ICT, Opening the era of Creation

2013 ETRI Technology Report



Electronics & Telecommunications Research Institute

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ICT, Opening the era of Creation



ETRI stands in the center of Happy Society realized by Technology

Easy and most vivid 3D environment technology makes people more comfortable and happy Heart-warming world created by ICT, World beyond our imagination is coming to our life.



Flourishing creative economy through technology, This is the future ICT is dreaming

The cutting-edge technology of ETRI creates new areas and new values. Realizing dreams into reality through technology, ETRI's cutting-edge ICT is the growth engine for the creative economy.



• Message from the President



ICT Innovator For a Great Tomorrow

ETRI will help the humanity realize a 'Smart World' where people, technology, and the environment are interconnected to create a more abundant, convenient, and safe life. ETRI will open a new era of hope and happiness for all the people through Creative Science and Technologies.

Message from the President

Since its foundation in 1976, ETRI, a global ICT research institute, has been making its immense effort to provide Korea a remarkable growth in the field of ICT industry. ETRI delivers Korea as one of the top ICT nations in the World, by unceasingly developing world's first and best technologies.

Korea, the wasteland of Science and Technology, became ICT leading nation through indomitable will and challenging spirit. In the 1980s, one-phone-per-house which brought significant changes to the everyday lives of Koreans was realized by the development of TDX; Time Division Exchange, fully digital electronic switching system. Korea stated to dominate the world's semiconductor industry by its development of 4M DRAM successfully. During 1990s ETRI once again astonished world by commercializing CDMA for the very first time in the world. In 2000s ETRI developed Terrestrial DMB, WiBro, and 4G LTE Advanced which became the foundation of Mobile Communication.

Recently, as a national ICT leader, ETRI is performing 'communication' and 'convergence' by developing SAN Technology(cutting-edge ICT technology converging with shipbuilding), Korean to English world-class portable automatic interpretation technology, and development of adjustable display technologies, such as transparent display.

Building on its past success, ETRI continues to dedicate in R&D to maintain its place among world's best research institutes leading creative economy. With its vision of being 'ICT Innovator, For a Great Tomorrow', ETRI will challenge continuously to develop creative and innovative technologies to be responsible for world ICT industry beyond Korea by creating innovative research achievement, securing global IP competitiveness and establishing world-class advanced management system.

ETRI will help the humanity realize a 'Smart World' where people, technology, and the environment are interconnected to create a more abundant, convenient, and safe life. ETRI will open a new era of hope and happiness for all the people through Creative Science and Technologies.

Thank you.

PRESIDENT OF ETRI Heung ham kim

| History | 1976. 12. 30. | • | KERTI Established Established to perform research on Electronic field |
|---------|----------------------------|---|--|
| | 1976. 12. 30. | • | KIET Established Established KIET to research in the field of electronics, e. g. semi-conductors, computers |
| | 1977.1 2.10. | • | KTRI Established KECRI became independent from KIST and KTRI was established in Dec 31, 1976 as a research institute specialized in telecommunication |
| | 1981. 1. <mark>20</mark> . | • | KETRI Established Established KETRI(consolidation of KTRI and KERTI) |
| | 1985. 3. 26. | • | ETRI Established ETRI, institute specialize on Information and Telecommunication was established(consolidation of KIET and KETRI) |
| | 1996. 1. 1. | • | SERI Established SERI, which was opened as data process department of KIST, incorporated into ETRI as an affiliate in May 25, 1998 |
| | 1997. 1. 31 . | • | ETRI, Institute's Korean Title changed Renamed it as Electronics and Telecommunications Research Institute(ETRI) based on regulations for electronics and |

telecommunication













December 1976.

Established KECRI, KIET, and KERTI, the origins of ETRI

On Dec. 31, 1976 KECRI was founded as an affiliate of KIST for systematic research and development in the field of communication technology and introduction and development of 'Electronic Switching System'.

On Dec. 10, 1977 Independent from KIST and renamed itself as KTRI

On Dec. 30, 1976, KIET(Korea Institute of Electronics Technology) was established to research in the field of electronics, e. g. semi-conductors, computers

On Dec. 30, 1976, KERTI(Korea Electric Research and Testing Institute) was established to research in the field of electrics

January 1981.

Established KETRI

On Jan. 20, 1981, KETRI(Korea Electrotechnology and Telecommunications Research Institute) was established in consolidation of KTRI and KERTI

March 1985.

Established ETRI

On March 26, 1985, ETRI, institute specialize on Information and Telecommunication was established(consolidation of KIET and KETRI) to meet with the emphasize on Electronics field

1996.

Data process department of KIST transferred to ETRI as an affiliate

On June 27, 1967, SERI(Systems Engineering Research Institute) was opened as data process department of KIST. In accordance with, government restructuring of the Ministry of Science and Technology to the Ministry of Information and Communication SERI became affiliate of ETRi on January 1, 1996.

On May 25, 1998 Incorporated into ETRI

1997.

ETRI, Institute's Korean Title changed

On Jan. 31, 1997, Institute renamed it as Electronics and Telecommunications Research Institute(ETRI) based on regulations for electronics and telecommunication

• Mission

ETRI makes contribution to the nation's economic and social development through research, development and distribution of industrial core technologies in the field of Information, Communications, Electronics, Broadcasting and Convergence technologies.



Achievement

2010'S

- 2000's
- 2008. The world's first digital content vending machine
 2007. The world's first 3.6Gbps 4th Generation mobile communication technology(NoLA)
 2006. Wireless Home Network(UWB)
 2005. Succeeded in exported Embedded SW Solution

 Terrestrial DMB Service launched
 - 2004. · WiBro Prototype

technology

1999. · Synchronized IMT 2000(CDMA2000) STP System

2012. Developed 100 times faster Optical Internet Technology

2011. · Developed transparency adjustable AMOLED display panel

2010. • The world's first 4G LTE-Advanced Technology • Developed Smart Ship Technology(SAN)

2009. · SMMD-Based 4D System Technology

· Developed Korean/English portable automatic interpretation

· Developed packet-optical integrated transport network technology

- 1996. · CDMA ATM Exchanging Machine
- 1995. · Successfully commercialize CDMA for the first time in the world
- **1991.** · Launched TDX-10
 - Developed TiCOM II
- **1990.** Developed 32bit microprocessor

1980's

1<u>990</u>'S

- 1989. Starting with development of 4M DRAM, Korea successfully developed 16M, 64M and 256M DRAM
 - 1988. · Developed 565Mbps Optical Communications System
 - 1986. · Launched TDX-1
 - **1984.** Succeeded in developing a 16bit UNIX domestic computer
 - 1983. · Developed 8bit Educational Computer
 - 1982. · Developed the Nation's first semiconductor product '32K ROM chip'

