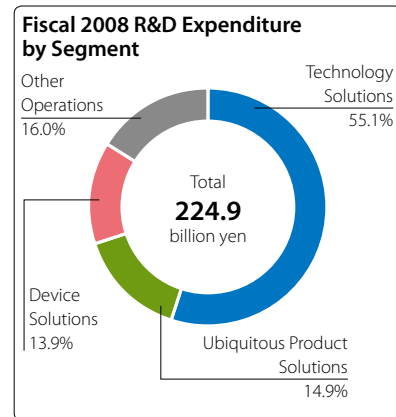
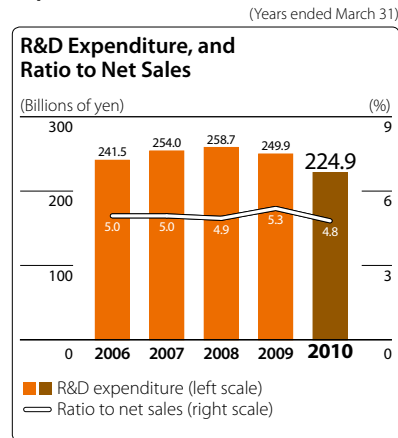


## Research & Development

### OUR MISSION IN R&D

Our basic R&D policy is to pursue the latest in technology for next-generation services, computer servers and networks, as well as the various electronic devices and materials which serve as building blocks for our products. This policy supports the overarching goals of creating new value for customers and achieving our Corporate Vision of contributing to the creation of a networked society that is rewarding and secure, bringing about a prosperous future that fulfills the dreams of people throughout the world.

- Foster the creation of new businesses
- Create and accumulate advanced technologies
- Extend our value chain globally
- Fulfill our social responsibilities



### Major Achievements for Fiscal 2009

#### (1) Japan Atomic Energy Agency's New Supercomputer System

Fujitsu has made progress in developing and commercializing next-generation supercomputers that combine PRIMERGY, Fujitsu's latest high-performance x86 server, with its Parallelnavi middleware for supercomputers and system integration technologies. The result has been the development of a system in collaboration with the Japan Atomic Energy Agency that achieved performance of 186.1 teraflops\*<sup>1</sup> based on the LINPACK\*<sup>2</sup> performance benchmark. This performance made it the fastest supercomputer in Japan based on the TOP500\*<sup>3</sup> list of supercomputers announced in November 2009.



New supercomputer system

\*<sup>1</sup> Teraflop: One trillion floating point operations per second.  
 \*<sup>2</sup> LINPACK: A program for measuring computer performance.  
 \*<sup>3</sup> TOP500: A ranking of the world's fastest supercomputers.

#### (2) Development and Standardization of Industry's First System-Failure Management Technology for Cloud Computing Era

Cloud computing is starting to be used to support the delivery of various services provided by social infrastructure. As such, there is a need for high reliability and stable operation of these large-scale systems. Fujitsu has developed technology that can automatically detect signs of pending cloud system failure, narrow down the causes, and resolve the issues before failure occurs. The ability to avert system failure before a problem becomes critical, allows for provision of stable service to users, and greatly reduces the workload on system administrators. Fujitsu intends to apply this technology to its full range of cloud-based infrastructure solutions.

Furthermore, to improve convenience for customers using cloud systems, Fujitsu is leading the push to standardize cloud application programming interfaces (APIs). To this end, Fujitsu has submitted its own API specification to the Distributed Management Task Force (DMTF), a prominent international body in this field, as a proposal for standardization.

#### (3) Dramatically Improved Color Electronic Paper and Field Test of Guidance Solution for Hospital Outpatients

Fujitsu has developed color electronic paper (e-paper) that boasts the world's highest color image quality. By extensively redesigning the panel structure and image re-write methods, Fujitsu has achieved brighter colors and improved the contrast ratio to 7:1 (a threefold



Electronic cardholder that uses e-paper



Image displayed using color e-paper

improvement compared to the previous version). These changes have doubled image re-write speeds to 0.7 seconds\*4. These improvements have produced a color e-paper with smooth image transition and the highest level of color display quality in the world.

