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BSI Standards Publication

Communication networks and systems for power utility automation

Part 90-14: Using IEC 61850 for FACTS (flexible alternate current transmission systems), HVDC (high voltage direct current) transmission and power conversion data modelling

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee PEL/57, Power systems management and associated information exchange.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

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FOREWORD

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IEC TR 61850-90-14 has been prepared by working group 10: Power system IED communication and associated data models, of IEC technical committee 57: Power systems management and associated information exchange. It is a Technical Report.

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

Draft	Report on voting
57/2232/DTR	57/2273/RVDTR

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

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/standardsdev/publications.

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

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.

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- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

The IEC 61850 series was established to focus on the main primary equipment and functionality of conventional AC substations. By now it has been widely deployed and has become state of the art in that area.

Soon after, ambitions emerged to make IEC 61850 applicable to a largely widened range of equipment and functionality. Even completely new domains, like wind or hydro power generation, have created extensions to the series in order to match their applications.

Thanks to the very generic basic information and communication structures of IEC 61850 and the integrated services provided, most domain requirements can be easily adopted and fulfilled with IEC 61850 core functionality. Most of the extension work thus just needs to focus on creating a domain specific data modelling, which allows the semantic description of domain specific signals.

Due to the latest boom in deploying an exponentially increasing number of power electronics and semiconductor based equipment directly in the area of medium, high and ultra-high voltage transmission networks, the call for integrating those direct current related processes and control systems into IEC 61850 is only logical and consecutive.

Two main groups of DC based types of applications exist: FACTS devices (shunt and series connected) that mainly influence the network at a definite point of connection and Power Converters (e.g. HVDC, SFC) that additionally allow the transmission of active power between two different points of connection.

The benefits of those technologies are clear: as methods to influence conventional AC networks are limited, DC based technologies provide the possibility to actively adjust power flow and network parameters like frequency and voltage within just milliseconds. They help to support network stability, performance and quality, increase transmission capacity. They enable transmission tasks that would otherwise be technically borderline or impossible, moreover doing so mostly with unprecedented efficiency respectively low losses.

FACTS and Power Conversion are thus indispensable to secure power supply and represent a vital component within the backbone of efficient, reliable and resilient future smart grids. This technical report finally enables those technologies to also become an integral part of the IEC 61850 world.

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

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1 Scope

This part of IEC 61850, which is a technical report, specifies the information model of devices and functions related to systems of power utility automation, specifically related to FACTS (Flexible AC Transmission Systems) and Power Conversion applications.

The IEC 61850-90-14 information model standard utilizes existing IEC 61850-7-4 logical nodes where possible, but also defines specific logical nodes where needed.

Specifically, the scope of this document:

- Covers communication between control system of FACTS, HVDC and Power Conversion and SCADA and HMI systems
- Includes the data model for FACTS, HVDC and Power conversion devices
- Does not cover Protection relays
- Does not cover process bus
- Does not cover valve communication

1.1 Namespace name and version

This new subclause is mandatory for any IEC 61850 namespace (as defined by IEC 61850-7-1:2011).

Table 1 shows all attributes of (Tr)IEC 61850-90-14:2020A namespace.