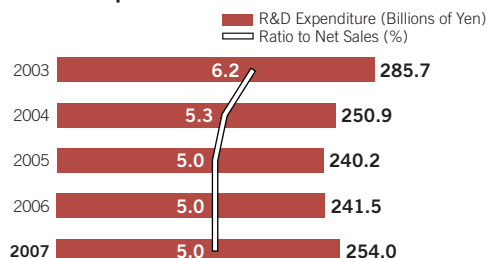# Research & Development

Our Mission in R&D

Guided by our basic policy of creating new value for customers and contributing to the realization of a ubiquitous networked world, we are driving forward cutting-edge research and development into next-generation services, servers and networks, as well as electronic devices and materials that support our services and products.
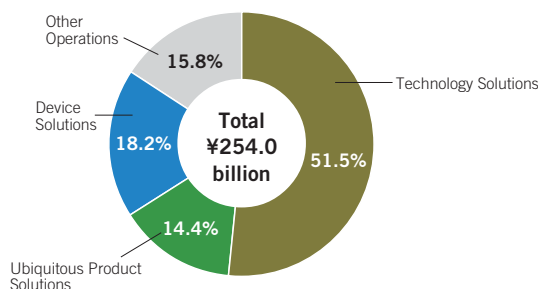
- **Foster the creation of new businesses**
- **Create and accumulate advanced technologies**
- **Extend our value chain globally**
- **Fulfill our social responsibilities**

■ R&D Expenditure

R&D Expenditure (Billions of Yen)
Ratio to Net Sales (%)

Year	Ratio to Net Sales (%)	R&D Expenditure (Billions of Yen)
2003	6.2	285.7
2004	5.3	250.9
2005	5.0	240.2
2006	5.0	241.5
2007	5.0	254.0

Years ended March 31

■ Fiscal 2006 R&D Expenditure by Segment

Total ¥254.0 billion

- Technology Solutions 51.5%
- Device Solutions 18.2%
- Other Operations 15.8%
- Ubiquitous Product Solutions 14.4%

Major Achievements in Fiscal 2006

(1) Web marketing technology for the Web 2.0 era

We developed technology capable of identifying and analyzing company and product reviews written in Chinese or English appearing on Internet bulletin boards or blogs. A subsidiary company has already been providing a similar Japanese-language service, and this new technology will now allow clients to conduct global web marketing analysis of company and product reviews in all three languages.

(2) Technology that enhances server system performance
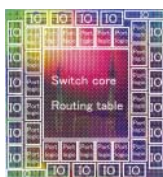

The world's first single-chip 10GbE switch LSI

We developed a new switching device that boosts the performance of server systems. The device, which incorporates the world's first 10 gigabit Ethernet (10GbE) switch chip, acts as a high-speed interface capable of transmitting data at 10Gbps over a single connection. In addition to enabling the design of more compact and energy-efficient servers with lower operating costs, this device will allow the replacement of multiple-standard networks used to connect servers in data centers with a single 10GbE network, thereby making operation and management easier. This technology has already been incorporated in the internal switches for our BX620 blade servers.

(3) Practical application technology for H.264/advanced video coding

IP-9500 HDTV encoder/decoder utilizing highly efficient H.264 standard video encoding

We created original new technology for the latest H.264 standard (also known as advanced video coding, or AVC) that speeds up data transfer rates by 30%. The technology includes an algorithm that uses knowledge about the characteristics of human vision to encode high-quality video images, and reduces processing capacity needed to encode high-definition images by 80%, while also eliminating unnecessary data transmission. We have also applied this technology in a low-power video encoding LSI for high-definition (HD) video—a world first—and our IP-9500 encoder/decoder, which enables real-time HDTV transmission over the Internet.
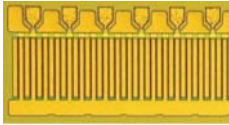
GaN HEMT for highly efficient data transmission amplifiers

(4) WiMAX amplifiers with world-class power efficiency

The WiMAX[1] protocol enables the creation of next-generation wireless broadband networks that allow users to easily send and receive large volumes of data outside or on the move. We developed new data transmission amplifiers for WiMAX base stations and terminals. With the amplifiers for base stations, we teamed up with KDDI Corporation, a Japanese telecommunications company, to develop highly efficient data transmission amplifiers utilizing gallium nitride (GaN) HEMT[2] technology. By developing and adopting a HEMT crystal structure and incorporating digital pre-distortion technology, we have roughly doubled power efficiency compared to conventional amplifiers. As a result, base stations can be made more compact and energy efficient. With WiMAX mobile terminals, we created compact, energy-efficient amplifiers with minimal digital signal distortion. As result, the usage time for the mobile terminals can be increased by roughly 1.5 times, and data transmission speeds can be boosted by approximately the same amount.

[1] Worldwide Interoperability for Microwave Access: A wireless network protocol based on the IEEE802.16 and IEEE802.16e standards. WiMAX enables the provision of high-speed mobile connectivity services of 75mbps even when the user is traveling at speeds of up to 120km/h.

[2] High Electron Mobility Transistor: An ultra-fast field-effect transistor pioneered by Fujitsu in 1980.

Fujitsu Wins Prestigious Award at nano tech 2007

Held annually since 2002, nano tech is the world's biggest international nanotechnology exhibition and conference. We were honored to receive the nano tech Award 2007, given to the best-of-show exhibitor in all categories, which recognized some of our latest R&D advances, such as quantum dot laser technology for optical transmission systems, carbon nanotube wiring for future LSI devices, and artificial antibodies (modified aptamers). In addition, we were praised by the award committee for establishing QD Laser, Inc., a quantum dot laser company that is advancing the practical application of nanotechnology.

nano tech Award 2007

Strategic Direction in Fiscal 2007

■ **Develop new solutions leveraging our technology value chain**

We will pursue R&D efforts to create high-value-added solutions that leverage and combine our wide array of cutting-edge technologies in IT services, computers, networks, electronic devices and other areas.

■ **Key research themes in fiscal 2007**
   (1) Next-generation IT service technologies
   (2) Next-generation server technologies
   (3) Next-generation network technologies
   (4) Technologies to create distinctive systems and devices (new terminals, imaging, electronic paper, low power consumption, reliability)
   (5) Technologies in new fields/frontiers (nanotechnology, robotics)

■ **R&D in emerging new fields to support future businesses**
   • Peta-scale computing (next-generation supercomputer)
   • Next-generation mobile communications technology
   • Nanotechnology
   • Intelligent Transport System (ITS) technology to improve safety and security
   • Humanoid robots with artificial intelligence
   • IT that supports lifestyles in an aging society
   • Environmentally friendly materials and solutions

■ **Promoting joint research to identify new possibilities in technology and products**

We will aggressively pursue joint research with universities, research institutes and corporations worldwide.