

HITACHI TECHNOLOGY

2007-2008

# Information Infrastructure Business

Solutions and Services

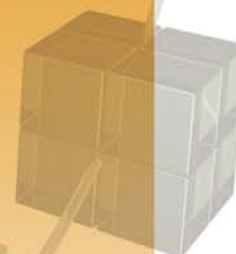
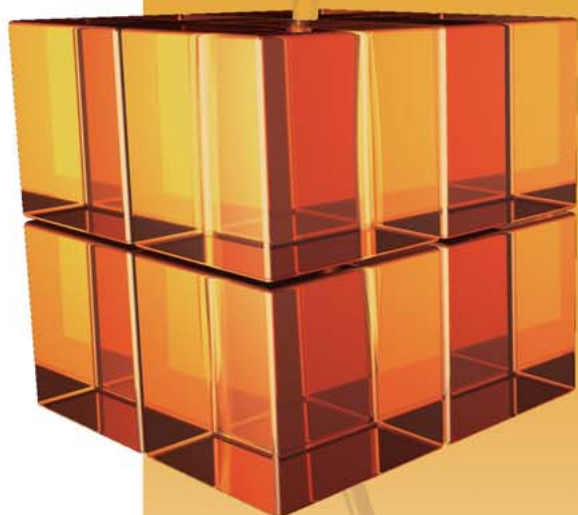
Software

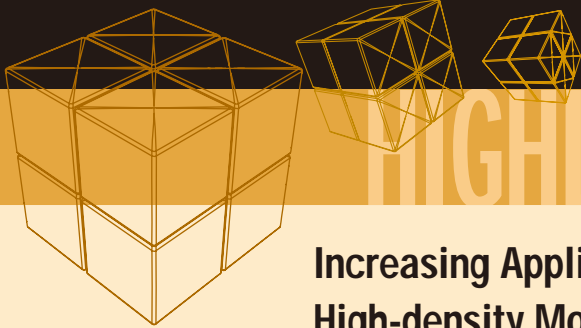
Hardware

Image and Information Equipment

Network Systems

Communication Devices





## Increasing Applicability of BladeSymphony by Offering High-density Models and Unique Virtualization

A highly scalable and integrated service platform called BladeSymphony is known for its state-of-the-art technology and is continually evolving. The initial 10U high-end blade server was introduced, and the platform was targeted at general business system and server integration. The introduction of the new 6U high-density blade server is suitable for PC (personal computer) server integration and data center implementation. In addition, enhancement comes in form of a Hitachi unique server virtualization feature for the 10U high-end blade server. Virtualization helps customers to lower their total cost of ownership through increased resource utilization and server consolidation.



Takayuki Jikuya (left), Director, Department II, Server Operation1, Enterprise Server Div; Hitoshi Ueno (right), Senior Manager, Department III, Server Development, Enterprise Server Div., Information & Telecommunication Systems

### What are the Key Features of the 6U High-density Blade Server?

The 6U high-density blade server is a blade system designed for customers striving to consolidate workloads in branch offices, remote offices, or departments. This blade server is far simpler to deploy and manage than traditional rack-mount servers. Amongst its many unique features, this blade server comes with a 100-V power option that can be plugged into a standard power outlet, and it does not require special equipment or adapters. In addition,

Ethernet switches and fibre channel switches, and management modules are built in. As a result, there is less cabling, less complexity, and lower administration costs. The 6U high-density blade server supports up to 560 cores in a standard 42U rack, with up to 10 dual-socket, Intel® Quad-core Xeon® server modules per 6U chassis. This highly reliable system has many features, such as hot-swap components, redundant switch and management modules, N+1 server fail-over, N+1 or fully redundant power supplies, and a chassis equipped with redundant fan modules.

### Introducing Hitachi's Unique Server Virtualization Feature

The 10U high-end blade server is the first true enterprise-class blade server. This blade server supports Intel Dual-Socket, Intel Dual-Core and Quad-Core Xeon and/or Intel Dual-Core Itanium® 2 server modules (running Microsoft® Windows® Server® 2003 or Red Hat® Enterprise Linux®4). This type of server has centralized management capabilities, high-performance I/O (input/output), and sophisticated RAS (reliability, availability, and serviceability) features. Configurations based on Intel Itanium 2 processors can take advantage of Hitachi's unique server virtualization, which can help customers to reduce the costs, risk, and the complexity of their IT (information technology) infrastructure—at the edge of the network, the application tier, the database tier, or all three.

Combining Hitachi's 40 years of experience in developing main-frame computers and their virtualization technology, Hitachi's server virtualization feature delivers a high-performance, extremely reliable, and transparent virtualization for the Intel Itanium 2 processor platform. The server virtualization feature requires no separate OS (operating system) layer or third-party virtualization software. Depending on the user requirements, hardware resources can either be dedicated to a single logical partition or shared between partitions. The feature is tuned specifically for BladeSymphony and has been extensively tested in enterprise production environments. The server virtualization feature uses hypervisor-type virtualization and therefore, offers performance advantages over host-emulation virtualization offerings. This is because the guest operating systems can execute directly on the virtualized hardware without extensive overhead by host-emulation. Hitachi's server virtualization feature takes advantage of Intel VT (Virtualization Technology) to ensure processor performance is optimized for the virtual environment and to provide a stable platform that incorporates virtualization into the hardware layer.

Hitachi will continue to enhance the features of the BladeSymphony, such as I/O virtualization and dynamic re-configuration of resources.



6U high-density blade server (a) and 10U high-end blade server (b)

\* See "Trademarks" on page 86.



## Hitachi Adaptable Modular Storage 1000 A Modular-type Scalable Storage Adaptive to High-level Storage Consolidation

From the perspective of IT (information technology) governance, integrating storage environments and managing and utilizing data effectively in current environments of progressively larger amounts of data with increasingly diverse characteristics pose imperative issues. Hitachi disk array subsystem has introduced the Hitachi AMS (Adaptable Modular Storage) 1000 that enables a high-level consolidation or integration of storage.

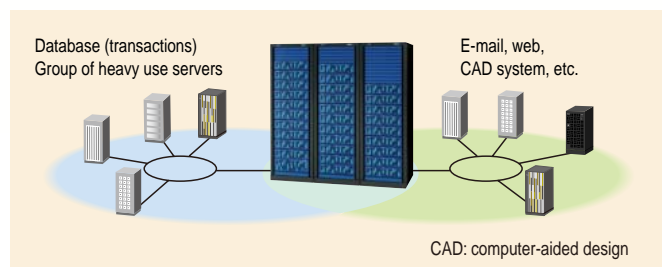


Atsushi Ishikawa (left), Engineering Manager, Disk Array Software Development Dept. III, Storage Systems Development, Disk Array Systems Division; Azuma Kano (right), Engineering Manager, Disk Array Hardware Development Dept., Storage Systems Development, Disk Array Systems Division, Information & Telecommunication Systems

### What is the Background of Development of the Hitachi AMS1000?

The mid-range class of storage has recently been utilized in certain parts of an essential system in fields where enterprise-class storage was typically used. Conversely, the response to different regulations and stricter compliance has seen a tendency toward increasingly larger sizes of various systems for data having critical business characteristics.