As part of its human centric solution technologies, Fujitsu has also launched a pilot project that uses color e-paper to provide guidance to hospital outpatients.

In this solution, energy-efficient e-paper developed by Fujitsu is incorporated into an electronic cardholder, which is then linked to an electronic patient chart via a proprietary wireless data system. This mechanism allows for personalized information such as a patient's position in a queue to be sent to each individual outpatient. The result is an improvement in patient services and a simultaneous reduction in hospital operating costs.

\*4 Compared to previous Fujitsu Frontech products.

#### (4) New Ways of Using Mobile Phones with the Launch of the World's First Separable Handset—the F-04B

Fujitsu developed the F-04B, the world's first separable mobile handset that allows the display to be separated from the keyboard.

When attached, the handset slides open and closes like a normal sliding handset. Separating the display from the keyboard allows users to easily access email, contacts and a host of other functions while talking on the phone. The display unit can function independently as a slim touch-panel handset. A projector unit is also available, enabling users to project mobile content onto a large screen. These features make it possible for users to tailor their mobile phone to fit the situation as needed.



docomo PRIME series F-04B

#### (5) PCs Compatible with "CLEARSURE" Security Solution

Data leaked from lost or stolen notebook PCs is a serious issue in society today. Fujitsu has developed a security technology that uses remote access over wireless networks to make it impossible to read data stored on the hard disk drive of lost or stolen computers. Fujitsu commercialized this technology as "CLEARSURE" in September 2009 in Japan, and it has been adopted by a life insurance firm and other clients for use on the notebook PCs of their sales staff.

Furthermore, Fujitsu has developed authentication technologies to prevent data leaks caused by the removal of a notebook PC's storage device (hard disk or solid state drive), and technologies that prevent data leaks via email and attachment files.

Fujitsu will continue to develop a host of new technologies that make notebook PCs safer and more secure to use for mobile computing.

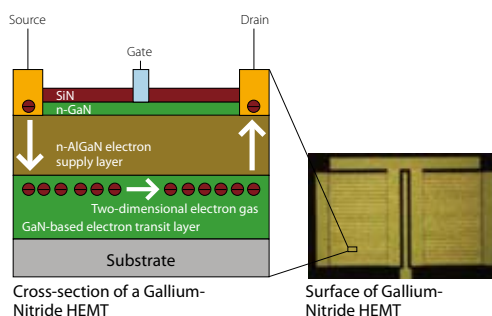
#### (6) World's First Gallium Nitride HEMT\*5 for Power Electronics

Fujitsu is developing advanced technologies that minimize its customers' environmental impact and that of its own operations. For example, in the field of power electronics, which includes power supplies, much of the power loss that occurs is in the form of waste heat, which creates a serious environmental burden.

To address this problem, Fujitsu successfully developed a gallium-nitride High Electron Mobility Transistor (GaN HEMT) for power electronics with a new design that can reduce power loss by one-third.

Fujitsu is seeking to establish a mass-production system for this product by 2011 and begin incorporating it into Fujitsu PCs and servers. The next step will be to broadly promote GaN HEMT across the power electronics field, including in home appliances and automobiles.

\*5 HEMT: High Electronic Mobility Transistor, a product that Fujitsu pioneered in 1980.



Cross-section of a Gallium-Nitride HEMT

Surface of Gallium-Nitride HEMT

#### (7) HD Transcoder LSI Compatible with H.264/MPEG-2

Fujitsu has developed the MB86H57 and MB86H58, two full HD-compatible LSI chips that can convert image and audio data between the two current HD standards—H.264 and MPEG-2—when recording digital broadcasts. At 1.0W, both chips also rank at the top of the industry for energy efficiency.

