

# NEC Group Tackles Building the Next-Generation IT Platform - Outline & Significance of the “REAL IT PLATFORM” VISION -

With the steady deployment of NGN, our world is accelerating toward the era of the Ubiquitous Society. In order to respond to the needs of the corporate systems that will be required by the Ubiquitous Society of tomorrow, IT Platform Business Unit of NEC has unveiled a development roadmap called “REAL IT PLATFORM.” The “REAL” in the vision’s name has two meanings: it stands for our commitment to the REALization of the next-generation IT that provides on-time real solutions optimized for the needs and circumstances of the customer, and it signifies our pursuit of a REAL (true) next-generation platform.

In this special issue, we would like to provide the reader with an understanding of the background and key technologies necessary to realize the “REAL IT PLATFORM.”

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## 1 What is the Ubiquitous Society IT Platform?

The advance of the Ubiquitous Society and the acceleration of this shift by the advent of the NGN (Next Generation Network) will not only give birth to networks and a new socio-economic order, but also bring dramatic changes to the IT platform that will serve as the social infrastructure supporting business. IT platforms have evolved from the centralized systems comprised of proprietary technologies and operated primarily on mainframe computers until the 1980s, and have transitioned to “distributed” systems that harness the power of commoditized servers en masse and employ open and de facto standard technologies.

The distributed system trend that had predominated for over a little over a decade until the dawn of this century can be described as offering two major merits: first, the drastic reduction in the cost of the IT platform as a result of standardization sharply reducing the prices for IT resources, and second, the expanded scalability and flexibility of utilization of IT platforms arising from the distributed model itself.

However, on the other hand, the limits of distributed systems are beginning to make themselves apparent. One issue is the difficulty in performing efficient administration and operation

because of the huge quantity and diversity of IT resources (mixture of different types of hardware, OS, middleware, etc.) encompassed by the system. Another point of concern is the highly advanced knowledge, experience, and operational know-how that are required to realize the performance necessary to fulfill the “real” fundamental work of an open system (processing of large quantities of messages at extremely high speed, high reliability and security to ensure data integrity).

The next-generation IT platform must continue to provide the merits of the distributed model while resolving the two above-mentioned issues.

## 2 What are the Requirements of an IT Platform in the Ubiquitous Society?

The IT platform of the future will be demanded to meet a variety of demands. Among them, the following three requirements are particularly important:

### (1) Quick and Easy Response to the Demands of Changes in Services and IT Resources (= Flexible)

The development of “flexible” NGN capable of quickly and easily responding to the demands of changes in services and IT resources will accelerate the establishment of flexible interconnections between companies and organization, and rap-

idly transform the enterprise environment. Requests for data processing that are required for the performance of business are expected to be far more complex than at present. In order to meet these needs, both a high level of performance capable of high-speed, high-volume processing to cope with huge amounts of data and an extremely high degree of flexibility to answer the changing content of services and drastic fluctuations in demand will be essential.

Swift response is required not only for day-to-day tasks. Solutions that can smartly respond to changes in scale and content of business itself as much as possible are demanded. The corporate systems of the future must possess both high scalability that facilitates rapid expansion of business even from a small start and a high degree of flexibility that enables reutilization in the next business without wasting past IT investment.

Delivering a level of flexibility that surpasses what the distributed model of the 90s achieved and further accelerating the speed of business evolution are the top requirements of the next-generation IT platform.

**(2) Economical Construction of High-Reliability System (= Dependable)**

With its inextricable connection to both NGN and social infrastructure, the IT platform is required to ensure a markedly high level of security and dependability while preserving the economic merits offered by using an open system.

In order for the platform to realize 24h/365d uninterrupted operation and ensure business continuity, it must possess “high availability” – the capability to totally avoid operational interruptions due to hardware malfunction, system trouble or other problems, and be equipped with multifaceted measures to support preservation of data and speedy restoration of services in the event of disaster as well as security against unauthorized access and malicious attacks from outside the system. These qualities comprise the 2nd requirement for realization of the next-generation IT platform.

**(3) Ease of Operation of Diverse Resources (= Simple)**

In the era of distributed systems in the 90s, the transition to open systems was conducted in phases, resulting in a period of increasing heterogeneity of IT resources (mixing of different types of hardware, different operating systems, etc.) This heterogeneity made the management of IT resources more difficult and could be called a significant factor in burgeoning operational costs. However, given the ongoing evolution of IT technology as it relates to open system, it would not be realistic to consider attempting the restoration of uniformity to the current heterogeneous IT resources.

