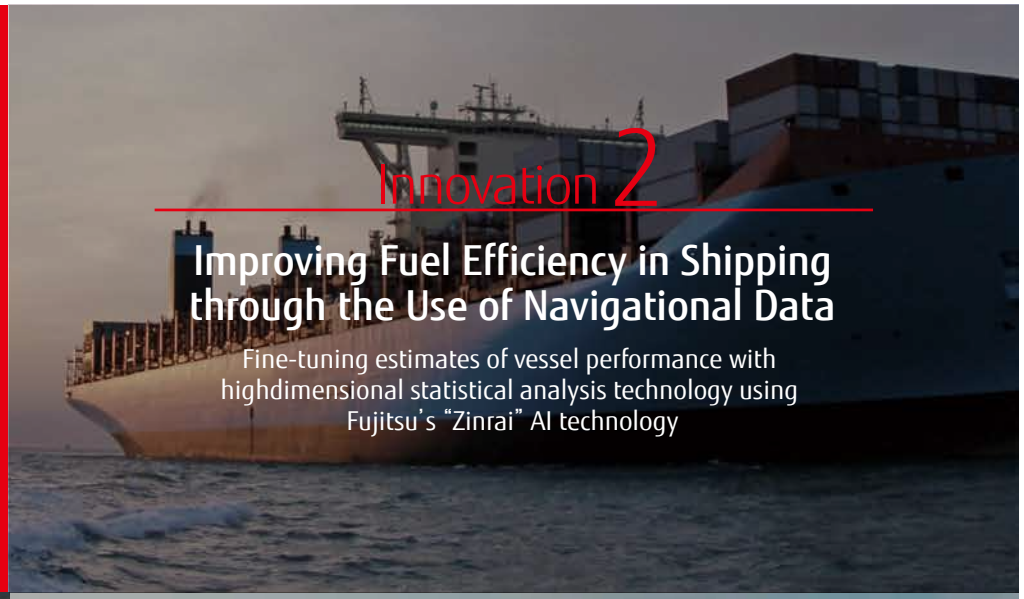
Special Feature 2

Digital Innovation

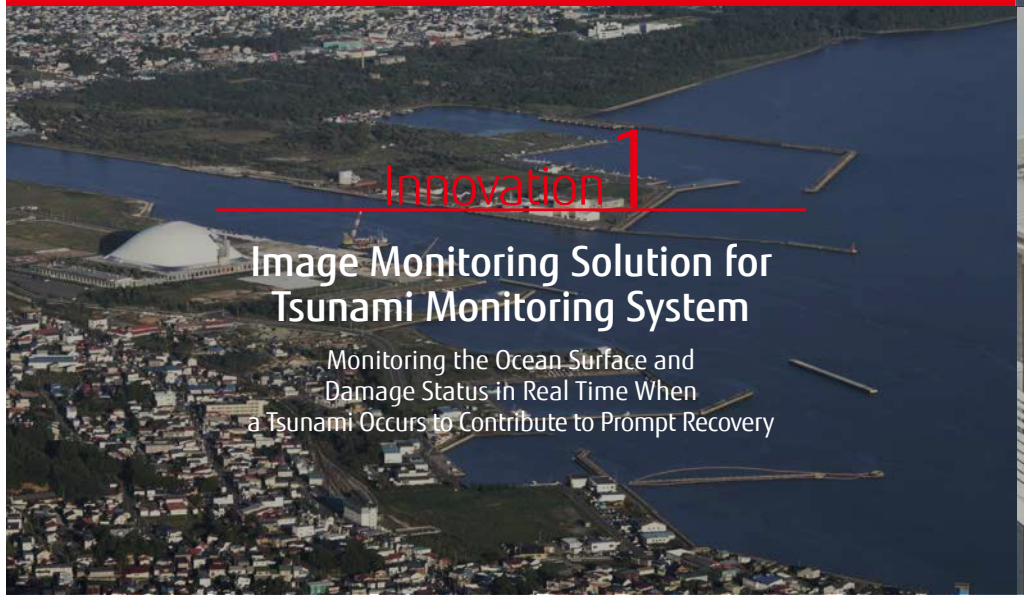
for Sustainable Development



Innovation 2

Improving Fuel Efficiency in Shipping through the Use of Navigational Data

Fine-tuning estimates of vessel performance with highdimensional statistical analysis technology using Fujitsu's "Zinrai" AI technology