This background has driven the strong needs for mid-range storage, for which an ongoing capacity increase of 60% per year is forecast, with the following features: high performance even under a load of larger amounts of data, high-value added function such as disaster recovery function to increase business continuity, and data storage at a reasonable price. What has been developed in response to these needs is the Hitachi AMS1000, a top-end model in a series of modular type scalable storage devices or Hitachi Adaptable Modular Storage (hereinafter "Hitachi AMS").



Storage consolidation using the Hitachi AMS1000

### What Features Address Customer Issues?

The Hitachi AMS1000 achieves high performance through higher CPU (central processing unit) processing speed and an expanded bus bandwidth. In addition, it supports SAN (storage area network), NAS (network attached storage) and iSCSI (Internet small computer system interface) for the host connection interfaces, and is compatible with the multi interface where up to two of these three interface types can be combined without restriction. Moreover, other types of disk drives such as the high-performance fibre channel drive and low-cost SATA (serial advanced technology attachment) drive are also supported and can be installed in combination on a device as desired by the customer. Regarding the storage functions, a cache partition function is supported for dividing and allocating the cache domain for each service. As a result, stable performance can be ensured by minimizing the interferences to performance caused between services that share a common storage, and performance can be tuned to match the access characteristics of each service. Thus, a flexible structure can be constructed to consolidate the data and applications scattered throughout a company, and thereby optimizing cost. With regard to disaster recovery functions, the asynchronous type remote copy function that can also be used on lines with less cost is also supported. These functions and features enable highly reliable long-distance copy operation by reducing server loads and line costs, and consequently provide strong support for enhancing the continuity of the customer's business.

### How will the Mid-range Market Evolve in the Future?

The most essential factors for customers in deciding to select the Hitachi AMS are considered cost-performance and a reduction of TCO (total cost of ownership). Consequently, our mission is to develop new products and functions that provide solutions for customers, and not retain the conventional concepts or functions of existing enterprise storage. The Hitachi AMS1000 is one of three models in the Hitachi AMS product lineup. It is very challenging work to implement the most appropriate tasks and functions for each model that shares the same architecture, and evolve these products to offer even better competitiveness. Such work remains worthwhile even after meeting the diverse needs of customers. Fortunately, in the Japanese market the Hitachi AMS has been ranked first for the past ten consecutive years in the area of external disk storage and in the overseas market Hitachi has been increasing its share. From now on, we will focus on reducing TCO and maximizing data value for customers by offering an easier-to-use GUI (graphical user interface) and layered management systems. Another of our major goals is to expand our share of the mid-range class segment in the global marketplace.



## Cutting-edge RFID $\mu$ -Chip Series

The world's smallest RFID (radio-frequency identification) " $\mu$ -Chip" was initially marketed in 2003. Since then, various field solutions and specific tags have been implemented, and several variations of  $\mu$ -Chip released in order to improve usability for customers. The next-generation, 2.45-GHz,  $\mu$ -Chip RKT102 series offers major enhancements of improved read range and anti-collision functionality in combination with dedicated reader equipment.

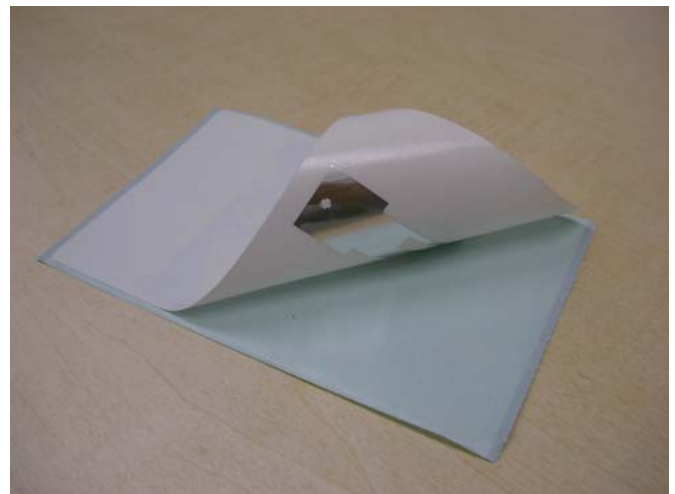
The maximum read range of the RKT102 series  $\mu$ -Chip has been extended beyond 45 cm thanks to an improved  $\mu$ -Chip semiconductor rectifying circuit and higher reader sensitivity of the dedicated high-power reader. The combination of the RKT102 series and an enhanced dedicated reader also enables anti-collision read functionality, and as a result the reader can read up to 50  $\mu$ -Chips per second throughput. Based on the RKT102 series  $\mu$ -Chip technology, an ultrathin (85  $\mu\text{m}$ ) inlet was developed for evaluation by the paper manufacturing industry. This ultrathin inlet consists of a  $\mu$ -Chip IC (integrated circuits) and antenna only 45 and 15  $\mu\text{m}$  thick, respectively.

A total of 40 field solutions have been implemented using the 2.45-GHz  $\mu$ -Chip in the following six areas in Japan: production & manufacturing, logistics, education, recreation, access control, and item level management. Unique tags using  $\mu$ -Chip such as linen tags, wristband tags, and secure sealing labels have been developed to enable unique applications based on diverse customer requirements. Some such solutions have also been developed and implemented in the US and European markets based on local  $\mu$ -Chip readers jointly developed with regional partners. More unique applications and tags are expected to be developed based on the unique features of 2.45-GHz  $\mu$ -Chip technology.


In addition to existing 2.45-GHz band  $\mu$ -Chips, the UHF (ultra high frequency) band, mass-market-oriented, RFID  $\mu$ -Chip series was released in November 2006 based on the results of the "HIBIKI Project" undertaken by Japan's Ministry of Economy, Trade and

Industry (METI). The "HIBIKI Project" was launched in 2004 as a consignment of R&D from METI and ended in July 2006. This UHF band  $\mu$ -Chip is compatible with the ISO18000-6 type C international standard and ideally suited for supply chain applications and logistics thanks to the communication distance as long as 3 m for reading and 1 m for writing with regard to the global UHF band and large size memory.

