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- ▶ Kazuhide Nakajima, Senior Distinguished Researcher, NTT Access Network Service Systems Laboratories

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## Front-line Researchers

### Kazuhide Nakajima, Senior Distinguished Researcher, NTT Access Network Service Systems Laboratories

#### ▼ Overview

Data communications in Japan currently exceeds 2.5 Tbit/s, but it is predicted that demand will rise to 10 Pbit/s by the late 2020s. This forecast is creating concern that the transmission capacity of the existing optical fiber infrastructure could reach its limit. Kazuhide Nakajima is a Senior Distinguished Researcher at NTT Access Network Service Systems Laboratories, where researchers are working to solve this fast-approaching problem. We asked him about the latest research achievements in this field and his mindset as a researcher.



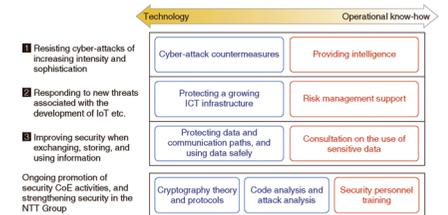
## Feature Articles

### Security Concerns—Growing Threats and Business Opportunities

### Research and Development of Security Concerns Relating to Growing Threats and Business Opportunities

#### ▼ Abstract

The Internet of Things era has resulted in many devices with security vulnerabilities being connected to networks, and this is resulting in a rapid increase in the number of security threats in new areas such as infrastructure facilities that have up to this point been regarded as safe. On the other hand, it is also creating new business opportunities with the utilization of diverse information. This article introduces the security research and development strategy of NTT laboratories from two perspectives: defeating new threats based on an understanding of environmental changes of this nature, and strengthening the competitiveness of our business.



## Regular Articles

### Discovery of a Stable Molecular State Consisting of Photons and an Artificial Atom

#### ▼ Abstract

In a joint study with the National Institute of Information and Communications Technology and the Qatar Environment and Energy Research Institute, we have conducted experiments to alter the strength of interactions between a superconducting artificial atom and microwave photons. We have confirmed the existence of a qualitatively new lowest energy ground state where an artificial atom is dressed with virtual photons to form a novel type of molecule. Our research makes it possible to control the interactions between matter and light over a range of energies orders of magnitude higher than has hitherto been possible. This is expected to have applications in quantum technologies including quantum communication, quantum computing, and next-generation ultraprecise atomic clocks.

