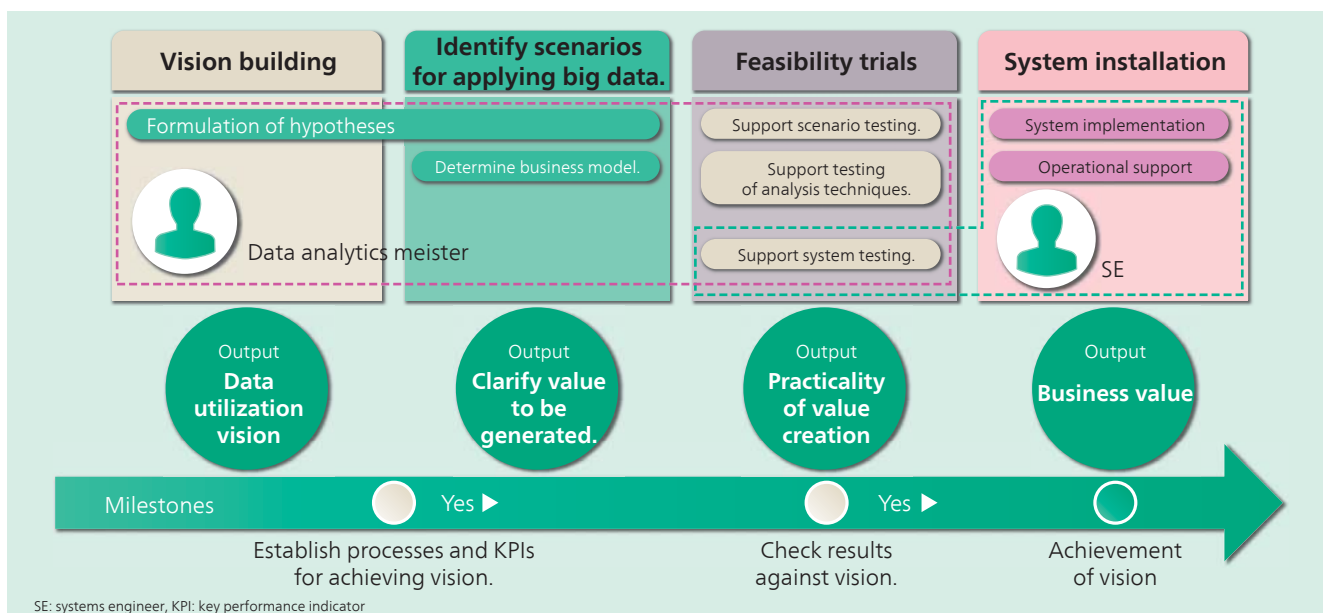


IT Solutions and Cloud Services



1 Process for utilization of big data

1 Data Analysis Service

Through its involvement with social infrastructure, Hitachi has collected large amounts of data from industrial machinery and other large plant and utilized it in applications such as the maintenance of this equipment. It has also proposed knowledge as a service systems that provide added value and knowledge extracted from large amounts of collected data and information technology (IT) resources. The data analysis service takes full advantage of these resources, working with customers to generate new value from big data.

To deliver this service, Hitachi has established an organization of more than 200 people, including consultants with expertise in system configuration and operation, engineers and researchers from the field of data analysis, and “meisters” who specialize in the use of big data, combining practical industry knowledge with expertise in fields like mathematical analysis and IT.

The analysis service process starts by agreeing on a clear vision with the customer. Next, hypotheses on how to achieve the targets are formulated based on an understanding of the customer’s business. The required data is then collected and the hypotheses tested using mathematical analysis to verify their validity before implementation on production systems.

2 Logistics Analysis Solution for Retailers

Hitachi has introduced a logistics analysis solution that speeds up

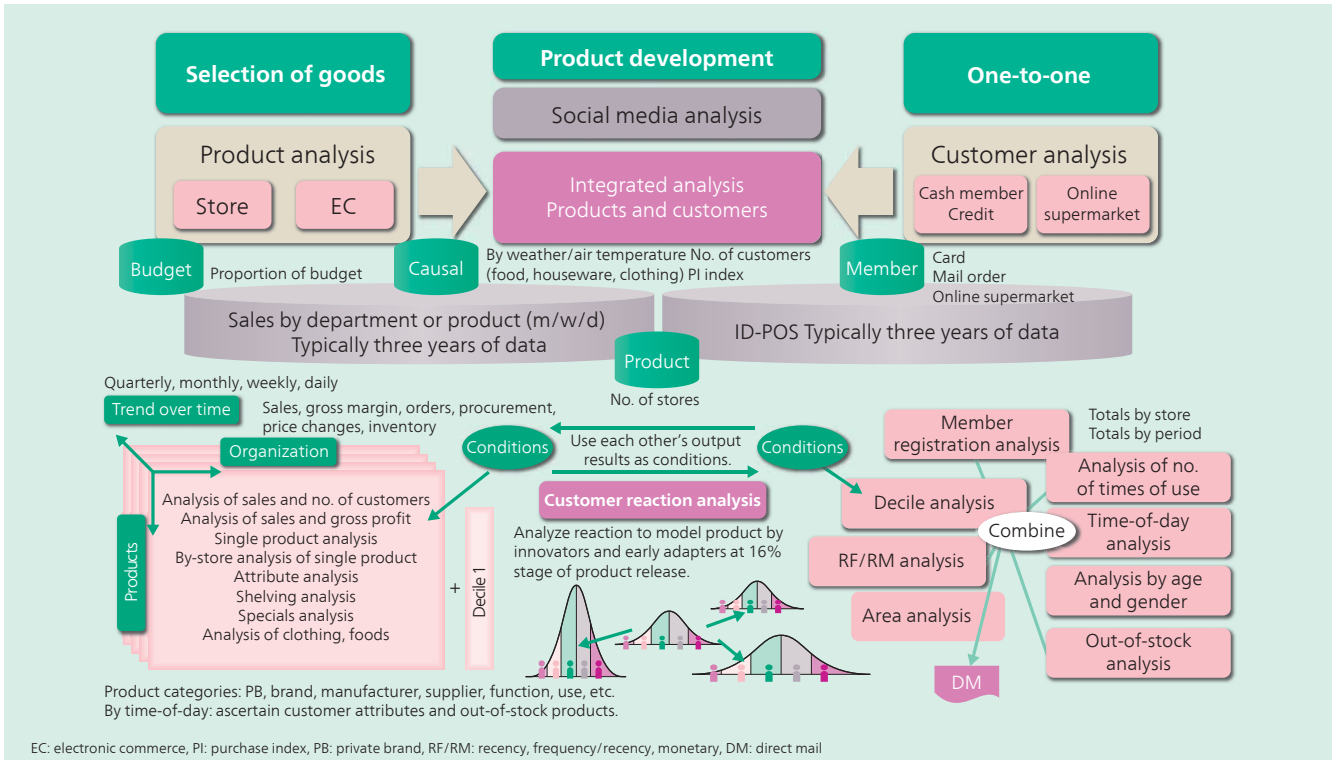
the utilization of big data such as point-of-sale (POS) data held by retailers or information from social networks.

The solution consists of three options: a product analysis system, a customer analysis system, and a social media integration system. The product analysis system facilitates the analysis of POS data from a variety of perspectives, including not only sales and inventory but also factors such as time or category. The customer analysis system uses a range of different analytical methods to analyze membership data and help decide on what approaches are needed for dealing with members, such as recency, frequency, and monetary (RFM) analysis and decile analysis. The social media integration system utilizes keywords and other information from tweets posted on social networks such as Twitter*1 to help with tasks such as formulating sales plans for top-selling products. To increase the speed of analysis, a high-speed data access platform*2 is used as the database engine.

These solutions are delivered in the form of an appliance that combines servers, storage, and other hardware with middleware such as the high-speed data access platform and the Job Management Partner 1 integrated systems management software.

*1 See “Trademarks” on page 142.

*2 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).



2 Concept behind logistics analysis solution

3 TWX-21 Global Huge Data Exchange Service

As the operations of manufacturers and other corporations have become increasingly global in recent years, overseas activities have extended beyond manufacturing to include such work as design, prototyping, selling, and maintenance. This has created a growing need for the fast and secure exchange of large amounts of data (in the gigabyte range) to facilitate the exchange of the design drawings, manuals, and various other types of information required for this work.

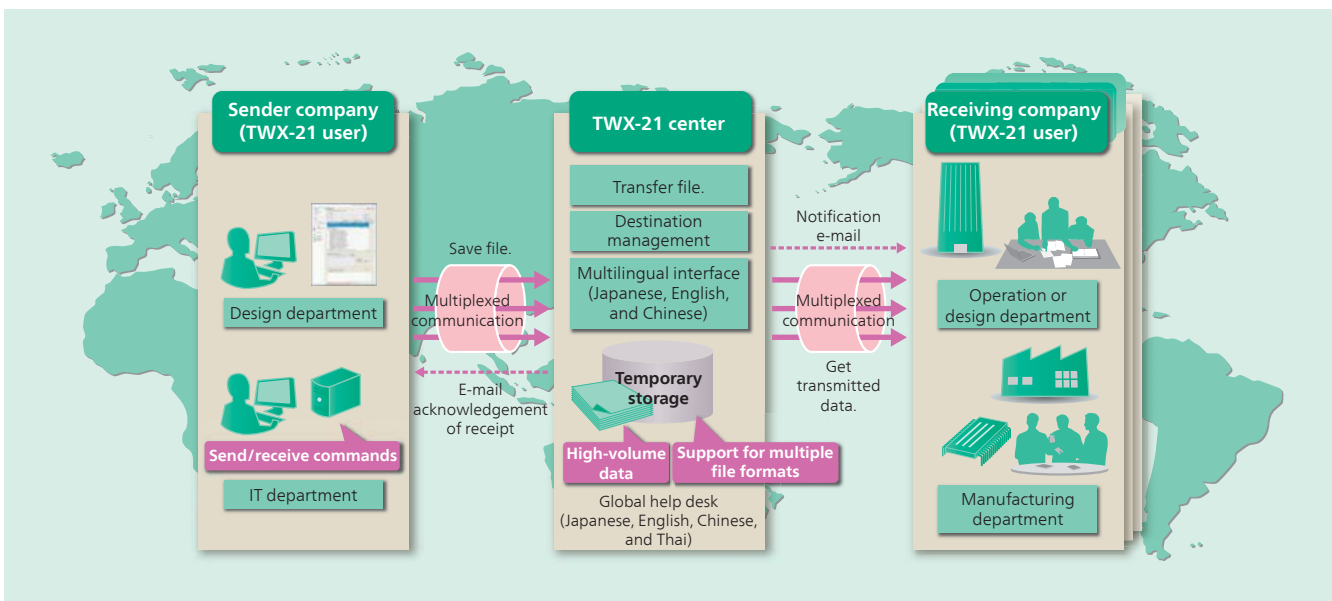
In response, Hitachi launched a new global huge data exchange service in June 2013. The service is provided as an option of the TWX-21*1 business system cloud, which is used by 210,000 users at 50,000 companies across 24 countries or regions (approx-

mately).

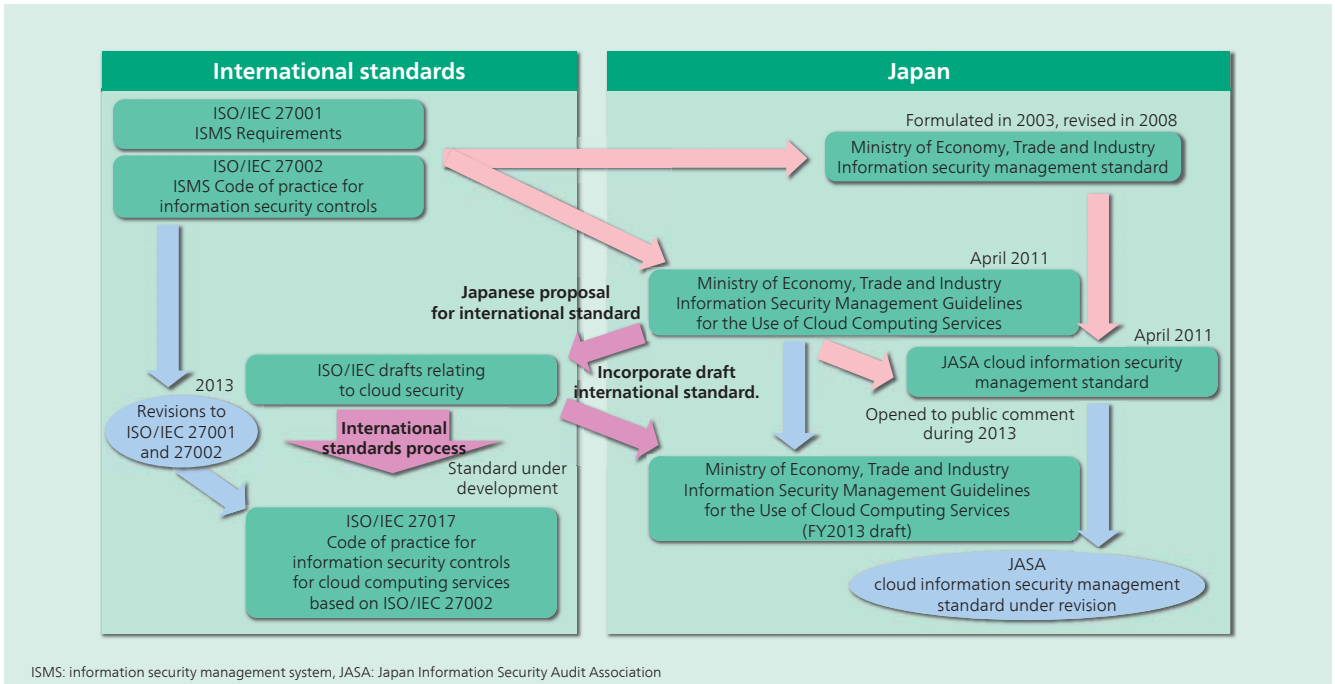
The service utilizes multiplexed communication techniques, security, and other technologies for the fast and high-quality transfer of large amounts of data across the internet. It also includes functions designed for business use, including a multi-lingual web interface (Japanese, English, and Chinese), global help desk (Japanese, English, Chinese, and Thai), administrator approval, and send and receive commands for linking different systems.

Hitachi intends to expand the range of global solutions offered on TWX-21 to support the anticipated increase in the number of companies from a variety of fields, such as manufacturing and logistics, that will establish overseas operations in the future.

*1 TWX-21 is a trademark of Hitachi, Ltd.



3 TWX-21 global huge data exchange service



4 National and international developments in cloud security relating to ISO/IEC 27017

4 International Standardization of Cloud Security

With security always an important issue in cloud computing, a number of guidelines have been published on the subject. Examples include those of the Cloud Security Alliance (CSA), a non-profit organization based in the USA; the European Union Agency for Network and Information Security (ENISA) and The Federal Risk and Authorization Management Program (FedRAMP), which deals with the certification of cloud procurement for US government agencies. In Japan, the Ministry of Economy, Trade and Industry, Ministry of Internal Affairs and Communications, National Information Security Center (NISC), and other agencies have each published guidelines from their own perspectives.

