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NTT DOCOMO, INC.

NTT Corporation

NIPPON CAR SOLUTIONS CO., LTD.

Start of Demonstration Experiment for Base Station Power Rescue System Using Electric Vehicles

*Providing Reliable and Safe Communication Services with Speedy Power Supply
during Power Outages through AI-Based Dispatch Planning*

NTT DOCOMO, INC. (hereinafter referred to as DOCOMO), NIPPON TELEGRAPH AND TELEPHONE CORPORATION (NTT), and NIPPON CAR SOLUTIONS CO., LTD. (NCS) will start a demonstration experiment on January 12, 2024, as part of their enhanced disaster response measures involving responding to power outages. This experiment focuses on a base station power recovery system utilizing electric vehicles (EVs).

The system for this experiment comprises DOCOMO's Energy Management System (EMS) platform for monitoring and controlling base station power, NTT's AI-based vehicle dispatch planning created using deep reinforcement learning *1, and real-time EV data (including location, stored power, and driving data) collected by NCS. The objective is to efficiently dispatch optimally located and charged EVs to power-downed base stations. This validation will take place from January 12 to June 30, 2024. Furthermore, NTT is a member of the EV100 initiative *2, and this demonstration experiment is conducted as part of the initiative's efforts.

During power outages, base stations currently provide communication services using backup batteries for a limited time and deploy generators for extended outages. This experiment aims to enhance disaster response by effectively using EVs, which are expected to become more common as corporate vehicles.

In the event of a disaster, when a power outage occurs at a base station

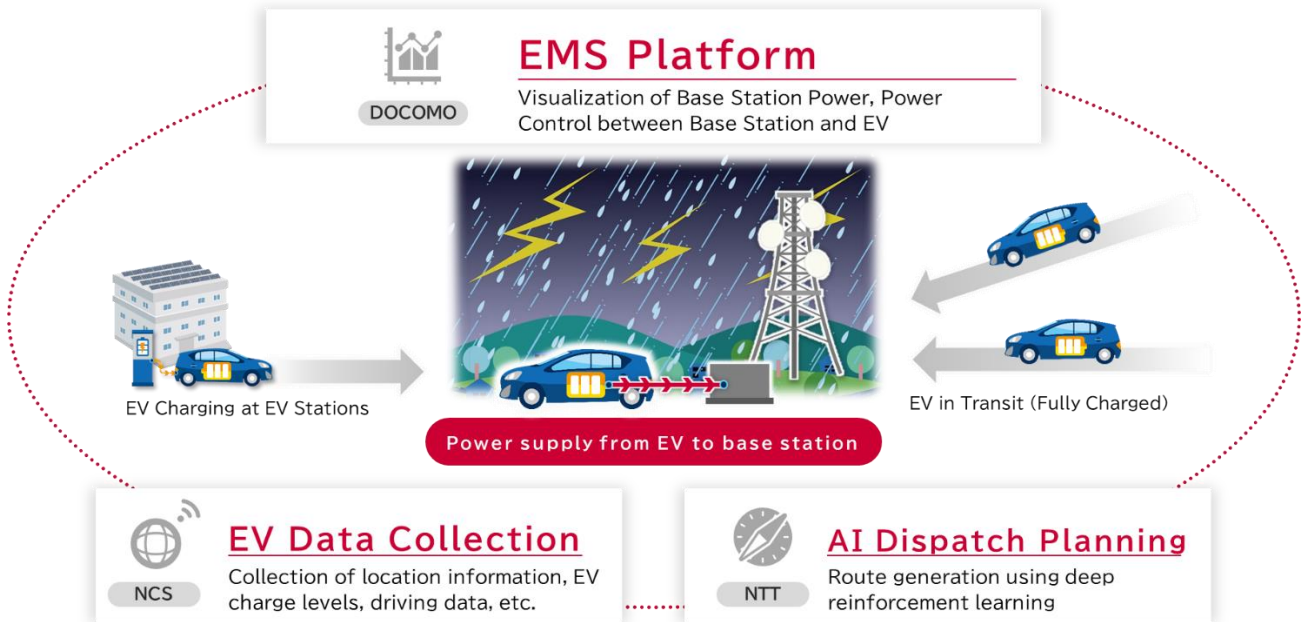


Fig. Overview of This Demonstration Experiment

This initiative will be showcased at the "docomo Open House'24" hosted by DOCOMO, starting January 17, 2024.

(<https://docomo-openhouse24.smarketing.jp/public/application/add/32>)

*1: Deep reinforcement learning is a combination of reinforcement learning and deep learning.

*2: EV100 is an international initiative aimed at promoting the use of electric vehicles and related infrastructure among businesses. In 2018, NTT became the first telecommunications operator to join the initiative.

■ Media Contact Information Regarding This Matter

NTT DOCOMO, INC.

Energy Tech Group X-Tech Development Department

press-xt-energy@ml.nttdocomo.com

NTT

Public Relations, NTT Information Network Laboratory Group

nttrd-pr@ml.ntt.com

NIPPON CAR SOLUTIONS CO., LTD.
Corporate Planning Division
ncs-pr@ncsol.co.jp

Overview of the Demonstration Experiment

1. Purpose

To investigate the efficiency of the EV-based base station power recovery system in dispatching optimal EVs for speedy power supply to power-downed base stations.

2. Experiment Details

Experiments simulating power outages will be conducted to evaluate and identify challenges in the base station power recovery system. These include:

- Creating dispatch plans for each EV on the basis of base station information and EV data, simulating a wide-area power outage in Chiba Prefecture and validating the effectiveness of the AI-based dispatch planning by actually driving the EVs as per the plans.
- Testing whether the base station batteries charge as expected during the planned power supply from the EVs and evaluating the efficiency of the power supply plan developed by the EMS platform.

3. Technologies Used in the Experiment

The experiment will utilize the following technologies:

EMS Platform	<ul style="list-style-type: none"> • Monitors the charge status of each base station and formulates power supply plans. • Controls efficient direct current power supply after connecting EVs to base stations.
AI-Based Dispatch Planning	<ul style="list-style-type: none"> • Generates routes for multiple EVs to achieve timely arrival at base stations before their batteries deplete and to reach charging stations before the EV's own battery runs out. • Speeds up traditional route generation issues through the application of deep reinforcement learning. <p>Reference: https://ntt-dkiku.github.io/rl-evrpeps/</p>
EV Data	<ul style="list-style-type: none"> • Collects information such as the location, stored power, and driving data of each EV. • Provides access to and disseminates collected data.

4. Experiment Period

January 12 to June 30, 2024.

5. Roles of Each Company

DOCOMO	<ul style="list-style-type: none">• Planning and overall management of the experiment.• Providing power-sharing technology between base stations and EVs; evaluating the driving results of the EVs.
NTT	<ul style="list-style-type: none">• Providing the route generation technology and AI-based dispatch planning for efficient EV circulation.• Examining challenges for improving accuracy and practicality of the route generation technology and AI dispatch planning.
NCS	<ul style="list-style-type: none">• Collecting and providing EV information• Examining challenges related to the provision of EV information.



Fig. Image of the Demonstration Experiment (State of Power Connection between the EV and the Base Station)