Innovation 1

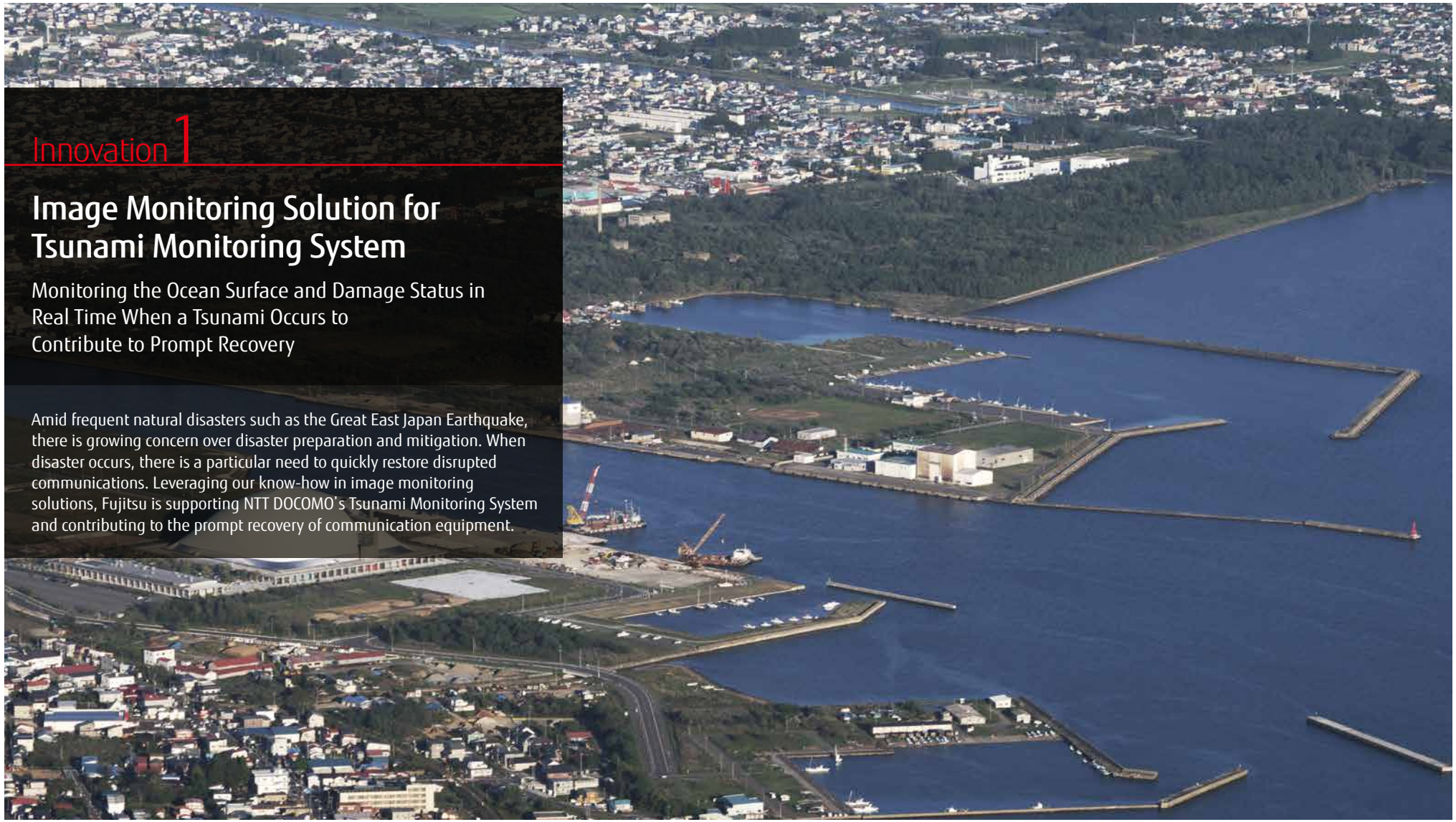
Image Monitoring Solution for Tsunami Monitoring System

Monitoring the Ocean Surface and Damage Status in Real Time When a Tsunami Occurs to Contribute to Prompt Recovery

Innovation 3

Rooftop Solar Power Project Leveraging IoT + Cloud Technologies

Supporting Stable System Operation through Fujitsu's Solar Power Monitoring Service that Supports Maintenance Service



Innovation 1

Image Monitoring Solution for Tsunami Monitoring System

Monitoring the Ocean Surface and Damage Status in Real Time When a Tsunami Occurs to Contribute to Prompt Recovery

Amid frequent natural disasters such as the Great East Japan Earthquake, there is growing concern over disaster preparation and mitigation. When disaster occurs, there is a particular need to quickly restore disrupted communications. Leveraging our know-how in image monitoring solutions, Fujitsu is supporting NTT DOCOMO's Tsunami Monitoring System and contributing to the prompt recovery of communication equipment.