Along with these, the International Organization for Standardization (ISO), together with the International Electrotechnical Commission (IEC), is also working on a standard (ISO/IEC 27017) that deals with security considerations and management practices specific to the cloud. ISO/IEC 27017 is based on the existing ISO/IEC 27001 standard for information security management. The new standard is a Japanese proposal based on the Information Security Management Guidelines for the Use of Cloud Computing Services published by the Ministry of Economy, Trade and Industry. The ISO/IEC is closing the working draft phase for the proposal. With other agencies such as the CSA participating in the work, the proposal is likely to be adopted as an international standard.

In addition to participating in work on the ISO/IEC 27017 proposal, Hitachi is also taking part in the Cloud Information Security Promotion Alliance of the Japan Information Security Audit Association (JASA), which is seeking to establish security auditing practices in Japan based on the proposal. Hitachi contributes to the alliance by conducting pilot audits to promote improved cloud security based on the international standards.

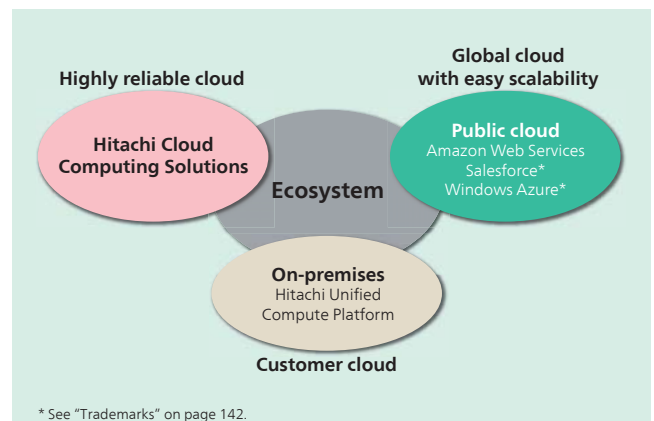
5 Cloud Up-scaling by Ecosystem through Partnerships

IT systems require speed and the ability to respond to change. While Hitachi has traditionally turned to “technologies for building” to satisfy these requirements, dealing with these on its own has become more difficult in recent years.

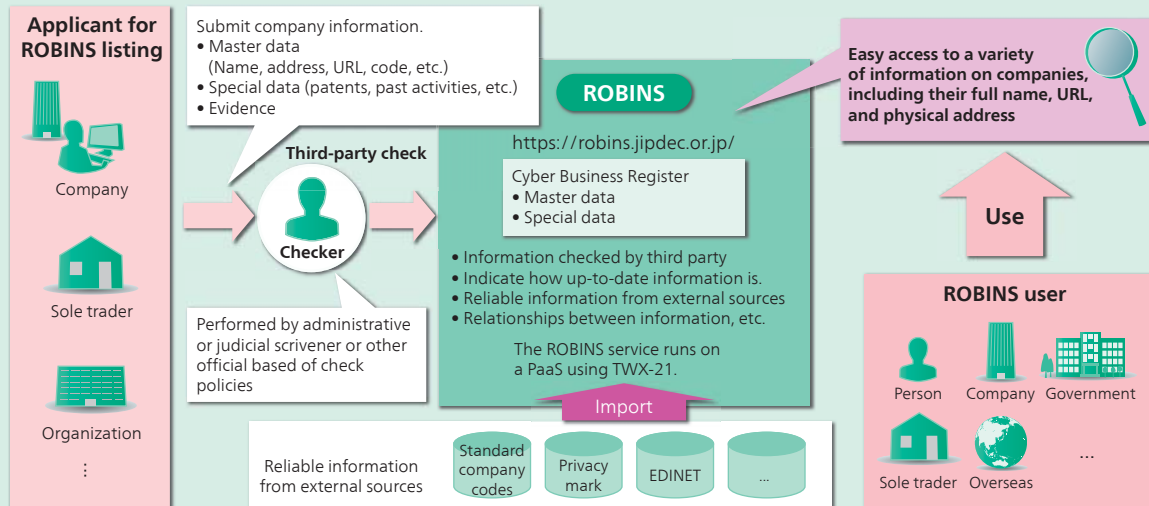
Given these developments, Hitachi has embarked on an up-scaling strategy for building IT systems through the application of “technologies for use,” and is establishing an ecosystem through partnerships with cloud vendors.

One example is the provision of a SAP*-based accounting system through the integration of Hitachi Cloud Computing Solutions with Amazon Web Services* (Amazon Web Services has a dominant share of the public cloud market). Other examples of services that deliver high added value include a monitoring and operation service that utilizes Job Management Partner 1 and combines Hitachi Cloud Computing Solutions with on-premises systems in an integrated package; a security platform enhanced by the use of data leakage prevention solution; and the mission-critical task solution for manufacturing and logistics service.

* See “Trademarks” on page 142.



5 Ecosystem-based cloud platforms



URL: uniform resource locator, PaaS: platform as a service, EDINET: electronic disclosure for investors' network

6 ROBINS Cyber Business Register

6 ROBINS—Cyber Business Register

In Japan, the difficulty of obtaining reliable information about companies when trading on the internet is an impediment to the speed of business and a cause of missed opportunities. In response, JIPDEC launched ROBINS Cyber Business Register service in July 2013 to provide an online registry of businesses and facilitate internet-based business activities in Japan.

The service makes reliable information about companies available to everyone, regardless of time or place. While the information is submitted by the companies themselves, it is verified by third parties such as administrative or judicial scriveners before being published and therefore can be trusted in practice.

In addition to display on the web, the company information published by ROBINS can also be accessed via an application programming interface (API). One application for the service is the *Anshin* Mark certification that indicates that web mail is genuine, and which was adopted on some political party e-mail magazines produced for the July 2013 House of Councillors election.

It is anticipated that further new services will emerge that use ROBINS company information.

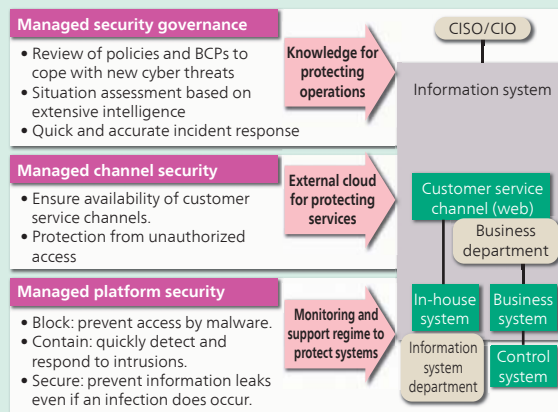
7 Managed Security Services

Hitachi launched cloud-based managed security services in October 2013 that supplies the latest security measures to protect organizations' information and systems from increasingly advanced cyber threats.

The increasing complexity and sophistication of cyber threats in recent years have imposed a growing workload on information system departments, including the securing of technical staff and the strengthening of monitoring regimes. In addition to existing improvement activities based on the plan, do, check and act (PDCA) cycle, there is also a need for operating practices based

on the observe, orient, decide, and act (OODA) concept that accept the inevitability of incidents occurring.

The managed security services provided by Hitachi are cloud-based and offer comprehensive support for cyber threat countermeasures. It reduces the burden on information system departments and implements dynamic security management based on



Category	Services	Functions
Managed security governance	Security consulting service	<ul style="list-style-type: none"> Assistance with formulation of security policy Assistance with analysis of security risk Assistance with formulation of business continuity management
	Security assessment service	<ul style="list-style-type: none"> Assessment of IT infrastructure vulnerabilities Malware survey
	Intelligence service	<ul style="list-style-type: none"> Provision of system vulnerability information Assessment of reputational risk for specific sites Assistance with incident response
	CSIRT technical support service	<ul style="list-style-type: none"> Assistance with in-house CSIRT operation Targeted threat mail exercises
Managed channel security	Web site protection service	<ul style="list-style-type: none"> Web application firewall Countermeasures for DDoS attacks on web sites
	Web site check service	<ul style="list-style-type: none"> Assessment of web system vulnerabilities Falsification detection
Managed platform security	Mail security service	<ul style="list-style-type: none"> Anti-virus, anti-spam Content filtering
	Web security service	<ul style="list-style-type: none"> URL filtering for web browsing Anti-virus
	Security event monitoring service	<ul style="list-style-type: none"> Integrated log management Log correlation analysis
	Virtual server protection service	<ul style="list-style-type: none"> Virtual UTM operation monitoring

BCP: business continuity plan, CISO: chief information security officer, CIO: chief information officer, CSIRT: computer security incident response team, DDoS: distributed denial of service, UTM: unified threat management

7 Services provided by managed security services

the OODA concept. In addition to the monitoring of both physical and virtual environments, the available services also include the correlation analysis of logs from different devices to support rapid incident detection and response.

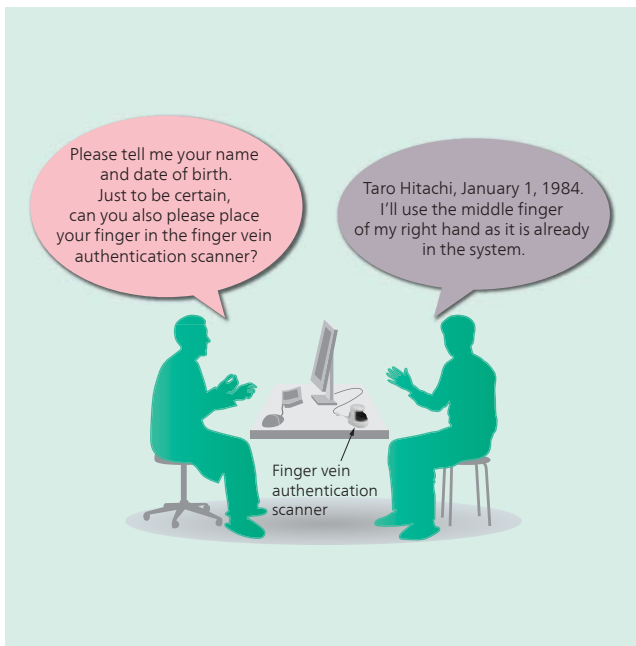
In the future, Hitachi intends to expand the range of services on offer to deal with increasingly sophisticated cyber threats and to support security measures that are suitable not only for corporate systems but also social infrastructure systems.

8 New Applications for Finger Vein Authentication Solutions

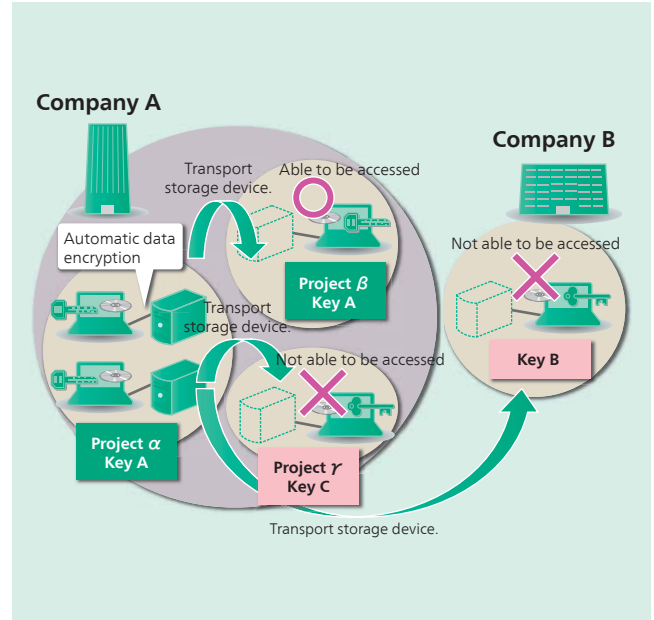
Hitachi's finger vein authentication systems achieve very accurate authentication by reading the pattern of veins in one's finger. They are already widely used in areas such as corporate IT security and physical security (premises access control). In recent years, their use has also expanded to include operator authentication on POS terminals and time and attendance applications in sectors such as the food and beverage industry or retail chains. The technology has been well regarded for its many advantages, which include preventing unauthorized operation or spoofing, reducing use of consumables such as identification cards, and eliminating the need for password entry.

2013 also saw growing use of the systems for patient identification in the healthcare and welfare sector. While the prevention of medical accidents due to patient misidentification has in the past relied on having the patient identify themselves by name and date of birth, use of finger vein authentication systems provides a reliable form of identification. Hospitals that offer radiological treatment have been the first in the healthcare sector to use finger vein authentication systems for patient identification.

It is anticipated that 2014 will see the technology being more widely adopted by other areas of healthcare (such as medical checkups and vaccinations).



8 Use of finger vein authentication systems for patient identification in the healthcare sector



9 Solutions for preventing mass data leaks through use of data protection middleware

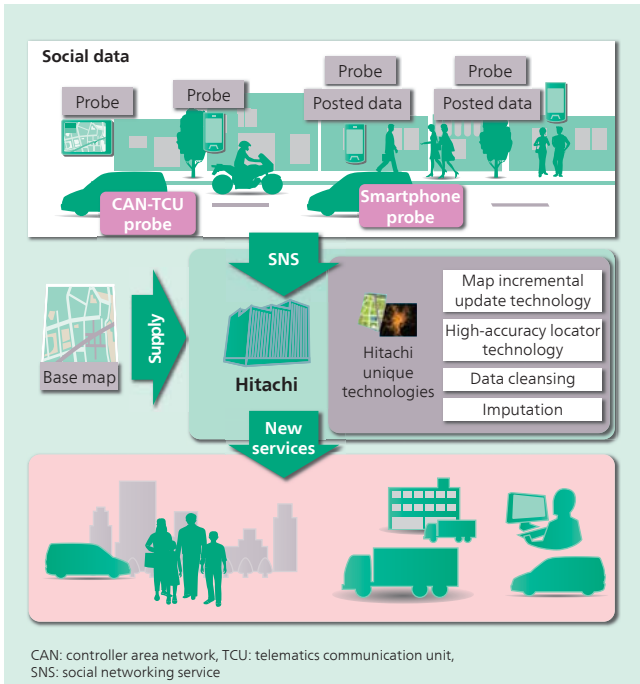
9 Solutions for Preventing Mass Data Leaks

To ensure security and convenience when taking mass storage data off site, Hitachi has developed data protection middleware for preventing data leaks.

Measures such as encryption are essential for preventing data leaks when transporting mass storage data on portable storage devices. Hitachi's data protection middleware enhances security by allowing each organization to set their own keys and only permitting data encryption and decryption in the specific areas assigned with that key. Also, because data encryption and decryption occurs automatically in a way that is transparent to users, the portable storage device can be used normally without any loss of convenience.

The volume of video content used in the broadcasting industry is progressively increasing as a consequence of developments such as the move to high definition and fully digital transmission for terrestrial broadcasting. There has also been a practice of transferring video data to external storage devices for editing, to improve the efficiency of this work. While this is convenient, the ease of copying video data and the potential for storage devices to be lost or used inappropriately raises the issue of what security measures should be adopted to deal with the risk of leaking private information or confidential corporate information that may be contained in this video. Hitachi's middleware can prevent information leaks resulting from the inappropriate use by third parties of video or other data.

In the future, Hitachi intends to supply the middleware to industries that need to maintain the security of mass storage data, including healthcare systems that handle diagnostic medical images, and surveillance and crime prevention systems in industries such as broadcasting, finance, logistics, and transportation.



10 Smart mobility services for vehicles

10 Smart Mobility Services for Vehicles

The trend in recent years has been away from vehicle-centric information sharing and toward user-centric information sharing. Meanwhile, advances in IT have made a wide variety of data available, leading to expectations for the creation of new value in ways that combine user information from different industries.

