The challenges to foster clean energy transition, resilience and energy security in Europe
IoT Week 2022, Dublin | 20.06.2022

OneNet project overview and use cases

Gianluca Lipari
Fraunhofer FIT - Zentrum für Digitale Energie

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 957739
OneNet Vision

- To create a **fully replicable and scalable architecture** that enables the whole European electrical system to **operate as a single system** in which a **variety of markets** allows the **universal participation of stakeholders** regardless of their physical location – at every level from small consumer to large producers.
Key facts about the OneNet project

Knowledge base
OneNet brings together the knowledge and technology developed in other H2020 projects (e.g., CoordiNet and INTERFACE)

Demo clusters
15 European countries will be involved in demonstrating OneNet's concepts and solutions at the regional and cross-border level

European consortium
OneNet brings together 72 partners, including two associations of European system operators

GRIFOn
OneNet will enable constant dialogue with all relevant stakeholders through the GRIFOn platform
Knowledge base

- Project funded in the last call for TDO-DSO-Customer cooperation
- OneNet brings together the large base of knowledge and technology developed so far in H2020 projects
- OneNet builds on previous projects like CoordiNet and INTERFACE
- OneNet vision is to create a standardized pan-European system of systems approach combining existing and new solutions
Demo clusters

- Several demos organized in 4 clusters covering the whole Europe
- Each cluster involving multiple DSO and TSO to implement completely new scenarios
- New market concepts tested in real life
European consortium

- OneNet brings together >70 partners
  - Including E.DSO and ENTSO-E
  - Together with a large set of TSOs and DSOs
  - Leading IT companies and
  - Renowned research institutions
GRIFOn: A platform to create unique European level consensus

- Create mechanisms of inclusions for any interested stakeholder
- Develop European level consensus and acceptance of OneNet proposed solutions
- Disseminate via two key documents:
  - Interoperability Strategy for OneNet
  - Market design for OneNet
The starting point for building OneNet - methodology

1. A list of **15 H2020 projects** was selected to form the basis for the review. The projects were clustered based on the topic each one addressed.

2. A questionnaire was circulated to be filled in for each project to gather all the necessary information. The received answers in addition to the available projects’ deliverables were studied and the important achievements and proposals on **product design, market design and BUCs** of each project were reported.

3. In addition to that, **4 national projects**, and collaboration initiatives among several stakeholders in energy sector based on their affinity to OneNet project are analyzed (DA/RE, GOPACS, NODES, and Piclo Flex). Relevant EU publications and research papers were studied to supplement the findings of the core projects.

4. The major findings were analysed and the starting point for building OneNet was defined.
System services identified in OneNet

<table>
<thead>
<tr>
<th>Adequacy</th>
<th>Frequency Control</th>
<th>Scarcity / need</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inertia/Damping of power oscillations</td>
<td>Correction Active Power Management for CM</td>
<td>Grid reconfiguration</td>
</tr>
<tr>
<td>Frequency Containment Reserve (FCR)</td>
<td>Predictive Active Power Management for CM</td>
<td>Predictive Active Power Management for CM</td>
</tr>
<tr>
<td>Fast Frequency Reserves (FCR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>automatic Frequency Restoration Reserve (aFRR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>manual Frequency Restoration Reserve (mFRR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replacement Reserve (RR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ramping products</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Operational (-D-1)

Services timeframe

Short term (M-1 to M-1)

Long term (M-1 onwards)

Capacity remuneration

Black Start

Corrective Active Power Management for VC

Corrective Reactive Power Management for VC

Predictive Active Power Management for VC

Predictive Active Power Management for VC

Predictive Reactive Power Management for VC

Predictive Active Power Management for VC

Predictive Reactive Power Management for VC

Predictive Active Power Management for VC

Predictive Reactive Power Management for VC

Long-term planning
Product framework

The SO needs to describe the aim of the product, i.e., what are the needs and when it should be used. This will allow the SO to understand whether the product is required or if these needs could be addressed by alternative methods/existing products. This is an important question as, if several products are competing for the same FSPs, there could be an increase in the SO’s costs.

With the definition of the product in hand, the SO can identify the main attributes of the product to ensure it delivers as expected.

What are the relevant attributes for the product?

What will the SO use the product for?

For each attribute, it is important to identify which decisions belong to the SO/MO and which to the FSP. E.g., when defining the quantity, the FSP needs to decide how much capacity/energy it offers but the SO/MO needs to determine whether there is a minimum quantity for the bid to be considered. For the values that the SO/MO determines, it is important to consider the effect these values will have on the decisions of the FSPs.
TSO current and potential products for the main system services

- Current products:
  - FFR
  - FCR
  - aFRR
  - mFRR
  - RR

- New products under evaluation:
  - Inertia
  - Corrective local active product
  - Predictive short-term local active product
  - Predictive long-term local active product
  - Corrective local reactive product
  - Predictive short-term local reactive product
  - Predictive long-term local reactive product
Products identified for DSOs

DSO PRODUCTS

Current products

- Corrective local active product
- Predictive short-term local active product
- Predictive long-term local active product
- Corrective local reactive product
- Predictive short-term local reactive product
- Predictive long-term local reactive product

Products under evaluation

- Islanding products
- Black Start products
Process of the Use Case methodology

https://smart-grid-use-cases.github.io/docs/usecases/onenet/
Methodology developed and applied for harmonizing the KPIs definition

- BUC analysis
  - BUC classified considering the objective and the activities

- KPI analysis
  - KPIs classified considering the matter of the assessment

- Proposal for harmonised KPIs
  - Mapping BUC (objectives and activities) with KPIs classification

- KPIs for OneNet
  - Harmonised KPIs adoption by the OneNet demonstrators

- KPIs for OneNet: gaps and challenges
  - Identified gaps and challenges regarding the definition of KPIs for OneNet
OneNet project overview and use cases
Gianluca Lipari – Fraunhofer FIT Zentrum für Digitale Energie

The challenges to foster clean energy transition, resilience and energy security in Europe

IoT Week 2022, Dublin | 20.06.2022

Thank You

Dr.-Ing. Gianluca Lipari
Fraunhofer FIT – Zentrum für Digitale Energie

Contact Information
Phone: +49-241-8049719
Email: gianluca.lipari@fit.fraunhofer.de
Website: https://www.digitale-energie.fraunhofer.de/
LinkedIn: https://www.linkedin.com/in/gianluca-lipari/

https://onenet-project.eu/