Basic Policy on Research and Development

The Company advances the following research and development with a balanced approach. These R&D efforts reinforce and reform our existing businesses and promote the creation of new value, in order to solve a variety of social issues through advanced technologies and contribute to the realization of a sustainable society.

(i)   Thoroughly enhance core technologies that drive increased profitability

(ii) Continuously deepen common fundamental technologies that form the foundation for the Company's businesses

(iii) Investigate and create new technologies as the source of future growth

In fiscal 2022, the Company will particularly work to accelerate the application of AI technologies in its businesses, build out and enhance its IoT technology infrastructure, and reform development methods through DX. The Company will also accelerate development and create value through proactive utilization of open innovation with universities and other external R&D institutions.

During fiscal 2021, the total R&D expenses for the entire Group have amounted to 190.5 billion yen (8% decrease compared to the previous fiscal year). Representative achievements are as follows.

● R&D policy

*1 SDGs : "Sustainable Development Goals" adopted by the United Nations as goals to achieve towards 2030
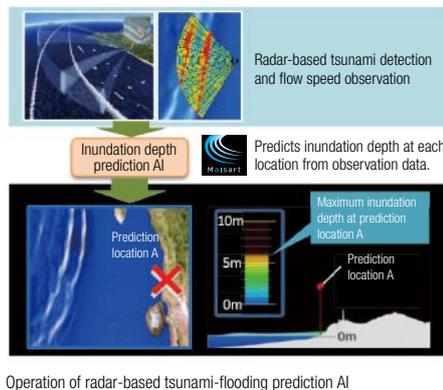*2 Society 5.0 : Defined in the 5th Science and Technology Basic Plan.

Major R&D Achievements in Fiscal 2021

Development of Radar-based Tsunami-flooding Prediction AI

Incorporating the AI technology "Maisart"[1], the Company has developed an AI technology[2] that forecasts water inundation depths[3] nearly simultaneously with the detection of a tsunami with a high degree of accuracy. This development trains an AI on the relationship between flow speed and inundation depths using simulations of various earthquakes. When an earthquake occurs, the AI detects the tsunami and observes the flow speed via radar, and calculates the inundation depth at the prediction site. The new system is able to provide a more accurate prediction in just several seconds after the detection of the tsunami, while the conventional system took several minutes to make a prediction.

Through this development, the Company will support rapid formulation of evacuation plans and prevent or mitigate disasters in local inland areas.

Radar-based tsunami detection and flow speed observation

Inundation depth prediction AI — Predicts inundation depth at each location from observation data.

Operation of radar-based tsunami-flooding prediction AI

*1 Mitsubishi Electric's AI creates the State-of-the-ART in technology: Mitsubishi Electric's AI technology brand aimed at making every device smarter
*2 Developed jointly with Society for the Promotion of Construction Engineering of the General Incorporated Foundation
*3 Height of water level measured from the ground

Development of New Technology to Realize Small, High-efficiency GaN Power Amplifier Module for 5G[1] Base-Stations

5G base-stations operate many multiple-element antennas in a coordinated manner. For this reason, the antenna elements must be mounted densely on the base-station, and there is demand to reduce the size of each component as well as their power consumption. The Company has developed a new technology to realize a gallium nitride (GaN) power amplifier module for 5G base-stations. This module offers a combination of compact footprint and extra-high power-efficiency exceeding an unprecedented rating[2] through proprietary high-density mounting technology and high-efficiency circuit-design technology. This technology reduces footprint by blocking interference between chip components based on advanced electromagnetic field analysis methods. It also uses GaN transistors capable of highly efficient operation, which reduce power loss by minimizing the number of chip components.

The module will help to improve installability due to the compact footprint and to reduce the power consumption of 5G base-stations.

Installation of the GaN power amplifier module at a 5G base-station
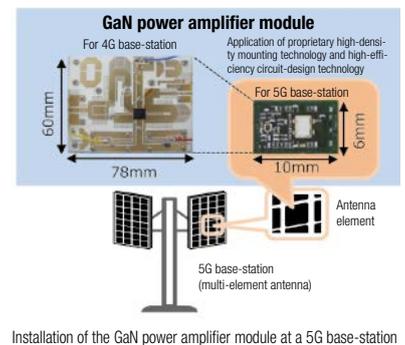
*1 5G: Fifth-generation mobile communication system
*2 According to internal research as of July 14, 2020.

> Contributing to disaster prevention and reduction by predicting tsunami inundation depth with high accuracy immediately after the tsunami is detected

> Contributing to easier installation and lower power consumption for 5G base-stations applying proprietary high-density mounting technology and high-efficiency circuit-design technology