IEC 61850 - Looking forward (2025+)

- The following slides (especially slide 4 and 5) have been discussed as the future of messaging in IEC 61850 during the kick-off meeting of a task force in Klaus/AT on 2025-09-25 (dealing with this approach for preparing a new work item proposal in IEC TC 57).
- The crucial question is: Is there a benefit with an additional messaging standard that would provide an option for MMS (ISO 9506) as specified in IEC 61850-8-1 and IEC 61850-8-2.
- The members of the kick-off meeting of the task force believe that there is a real benefit, especially for DER with hundreds or thousands of IEDs (IEC 61850 server) with the same mandatory model. So that no top-down engineering is required.
- The acceptance of IEC 61850 would increase … especially outside substations, e.g., in the domain of distributed energy resources (DER).
- These slides may be used for discussions with other interested experts, too.

IEC 61850 - Looking forward (2025+)

- Since the year 2005 a lot of model extensions, new aspects like top-down engineering, cyber security, … have been defined and published … extending the application domains and securing the communication.
- One of the main foundations regarding information exchange is still stable and in use: The mapping of the ACSI (IEC 61850-7-2) to MMS (IEC 61850-8-1 and IEC 61850-8-2).
- IEC TC 88 PT 25 has struggled (is still struggling) to define several alternative mappings. Mapping to OPC UA is underway for years.
- A solution for a web-based mapping in IEC 61850 is now (2025) within range:
  - A proof-of-concept driven by Netherlands DSOs for RTI V2 shows positive results (Real-time Interface Version 2; version 1 is IEC 61850-8-1 … in operation): using WebSockets, direct mapping of ACSI to ASN.1, and using JER (JSON encoding rule).

IEC 61850 - Looking forward (2025+)

IEC 61850-8-3

Edition 202x

INTERNATIONAL STANDARD

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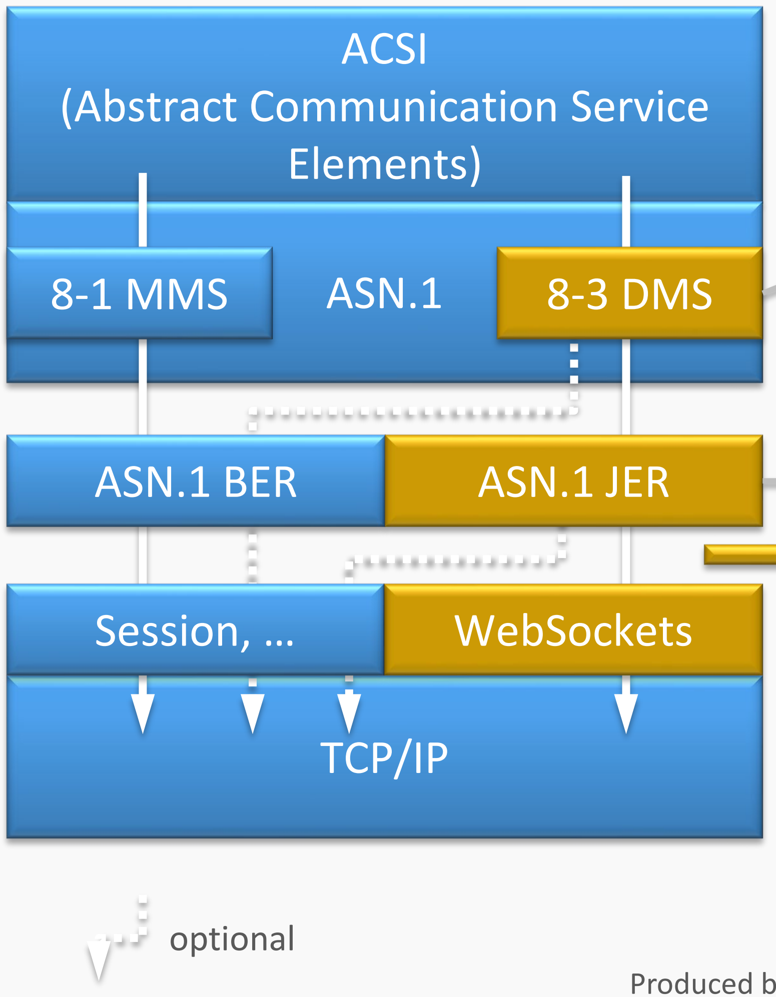
colour inside