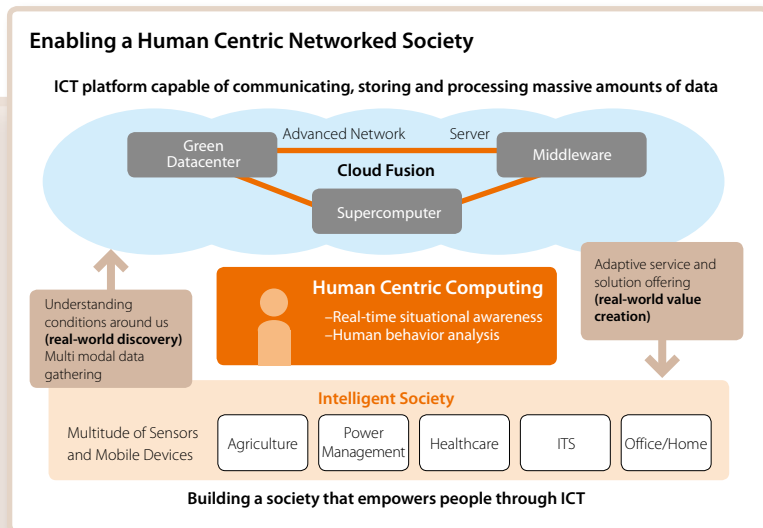
Fujitsu independently developed the transcoder to achieve high energy efficiency for the LSIs, which are also compatible with smaller form factors. These features make it possible to record digital broadcasts while conserving space, enabling the chips to be incorporated into mobile devices, such as notebook PCs, as well as a wide range of other devices.

## Research & Development

### Topics

#### A Human Centric Networked Society: Generating New Value Through Human Centric ICT

The realization of a human centric networked society is the R&D vision of Fujitsu. By connecting with our surroundings, we create a "human centric" network society, delivering value through experience, discovery, reliability and growth. This is the vision we strive for in our development of advanced technologies.



### Prizes and Awards

Commendations for Science and Technology (Development Category) from the Minister of Education, Culture, Sports, Science and Technology in Fiscal 2010

Four members of the Fujitsu Group were honored with Commendations for Science and Technology (Development Category) for the development of a 40G LN optical modulator for optical communications by Japan's Minister of Education, Culture, Sports, Science and Technology in fiscal 2010. These awards are in recognition of the outstanding success that the Group has enjoyed in R&D and in advancing our understanding of science and technology.

#### Fujitsu Laboratories Fellow Kenichi Miura receives the Seymour Cray Computer Engineering Award

Kenichi Miura, a Fellow of Fujitsu Laboratories Ltd. and Director of the National Research Grid Initiative, received the Seymour Cray Computer Engineering Award given by the Institute of Electrical and Electronics Engineers (IEEE). The award is presented to individuals for their innovative contributions to the

development of high-performance computer systems, and is one of the highest honors that the IEEE Computer Society can bestow. Mr. Miura was offered the award in recognition of his leadership in the development of critical hardware and software for vector-based supercomputers. It is only the second time that a Japanese person has received this honor.

#### Former Fujitsu Laboratories Vice President Kaneyuki Kurokawa receives the MTT-S Career Award

Kaneyuki Kurokawa, a former Vice President of Fujitsu Laboratories Ltd., was awarded the Microwave Theory and Techniques Society (MTT-S) Career Award by the IEEE. The MTT-S Career Award is given to individuals in recognition of their overall contribution to a wide range of activities, including academic accomplishments in the field of microwave research, contributions to programs to promote research in the field, and efforts to foster the development of researchers. This award is also the highest honor that the IEEE Microwave Theory and Techniques Society can bestow.

