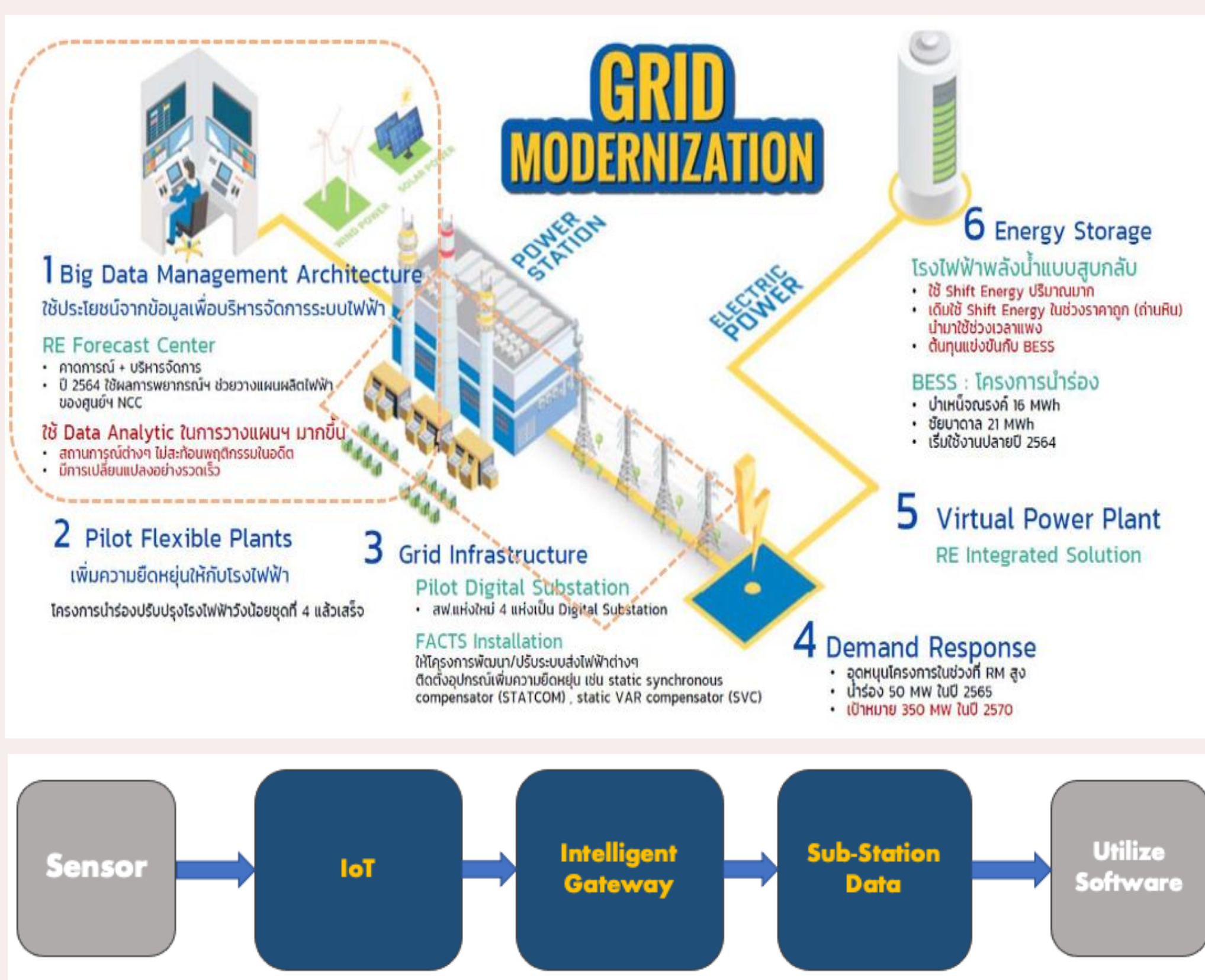


# Intelligent Gateway & IoT Sensing System for Power Grid Assets Utilization Management.

## Introduction

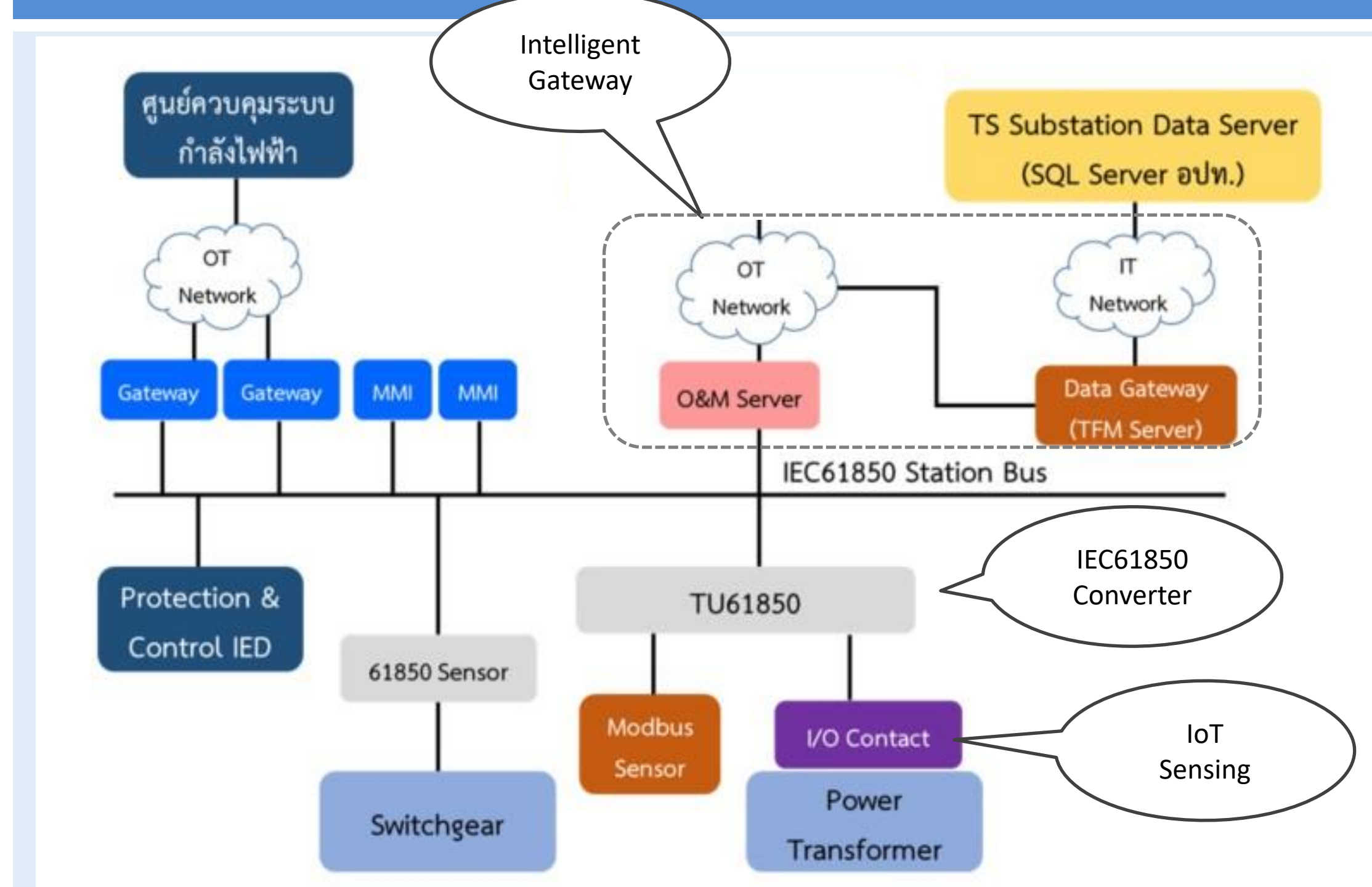
Important components in high-voltage substations such as transformers, circuit breaker These devices are critical to the reliability of power transmission systems and are expensive, requiring data to be utilized. In addition to being used in Realtime Monitoring systems within high-voltage power stations such as

- Equipment health forecasting system.
- Online Condition based Maintenance system.
- Big Data of high voltage station information.
- Research in areas such as AI, ML, Digital Twin, GIS.
- WEB Based Real-time Dashboard.



