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TECHNICAL REPORT

Communication networks and systems for power utility automation - Part 90-20: Use cases of redundancy in systems

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Communication networks and systems for power utility automation - Part 90-20: Use cases of redundancy in systems

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IEC TR 61850-90-20 has been prepared by IEC technical committee 57. It is a Technical Report.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
57/2786/DTR	57/2817/RVDTR

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 61850 series, published under the general title *Communication networks and systems for power utility automation*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

Parts of this document are based on IEC TR 61850-90-2, *Communication networks and systems for power utility automation – Part 90-2: Using IEC 61850 for communication between substations and control centres*.

Redundancy is used to increase the availability of a system. This document describes different types of redundancy (denoted as redundancy schemes), while focusing on device redundancy.

Put into simple words, device redundancy is using two physically different devices for the same purpose. If one of them fails, the other one takes over. The failover time of the affected components, which results in a downtime of this part of the system, is as little as possible. In this way, continuous operation is ensured. Loss of data can be avoided.

Since redundant devices provide equal functionality at the same time, information flow to and from these devices is often duplicated. Therefore, components of a redundant system are able to handle duplicated data.

Figure 1 and Figure 2 describe two basic redundancies. The first one shows redundant clients, the second one shows redundant servers. Blue lines indicate dataflow, the green dotted lines indicate an option for shared data between the two redundant components. In the first example a server in IED A has two redundant clients, one in each of IED G and H. In the second example, a client in IED H has two redundant servers, IED A and IED B.

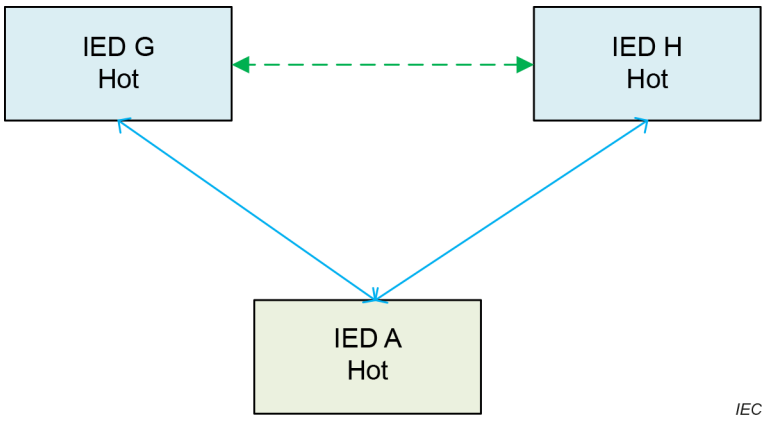

Figure 1 – Basic redundancy scheme, Redundant Client

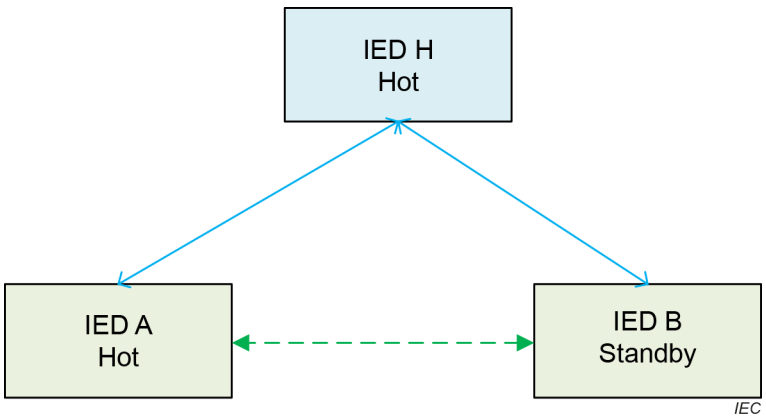

Figure 2 – Basic redundancy scheme, Redundant server

For the communication between the redundant system application and the lower level IEDs typically IEC 61850 is used, mainly based on IEC 61850-8-1(MMS) reporting and commands, for time critical functions with IEC 61850-8-1(GOOSE) and IEC 61850-9-2(SV).

For the communication with clients at station level typically IEC 61850 based on MMS is also used for supervision, commands, and configuration changes. Since MMS is an acknowledged service, server and client are aware of each other and the client supervises the servers.

To enable changes of settings or configuration data without having contradicting behaviour, the higher-level client must be able to switch the standby IED entity to off, thus invalidating all application related output data for any possible receivers.

Since GOOSE and SV are unacknowledged services, the sender does not need to be aware of any receivers. The receivers are only aware of the message (application) addresses, and not of the physical senders, a separate supervision of the physical senders might be necessary.

Setting the application mode of the active IED entity to off could be one possibility to force a switchover to the standby unit. This especially means that the deactivated entity does no longer send GOOSE and SV messages. Other methods for triggering a switchover are discussed in this document.

In this document several use cases are elaborated and presented to serve as input to a future edition of this document to extend initialization and synchronization requirements based on these use cases.

1 Scope

This part of IEC 61850, which is a technical report, describes use cases of redundancy in systems.

This document considers use cases of duplication of function and devices and covers redundancy of information flow at message level. Functional safety is out of scope of this document. To keep focus on details relevant for this document, some figures and drawings do not show electrical wiring, redundant coils, etc, where this is not important for the use case.

This document is not a guideline on the design of redundancy systems; guidance on designing redundancy systems can be found in textbooks such as [1][1] and [2].

2 Normative references

There are no normative references in this document.

[1] Numbers in square brackets refer to the Bibliography.