Innovation 1 Image Monitoring Solution for Tsunami Monitoring System

Monitoring the Ocean Surface and Damage Status in Real Time When a Tsunami Occurs to Contribute to Prompt Recovery

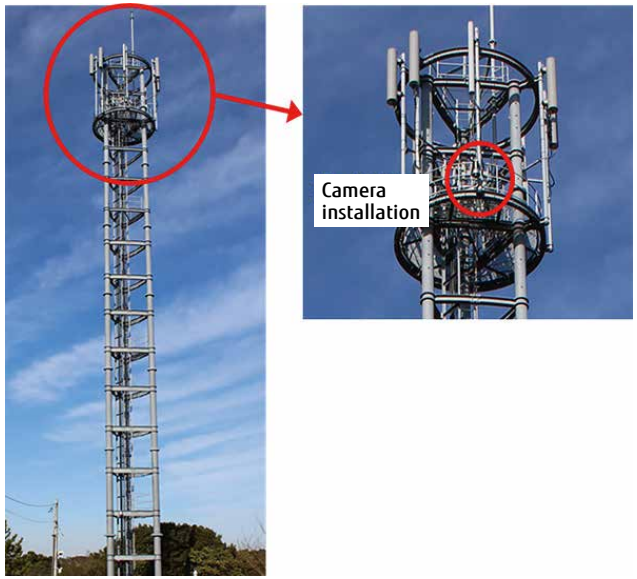
With a variety of natural disasters seen in recent years, concern over disaster preparation and mitigation is rising. For telecommunications carriers in particular, prompt recovery of base stations and other equipment is an imperative following a disaster.

In response, NTT DOCOMO launched operation of its Tsunami Monitoring System in March 2016. The system installs high-performance monitoring cameras in base stations along the coast to monitor the ocean surface offshore when a tsunami occurs. Operated remotely, the cameras can also confirm the damage status of the base stations' communications equipment. Images picked up by the cameras can be assessed in real time, which is expected to aid in the prompt recovery of base stations.

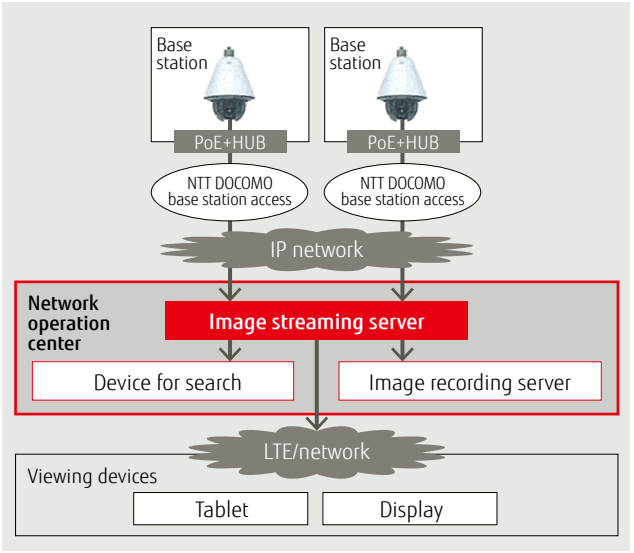
Fujitsu offers an image monitoring solution that includes monitoring cameras and networking equipment, providing total support that extends from high-resolution acquisition, storage, management, and encryption of images to transmission of images to devices. Using advanced compression and transmission technology, the system sends images in real time to NTT DOCOMO's network operation center.

Fujitsu has enabled multi-vendor selection of cameras from among multiple models according to desired features, has enabled a secure network environment to prevent leaks of monitored images, and has enabled the transmission of images to smartphones, tablets, and other devices, achieving a system that offers convenience and reliability. Moreover, as some utilize independent power sources based on solar panels, they can continue monitoring even after a disaster, thus contributing to the reduction of environmental impacts and electricity expenses.

At present, the monitoring cameras are installed in four locations, including the city of Shima in Mie Prefecture. Drawing on our extensive track record of implementing image monitoring solutions, we will support NTT DOCOMO's tsunami monitoring system, cooperate with disaster countermeasure initiatives, and contribute to the creation of a safe and secure society.



Overview of system



Innovation 2

Improving Fuel Efficiency in Shipping through the Use of Navigational Data

Fine-Tuning Estimates of Vessel Performance with High-Dimensional Statistical Analysis Technology Using Fujitsu's "Zinrai" AI Technology

Annual CO_2 emissions associated with marine transportation are about 900 million tons, or about 3% of global CO_2 emissions*. The marine transportation industry is being asked to improve fuel efficiency in order to reduce CO_2 emissions. Fujitsu has developed technology for applying and analyzing ships' operational data and precisely estimating fuel efficiency in actual sea conditions. Through this, we will contribute to increased fuel efficiency in ships.

