
Norma IEC 61850

– Pregled glavnih značajki i budući razvoj (I. dio)

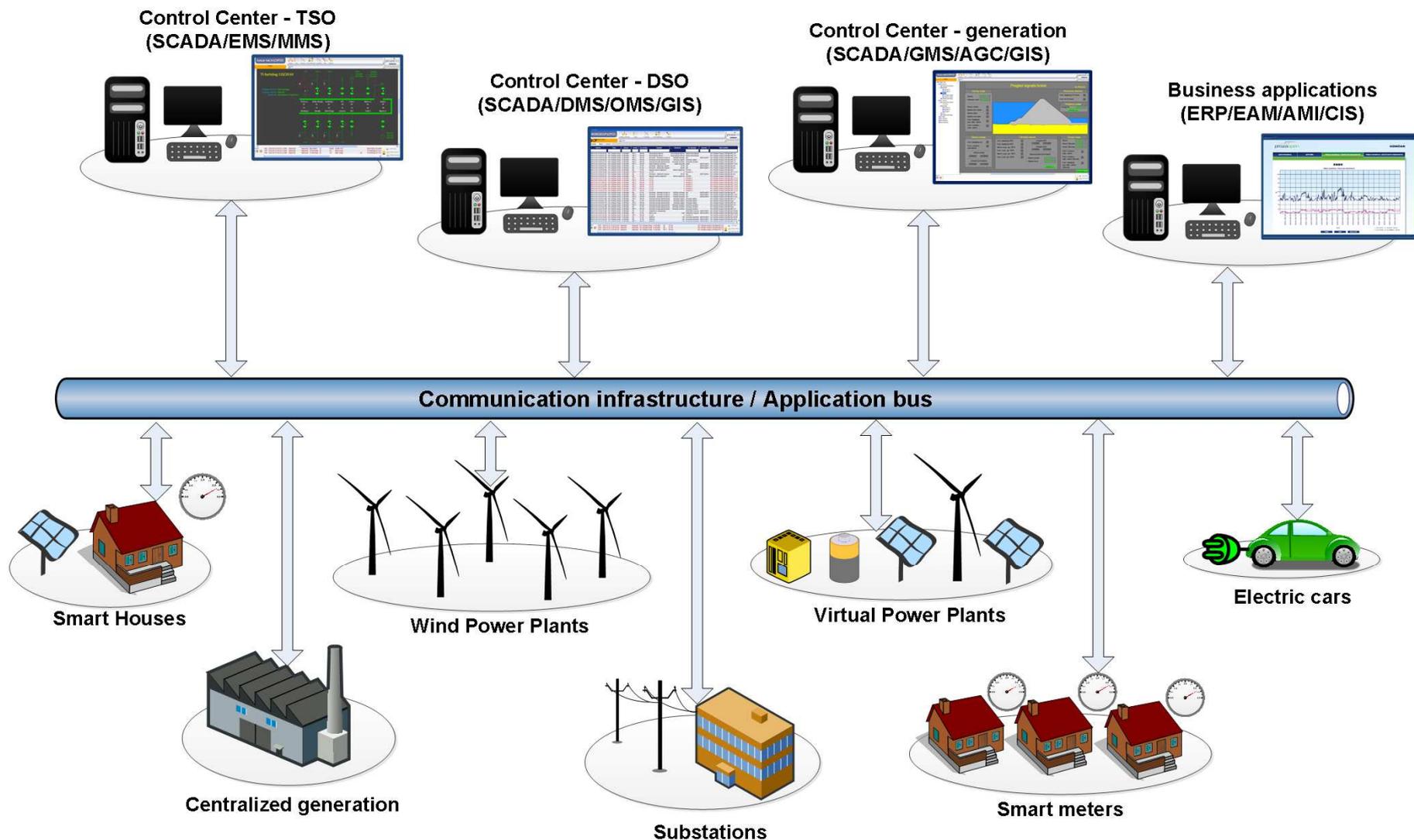
Predavač:

