, which provides an execution environment including middleware built by Hitachi for use in the construction of medium-scale private clouds. This model is only provided for the Japanese market.

These two UCPs are available in a lineup that includes six versions with different numbers of CPU cores and storage capacities, based on the scale of the system. One of these versions is sure to be the perfect fit for any of a wide range of operational requirements, with the ability to begin service immediately at a reasonable cost. Hitachi will continue to enhance UCP in response to the needs of the market.

Makoto Yoshimura (left), Director, Strategic Sales Promotion, Platform Sales Promotion and Marketing Operation; Masanori Araki (right), Engineering Manager, Integrated Platform Strategy and Planning, IT Platform Business Strategy & Planning Operation, IT Platform Business Management Division, IT Platform Division Group, Information & Telecommunication Systems Company, Hitachi, Ltd.

Hitachi GX1000 WAN Accelerator for High-speed Data Communications between Domestic and Overseas Sites

The ongoing global expansion of manufacturing and other businesses is creating growing demand for high-speed data communications between domestic and overseas sites. In response, Hitachi has developed the GX1000 WAN accelerator in a joint research project with Honda R&D Co., Ltd.*[1, *2]. By performing precise control of data transmission volumes involving the estimation of free bandwidth on existing WAN links, the GX1000 provides faster speeds while maintaining compatibility with the TCP standard. Here, the engineers involved in the development explain the product's features and the benefits of installation.

Hitachi GX1000 WAN accelerator

Provision of Global Access to Frequently Updated Data

Corporations that operate globally have a growing need to consolidate intellectual property at key sites, and to provide access from other sites to frequently updated data such as that used in research and development or design. Meanwhile the quantity of data transferred across the network by various applications continues to grow year after year. However, the problem with using the transmission control protocol (TCP) to send data over nationwide wide-area networks (WANs) is that the round-trip delay increases with physical distance. Having come up against this problem in applications such as the transfer of three-dimensional computer-aided design (CAD) data for vehicles, Honda R&D Co., Ltd. joined us in a joint technology development project that commenced in 2009. This work ultimately resulted in the release of the Hitachi GX1000 WAN accelerator in January 2012.

Significant Increase in Speed of Data Communications between Domestic and Overseas Sites

The GX1000 uses proprietary Hitachi algorithms to increase the speed of TCP communications over WAN links so that it can take maximum advantage of the contracted bandwidth. Specifically, it makes realtime measurements of the free bandwidth on WAN links and performs detailed control of the volume of transmitted data based on the degree of congestion. This provides high-speed communications without severe reductions in throughput even if packet loss occurs. A major advantage of the technology is that it delivers uniform benefits regardless of the protocols being used, such as the file transfer protocol (FTP), common Internet file system (CIFS), or SnapMirror*[3], for example, and without any need to make system changes to the network, servers, clients, or other equipment.

In commercializing the WAN accelerator, we took technologies that our Central Research Laboratory has been researching and developing over many years as a base and applied switch development techniques and know-how from within Hitachi to implement a highly reliable design featuring a fail-safe capability to ensure that data transmission continues to operate even if a fault occurs.

Testing of FTP file transfer between Honda R&D Co., Ltd. sites in Japan and North America demonstrated a 15-fold improvement over previous systems for the transmission of 100 Mbyte. Honda R&D Co., Ltd. has already installed seven WAN accelerators in Japan and overseas and is using them for the global sharing of large quantities of design, office, and other data*[1, *2].

Expansion of Product Range to Support Wider Range of Applications

The GX1000 can be used for the high-speed transfer of large quantities of frequently updated data between domestic and overseas sites, such as the transfer of CAD data by manufacturers or video files by broadcasters. Also, because it can shorten the time taken for backups between data centers, the technology can help with disaster preparedness.

Already released are a high-end model with a maximum TCP session performance of 300 Mbit/s intended for use in long-distance data transmission at domestic or overseas sites, a remote backup model for high-speed backups between data centers, and an office model for accessing large volumes of data from offices. In the future, we intend to extend this product range with new models to suit a variety of different uses, including models that have been optimized for specific applications.

*[1] Source: Example Installation of Hitachi GX1000 WAN Accelerator: Honda R&D Co., Ltd.: Significant Reduction in Data Transfer Times between Japan and America to Allow Global Sharing of Big Data, pp. 52–53, Nikkei Communications (Apr. 2012) in Japanese.

*[2] Source: Hitachi GX1000 WAN Accelerator Supports Global Networking at Honda R&D Co., Ltd., pp. 3–6, Hitac Magazine (May 2012) in Japanese.

*[3] See "Trademarks" on page 91.

Hirofumi Masukawa (left), General Manager, Network Solution Second Operation; Hiromi Harada (right), Senior Engineer, Network Appliance Department, Network Solution Second Operation, Telecommunications & Network Systems Division, Information & Telecommunication Systems Company, Hitachi, Ltd.

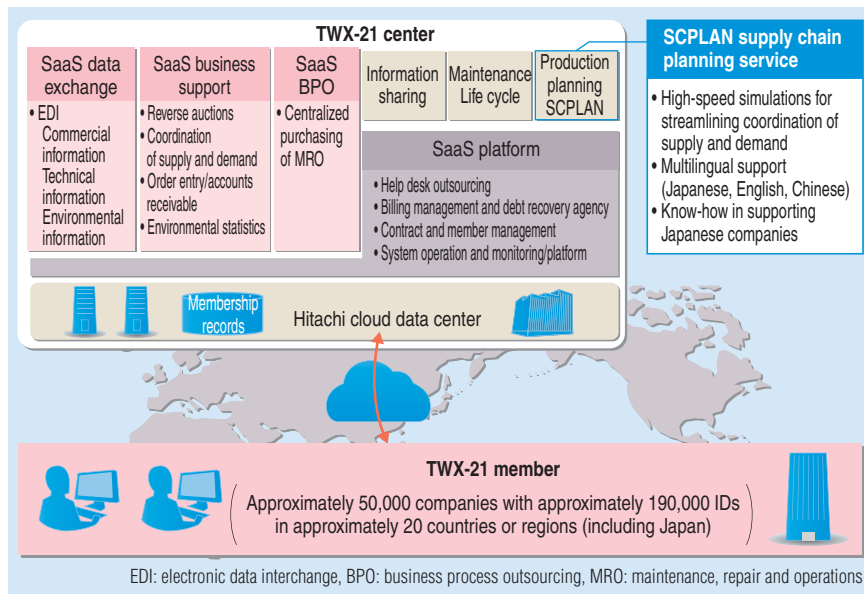# Data Utilization Service and Global Support for TWX-21 SaaS Platform

The SCPLAN* supply chain planning service was launched in April 2012. The new service is provided through the software as a service (SaaS) platform for the TWX-21* business system cloud, which is used in about 20 other countries or regions, including Japan, by approximately 50,000 companies, primarily from the manufacturing and logistics sectors, with a total of approximately 190,000 identifications (IDs).

The service supports the coordination of supply and demand throughout the world in response to changing customer demand. By allowing users to assess supply and demand, identify problems, and conduct high-speed simulations of provisional plans, the service enhances their ability to keep pace with fluctuating demand by shortening the time taken for planning and other aspects of the planning cycle.

Hitachi intends to continue supporting the global operations of the manufacturing and logistics sectors by expanding the TWX-21 SaaS platform and further enhancing its cloud marketplace for manufacturing and logistics on Hitachi Cloud Computing Solutions.

TWX-21 SaaS platform and data utilization service

* SCPLAN and TWX-21 are trademarks of Hitachi, Ltd.

SaaS-based Life Cycle Support for Plant and Equipment

In place of their traditional business models based on enhancing the functions of their products and selling them, Japanese manufacturers and suppliers of plant and equipment are developing an increasing interest in after-sales service businesses that have the potential to be more profitable. Meanwhile growing price competition resulting from the entry of corporations from emerging economies into the global market is creating a need to enhance product value by using the life cycle management of plant and equipment as a differentiating factor.

Global e-Service on TWX-21 utilizes Hitachi Construction Machinery Co., Ltd.'s Global e-Service that consolidates business know-how and has been collecting and leveraging information on service operations in the global market for 12 years. By giving access to centrally managed information on the life cycle management of plant and equipment, this service helps to enhance the efficiency of maintenance work and to improve customer satisfaction and the proportion of products covered by service contracts. The platform system used to supply Global e-Service on TWX-21 is the software as a service (SaaS) business support service for the TWX-21 business system cloud, which is the largest of its type in Japan. Being a highly reliable SaaS-based service means it is quick to set up, and can supply safe and secure services at low cost.