1970's

- 1977. · Established KTRI(Korea Telecommunication Research Institute)
 - **1976.** Established ETRI, an affiliate of KIST
 - · Established KIET
 - · Established KERTI

14.15



Common Core Technology

Research planning system to build ICT based Creative Economy through convergence ICT ecosystem

Convergence **Technology**

Develop vertical and horizontal ICT convergence technology to create new industry and strengthen competitiveness dramatically

Creative Content Research

Develop video content and convergence related technologies for more affectionate and pleasant digital life

Software

Develop software technology, the key point to the BigData intelligent technology and the source of national competitiveness, which can change the world

Common Core Technology

Communications & Internet

Develop smart cloud internet technology to provide realistic private space services

Components & Materials

Develop smart global leading material technology to provide happiness and satisfaction to mankind

Broadcasting & Telecommunications Media

Develop human friendly technologies to build smart advanced nation

16.17

ICT Innovator For A Great Tomorrow

ETRI

ETRI is enhancing its global competitiveness through adding higher value to the traditional industries and producing creative business with ICT convergence. Aiming Korea to become the world's most powerful nation by 2020 in the field of ICT, ETRI will lead smart revolution based on world-class research and development.

Research Fields

- 20 IT Convergence Technology Research Laboratory
- 28 Components & Materials Research Laboratory
- 32 Broadcasting & Telecommunications Media Research Laboratory
- 36 Communications Internet Research Laboratory
- 42 Software Research Laboratory
- 46 Creative Content Research Laboratory
- **48** Future Research Creative Laboratory
- 54 Technology Commercialization Division



IT Convergence Technology Research Laboratory

Under the vision of Global Leader for Future ICT Convergence Technology, the IT Convergence Technology Research Laboratory aims to develop core technologies, establish world-class industries and create new convergence industries. To achieve its goal, the laboratory is developing a range of technologies, including converging technologies of System SOC and Embedded Software to strengthen core competitiveness of SW-SoC convergence industry, environmental friendly green computing technology for low-carbon green growth, u-health/life care technology and human friendly intelligent robot technology, future vehicle and ship building technologies converging sensors with telecommunications, intelligent mail distribution technology. Furthermore, it develops core technologies of the u-city such as USN/IoT and ubiquitous network technology. To become global ICT leading nation by year 2020, it carries forward Giga Korea project.



Industries IT Convergence

Under the goal of next generation intelligent vehicle and shipbuilding ICT convergence technology leader, ICT convergence research department focuses on the development of advanced green and intelligent vehicle technology to support drivers, the development of digital maritime infrastructure and communication e-navigation services.

In the field of vehicle-ICT convergence, we have been developing various core technologies such as 'The development of decision making/control technology of vehicle/driver cooperative autonomous driving system(Co-pilot) based on ICT', 'WAVE communication technology', 'Driver-oriented vehicle augmented reality system based on head up display for the driving safety and convenience', and 'autonomous vehicle guidance system and auto-valet parking system'.

In the field of ship building-ICT convergence, we mainly research on 'The development of solution for ship safety navigation based maritime ad-hoc network' and leading standardization of the ship building-ICT technology.

IoT Convergence

With the purpose of smart convergence service creation and 'smart life' realization through Internet of Things technology which connects all things, environments and contents intelligently, the department has been focusing on environmental sensing and things recognition, things communications and networking, smart devices, open platforms, context-awareness and convergence of smart things and emotion. The department is developing overall IoT core technologies such as environmental sensors, wireless charging, NFC, RFID, RTLS, sensor networks, smart sensor devices, collaborative things, RFID/USN middleware, semantic service platform, Web plug-in for things, synchronization between physical and virtual worlds, and context-based dynamic things interactions. In addition, the department is developing IoT convergence technologies by applying developed IoT core technologies to various kinds of application areas including agriculture and stockbreeding, environments, health, medical treatment, energy, social safety, vehicle, traffic, logistics, emotion, and etc.

Intelligent Cognitive Technology

Under the vision to become a global technology leader in robot technology, the Robot-Cognitive System Convergence Research Department focus on securing core robot technologies such as human-robot interaction, robot intelligence, and autonomous robot navigation. To achieve this vision, we have been concentrating on development of open platform for robotic services(OPRoS), context aware robot middleware, learning and developmental agent, vision recognition, multimodal based human-robot interaction, and vision SoC(System on a Chip), analysis and reasoning based knowledge convergence service technologies. In addition, we have been focusing on development of indoor/outdoor environmental awareness for autonomous robot navigation, position recognition and seamless positioning, 3D reconstruction based on spatial information, and spatial fusion engine technologies. With the results, we apply our knowledge to various robot developments such as personal service robot, military robot, silver-care robot, and surveillance and guard robot.





Smart Green Life

Smart Green Life Technology refers to the advanced convergence technology that enables to provide a smart, safe, sustainable, and energy-efficient environment to human beings. The Smart Green Life Research Department aims to develop ICT solutions to realize such a smart and green environment by carrying out a wide range of R&D projects in five fundamental and disciplinary research areas. These include personalized immersive and emotional service technology, autonomous control middleware and multi-domain smart services, smart grid and home/building energy management technology, LED-based lighting communication technology, and radio communication for WPAN and eco-adaptive networking application technology. Especially, motivated by the new agenda of national Strategy for ICT development, 'a society of safety and integration - building comfort and sustainable environments', the Smart Green Life Research Department strives to develop core fundamental technologies, advanced applications, and services with the goal of realizing smart green home & life and thus improving the quality of all lives.

Bio-Medical IT Convergence

The Bio-Medical IT Convergence Research Department is developing ICT-BT convergencebased bio and medical technologies to prepare for the aging society of the near future. The department is doing research on various ICT-BT convergence technologies, including u-health, which is health management that is available anytime and anywhere; life care, which leads to a healthy life through the management of daily living; point-ofcare, which makes on-site diagnostic; Bioinformatics, which predicts genetic diseases by genetic information analysis; ICT based new diagnostic and treatment systems, and components of medical devices. We are also actively conducting various activities, such as promoting commercialization of research outcomes and standardization.





Postal & Logistics Technology

The Postal & Logistics Technology Research Department conducts dedicated research on green logistics and postal logistics technology with the aim of improving the national infrastructures of the postal service. The department plays a central role in the postal industry and has made numerous outstanding contributions, particularly in strengthening the competitiveness of the postal service through digitization. Its achievements in this area include the design of PostNet and advanced automation such as the development of address recognition technology and postal sorting machines-including letter, registered, sequence and parcel sorting machines. We are working to develop smart postal technology in order to establish sustainable postal operations and respond to major challenges in the postal environment. To achieve this goal, we are developing self-service post offices, intelligent logistics planning, address-based management systems, new postal service models, and smart packaging classification technology. The department is also developing logistics convergence technologies for smart postal and railroad operations(e.g. an RFID System for the Parcel and Courier Service, remote sensing technology, advanced robot technology, and a geographic information system).