Communication networks and systems for power utility automation –
Part 8-3: Specific communication service mapping (SCSM) — Mapping to Direct Message Specification (DMS), JSON Encoding Rules, and WebSockets

IEC 61850 - Looking forward (2025+) - Architecture

Communication overview



IEC 61850-8-3
Specific Communication Service Mapping
(SCSM)
Mapping to Direct Message Specification (DMS), JSON Encoding Rules, and WebSockets

Direct Message Specification (new)

JSON Encoding Rule

GetLogicalNodeDirectory, DMS

```
GetLogicalNodeDirectoryRequest ::= SEQUENCE
{
    lnRef [0] ObjectReference,
    -- Format: \p{L}[\d,\p{L},_]*/[\p{L},_]*[\d]*

    aCSIClass [1] ACSIClassKind,
    continueAfter [2] ObjectReference OPTIONAL
}

GetLogicalNodeDirectoryResponse ::= SEQUENCE
{
    instanceNames [0] SEQUENCE OF ObjectReference,
    moreFollows [1] BOOLEAN OPTIONAL
}
```

```
"request": {
    "associateId": "id_1",
    "invokeId": 6,
    "service": {
        "getLogicalNodeDirectory": {
            "aCSIClass": "dataObject",
            "lnRef": "LD0/MMXU1"
        }
    }
}
```

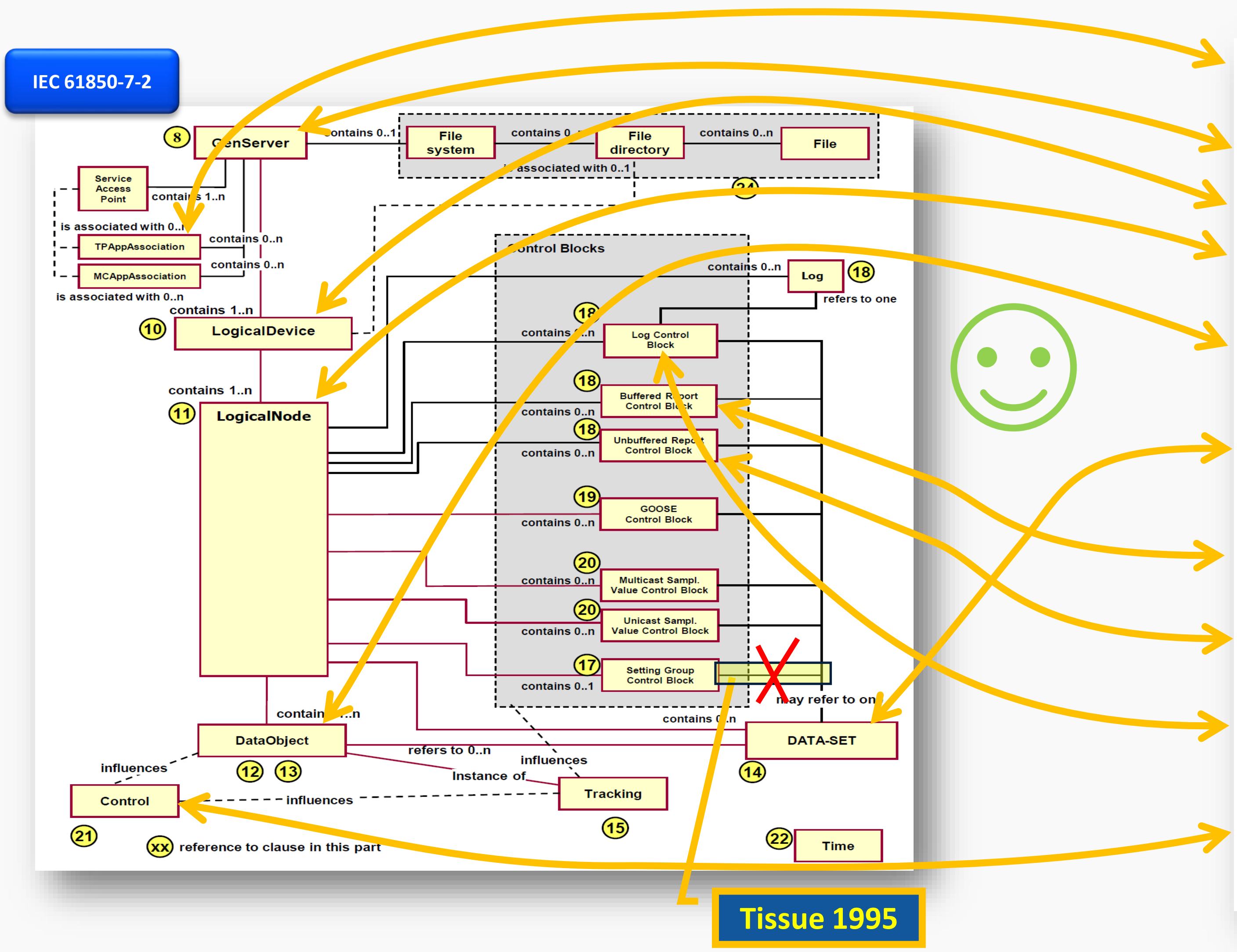
```
"response": {
    "associateId": "id_1",
    "invokeId": 6,
    "service": {
        "getLogicalNodeDirectory": {
            "instanceNames": [
                "Beh",
                "TotW",
                "TotVAr",
                "PhV",
                "PPV",
                "A",
                "AvWPhs",
                "MaxWPhs",
                "MinWPhs"
]}}}
```