Through its existing car information system solutions (including traffic information services and map information services), Hitachi has built up a portfolio of technologies that include the conversion and processing of digital map data from map vendors, and also Hitachi's own probe data processing technologies^{*1}, data cleansing^{*2}, and imputation techniques^{*3}. By combining these technologies with data from vehicles and location-based information from social networks, Hitachi is providing

new smart mobility services for vehicles that allow people to travel in comfort while also taking account of safety and convenience.

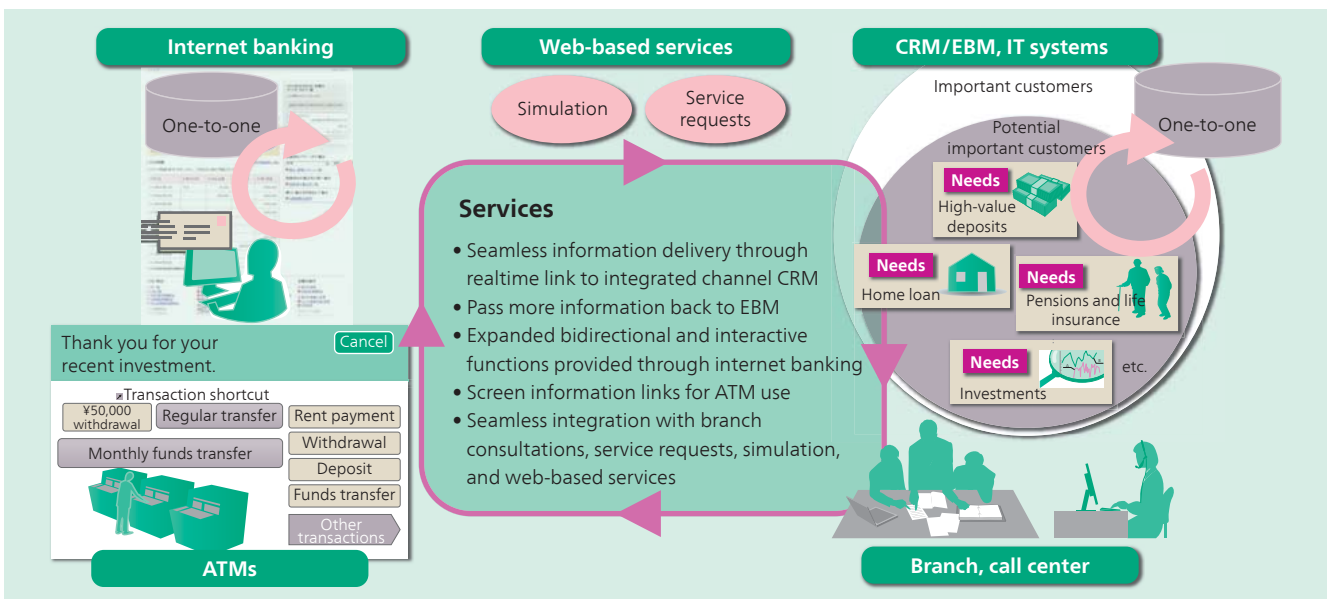
*1 Traffic information generated from location, speed, and other data collected from vehicles on the road.
*2 A technique that uses probe data and map data to augment map-overlaid data based on factors such as distance and speed.
*3 A technique for the precise imputation of missing traffic data through the analysis of nearby traffic conditions and past statistics.

11 Omni-channel Environment for Regional Financial Institutions

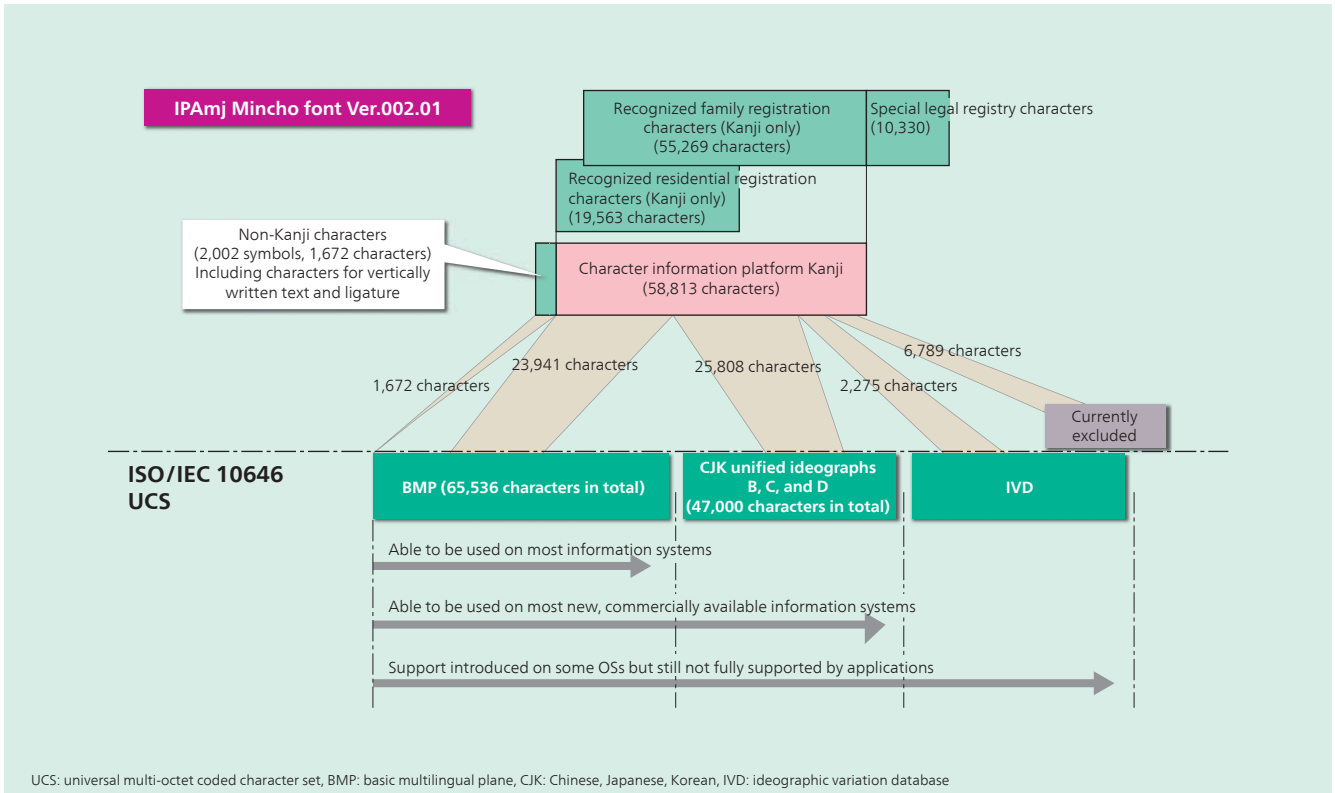
It is more than a decade since internet banking first appeared. Nowadays, with services available via the internet having expanded beyond core transactions such as checking balances or transferring funds, there is a need to use internet banking as both a means of generating income and a channel for communication. This requires not only the sale of foreign exchange, investment funds, government bonds, and loans, but also the linking of internet banking to credit and securities; its use for data analysis, information delivery, and marketing; and its integration with stores and automated teller machines (ATMs). In response, Hitachi is utilizing a variety of solutions sourced in-house as well as working in conjunction with other service vendors.

Regional financial institutions, meanwhile, in order to differentiate themselves from competitors such as major banks or dedicated internet banks, need to find distinctive competitive practices that take advantage of their dominant position in on-the-ground opportunities for contact with customers. Hitachi's joint internet banking center seeks to provide an omni-channel^{*1} environment that delivers the best possible experience value to customers by enhancing customer relationship management and event-based marketing^{*2} (CRM/EBM) in ways that link together the different channels (branches, call centers, ATMs, and internet banking).

*1 A way of dealing with customers through a seamless combination of the various different channels
*2 A customer information and marketing technique



11 Omni-channel environment



12 Character information platform promoted by Ministry of Economy, Trade and Industry (encoding of IPAmj Mincho font)

12 Character Information Platform Promoted by Ministry of Economy, Trade and Industry

In collaboration with the National Strategy Office of Information and Communications Technology, Cabinet Secretariat, and the Ministry of Economy, Trade and Industry, the Information-technology Promotion Agency, Japan (IPA) is working on establishing the environment needed for the practical implementation of a character information platform. To provide a platform for the efficient handling of the currently unstandardized use of Kanji for names and other purposes in information systems operated by the national government or regional agencies and other public institutions, the IPA has published a table of character information and the IPAmj Mincho font, which includes approximately 60,000 characters.

As part of establishing the environment needed for the practical implementation of the character information platform, web trials were conducted during FY2012 to investigate the technical challenges associated with use of a web font that allows mainstream operating systems (OSs) and browsers to handle the approximately 60,000 characters without the need for clients to maintain their own copy of the font. The trial included use of character platform products from Hitachi.

Use of the character information platform is stipulated in documents such as the Technical Reference Model for the Government Procurement of Information Systems (FY2012 edition) published by the Ministry of Economy, Trade and Industry and the “Declaration to be the World’s Most Advanced IT Nation” (approved by cabinet in June 2013) of the Strategic Headquarters for the Promotion of an Advanced Information and Telecommunications Network Society (IT Strategic Headquarters). It is anticipated that it will become a de facto standard

for future information system development.

Character platform products from Hitachi will be modified to suit the nationally decreed character information platform in a timely manner.

13 Geospatial Information Solutions

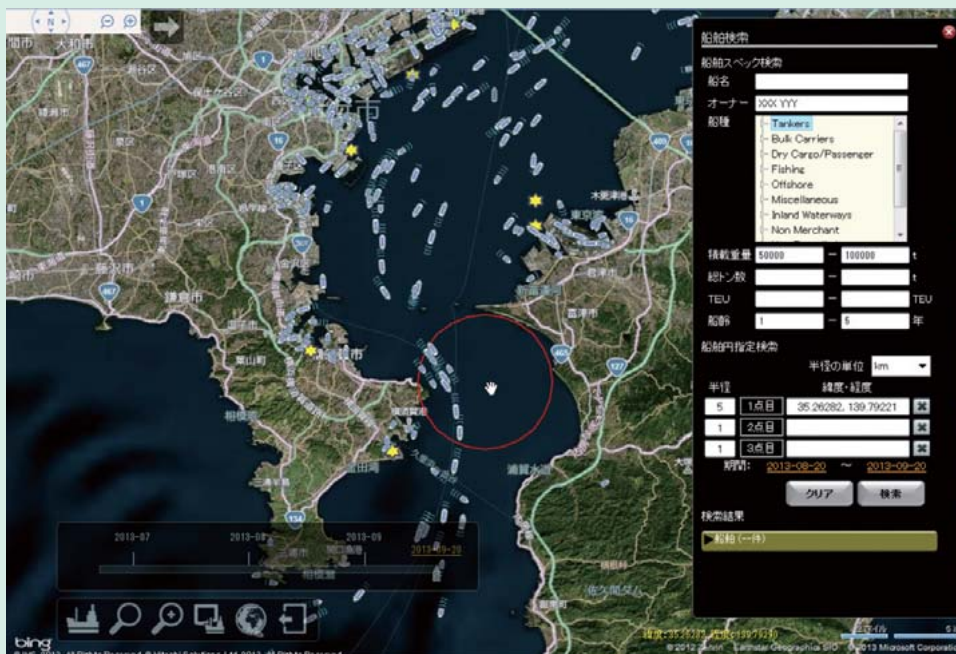
Hitachi’s geospatial information solution business is based around a geospatial information cloud and combines satellite images with geographic information systems (GIS). The business is operated on a geospatial information service platform that brings together different forms of geographic content including satellite images. Use of the platform allows applications and other services that use geospatial information to be implemented without the need for specialist GIS expertise.

A recently launched service that uses this cloud is a vessel location tracking service targeted at the shipping industry, ship-builders, and trading companies. The service presents information on vessel movements extracted using search keys such as vessel type or location, and it helps with objectives such as reducing vessel operating costs or risks.

The main uses envisaged for the system are as follows.

- (1) Use by shipping companies to optimize vessel routes, speeds, and other parameters based on information about the current location of other company’s vessels.
- (2) Design vessels that meet actual needs.
- (3) Plan less dangerous routes based on the movements of vessels along new routes or dangerous routes.

Hitachi plans to release a series of new services that utilize this geospatial information cloud.
(Hitachi Solutions, Ltd.)



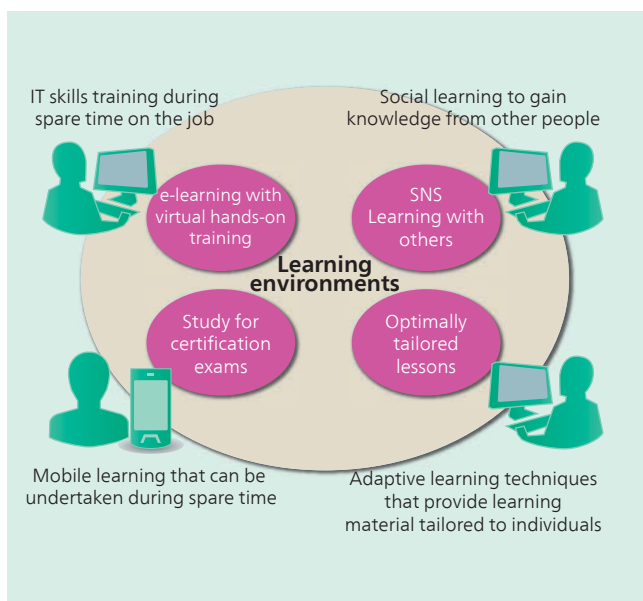
13 Example screen from vessel location tracking service

14 IT Human Capital Development Solution

Hitachi is extending the solutions it offers for developing IT staff who can identify problems on their own and collaborate to overcome them.

This form of human capital development requires not only the acquisition of knowledge and skills but also training exercises that cover judgment, action, and responsibility. The FY2013 intake of new recruits at the information and telecommunications division of Hitachi used an SNS that incorporated collaborative learning and gamification into their training. This enhanced educational effectiveness by encouraging more initiative and collaboration in the learning environment.

Representing a new approach to learning, Hitachi set up a



14 Variety of learning environments for IT staff training

teaching environment on a public cloud and launched a service in April 2013 that offers exercises to be taken anytime and anywhere. The service can be used to gain certification in Hitachi Open Middleware, for example, or to reinforce knowledge and skills gained through earlier training. Hitachi also added mobile learning in December 2013 by providing content such as preparation for certification exams that can be studied from a smart device.

In the future, Hitachi intends to establish learning programs that are user-friendly and tailored to individuals. The programs include adaptive learning techniques incorporating training methods that take into account the needs and level of understanding of individual students.

