

Innovative Technologies

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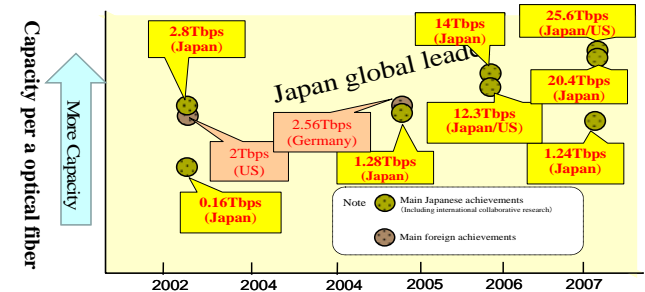
All-Optical Networking Technology

Outline of Technology

- Signal processing technology which is realized in optical domain only (not in electrical domain) for all-optical networks, such as the switching, labeling, multiplexing.
- Enables ultrafast communication networks with significantly suppressed electrical power consumption.
- Aiming of the international standardization initiative by strategic technology development.

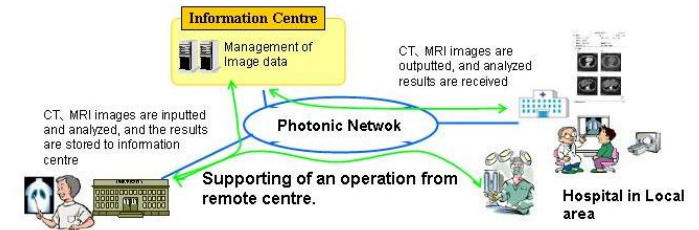
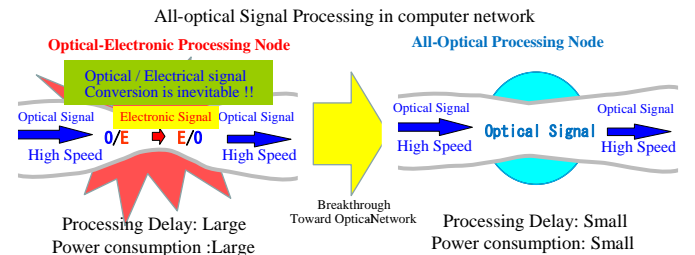
Superiority of Japanese Technology

- Japan is leading the world in the strategic development of expanding transmission capacity per an optical fiber.
- Also the world top level in optical switching speed and throughput.
- The world No.1 in FTTH penetration (Fiber-To-The-Home subscribers number is over 11 million in December 2007.)



Impact on Society

- Realization of new services which require high-speed capacities in future network, such as VOD with ultra-high definition quality, teleconference system, telework, and remote medical care/diagnosis, by all-optical communication network .
- All-optical network will contribute not only for network capacities which is estimated 190-times in 2025, but also for a low carbon society by significant improving power efficiency (several ten times) .
- Enhance international competitive edge of Japan in the optical communication technology field. Also planning to catch up with business organizations in the United States in terms of market share and make it the driving force in activating industry by developing and utilizing optical routers ahead of the world, which will lead to international standardization activities.
- Expectation of internationally contributing to technology support and new market cultivation in ICT developing nations.
- The market related to network associated equipment (routers and LAN switches) was 394 billion Japanese yen in Japan in 2007, 411 billion Japanese yen in 2008, and 11.2 billion dollars globally (in 2007) and it will keep on increasing (estimate made by a private research institute.)



Required Framework for Technology Development

- The development of a promotion structure to adjust the division of roles of the many cooperating research and development institutions and combine the collective effort of the nation.
- Establishment of a research and development strategy including international standardization and business applications.
- Enhancement of human resource cultivation and an activity support system to hold international standardization conferences to acquire international standards and those who can lead the way in strategic international consensus building.
- The development of a large scale base network that enables verification in the actual fields of the developed equipment.

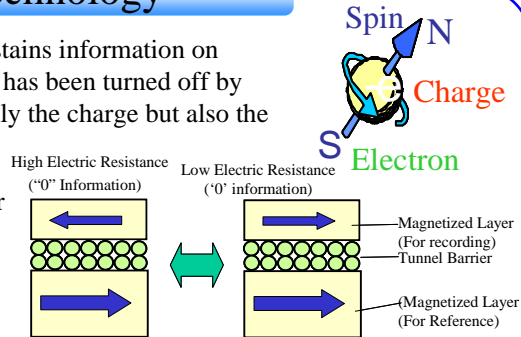
Required Reformation in Social System

- Support for optical fiber to be installed in rural areas (mountainous regions etc.)
- System to cultivate and evaluate human resources that can contribute to international standardization (establishing the career paths of international standardization specialists.)
- Support plan for standardization in Asia such as the development of a standardization information database, bidding for a standardization conference, inviting key persons from standardization institutions etc.
- Application of ODA toward international evolution of developed technologies.

Spintronics Technology

Outline of Technology

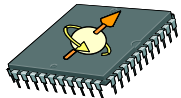
- Totally new electronics technology that sustains information on memory after turning the electricity source has been turned off by controlling the degree of freedom of not only the charge but also the rotation = spin of the electrons.
- Stable twin status recording (left-to-right or up-to-down) of the spin (electricity is not needed to sustain the information.)
- Reads information through the change in electrical resistance.



Superiority of Japanese Technology

- The introduction of the innovative MgO series tunnel element in hard discs can be expected all over the world in 2008.
- Successfully prototyped nonvolatile memory with spin injection magnetization reversal of 2 Mbit (largest in the world.)
- Successfully developed technology that realizes large volume nonvolatile memory of Gigabit size for the first time in the world.
- Developing a ferromagnetic semiconductor based on electrons and the optical semiconductor for the first time in the world.

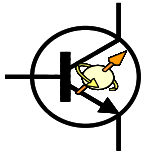
Impact on Society



High functional logical circuit with high speed operation and limitless writing of high capacity nonvolatility and low power.



Super high capacity storage for recording content all over the world. (3.3 trillion Japanese yen market in 2006 and 4.3 trillion Japanese yen market in 2011)



Transistor in which the information does not disappear even if the electricity is turned off more than 1000 times a second.

Non-volatile electrons will be the core of future generation semiconductor production technology

Necessity for early technology establishment due to the expectation of huge market expansion

Can enable super low power consumption of electrical devices of more than 2 characters because electricity is necessary only for the information transition.

IT devices with start times of below 1/100 second.

Super long operation of mobile devices

Electricity saving operation of the numerous urban sensors

Secures IT functions in case of disasters

Required Framework for Technology Development

- Integrated corporative research and development system in a wide range of fields such as physics, materials, devices, systems and software.
- System for business and university collaboration enabling a smooth technology transfer of the researched product of universities and independent administrative institutions to business.
- Organic collaboration of business and universities generating creative intellectual property.
- Output of a research and development system by the private sector.

Required Reformation in Social System

- None