Stjepan Sučić, mag.ing.el. Končar–KET

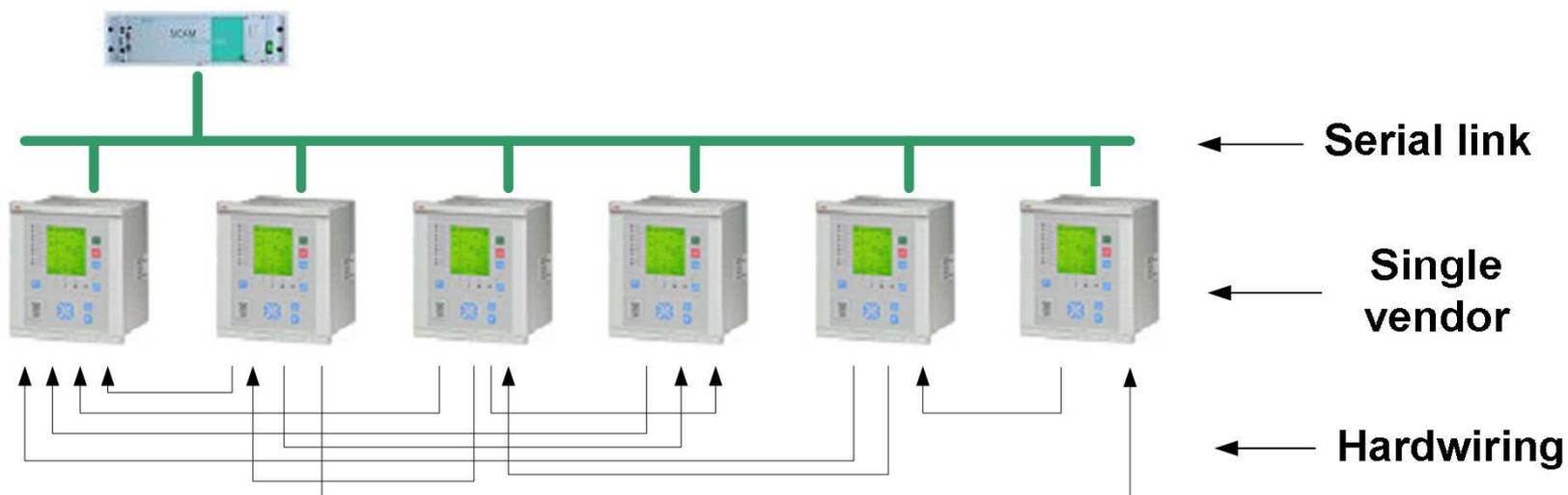
Sadržaj

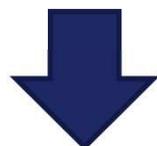
- 1 • Uvod
- 2 • Arhitektura IEC 61850 sustava
- 3 • Informacijsko modeliranje
- 4 • Komunikacijski servisi
- 5 • Implementacijski zahtjevi
- 6 • Konfiguracija sustava

