



i-PCGRID 2017
Panel session IEC 61850 solutions

DER Grid Integration and IEC 61850

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Integrating DER

- IEC 61850-90-15: IEC 61850 based DER Grid Integration
 - Basic concepts
 - Functional requirements
 - IEC 61850 data models



Possible use cases for DERs

... from European research project OS4ES

Integration into Energy Trading

- Certified Energy Market
- Energy Management using Virtual Power Plant

Imbalance Management

- Marketization of Balancing Group Management

Grid Services

- Frequency Control
- Volt / Var optimization and control

Grid Congestion Management

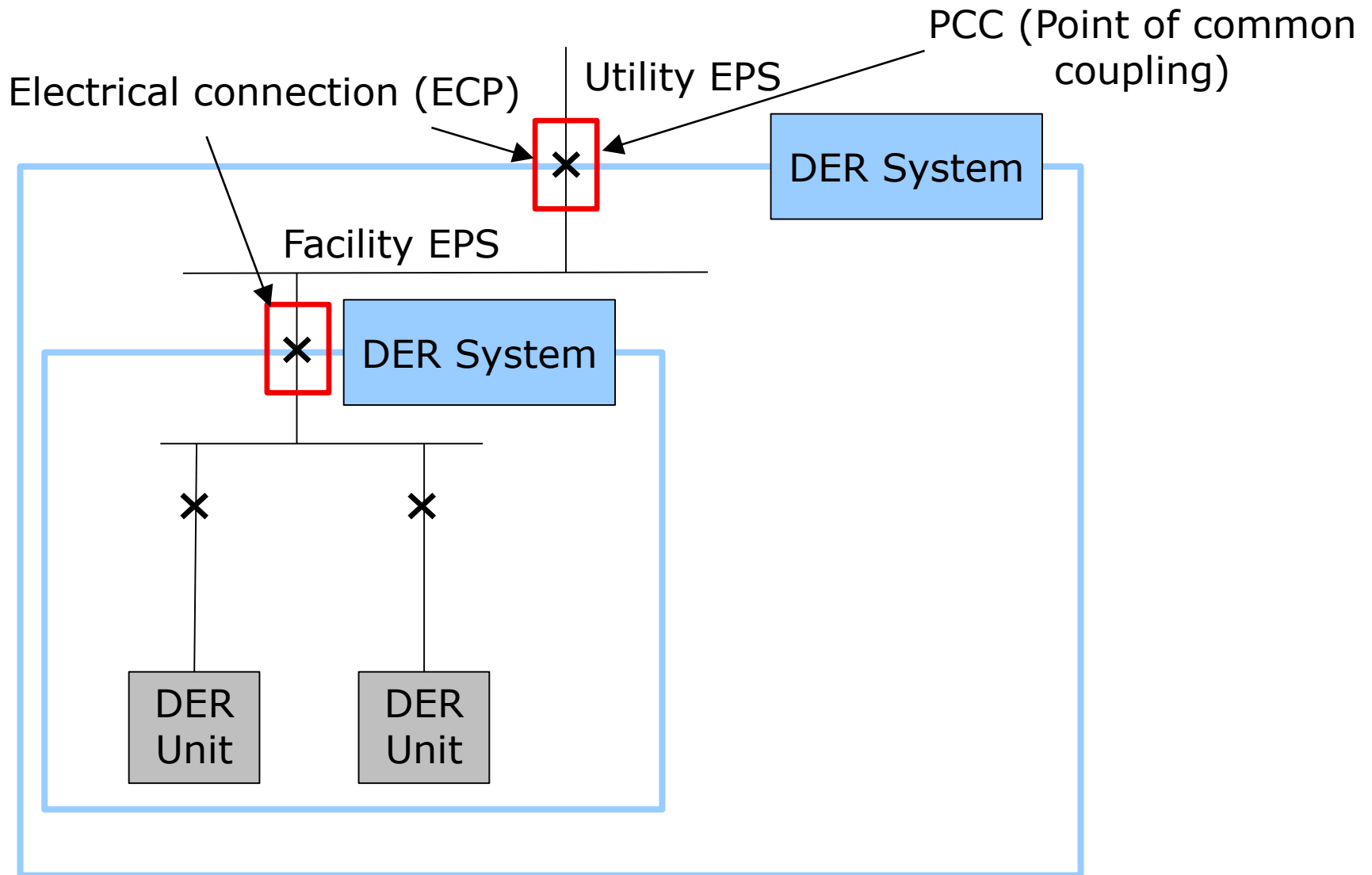
- Aggregation and settlement of flexibility
- Demand Response management of EVs

What wants the aggregator know?