Giga KOREA Project Department

The Giga KOREA Project aims to lead the global ICT industry by improving Gigabit Wire/Wireless communication network and developing the advanced technologies such as next generation devices, SW, high-speed platforms and multi-dimensional hologram and contents technologies. In order to make a successful Giga KOREA Project, we are responsible for adjusting the technology contents of networks, devices, platforms and software, analysing industry and technology trends, establishing industry promotion strategy, planning Giga KOREA project vision&goals and deriving service models by advanced and detailed research planning In the field of Project Strategy, we are making continued efforts for managing the project performance, running Giga KOREA Forum, and establishing project propulsion system and the business development strategy with internal and external policy cooperation.

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Daegu-Gyeongbuk Research Center

The Daegu-Gyeongbuk Research Center, established to strengthen ICT R&D competitiveness in regional ICT industry, to strengthen technology competitiveness and to create added value. It aims to revitalize regional industries by commercializing the source technology of ETRI and by field-friendly technical support. We develop core technologies of vehicle, healthcare, mobile related with local strategic industries and regional industry's demand-based ICT convergence commercial technology. Moreover we will continue research and develop Environment friendly intelligent greenhouse, ICT convergence platform technology for intelligent vehicles, and healthcare ICT convergence technology to contribute in local industry development.

Agricultural-IT Convergence Research Department

We are developing the intelligent greenhouse platform software which is Agricultural-ICT Convergence Solution for cultivating various crops, vegetables and etc to ensure the competitiveness in the agricultural sector of Korea. Firstly, our research efforts have been toward automatic environment measuring and actuator controlling based on well-known agricultural knowledge. This platform also provide interface for reflecting farmer's personal experience to increase production capacity. Finally, we make effort to feed forward control by mass environment simulation and prediction calculation to provide optimum growth environment to the plant.

Automotive-IT Convergence Research Department

To meet distributed and complex intelligent future vehicle electronics, we are developing the embedded SW platform technology based on the international standards and also developing the reliability guarantee technology to ensure the stability and reliability of embedded SW platform for automotive E/E. The embedded SW platform for automotive E/E includes the real-time OS, middleware, and SW development tool, which can be applied to a variety of vehicle's electronic system as like power system, body, chassis, and so on. Currently, OSEK/VDX and AUTOSAR(Automotive Open System Architecture) based real-time OS for automotive E/E and SW development tool have been developed, it can be applied to a variety of core automotive parts as like Blackbox, PAS(Parking Assist System), BSD(Blind Spot Detection), and so on.





Embedded Software

The Embedded Software Research Department has developed the open software platform, and has been endeavoring to enhance national competitiveness of the next generation software through creating added value of ICT and manufacture industries by providing the software platform. To this end, the department research on defense, aerospace, energy, automotive industries, mobile and smart appliances. Also, it provides a software platform as an integrated form of operating systems, middlewares, and development tools. For corporate and individual users. In addition, a SW-SoC platform is developing SoC-SW convergence technology that can interwork with SoC.

Operate on-off line services to support developed technologies users in industrial sites easily.

In particular, the department has been preparing for convergence between a variety of industries and services by developing the core enabling technologies of D2D smart connection, AV group communication and CPS on the basis of Linux & RTOS and a sensor OS.

System-on-Chip

The System-on-Chip Research Department currently works on SoC developments to secure the national competitiveness, especially, on the four primary topic which are mobile, smart appliances, energy, and automobile. To achieve our goal, we researches on high performance embedded processor which is the foundation of ICT industries, the ultra high definition video codec and graphic processor for the next generation multimedia services, the advanced T-DMB SoC and LTE femtocell SoC technology realize the convergence of broadcast and communications, the smart human-interface SoC and its applications, and the digital RF SoC for maximizing the connectivity between smart devices. In order to improve generating efficiency of renewable energy system, we develop ultra low power SoC to improve the power-generation efficiency of the new regeneration energy system, the fault-tolerant processor for automobile electric system, the 77GHz automobile radar system based on CMOS SoC.

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Seoul SW-SoC Convergence R&BD Center

The SoC(System of Chip) integrates various functions of a system into a small chip by combining the hardware and software. This electronic device is applied to automobiles, Bio, Green Semiconductor, Smartphones and DTVs. The system semiconductor has been spotlighted as a significant potential new growth engine for the nation, through expending its application to different industries. Seoul SW-SoC Convergence R&BD Center has been working to promote the system semiconductor industry by training manpower with ICT convergence knowledge through education programs for graduate students and company employees based on industry demand. Also The Infrastructure Support for the System IC Industry business has contributed to strengthen industrial competitiveness of domestic small and mediumsized businesses and localization of SoC parts through supporting various SoC development environment for outstanding fabless companies. In addition, through a new platform called SW-SoC Open Convergence Platform in smart compliances, we makes it possible to strengthen the technology competitiveness of fabless software companies by providing time-to-market and multi-product, smallsized production and provide continuous growth of core technologies in major industries by expanding SW-SoC Open Convergence Platform to the major



industries such as mobile devices, vehicles and energy devices, support secure ecosystem of virtuous cycle of SW-SoC industry fields.

Human Resource Development for SoC

The Human Resource Development for SoC project fosters SoC masters and doctoral advanced design manpower through joint research on chip design with universities. Through this project, employment toward SMEs is facilitated by resolving the qualitative mismatch. Also, it provide practical training environment such as MPW manufacturing opportunities for students to perform chip design and production. Furthermore, various on-offline field practice are provided based SoC industry demand such as corporate ondemand training, employment-linked training, practical skills improvement training for employees.

The Infrastructure Support for the System IC Industry

The Infrastructure Support for the System IC Industry project has made an effort to expand the technical ground of SoC industry and strengthen SoC product competitiveness through building infrastructure to develop SoC necessary for SoC industries From 2013, ETRI SoC-SW R&BD center focuses on support to 5 core services, start from SoC design environment, SoC-integrated verification environment, common IP-sharing, business incubator and SoC industrial ecology through a selection and concentration strategy based on long business experience. It will also strive to foster strong fabless companies by making use of industrial cooperative network with the know-how from ETRI.

Development of SW-SoC Open Convergence Platform

The SW-SoC Open Convergence Platform(SS-OCP) technology provide its efficiency and directivity by concentrating R&D capability and building R&BD ecosystem. Also it serves as a core technology for developing the global innovative products. First, it is focused on the area of smart home appliances in order to develop the SS-OCP technology. We are developing the elementary technologies related smart home appliances such as speech recognition with noise suppression and new media service with D2D connection. Then, we will secure the SW-SoC Open Convergence Platform in smart home appliances by using various SW-SoC component technologies to our reference platform which later can be used for commercial business. By using secured SW-SoC Open Convergence Platform technologies in smart home appliances, we extend the technology to the major industries such as mobile devices, vehicles and energy devices. Our SS-OCP makes it possible to drive the continuous growth of major industries and strengthens the competitiveness of fabless software companies by providing time-tomarket and multi-product, small-sized production.