To allow customers to conveniently evaluate the superior performance of UHF band  $\mu$ -Chip products, the Introduction Kit (consisting of a UHF reader/writer, antenna, evaluation software, and sticker labels) was released in November 2006 in the Japanese domestic market. Usage of the UHF band (860—960 MHz) RFID tag has just begun in the market and wide-ranging applications are expected by utilizing its superior performance and cost advantage.



Sticker label of UHF band  $\mu$ -Chip



(a)

	Recreation	Access control	Traceability	Manufacturing line SCM	Management of uniforms	Anti-counterfeit falsification	Individual recognition	Tool/fixture management	Recording media management	Tracking children
Seal tag	—	○	○	—	—	—	—	○	○	—
Label seal	—	○	○	○	—	—	—	○	○	—
Paper card	○	○	—	—	—	—	—	—	—	○
Plastic card	○	○	—	○	—	—	—	—	—	○
Special purpose tag	Wristband	—	Sealing label	Binding band	Laundry tag	Sealing sticker	Ear tag	Tag for metals	—	Key ring

SCM: supply chain management

World's smallest RFID " $\mu$ -Chip" (a) and  $\mu$ -Chip applications and unique tags (b)

## Promoting Finger Vein Authentication Technology Developed in Japan

In recent years such crimes as illegal access, the leaking of information, and access to the ATMs (automated teller machines) of financial institutions through spoofing have been rising, along with illegal entry into important facilities, apartment houses, and other establishments. Consequently, there is a growing demand for advanced security and personal authentication.

This has prompted wider public attention on biometrics, a technology based on the physical characteristics of individuals. In 2000, Hitachi developed a finger vein authentication technology using finger vein patterns as the authentication key for the first time in the world. Among all biometric technologies that realize high security and personal authentication, this technology utilizes the actual veins in human fingers. As a result, it is more secure than other technologies and now being used in a wider range of applications, including ATMs, door access, and PC (personal computer) login.

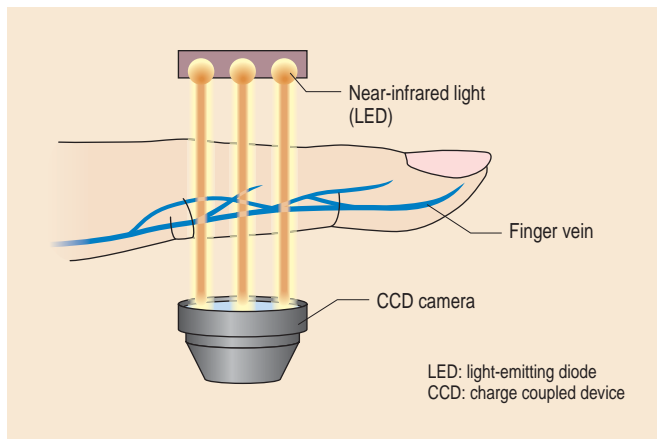
Above all, this technology is highly recognized in the ATM field in Japan not only for its high security but also for its precision and

authentication speed. In fact, about 80%\* of Japanese banks that use biometrics have adopted finger vein authentication.

As the public becomes increasingly aware of such finger vein authentication, inquiries are quickly increasing for its application to door access systems, PC login devices, and other systems not only from Japan but from abroad as well. Asia is witnessing particular growth in the use of such technology in controlling access to banks and apartment houses. In the USA, the technology has also been adopted by the New York branch of Shinkin Central Bank. The market for this technology is thus expanding globally.

By relying on the comprehensive expertise of the Hitachi Group, Hitachi will establish finger vein authentication as a global-standard elemental technology and will work to develop additional products for its lineup, one after another.

\* Hitachi's survey based on the presentation materials of various banks in the ATM field (as of March 2007)



Finger vein authentication technology



USB (universal serial bus) finger vein biometric scanner



# Material and Machining Process Management System for Automobile Unit Production Lines

The objective of this system is to reduce the level of processed stock drastically to achieve the most efficient use of automobile unit production lines.

The unit production lines used in automobile production, such as engines and transmission lines, need casting and machine processes that require much production. On the other hand, the main production/assembly lines run best with individualized work instructions and parts delivered to each vehicle as needed. This is called *Douki-seisan* (just-in-time production).

To meet the *Douki-seisan* of the assembly lines, the unit lines need to keep a high stock level, and this drastically reduces the cost reduction effort.

This system will incorporate “look alike” *Douki-seisan* to the unit lines to support the assembly lines.

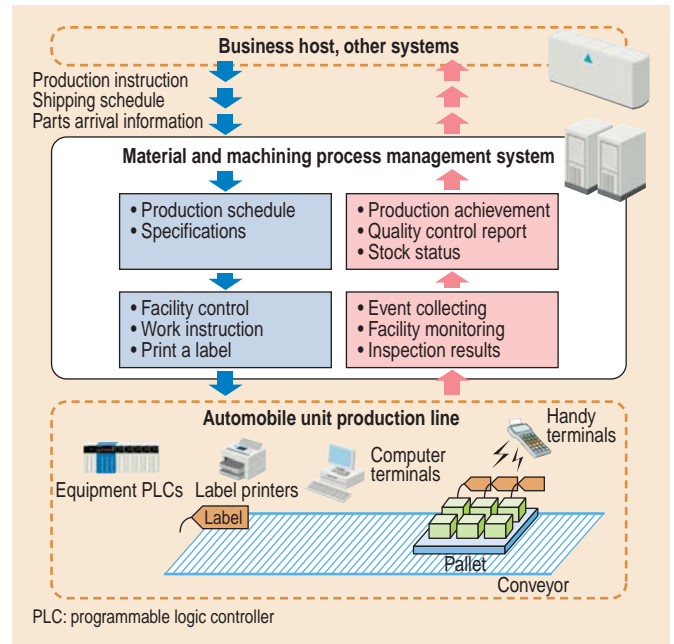
“Look alike” means the operation and its procedures, such as lot quantities, will remain the same to minimize operational change. At the same time, the system will manage individual units based on the production schedule to carry a zero processed stock.

[Advantages of the system]

- (1) The *Douki-seisan* can be used in unit lines based on the individual schedules.
- (2) Items are lot produced but individually managed using a bar-code.
- (3) The system will use a highly reliable and open platform application (NXAUTO).
- (4) The system will use a table definition for screens and work

instruction thus reducing the need for complex programming.

(5) The system will achieve a high response when a large quantity of handheld wireless input terminals are introduced.