Integracija i automatizacija EES-a



IEC 61850 – Motivacija

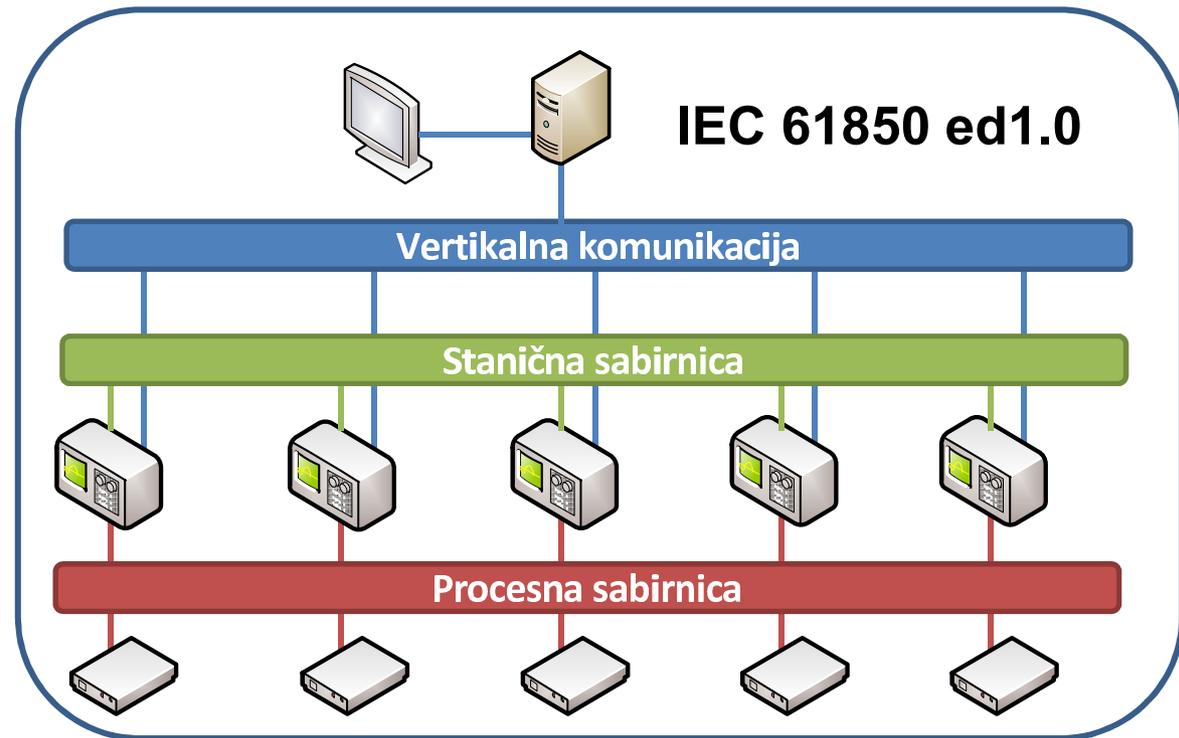


 **IEC 61850**



IEC 61850 – Arhitektura

- Više od komunikacijskog protokola
- Automatizacijska arhitektura
- Tehnološki neovisan pristup
- Načela upravljanja
- Razvoj proširenja
- Nove domene
- Globalna prihvaćenost