 Components & Materials Research Laboratory

The Components & Materials Research laboratory is developing, multi-functional, high-efficiency, and high value-added convergence components with linked systems and services through convergence system component technology that realizes convergence and integrated broadcasting systems, next generation semiconductor technology that will out perform current semiconductor memory, and green conversion components technology that will advance a low-carbon and green-growth agenda. It is also focused on creative and adventurous research projects that will overcome the limitations of current technologies and create the ICT of the future.



Next Generation Display

The Next Generation Display Research Department mainly researches on oxide TFT(backplane based on oxide TFT and applied devices such as driving circuit for display), UI/UX touch, reflective display (photonic crystal display, electrochromic display, color electronic paper), OLED(white OLED panel, light extraction, and lighting system), and stretchable interface(materials, devices, process, and modules for developing flexible and stretchable display).

We develop a core technology of materials, devices for realizing next generation display such as flexible display, transparent display, reflective display, OLED lighting, and LASA(Light Adaptable, Space Adaptable) display to meet the demand of market in display industry and to create new growth engines.

Photonic Wireless Convergence Components

The Photonic-Wireless Convergence Components Research Department researches on innovative Photonic-Wireless Convergence Components based on Compound Semiconductor such as InP, GaAs, SiGe, and GaN. We are conducting researches on HEMT and HBT based MMIC(Microwave Monolithic Integrated Circuit), high speed optical internet components, optical wireless convergence communication devices, Photonic-Wireless convergence devices such as Opto-electronic and optical devices and three-dimensional integrated packaging technologies. We are committing multiple research projects to develop high efficiency, energy saving semiconductor technologies such as LED(light emitting diode) and power electronic devices to contribute in solving energy crisis. In addition, we will provide core components for Military Electronic System and high speed wide range wire-wireless communication technology, and brightening our future by securing core technologies for new innovative system.

Nano Scale Electronics & Optics Integration

The Nano Scale Electronics & Optics Integration Research Department carries out various R&Ds on nano scale electronics convergence technologies, such as low power convergence sensors based on MEMS and nano technology, energy storage devices, and BLDC motor driving circuits with high-voltage high-current power devices. We are also focusing on research into both high-performance mixed-signal products and signal processing algorithms which interface intelligent sensors, power devices, and optical devices as SoC(System-on-Chip) technology. In addition, for future computers and communication systems, we are developing the Photoelectric convergence technology for the silicon photonics technology.



IT Components and Materials Industry Technology

The IT Industrial Technology Research Department is developing and commercializing the solar cell technologies, based on inorganic and organic materials, to convert the infinite and clean solar energy to electricity in order to solve the global energy problem due to the fossil fuel depletion and the global warming due to the environmental pollution. Silicon/metal heterostructured thermoelectric devices are being researched to convert the wasted heat into electricity. Also, energy and TFT devices by printed methodology are being studied. We are working on the development of GaN and silicon power devices technology in order to lead the power electronics industry and build up the Green ICT for high efficiency, low loss and energy-saving. Advanced cooling material and device are being studied for enhancing a reliability of the electronic telecommunication equipment. Especially, the thin cooling device can realize a high density electronic packaging. Furthermore, we are supporting small companies by solving technological problems and making proto-type device for SMEs with our possessing technologies and with research equipments.





 Broadcasting & Telecommunications Media Research Laboratory

The Broadcasting & Telecommunications Media Research Laboratory has been conducting researches under the vision of Leading the New Technologies in Broadcasting and Telecommunications Media(BTM) for warm-hearted society. The key objectives of our researches are; to develop next generation BTM core technologies and international standards, to create high class global BTM service with realistic BTM technologies, and to improve facilitation of RF resource service with advancement and enhancement of RF resource application.



Next Generation Smart TV

The Next Generation Smart TV Research Department is developing the future core technologies to control a smart TV by the user-friendly multi-modal human interfaces. The department also focuses on developing the beyond smart TV(called Smart TV++) technology based on CPND(Content, Platform, Network, and Device) to support those services such as the broadcasting, telecommunication, a convergence of broadcasting & communication, and computer service through multi-screen.

The core technology areas of development for the SmartTV++ are as follows :

- Developing a test-bed implementation for function verification, set-top-box implementation, and HTML5 based smart TV software platform technology
- Developing a multi-modal user interface & experience technology based on speech recognition, gesture recognition, and mirroring smart remote control technology
- Developing an augmented broadcasting and broadcasting advertisement technology
- Developing a media transmission technology, multi-screen service technology, and intelligent media search & recommendation service technology

Broadcasting Systems

The Broadcasting Systems Research Department's objectives are enhancement of the digital broadcasting systems/services and fundamental research, standardization, and systems/services development for promising future broadcasting technologies. The known technologies include next-generation digital cable transmission system, RF/IP converged access technology over HFC network, next-generation digital terrestrial television broadcasting, terrestrial DTV emergency wake-up alert service, advanced T-DMB system, smart mobile hybrid T-DMB, T-DMB emergency wake-up alert service, auto-stereoscopic 3DTV broadcasting, and digital radio broadcasting.

Realistic Broadcasting Media

Our main research goal is to develop core technologies for more realistic audio-visual information by deliver it through digital broadcasting. We conduct researches on capture, production, compression and coding of large-scale ultra-high resolution video and 3-dimensional audio signals. Furthermore, we research on capturing panoramic video and representation technologies to deliver feeling of realism with various technologies which include haptic and capturing smells, in order to add more realistic information. Digital holography is another important research, which will be the eventual form of 3-dimensional image representation.



Intelligent Converged Media

The Intelligent Converged Media Research Department is performing research and development on core technologies to provide more convenient and useful service by using a various smart devices with the aims of user-centered participation, common-ownership, personalization, and service convergence. Especially, we are responding very well to the future environmental changes of converged services utilizing lots of core essential technologies that have been developed by us and we are discovering and developing the core essential technologies to realize the various converged media service technologies including next generation Smart TV service. Main research topics that we are carrying forward are Enabler Technologies for social TV services, collaboration services technologies between screens using dynamic relocation technologies of web contents. We are also pushing forward our core technologies such as Enabler Technology for Social TV, Inter-Screen Collaboration System for web contents, Context-Aware Tele-Screen System Technology, web mobile virtualization platform technologies based on HTML5, and cloud-based media virtualization technology.