Install more IoT sensors Or add IoT devices to existing sensors and modify them to Standard Digital Protocol (IEC 61850), or may have to develop their own sensors. and to develop a process for transmitting these data to be the main database of equipment in high-voltage substations in order for users to apply

## How it's work



1. Develop Proxy Real-time Software.
2. Develop Restful Server Software.
3. Develop Substation Data Gateway Software.
4. Substation Database Database Design.
5. Design and development of IoT devices for measuring.

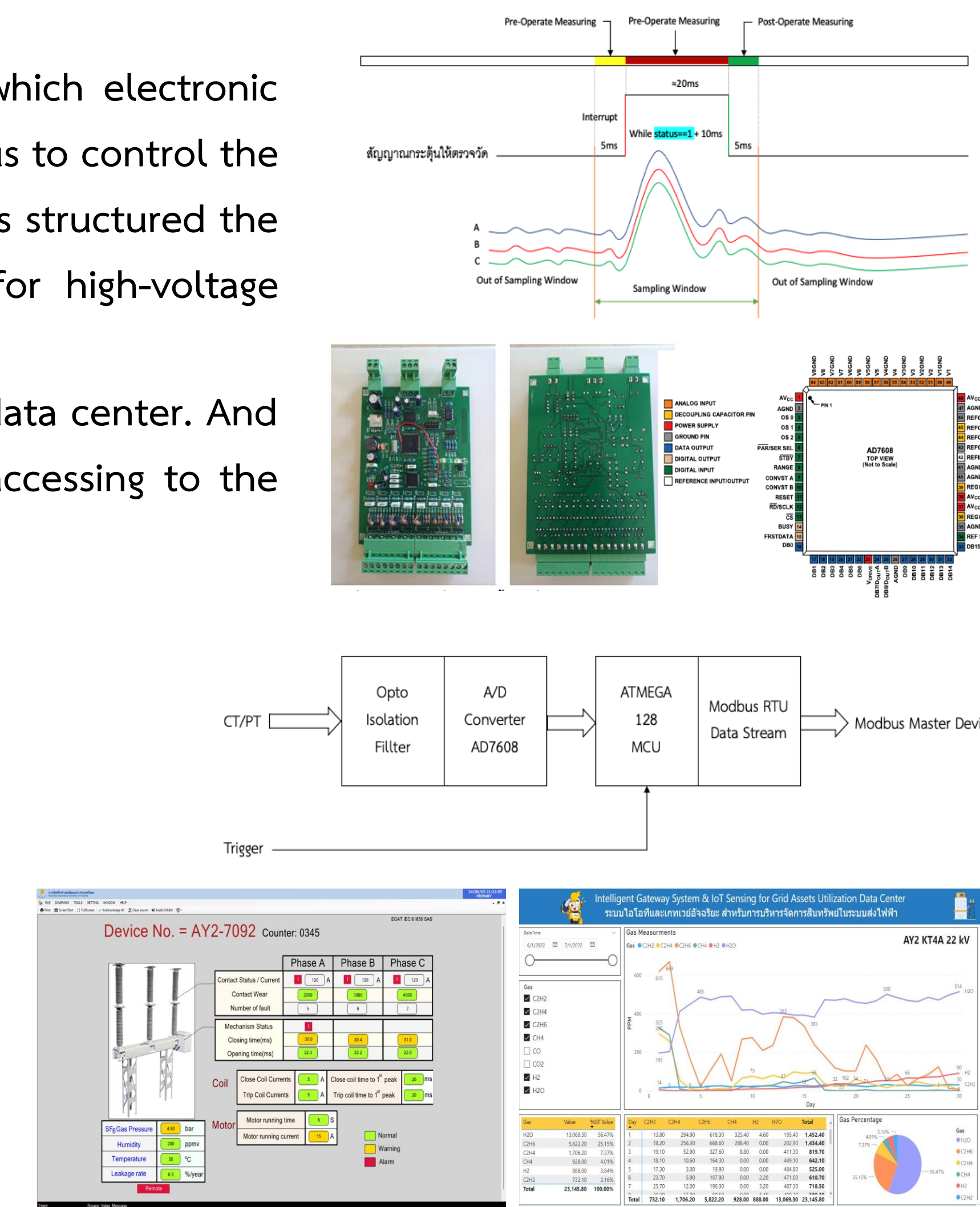
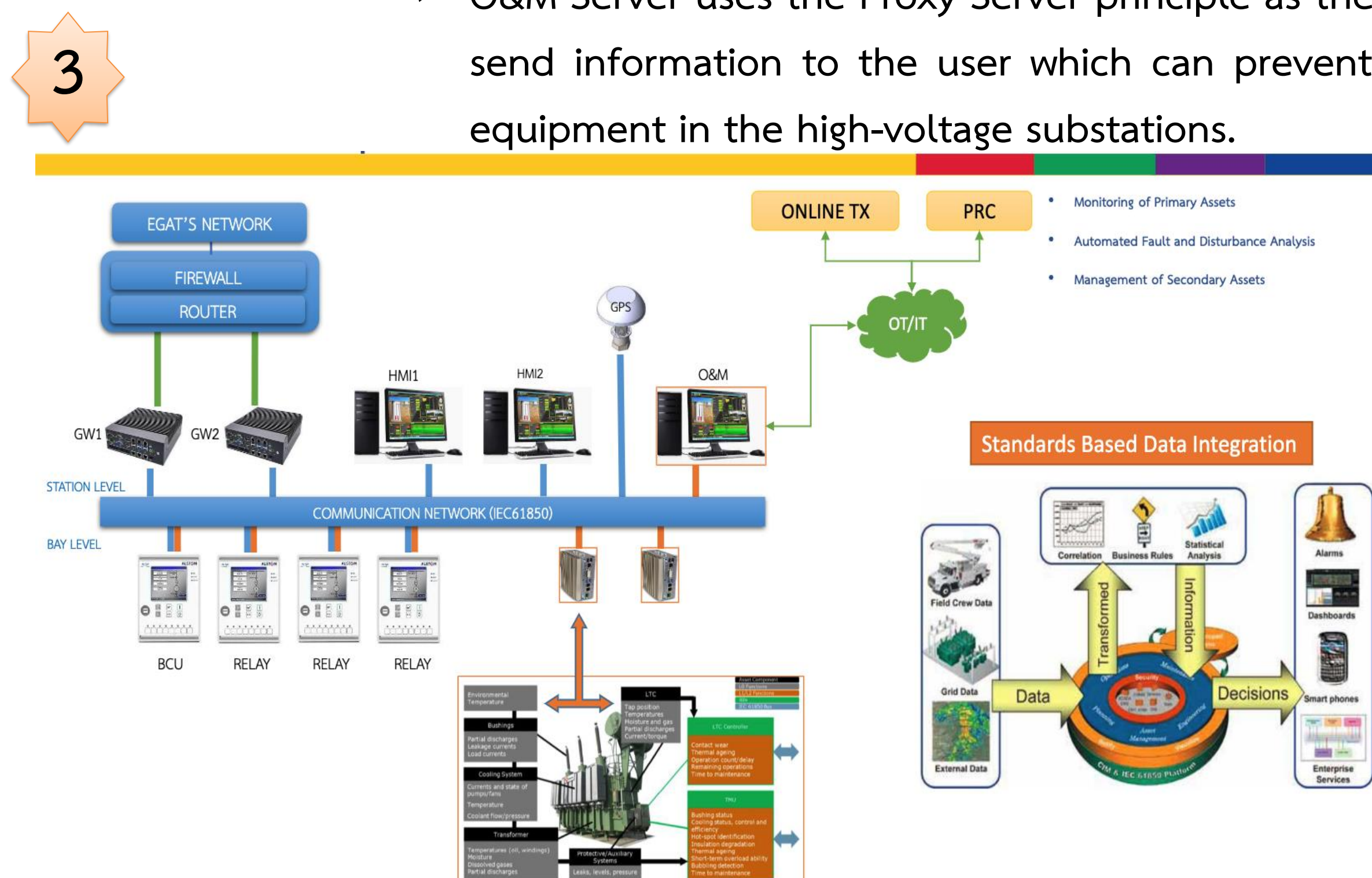
## Conceptual Designs (Software Process)

