

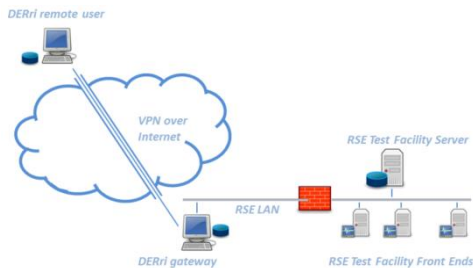
# Joint virtual testing facility for distributed energy resources – development and use cases



The interconnection of testing facilities via the DERri gateway is paving the way to a virtual laboratory allowing for a better utilization of specialized research infrastructures and facilitating long-term tests or field trials.

## Concept development and implementation

The concept for a joint common interface for testing facilities interoperation was developed and implemented at nine laboratories across Europe.

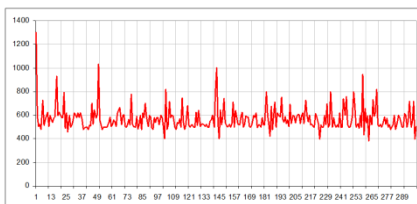


Communication scheme

The gateway works as a SCADA, providing the operator with an immediate view of the principal electric values of the connected testing facility. This both for the on-line status of the test grid rather than for the status at the moment of a particular experiment. The concept implementation was verified by performing relevant use cases.

## Quality of Service (QoS)

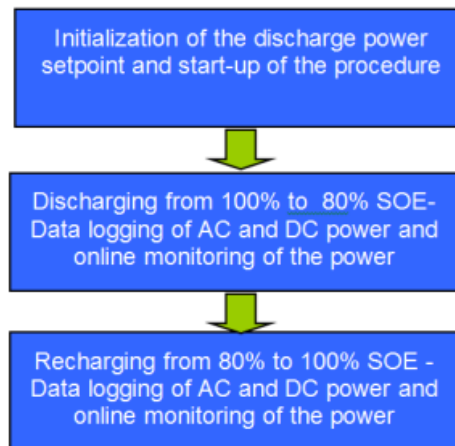
The usual ICT definitions of QoS has to be enhanced by specifications of the test set-up, like the required sample time or the data polling process. For steady state analysis good results were achieved.



Response time of 300 consecutive data update requests in milliseconds

## Remote efficiency performance testing of a storage system

One exemplary use case was the remote supervision and control of one of the battery storage systems located at CRES facilities in Pikermi-Athens, Greece, from RSE in Milan, Italy, and ICCS-NTUA, Athens, Greece. The selected system consists of one lead-acid battery bank connected to the grid via single-phase inverter.



Remote supervision and control testing procedure of a storage system

Monitoring of the real power provided the user with information about the status, while local measurements of the AC and DC power provided data for the round efficiency calculation.

## Multiple monitoring

In addition a parallel monitoring test was successfully performed with two connected clients which had the possibility to monitor concurrently the operating state of the battery storage unit.

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## Results:

- The DERri gateway as a joint common interface for the interoperation of testing facilities was developed and implemented at nine laboratories across Europe.
- Use cases for the evaluation of the communication path were defined and performed successfully.
- Exemplary applications for remote testing and multiple monitoring were set up and performed successfully.
- The interconnection of testing facilities via the DERri gateway is paving the way to a virtual laboratory.

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