Research Fields



Satellite & Wireless Convergence

The Satellite & Wireless Convergence Research Department is developing the technology for the satellite communication/broadcasting and its application based on the space proven activity and commercialization of COMS satellite launched in June 2010 with Korea's technologies developed Ka-band payload and performance verification of its satellite ground control system. To support these goals, we are developing core technology for DVB-RCS 2-based high-efficiency satellite VSAT system, a realistic satellite broadcasting service that offers guaranteed continuity of broadcasting services amid changes of channels including heavy rainfall, Global Navigation Satellite System and its application technologies, as well as IMT-Advanced satellite and terrestrial integrated network connection for next generation satellite mobile communications. In addition to these, we are also developing RF equipment including MMICs for radar/antenna/transponder for the next generation satellite radio convergence services based on the heritage of COMS project, analyzing the impact of radio waves in space, and researching on the meteorological satellite data reception and processing technology.

Radio Technology

The Radio Technology Research Department is developing technologies for radio resources utilization and spectrum sharing technologies, core and system technologies for new radio resources, applied radio technologies, and electromagnetic environment technologies. Radio resources utilization and spectrum sharing technologies are being developed using advanced spectrum engineering, and improve the spectral efficiency of limited radio resources through approaches such as cognitive radio. The development of new radio resources is focused on new system design and radio transmission approaches that are suitable for the radio environments such as millimeter-wave and Tera Hertz band, in order to achieve data rates of several Gbps. Research on Electromagnetic_(EM) engineering technologies include countermeasures to the adverse effects of EM wave on the human body and interference between devices, EM computational analysis, the measurement of unused EM waves, and the monitoring of EM emissions. For industrial radio applications, we are developing human-life radio applications such as breast cancer screening and food safety technologies by using spectroscopy and imaging technologies in the millimeter wave and Tera-Hertz bands.

<image>

Communications Internet Research Laboratory

The Communications and Internet Research Laboratory is actively researching on the fields of mobile communication technology which includes wired/wireless integration and broadcasting & communications convergence, future internet technology, optical internet infrastructure, and future network technology. Through these researches, the quality of life and public convenience would improve through the realization of mobile life and communication services that can be provided anytime, anywhere. Also it would bring the future knowledge-based society into the reality. Also The Honam Research Center has gone to great lengths to develop into a technical hub for the promotion of the leading and strategic industries of the Honam region through R&BD of ICT convergence technology. Our representative research technologies are as follows : the 4G and 5G mobile communications, high-speed short-range wireless communications, future internet technology, internet-based converged network, packet-optical integration, converged service platform, next-generation called Tactical Information Communication network(TICN), etc. The main focus of our research is on the core technologies and also other technologies that can be vital for green growth.

Future Internet

Internet which was created in 1974 one of communication tools with researchers. It has been grown enormously toward a global network infrastructure that affects every aspects of our daily lives. But, due to radical changes in communications environment and emergence of new users' requirements have pushed to ponder over the limitations of the current Internet architecture and their associated fundamental problems. Along the line of such recognition, clean-slate architectural research on Future Internet has actively been conducted by various research groups globally. Future Internet may mean a new Internet which will be designed in clean-slate manner to overcome the current Internet's architectural limitations and to accommodate newly emerging future requirements. Our Future Internet Research Division is conducting various research in the area of Future Internet to respond to the global research trend. We are actively engaged in the research of Software Defined Network technology, Network OS technology, Future Internet services, and Internet applications. Besides, we are researching for a novel 5G network architecture based on fixed & wireless convergence.

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B4G mobile communications

Based on the 4G(4th generation) mobile communication systems, the mobile communications evolves into the B4G(Beyond 4th generation) mobile communications with key features of broadband high-speed radio transmission and convergence for high quality multimedia service. B4G mobile communication systems provide a high-quality, high efficient future mobile services, efficient adaptation with respect to spatio-temporal traffic variation, and also 10 times the radio transmission capacity and energy efficiency compare to the 4G systems. B4G Mobile Communications Research Department is carrying out research and development projects for key technologies for the B4G mobile communication systems that evolve beyond the 4G mobile communication system, accompanied with activities for its international standardization. Also, research and development on the next generation Cloud RAN system is in progress.



Wireless Access System

The commercialization of IMT-Advanced communication technologies makes the mobile internet service era to be coming to provide the best services to the user in any situation, anywhere, and anytime. However, the mobile users are anticipating the technologies to have the better and faster wireless service with low cost and convenience. In order to meet the demand, there are in progress competitively on the developments and standard activities of wireless access technique for wider channel bandwidth, smart collaborated access technologies for heterogeneous network and multi radio access technologies, enhancement of IMTadvanced system, device-to-device communication, etc. Wireless Access System Research Department is currently developing the beyond 4th Generation IMT-Advanced mobile access technologies, the techniques for mobile communication cloud infrastructure and mobile terminal, the WiBro system, and public and/or applied wireless communications systems for other industries(national defense technologies, communication for public safety and railroad, wireless private network, etc.).



Wireless Transmission

5G mobile communication is the future mobile technology which has 1000x larger wireless transmission capacity than the present mobile communication(4G). The main goal of 5G mobile communication is to realize knowledge-enriched communication network, which not only has similar characteristic to human nerve system but also provides more advanced communication than the simple voice/data transmission. Our perspectives for 5G communication system is not only to follow the aspects of 3G and 4G mobile communication development process but also develop revolutionary mobile communication system. Wireless Transmission Research Department carries out the developments and researches for the 5G related technologies such as Center-Autonomy Network Technology, mmWave and related RF technology, and Post Wi-Fi. Through the results of these developments and researches, we highly contribute to international/domestic standardization organization and take the leading role in 5G mobile communication standardization.

Research Fields



Smart Network

The Smart Network Research Department seeks for multi-dimensional solution for resolving problems of ICT infrastructure. The typical problems include limitations of value creation when we use the legacy network infra that was originally designed for simple delivery of Internet traffic, limitations of flexibility in information distribution, limitations of reuse of network resource, and limitations of security as a social infra. To resolve these limitations, we focus our research effort on smart cloud networking technology where the network, computing, and storage resource are tightly coupled. We anticipate this will be the core technology to realize an efficient exchange of knowledge and information in Big Data era when the cloud computing services and variety of new media services are commonly used.

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Optical Internet

An increase of telecommunication traffic being triggered by Internet is growing 40% per year and is expected to continue afterwards resulting in 10-folds traffics in every 6~7 years. The network traffic will be 10Tb/s in year 2015 and 100Tb/s around year 2020. Considering ICT a means to solve the imminent Global energy and environment challenges, the drastic traffic increase is rather reasonable. The Optical Internet Department conducts the research on technologies that enable the network of 10Tb/s, 100Tb/s and 1Pb/s step by step. Those networks can be realized only through innovations that we never have experienced. We focus our effort to achieve technical breakthroughs on such issues.