## IoT Process

1. **“Convert all measurement points in high-voltage substations to Substation Protocol IEC61850 and manage them as Substation Data Center”**

2. **Principle & Theory**  
 ✓ TU uses the Internet of Things (IoT) principle in which electronic devices can link or send data to each other Allows us to control the use of various electronic devices. In addition, TU has structured the data in accordance with the IEC61850 standard for high-voltage substations .  
 ✓ O&M Server uses the Proxy Server principle as the data center. And send information to the user which can prevent accessing to the equipment in the high-voltage substations.

4. ✓ Convert electrical signals from old measuring points -> IEC61850.  
 ✓ Convert Modbus Protocol to IEC61850.  
 ✓ Building IoT Innovations for Transducers.  
 ✓ Create an innovative, intelligent IEC61850 Data Gateway.  
 ✓ Cover all devices, Support for expansion.  
 ✓ Support for use on IT Network (Intranet)  
 ✓ It is a standard form of high-voltage substation engineering in the form of high-voltage Digital substations .  
 ✓ Utilize all EGAT personnel and Domestic Product.



## Conclusion and Benefits (Output, Application)

## Outcome

### Benefits (Application)

1. Bring data to use in Monitoring & Alarm in high-voltage substations. and within EGAT's intranet network, such as creating a real-time dashboard, creating an alarm system.
2. Utilize the data to predict the health of the equipment in the transmission system and the power transformer system, circuit breaker for Online Condition based Maintenance.
3. Bring information to use in research projects to develop a digital twin platform (Digital Twin) to be used in the development process. and maintenance of transmission systems (Digital Twin Platform Research for Transmission System Development and Maintenance Process)
4. Be a Data center of large power transmission system (Big Data) that supports users to utilized, such as big data analysis with AI, ML.
5. Helps conventional high voltage substations. (Conventional Substation) with old measurement technology Old communication protocol to be able to fully support the project of converting high-voltage power stations into digital substations Without having to change new equipment or procurement from overseas at expensive prices.

### Opportunities for further expansion (Outcome)

- Installation of power circuit breaker sensor at Rangsit high-voltage substations to provision with device health prediction and real-time dashboard.
- Used as a standard system in Digital Substations that will be improved in all EGAT substations.
- Improvement of the special protection system commanded by the power plant. to be compatible with the newly developed system (Due to the special protection system, there is a control box that is in use with the power station RTU. Therefore, it should be adapted to use with the Digital Substation Bus Protocol, including special protection systems as follows.
- Special Protection Schemes for Chana Power Plant, Songkhla Province.
- Special Protection Schemes for Khanom Power Plant, Nakhon Si Thammarat Province.
- Special Protection Schemes for Ratchaburi Power Plant, Ratchaburi Province.
- Special Protection Schemes for Mae Moh Power Plant, Lampang Province .
- Special Protection Schemes for Hongsa PowerPlant, Lao PDR.
- Special Protection Schemes for Nam Ngum Power Plant, Nam Theun, Lao PDR.

