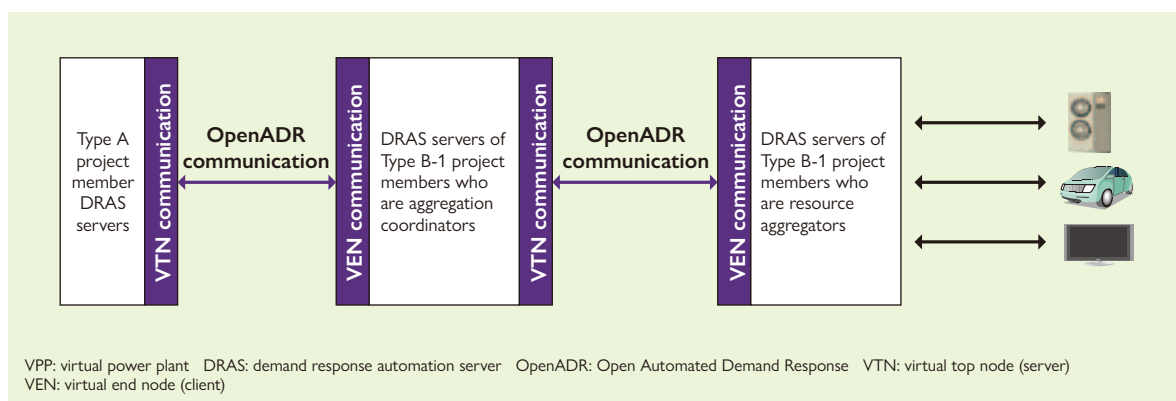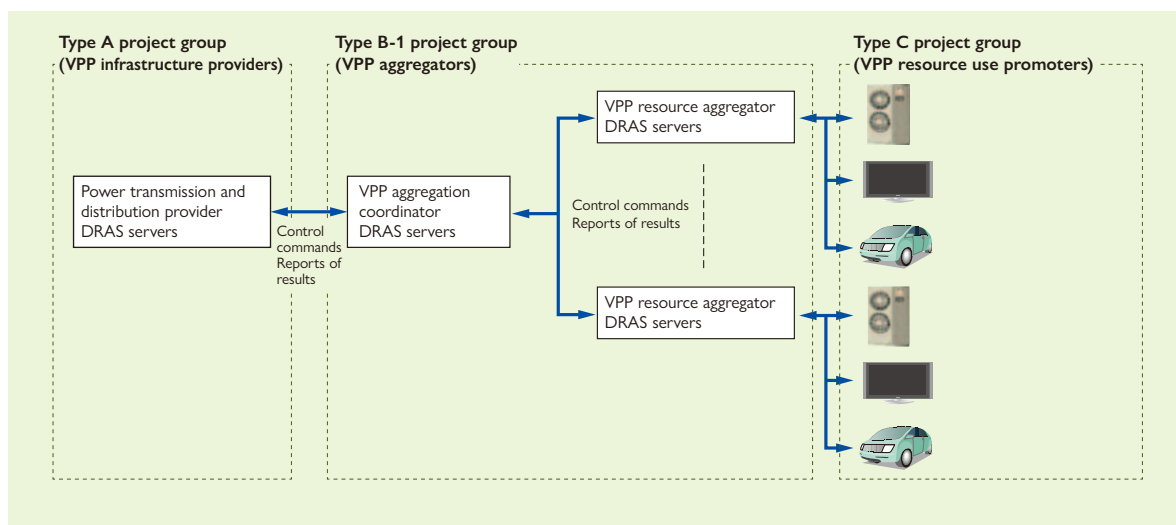# Social and Public Sector Systems

1 Common VPP Solution Package

A virtual power plant (VPP) is a system that uses information and communication technology (ICT) to control and use distributed sources of energy such as photovoltaic power generation systems and storage batteries as though they were a single conventional power supply. The Virtual Power Plant Construction and Demonstration Project is an initiative currently underway by Japan's Ministry of Economy, Trade and Industry to demonstrate the use of VPPs for adjusting power supply and demand.

Hitachi has developed a common VPP solution package that provides basic demand response automation server (DRAS) functions such as communication using the Open Automated Demand Response (OpenADR) international standard protocol for demand response. In this demonstration project, the package is being used for the DRAS servers of participants such as Type A project members (VPP infrastructure providers) and Type B-1 project members who are aggregation coordinators. This package also has an application programming interface (API) used to call OpenADR communication functions from user programs, and it is also being used by the DRAS servers of Type B-1 project members who are resource aggregators.