The Honam Research Center(HRC)

The Honam Research Center(HRC) has gone to great lengths to develop into a technical hub for the promotion of the leading and strategic industries of the Honam region through R&BD of ICT convergence technology. To this day, the center is supporting technology from strategic businesses in the area and developing customized technology for the facilitation for local businesses, while commercializing the technologies developed by the main office and the center for distribution. In addition, the center has supported over 200 cases of A2LA tests in relation to optical communications components and operated the One Company, One Researcher Mentoring program to solve the difficulties faced by industries and facilitate local businesses in the region.

Customized R&D for regional strategic industries

The Honam Research Center(HRC) performs in finding regional industries demand based cooperative research item and supports local companies for commercializing ETRI's core technologies. Additionally, HRC has fostered regional strategic industries by counseling and advising on technical difficulties, by international certification tests in optical communications within the project.

Energy-efficient Optical Access Network Technology

As a low-power access network technology for urban infrastructure of GreenICT City, XG-PON core technologies has been developed to realize Giga-class wire and wireless services. XG-PON technology, based on ITU-T G.987 standards, replaces xDSL, LAN, HFC and EPON/GPON technologies in an existing access network, and enables Giga-Internet services to each subscriber. HRC leads development of XG-PON MAC, OMCI and optical terminal technologies to strengthen the technical competitiveness of the domestic companies and to foster optical communications industry.

Green IT Urban Control & Surveillance Technology

In order to achieve efficient urban control & surveillance, the Honam Research Center(HRC) is researching and developing core technologies such as sensor data transfer technology based on wireless network and DTN, sensor data analysis technology based on real-time pattern classification, UWB-based impulseradar signal processing algorithm, and high-performance computing based mobile gateway. HRC plans to apply network protocols, embedded software and hardware modules from this project in a regional field trial service along with a telecom company for deployment and commercialization of the technology.

Optical Applications Components Technologies Research Department

The Optical applications components technologies provide optical component and module solutions not only optical communications but also other industries such as consumer electronics, vehicles, shipbuilding, etc. Especially, we have been developing small, low-power, and over 10Gbps high-speed optical modules through a new paradigm of fusion packaging technology, which consists of SOP(System-On-Package) technology for the electronic base and optical communication technology, and core optical modules for laser BLU(back light unit) for next generation glassless 3D displays.

International Certification Tests in Optical Communication

HRC is the only laboratory in Korea that is accredited by A2LA for testing optical communication elements, components, modules, devices and systems. According to 66 international standards such as Telcordia, IEEE, IEC, TIA/EIA, MIL-STD etc, the testing services includes 15 reliability test items for temperature/ humidity cycling, mechanical shock, vibration, internal moisture test, and 41 performance test items for center wavelength, return/insertion loss, PMD.





Software Research Laboratory

With its motto, creation of software technology changing the world, the Software Research Laboratory(SRL) has been researching & developing Big Data platform leading revolution of smart technologies, speech/language information technologies overcoming language barrier, cloud computing technologies including low-power & high performance supercomputing technologies, cyber security technologies building clean and secure cyber environment for the purpose of assuring the national strategic SW technologies, preempting SW Future technologies, and creating new SW markets.



Cyber Security

According to the global ICT trends is transforming from competition in communication privacy to competition in daily life, the Cyber Security Research Department aims to realize secure and safe smart society together with development of generic and core technologies in various security technologies.

First, the generic technologies consist of Cryptography, Digital Forensic and Authentication, Smart Wallet such as digital forensic technologies for smart environment based Cryptography and securing digital evidence from cyber crime, smart wallet and mobile ID technologies for user and environment authentication and privacy protection based on Big Date environment.

Second, the Dynamic Security Technologies consist of Networks and Public Facilities Security technologies, Device Security technologies, DDoS Attack Hacking intrusion analysis for various layers of network security operation technologies, corresponding, detecting, defence technologies for Side Channel Attack to prevent information leakage from various mobile devices, and MTM(Mobile Trusted Module)-based Security Core Technology for Prevention of personal information Leakage in Smart Devices

Third, the Application Technologies consist of Face Recognition, Video Surveillance, ICT Convergence Security such as Biometric technologies at a distance to provide safer environment, filtering technologies for objectionable multimedia contents, transportation(vehicle-aviation) security technologies convergence with traditional industrial sectors, and shipbuilding medical construction security technologies.

Big Data SW Platform

Big Data has been contemporary buzzword as data big bang in the digital space becomes the reality and emerges into a new growing engine as Big Data Software Technologies make it possible to create new value from Big Data. Futhermore, Big Data Analytics and Big Data Platform Technologies will become a national infrastructure in order to the pre-emptive response of national crisis such as disasters, diseases, and national welfares. And, next generation computing technologies are being evolved to provide human-friendly and creative computing environment by understanding human and interacting with human-centric UI/UX. Big Data SW Platform Research Department mainly performing the R&Ds in the following areas : Stream processing and In-Memory Database Technology, Big Data Analytic Software Technology, Human Data Analysis and Real-World Knowledge Digest Technology, Human-Friendly Personal Computing Platform and Natural UI/UX Technology.



Cloud Computing

Cloud computing is the computing technology providing virtualized ICT resources based on internet technology, and the computing resources will be used as much as needed by allowing clients to borrow ICT resources such as SW, servers, storage, and networks. It also supports realtime scalable services depending on the load and provides computing methods used to pay as much as used. The Cloud Computing Research Group develops next generation cloud computing core technologies providing new concepts based on open software. It facilitates the creation of high guality and new knowledge information services so that Korea can maintain its reputation as the leader of internet technologies. Also, our group secures the highest fundamental computing technologies to make Korea the leading ICT nation.

Currently, our department carries out the following projects :

- Cloud DaaS(Desktop as a Service) system and terminal technology
- Cost-effective, high-performance cloud storage SW(GLORY-FS) technology
- 3D SW service method using client rendering SW technology
- Supercomputing system technology specialized for genome data analysis
- Energy-aware operating system technolog



Automatic Speech Translation and Artificial Intelligence Research Center

The Automatic Speech Translation and Artificial Intelligence Research Center aims to realize a convenient community in a humanfriendly computing environment for the 21st century' knowledge-centered society by achieving remarkable developments in speech, language, knowledge processing, and artificial intelligence technologies. We are conducting research on an multilingual machine translation technology that will eliminate the language barriers in global business environments, interactive speech interface technologies with a large vocabulary for various devices in the ubiquitous society, artificial intelligence technologies, social web issue detection and monitoring technologies, and multilingual automatic speech translation system. We are also developing computer aided English learning system with a dialogue based speech recognition interface technology.