## Strategic Direction in Fiscal 2010

Fujitsu has classified its framework for advanced research into the three categories below, with a view to achieving company-wide optimization from a global standpoint. Fujitsu will employ a top-down approach to setting research themes and will conduct strategic research investment. Through this framework Fujitsu will carry out strategic R&D work for the future of the Fujitsu Group, align business segment strategies with research strategies, and enhance resource shifts in response to changes in Fujitsu's business portfolio.

- 1. Core Strategic Themes: Technologies essential to the medium- to long-term future of the Fujitsu Group**
- 2. Business Strategic Themes: Short- to medium-term technologies that business segments have committed to commercializing**
- 3. Seeds-oriented Themes: Budding technologies not specific to current businesses, and medium- to long-term technologies targeting unknown domains**

In particular, Fujitsu is promoting the following four themes under Core Strategic Themes.

(1) Human Centric Computing

Fujitsu will integrate ubiquitous devices with a cloud infrastructure to create new technology solutions and services in healthcare, energy management and other human centered activities.

(2) Intelligent Society

Fujitsu will respond to societal needs across industry verticals to create new social infrastructure, solutions, and services business.

(3) Cloud Fusion

Fujitsu will provide unified operation and quality management as well as service distribution and load balancing over multiple clouds and existing systems.

(4) Next-Generation Green Datacenters

Fujitsu will optimize new energy-saving and cooling technologies, and utilize optical networks to realize next-generation, low-power, and high cost-performance green datacenters.

## "arrowhead" STORY

### Developing the Next-Generation "arrowhead" Trading System

World-class system brings 2-millisecond trading to Tokyo's stock exchange



On January 4, 2010, the Tokyo Stock Exchange (TSE) introduced a cutting-edge next-generation trading system called "arrowhead." Fujitsu developed every part of the system, from the hardware to the applications, staking the prestige of the Fujitsu name on the ability to deliver world-class speed and bedrock reliability. This is the story behind the development of TSE's "arrowhead" trading system.

#### Development of the Ultra-high-speed Primesoft Server Middleware

One of the criteria that TSE specified for the new trading system was that the order execution time had to be 10 milliseconds or less, so Fujitsu proposed developing ultra-high-speed Primesoft Server middleware from scratch as part of the system architecture. The Primesoft Server at the heart of this system keeps transaction data resident in memory, which allows for rapid data processing by eliminating the need to access the disk during the transaction. However, as the data are only memory resident, the system also requires a mechanism to prevent data loss if an error occurs during transaction processing. Fujitsu therefore developed middleware to provide a risk-hedging function that automatically triplicates the data.

#### TSE's Rigorous Requirements and Testing

Because of past experience with system failures, the TSE took responsibility as the purchaser to define the system specifications



Project managers reflecting on development

and conduct testing for quality control purposes. The TSE produced an external vendor manual and a specifications document\* some 4,000 pages long and ran an extremely rigorous testing program that included handling some 60,000 test cases. Fujitsu satisfied the TSE's requirements by transforming its project management methods and having the TSE sign off on all Fujitsu development processes.

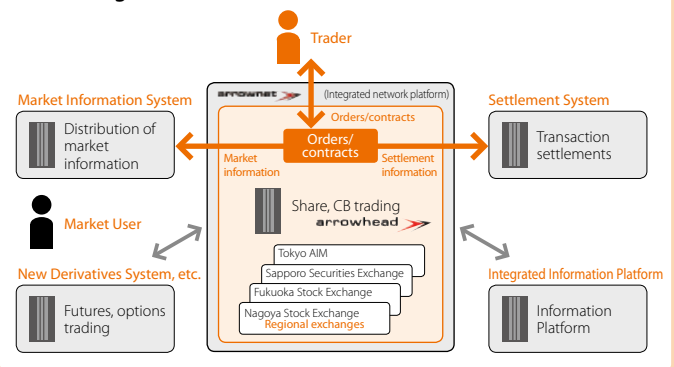
\* A specifications document clearly defines what functionality is required in the development of systems or software.