What is needed now is the capability to easily operate and manage IT resources that have grown more complex. Another condition will be the cutting of wasteful consumption of en-

An IT platform that can flexibly respond to real-time information systems and business changes, and facilitate exploitation of business opportunities is needed.

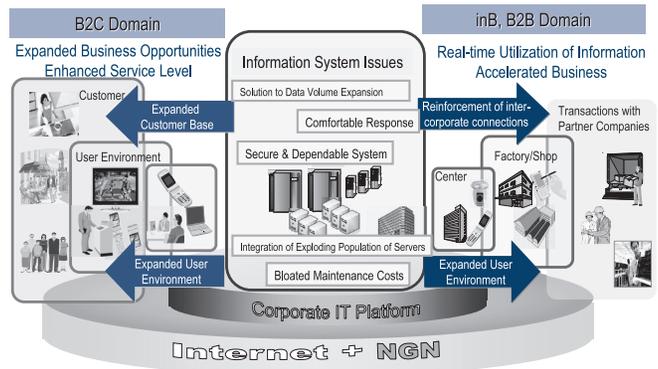


Fig. 1 The future of the enterprise IT platform.

ergy and other resources, and the reduction of adverse impact on the installation environment to as close to zero as possible. In other words, the realization of “comfort” (simplicity) from an operation perspective is the 3rd requirement of the next-generation IT platform. (Fig. 1)

**3 Concept for NEC's IT Platform Vision**

At NEC, we have asked ourselves how the development of a next-generation IT platform that satisfies the three conditions of “Flexible,” “Dependable” and “Simple” should be pursued, and our answer is a unified vision called “REAL IT PLATFORM.” Based on this vision, NEC is undertaking the development of innovative technologies to realize a new platform.

**3.1 Concept for the “REAL IT PLATFORM”**

NEC envisages a new IT platform that will both liberate and drive the evolution of business in the coming age of the Ubiquitous Society. Named the “REAL IT PLATFORM, this vision will be realized by empowering it with the three requirements of “Flexible,” “Dependable” and “Simple.”

The “REAL” in NEC’s vision holds two meanings. First is NEC’s commitment to providing “real” solutions that REALize on-time optimization aligned with the needs and circumstances of the customer. Depending on the state of the customer’s IT investment and the future direction of business, the differences in the IT platform needed by the enterprise can be very large. NEC has been providing a wide scope of enterprises with a comprehensive offering of product lineups from servers ranging from mainframe class to PC servers, a robust selection of storage solutions, and a variety of software products that integrate and optimize the operation of all the IT resources. With an im-

pressive record of installation and deployment of this rich product lineup as background and a clear policy of constantly being in the forefront of the intensely technology-competitive IT industry with the very latest products, NEC is providing “timely” IT platform products optimized to the unique needs and actual circumstances of each customer. This is the first significance of “REAL” in our vision.

“REAL” also stands for our pursuit of a “REAL” (true) next-generation IT platform. The most critical issue facing enterprise management is how their business can effectively and efficiently leverage the cutting edge of network and IT technologies to evolve and exploit opportunities in a social environment that is dramatically and rapidly transitioning to the Age of NGN and the Ubiquitous Society. At NEC, we are exploring what comprises a real (true) next-generation IT platform from the perspective of our customers, developing innovative IT platform technologies that will make this vision a reality, and providing customers with a true IT platform from which they can launch business. This commitment to technological development is the second reason for choosing to use “Real” in the naming of our vision.

### 3.2 The Two Meanings of “REAL” – What We Have Achieved

In order to realize our above-described IT platform vision, NEC can tap the wealth of two major corporate resources. First is many years of experience in mainframe and super computer development. This vast legacy is encoded in our IT platform DNA. In the field of mainframes, NEC has developed numerous high-reliability systems for traffic management, account management for financial institutions, and other mission-critical applications where system downtime can have a profound social impact. In the realm of super computers, we have achieved the pinnacle of high-speed processing with the world’s fast scientific computation. The know-how and policies behind the tech-

nological development that realized these lofty levels of reliability and performance are a fundamental part of the NEC’s IT platform development DNA. This approach equally extends to our development of open-architecture hardware and software.