Creative Content Research Laboratory

The Creative Content Research Laboratory develops video content and convergence related technologies with the goal of creating and improving a people-centered digital life. To pursue this goal, the Creative Content Research Laboratory has focused aggressively on research and development in the following areas of technology : computer graphics, 2D-to-3D conversion and interaction, digital holographic content, virtual reality technology, u-learning technology, copyright protection management, digital cinema and signage technology and high-quality video and gaming content production. Above all, our emphasis on core technology and content creation for new markets has led to innovations in 3D stereoscopic video, smart content and experience-enabled content. The Creative Content Research Laboratory strives to actively contribute to the growth of the content production industry by developing the cutting edge tools and technologies required by the global media marketplace.





Visual Content

The Visual Content Research Department has conducted researches on the core technology for digital contents and the related IPR(intellectual property rights), international standard and patents. We are leading groups associated with industry and academic world. More specifically, we are focusing on computer vision researches such as 2D-3D conversion, full 3D image reconstruction, 3D image sensing, motion recognition and UI/UX and have developed core technologies in these areas. We also have developed technologies for the digital actor creature nature, fluid simulation, real-time rendering, image mixing and animation specialities within computer graphics. We are concentrating on the core technology for nextgeneration digital content services such as smart content, digital hologram, real 3D reconstruction and user interaction.

Content Platform

Our Content Platform Research Department has conducted research and development on gamebot detection and counter-action technology, GPU-virtualization based cloud game streaming technology, camera-image based smart information retrieval technology, content copyrights protection and distribution technology on clean cloud internetworking infra, digital cinema and digital signage for 8K image and video data.

The Content Platform Research Department will continue to work on the basic and core technologies required to build image content platforms and content distribution platforms as well, aiming to develop new service markets for operating various types of digital contents.

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Convergent Content

The Convergent Contents Research Department has made great strides in researching and developing virtual reality, u-learning, and smartcontent technologies. In the virtual reality area, we have developed new technologies in mixed reality, virtual training simulation, and realistic 4D technologies. In the field of u-learning area, we are exploring new avenues of interactive learning, mixed reality-based learning systems and cooperative interactive 3d e-book technologies. The main results include virtual spray painting and welding simulator, eyeglasses display and interactive English learning systems for elementary school students.



Future Research Creative Laboratory

The Future Research Creative Laboratory(FRCL) is a collaborative think-tank that leads Korea's future ICT policy and R&D planning, which is focused on future growth technology, creative research, and standardization. The FRCL consists of three departments Economic Strategy Research Department, Future Technology Research Department, and Industry-Strategy Research Department that mainly focus on ICT innovation policy and future technology planning. It also contains six research centers Standards Research Center, Graphene Electronics Creative Research Center, THz Photonics Creative Research Center, MIT Creative Research Center, Transparent Transducer and UX Creative Research Center, and Nano Electron-Source Creative Research Center. The Standards Research Center handles international standardization while the other five creative research centers conduct basic core research as seeds for future technology initiatives. The major roles of FRCL are to generate ICT policy and strategy with visions supporting cooperative research and convergence within ETRI and to provide a national technology roadmap supporting the government in realizing the 'Creative Economy of Korea' mission to be a world leader.

Economic Strategy

The main role of the creative & economic research department is to establish the ICT innovation policy leading to a futuristic society. Following the main role it researches the future scenarios and the service policy based on the monitoring and analyzing the interlinkage among the future society, economy, and technology and the convergence between ICT technologies and Humanities & Sociology. It excavates the prospective future ICT R&D fields and suggests the corporate growth strategies through the market analysis of the excavated ICT R&D field. And it analyzes the related legislation and develops the policy alternative to support the new ICT technology and the new industry. It also acts as the national ICT policy think-tank to support the establishing technology policy and the ICT national R&D long term development strategy in the new ICT ecosystem.

Future Technology

The mission of Future Technology Research Department(FTRD) is the general organization and coordination of planning for research and development. For the creation and acceptance of new projects based on the external countermeasure to technical policy, FTRD also involves technical analyses, making strategies and planning. Interdisciplinary mega-scaled projects are being developed through the leading ICT-planning projects of ministries. In addition, efforts are made to attract and participate to Research Center for fundamental technology and global frontier project. Internally, FTRD intimately supports the project planning of each department as well as coordinates the future project planning of ETRI. Ideas of creative researches and future technology are actively being mined through the trend analyses of ICT/ convergence-based smart future infrastructure, creative service, and consilience technology.



Industry-Strategy

The main role of industry-strategy research department is to develop successful strategic roadmaps for government-funded research industry, ETRI, and enhancing the competitiveness of Korean ICT industry. This department is accomplishing diverse researches, covering from ICT R&D planning to development of technology policy to development of business model. Specifically, this department encompasses several research areas not only development of policy alternatives for national ICT technical innovation, techno-economic analysis of core ICT R&D but also establishment of regulatory policies and development of business models and strategies for broadcasting-communication market activation.



Standard Research Center

The Standard Research Center(SRC) is a ETRI's specialized group for standardization in ICT area. It directs and collaborates with other divisions to develop domestic and international standards not only for future technologies, but also public services along with ETRI's R&D outcomes. The main areas it has involved include IPTV/Smart TV, smart work, contents networking, overlay service networking, P2P, RFID/USN, M2M/IoT, Green ICT, Future Network, Software Defined Networking, Mobile Web, Next Generation web, Cloud Computing, Mobile Telecommunications, Smart Grid, and so on. Also, the SRC focuses on the development of regulations and national standards on ICT area to serve the public, e.g. Also, performs standardization researches in the field of public infrastructure technologies required by the government such as technical regulation, Emergency Communication, Voice Phishing, Lawful Interception, and Number Portability.

Research Fields



Graphene Electronics Creative Research Center

The Graphene Electronics Creative Research Center is developing various electronic and optoelectronic devices using graphene, a dream nano-material. To carry out research on graphene electronic and optoelectronic devices, it is critical to be able to manufacture massive volumes of high quality graphene, and to secure the technology that enables the control of its properties. This center is developing a high-quality large-scale graphene growth technology through chemical synthesis and CVD growth method and graphene-based flexible devices and systems such as chemical bio sensors, light emitting transistor, ultra high-speed transistors and logic devices, plasmonic optoelectronics, metamaterials, transparent electrodes.

THz Photonics Creative Research Center

Recently, there have been active studies on the application of THz to information and communications technology, security, biology, medicine, non-invasive testing, food and agricultural goods quality control, and environment monitoring. To exploit THz radiation in everyday life, small and cost-effective THz components and systems must be developed. If we adopt photonics technologies, we can benefit from using optical components, electronics components, measurement instruments, and measurement techniques developed for the photonics industries. We are developing THz components such as 1.3/1.55 μ m dual-mode laser diodes, broadband·high-power photomixers, and high-sensitive detectors, and THz systems such as THz spectrometers·imagers, cost-effective THz thickness measurement systems, and tunable THz transceivers based on photonics technology to realize portable THz systems.