#### 1,000 Team Members Working Together

In order to satisfy the rigorous performance requirements for the new trading system, Fujitsu decided to develop both middleware and application programs from scratch instead of using existing systems. Some concerns were voiced over the development of such a complex system, as 70–80% of the Fujitsu team members had not been involved in work on the previous TSE systems. To address these concerns, Fujitsu set up a third-party body to objectively check

development progress and manage risk, the first time the company has taken such a step for a specific project. This was a major project involving some 1,000 team members, including partners, so Fujitsu employed systematic quality control procedures, including contracting an external organization to check that coding and other protocols were followed precisely. A major development project like this, where the middleware and applications are developed from scratch at the same time, only happens once every 20 years or so. The Fujitsu team expected this to be a particularly difficult project, but were motivated to develop one of the world's most advanced systems. Another critical success factor was that many of the new team members in the divisions involved had a strong desire to be assigned to this project, which also made for a highly motivated team.

#### Positioning of "arrowhead"



#### CUSTOMER'S VOICE

##### Crucial Project for the TSE: "On a 100-point scale, Fujitsu scored 150"

We decided to build this system in order to restore the TSE's credibility after the system failure four years ago. During the tendering process, which included vendors from outside Japan, Fujitsu's proposal stood out for its emphasis on creating a world-class trading system that would be both fast and reliable. There were some anxious moments during the design and testing stages, but ultimately we achieved order execution times of 2 milliseconds, significantly better than the 10-millisecond target, and had no problems when the system was launched. On a 100-point scale, Fujitsu scored 150.



**Hiroaki Uji**  
Director of Equities Trading System,  
IT Development Division  
Tokyo Stock Exchange

# Intellectual Property

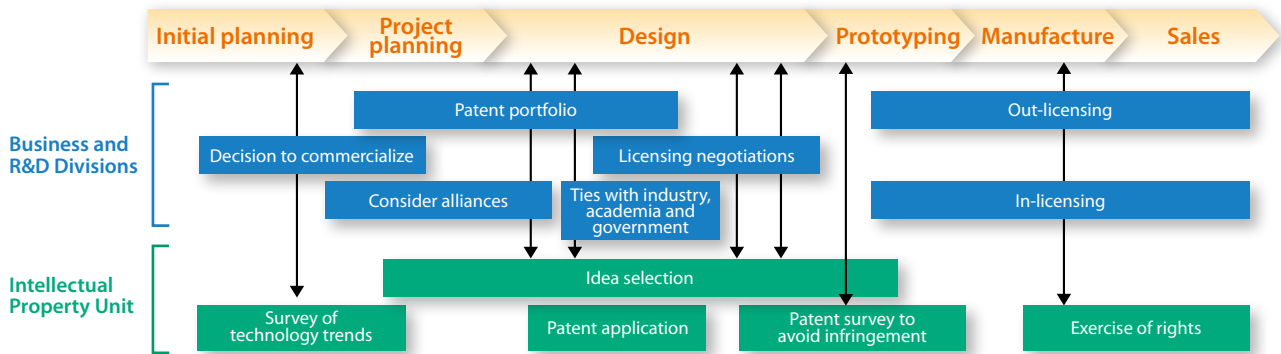
## THE IMPORTANCE OF INTELLECTUAL PROPERTY

Protecting and respecting intellectual property is part of the Code of Conduct in the Fujitsu Way, which articulates the philosophy of the Fujitsu Group and the core values and principles guiding the actions of each of its employees. Accordingly, every employee recognizes intellectual property as a key corporate asset supporting business activities. Moreover, Fujitsu employees are acutely aware of the role that technologies backed by intellectual property play in enabling customers to rely with confidence on the products and services we deliver.

## INTELLECTUAL PROPERTY STRATEGY

We are promoting an intellectual property strategy closely integrated with our business and R&D strategies. Each business unit and R&D division is individually responsible for analyzing the intellectual property assets owned by Fujitsu and other companies in their respective fields. Based on this analysis, they formulate and implement intellectual property strategies.