In the future, Hitachi intends to deliver new value through the centralized management and analysis of big data by incorporating machine-to-machine (M2M) functions for the remote collection and control of information from plant and equipment operating around the world.
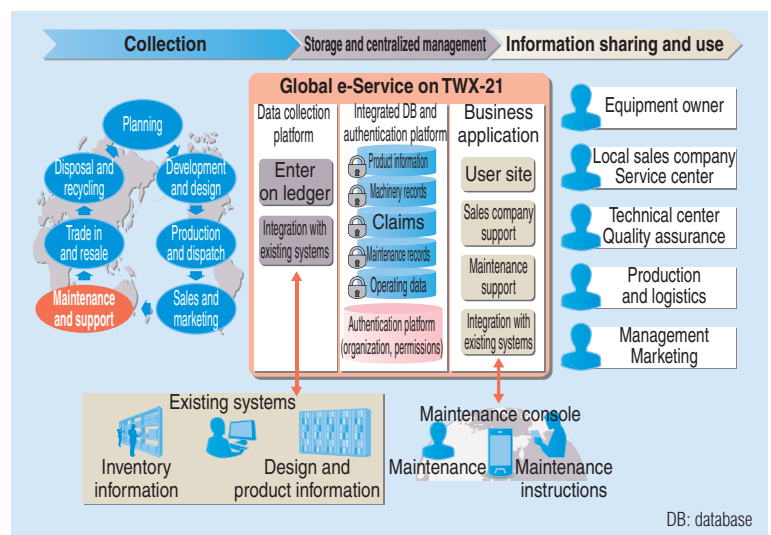
Concepts behind Global e-Service on TWX-21

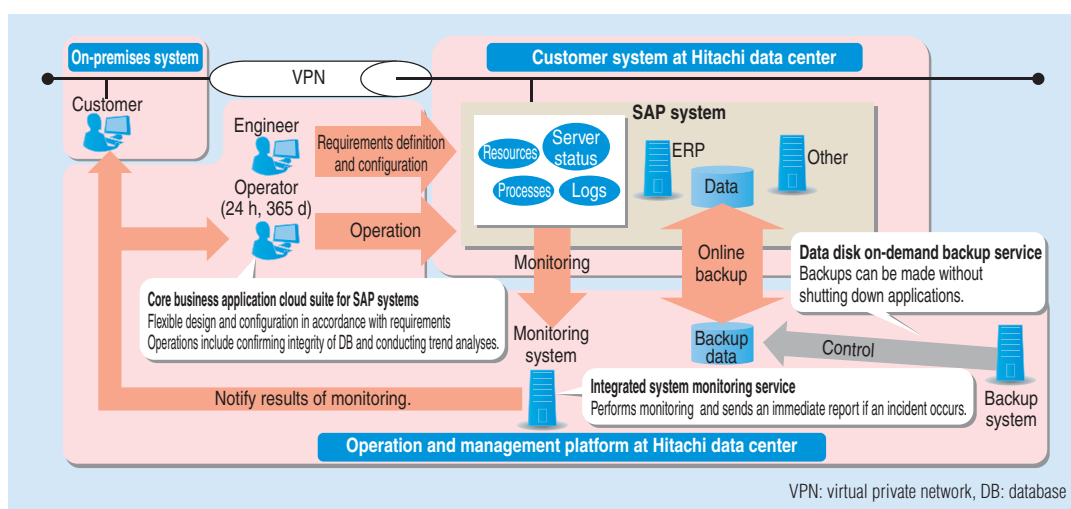# Cloud Services for Core Business Applications

As the public cloud market in Japan continues its steady growth, interest in the cloud among customers is shifting from office automation (OA) and other general-purpose systems toward its use for core business systems.

The cloud services for core business applications supplied by Hitachi in response to this change consist of the "core business application cloud suite for SAP* systems," which is based around SAP AG's enterprise resource planning (ERP) package, the "data disk on-demand backup service" for the online backups required by core business applications, and the "integrated system monitoring service" that monitors virtual servers and provides notification of the results. In the case of the core business application cloud suite for SAP systems, Hitachi can provide one-stop support that extends from system requirements definition through to configuration and operation.

Offerings such as the data disk on-demand backup service and integrated system monitoring service also facilitate the use of the cloud for core business systems.

In the future, Hitachi intends to continue meeting customer needs by providing worldwide cloud platforms with an emphasis on services for core business systems.

* See "Trademarks" on page 91.

Structure of cloud services for core business applications

Data Center Service Platform for Cloud Era

The locations of Hitachi's advanced data centers at Yokohama and Okayama make them geographically suitable for disaster recovery (DR) purposes. To meet the growing demand for DR since the Great East Japan Earthquake, Hitachi plans to implement a mutual backup and DR function that operates between the two sites and offers customers the combination of a (local) primary center and (distant) DR center.

The trunk network linking the two centers is already complete and Hitachi is currently developing the ready-made backup and DR service that will run on a cloud platform and minimize the customer workload and costs associated with its use. Hitachi also plans to extend the trunk network and cloud platform to include other data centers in the near future so that multiple sites will be able to be treated as a single virtual center. This will provide a more comprehensive backup and DR service and cut costs. It will also mean that numerous services will be able to be delivered from any data center so that customers will be able to access services that are not dependent on a specific location.

The intention is to release these services progressively, with the first services introduced in the second half of FY2012.
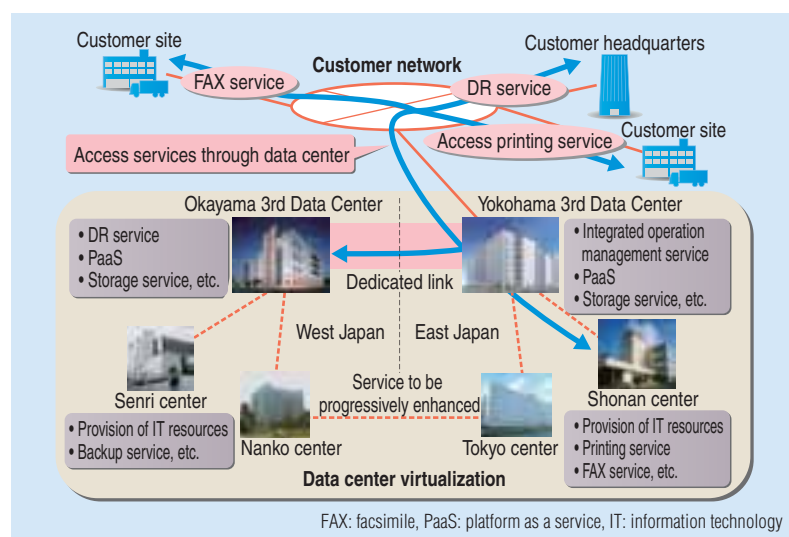
Data center virtualization

Mobile Security Solutions

Hitachi has released a new secure device. This secure device provides highly secure network access in mobile environments. It can prevent information leaks occurred from spoofing and fraudulent access, thereby making mobile computer use safer.

It has the following features:
(1) Two-in-one device with a built-in secure, tamper-resistant integrated circuit (IC) chip and standard flash memory.
(2) Secure storage area for digital certificates and configurable personal identification number (PIN).
(3) microSD* form factor supports use in a wide range of devices, including laptop, smartphones, and tablets.

* See "Trademarks" on page 91.

Secure device configuration and supported devices

Finger Vein Authentication Solutions—Expanding into Services

To date, use of finger vein authentication has mainly been confined to the business-to-business (B2B) market, where it has been widely used to enhance enterprise security, including personal computer (PC) log on and building access control systems. It has also been widely used in social infrastructure applications such as time clocks and alcohol detectors where it contributes to law enforcement.

Recently, however, its use has been growing in the business-to-business-to-consumer (B2B2C) market. Examples include member control systems for public facilities and services such as fitness clubs and golf courses.

The system uses biometric information in place of traditional membership cards to make authentication more secure, thereby preventing fraudulent or fake use of club memberships. It also eliminates the cost of card issuance, and is more convenient for customers who no longer need to carry a membership card.