The second resource is our wealth of experience in building open mission critical system (OMCS). From large-scale real-time systems for today’s mobile phone society to enterprise infrastructure systems, NEC has employed open architecture and leveraged de facto technologies to construct numerous systems. This vast experience will be applied in the development of the next-generation IT platform(Fig. 2).

## 4 Key Technologies to Make the REAL IT PLATFORM a Reality

### 4.1 “Flexible”

In order to realize the economical provision of flexible IT resources, it is necessary to pursue virtualization technologies that enable flexible utilization of IT resources through multi-OS environments and Virtual Machines (VM), overcoming the physical limitations of hardware resources such as servers and storage, and to enable the freely maneuverable allocation of resources. By promoting the virtualization of the diverse layers of IT resources, NEC aims at realizing maximum flexibility in the provision of IT resources while delivering economy.

#### (1) Scalable Storage Technologies

In the area of storage, we provide storage solutions that enable “build out” of capacity without system interruptions. In May 2007, NEC announced the iStorageD series of storage systems. Modularizing an in-storage host adaptor, cache adaptor and data adapter, the system significantly expands the range of freedom in configuration of storage. In addition to empowering customers with “build out” scalability, NEC is realizing application-optimized storage configurations (Fig. 3).

#### (2) Scalable Server Technologies

NEC will provide high-end servers that boast “build up” scalability of the servers themselves as well as flexible configuration of in-server CPU and I/O resources in accordance with applications (2008 planned launch).

Through further advances in our pioneering floating I/O technology, NEC has realized an environment in which freedom to virtualize in-cabinet resources is possible even across multiple cabinets. (By the modular virtualization of the physical connectivity between CPU and I/O, floating I/O technology solves the problem of fixed and unchangeable CPU- I/O relationships that has been a bottleneck in the performance of high-end servers).

As for securing a reserve resource pool for utilization in the

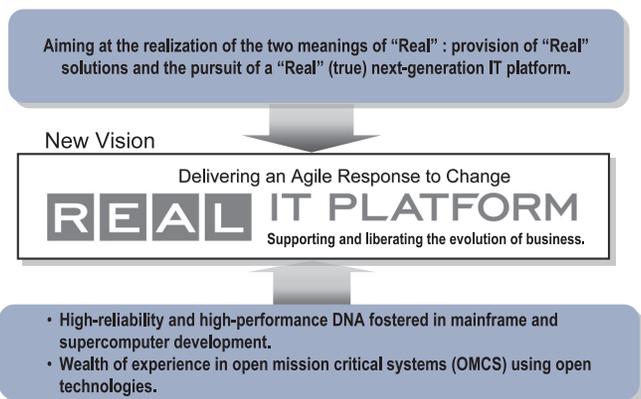


Fig. 2 NEC’s vision for the next-generation IT platform.

- ◆ Building-block construction using high-speed switch connections
- ◆ Distributed caching using intelligent cache.

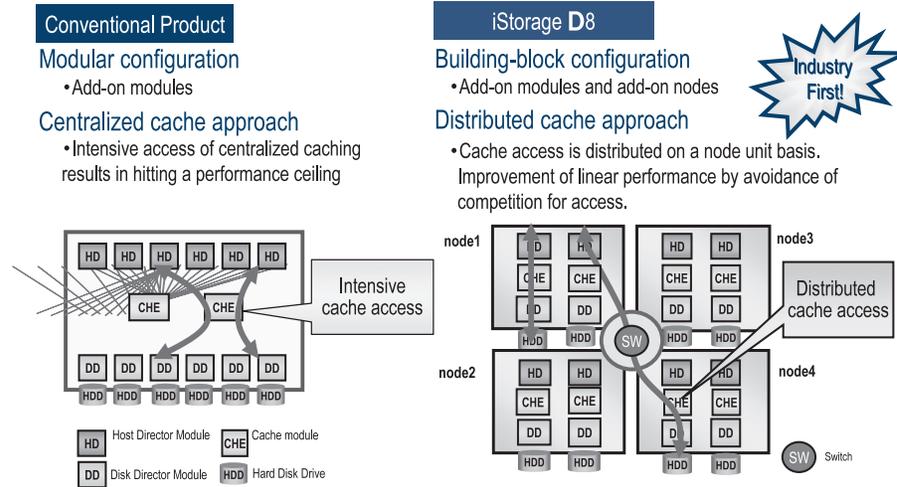


Fig. 3 Scalable technology.

event of sudden load increases or malfunctions, we have realized inter-cabinet module sharing. By keeping down the scale of the initial investment and, at the same time, achieving significantly enhanced extensibility, NEC provides a scalable server that offers both outstanding flexibility and economy.

