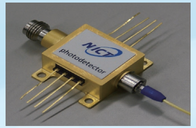
Research outcomes

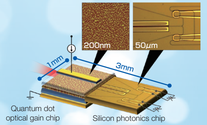
The world's best class photonics devices



Ultra-high speed O/E conversion device

Quantum dot optical semiconductor amplifier

High precision wavelength-tunable quantum dot light source



Heterogeneous quantum dot laser with silicon-photonics technology

Advanced Network Equipments

Optical Packet & Circuit Integrated Node (1st version)

Layer 3 Switch Capable of Automatic Locator Allocation Mechanism HANA

ITU-T Recommendations

Future Networks

Radio-over-fibre technologies and their applications

National Institute of
Information and Communications Technology

Network System Research Institute

NICT National Institute of Information and Communications Technology

4-2-1, Nukui-Kitamachi,
Koganei, Tokyo 184-8795, Japan
URL http://www.nict.go.jp/en/

Network System Research Institute
Tel : +81-42-327-5959 Fax : +81-42-327-7601
E-mail : public-NSRI@ml.nict.go.jp
URL : http://www.nict.go.jp/en/nwsystem/

For inquiries regarding NICT, please contact the Public Relations Department.
Tel : +81-42-327-5392 Fax : +81-42-327-7587
E-mail : publicity@nict.go.jp

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National Institute of Information and Communications Technology

Network System Research Institute

The Network System Research Institute promotes fundamental research and development of global and advanced network system technologies to meet the recent explosive growth in data traffic and for the diversification of communication quality and network service. The research aims to “Connect a Society,” in order to create new opportunities for citizens and revolutionize business and social interactions.

Photonic Network System Laboratory

The Photonic Network System Laboratory performs research into ultrahigh-capacity multi-core fiber transmission technologies and optical integrated network technologies to meet the increased demand for data services, predicted to increase by three orders of magnitude from today by 2020. This research includes investigation of both high-capacity point-to-point transmission and fully dynamic, flexible network systems able to accommodate rapid traffic fluctuation and the diversification of data services. Further research is required to develop basic technologies for optical access networks to allow these high capacity networks to reach increased numbers of subscribers at greater distances and with more power efficiency than currently possible.

Network Science and Convergence Device Technology Laboratory

The Network Science and Convergence Device Technology Laboratory performs research into new network architecture and key enabling technologies to realize innovative networks able to support a myriad of future Internet of Things (IoT) services as well as applications that are aligned with the rapidly evolving cloud technology. In particular, the lab pursues research on technologies for (i) automation of dynamic, on-demand network configuration and control (ii) information dissemination and sharing based on information-centric networking concepts.
In addition, to develop an optical access network capable of accommodating a huge data traffic in 5G mobile and beyond networks, research in the lab is conducted to realize the seamless convergence of optical access and core networks to support high-capacity communications to end users.

Network System Research Institute

Network System Research Institute

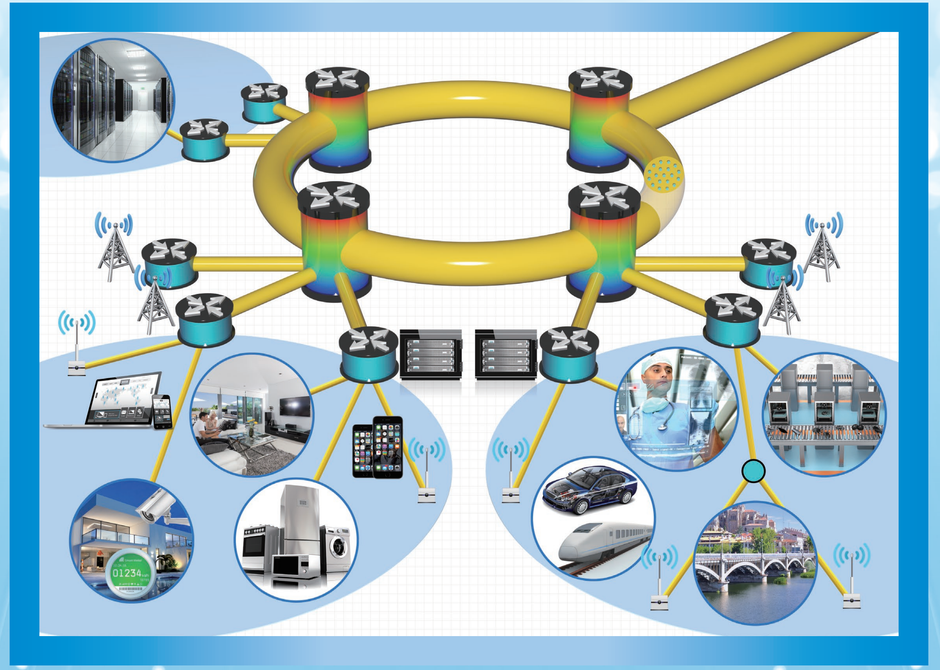
Innovative Network Architecture Technologies

These technologies enable automation of dynamic, on-demand network configuration and control. In particular, the study focuses on automatic and distributed control for resource arbitration among multiple services, for registration and update management of connected devices, and for reconfiguration against network disconnection and/or congestion. The ability to guarantee the service quality in the presence of changing network infrastructures and traffic characteristics is also pursued.
In parallel, technologies for efficient information dissemination and sharing based on information-centric networking concepts are studied. The target is effective dissemination of large size data and human-to-device and/or device-to-device communication data by content-dependent control, routing, and privacy/security issues.

Optical Access Device Technologies

In this area, we conduct research into advanced devices for information and communications technology (ICT) with a focus on high-integration and high-precision for signal transmission, reception, and data-exchange. This research also aims for efficient convergence of fiber and ultra-high frequency radio waves to realize an optical access network utilizing different transmission mediums [Parallel Photonics].
In addition, research of 100-Gbps-class fiber and ultra-high frequency radio wave converged systems [100G Access] and high-speed waveform transfer technology [Sensor on Fiber] enables low-latency transmission of high capacity and broadband sensing signals to end users.

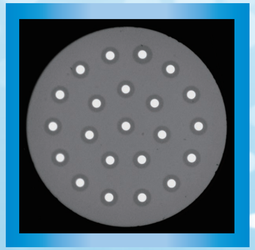
Applications with radio over fibre (RoF) technology
Foreign object debris detection system for runway, Railway Radio communication System between Train and Trackside (RSTT)



Network innovation technologies to transmit huge amounts of information world-wide.

Photonic Network System Technologies

This research develops technologies for ultrahigh-capacity multi-core fiber network systems with more than 1-Peta bps switching nodes. Energy-efficient all optical switching technologies for packet processing without converting optical signals into electrical signals are investigated in addition to optical transmitter and receiver technologies for multicore fibers. To increase achievable capacity, development of basic technologies for spatial super-mode transmission is also performed.
In addition, this research aims to develop optical switching and transport node platforms that can handle different baud rates, communication schemes, and protocols enabled by the reconfiguration of common hardware. Further research develops 1-Tera bps-per-channel class optical transceiver and switching and real-time dynamic control technologies for optical signals in both the time and frequency domain.



22-core fiber

Optical Integrated Network