As awareness of these benefits has grown, use of finger vein authentication systems to check in golf club members started to become widespread across Japan during 2012. In 2013, applications are anticipated to spread to public facilities and services such as theme parks and shopping malls.
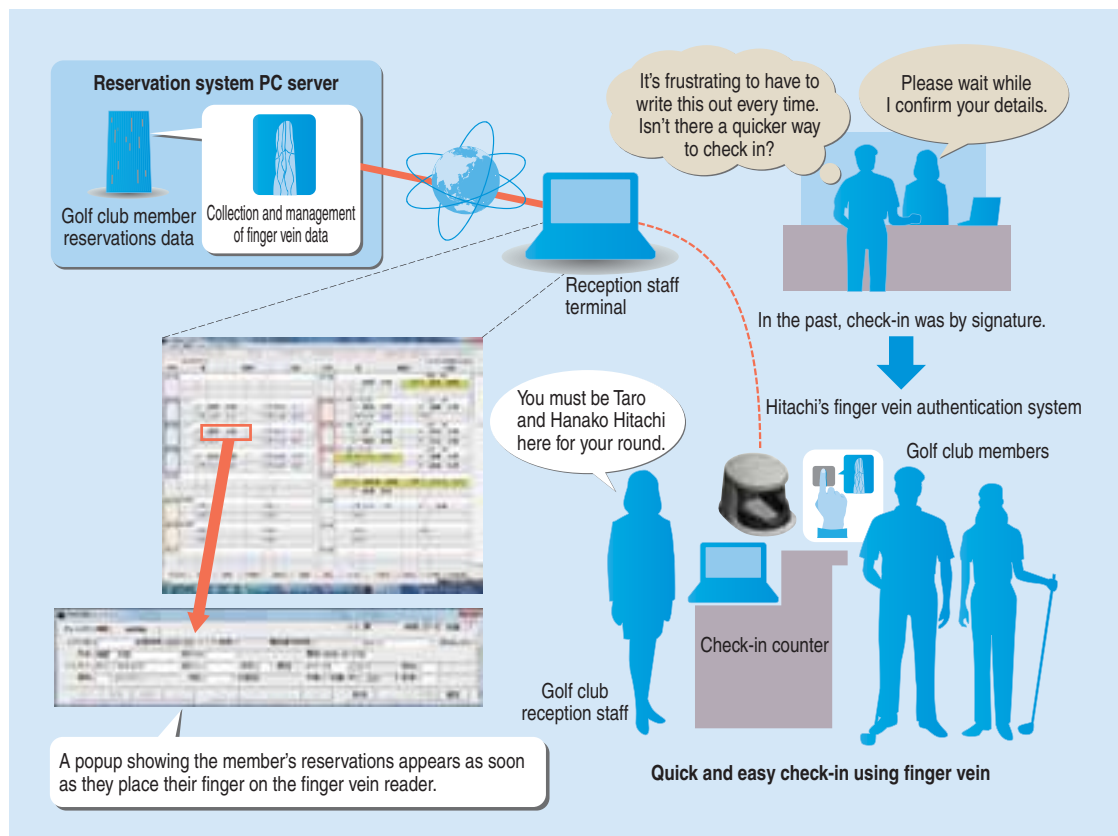
Example check-in system for golf club members using finger vein authentication system
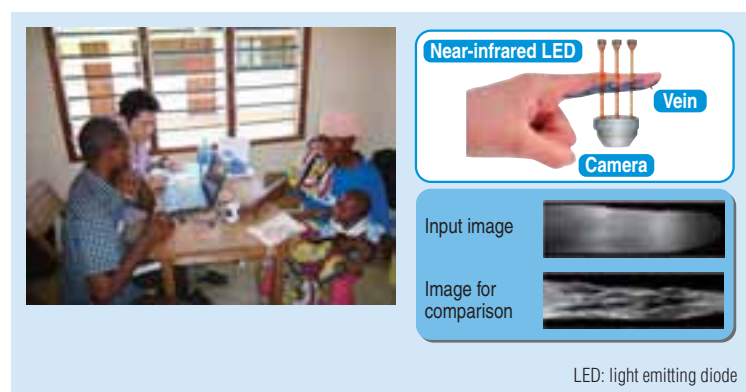
Use of Finger Vein Authentication in the Collection of Personal Health Information in the Republic of Kenya

The World Health Organization (WHO) and numerous other international aid agencies are actively working to prevent infectious diseases, which are still widespread in places such as Africa or Southeast Asia.

Countering infectious disease requires an understanding of local circumstances and follow-up studies that track individuals to identify the causes of disease. However, customs in developing nations, such as the ease with which people can change names, make it difficult to identify individual patients. One way of overcoming this problem is Hitachi's finger vein authentication technology[*1]. Using finger veins as for personal identification (ID) allows individuals to be identified without relying on names.

The Health and Demographic Surveillance System[*2] (HDSS) program being undertaken by the Institute of Tropical Medicine at Nagasaki University has adopted Hitachi's finger vein authentication system and is running joint trials of its use in the Republic of Kenya. Use of finger vein authentication dramatically improves the accuracy of identification. This one innovation has eliminated the queues that used to build up at reception during regular health checks. Recognizing these benefits, the Research Institute for Humanity and Nature has also adopted finger vein authentication for a trial dealing with malaria and clonorchiasis (an infectious disease caused by the Chinese liver fluke) in the Lao People's Democratic Republic.

It is anticipated that finger vein authentication technology will be widely adopted in developing nations in the future as a means of identification in healthcare and other social-sector applications.

[*1] A biometric authentication technique developed by Hitachi's Central Research Laboratory. First commercialized in 2002, it is primarily used in security applications such as automatic teller machines (ATMs), personal computers (PCs), and building access control. Unlike past technology that was based on information acquired from the skin, finger vein authentication utilizes distinctive biometric information from inside users' fingers. This gives it a reliably high authentication accuracy.

[*2] A method for recording personal information (marriages, births, deaths, relocation, etc.) for use in ongoing health surveys. HDSS has the potential to contribute to the implementation of effective policies through its use in developing nations that lack an infrastructure for personal information for conducting follow-up assessments of aid activities such as vaccination or food distribution.

Near-infrared LED

Vein

Camera

Input image

Image for comparison

LED: light emitting diode

Collection of finger vein data (left) and finger vein image taken by transmitted light photography (right)
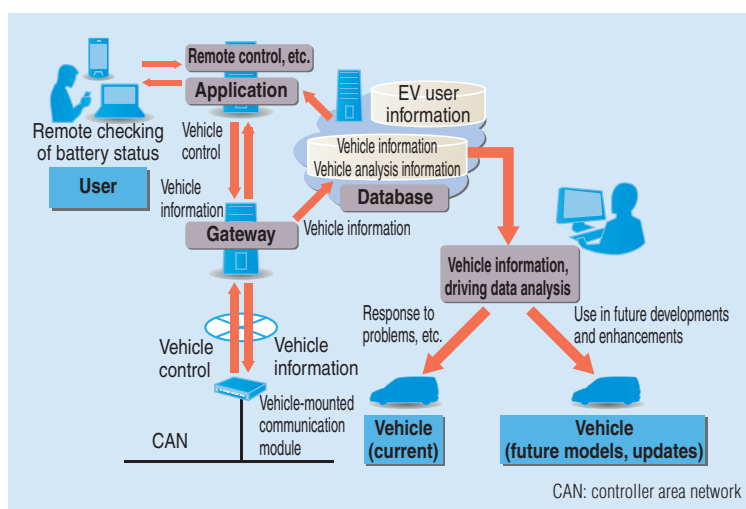
EV-ICT Solution

Hitachi has launched a service for the information technology (IT) support system for the electric vehicle (EV) model of customer as part of an electric vehicle information and communication technology (EV-ICT) solution that provides a global connected service platform for EVs that commenced commercial operation in January 2011.

In addition to functions for remotely checking the status of the drive batteries, starting or stopping charging, and turning the air conditioning on or off from a smartphone, personal computer (PC), or other similar device, the IT support system for the EV model also has timer functions for controlling when to perform charging or run the air conditioning. Vehicle information, including data on driving and operational information from the main electric drive unit, is collected on a dedicated server where it is available for responding to problems, etc. or for use in the development of future products. The EV-ICT solution supports the implementation and operation of these functions.

The EV-ICT solution will contribute to the use of EVs with a view to deployment throughout the world in response to market demand.

Remote control, etc.

Application

EV user information

Remote checking of battery status

User

Vehicle control

Vehicle information

Vehicle information
Vehicle analysis information

Database

Gateway

Vehicle information

Vehicle information, driving data analysis

Response to problems, etc.

Use in future developments and enhancements

Vehicle control

Vehicle information

Vehicle-mounted communication module

CAN

Vehicle (current)

Vehicle (future models, updates)

CAN: controller area network

Configuration of service and its use with EVs, batteries, and other equipment

(Commencement of service: October 2012)

Digital Watermarking Service for Smartphones

This photograph has had information embedded using digital watermarking. (Sample only)

Sample image using digital watermarking service for smartphones

An increasing number of companies are using QR Code* and other two-dimensional (2D) barcodes to embed information in their product advertising and promotional material. People use the cameras in their smartphones or mobile phones to read the 2D barcodes and open the company's web site. However, conventional 2D barcodes are required to have a prescribed shape, and this can detract from the appearance of design-conscious advertising or promotional material.

The digital watermarking service for smartphones uses Hitachi's proprietary digital watermarking technology to embed information by incorporating minute brightness variations into images. This information can then be read by the camera in a smartphone and used to display a web site to the user. This facilitates effective advertising or promotional practices that take advantage of image design.

While digital watermarking has primarily been used for security applications, the digital watermarking service for smartphones has redeployed this technique to advertising and promotion by making it possible for smartphones to read the watermarks.

In the future, Hitachi intends to use the digital watermarking service for smartphones as a base for offering solutions for advertising and promotion.
(Hitachi Solutions, Ltd.)

* See "Trademarks" on page 91.

Image Search Solution

Hitachi Solutions, Ltd. has been supplying an image search solution incorporating a high-speed similar image search engine developed by Hitachi, Ltd.'s Central Research Laboratory since August 2009.