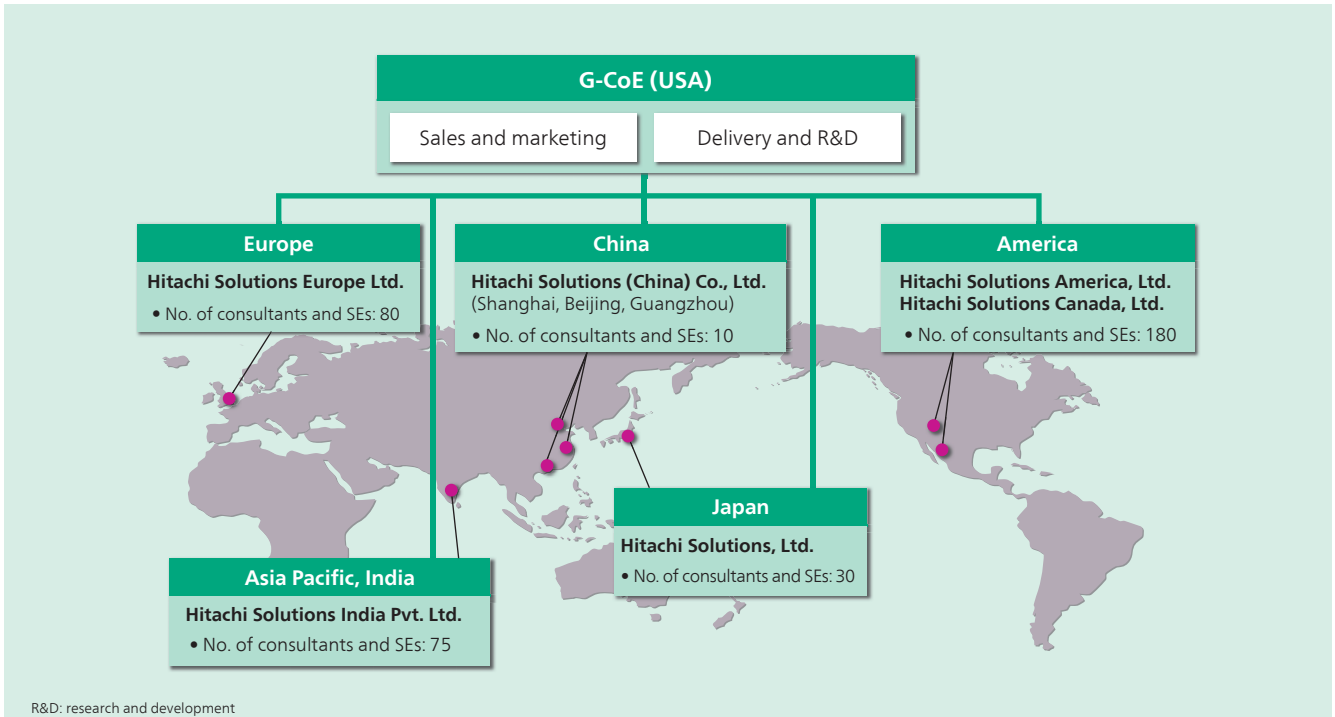
(Hitachi Information Academy Co., Ltd.)

15 Microsoft Dynamics Global Solution

Factors such as the acceleration in moves by Japanese corporations to establish overseas operations and an increase in mergers and acquisitions (M&A) are driving demand for the installation and integration of business systems at overseas sites.

Hitachi's Microsoft Dynamics* businesses in North America and Europe were transferred from Hitachi Consulting Corporation to Hitachi Solutions, Ltd. in April 2012. Hitachi Solutions, Ltd. then went on to launch its Microsoft Dynamics global solution, a service providing consulting, installation, and maintenance of Microsoft enterprise resource planning (ERP) and CRM products. The service is available in five regional markets, namely Japan, China, America, Europe, and the Asia Pacific region.

A feature of this solution is its ability to meet customers' high level of global system needs. Hitachi has established a Global Center of Excellence (G-CoE) at its US subsidiary. The G-CoE



15 Organizational structure based on G-CoE and five regional hubs (September 2013)

acts as a center for commercial negotiations and service delivery for the five regional hubs, has an American Chief Operating Officer (COO) who is a leading consultant in Microsoft Dynamics, and coordinates customer projects and the activities of approximately 400 specialist engineers (as of September 2013) in the USA, Canada, the UK, India, Japan, and China. That is, engineers who are familiar with the local language and other needs provide a one-stop service on behalf of Hitachi for customer systems that operate across a number of countries or regions. This allows Hitachi both to meet the local needs of customers and to work directly with headquarters to assist with overall optimization, something that in the past could only be accomplished by global system integrators.
(Hitachi Solutions, Ltd.)

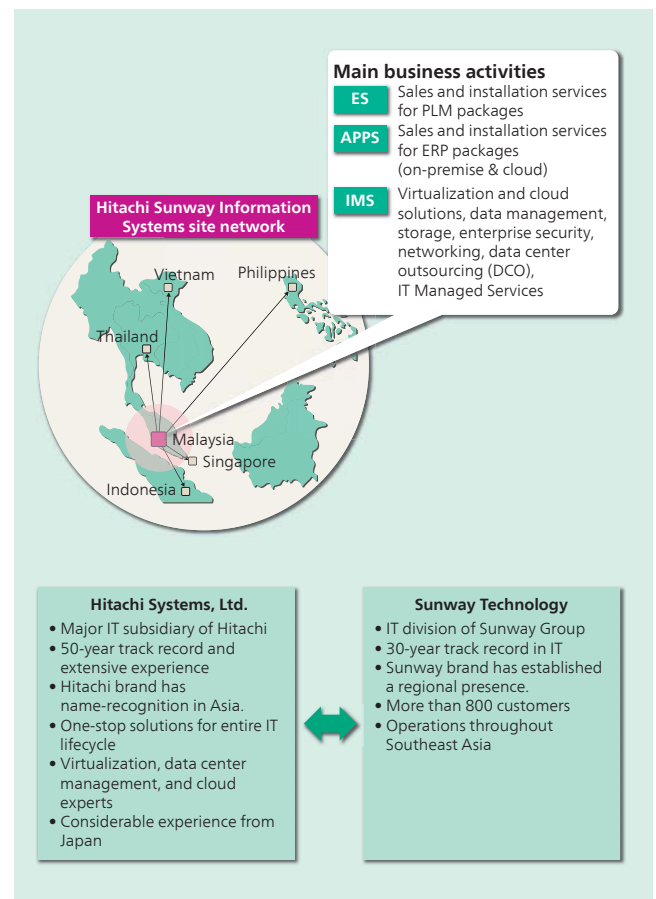
* See "Trademarks" on page 142.

16 Establishment of Hitachi Sunway Information Systems

In April, 2013, Hitachi Systems, Ltd. established Hitachi Sunway Information Systems Sdn. Bhd. as a joint venture with Sunway Technology Sdn Bhd, a group of unlisted IT subsidiaries of Malaysian conglomerate Sunway Group. Set up with the aim of expanding its IT service business in Southeast Asia, Hitachi Sunway Information Systems has its headquarters on the outskirts of Kuala Lumpur in Malaysia and has launched IT service businesses in various countries around Southeast Asia (Malaysia, Republic of Singapore, Kingdom of Thailand, Republic of Indonesia, Republic of the Philippines, and the Socialist Republic of Viet Nam)

Hitachi Sunway Information Systems operates service businesses in each of these countries that help their customers adopt more advanced IT. The three businesses operated by Hitachi Sunway Information Systems are (1) engineering solutions (ES)

business that includes product lifecycle management (PLM) and product data management (PDM), (2) applications (APPS) business that handles ERP and other systems, and (3) infrastructure and managed services (IMS) business for building and operating IT infrastructure including virtualization, security, network and data center operations. Hitachi Sunway Information Systems is seeking to become a one-stop information and



16 Business expansion in Southeast Asia by partnering with Hitachi Sunway Information Systems

communication technology (ICT) solution and services provider by taking advantage of Sunway Technology's local engineers and the customers of about 800 companies, and by combining these resources with the extensive experience and know-how in IT services built up by Hitachi Systems, Ltd. in Japan. In doing so, it intends to supply excellent IT services technology to customers in Southeast Asia, and to provide Japanese companies that have established operations in Southeast Asia with the same level of support for their IT systems as they receive in Japan.

(Hitachi Systems, Ltd.)

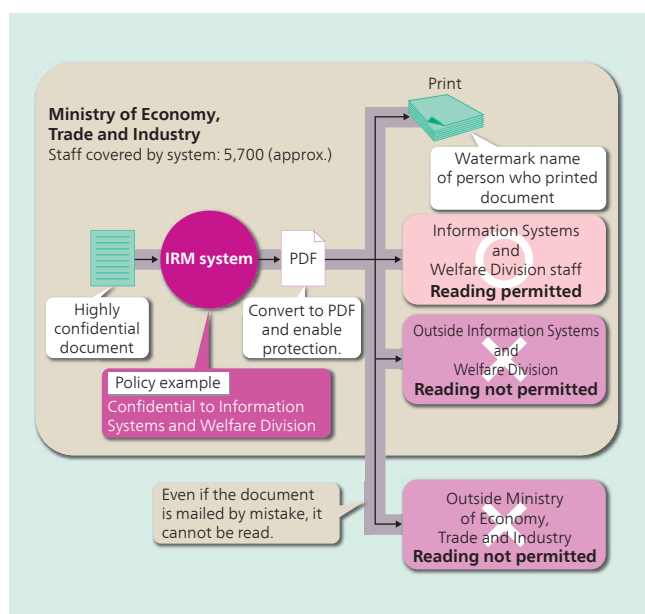
17 Restricted Readership System of Ministry of Economy, Trade and Industry

The Ministry of Economy, Trade and Industry upgraded its restricted readership system in February 2013. This system converts the highly confidential official documents handled by ministry staff to portable document format (PDF) and restricts read access to authorized personnel only. As protected documents are converted to a format in which only designated staff are able to view them, and only on the ministry's local area network (LAN), using the system prevents the documents from being viewed if they are taken outside the ministry.

This arrangement is underpinned by the information rights management (IRM) system. By incorporating security into the document itself, this solution allows documents to be protected appropriately even after they have left the hands of their creators.

Although the Ministry of Economy, Trade and Industry has used levels to classify and manage the confidentiality of official documents and taken steps to prevent leaks of confidential documents, information leaks are difficult to eliminate entirely. For this reason, the ministry runs education programs to raise staff awareness and teach them about the aims and practical aspects of information security. The Ministry of Economy, Trade and Industry will continue working on initiatives with the aim of achieving best practice in information management.

(Hitachi Solutions, Ltd.)



17 Management of electronic documents at the Ministry of Economy, Trade and Industry

18 Next-generation ATM

Hitachi has developed a next-generation ATM that has been designed for simplicity to provide reliability and ease of use and ensure that it can be used with confidence by a diverse range of people.

The ATM* includes a variety of light and sound prompts to guide the user through its use, including a welcome light that illuminates when someone comes near, and a media spotlight that illuminates the user's card or bank book. It also has an enlarged area underneath to make it easy for people in wheelchairs to get close enough to the ATM to use it. The ATM has also been awarded color universal design certification by the Color Universal Design Organization [a non-profit organization (NPO) in Japan] for its case design and user screens that are designed for use by people with a variety of different forms of color perception. To ensure that the ATM can operate for long periods of time without halting or jamming, Hitachi has also combined the bill handling techniques it has built up from experience in different parts of the world to develop a new bill handling unit that significantly reduces the incidence of bill jams while simultaneously increasing the number of bills the ATM can hold. The design is conscious of the environment, with the power consumption of the ATM in standby mode having also been reduced.

The ATM has been adopted by a large number of financial institutions, including major banks, who have recognized it for its features, which include significant improvements in ease of use for both users and service staff, and a lower frequency of faults. In the future, Hitachi intends to continue supplying ATMs and associated services that meet the needs of society by improving on its core competencies of sensing and handling, and through measures such as taking account of the environment and the application of universal design as a response to an aging population.

(Hitachi-Omron Terminal Solutions, Corp.)

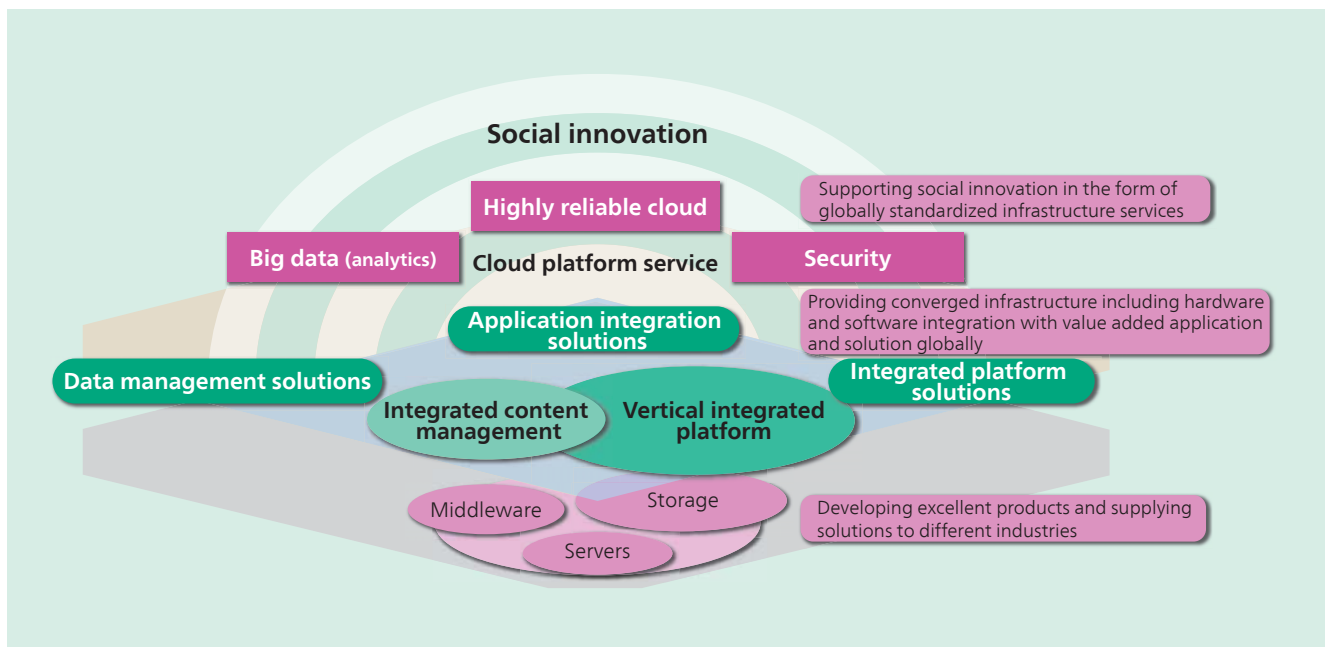
(Product released: June 2012)

* The ATM is intended for the Japanese market.



18 Next-generation ATM

IT Platform



1 Hitachi's IT platform business vision

1 Hitachi's IT Platform Business Vision

With the globalization of the economy in recent years and ongoing dramatic changes in the business environment, the requirements being placed on information technology (IT) are becoming more diverse. Also growing in importance are new developments such as cloud computing that can adapt quickly and flexibly to changing circumstances, and the utilization of big data with the potential to create new business value from the large amounts of different types of data being generated by companies and society.

In addition to the core systems that support the information society, Hitachi also supplies platforms and services that underpin social innovation through highly reliable cloud and security, and the utilization of big data.

Using its servers, storage, and middleware as a base, Hitachi is contributing to the growth of its customers' businesses by offering integrated platform solutions, application integration solutions, and data management solutions that generate added value through the collection, search, and analysis of data, and by using the latest functions such as virtualization and other advanced technologies and providing user-friendly systems.

2 Hitachi Unified Compute Platform

The use of different forms of cloud computing has gathered pace

in recent years, with aims that have included customers expanding existing businesses, the rapid startup of new ventures, or raising the efficiency of IT investment. The critical factors in these developments have been the speed and ease with which IT systems can be put in place.

The Hitachi Unified Compute Platform is an integrated platform solution including the required hardware, virtualization, and software in a single package. It helps customers get IT systems up and running quickly because it uses proven system configurations that are easy to install.