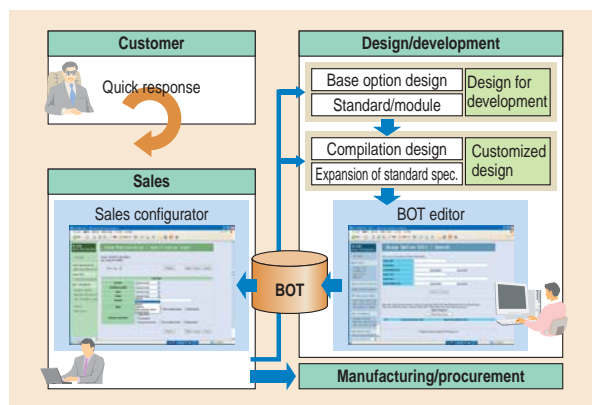


System configuration

# PLM Solution for ETO Processes Manufacturers

The PLM (product lifecycle management) solutions can be used to provide background information and explain problems when ETO (engineering to order) products are designed, manufactured, and

sold. The ETO product is customized for each customer using a standard product and is then delivered. The PLM solution enables inquires during the design stage and the manufacturing section, and if necessary, answers customer inquires such as “Does the option fill the spec?,” “Is the delivery date ok?,” or “Is the price ok?.” In the figure, the system consists of a configuration system (sales configurator) and the BOT (base option table) editor. The sales configurator automatically determines the specifications of the requested option or parts based on the customer’s description. The design knowledge to move configuration is managed using a BOT editor. An accurate configuration is achieved by using such a system, and the system is able to manage the specification composition promptly and easily. Moreover, non-standard items can be made efficiently by matching them to standard items as much as possible. It corresponds in BOT when non-standard items are designed and used exclusively, and in addition, as additionally registered in BOT, it is able to correspond to non-standard items efficiently as standard items from next time.



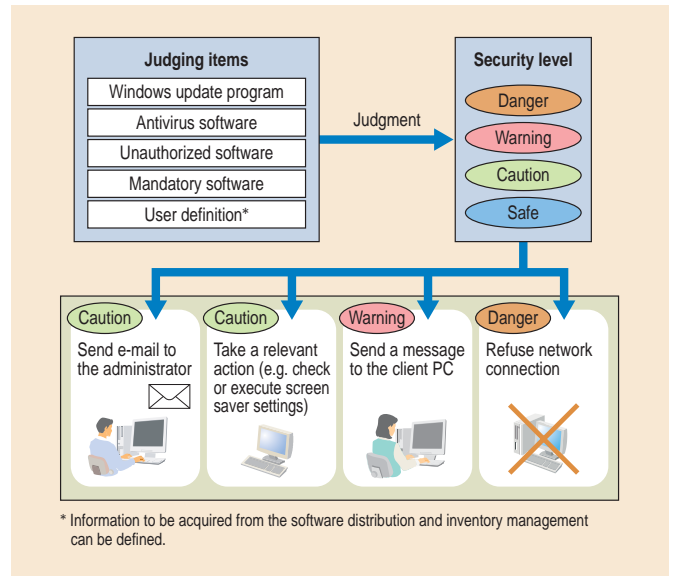
Function composition of the system

# The Best Choice for Evolving Information Systems—Integrated Systems Management Software, Job Management Partner 1 (JP1)

Information systems used by companies throughout the world have evolved from mere “tools” to indispensable “business infrastructure” that optimizes enterprise activities from a management, organization, and society point of view. Consequently, information systems requirements have become increasingly business-oriented; for example, IT (information technology) compliance is one very important issue. JP1\* greatly enhances the reliability of an enterprise and its business by controlling IT assets centrally and by providing an environment that is prepared to respond quickly to any situation.

JP1 IT compliance ensures that the overall control of IT in an integral system complies with the control standards defined by the enterprise or organization. For example, the software monitors the system environment and protects the system from threats or risks, such as unauthorized accesses and virus infections. JP1 IT compliance centrally manages asset information and takes prompt actions to enhance internal control based on predefined security policy, laws and regulations.

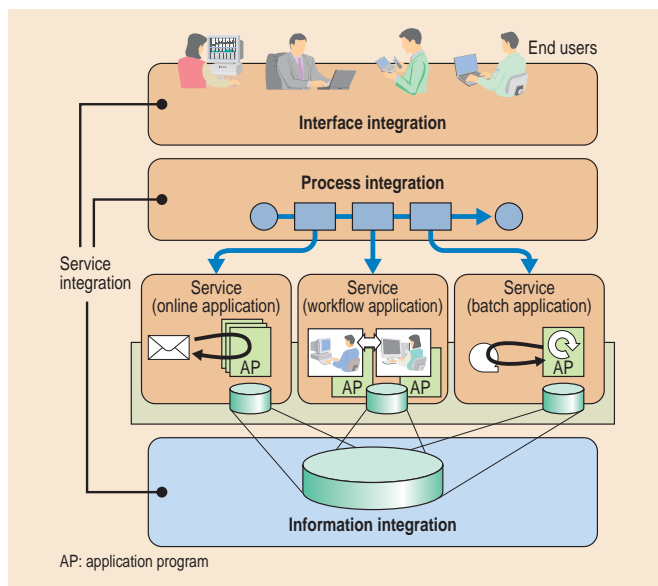
\* JP1 is an acronym for Job Management Partner 1.



JP1 IT compliance example: Client security management. Immediate treatment of PC containing security threats contributes to safer operating environments.

# Universal Application Platform — Hitachi Application Server Version 7

To ensure continued growth, businesses require information systems to provide a greater number of business activities/functions



SOA-based system's reference architecture

and be able to respond to changes in the business setting. This will result in businesses having greater efficiency and flexible software. “Hitachi Application Server Version 7” provides key solutions for situations using an SOA (service-oriented architecture)-based system reference architecture and consists of service integration and service deployment functions.

Using service integration, information system administrators can obtain software structure based on users’ business view by integrating three methods of existing systems and obtain the efficiency and flexibility mentioned above. Service integration includes interface integration, which virtualizes the user interfaces of systems as end users’ view for their business activities, Process Integration, which integrates services into a new service defined as business process flow, and Information Integration, which virtualizes data as an enterprise data model’s view without the need to change existing databases.

Service deployment provides runtime, development, deployment, and administration for application programs that implement the service. A special feature of the Hitachi SOA is that it provides various implementation styles for services, including facilities for batch applications and workflow applications, and a practical way using SOA to implement mission critical systems.



# New Version of Embedded RDBMS with High Performance Retrieval Features

The second version of Hitachi's embedded database "Entier," which is widely used in car navigation systems and mobile phones,

has been released with improved search features. The new version supports a full-text search that is useful for key word searches and has a repeated column that is suitable for alias search. These features greatly improve the development efficiency and add significant value.

