Smart Grid Device Management System by eDF
THE FUTURE DISTRIBUTION NETWORK
SMART GRID DEVELOPMENTS IN FRANCE

2300 Smart primary substations

100k Smart MV reclosers

300k Smart secondary substations

29 Smart Control rooms

10k DER with innovative grid connection solutions

Smart O&M

35M Smart Meters by 2022

7M Charge points by 2030

>1M Smart EVSE

3M Charge points by 2030
CHALLENGES TO ADDRESS:
MANAGE THE INCREASING NUMBER OF SMART GRID DEVICES BEING DEPLOYED ON THE FIELD WITH A VERY HIGH LEVEL OF CYBERSECURITY

+ 400 000 SMART GRID DEVICES

TSO

HV/MV Substation

20 kV MV Network (Switch, recloser)

≈ 100 000

20 kV MV Network (Switch, recloser)

≈ 10 000

≈ 300 000

MV/LV Substation

MV Network

MV DER Interface

≈ 40 GW OF DER WILL BE CONNECTED TO THE FRENCH MV AND LV NETWORKS BY 2025

Security Operating Centre

DSO Control Center

DSO O&M Office

HV Network

LV Network (400 V)
SMART GRID DEVICE MANAGEMENT SYSTEM: A NEW SYSTEM TO MANAGE IEDS

- TSO
- HV Network
- HV/MV Substation
- DSO Control Center
- MV/LV Substation
- MV DER Interface
- Information Systems

IEC 61850

Approximately 100,000

Approximately 300,000

Approximately 10,000

20 kV MV Network: Switch, recloser

MV Network

LV Network (400 V)

- 40 GW OF DER WILL BE CONNECTED TO THE FRENCH MV AND LV NETWORKS BY 2025

SMART GRID DEVICE MANAGEMENT SYSTEM

TSO

≈ 10,000

≈ 300,000

≈ 100,000

≈ 40 GW OF DER WILL BE CONNECTED TO THE FRENCH MV AND LV NETWORKS BY 2025
MAIN REQUIREMENTS?

- An **Interoperable** solution
- A **Scalable** solution
- A **Cybersecured** solution

Smart Grid Core Standards (CIM, 61850, 62351)

+ new Smart Grid functions
SMART GRID DEVICE MANAGEMENT SYSTEM IS ONE PIECE OF A BIGGER PUZZLE…

Enterprise
- GIS
- Asset Mgt
- CRM
- ...

Operation
- Smart Grid Device Management System
- Smart Grid Device Configuration System
- SCADA

Station
- RTUs
- IEC 61850
- IEDs

Field
- RTUs
- RTUs
- RTUs

Process
- Transmission
- Distribution
- DER
- Customer premises
SMART GRID DEVICE MANAGEMENT SYSTEM BETWEEN THE PROCESS AND THE DATA ANALYTICS

Data Analytics App
- Cyber defense
- Crisis Management
- Predictive maintenance

Data Lake
- Asset Management
- Network topology history
- Unstructured Data (photos...)
- Asset supervision
- Measures history

Systems
- Smart Grid Device Management/configuration System
- SCADA

Substations
- Information retrieve for the SCADA system (TM, TS)
- Request dispatch or set points

Units
- Proxy / Gateway

Process
- 61850-90-2 (MMS) or 104
- IED...

61850
FUNCTIONAL SCOPE

SMART GRID DEVICE MANAGEMENT SYSTEM

- ADMINISTER RTU
- CONFIGURE RTU

RTU 1
RTU 2
RTU 3
FUNCTIONAL SCOPE

SMART GRID DEVICE MANAGEMENT SYSTEM

ADMINISTER RTU

CONFIGURE RTU

GENERATES CONFIGURATION FILE

SMART GRID DEVICE CONFIGURATION SYSTEM

RTU 1
RTU 2
RTU 3
ASSET MANAGEMENT INFORMATION SYSTEM

SMART GRID DEVICE MANAGEMENT SYSTEM

ADMINISTER RTU
CONFIGURE RTU
PROVIDE RTU DATA TO DIFFERENT INFORMATION SYSTEMS
FUNCTIONAL SCOPE

SMART GRID
DEVICE
MANAGEMENT
SYSTEM

ADMINISTER RTU
CONFIGURE RTU
PROVIDE RTU DATA TO DIFFERENT INFORMATION SYSTEMS
SUPERVISE RTU

RTU 1  RTU 2  RTU 3
MANAGEMENT FUNCTIONS TO BE STANDARDIZED

Need to standardize in coordination with the IEC 61850 standard - IEC Task Force SM, hosted in the WG17 of the IEC TC57
IED LIFE CYCLE AND USE CASES IDENTIFIED BY THE IEC TASK FORCE SM

**Configuration Use Cases**
- Update configuration files
- Set online configuration parameters
- Synchronising configuration update along a feeder/in the same substation

**Asset Management Use Cases**
- Introducing a new component
- Replacement of an existing component
- Store and provide asset information on an IED
- Decommissioning

**Administration Use Cases**
- Update IED Firmware
- IED files upload management

**Supervision & Maintenance Use Cases**
- Manage logs,
- Retrieve disturbance measure files from an IED
- Restart an IED

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Smart Grid Device Management

Plan  Design  Build  Operate, Supervise & Maintain  Decommission
The Smart Grid Device Management System will address different types of functions in a consistent and uniform way.

- Automation functions
- Telecommunication functions
- Cybersecurity functions

These functions may be integrated in one or several RTUs.