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MIT Creative Research Center

The Metal-Insulator Transition(MIT) is a topic for research interest in condensed matter physics field. The MIT is occurred by external parameters, such as temperature, pressure, light and electric or magnetic fields. The MIT Creative Research Center is focused on the MIT, the unsolved riddle of solid state physics, and is researching applied MIT technologies. Mott MIT, which is free from structural transition, is based on the hole-driven MIT theory developed by ETRI. The department is researching the mechanism with diverse strongly correlated materials, using THz spectroscopy, infrared ray and ultraviolet ray based spectroscopy, Raman scattering, I-V analysis, X-ray and meta materials. For the applications of the MIT, the MIT department is researching materials, devices, highly sensitive sensors, MIT-based applied systems, and MIT meta materials. Recently, outstanding research results produced through active joint research with excellent domestic and international research groups.

Transparent Transducer and UX Creative Research Center

In modern technology, the value of user interface is getting more important than the value of technology itself. It is obvious that future electronic devices will require new user interface, and the Transparent Transducer & UX Creative Research Center is studying innovative interfaces for user experience, convenience and intuition. Particularly, future display such as flexible-transparent display will need new interface composed of flexible-transparent components, and the major research area of our lab is developing transparent actuators & sensors, and interaction methodology.



Nano Electron-Source Creative Research Center

The Nano Eletron-Source Creative Research Center is focused on developing ultra-high density field emission electron-sources based on nanoscaled materials, for example, carbon nanotube, graphene and nano wires. Especially, we are developing a core technology of quantum-degenerate limit electron sources to overcome the technical limitation of conventional thermionic and cold cathode ones, and applying them to new-concept devices such as a super-miniatured digital X-ray source, smart X-ray computed tomography system, high-power terahertz source.



Technology Commercialization Division

The role of Technology Commercialization Division is to ensure that the ETRI serves as an innovative partner for technology commercialization. Its goals are promoting technology commercialization to facilitate industrial growth, securing intellectual properties which create value added, cooperating with SMEs and promoting overseas marketing. It focuses on establishing new Eco-Systems for technology commercialization and adding values to the technologies by implementing new business strategies to accomplish those goals. It also provides SMEs with support for technology and human resources to lays foundation for competitiveness of Start-Ups.

Research Fields





SMEs Cooperation Center

The SMEs Cooperation center aims to support SMEs in the ICT and convergence sectors for enterprises which can lead the national economy. To this day, the center is establishing strategies for cooperation between ETRI and SMEs, laying the foundation for start-up ventures to grow, supporting the commercialization efforts of SMEs and expanding its internal and external cooperation activities. In addition, the center is providing tech support services for SMEs using ETRI's technology infrastructure.



Intellectual Property Management Department

The Intellectual Property Management Department focuses on strategic planning to facilitate commercialization of core technologies developed by ETRI. Also, it plays key roles in securing excellent IP and boosting success rates of commercialization through building and implementing business strategies. In order to improve IP productivity and realize the values offered by technology, following activities are performing including the acquisition and management of IPR, contracting of acquired IP, active responses to infringements of intellectual property rights, transfer of ETRI technology to enterprises, patent marketing, expansion of the overseas patent licensing base, and participation in the international standard patent pool.

Overseas Research Centers(ETRI Beijing R&D Center, ETRI USA R&D Center)

The Overseas Research Centers facilitate the commercialization of ETRI-developed technology in local sites and operate joint research projects with local businesses. Currently, the centers research the technologies and search products based on local markets and identify promising technologies for the global market, serving as a technology marketer based on a systematic technology PR network.

In addition, the centers aim to strengthen their network for cooperation with oversea's businesses and related organizations. The center also expand customized support services, and reinforce marketing for ETRI technology-incorporated products in global markets.

The World #1 IPR Factory



ETRI contribute to national competitiveness through attaining International Standards. ETRI ranked #1 Innovation Anchor Scorecard conducted by the US Patent Board for the last two consecutive years.

ETRI will enhance the global status as an IPR factory and accelerate high-added value creation to realized creative economy in Korea.



General Status

- Personnel Status Project Status Patent Application Technology Transfer Standardization SCI Papers ETRI Alumni Companies ETRI Laboratory Enterprise Statu
- 62 Nationwide Research Center
- 63 Grobal R&D Cooperation Network



Number of Project(Unit : cases)

Budget(Unit : million won)









Patent Application(Unit : cases)

Technology Transfer

No. of Technology / Royalty Income : 1,362 cases / 1,728 hundred million won(Total of past 5 years) No. of Technology Transfer Companies : 1,786 cases(Total of past 5 years)



No. of Technology / Royalty Income (Unit : cases, million won)

No. of Technology Transfer Companies (Unit : cases)

Standardization





SCI Papers

No. of SCI Papers / Average IF : 1,366 cases(Total of past 5 years) / 1.80(Average)





No. of SCI Papers(unit : cases)





ETRI Alumni Companies



No. of Alumni companies : 180

No. of Listed Companies : 24(KOSPI : 4, KOSDAQ: 20)

Average Sales : 6.5 Billion won(Among 108 Companies)

TRIGEM COMPUTER Inc., Korea Data Communications Corp., ELEX COMPUTER Inc., COMTEC SYSTEMS Co., Ltd., APEX Inc., BIT COMPUTER Co., Ltd., HANDYSOFT Co., Ltd., Seodu inchip, Inc., Hi-per information & Communications Co, Intelligent Telecommunications Inc., ARALION Inc., GIGA TELECOM INCORPORATED, KORNIC SYSTEMS, LIGTHTRON FIBER-OPTICDEVICES Inc., INNOWIRELESS Co., Ltd., HAVIT Information Co., Ltd., KL Tech, Inc., RFSEMI TECHNOLOGIES Inc., S&S TECH Co., Ltd., NewGrid Inc., BIT Computer Inc., ELK Co., XENER SYSTEMS Co., Korea Materials & Analysis Corp., SECUVE Co., Ltd.

ETRI Laboratory Enterprise Status



From year 2007, ETRI has established 17 laboratory enterprises. ETRI was able to success on commercializing its research results by managing the companies through a holding company while fulfilling its role as the nation's growth engine for new market development and strengthening industries.

What is a laboratory enterprise?

A laboratory enterprise is a company that is established by the government and public research institutes with the capital and management knowledge of private enterprises. This will enable research institutes as technology suppliers and enterprises as users of the technology to form an innovation-oriented network so that technological competitiveness can be developed or transformed into industrial competitiveness, resulting in a competitive edge in the market.

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