... IoT for DER systems

- Which functions (or service) does a DER system support?
- What are the rated values?
- Can it be controlled?
- Is it predictable?
- If not - what is the forecast?
- Is it available?
- Can I book it?
- Can I book it only partially?
- What does it cost?
- Where is it connected?

Integration of DER system



Modeling DERs

Electrical and functional characteristics

- Ratings of DER system at PCC
- Electrical connection characteristics of the PCC
- Generic functional characteristics
- Generic time constraints of DER system
- Functional capabilities
 - Understanding schedules
 - Providing forecasts
 - Planning capabilities

Modeling DERs

Electrical energy function at PCC

- Active power
 - Load
 - Generation
- Flexibility
 - Storage (energy corridor)
 - Time shiftable profile
- Autonomous frequency control (frequency / watt)
- Reactive power (Volt / Var)
- Constant voltage

Modeling a Electrical energy function

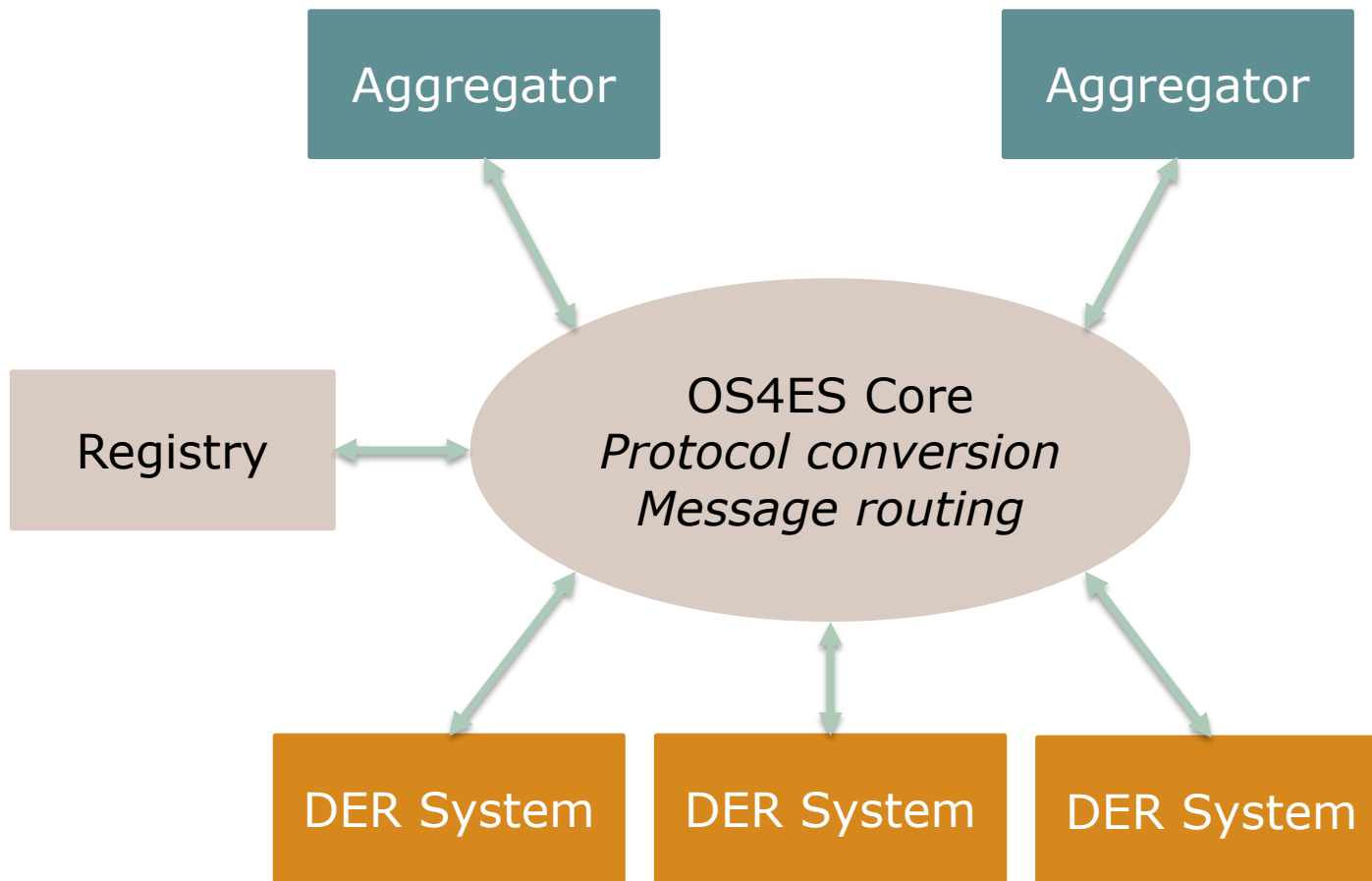
- Rated parameters
- Actual values that are available at the PCC
- Setpoints and controls