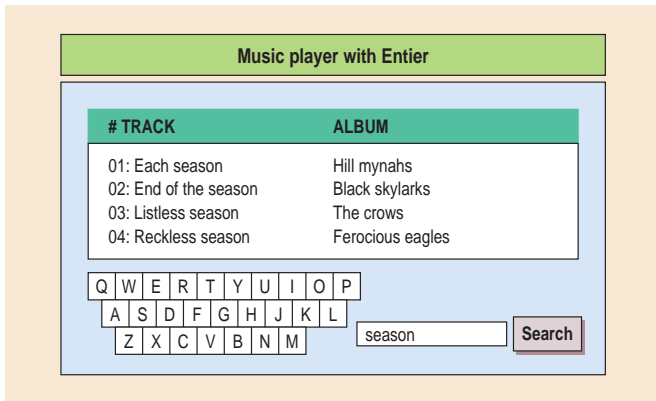
[Main features]

### (1) Full-text search

This can be available for mail and schedule searches on mobile phones, place name searches in car navigation systems, and EPG (electronic program guide) searches in hard disk recorders. Additionally, this function simplifies a user's search by automatically generating derived search keywords through the use of different notations, such as upper or lower case.

### (2) Repeated column

For example, official name and abbreviation, like "xxx international airport" and "xxx airport," even if a place or spot has different expressions, Entier can search for a specified name using all registered names in the same column through the use of this feature.



Example of full-text search result when the keyword is "season"

# Hitachi Server Platform Overview

Hitachi offers a variety of computer products ranging from client systems and PC (personal computer) servers to mainframes and supercomputers, using the experience it has gained in over 40 years of computer manufacturing.

Mainframe products running Hitachi's VOS (virtual-storage operating system) provide the high reliability and high availability required for mission-critical applications.

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

Enterprise server customers looking for AIX\* OS (operating system) can run their mission critical applications on machines of the Enterprise UNIX\* server series.

The multi OS server product line based on Intel Itanium2 processors offers users a choice of HP-UX\*, Windows, and Linux and scales from 2-core to the large 128-core SMP (symmetric multi processor) servers. The mainstream PC server series is Xeon/Pentium\* based and runs on Windows or Linux.

BladeSymphony is a highly scalable, performance-oriented blade server platform supporting multiple operating systems on Intel Xeon and Itanium2 processors to address the needs of the modern data center.

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

Overall, whatever the user requires, Hitachi has the appropriate server products.

\* See "Trademarks" on page 86.



Hitachi server platforms for various IT (information technology) infrastructures

## Hitachi's Integrated Service Platform BladeSymphony

Designed for maximum performance and scalability, BladeSymphony is a highly integrated next-generation IT (information technology) platform that manages servers, storage, and network resources. The BladeSymphony Management Suite allows the central management of configurations containing multiple chassis and racks of blade servers, and the various system resources can be managed through a unified dashboard. As a result, customers can reduce complexity of their systems through integrated management, lower total cost of ownership, and improve the return on their investments.

Hitachi offers two BladeSymphony models: (1) 10U high-end blade server (Intel Xeon processor-based or Intel Itanium 2 processor-based), providing enterprise-class capabilities for mission-critical applications, and (2) 6U high-density blade server (Intel Xeon processor-based) is suitable for remote office or branch office workloads. Customers can select the most appropriate model according to their specific business needs. All server blades can run Microsoft Windows Server 2003 or Red Hat Enterprise Linux 4. The server blades using Intel Itanium 2 processors can take advantage of Hitachi's unique server virtualization features and SMP (symmetrical multi-processing) functionality. These features make

it possible to consolidate enterprise-class workloads with a high level of flexibility to meet changing business needs.



Integrated service platform, BladeSymphony

## Security PC

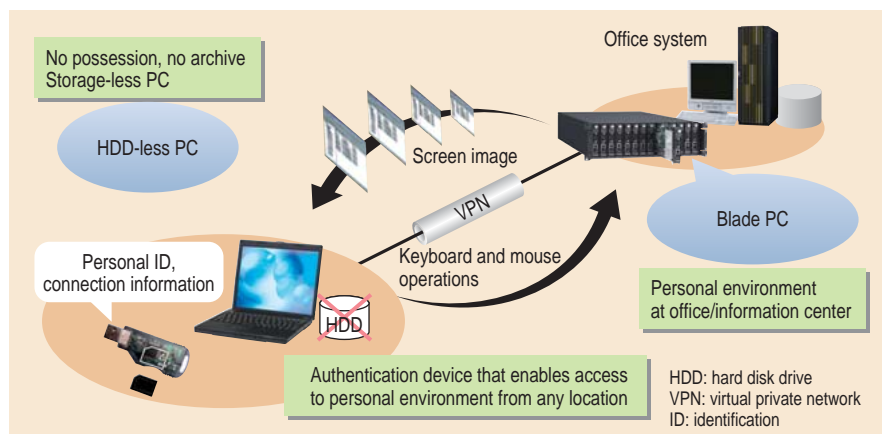
Security PC (personal computer) is a thin client PC that does not have a hard disk and a print function. Therefore, this PC cannot save any data on a local hard disk drive or print documents. Secure Client Solution will reduce the concerns of frequent traveling executives who are afraid of losing critical information (by mislaid PC or baggage lifting, etc). This reduced fear is possible because

this secure PC has an authentication device.

Both user files and application software are stored on the user's blade PC or other servers within a company's internal information system. As a result, the end users can access and use data and applications using the Internet (or Intranet) safely wherever they are.

The end users can also store presentation data in the authentication device and make a presentation using PowerPoint\* viewer of security PC (optional service) when they have to work offline.

The ultra light mobile thin client weighs as little as 1 kg and provides up to five hours of operation with a standard battery. The size of space saving desktop thin client has decreased by more than 70% of the previous model. To reinforce the level of security, both models have finger vein authentication (option) based on Hitachi's original biometrics technology.



Security PC

\* See "Trademarks" on page 86.



## Mid-range Disk Array Subsystem Hitachi Adaptable Modular Storage 1000

In line with the expanded corporate use of IT (information technology), storage is becoming increasingly important every year. Also becoming important is the optimization of storage investments and administrative costs. For these reasons, the demand for mid-range storage that achieves high cost performance is rapidly growing.

To optimize storage investments and costs for maintenance and management, and increase business continuity, Hitachi has developed the Hitachi AMS1000, the highest-level model of the Hitachi AMS (Adaptable Modular Storage) series that significantly increases performance and scalability, and improves storage management capability.