Based on features such as the distribution of color and of brightness gradient patterns, the search engine takes less than a second to search a large collection of photographic and other image data (comprising several million entries) for images that are similar to a given image. The image search solution is based on a version of the search engine that can be accessed via an application programming interface (API), and supports everything from the development of user systems to their operation and maintenance, including the development of graphical user interface (GUI) or other applications for specific user requirements.

Version 2 of the image search solution was released in July 2012, with enhanced search accuracy provided by a new version of the high-speed similar image search engine, and an optional object search function that uses new technology. The object search function identifies the parts that make up an image and searches for other images that contain similar parts. This provides a flexible approach to searching that can be used for tasks such as identifying people or vehicles in surveillance videos, or searching e-commerce (electronic commerce) sites for items that appear in snapshot photographs.

In the future, Hitachi intends to expand the potential for using image search in a variety of different scenarios.
(Hitachi Solutions, Ltd.)
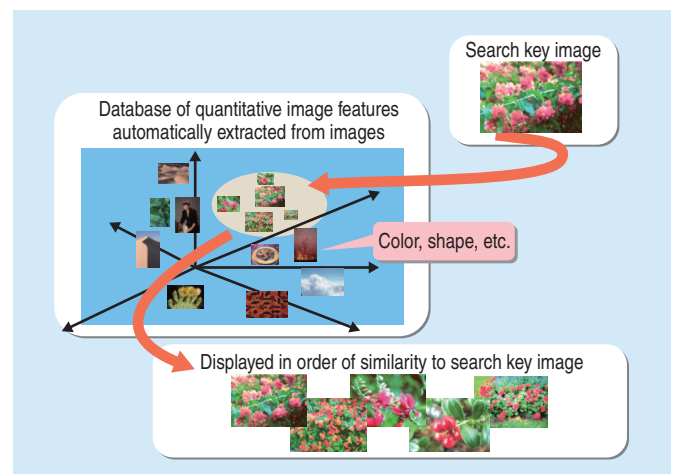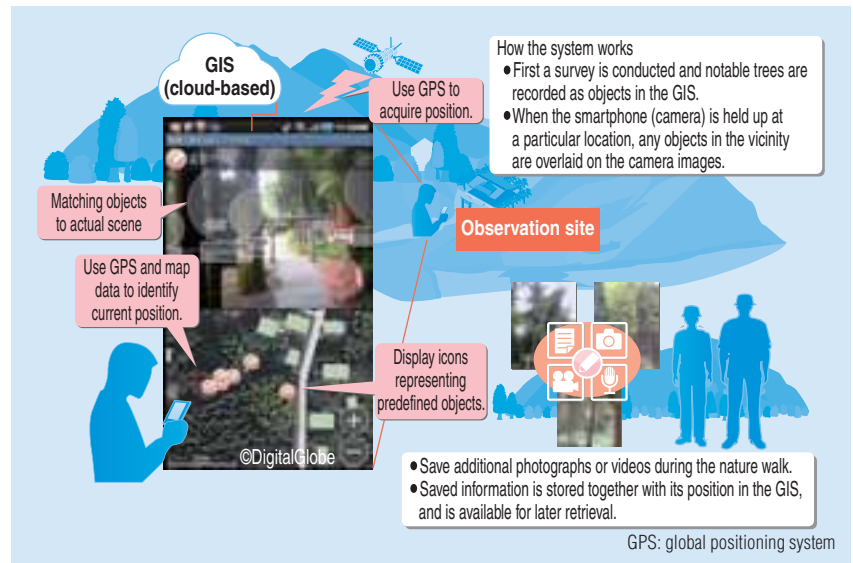

Overview of similar image search

AR-based On-site Visualization System

Demand has been growing recently for using smartphones, tablets, and other portable devices to access various types of information outdoors.

In response, Hitachi has released an on-site visualization system that utilizes augmented reality (AR) technology to present position-linked information together with live images on an Android* device. AR is a new technology for overlaying information on top of the actual scene displayed on a smartphone or other similar device.

When the camera in the Android device is used to display a particular object, the device automatically determines its position and other details such as the direction of the object being viewed, and then accesses information about the object that is stored in a server and overlays it on top of the displayed camera image. A geographic information system (GIS) provides the platform that manages the position-linked information, and the new system was implemented by integrating the AR technology with this GIS.

The system was trialed experimentally at a nature walk held at Hitachi IT Eco Experimental Village. In the future, it is anticipated that the system will be deployed in a variety of different field

work, such as maintenance inspections.
(Hitachi Solutions, Ltd.)

* See "Trademarks" on page 91.

GIS (cloud-based)

Use GPS to acquire position.

How the system works
● First a survey is conducted and notable trees are recorded as objects in the GIS.
● When the smartphone (camera) is held up at a particular location, any objects in the vicinity are overlaid on the camera images.

Matching objects to actual scene

Use GPS and map data to identify current position.

Observation site

Display icons representing predefined objects.

©DigitalGlobe

● Save additional photographs or videos during the nature walk.
● Saved information is stored together with its position in the GIS, and is available for later retrieval.

GPS: global positioning system

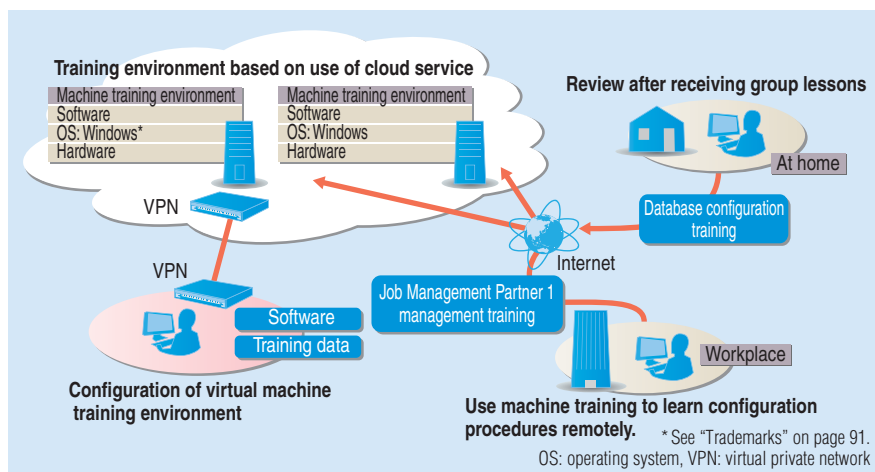Use during nature walk at Hitachi IT Eco Experimental Village

IT Human Resource Development Solution

Hitachi is extending its solutions for training people to be able to put information technology (IT) to appropriate use.

In addition to training in knowledge and technology, developing people capable of generating optimum value also demands human skills. In the FY2012 training of new recruits at the information and telecommunications divisions of Hitachi, a multidi-mensional and homogenous level of knowledge was achieved among trainees through synergies of appropriate communications between trainers, trainees, and others utilizing an in-house social network service (SNS).

Based on this in-house know-how and an ability to use IT that comes from being an IT vendor, Hitachi has established a virtual machine training environment for FY2013 on a public cloud and launched a service that allows people to study whenever they want, wherever they are. Specifically, the aim is to achieve better learning outcomes than in the past by combining virtual machine lessons and other electronic-learning (e-learning) for new recruits with direct interaction with trainers, and creating a training environment that provides a sense of immediacy even for people who are attending remotely. Hitachi also intends to expand the range of uses for this training environment to include such things as the acquisition of qualifications in Hitachi Open Middleware or to increase the benefits of reviewing previous material.
(Hitachi Information Academy Co., Ltd.)

Training environment based on use of cloud service

Machine training environment
Software
OS: Windows*
Hardware

Machine training environment
Software
OS: Windows
Hardware

VPN

VPN

Software
Training data

Configuration of virtual machine training environment

Review after receiving group lessons

At home

Database configuration training

Internet

Job Management Partner 1 management training

Workplace

Use machine training to learn configuration procedures remotely.

* See "Trademarks" on page 91.
OS: operating system, VPN: virtual private network

Training environment based on use of cloud service

High-speed Data Access Platform for Big Data

Ways of improving business efficiency and providing new services that utilize big data are a focus of attention against a background of factors that include the growing quantity of digital content, the spread of multi-function digital devices, and advances in sensor technology.

To satisfy the increasingly diverse requirements for the utilization of data, Hitachi has enhanced data storage and searching by combining a high-speed data access platform* with a platform for processing large quantities of data.

The high-speed data access platform combines highly reliable high-performance servers and storage with an ultra-high-speed database engine. It uses massively parallel data processing techniques to take maximum advantage of the hardware performance and achieve up to about 100 times the data search performance of previous database engines. By providing high-speed access to quantities of data in the petabyte range, it enables high-speed data analysis to be conducted in a variety of ways.