Data Objects only

JSON coded message examples

Produced by Karlheinz Schwarz

IEC 61850 - Direct Message Specification (DMS)



IEC 61850-8-3
Models and Services

Association model
Associate Abort
Release

GenServer model
GetServerDirectory

LogicalDeviceClass model
GetLogicalDeviceDirectory

LogicalNodeClass model
GetLogicalNodeDirectory
GetAllDataValues

DataObjectClass model
GetDataValues / SetDataValues
GetDataDirectory
GetDataDefinition

DATA-SET model
GetDataSetValues / SetDataSetValues
CreateDataSet / DeleteDataSet
GetDataSetDirectory

BUFFERED-REPORT-CONTROL-BLOCK:
Report
GetBRCBValues / SetBRCBValues

UNBUFFERED-REPORT-CONTROL-BLOCK:
Report
GetURCBValues / SetURCBValues

LOG-CONTROL-BLOCK model:
GetLCBValues / SetLCBValues
QueryLogByTime / QueryLogAfter
GetLogStatusValues

Control model
Select / SelectWithValue / Cancel / Operate /
CommandTermination / TimeActivatedOperate

MMS survived 40 years

- MMS and the MMS companion standards were (understood as) one of the show-stoppers in projects like MAP, miniMAP, CNMA, Profibus (FMS), international Fieldbus (IEC 61158), Sinec (Siemens PLC communication), ...
- The lack of support for MMS led, e.g., to the project OPC and later to OPC UA.
- IEC 61400-25-4 defines several mappings … including MMS (IEC 61850-8-1) … the wind power market is mainly using the MMS mapping … and looking for an alternative option.
- The OPC Foundation is now mapping the model basics of IEC 61850 and IEC 61400-25 onto OPC UA … not the services (except control). IEEE 2030 and … use just the models …
- MMS will continue to be a stable foundation for the information exchange in IEC 61850.
- **I hope MMS will not be a show-stopper for IEC 61850 in the long-term and history will not repeat.**