Development of Communication Platform for Next Generation Distribution and Demand-Side Systems

Hiroyuki Yusa and Tetsuo Otani
Senior Research Scientist, System Engineering Laboratory,
Central Research Institute of Electric Power Industry (CRIEPI)
Yokosuka, Japan

Hiroyuki Henmi
Assistant Senior Engineer, Research & Development Group, Meidensha Corporation
Tokyo, Japan

Yutaka Arai
Senior Technical Expert, Power & Social infrastructure System Business Unit,
Meidensha Corporation
Tokyo, Japan

Abstract

It is expected that interactions among electric power utilities and their customers will progress according to increase of renewable energy resources such as photovoltaic generation systems connected to distribution systems and expansion of introduction of demand-side systems for advanced metering infrastructure and demand response. The progress will accelerate digitalization of the utilities. ICT for the exchange of various information among the utilities and their customers will play an important role for creation of added value by the digitalization. So it is important to facilitate information exchange among systems. On the other hand, IEC 61850, IEC 62056 and OpenADR are indispensable standards for each communication in the systems. To realize the interaction among these systems, it is necessary to apply and integrate these standards properly. As Extensible Message and Presence Protocol (XMPP) has a possibility to be applied to and integrate these communications, we proposed a communication platform based on XMPP as the data transmission protocol. The platform involves common application programming interface (API) for XMPP messages. Each data of application protocols is assembled to XMPP message so the platform can handle every communication protocols defined in the standards without concerning the difference of the protocols.

We developed an experimental system incorporating the common API and application programs which include programs for the communication in IEC 61850 protocol between master and field controller of distribution automation application. The results of the experiment shows that the function of the platform worked properly. We also measured communication performance with generic computer equipment and communication line then confirmed the applicability of the platform for the distribution automation application.