To support the use of big data to create value, Hitachi intends to continue improving both the functions and performance of the platform for processing large quantities of data.
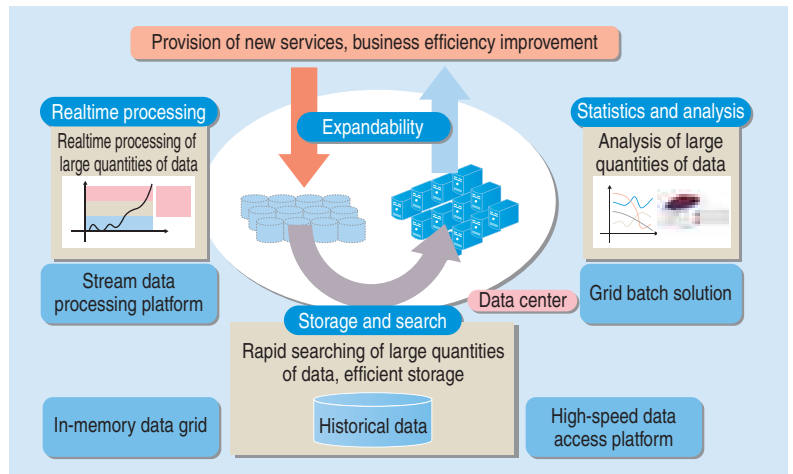
Platforms for processing of large quantities of data

* Utilizes the results of "Development of the Fastest Database Engine for the Era of Very Large Database and Experiment and Evaluation of Strategic Social Services Enabled by the Database Engine" (Principal Investigator: Prof. Masaru Kitsuregawa, The University of Tokyo/Director General, National Institute of Informatics), which was supported by the Japanese Cabinet Office's FIRST Program (Funding Program for World-Leading Innovative R&D on Science and Technology).

Job Management Partner 1—Automation of IT Operations

The operation of information technology (IT) systems has become increasingly complex due to the spread of cloud computing and data centers, and also the large-scale consolidation of in-house corporate systems. Accordingly, their complex operation spans diverse elements of IT systems. This in turn increases staff workloads based on operation procedure manuals. In these circumstances, it is necessary to improve efficiency and eliminate problems caused by human error.
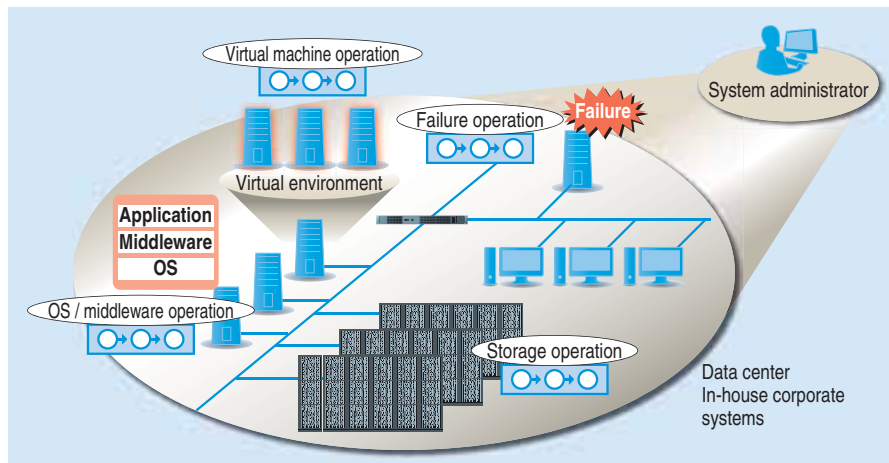
Job Management Partner 1 can automate complex operations that in the past were handled manually by following the instructions in multiple operation procedure manuals. This approach improves IT operational efficiency and reduces human error.

The product provides templates for typical IT operations. Able to be used without further modification, these templates have been created based on Hitachi's operational expertise in cloud computing, data center operations, and corporate system operations.

For example, the provisioning of virtual machines often involves numerous procedures for different types of software. When these procedures need to be performed frequently, the result is a significant increase in administrator workload. With Job Management Partner 1, in contrast, processes such as creating virtual machines and initializing their operating systems (OSs) can be performed simply by using the template provided.

Job Management Partner 1 improves operational efficiency by automating IT operations that used to be handled manually.

Overview of automation of IT operations using Job Management Partner 1

Hitachi Unified Compute Platform

Hitachi Unified Compute Platform

Amid trends that include the shift of information technology (IT) systems to the cloud and the creation of value from big data, Hitachi has released the Hitachi Unified Compute Platform, an integrated platform that can respond with flexibility to the changing business environment.

Hitachi Unified Compute Platform is an "All in One" integrated product that bundles management software with server, storage, and network equipment hardware. Intended for use in private cloud systems, it delivers the simplicity that comes from adopting a proven product, and shortens the preparation time required to make a new system available to users. The management software cuts administration costs by helping simplify and automate the operation of a virtualization environment, providing a system that operates reliably and can adapt quickly to changes in the business. It also includes an integrated platform orchestration function that allows a virtual machine (VM) administrator to centrally manage hardware that in the past would have been administered separately by server, storage, and network administrators respectively. The aim is to transform know-how from Hitachi's system solution and cloud businesses into products and services so that business activities can proceed without the need for platform configuration.
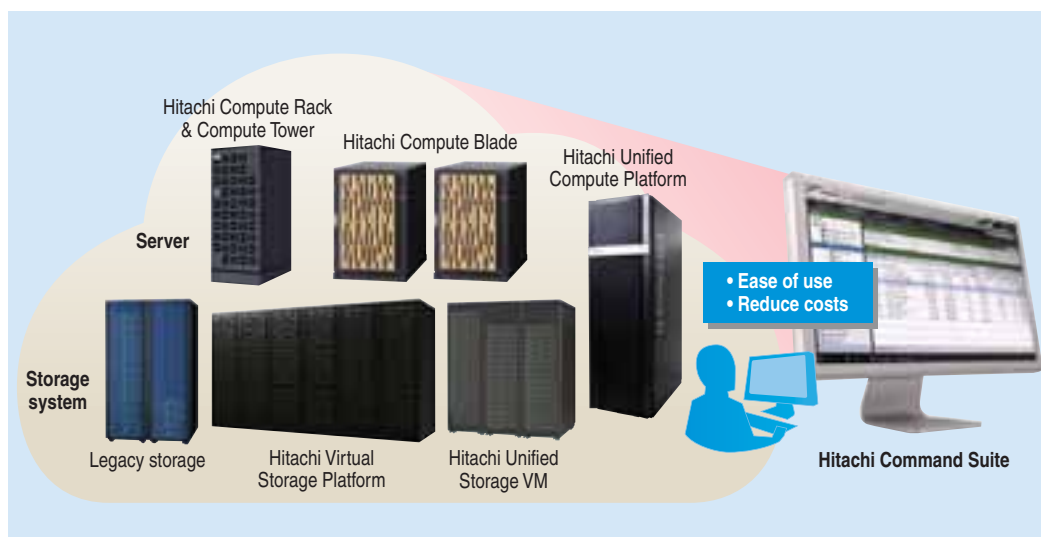
Hitachi Command Suite for Unified Management of Storage Systems

Hitachi Command Suite is an integrated software suite for the efficient management of storage systems, consolidating management of the entire system infrastructure in a data center, and covering the full range of Hitachi storage systems and servers. Hitachi Command Suite also forms part of Hitachi Unified Compute Platform, where it contributes to simplifying its management.

Today, it is critical for many organizations to handle and utilize ever-increasing amounts of data. The issues with this include the increasing complexity of information systems and their associated administrative tasks.

Hitachi Command Suite that consolidates management of entire storage systems

As one of the solutions for increasing the efficiency of administrative tasks, Hitachi Command Suite provides a simple and intuitive graphical user interface that makes it easy to configure data storage systems. For example, users only need to enter the name and the size of the file system to set up the system for file storage.

For stable operation of storage systems, which need to expand dynamically in accordance with business conditions and the increasing quantity of data, Hitachi Command Suite offers functions that help identify potential performance degradation in advance. Hitachi Command Suite regularly checks the health of storage systems and automatically issues alerts to indicate which servers are at risk of slower performance.

Hitachi Command Suite will continue to offer easy-to-use software tools that help customers reduce operating expenses.

Hitachi Compute Blade Series

The Hitachi Compute Blade series are x86 blade servers that draw on Hitachi's development capabilities and know-how, and incorporate the system virtualization, integrated management, energy-efficient operation, and other features demanded by the next generation of platforms. They can adapt flexibly to the needs of various different future information technology (IT) applications, including the utilization of big data, business intelligence (BI), cloud-based operation, and sophisticated social infrastructure.

The 2000 high-end model in the Hitachi Compute Blade series incorporates technologies built up by Hitachi in mainframe development to combine high performance with high reliability. With extensive input/output expansion capabilities and long-term hardware maintenance, it can provide the highly reliable IT environment demanded by social infrastructure platforms or mission-critical systems. The Hitachi Compute Blade 500 is suitable for virtualization and cloud platforms as well as systems for the utilization of big data. Its large memory and highly flexible and expandable networking simplify the configuration and operation of increasingly large and complex cloud systems. The server logical partitioning feature included with the Hitachi Compute Blade uses proprietary Hitachi technology to perform hardware-assisted configuration together with a logical partitioning technique for resources to provide a logically partitioned server environment that features both low overheads and high security and reliability.