### Linking Business and R&D Divisions



## Group-wide Initiatives

We are developing a framework to strengthen Group-wide intellectual property activities to enable the entire Group to leverage our intellectual property assets. Some issues, such as the creation of international standards, require coordinated action among the global bases in the Group. Here, we use regular meetings among Group companies to share information as well as promote specific measures. In this way, we foster a unified approach to intellectual property activities.

### 1. Patent Rights

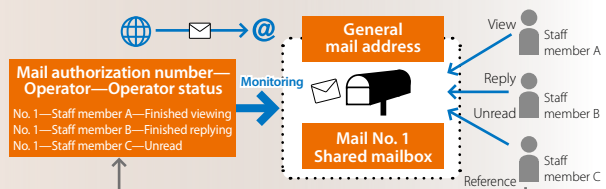
Patent rights support technological strength. Recognizing these rights as an important corporate asset, we are assembling a global patent portfolio centered on patents in Japan.

We ensure that the acquisition, maintenance, and utilization of patents are carried out in keeping with the Fujitsu Group's global business development strategy. We therefore acquire, maintain, and utilize the patents we need in the countries (regions) where they are needed, to support the operation of our R&D, production, and sales bases. Representative offices have been established in the US and China so that local research or inventions at development bases can be securely protected. For obtaining patents in the US, Fujitsu has a framework not only for yielding inventions, but for handling the entire adjudication process to achieve more efficient registration of high-quality patents.

### SYNCDOT Secure Email Solution

SYNCDOT is the name of a software product suite focused on business email security. Specifically, SYNCDOT combines robust security features, such as information leak prevention and supervisor approval, with the benefits of ready accessibility. Fujitsu has applied for some 20 patents in and outside Japan for functions that pertain mainly to organizational patterns in Japan. The sharing of product inquiry emails between appropriate supervisors (read, replay, email history), which stops replies from being leaked or duplicated, is just one of example of a function that supports improved customer satisfaction through reliable responsiveness.

In line with business strategies, Fujitsu involves intellectual property divisions from the product planning and conceptual design phases. This effort to fuse business and intellectual property is delivering clear results, as Fujitsu takes steps to protect technologies and establish viable patent rights.



## 2. Exercising Patent Rights

We conclude many patent licensing agreements, including cross-licensing agreements with prominent firms worldwide, aimed at preserving a high degree of business latitude. We also license out basic technologies in fields outside of our main areas of business. For example, a licensee commercialized an antibacterial mask and antibacterial stationery created through application of titanium apatite technology developed jointly by Fujitsu Laboratories Ltd. and the University of Tokyo.

Fujitsu has also developed a wide range of advanced environmentally conscious technologies, including a water-action paper fastener that doesn't require wire staples, an atmospheric sensor, and an environmental evaluation system. More information on our intellectual property can be found on our website.

(<http://img.jp.fujitsu.com/downloads/jp/jip/ipreport/ipreport2009e.pdf>)

## 3. Global Standards Initiatives

The technology and market landscape is shifting from an era of using rules to one of creating them. Amid this changing competitive environment, Fujitsu recognizes the need for each division to align its business strategies with standardization initiatives. Fujitsu is helping to develop global standards through participation in the International Organization for Standardization/International Electrotechnical Commission (ISO/IEC), Institute of Electrical and Electronics Engineers (IEEE), European Telecommunications Standards Institute (ETSI), Internet Engineering Task Force (IETF), 3rd Generation Partnership Project (3GPP), and other major global standard-setting organizations.

## 4. Respecting Third Parties' Rights

Infringing upon the rights of third parties could have a major financial impact on our company, including having to pay significant compensation and the loss of business opportunities. In addition, it could prevent us from providing products and services, thereby severely inconveniencing our customers. We are fostering a culture at Fujitsu that respects the patent rights of other companies, as well as creating an environment that allows all our engineers to utilize the ATMS/IR.net system\* to efficiently and effectively research patents held by other companies.