Additionally, as part of supporting function

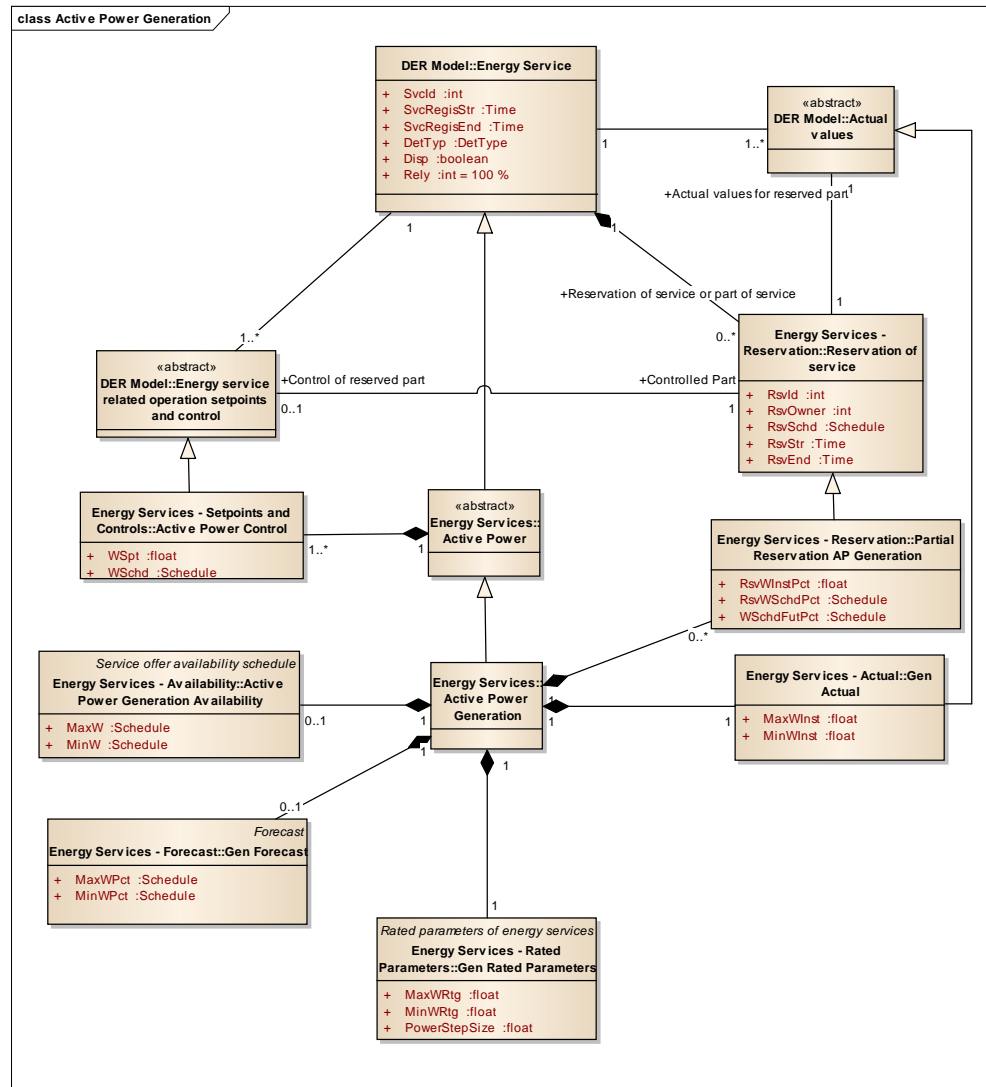
- Planning forecast
 - Based on the own usage – what is the planned availability of the function
- Forecast for intermittent (non-deterministic) DERs