* Values for FY 2012.

Innovation 2 Improving Fuel Efficiency in Shipping through the Use of Navigational Data

Fine-tuning estimates of vessel performance with highdimensional statistical analysis technology using Fujitsu's "Zinrai" AI technology

In recent years, the environmental impacts, economy, and safety of marine transport have become major issues for the shipping industry. Annual CO_2 emissions associated with marine transportation are about 900 million tons, or about 3% of global CO_2 emissions. In 2013, global CO_2 emissions regulations for new shipbuilding were adopted. Moreover, the annual cost of fuel is hundreds of billions of yen, making the reduction of fuel consumption an important issue.

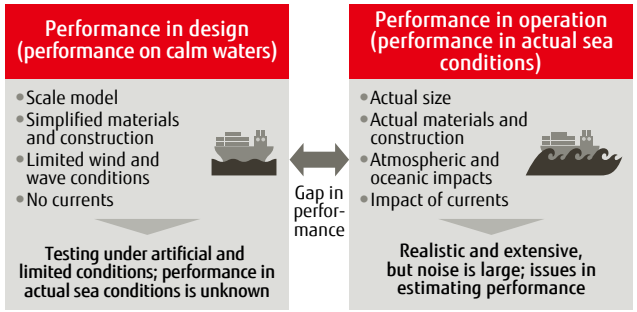
To overcome such issues, movements have begun in the marine transportation industry to collect, store, and analyze navigational data under stormy weather for use in planning safe and economical ships and in navigating ships in rough seas. However, estimation of ship performance in the past has relied on physics model simulations and water tank experiments using models, techniques that are unable to take into account the complex interactions of ship status, wind, waves, currents, and so on in actual seas, thus significantly compounding prediction errors.

In response, Fujitsu Laboratories Ltd. has applied and analyzed big data from actual sea conditions and has developed technology that precisely estimates fuel efficiency, speed, and other ship performance factors with an error of 5% or less. The technology uses proprietary high-dimensional analytical technology based on Fujitsu's "Zinrai" AI technology to analyze and learn from meteorological and hydrographical sensor data, ship engine log data, ship speed and location data, and other big data collected during actual passage, in order to estimate ship performance.

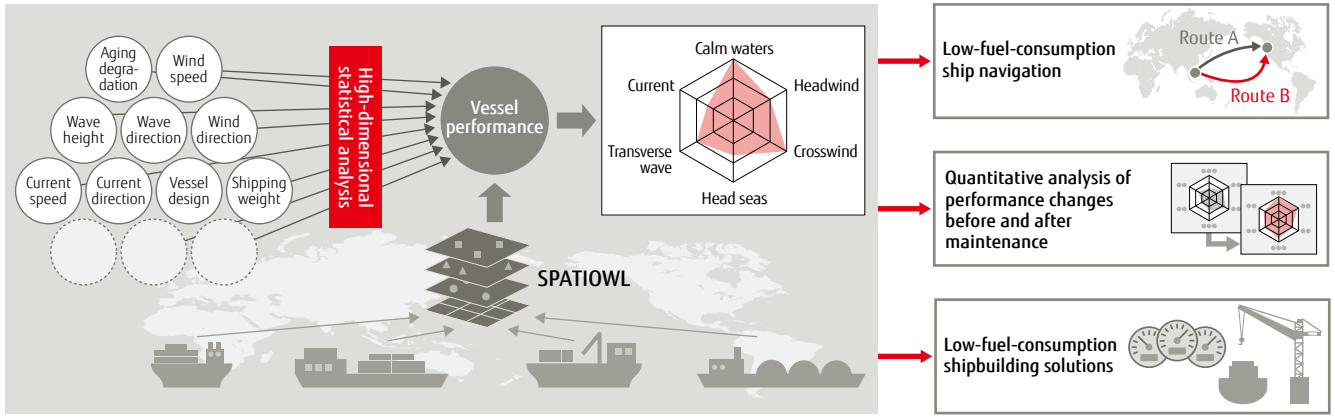
By incorporating the research results into the Weather Routing Simulation of Tokyo University of Marine Science and Technology and performing evaluation, the technology confirmed that fuel efficiency improvement of about 5% compared with shortest-route passage is possible. The technology has enabled the accurate prediction of actual ship performance in actual sea conditions, and will enable significant fuel efficiency improvements that can be fed back into ship performance evaluations and design and can be applied to ship navigation.