### (3) Integrated VM Technologies

Virtual machines (VM), which virtualize different OS environments, are rapidly becoming indispensable to the efficient utilization of IT resources. However, when attempting to select the optimum performance/function/cost VM for the job that is the subject of virtualization, a situation of coresident VM level arises. Because of this, there is a tendency for the OS coresidence issue to be substituted by a VM coresidence issue. In addition, in response to new demands for VM that previously did not exist such as thin client applications, etc., there is also the problem of having to support the swift selection and provision of the appropriate VM.

In order to solve the above issues, NEC is developing technology for centralized integrated operation to efficiently arranges a heterogeneous VM environment such as VMware and Xen, and at the same time, moving forward with original VM development for domains that currently are not sufficiently addressed by VM to facilitate full enjoyment of the benefits of the added-value functionality of NEC servers. As a result of these efforts, NEC is realizing the selection of the ideal VM environment for the subject job or OS, as well as provisioning and processing migration across different VM (Fig. 4).

### (4) Service Execution Platform & Information Management Technology

We are entering an era when the provision of more sophisticated services by information systems is becoming increasingly and directly linked to an edge in corporate competitiveness. In order to execute and deliver advanced services, it is necessary to have solutions to the growing complexity of applications, the ballooning volume of data that is handled by the applications and the demand for more real-time response.

In order to swiftly incorporate new technology in business systems and deter the increasing complexity of application programs, NEC will provide a service integration platform that consists of a cluster of service components that facilitate the integration new technology and devices in a business system as a “service execution platform,” and facilitates the flexible combination of services. Technology to “virtualize” SIP servers in a way that enables application programs to complete their task unaware of network environment differences, and RFID tracking technology based on the latest EPC Global specifications that enable tracking of RFID events in product distribution channels are a few examples of the service components that will be provided. Also during flexible service linking by the service integration platform, the application of XML high-speed analysis technology on the service bus receiving the largest load is producing performance superior to the products of other companies.

On the other hand, the quantity and diversification of corporate information continues to grow, as well as its dispersal

- Realization of the ideal Virtual Machine (VM) environment for the job characteristics/application.
- Realization of a flexible system that provides integrated management and optimized provisioning for a heterogeneous VM environment.
- Providing an originally developed VM platform that serves as a Virtual Machine with unprecedented reliability.

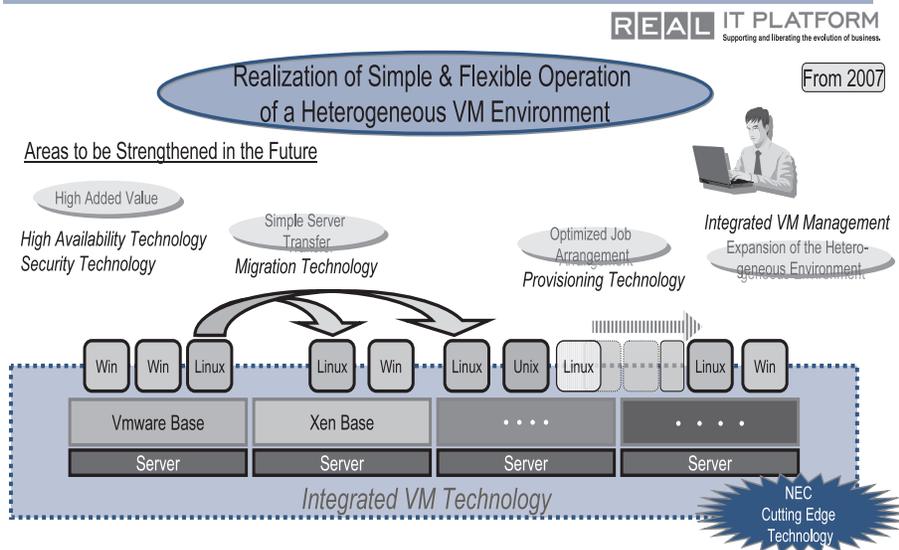


Fig. 4 Integrated VM technology.

throughout the internal corporate network. Moreover, when it is needed by applications, it must be provided in specified formats. To meet this situation, centralized (unified) management of information is demanded. However, NEC’s solution is not to consolidate the distributed information in a single location. Rather our solution employs two virtual buses: one for data and the other for content, to minimize the overhead imposed when applications are required and to enable “virtually” direct access.