\* An ASP-based service which searches laid-open patent applications and prosecution history data provided by the Japan Patent Office.

### Patents Issued in Japan in 2009

1	Panasonic Corporation	5,049
2	Sony Corporation	4,386
3	Toyota Motor Corporation	4,194
4	TOSHIBA Corporation	3,226
5	Canon Inc.	3,220
6	DENSO CORPORATION	2,932
7	Seiko Epson Corporation	2,929
8	Honda Motor Co., Ltd.	2,773
9	Ricoh Company, Ltd.	2,688
10	Mitsubishi Electric Corporation	2,595
11	Sharp Corporation	2,556
12	Hitachi, Ltd.	2,328
13	FUJI FILM Corporation	1,908
14	<b>Fujitsu Limited</b>	<b>1,890</b>
15	Panasonic Electric Works Co., Ltd.	1,477
16	SANYO Electric Co., Ltd.	1,298
17	Dai Nippon Printing Co., Ltd.	1,253
18	NEC Corporation	1,188
19	NIPPON TELEGRAPH AND TELEPHONE CORPORATION	1,106
20	Olympus Corporation	1,043

Source: Fujitsu survey based on Japan Patent Office data (Number of issued patents)  
The above figure includes 960 patents from Fujitsu Group companies (16 companies) other than Fujitsu Limited.

### Patents Issued in US in 2009

1	IBM Corporation	4,914
2	Samsung Electronics Co., Ltd.	3,611
3	Microsoft Corporation	2,906
4	Canon Inc.	2,206
5	Panasonic Corporation	1,829
6	TOSHIBA Corporation	1,696
7	Sony Corporation	1,680
8	Intel Corporation	1,537
9	Seiko Epson Corporation	1,330
10	Hewlett-Packard Development Company, L.P.	1,273
11	<b>Fujitsu Limited</b>	<b>1,220</b>
12	LG Electronics, Inc.	1,065
13	Hitachi, Ltd.	1,058
14	Hon Hai Precision Industry Co., Ltd.	995
15	Ricoh Company, Ltd.	988
16	General Electric Company	979
17	Micron Technology, Inc.	966
18	Cisco Systems, Inc.	913
19	FUJI FILM Corporation	880
20	Honda Motor Co., Ltd.	774

Source: IFI CLAIMS Patent Services (Number of issued patents)  
The above figure includes 459 patents from Fujitsu Group companies (10 companies) other than Fujitsu Limited.

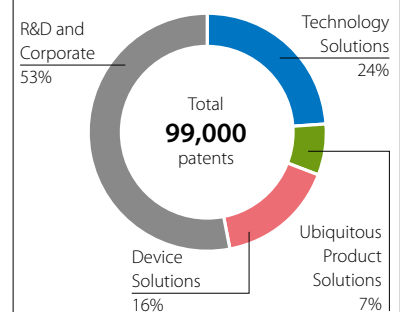
## Helping to Create Next-Generation Mobile Communication Standards

Fujitsu is actively involved in formulating standards for Long-Term Evolution (LTE), a next-generation mobile phone communication standard, through its membership in the standard-setting organization 3rd Generation Partnership Project (3GPP), a global consortium of mobile telecommunications operators. Fujitsu teamed up with NTT DOCOMO, INC. to develop LTE wireless mobile base stations (pictured) for DOCOMO's LTE services, which are scheduled to start in December 2010 in Japan (announced March 19, 2010). In the course of development, Fujitsu has applied for 40 patents worldwide, and actively participates in LTE patent pool initiatives as a holder of LTE-related patents.



(Year ended March 31, 2010)

### Fujitsu Filings and Registered Patents by Business Segment



(Year ended March 31, 2010)

### Fujitsu Filings and Registered Patents by Geographic Region