2 Hitachi Unified Compute Platform

The Hitachi Unified Compute Platform Pro for VMware vSphere* is targeted at cloud service operators and the Hitachi Unified Compute Platform with OpenMiddleware is aimed at mid-range or larger private clouds. In addition to these two enterprise platforms, Hitachi also offers a model that has been optimized for small or medium-sized private clouds or server integration applications. This latter model is quick and easy to set up, and can be supplied to customers with a lead time as short as 10 working days. As it comes complete with dedicated management software that simplifies the operation of virtual servers as well as operation manuals and practical training, customers who are unfamiliar with virtual servers can be confident about installing the platform.

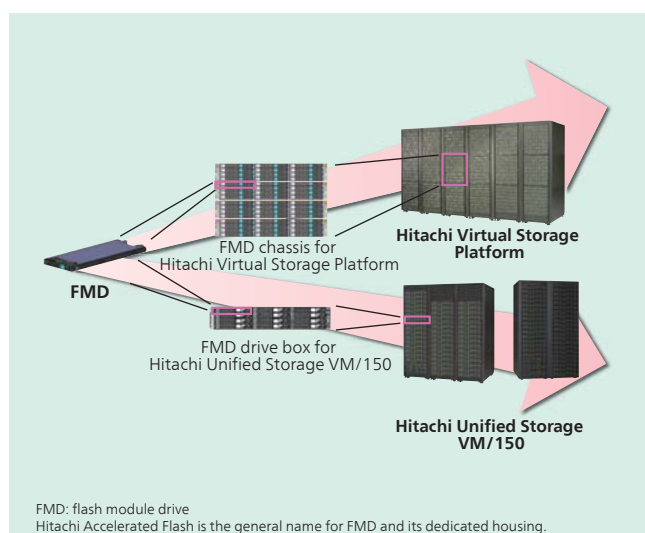
Hitachi also supplies a desktop virtualization platform model that can be used to configure suitable virtual desktop infrastructure (VDI) environments quickly and easily based on the system size and the type of installation (from the proof of concept level up to fully operational systems).

* See "Trademarks" on page 142.

3 Flash Modules Hitachi Accelerated Flash

As companies take on new fields of business and grow globally, they are looking to their IT systems to make timely use of data generated from the different operations and products and to play a role in new value creation. Storage systems have an important role in the timely utilization of data, and these developments have been accompanied in recent years by growing interest in the use of flash memory and its ability to offer faster data access than hard disk drives (HDDs). However, because they are expensive to install, the solid state drives (SSDs) in which flash memory is typically supplied have limited usefulness as a mainstream form of data storage.

Hitachi Accelerated Flash provides large-capacity and high-performance flash modules that can be incorporated into Hitachi storage systems at lower cost than conventional SSDs thanks to features such as a flash memory controller developed by Hitachi. Hitachi Accelerated Flash incorporates techniques for improving the efficiency with which data is written to storage and can



3 Hitachi Accelerated Flash

maintain a high level of performance over long-term use. It also achieves high reliability thanks to a function that interoperates with the storage controller to detect faults before they occur.

Hitachi storage systems currently offer extensive support for Hitachi Accelerated Flash in products from the high-end Hitachi Virtual Storage Platform to the mid-range Hitachi Unified Storage VM and Hitachi Unified Storage 150. This makes it possible to offer storage solutions that satisfy customer needs for performance, cost-per-byte, and space-efficiency. For example, a Hitachi Virtual Storage Platform incorporating Hitachi Accelerated Flash achieved world-leading performance (as of July 11, 2013) on SPC Benchmark-1*, the standard benchmark for data input and output performance. Hitachi also offers Hitachi Unified Storage VM in All Flash System to provide an easy and low-cost way to improve performance on small to medium-sized systems or in special applications.

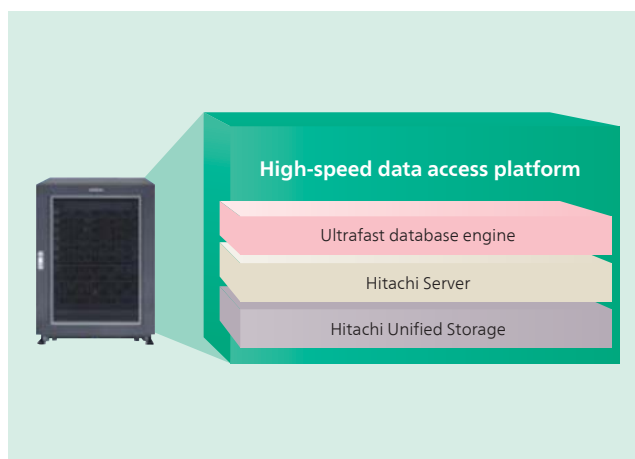
In the future, Hitachi intends to support the timely utilization of data by corporations and other organizations and contribute to the creation of new value by enhancing its storage solutions that incorporate flash memory.

* See "Trademarks" on page 142.

4 High-speed Data Access Platform

Against a background that includes the growth of the cloud and the rapid spread of sophisticated mobile devices, there is a growing demand for the utilization of big data by companies and other parts of society. The rapid searching and analysis of big data requires that maximum advantage be taken of the ongoing dramatic improvements in hardware performance to significantly increase processing performance. With the aim of achieving the challenging task of performing rapid searches of big data, Hitachi has been collaborating with the University of Tokyo on the research and development of an ultrafast database engine*¹.

Hitachi's own ultrafast database engine draws on the results of this joint research and development and has become the first in the world to satisfy TPC-H*², the industry benchmark for decision support systems, for a 100-Tbyte-class database (the largest category). This achievement of world-leading performance on the largest class of database covered by the TPC-H benchmark demonstrates the major contribution that this product makes to



4 High-speed data access platform

the utilization of big data.

The high-speed data access platform also includes Hitachi hardware and storage products. Hitachi intends to continue developing this technology to meet customer needs.

*1 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).

*2 See “Trademarks” on page 142.

intelligence (BI) tool to visualize web access.

(2) Easy Hadoop solution for batch processing

Combines Hadoop with Asakusa Framework*, a tool that facilitates the development of batch programs, to shorten the time taken to process batch jobs. By increasing the frequency with which batch processing can be performed, it supports timely and accurate understanding and utilization of data required for uses such as business decision making.

* See “Trademarks” on page 142.

5 Easy Hadoop Solutions

The easy Hadoop solutions supply the highly integrated Hitachi Compute Blade 10 server with Hadoop*, other required software, and sample programs preinstalled. The aim is to provide quick installation for systems that use the Hadoop technology for parallel and distributed processing of big data.

The two main solutions being offered are as follows.

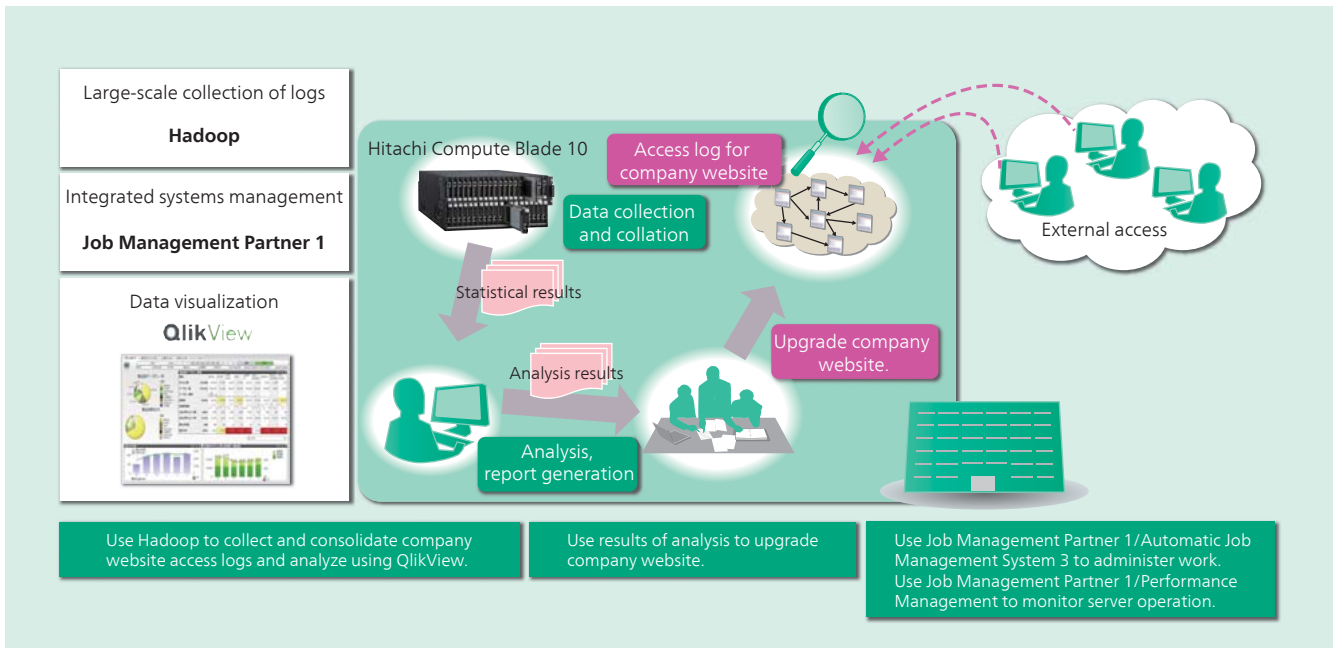
(1) Easy Hadoop solution for log analysis

Web access logs are a familiar form of big data. The solution uses Hadoop to collect this data and uses the QlikView* business

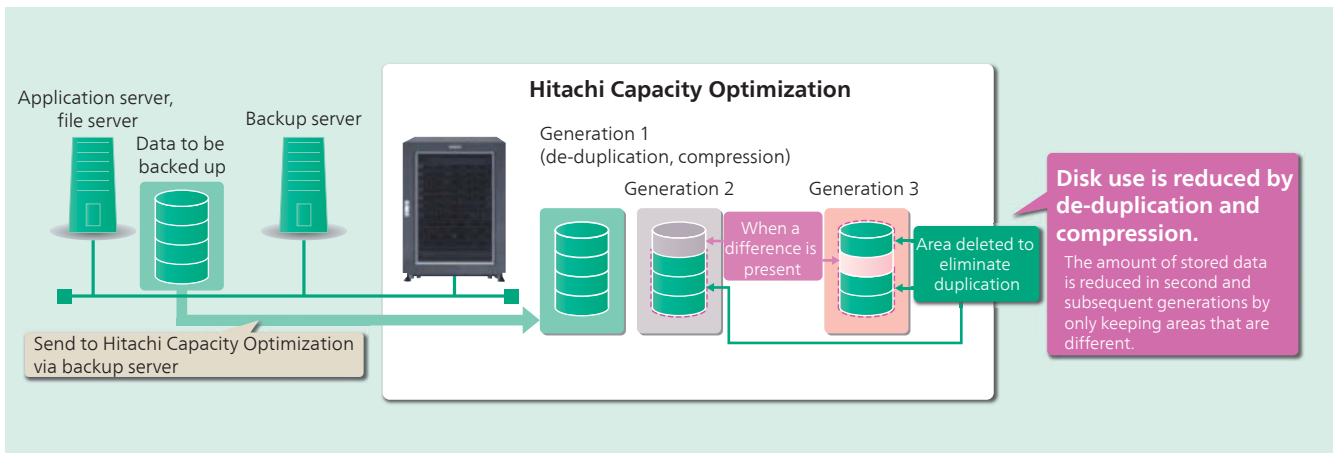
6 Hitachi Capacity Optimization File Storage System for Backups

As the volume of business data grows, backing up this data is becoming an increasingly important part of internal control and business continuity planning in case of disaster. In addition to storing data economically, the systems used for these backups also need sufficient performance to complete backups quickly.

Hitachi Capacity Optimization is a file storage system designed for backups to meet the demands. It includes a function for eliminating duplicate data that cuts storage costs by reducing the quantity of stored data. Also supported are functions for automatically selecting which of the available methods to use for elim-



5 Simple Hadoop solution for log analysis



6 Use of Hitachi Capacity Optimization to eliminate duplication in backup data

inating duplicate data based on the data format, and a hybrid function that can specify whether to eliminate duplications at the time of writing, at a later timing, or both, depending on whether disk capacity or performance is being prioritized. The system can reduce the quantity of backup data by a factor of around 20* in cases when multiple generations of backup data are being held.

In the future, Hitachi intends to supply backup storage systems that are more economical and come equipped with high-performance functions that are easy to use.

* Actual results depend on type of data, degree of duplication in data, and backup methods used.

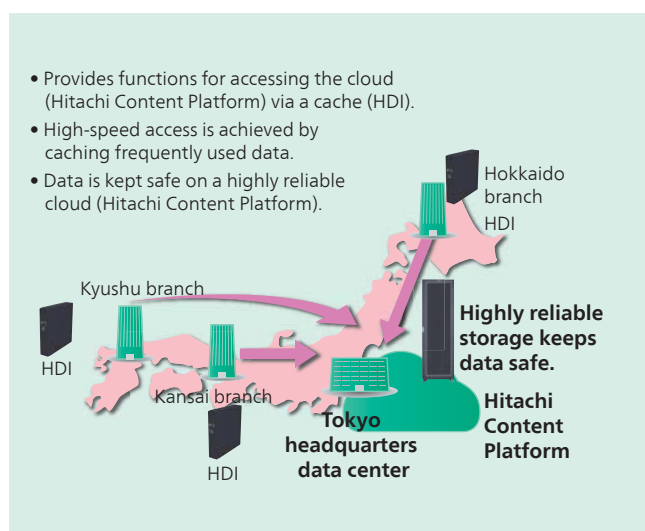
7 Hitachi Data Ingestor Small Storage Unit Specifically for Cloud on-Ramp Solution

Hitachi's cloud on-ramp solution resolves the issues associated with the efficient storage and management of the ever-increasing quantities of corporate data.

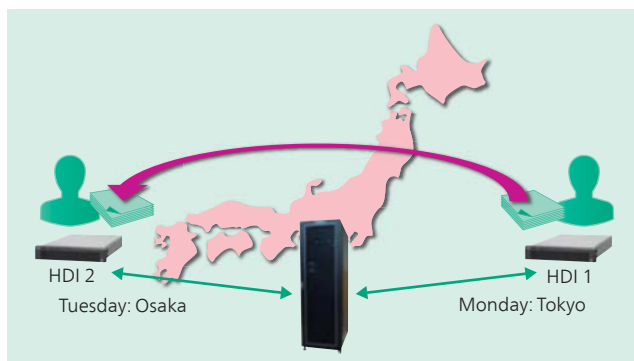
The solution uses storage systems located at different sites or departments as on-ramps to the cloud and provides automatic consolidation and centralized management at a data center of the file data spread across multiple sites and departments. The file virtualization function allows users at remote sites to use their data without needing to concern themselves with whether it is held locally or at the data center. Because this resolves the problems of having to administer each site and deal with complex storage system, capacity upgrade, and data management issues as the quantity of data increases, benefits include cutting the total cost of ownership (TCO) and improving return on investment (ROI).

The Hitachi Data Ingestor (HDI) released in October 2013 as part of Hitachi's partner strategy is a special-purpose cloud on-ramp appliance that is small and easy to install. With a compact case that is smaller even than an A4 sheet of paper (44.5 mm wide × 220 mm deep × 205 mm high), it is easy to install and takes only about 10 minutes to set up.