For the data bus, high-speed access and high-speed conversion technologies for static-type data such as in relational databases will be applied. In the case of dynamic office documents, image data, etc., an adapter with rich compatibility with diverse data sources, high-speed data conversion technology and “single sign on” controls through centralized/unified security management technology will be applied with the content bus. Through the application of these technologies, NEC is steadily realizing a real solution to the very real challenges facing corporate information management.

#### 4.2 “Dependable”

In the coming age, IT and networks will serve as the very nucleus of corporate activities. A high degree of reliability will be demanded of them, not only as social infrastructure in which business interruptions can have a significant social impact, but

also as vital corporate IT systems. In order to provide an IT platform that satisfies these demands, NEC will be providing not only high-reliability hardware and software built with high-reliability technology honed in our long-experience with mainframe development, but also the sense of security that comes with knowing every aspect from clustering to operational support has been improved with eye on reliability.

Another necessity for corporate systems is protection against information leaks, cyber attacks and other threats to information security which are on the rise. Through our development of the industry’s first “cooperative-type security,” which provides an expanded scope of protection by integrated management of everything from paper documentation in the office to electronic data and networks, and mutually and automatically links security functions of PCs, servers, etc., NEC is realizing true corporate system security.

##### (1) Dependable Server Technology

In introducing the NX7700i series of integrated enterprise servers and the next-generation SIGMABLADE system that comprise the core of a new lineup of high-end open servers that boast mainframe-class fault tolerance and self-recovery, NEC has provided a preview of a new generation of open servers that carry mainframe DNA, realized through technologies including linked action at the time of faults and smooth recovery from malfunctions. In the future, NEC plans to pursue further linkage with OS functions and realize features

such as “processor relief” for continuous operation in the event of a processor fault, dynamic addition of CPU/memory, and other features that were considered difficult to realize in open servers (plans for phasing in of new functionality from 2007).

### **(2) Fault-Tolerant Technology**

For realization of high availability on a IA (Intel Architecture) server unit basis, fault-tolerant technology relies on synchronization based on complete redundancy of all components so if a fault occurs, the malfunctioning system is immediately taken off line and the redundant system take over without interruption of system operation.

NEC has developed a dedicated chip called the GeminiEngine to support this fault-tolerant technology, realizing complete synchronization with the latest CPU – a task that had been quite difficult until now, and successfully securing higher availability.

Future plans call for ensuring the compatibility of this technology with next-generation CPU/ chipsets and applicability with blade-type servers. Also in combination with software to further enhance availability, NEC plans to expand application to scalable ft servers.

### **(3) Cooperative Security Technology**

The level of protection at the time of installation of security measures is difficult to maintain in the changes in the conditions and general environment in which they operate, for example, the constant evolution of IT technology and systems, new methods of malicious intrusion and attacks and, of course, user carelessness. This is because these changes in the surrounding conditions alter the threats and weaknesses that determine the security measure level as well as change the sites where problems arise. In order to resolve this situation, it is necessary to link conventional security measures in a cooperative way so that they complement each other, broadly responding to the changes in the surrounding factors and environment. The cooperative security approach essentially considers the threats and weaknesses, the changes in the surrounding environment, the new threats and weaknesses arising from those changes, and the measures to counter them. While the focus is on PCs, servers, and networks, there are literally thousands of patterns of cooperative security. NEC has realized the Cooperative Security engine to evaluate those patterns.

As an example, in the case of quarantining a PC, the PC and network devices are connected. However, using the cooperative security engine, the scope of the quarantine is expanded to firewalls and servers on the network, office copy machines, room access control, etc.

## **4.3 “Simple”**

In the staged deployment of an open system, the management of the operation of the excessive and increasing IT resources such as the various middleware with different functions due to different versions, different OS’s, etc., not only demands a huge cost investment but also demands the system administrators and operation managers to have extensive know-how that covers past development and be highly skilled.

In order to restore control over the IT resources which are expected to become increasingly complex, enable the strategic utilization of IT resources, and reduce bloating operational costs, technology that enables the simple management of complex resources is needed. Another important consideration is how to deal with the impact of servers and other IT resources on the environment, both from a work and planetary perspective.