We plan to further improve the precision of predictions through joint research with Tokyo University of Marine Science and Technology. We will further carry out demonstrations applying the technology to diverse routes and vessel types, and aim to offer services through Fujitsu's location information cloud service, FUJITSU Intelligent Society Solution SPATIOWL, in fiscal 2016.

Gap in performance in design and operation



High-precision Estimate of Vessel Performance in Actual Sea Conditions



Innovation 3

Rooftop Solar Power Project Leveraging IoT + Cloud Technologies

Supporting Stable System Operation through Fujitsu's Solar Power Monitoring Service that Supports Maintenance Service

Amid expectations for the expansion of renewable energy, Leopalace21 Corporation, a developer of leased residential properties, operates its Roof Mega Solar Project.
Fujitsu supports this project with an IoT and cloud-based monitoring service that contributes to the expansion of solar power.

Innovation 3 Rooftop Solar Power Project Leveraging IoT + Cloud Technologies

Supporting Stable System Operation through Fujitsu's Solar Power Monitoring Service that Supports Maintenance Service

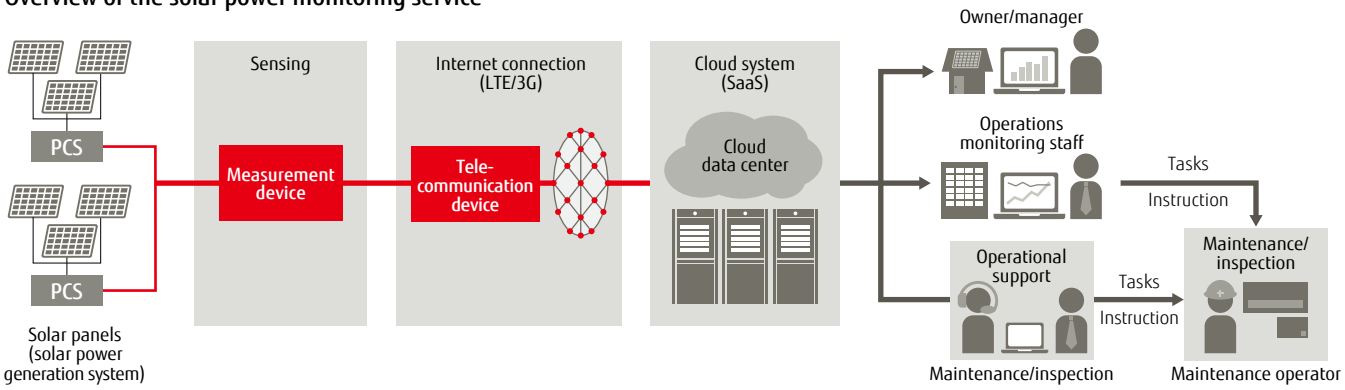
Leopalace21 Corporation is a major company in the rental property business. Seeking to conserve energy and reduce emissions of CO_2, the company launched a new project in 2011 to install solar power systems on the rooftops of its managed properties. However, the initial cost of installing rooftop solar power systems on rental properties is high and the burden on the property owners is large. In addition, solar power systems are exposed to wind, rain, and other elements, making them susceptible to failure and reduced power generation performance caused by external factors. These issues hindered the expansion of Leopalace21's new project.

Around the same time, Fujitsu launched a new business model for central management of its solar power remote monitoring service to support maintenance service. This was aimed at promoting the spread of solar power in residences in Fukushima Prefecture, which suffered extensive damage from the Great East Japan Earthquake. However, Fujitsu lacked know-how for selling to the residential market, and faced issues in growing the business.

Accordingly, Fujitsu approached Leopalace21, which develops rental properties nationwide, to propose an idea that paired the rental of rooftops from owners with the solar power monitoring service that combines the IoT and the cloud. Owners of the residential properties are able to earn fees from renting out their rooftops, without having to bear the initial expense of system installation. Through this innovative business model, the Roof Mega Solar Project was launched to aid the expansion of solar power. As of September 2015, the project has installed solar power generation equipment on the rooftops of 4,500 buildings.

Through sensors in solar power systems installed on rooftops in rental properties around the country, Fujitsu's solar power monitoring service collects data on solar panels' power generation, comparisons of amount of sunlight and expected power generation, and other data, every minute. The information obtained is sent to the data center every five minutes. When the system detects a problem, it sends an email alert to the operations monitoring center; if the center determines that a failure has occurred, maintenance workers are dispatched to the site. In this way, the system achieves central management, and by detecting trouble early, it prevents the loss of opportunities for power generation and helps achieve the stable operation of solar power generation systems.

Overview of the solar power monitoring service



Data sent from sensors installed in solar power generation system