Integration approach

OS4ES – Open System for Energy Services

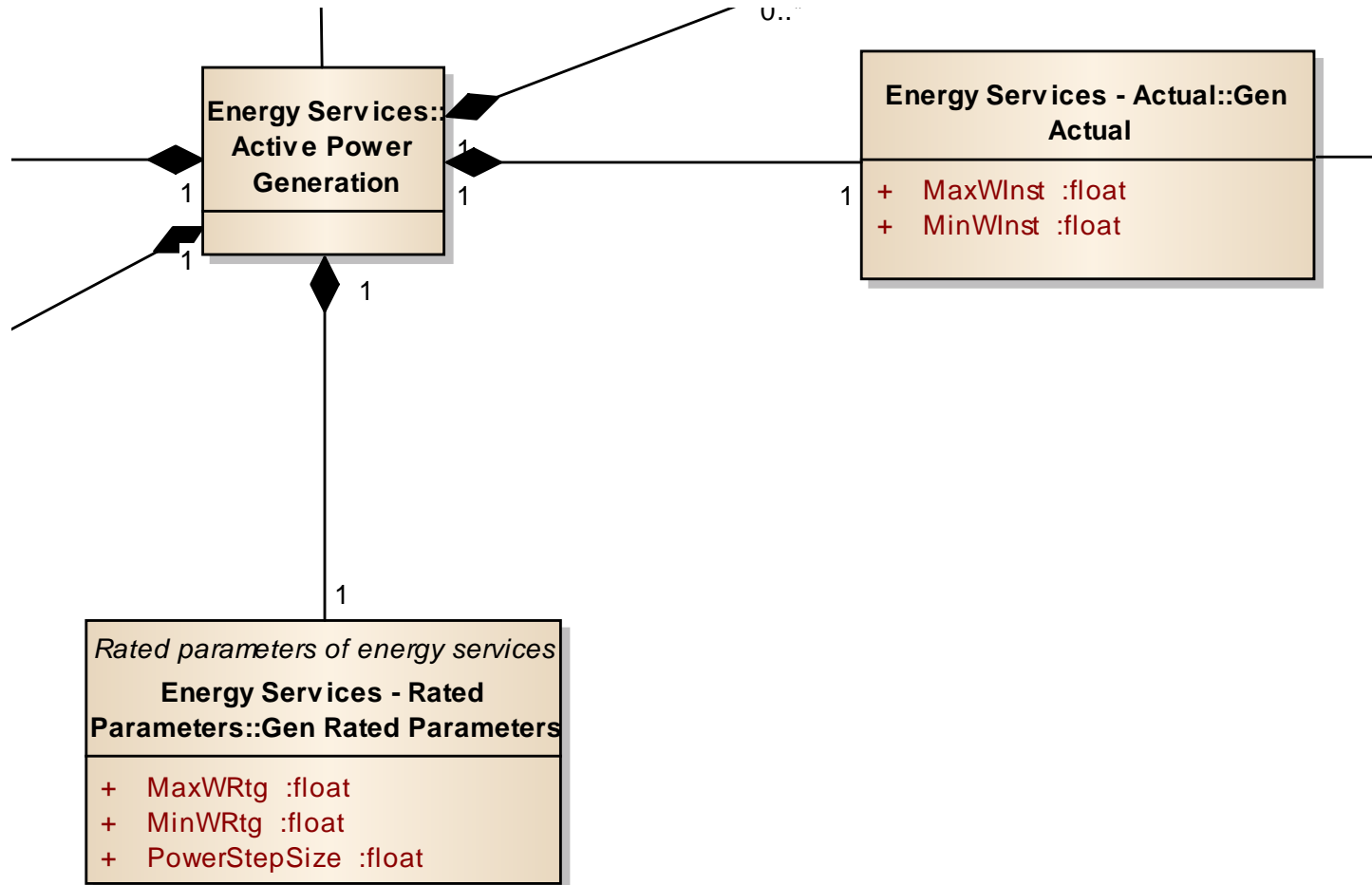