With servers installed in not only dedicated computer rooms but also offices, efforts to lessen their impact on varied environments (quieter operation, efficient treatment of heat generation, etc., cannot be overlooked. At the same time, the huge increase in the quantity of servers and the consequent necessity for reduced electrical power consumption and consideration of resource recycling as well as other considerations have given rise to increased awareness of more general environmental issues. Packaging/mounting technology and various manufacturing technologies to respond to these issues will also be indispensable to maintaining the “Simple” of operation from physical perspective.

### **(1) Heterogeneous Management Technology**

As an answer to the need for technology to realize the integrated management of IT resources that are increasing in both complexity and scale, NEC is developing and providing the WebSAM framework. We have taken the lead in the industry by realizing a CMDB\*1 configuration which is fundamental to the integrated management of a heterogeneous environment under the WebSAM framework. Based on this, we have been able to realize a significantly broadened range of multichip platform/multi-OS management (**Fig. 5**).

Also, because of a configuration that enables easy “plug-in”-type addition of necessary management functions (performance monitoring, job management, policy management, etc.), it is possible to swiftly adapt the system for management and operation of IT resources in step with changes in the system and the business environment. The WebSAM framework supports simplicity in business from an operational perspective.

### **(2) Knowledge & Policy Base Technology**

As a decisive factor in reducing the time and troubles in op-

\*1 CMDB: Configuration Management Database

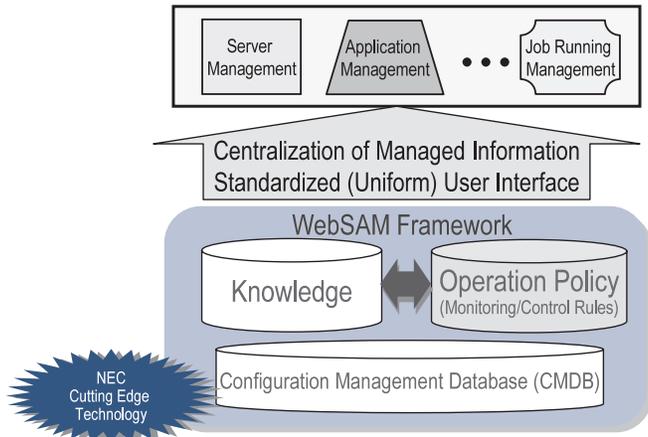


Fig. 5 Heterogeneous Management Technology.

erational management, automation and autonomous technologies are receiving increasing attention. However, in actual practice, determining in what instances and how automation should be applied varies greatly depending on the customer’s environment. The adoption of automation without the input of human judgment faces the limitations imposed by the stability/dependability of system operation.

At NEC, we are focusing our attention on this point, and are providing, as a knowledge database, the capability to determine what kind of policy should be constructed for the automation of operations. We are also developing knowledge/policy base technology that reinforces the grasp of the customer’s system operation. The basis for this knowledge is NEC’s wealth of SI experience in open technology/de facto standard technology that we have accumulated over long years. By applying these in a policy-based management system, it becomes possible to support autonomous operation in accordance with the distinctive and individual state of customer systems.

In addition, we are developing the ASDS (Autonomic System Distributed System) as an expanded function of WebSAM. This is system performance analysis technology that inspects and models the invariance relationships of a system’s normal operation state and then can swiftly detect invariance faults in the event of system degradation.

## 5 The Future of the REAL IT PLATFORM

Through these technologies, products and solutions that will realize this vision, corporations will lay the foundation of an IT platform that holds the next generation within its scope of vision, and promote the deployment of new styles of business. By effectively utilizing the next-generation IT platform, they will

enjoy the benefits of closer coordination between departments, divisions, business/production centers and group affiliates; real-time information utilization; accelerated business; improved exploitation of business opportunities; and enhanced customer satisfaction. It will be the certain key to realizing a strategy for clear competitive superiority in the market.

In this scenario, the upgrading of the IT platform to respond to the expansion of the system utilization environment will be indispensable. Through the expansion of business enabled by the provision of an IT platform that facilitates the utilization of real-time information, the acceleration of business and improved internal corporate cooperation through closer intra-corporate coordination, the REAL IT PLATFORM will contribute to the establishment of business styles in tune with the next generation.

Already introducing paradigm-shifting innovation to the potential of IT in business, NEC invites you to expect even more from the REAL IT PLATFORM in the years to come.