Hitachi Compute Blade 2000

I/O expansion unit

Hitachi Compute Blade 500

The server logical partitioning feature

I/O: input/output
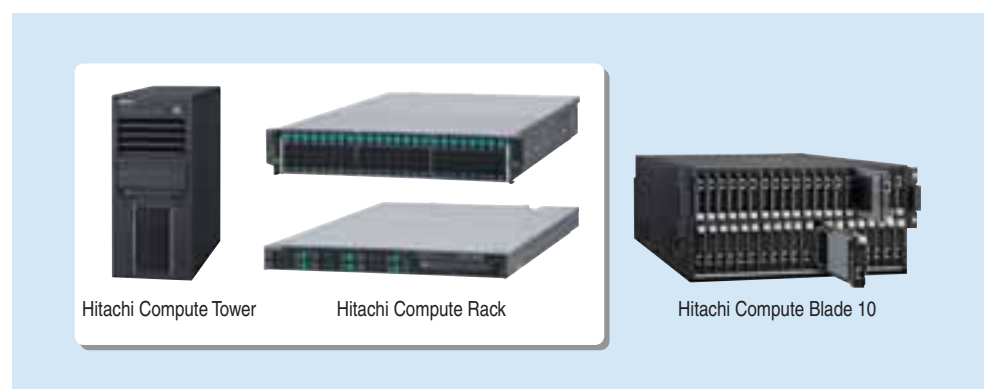
Hitachi Compute Blade series

Hitachi Compute Rack, Hitachi Compute Tower, and Hitachi Compute Blade 10 Entry-level Blade Server

Hitachi's range of x86 servers support a variety of different businesses and feature advanced processors such as the Intel* Xeon* processor. The Hitachi Compute Rack and Hitachi Compute Tower are respectively rack and tower servers that offer excellent memory, input/output (I/O), and storage expansion capabilities. They have the flexibility to suit a wide range of applications and diverse requirements, from small-office departmental servers to medium or large database servers. The virtualization support provides efficient utilization of resources, while features such as the use of low-voltage components help reduce system power consumption.

The Hitachi Compute Blade 10 entry-level blade server was developed for use in data centers, being compact and featuring low power consumption. It suits applications that require systems with a large number of servers installed in the same place, such as those of cloud service operators or content distributors. It is also suitable for use as a system platform for the parallel and distributed processing of data using software such as Hadoop*, supporting the application of big data to business in a wide range of fields.
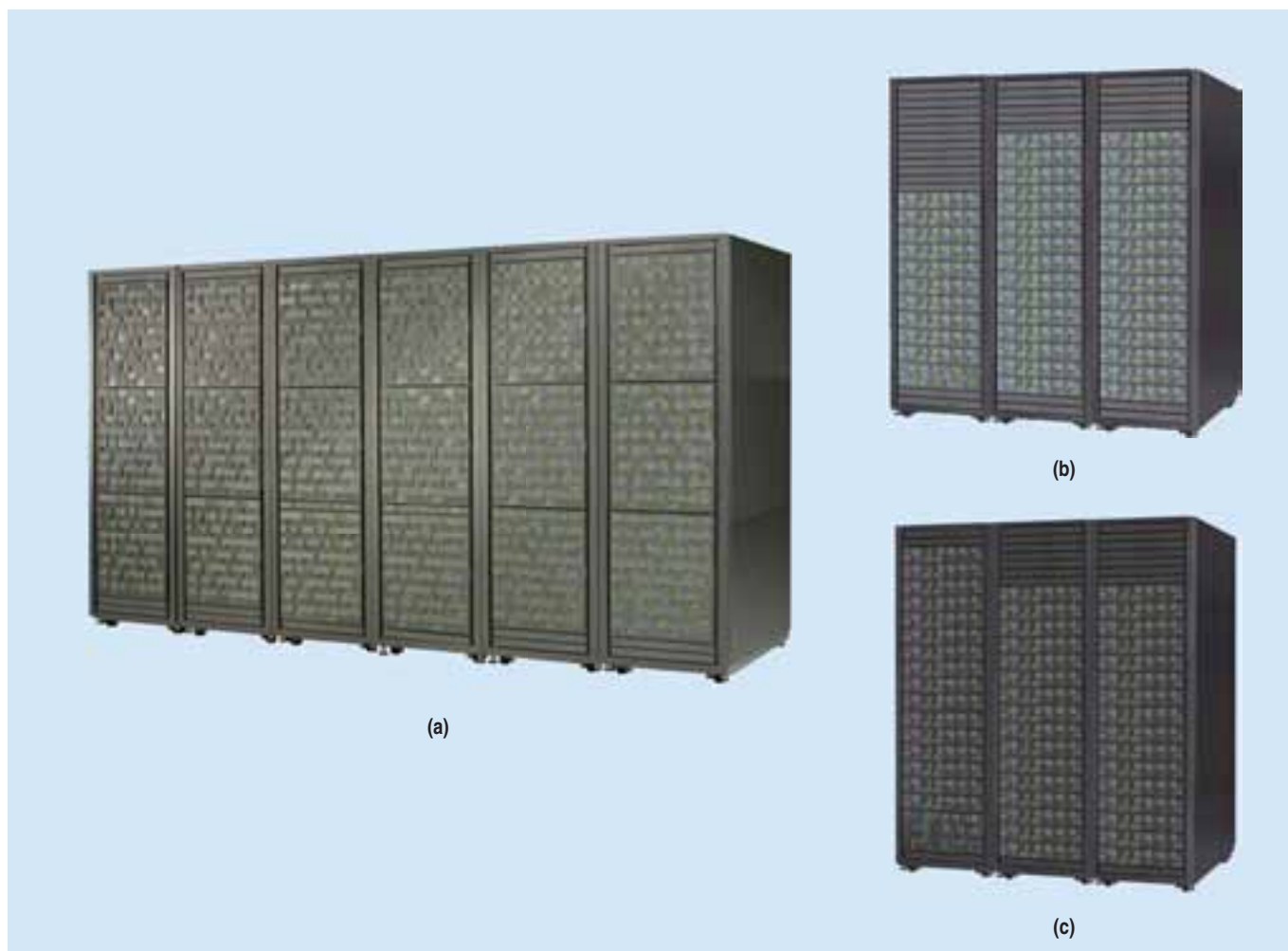
* See "Trademarks" on page 91.

Hitachi Compute Tower   Hitachi Compute Rack

Hitachi Compute Blade 10

Hitachi Compute Tower and Hitachi Compute Rack (left) and Hitachi Compute Blade 10 entry-level blade server (right)

Solution for Cloud Era Featuring Advanced Virtualization Technology

Hitachi Virtual Storage Platform (a), Hitachi Unified Storage 150 (b), and Hitachi Unified Storage VM (c)

Following three Hitachi storage solutions for the cloud era feature the latest virtualization technology.

(1) Hitachi Virtual Storage Platform

The explosive growth in the quantity of data in recent years has focused attention on the potential for flash memory in the high-speed processing of large quantities of data.

Recognizing the growing demands associated with the increasing pace of business, the Hitachi Virtual Storage Platform range has been strengthened with the addition of flash memory products. A flash acceleration function released in August 2012 uses flash memory to increase the speed of data processing. This was followed in November 2012 by the release of Hitachi Accelerated Flash, a flash memory module that features high performance, high reliability, and low cost.

These enhancements support the faster pace of business operations by speeding up data processing in applications such as databases and mission-critical systems.

(2) Hitachi Unified Storage 100 series

Hitachi has released the Hitachi Unified Storage 100 series that supports platforms that seek to make timely use of big data by storing a variety of different types of data on the same system.

The Hitachi Unified Storage 100 series supports protocols for both block and file access. This reduces the cost of hardware installation, operation, and administration by providing a single system that can support access from applications that use different types of data. The Hitachi Device Manager storage hardware management software provides a centralized portal for operations such as allocating storage capacity or reviewing capacity and usage of both block and file storage. It also includes a storage hierarchy virtualization function that reduces the daily workload for administrators and supports efficient data center operation.

(3) Hitachi Unified Storage VM

Hitachi has released Hitachi Unified Storage VM to provide efficient management and utilization of data from a variety of different sites or business sectors.

Incorporating functions supporting disaster recovery and storage virtualization that were developed through Hitachi's experience with enterprise storage, Hitachi Unified Storage VM delivers strong support for solving the information technology (IT) challenges faced by corporations by providing the scalability to store large quantities of data, efficient administration that includes existing storage resources, and shorter system outage time when moving data.

The management software that is included as a standard feature and the optional file module reduce the daily workload for administrators by operating as unified storage and providing centralized operation and the ability to review capacity usage.