HDI is a component in cloud services supplied by partners. In the future, Hitachi intends to continue working with its partners to supply the benefits of cloud on-ramp solutions to more customers.



7 Typical cloud on-ramp solution incorporating HDI



8 Home directory roaming using HDI

8 Home Directory Roaming Using Hitachi Data Ingestor

Corporate file data, which consists primarily of unstructured data such as e-mail or documents, is typically spread across a number of sites or departments and is steadily growing in volume. How to reduce the total cost of storing, managing, and using this data has become an issue in recent years.

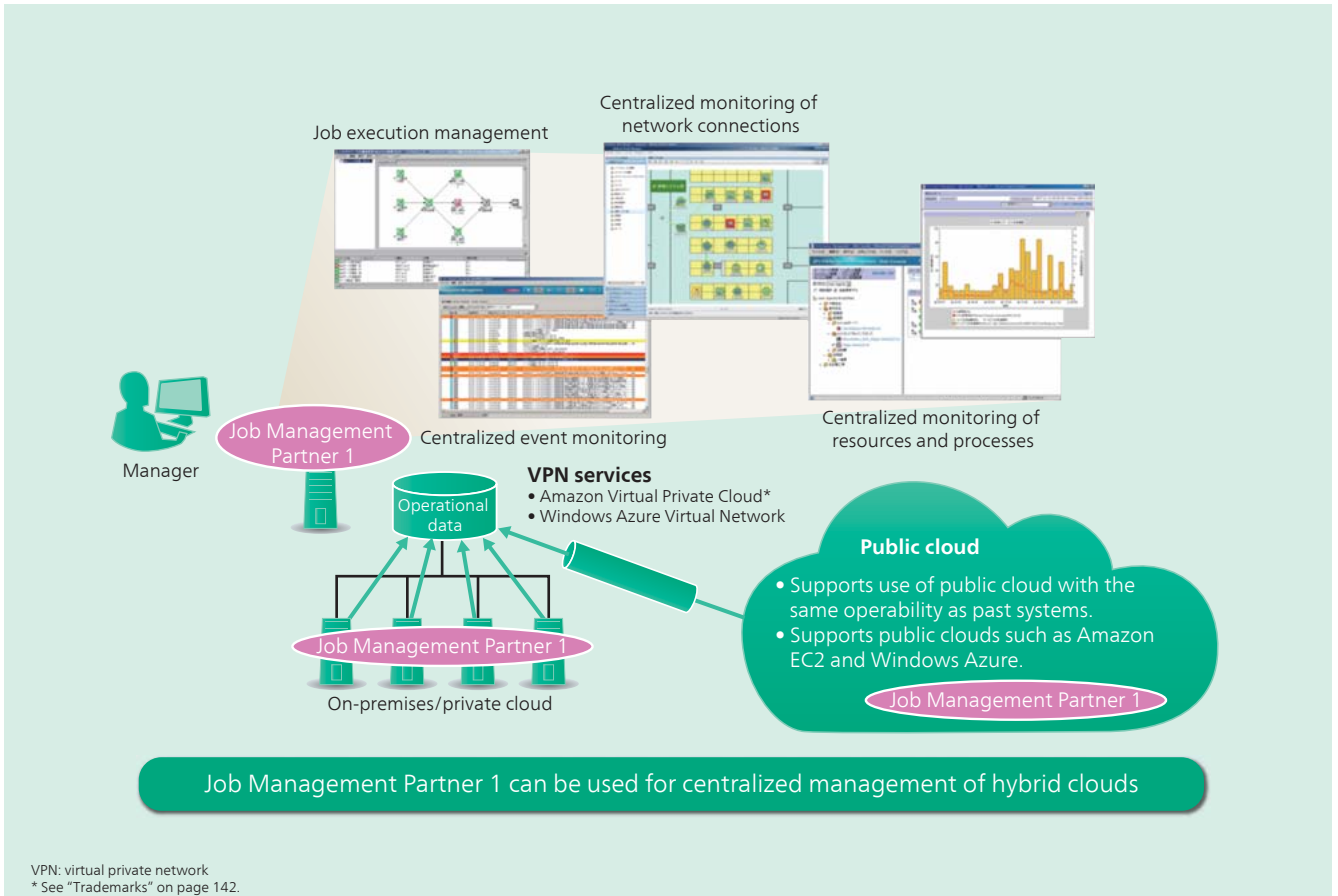
Hitachi Data Ingestor (HDI) offers a solution to this problem. As well as supporting use as conventional network-attached storage (NAS), HDI can also be integrated with Hitachi Content Platform, which provides backup or archive storage at data centers. By providing a means for the automatic consolidation and centralized management of unstructured data, it can also serve as a cloud on-ramp solution. This overcomes the problems of having to administer each site and to deal with the complex storage system, capacity upgrade, and data management issues associated with conventional NAS as the quantity of data increases.

In April 2013, the HDI content sharing model was enhanced by adding the ability to synchronize the content of home directories between HDI located at different sites. Through this mechanism, users can access the latest content stored in their home directories from any HDI system that is part of the content sharing network.

9 Job Management Partner 1 V10.1 Integrated Systems Management

The wholesale adoption by corporations of private and public clouds has raised the issue of how to boost the efficiency of IT operations in a hybrid cloud environment.

To provide more efficient operation of the cloud and data centers, Hitachi has enhanced Job Management Partner 1/Automatic Operation, a platform for automation of IT operations of the Job Management Partner 1 V10.1 integrated systems management suite. Job Management Partner 1/Automatic Operation Contents Set is a collection of automation templates based on Hitachi's operational paid know-how. It has been extended by the addition of new automation templates covering basic operating procedures, such as adding or deleting virtual servers, that are a necessary part of daily operations. In addition to VMware*, Job Management Partner 1/Automatic Operation Contents Set can now also be used in Hyper-V* environments. Hitachi also has plans to add automation templates for



VPN: virtual private network
* See "Trademarks" on page 142.

9 Use of Job Management Partner 1 for centralized management, including public clouds

OpenStack*, an open source cloud platform. Another enhancement is a new graphical user interface (GUI) editor for creating or customizing automation templates that simplifies the task of detailed operational automation.

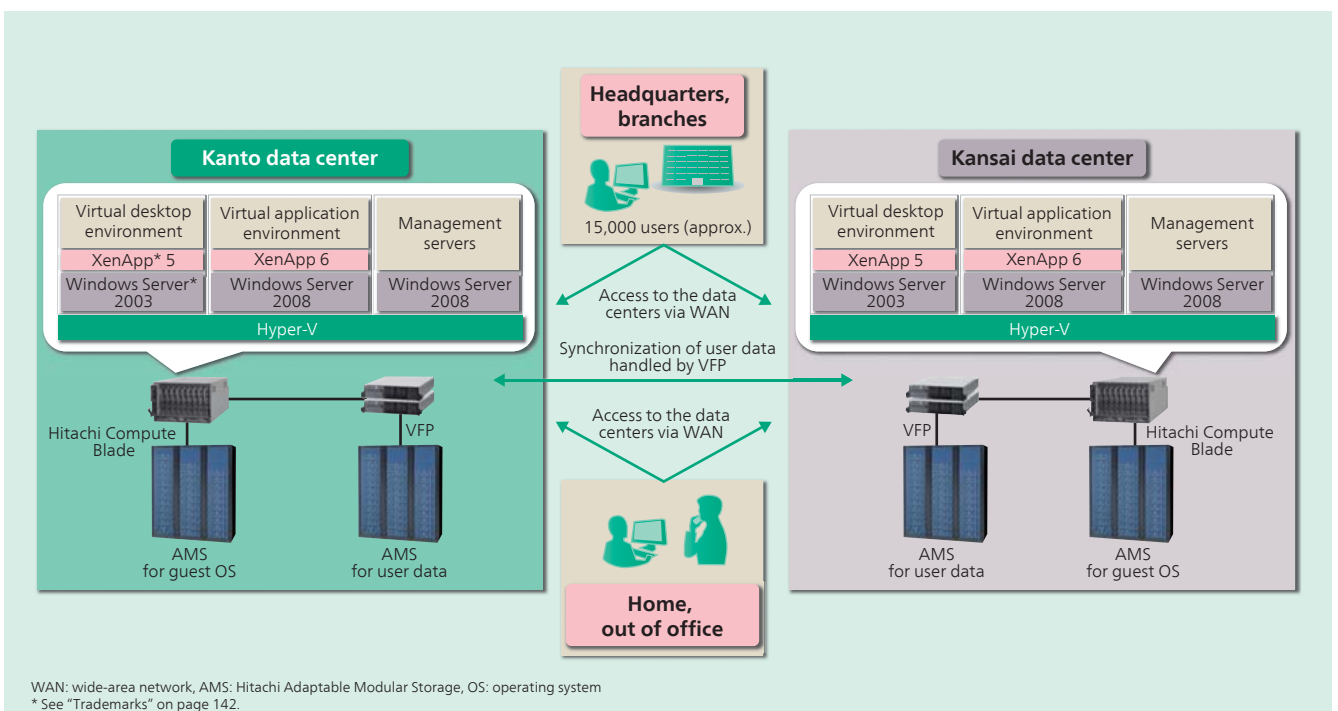
Job Management Partner 1 also supports public clouds such as Microsoft* Windows Azure and Amazon Elastic Compute Cloud* (Amazon EC2*). Hitachi intends to continue delivering efficient operation through the centralized management of hybrid

clouds that combine private, public, and on-premises systems.

* See "Trademarks" on page 142.

10 Virtual Desktop Environment for Sompo Japan Insurance Inc.

A large virtual desktop environment that incorporates Hitachi platform products and is used by approximately 15,000 staff at the



10 Virtual desktop environment for Sompo Japan Insurance Inc.

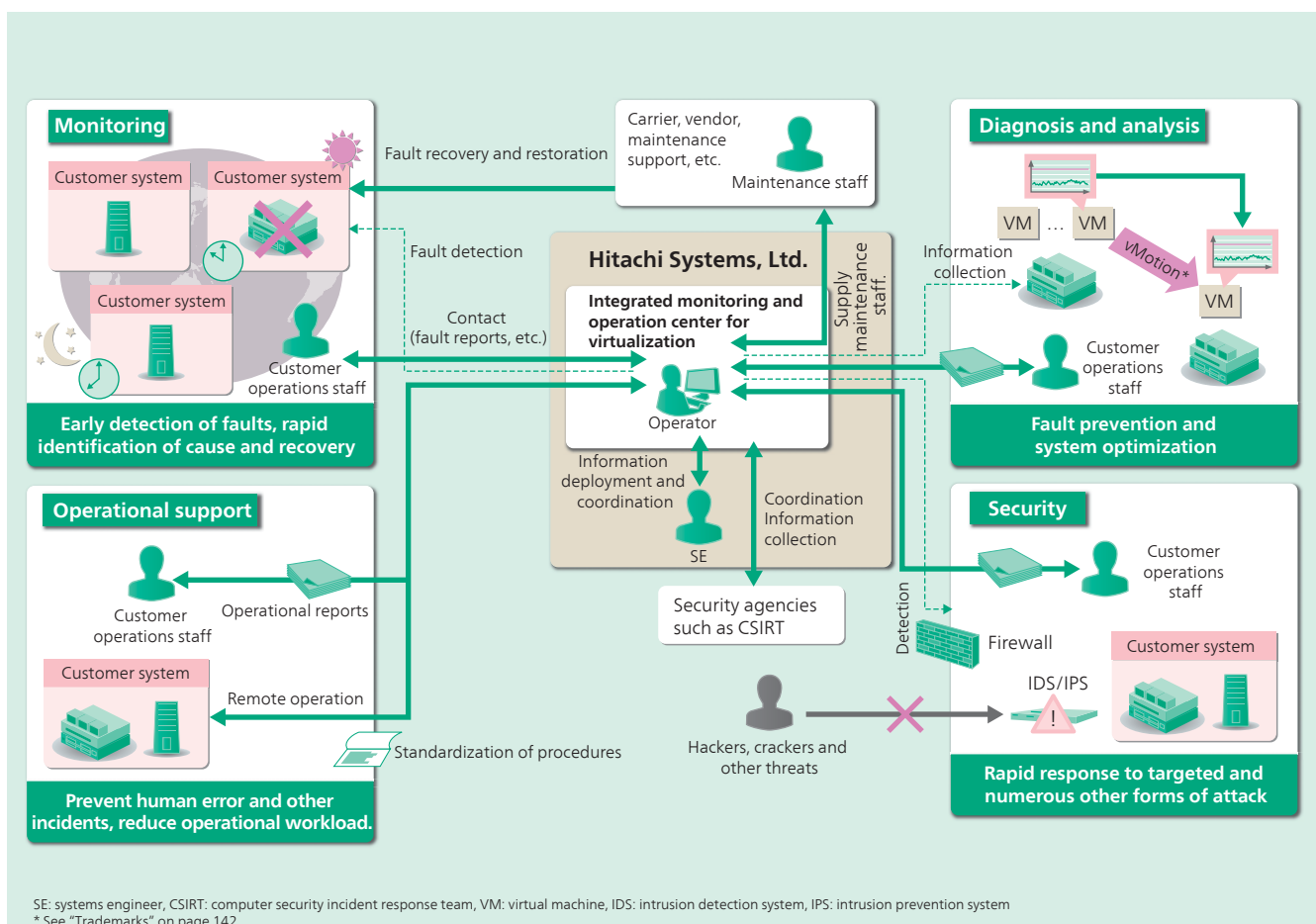
headquarters and branches of Sampo Japan Insurance Inc. entered full-scale operation in 2013. In addition to strengthening IT governance, the environment also delivers improved security and facilitates different ways of working to empower sales staff working out of the office and make them better able to deal with customers. The desktop environment also enhances business continuity because its operation has been consolidated at two data centers in the Kanto and Kansai regions respectively, so that in the event of one of the centers being disabled by a natural disaster, operation can continue using the other. With a merger between Sampo Japan Insurance Inc. and Nipponkoa Insurance Co., Ltd. planned for September 2014, an expansion of the system to cover approximately 38,000 users is scheduled to occur during FY2014. This will include approximately 10,000 personal computers (PCs) used by the headquarters and branch systems of Nipponkoa Insurance Co., Ltd., and a virtual application environment for approximately 13,000 PCs to be used by the new merged company for damage survey.

The current system includes 15,000 mobile thin client terminals that feature thin profiles and long battery life, 400 blade servers (Hitachi Compute Blade) for the data centers that host the desktop environment, and storage systems including Hitachi Virtual File Platform (VFP). It uses Job Management Partner 1 to manage system operation. VFP is used to synchronize user data between the two data centers and ensure business continuity in the event of a disaster.

11 Integrated Monitoring and Operation Service for Virtualization

With the growing globalization of business in recent years, virtualization has been widely adopted as a means of ensuring business continuity and the effective use of resources for core mission-critical systems and networks as well as for more peripheral systems. In contrast to the physical configurations used in the past, faults in virtualization platforms tend to have a wider impact extending across a number of systems. Along with greater use of multi-vendor and multi-platform configurations, this has made their management more sophisticated and complex. Other factors that are growing in importance include the ability to achieve a quick recovery when faults do occur, optimization of resources, security measures for dealing with targeted attacks, and the automation and standardization of operating procedures. Accordingly, there is a need for measures that help maintain reliable system operation, including operations monitoring to predict performance problems before they happen and identify the causes of faults quickly.