The new model offers a higher-level cache partition function that prevents interference in performance between tasks and reduced resource use efficiency, and which enables expansion up to a maximum 32 partitions. It also supports a multi-interface configuration [SAN (storage area network), NAS (network attached storage), and iSCSI (Internet small computer system interface)] that enables connection to various systems. This new product supports a low-bit-cost SATA (serial advanced technology attachment) 500-

Gbyte disk drive, so that its capacity can be expanded to a maximum of 215.2 Tbytes. The array controller's internal transfer rate has also been approximately doubled from that of the conventional Thunder 9585V model. In so doing, the new model optimizes business environments involving data having different uses and characteristics by integrating and gathering storage units.

The model also comes equipped with an asynchronous remote copy function that is adaptable to changes in network bandwidth and which enables simple and inexpensive disaster recovery in response to disasters and disorder. Online data migration between built-in disk drives also optimizes data arrangement according to the usefulness of data.

In order to increase security for inhibiting illegal acts, the new model also supports password management as well as account authentication, which sets a range of authority by manager roles, along with monitoring logging that accumulates the history of storage operations and transmits it to an external log server. Hitachi will solve different storage-related problems facing its customers, as well as help them realize more business opportunities.



Mid-range disk array subsystem Hitachi Adaptable Modular Storage 1000

# Hitachi Disk Array Subsystem that Realizes Storage Virtualization

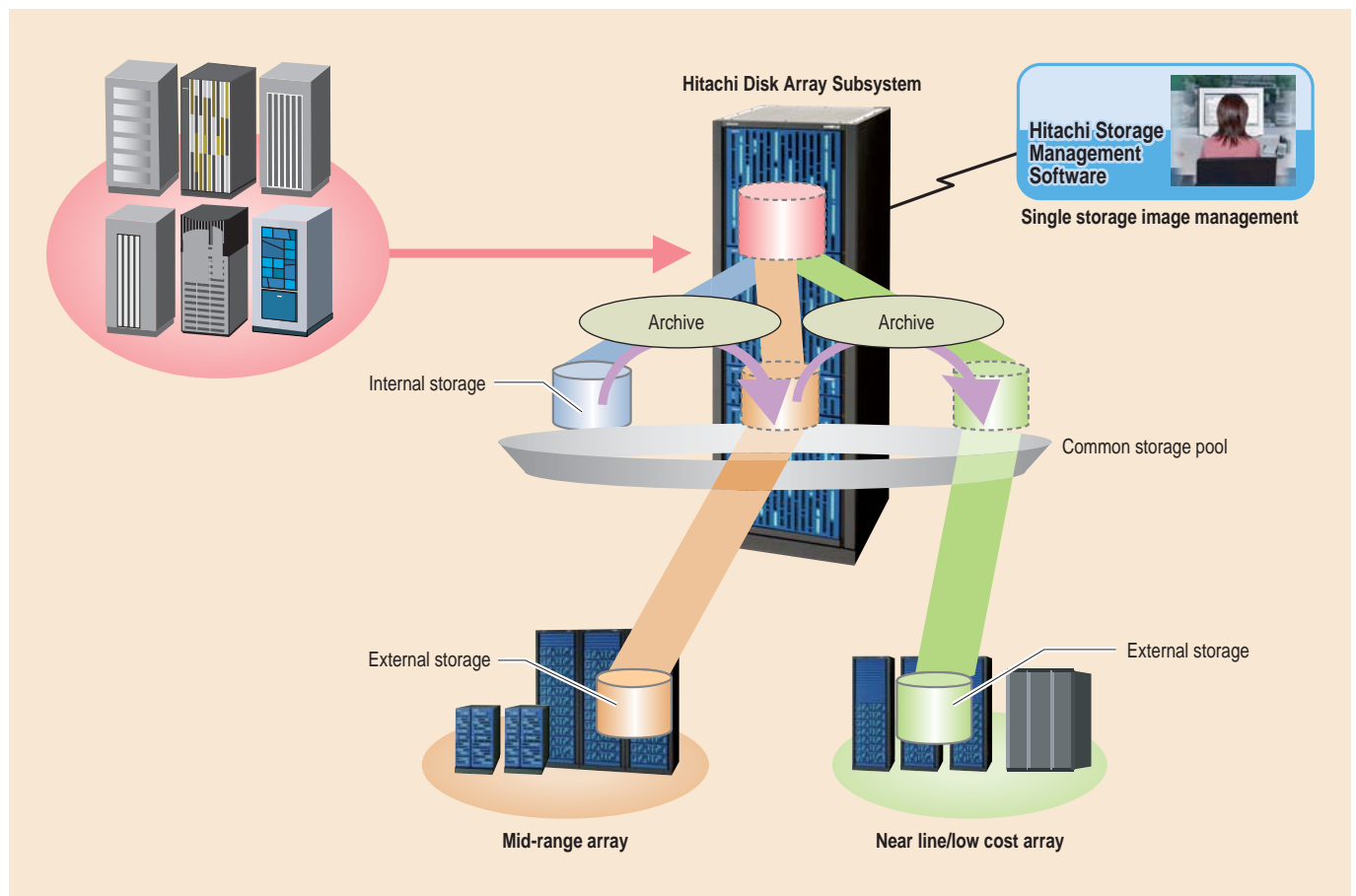
Along with the growing diversification of needs regarding the information systems of business enterprises, increasingly diverse needs for storage have been seen in recent years. Adding equipment to address these needs may increase the costs for implementation and operation management.

The virtualization function using disk arrays provided by Hitachi enables the virtual integration of multiple storage resources for different types of equipment and simplifies the operation management of corresponding storage infrastructure. Moreover, the various functions already provided by Hitachi's disk arrays for virtualized storage resources are also applicable. Thus, a storage base suitable for various needs can be constructed at reasonable cost, as well as with reduced operation management expenses.

In April 2006, a model not equipped with a built-in internal disk was supported. This enabled the easy implementation of such

highly reliable functions as a data replication function for existing storage system environments that typically have adequate capacity but insufficient functions.

The performance of Hitachi's enterprise-class disk array was also enhanced in May 2006 and realized the processing capacity as high as 2.5 million IOPS (input-output operations per second), thus further improving operation given the stable performance already attained. Also enhanced was the remote copy function. This function includes a function to enable the structuring and extending of a flexible disaster recovery system even when the system is enlarged, and the rapid restructuring of a disaster recovery system only between its multiple remote sites when the main site is struck by disaster. These enhancements will better support the continuity of business.