UML Model – Example Active power



Example – Active power

... actual and rated values

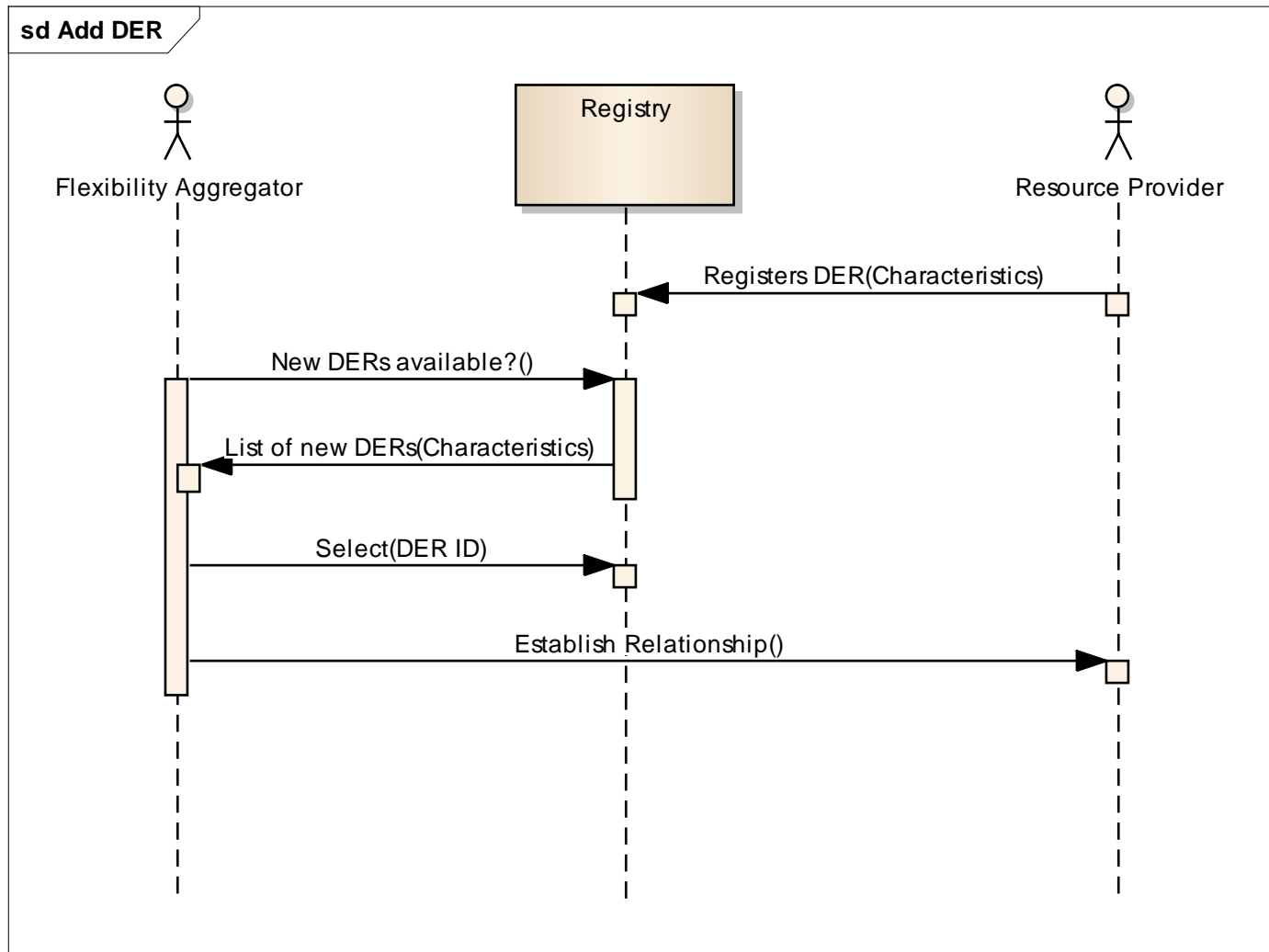