In response to these requirements, Hitachi Systems, Ltd. supplies a one-stop integrated monitoring and operation service for virtualization with 24-h/365-d operation that includes monitoring, diagnosis/analysis, security, and operational support services designed for use with platform virtualization technologies. (Hitachi Systems, Ltd.)



11 Overview of integrated monitoring and operation service for virtualization

Network Systems

1 Hitachi's Network Products

The spread of smartphones, faster networks, and the growing use of cloud computing in recent years has seen the emergence of a variety of services delivered via networks. As these services transform people's lives and corporate activity, the networks that underpin them have become an important part of the social infrastructure. Now that networks, in their role as social infrastructure, support greater diversity in people's way of life and improvements in business efficiency and productivity, there is a need not only for high performance and reliability, but also for innovation in platforms that create new value.

In response to these changes, Hitachi is contributing to the construction of networks that provide safe and secure social infrastructure while also acting as platforms for the creation of new value by supplying solutions and other products both for telecommunications carriers and for the corporate sector.

For telecommunications carriers, Hitachi develops and supplies new solutions and other products that incorporate the latest technologies such as wireless access, wide-area network (WAN) virtualization, and big data processing. Its aim is to create the network systems that are forming a new highly reliable ecosystem encompassing not only telecommunications carriers, but also extending to service providers and end users. For the corporate sector, Hitachi is supporting the establishment of networks that help improve business efficiency and productivity and enhance corporate competitiveness by developing and supplying network solutions and appliance products that incorporate such technologies as data center network virtualization and cloud computing.

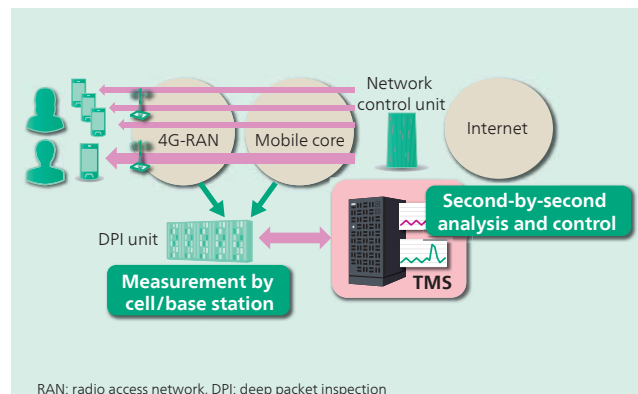
2 Traffic Management Solutions

The explosion in the volume of telecommunications traffic that has come with the widespread use of smartphones has complicated the task of equipment design for carriers. Traffic management solutions (TMSs) help build high-quality networks that maximize use of resources by monitoring the overall network and controlling traffic accordingly.

The main features are as follows.

(1) Fusion of network technology and big data products

Hitachi possesses both diverse know-how that extends from the design to the operation of telecommunication networks, and software that incorporates new techniques such as stream data processing. By combining these resources, the TMS uses the large amounts of traffic data sent across the network to monitor the overall network status and perform traffic optimization.



2 System configuration of TMS

(2) Network measurement, analysis, and control

This involves the collection of traffic data (measurement), the use of big data platform software for high-speed analysis of large amounts of traffic data (analysis), and the issuing of optimization commands to the network control equipment (control), all in realtime. This allows the TMS to assess and optimize the ever-changing network status instantaneously.

Hitachi has already received feedback from numerous customers about this TMS, which fuses Hitachi's network know-how with big data platform software. An order was received from a Japanese telecommunications carrier in July 2013 for a system for optimizing the traffic according to the congestion state of network equipment. This solution is currently being implemented and Hitachi has plans to build on this experience to deploy the solution at other telecommunications carriers in Japan and elsewhere. In addition to network optimization, Hitachi also has plans for additional functions such as revenue generation and the use of traffic predictions in equipment design.

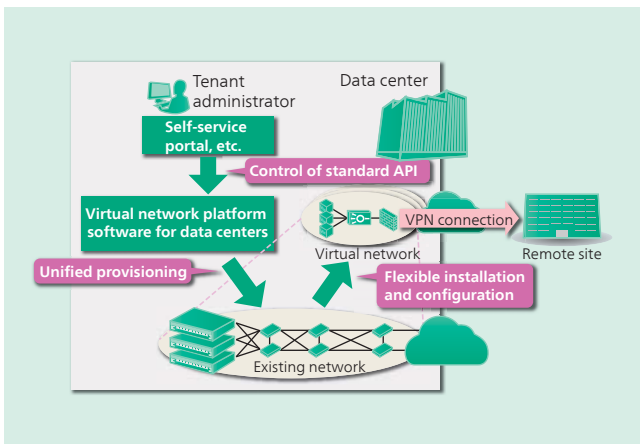
3 Virtual Network Platform Software for Data Centers

In terms of enhancing operational efficiency and speeding up service provision, providing those individual tenant administrators who handle their own provisioning with the means to build and configure virtual networks along with virtual servers has become an issue at large multi-tenancy data centers in recent years. In response, Hitachi has been developing virtual network platform software for data centers.

The main features are as follows.

(1) Application programming interface (API) for configuring physical and virtual network equipment is provided, allowing automatic configuration of self-service portals via software.

(2) Simplification of flexible network implementation procedures, including the transparent deployment of firewalls and



3 Overview of how virtual network platform software for data centers is used

virtual private network (VPN) connections to remote sites.
 (3) Simplification of software development process for API calling programs through the standardization of the configuration APIs for network equipment such as firewalls, load balancers, and VPN hardware.

In addition to extending the range of network equipment that can be configured via the software, Hitachi also plans to incorporate additional functions such as traffic monitoring and analysis.

4 M2M Cloud Network Solution

This machine-to-machine (M2M) cloud network solution was developed by combining technology and know-how that Hitachi has acquired through the implementation of sensor networks and other large networked systems. It supports all aspects of M2M systems, through installation, operation, and maintenance.

The main features are as follows.

(1) Supports a wide range of customer needs, from starting small

to short development period before launch, by providing a single solution that combines communication nodes capable of housing a variety of different sensors, concentrators that take advantage of a high level of consolidation, and cloud services for things like node control and data collection and viewing.

(2) Flexible system operation achieved through features that include an automatic registration of sensors to reduce the workload associated with device configuration and portable data collection devices that can operate in locations not covered by public wireless networks.

(3) System maintenance environment that supports the centralized management and monitoring of large numbers of sensors and the data they collect through features that include the display of information on the operational status of sensors, alarms for notifying when problems occur, and remote control functions.

In the future, Hitachi intends to develop the solution into an M2M communication platform that can be shared by customers from a range of different industries.

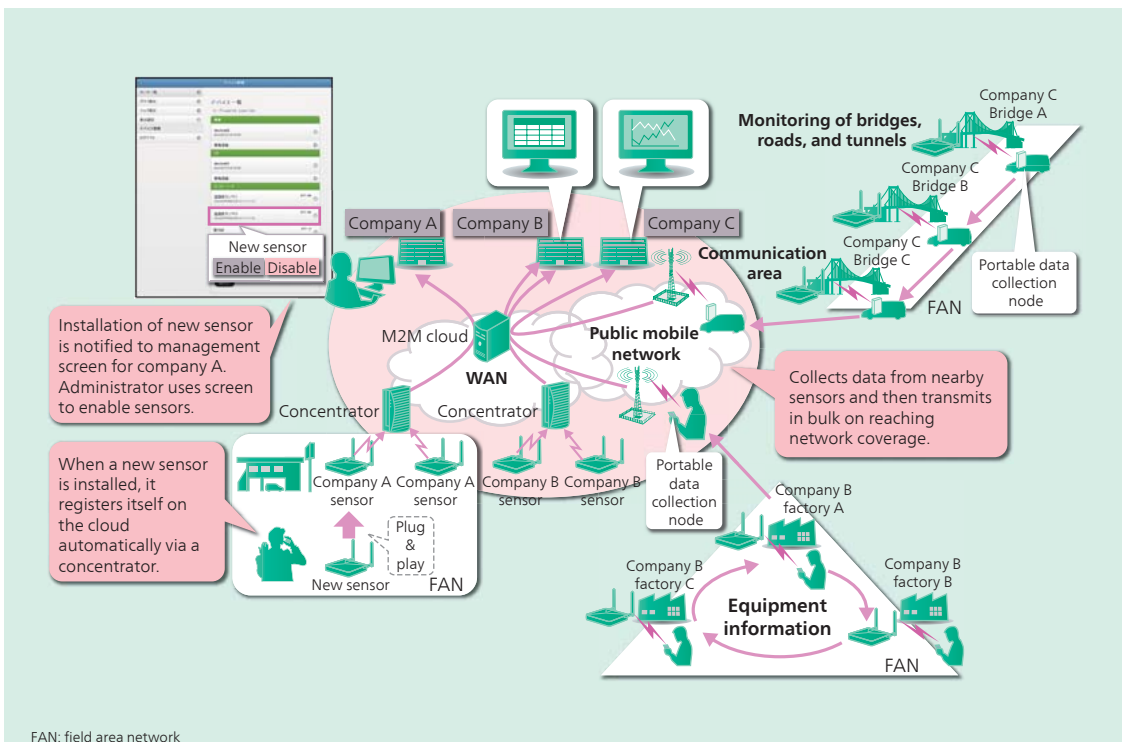
5 Hitachi Network Products Design Suite

Hitachi Network Products Design Suite is a comprehensive solution package of reference design, hardware, and software for building next-generation network products. Hitachi Network Products Design Suite helps simplify the product development process while enabling designers to concentrate their efforts on core competencies and differentiation of new products.

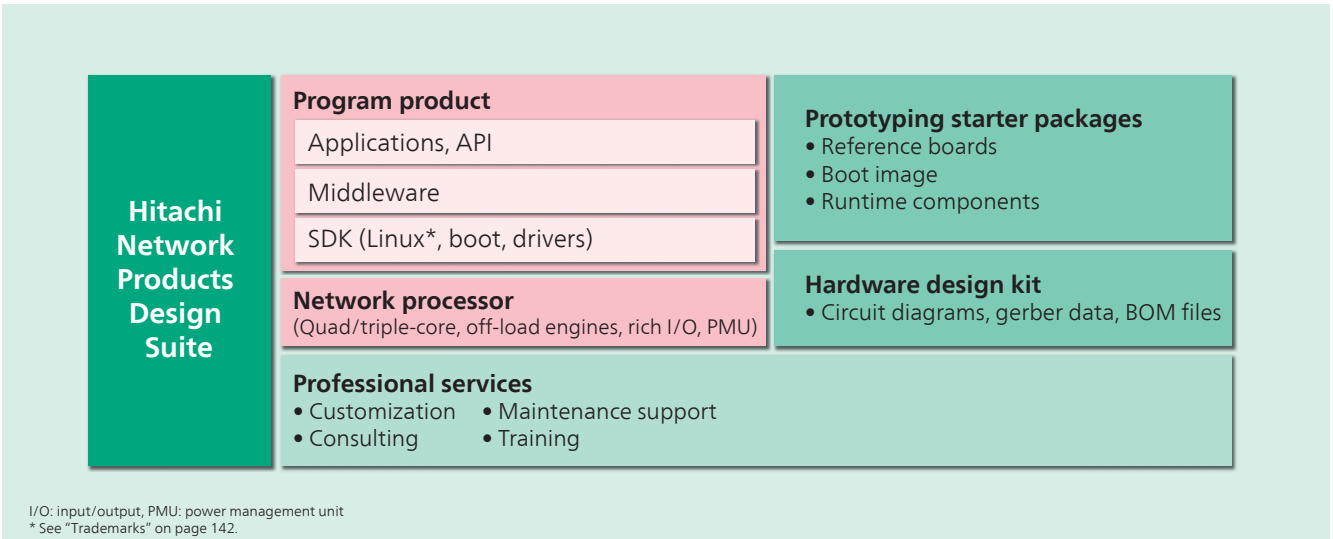
This package offers the following elements.

(1) Program Product: this consists of applications developed for various types of products, a software development kit (SDK), and middleware.

(2) Prototyping Starter Packages: these packages support prototyping and evaluation by providing reference boards, boot image,



4 Overview of how M2M cloud network solution is used



5 Main elements of Hitachi Network Products Design Suite

and runtime components as an integrated package needed in early-stage development.

(3) Hardware Design Kit: this consists of a network processor developed for communication and networking products, schematic diagrams, bills of materials (BOM), and other reference design manufacturing information for various types of products that use the network processor.

(4) Professional Services: these include hardware and software customization, porting, driver development and tuning, product design, technical support for testing, maintenance support, consulting, and training.

In the future, Hitachi intends to continuously help speed up development of network products along with enhancement of Hitachi Network Products Design Suite reference designs.

6 TD-LTE System

In response to the rapid increase in the volume of mobile data traffic for devices such as smartphones and tablets, Hitachi has developed a range of Time Division-Long Term Evolution (TD-LTE) products that include center systems, base stations,

and LTE-Wi-Fi* access points.

The main features are as follows.

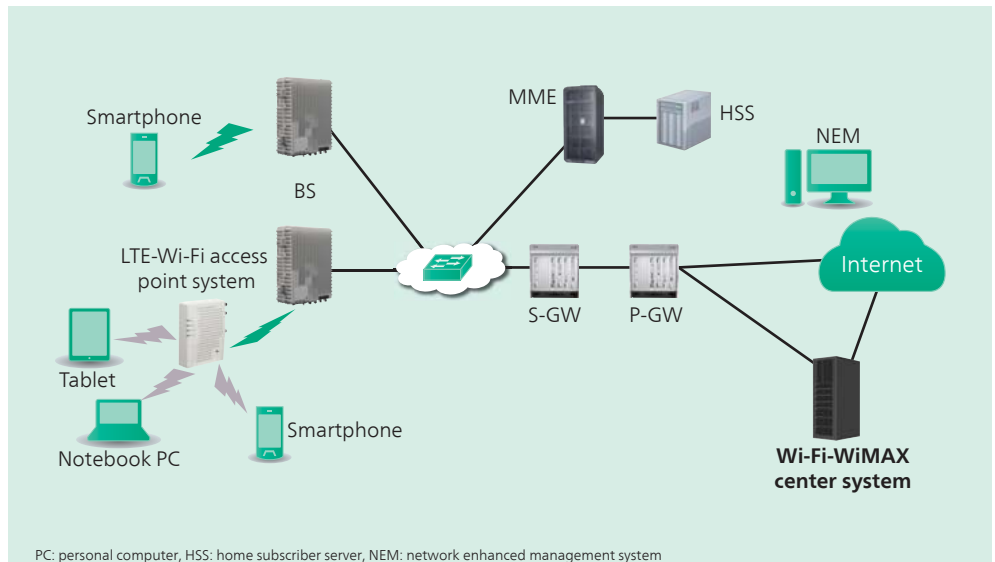
(1) Evolved Packet Core (EPC)

This supports both LTE and TD-LTE. Its component parts include a Mobility Management Entity (MME) that handles mobility functions such as device handover, a Serving Gateway (S-GW) that handles the transfer of data packets to and from base stations, and a Packet Data Network (PDN) Gateway (P-GW) that handles connection to the external packet network (internet) and related functions such as Internet Protocol (IP) address allocation.

(2) Base station (BS)

This simplifies installation by providing a single housing of baseband and radio parts that is robust enough for outdoor installation and combines a high-output (80 W) radio unit with a highly integrated signal processing unit. The signal processing unit supports 2×20 MHz, 4×4 multiple-input and multiple-output (MIMO), and dual-mode (WiMAX* and TD-LTE) operation. Features include smaller size and lighter weight thanks to significant reductions in power consumption achieved through improvements in amplifier efficiency.