Hitachi Data Ingestor and Hitachi Content Platform

File data used by corporations consists primarily of unstructured data such as e-mail and documents, is spread across numerous branch offices or departments, and is growing in quantity day by day. To overcome the challenges associated with the efficient storage and management of this ever-increasing quantity of dispersed file data, Hitachi supplies the Hitachi Data Ingestor. Instances of Hitachi Data Ingestor installed at branch offices, departments, and other company sites act as an on-ramp to the cloud, and used in conjunction with Hitachi Content Platform, which is installed at the data center and provides cloud-compat-

ible backup and archival storage, it provides consolidation and centralized management with automatic backup and archiving of file data from remote sites at the data center. Meanwhile, the file virtualization function allows remote users to access data without concern for whether the data is held at their own site or at the data center. This helps corporations achieve efficient data storage and management, overcoming the complex issues of storage hardware and capacity upgrades or data management at individual sites that accompany the rising volume of data.

* The above photograph shows models intended for the Japanese market. In Japan, Hitachi Data Ingestor is branded as the Hitachi Virtual File Platform.

Hitachi Data Ingestor (left) and Hitachi Content Platform (right)

Hitachi NAS Platform

Hitachi NAS Platform

The Hitachi NAS Platform is a high-end file storage system that meets the need for high-performance file services that provide rapid access to daily increasing quantities of file data.

Hitachi NAS Platform achieves high performance by using hardware for functions such as communications protocol control and the file system that are conventionally provided by software. It is suitable for applications such as the integration of large file storage systems and high-speed processing of large quantities of data as required in fields such as scientific computing, medicine, life science, and entertainment.

Signal Conditioner for Large-scale, High-speed Transmission

Telecommunications equipment including high-end servers transmits signals within and between boards using a variety of different communication standards, and as a result the maintenance of signal quality becomes an issue as transmission speeds increase.

In response, Hitachi has developed a signal conditioner that uses the clock data recovery (CDR) technique to transmit 8-Gbit/s and 10-Gbit/s signals with better quality than previous systems. The signal conditioner helps improve the performance of telecommunications equipment and has the following features.

(1) High-quality transmission is achieved by retiming using CDR to reduce signal jitter (deviation from periodicity).

(2) Auto-detection of transmission speed, with CDR enabled at high speeds and disabled at low speeds to reduce power consumption.

In the future, Hitachi intends to contribute to ongoing performance improvement in telecommunications equipment by supporting a variety of transmission standards (including PCI Express* 3.0/4.0, Fibre Channel, and Ethernet), and further increasing transmission speeds.

* See "Trademarks" on page 91.
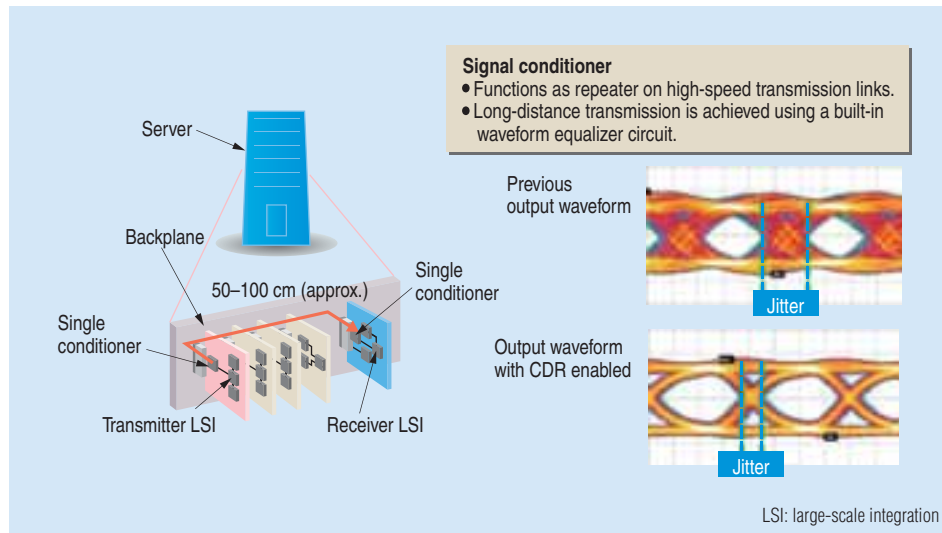
Functions and benefits of new signal conditioner

Automatic LSI Testing Technique with High Precision and Detection Capability

As the telecommunications equipment that underpins the information infrastructure of society must be reliable, the large-scale integrated circuits (LSIs) used in this equipment are subject to very high quality demands, along with functionality and high performance. When using LSI testers to perform testing in ways that take account of the operating conditions in actual equipment, the following issues arise.

(1) LSI faults that occur in actual equipment cannot be reproduced in the LSI tester.

(2) It is difficult to determine whether a fault lies in the LSI or its peripheral components.

To overcome these problems, Hitachi has developed a built-on self-test (BOST) system. This system includes an LSI self-test function that executes prior to the equipment starting operation, and a function for testing the ability of the LSI to access peripheral components when mounted in the equipment. This significantly improves equipment quality because it makes it easy to perform testing and fault analysis with the LSI in place.
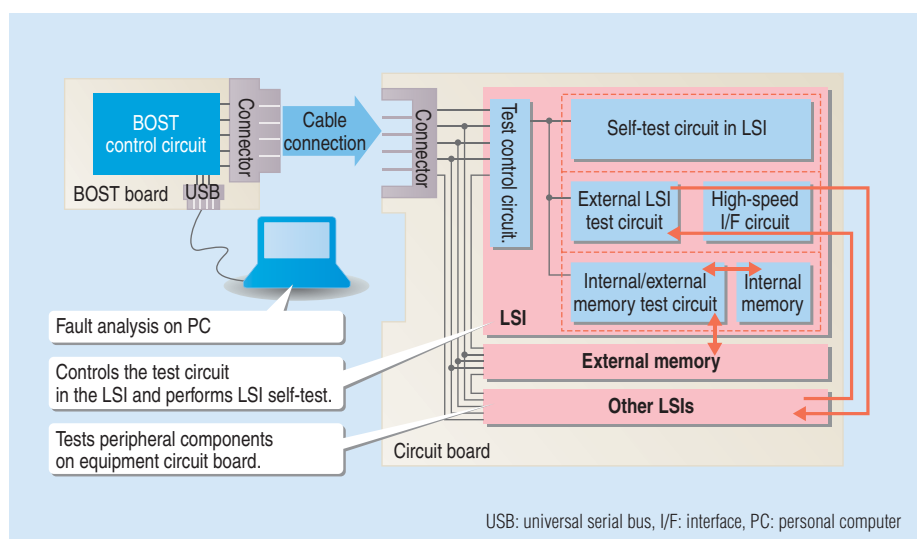
BOST configuration

The technique is currently contributing to higher reliability for the telecommunications equipment that supports the information infrastructure of society through its use in application-specific integrated circuit (ASIC) LSIs produced using a 40-nm/28-nm complementary metal oxide semiconductor (CMOS) process.

Packet Ring Transmission System for Metro Networks

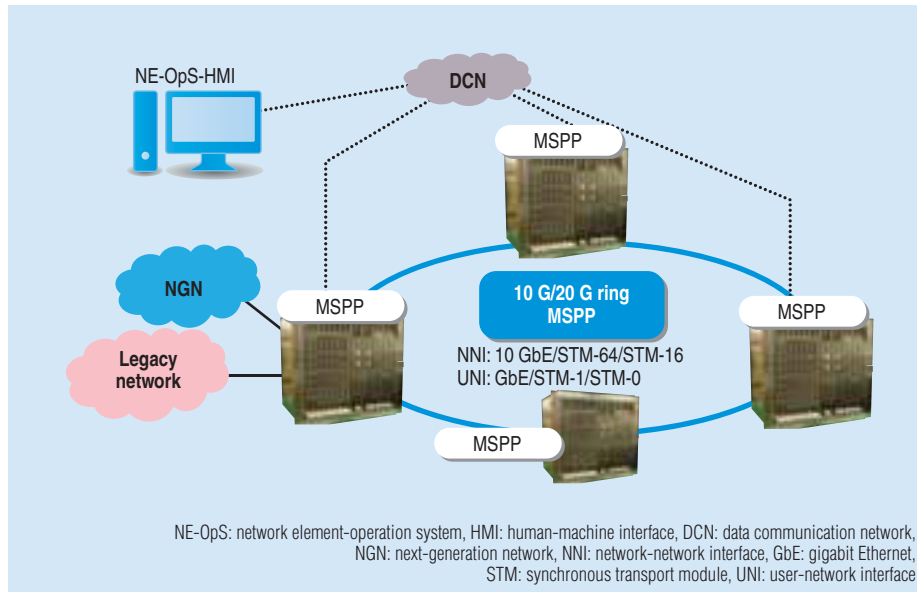Hitachi has commenced deliveries of its multiservice provisioning platform (MSPP) packet ring system for telecommunications carriers that incorporates multiprotocol label switching-transport profile (MPLS-TP) technology. The main features are as follows.