LN DSPG

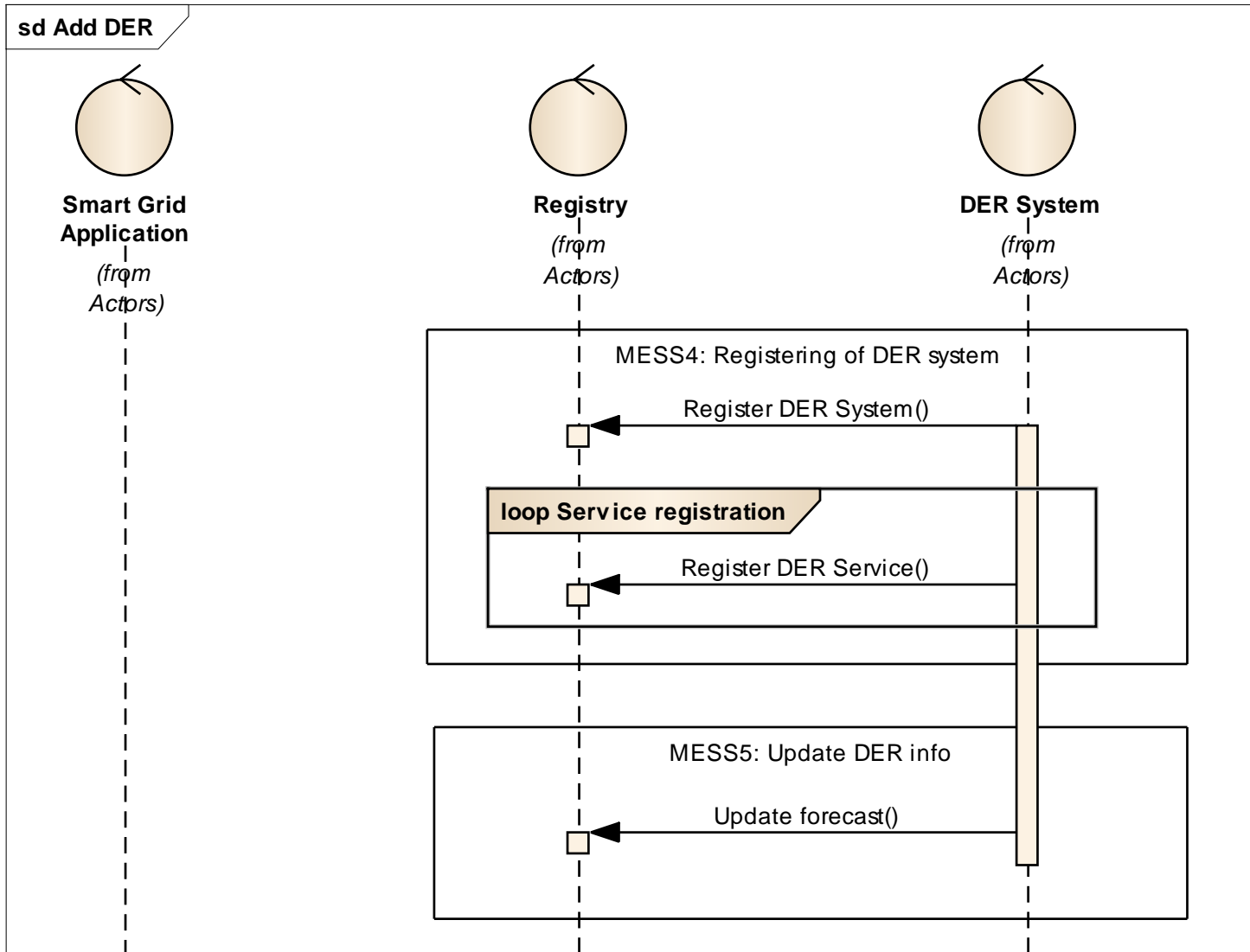
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```