Typical application of the virtualization function of Hitachi Disk Array Subsystem



# Hitachi Simplifies Storage Management and Business Continuity

Hitachi's customers have enjoyed the benefits of consolidating data in highly available, intelligent storage systems through the use of storage area networks. Unfortunately, this consolidation has not eliminated the challenges facing large organizations from the rapid ongoing growth for increased storage capacity and increasingly complex infrastructures. These challenges include:

- (1) Managing increased storage capacity with the same number of IT (information technology) engineers or less;
- (2) Efficiently matching the requirements of applications to tiers of storage with the appropriate performance, availability, functionality, and cost;
- (3) Complying with legal requirements regarding long-term, secure data retention;
- (4) Training staff on the latest wide range of device-specific management tools and tactical storage resource management tools; and
- (5) Building a flexible storage infrastructure to respond more quickly to new business opportunities.

The rapidly maturing Hitachi Storage Management Software provides a full range of capabilities for coping with these challenges by greatly simplifying the management of heterogeneous storage environments in the following ways:

### (1) Application management

Hitachi Storage Management Software provides application-to-storage capacity and performance management for the most common messaging, databases, and file server platforms, including Oracle\*, Microsoft SQL Server\*, Sybase\*, Microsoft Exchange Server, and Windows and UNIX file servers.

### (2) Operations management

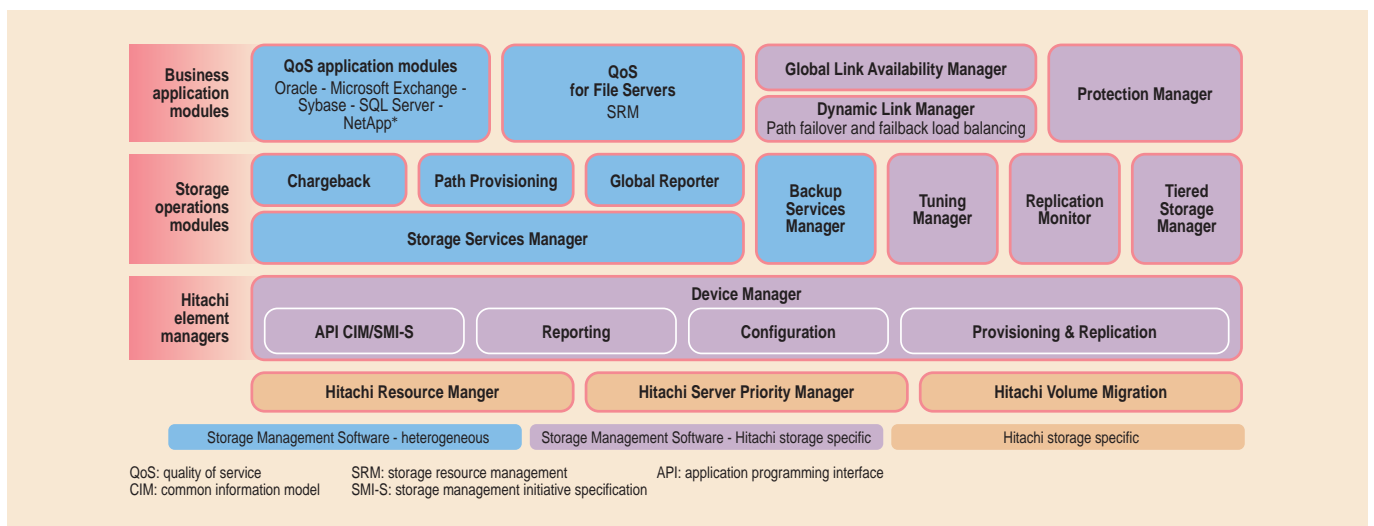
Hitachi Storage Management Software offers fast, efficient solutions that automate complicated manual administrative tasks such as installing host bus adapters, managing world wide names, identifying and upgrading out-of-date firmware, deleting unnecessary or redundant files from file servers, finding new possible capacities for any application, providing that new capacity, and diagnosing "it's slow" help desk calls.

### (3) Data management

Hitachi provides a complete solution to move application data between heterogeneous tiers of storage. The unique Tiered Storage Manager simplifies the management of classes of data and moves data between tiers without disrupting applications that are in use. Tiered Storage Manager, combined with the powerful, controller-based virtualization capabilities of the Hitachi Universal Storage Platform and Network Storage Controller, enables storage administrators to move data to the most appropriate existing tier of storage, thereby reducing costs.

In addition to the Tiered Storage Manager, Hitachi Storage Management Software includes several modules designed to improve application and data availability. Tuning Manager helps optimize application performance. Backup Services Manager manages and simplifies all aspects of backup and restore functions, and provides predictive analysis of tape consumption needs, while boosting successful backup completion rates for greater data protection. Replication Monitor simplifies the configuration and administration of Hitachi's best-of-breed replication software used by many large financial institutions and other businesses. Dynamic Link Manager provides robust path-failover and load-balancing capabilities to ensure 24/7 data access. For organizations overwhelmed by the challenges of simultaneously managing multiple servers and multi-path storage environments, Global Link Availability Manager provides simple integrated single-point management and reporting capabilities to improve administrator efficiency and minimize configuration errors. Through ongoing improvements, the Hitachi Storage Management Software delivers quantifiable benefits by simplifying management, ensuring availability and performance, and lowering the total cost of providing Services Oriented Storage Solutions for the critical applications that drive business processes.

\* See "Trademarks" on page 86.



Hitachi Storage Management Software

## Bright and Lightweight Projector: CPX1

Hitachi's latest product, CPX1 allows users to project presentations easily. The projector has a brightness of 2,000 lumens, which means there is no need to turn off a room's light. The projector has a weight of 1.7 kg and is B5 in size and easy to carry. The CPX1 projector has automatic vertical keystone correction and QUICK ON/OFF functions which help the easy setting up of presentations and putting away the CPX1 quickly. The CPX1 projector has a quiet design, only 29 dB is made in the whisper mode. This is useful for audiences that have to concentrate on presentations. The CPX1 projector has a short focus lens and can achieve a 60-inch screen from a distance of 1.5 m. This provides a smooth projection area, even in small rooms and limited spaces. There is also a mouse function, and the computer's cursor and Page Up/Down functions can be controlled using CPX1's remote controller. Two computer inputs, and single input for composite, S-video, and

audio in/out to connect external speakers provide greater connectivity than conventional projectors. The CPX1 projector has a USB (universal serial bus) port and can directly read picture data from external USB memory. Therefore, it eliminates the need for a computer.



Bright and lightweight projector: CPX1

## Camera and Recorder for Video Surveillance



(a)



(b)

Camera (a) and recorder for video surveillance (b)

Surveillance systems, in addition to record and playback functions, require capabilities that include high-quality digital video, long-term recording, and remote monitoring of network systems. To meet these needs, the "VK-S654" camera module and the "DS-G series" digital recorder were developed for surveillance purpose.