(1) MPLS-TP technology is used to combine legacy and Ethernet services in the same system (rather than their being separate systems as in the past). This makes it possible to provide advanced management and operations functions such as switching over to backup routes.

(2) The system is approximately 90% smaller and costs only about 40% as much as similar systems in the past. Power consumption has also been reduced by 75%.

(3) Compatibility with maintenance and operation of existing systems simplifies installation.

After initial applications in metro networks in Japan (city-level networks), Hitachi intends to market the system globally in the future.

NE-OpS: network element-operation system, HMI: human-machine interface, DCN: data communication network,
NGN: next-generation network, NNI: network-network interface, GbE: gigabit Ethernet,
STM: synchronous transport module, UNI: user-network interface

Packet ring transmission system for metro networks

Packet Optical Transport System

Demand for high-capacity and high-quality data transmission is growing rapidly due to factors such as the growth in mobile communication volumes resulting from the spread of smartphones, and the increase in data center communications resulting from greater use of the cloud.

In response, Hitachi is developing a packet optical transport system that incorporates both an integrated operation system (OpS) and packet optical transport units that use multiprotocol label switching-transport profile (MPLS-TP) technology. The main features are as follows.

(1) Use of MPLS path to control communication quality and optical paths for high-capacity (100 Gbit/s) data transfer

(2) Operation, administration and maintenance (OAM) functions that enhance reliability and quality of packet network

(3) More efficient network operation through centralized management of packet and high-capacity optical networks from integrated OpS

In the future, Hitachi intends to extend the functions to support the hosting of a range of services and access or existing networks.

HMI: human-machine interface
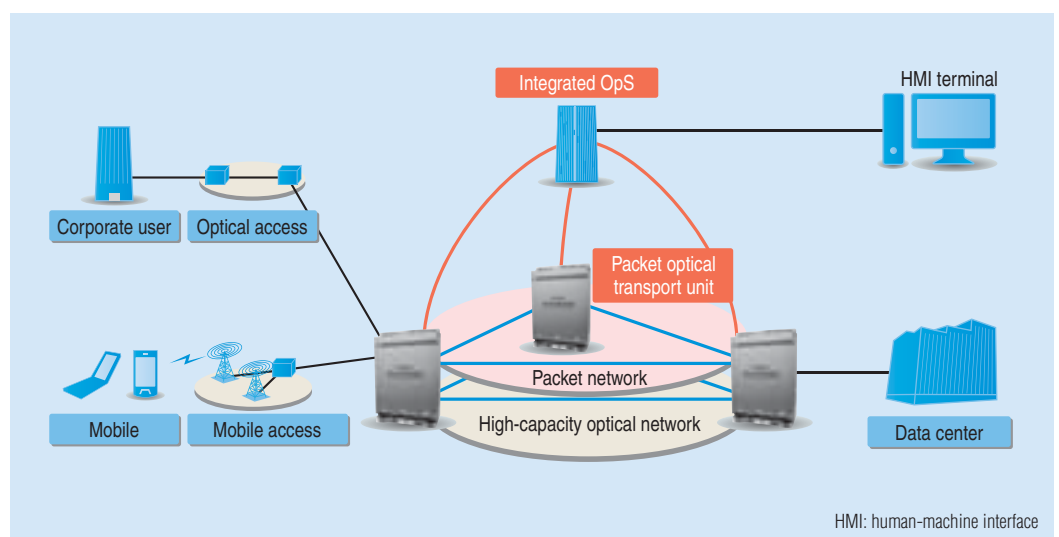
Packet optical transport system

Mobile WiMAX Systems

Hitachi sees WiMAX* as a wireless broadband technology that can deal with the rapid increase in mobile traffic, and has already developed a wide range of systems, including center systems, Base Stations (BSs), terminals, and WiMAX-Wi-Fi* Repeaters. Key product features are listed below.

(1) Access Service Network Gateway (ASN-GW)

A gateway that handles functions such as handover that support mobile operation. Features include high throughput, high housing capacity, and carrier-grade redundancy control.

(2) Home Agent (HA)

Network equipment that ensures that mobile terminals keep the same Internet Protocol (IP) address. Features include high processing capacity, virtual network support for multiple Mobile Virtual Network Operators (MVNOs), and advanced Reliability, Availability and Serviceability (RAS) functions.

(3) BSs

Small, lightweight BSs with advanced functions.

(4) Dual Terminals

Supports both WiMAX and CDMA2000* 1x Evolution Data Only (EV-DO) so that the appropriate mobile service can be selected based on wireless operating conditions.

(5) WiMAX-Wi-Fi Repeater system

Provides a secure Wi-Fi service so that WiMAX can be used as a backhaul link for data offload purposes. A large-capacity log collection system that utilizes Hadoop is also available.

* See "Trademarks" on page 91.
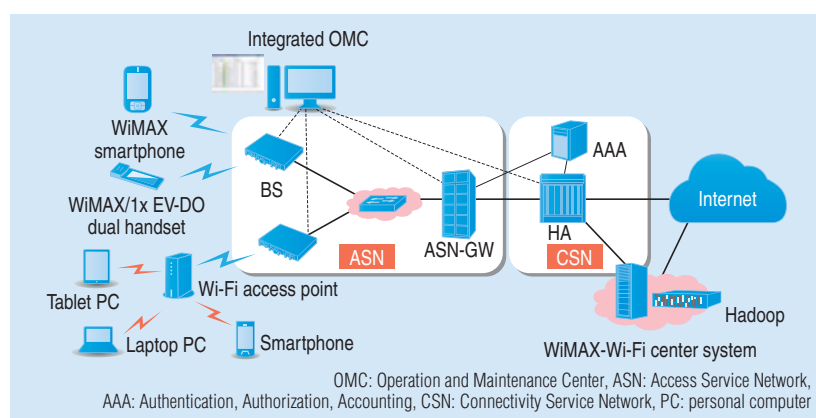
Mobile WiMAX systems

Interconnectivity between LTE and 3G Systems

Because telecommunications carriers will only provide limited coverage area during the early stages of commercial Long Term Evolution (LTE) services, devices will need to continue using the existing third-generation (3G) network infrastructure. Two technologies are needed to achieve interconnectivity with 3G systems, and Hitachi has conducted interoperability tests (IOTs) to test actual devices with connections to both its own systems and those supplied by other vendors. The implemented technologies are as follows.
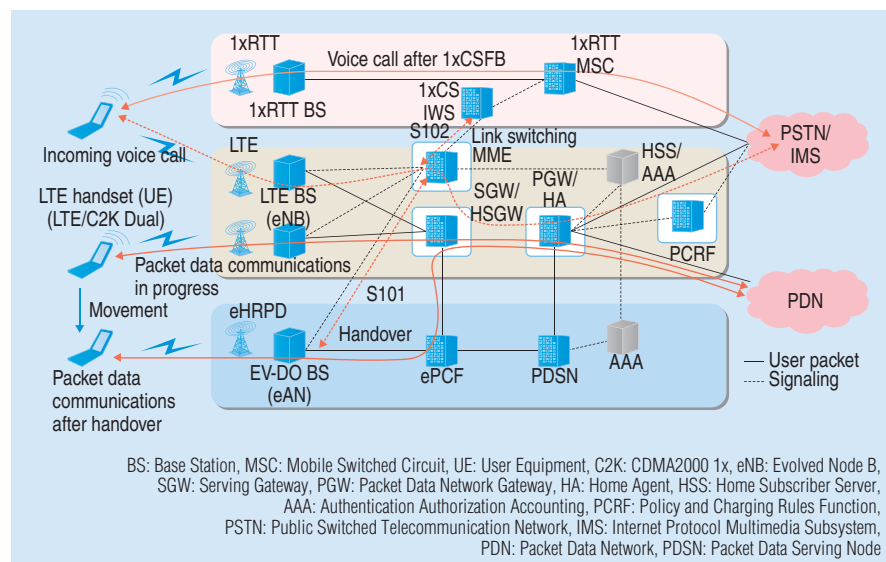
(1) Evolved High Rate Packet Data (eHRPD)

To maintain seamless continuity of high-speed data packets using the Evolution Data Only (EV-DO) network when the user moves out of the LTE coverage area, Hitachi installed High Rate Packet Data Serving Gateway (HSGW) in the LTE core network, and verified the connection to the Evolved Packet Control Function (ePCF) and S101 interconnectivity with Mobility Management Entity (MME) and enhanced access node (eAN).

(2) 1x Circuit Switched Fallback (CSFB) [1x Radio Transmission Technology (RTT) CSFB]

Configuration and testing were conducted to ensure S102 interconnectivity with MME and the 1x Circuit Switched Interwork Solution (CS IWS) for switching the link to the existing 1x network when an LTE handset has received a voice call.

In the future, Hitachi intends to proceed with development of Voice over LTE (VoLTE) so that voice calls can be carried on the LTE packet link alone.

Interconnectivity between LTE and 3G systems