Rated values

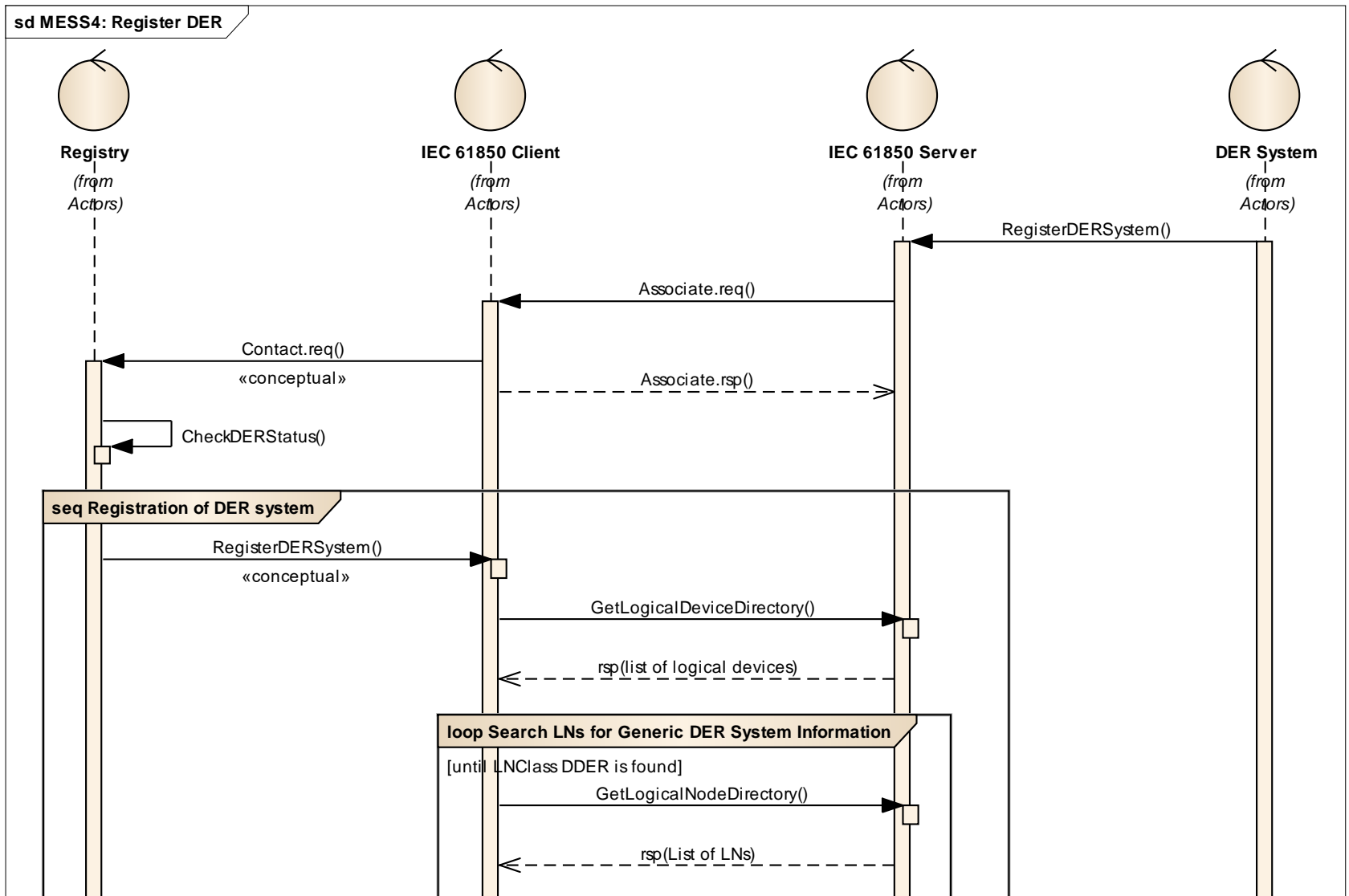
Adding new DER



Implementing information exchange



Registration - details



Conclusion

- IEC 61850 provides in various parts of the standard the framework for Smart Grid applications
- The concepts explained in this presentation have been developed and verified in various demonstration projects like OS4ES, a project sponsored by the European Commission



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