(3) LTE-Wi-Fi access point system



6 TD-LTE system

To facilitate data offloading, this provides a secure Wi-Fi service for buses and other forms of public transportation that uses a number of different wireless protocols (WiMAX, LTE, and TD-LTE) for the backbone link. A feature of Wi-Fi is that it operates in the 2.4 GHz and 5 GHz bands and can support a total of 200 users.

In the future, Hitachi intends to expand the functions of the system through the use of network virtualization techniques to ensure scalability, and cauterized self-organized network (C-SON) control to improve wireless network efficiency through autonomous control.

* See "Trademarks" on page 142.

7 High-capacity Packet Transport System

Factors such as mobile communications for smartphones or the communications with data centers associated with cloud computing are behind ongoing increases in network traffic volumes. The cloud is also driving up the level of reliability expected from networks. To deal with this increase in communication volumes and satisfy demand for higher network quality, Hitachi has developed the packet transport system and its associated operating system. The packet transport system is targeted at telecommunications carriers and is capable of hosting a variety of services using multi-protocol label switching (MPLS).

Its main features are as follows.

- (1) High-capacity packet switch able to handle 1.6 Tbit/s
- (2) Enhanced network reliability and quality through monitoring of all communication paths using operation, administration, and maintenance (OAM) functions that interoperate with customer-premises equipment.
- (3) Comprehensive quality of service (QoS) function that provides reliable traffic quality on a service-by-service basis.
- (4) Faults on the network can be isolated easily using the various test functions provided.

In the future, Hitachi intends to add support for network virtualization as well as adding additional interfaces and new functions for hosting various services and access networks.

8 Model-driven BSS Development Solution

The increasingly competitive telecommunications business means that companies need to keep ahead of their competitors by offering attractive service plans that combine different services at competitive prices, such as the convergence of mobile and fixed-line services or interoperability with add-on services. For the business support systems (BSSs) that provide system-based support for service sign-up, contract administration, and billing, the challenge confronting telecommunications operators is how to speed up the provision of new services by shifting from stand-alone BSSs that implemented specific telecoms services to an integrated BSS that provides a one-stop shop for consolidating the introduction and withdrawal of a variety of different services so that they can accelerate the rollout of their service strategies. However, if the development of an integrated BSS were to continue along the same line as the development methods used on standalone BSSs, the result would be a lack of flexibility and difficulties in shortening development times and cutting costs.

The model-driven BSS development solution is intended to overcome these problems in the development of integrated BSSs. It provides new development methods that make BSS development and integration more efficient and allow telecommunications operators to implement their innovative services in a timely manner.

The elements that make up the service are as follows.

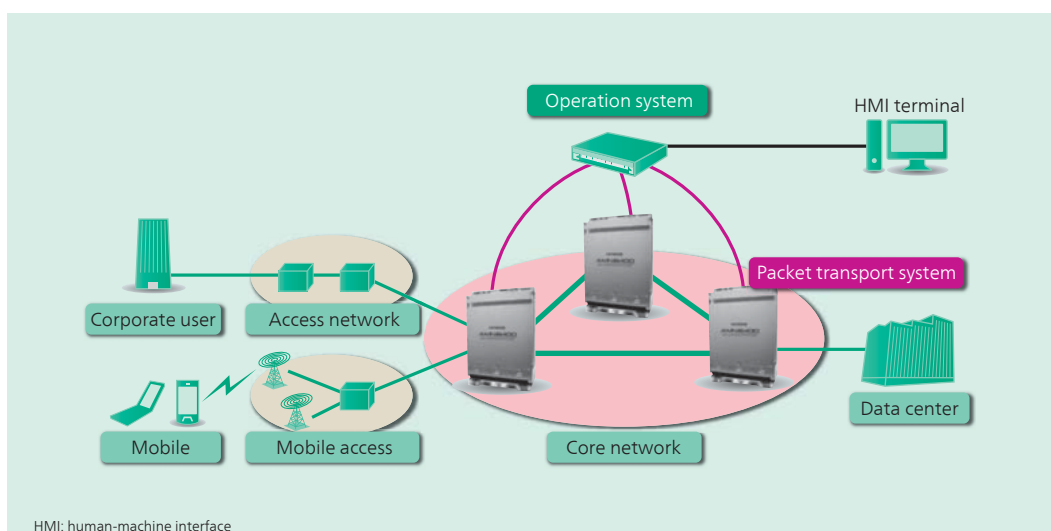
- (1) Model-driven BSS platform

This is a BSS application development platform that uses the BSS work flow and data model as a base. It allows rapid service development, expansion, and integration by utilizing advanced modeling techniques for the consistent design of a variety of different services.

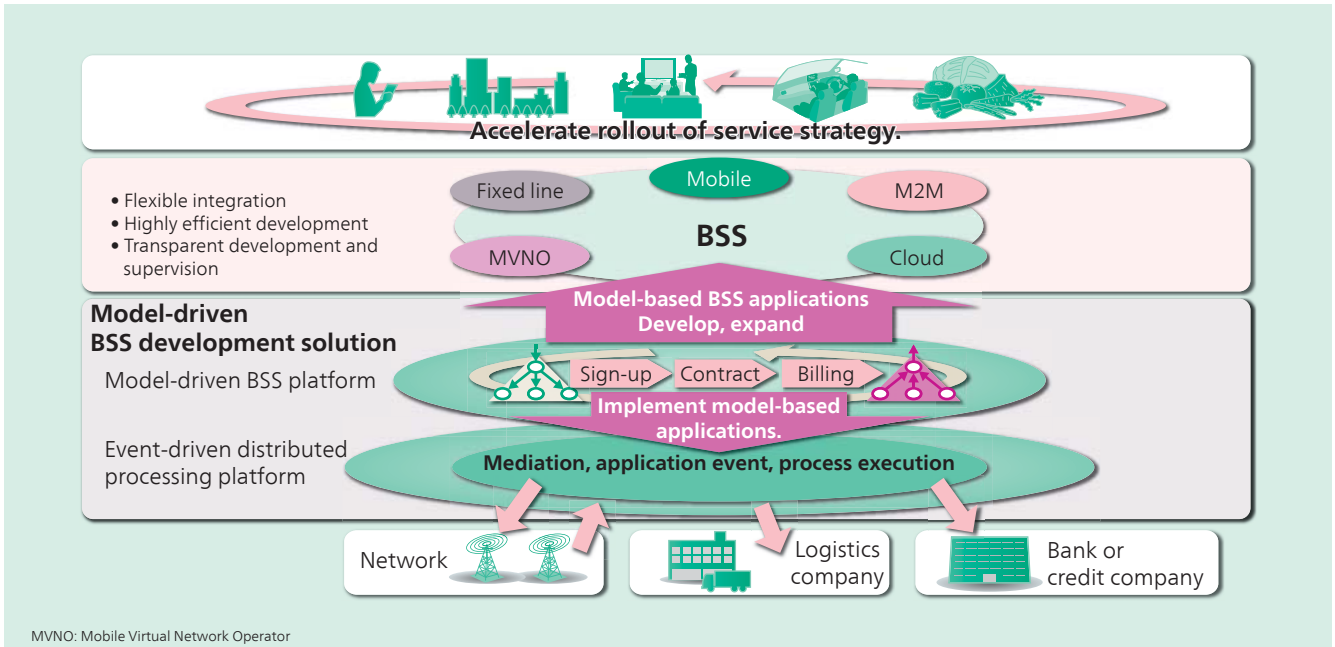
- (2) Event-driven distributed processing platform

This platform controls the distributed execution of model-based business processes. It supports flexible system up-scaling in response to service expansion or modifications.

By gaining experience through the development of BSS application sets that incorporate portal screens for LTE data communications services and provisioning functions for network



7 High-capacity packet transport system



8 Model-driven BSS development platform

equipment, Hitachi plans to make the implementation of BSSs for specific industries even faster by developing BSS application sets for various industries, including M2M and cloud applications.

9 Cloud Communication Service

Cloud communication service is a cloud-based voice service that enables telephony systems to be implemented quickly in a way that minimizes up-front investment and management costs by avoiding the need for companies to own the required equipment themselves.

The main features are as follows.

- (1) In addition to a standard telephony service that provides extension lines for a monthly fee, the options also include a high-reliability service that features redundancy in the call control functions and a high-security service based on VPN connections that uses a closed network to ensure security.
- (2) A unified communication (UC) portal service that integrates with a personal address book, which groups together frequently called people, and a presence function that indicates whether the

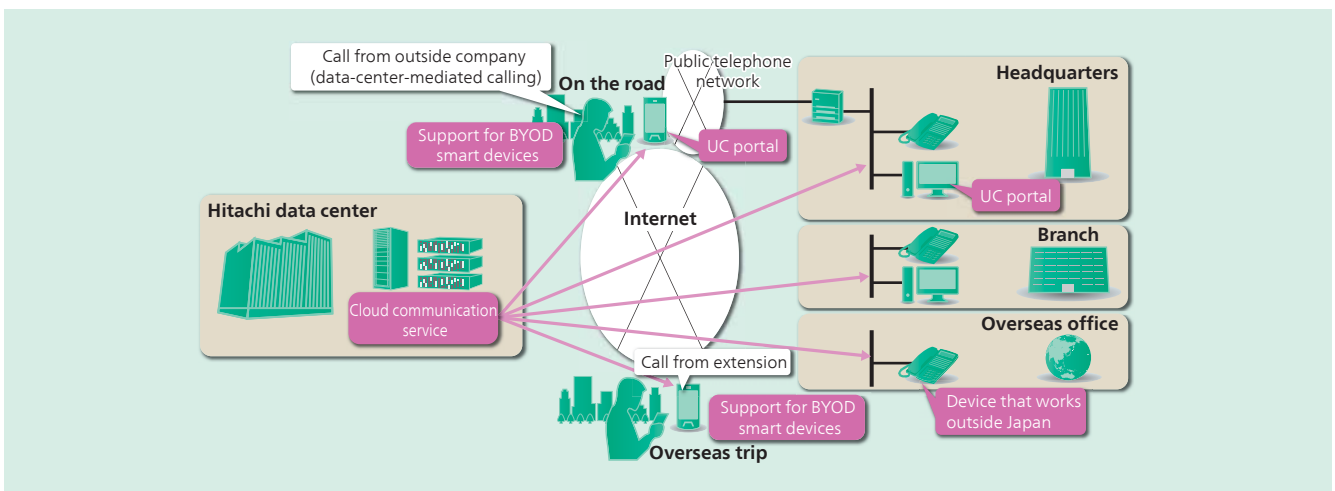
person you want to call is currently has another call in progress, for example.

(3) To allow for users who want to use their own phones [bring your own device (BYOD)], the service handles allocation of billing for personal and private calls, and supports data-center-mediated calling in which calls are first terminated at the data center so that the company telephone number can be passed to the call recipient. For Android* smartphones, the service can also manage data such as the user's phone book or incoming and outgoing call records centrally at the data center to prevent the leaking of information should the phone be lost.

(4) Smartphones and similar devices can be used to make calls via the internet from overseas locations such as company offices to a company extension. This reduces the cost of using the phone overseas and helps with company globalization.

In the future, Hitachi intends to improve the service further by meeting increasingly diverse user and market needs, and by enhancing UC functions to expand compatibility with various other communication functions.

* See "Trademarks" on page 142.



9 Overview of cloud communication service



10 Hitachi WAN Accelerator Office Model

10 Hitachi WAN Accelerator Office Model

The performance of transmission control protocol (TCP) communications can be reduced significantly due to round-trip delay time and packet loss^{*1}. The Hitachi WAN Accelerator Family uses a proprietary Hitachi algorithm to optimize the TCP data transfer performance and maximizes the use of physical WAN bandwidth. Hitachi WAN Accelerator Family dramatically improves business productivity by reducing the data transmission time for large data that is updated frequently, which is difficult to optimize with typical caching technology.

Hitachi has added a new Hitachi WAN Accelerator Office Model to its Hitachi WAN Accelerator Family lineup. Hitachi began selling this new Office Model on June, 2013. It is priced below current models and targeted at relatively small offices such as domestic and overseas branch offices and development sites. Optional licenses can also be added to incrementally upgrade the maximum TCP session^{*2} performance and optimized WAN capacity per device. This allows a flexible response to changes in network environments after the model has been introduced.

Hitachi provides a wide product lineup to respond flexibly to a variety of corporate applications and existing communications environments.

*1 Packet loss: a packet is a small package of data used in computer communications that includes control information such as the destination address. Packet loss occurs when data is lost within a network and fails to arrive at the destination.

*2 TCP session: a unit for communication via TCP.

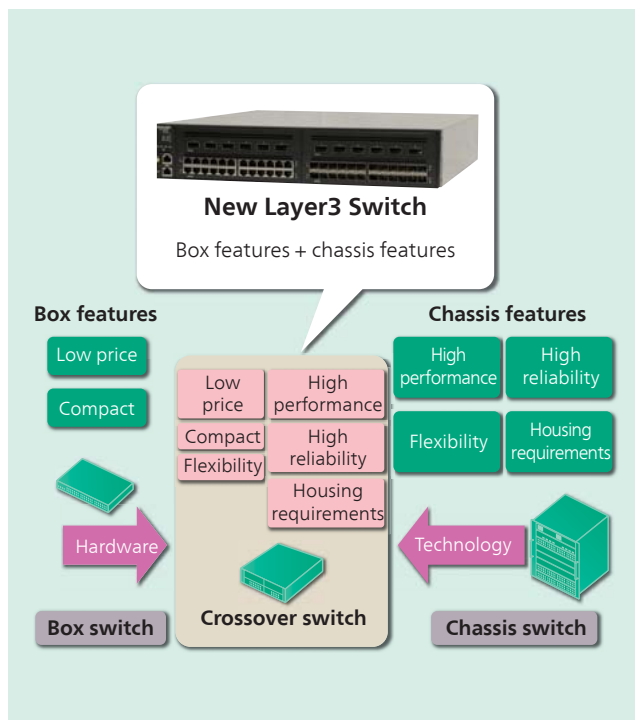
11 Crossover Switch

New Layer3 Switch is based on the new concept of a compact crossover switch with high cost-performance that also has the flexibility and expandability of a chassis switch.

The main features are as follows.

(1) Performance

Superior specifications to chassis products



11 Crossover switch

- Maximum switching speed of 1.92 Tbit/s (to be upgraded to 2.24 Tbit/s from FY2014)

- Housing requirements suitable for use as core switch in large network

(2) Flexibility

Can be configured as required from a choice of four interface modules.

- 24 × 1 G ports [unshielded twisted pair (UTP)]

- 24 × 1 G/10 G ports [small form-factor pluggable (SFP)/SFP+]

- 24 × 1 G ports (SFP)

- 6 × 40 G ports [quad SFP+ (QSFP+)] (to become available from FY2014)

(3) High-density port housing

A large number of high-speed lines can be installed in a 2U^{*1} housing.

- 1 G/10 G: up to 96 ports

- 40 G: up to 28 ports (to become available from FY2014)

(4) Reliability

- Full support for the layer 3 functions required for core switch in corporate network

- Virtual redundant system (VRS) function^{*2} provides device redundancy.

In the future, Hitachi plans to use the platform capabilities of the New Layer3 Switch to expand the scope of crossover switching.

*1 1U is approximately 44.45 mm.

*2 Function for connecting together two physical switches so that they operate as a single virtual switch