[Main features]

VK-S654 camera module

- (1) Industry top-level compact X35 optical power zoom lens
- (2) High-sensitivity F1.4 lens (minimum sensitivity: 0.5lx /interlace mode)
- (3) Progressive signal output to DVR (digital video recorder) recording

(4) EIS (electronic image stabilizer)

(5) WDR (wide dynamic range)

DS-G series digital recorder

- (1) Full-frame (30 frames per second) and progressive recording function for high quality video
- (2) Built-in mass HDD (hard disk drive) up to 1Gbyte
- (3) Remote monitoring function by the exclusive software

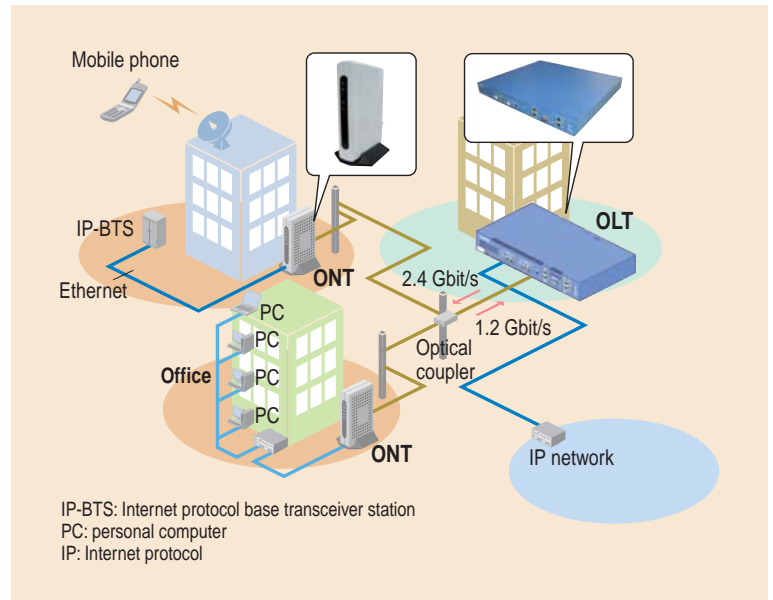


## A Gigabit PON System that Provides a Fast Access Network

This system provides a gigabit-class fast access line as an optical access system for communication carriers. Based on the PON (passive optical network) system, Hitachi's PON system can accommodate up to 32 ONTs (optical network terminals) from a single OLT (optical line terminal).

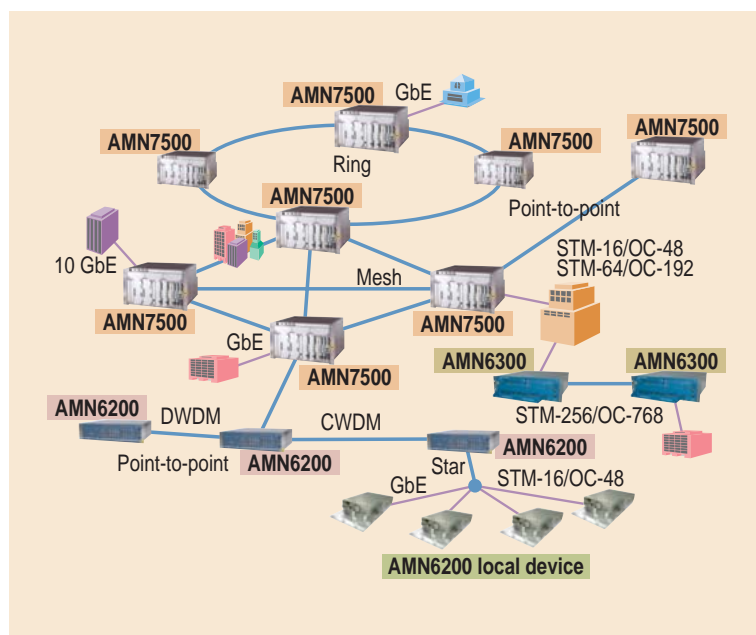
[Main features]

- (1) Compliant with International Standard ITU-T (International Telecommunication Union-Telecommunication Standardization Sector) Recommendation G.984
- (2) Fast transmission: 2.4 Gbit/s downstream, 1.2 Gbit/s upstream
- (3) Line accommodated: Ethernet
- (4) Maintenance based on the Ethernet (Hitachi Communication Technologies, Ltd.)



An example of network configuration based on a gigabit PON system

## Optical Transport Systems for Next-generation Networks (AMN6200/6300/7500)



An example of network configuration of an NGN-compliant optical transport system

The rapid spread of broadband networks has prompted public requirements for optical transport products adaptable to large capacity and various system configurations. Under these circumstances, Hitachi has commercialized WDM (wavelength division multiplexing) equipment that ensures integrated management and mutual connectivity with various networks in preparation for the upcoming NGNs (next-generation networks). The AMN6200 offers an optical transport platform for access areas not only with CWDM (coarse wavelength division multiplexing) but also with DWDM (dense wavelength division multiplexing). On the other hand, a lineup of multiplex interfaces has been added to the AMN7500 for multi reach networks. Hitachi has also commercialized the AMN6300 that achieves the long reach transmission of large-capacity 40-Gbit/s signals.

(Hitachi Communication Technologies, Ltd.)

## 10-Gbit Optical Modules Compliant with XFP-MSA, Guaranteed High-temperature Operation

Due to advances made in the high-density implementation of optical transmission equipment, the requirements for high-temperature operation to its constituent optical modules have been augmented in recent years. Given these circumstances, 10-Gbit/s optical modules with guaranteed operation up to 85°C have been developed in compliance with XFP (10 Gigabit Small Form Factor Pluggable) MSA (Multi-source Agreement), and the widespread use of such modules is expected.

A newly developed 1.3- $\mu\text{m}$  distributed-feedback laser diode is employed as the light source, and is operable at high temperatures. This diode can operate at temperatures as high as 95°C that may be reached due to internal rises in temperature, and is applicable to transmission distances of up to 10 km.

(Opnext Japan, Inc.)



XFP optical module adaptive to an operating temperature of 85°C

## Mid-range Switch Series Adaptive to 10 Gbit/s

The mid-range switch series adaptive to 10 Gbit/s has been commercialized for supporting integrated IP (Internet protocol) network in the ubiquitous information era. This switch series includes a cost-performance model that focuses on the high density of 1-Gbit/s—10-Gbit/s lines, and a high-performance model that offers the switching capacity of 1 Tbit/s or more. These models can

be used to realize a comfortable triple-play environment or a secure network to protect IT (information technology) systems. Moreover, power consumption has been dramatically reduced due to the implementation of devices offering high energy efficiency. (ALAXALA Networks Corporation)



Lineup of mid-range switch series adaptive to 10 Gbit/s