VPP: virtual power plant   DRAS: demand response automation server   OpenADR: Open Automated Demand Response   VTN: virtual top node (server)
VEN: virtual end node (client)

1 Virtual Power Plant Construction and Demonstration Project (top) and server connection using OpenADR communication (bottom)

## 2 Demonstration Test Using Technology Combining Blockchain and PBI

With recent advances in financial technology (fintech) accelerating the creation of new blockchain-based services, blockchain use is being studied by a variety of business areas not limited to financial services.

In a demonstration test of a blockchain-based service, Hitachi's public biometrics infrastructure (PBI) has been used to create a coupon payment system with a user authentication function implemented on a blockchain platform. Employees of Hitachi and Japanese telecommunications giant KDDI Corporation have validated the system's effectiveness through testing done at KDDI's au* SHINJUKU cell phone store and a fast food franchise store in Tokyo. The test examined the effectiveness of the operation flow for using coupons after users had been registered and authenticated with PBI.

The system enables registered users to authenticate themselves just by presenting a finger, eliminating the need to show a coupon in the store and enabling payment without any tangible medium of exchange. It can be expected to improve user convenience by making the processing procedure for using coupons simpler and faster than with conventional paper or electronic coupons.

Since coupon usage histories recorded in blockchains are very difficult to falsify, service providers can easily share coupon usage histories with guaranteed reliability. Payments dependent on the number of coupon users can also be made with a high degree of accuracy.
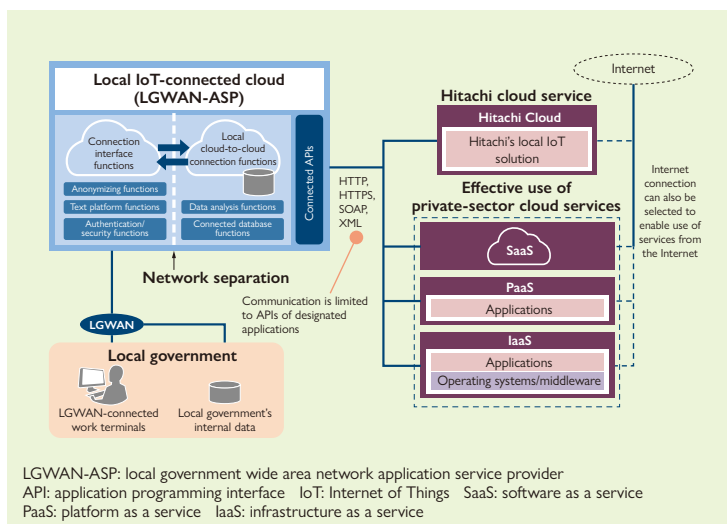
* See "Trademarks" on page 158.

PBI: public biometrics infrastructure
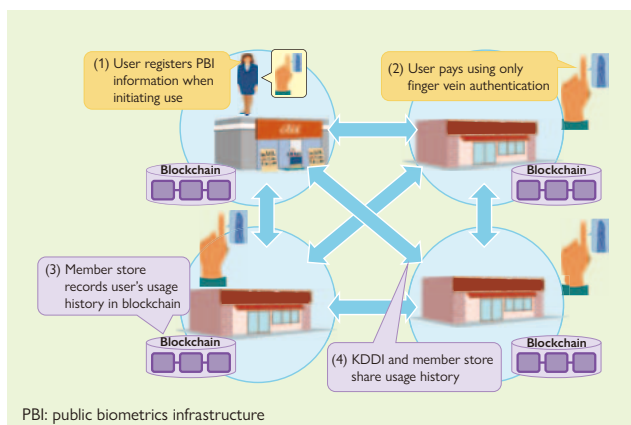
2 Overview of demonstration test

3 Public Cloud Use Based on Model for Improving Local Government Network Robustness

Demand for the use of public/private-sector data and clouds has been growing recently. With the release of a local government network robustness model by the Ministry of Internal Affairs and Communications in FY2013, Japan's local government networks are now divided into three layers, and text-only email communication is used to prevent virus infections. The three layers are (1) systems using Individual Numbers (Japan's national ID numbers issued to all residents), (2) systems connected to local government wide area networks (LGWANs), and (3) systems connected to the Internet. The use of public clouds from LGWAN-connected systems has become an obstacle as a result since LGWANs are the main networks for system public/private-sector data usage and local government office work systems. To solve this problem, a local Internet of things (IoT)-connecting cloud service was announced on August 20, 2018. To support network separation, this service uses the application layer to relay communication. To provide text-only communication, it limits communication to the APIs of designated senders/receivers. This service is expected to increase the amount of business done using public clouds from LGWAN-connected systems.

LGWAN-ASP: local government wide area network application service provider
API: application programming interface   IoT: Internet of Things   SaaS: software as a service
PaaS: platform as a service   IaaS: infrastructure as a service

3 Using the local IoT-connecting cloud service