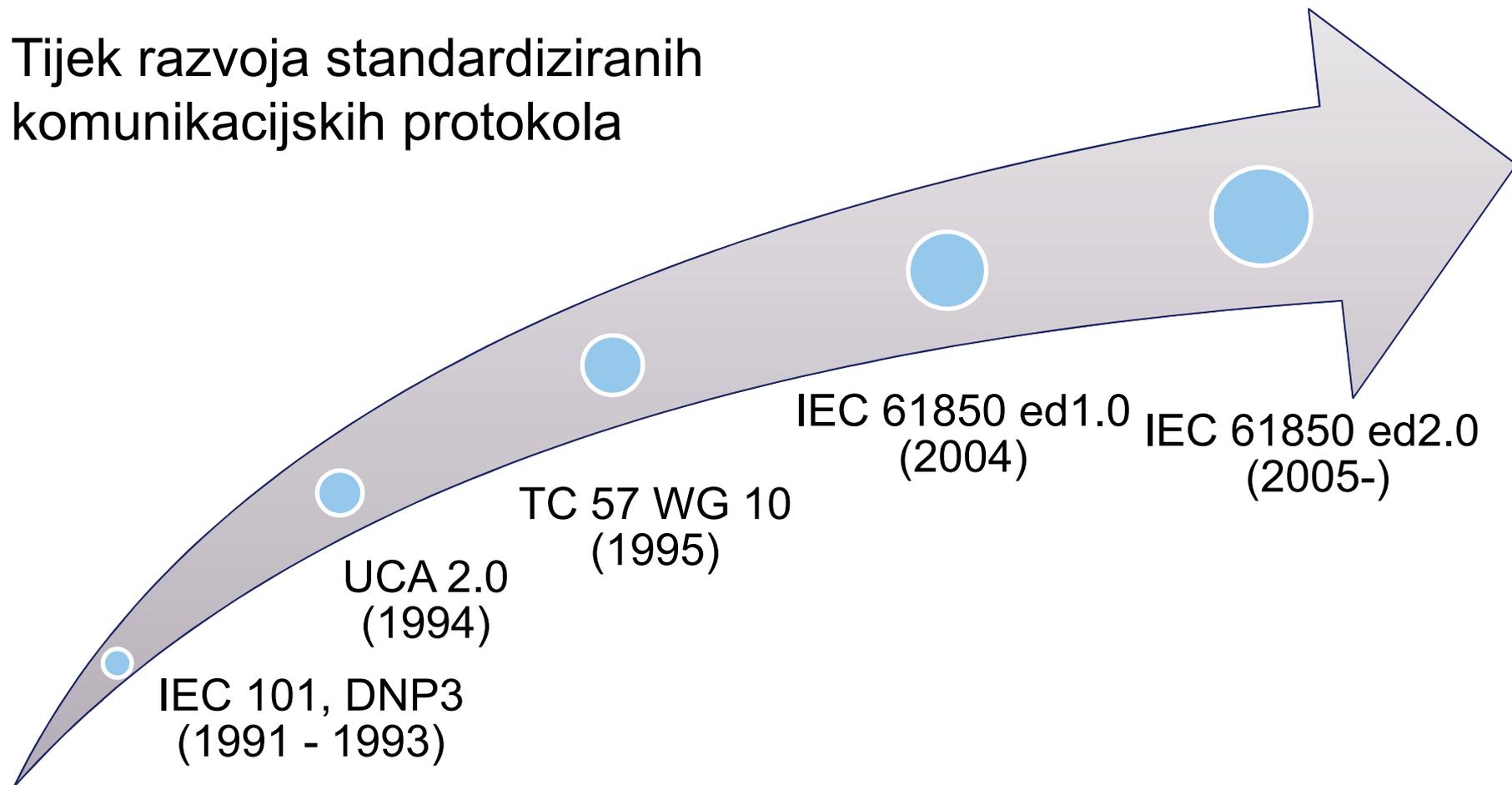


IEC 61850 – Osnove prednosti

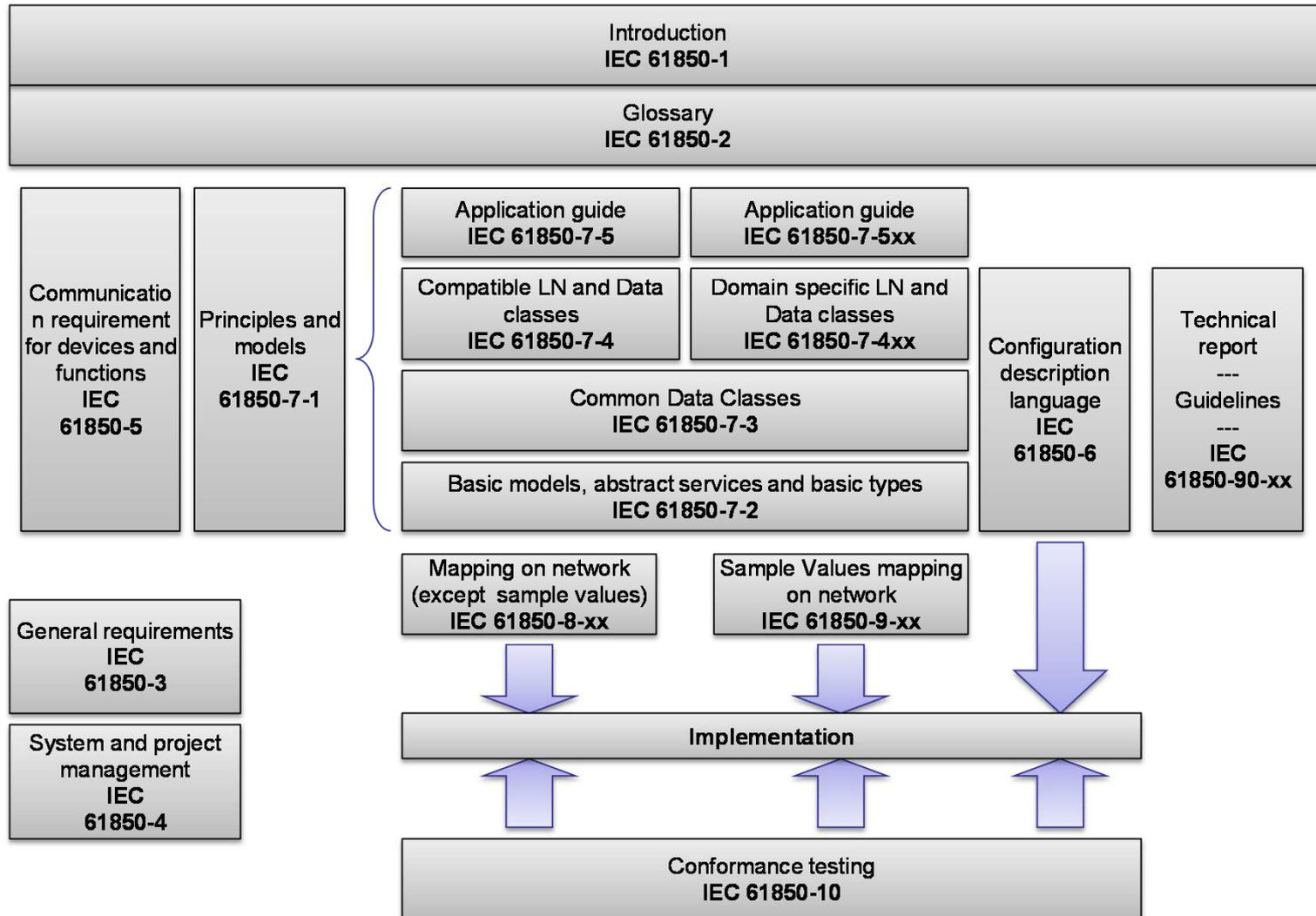
- Jedinствeno rješenje za komunikaciju u EES-u
- Interoperabilnost opreme
- Globalna prihvaćenost
- Brža i jeftinija integracija novih sustava
- Jedinstvena semantika procesnih podataka
- Primjena izvan domene trafostanica
- IEC 61850 je arhitektura, a ne tehnologija !

IEC 61850 – Povijesni razvoj

Tijek razvoja standardiziranih komunikacijskih protokola

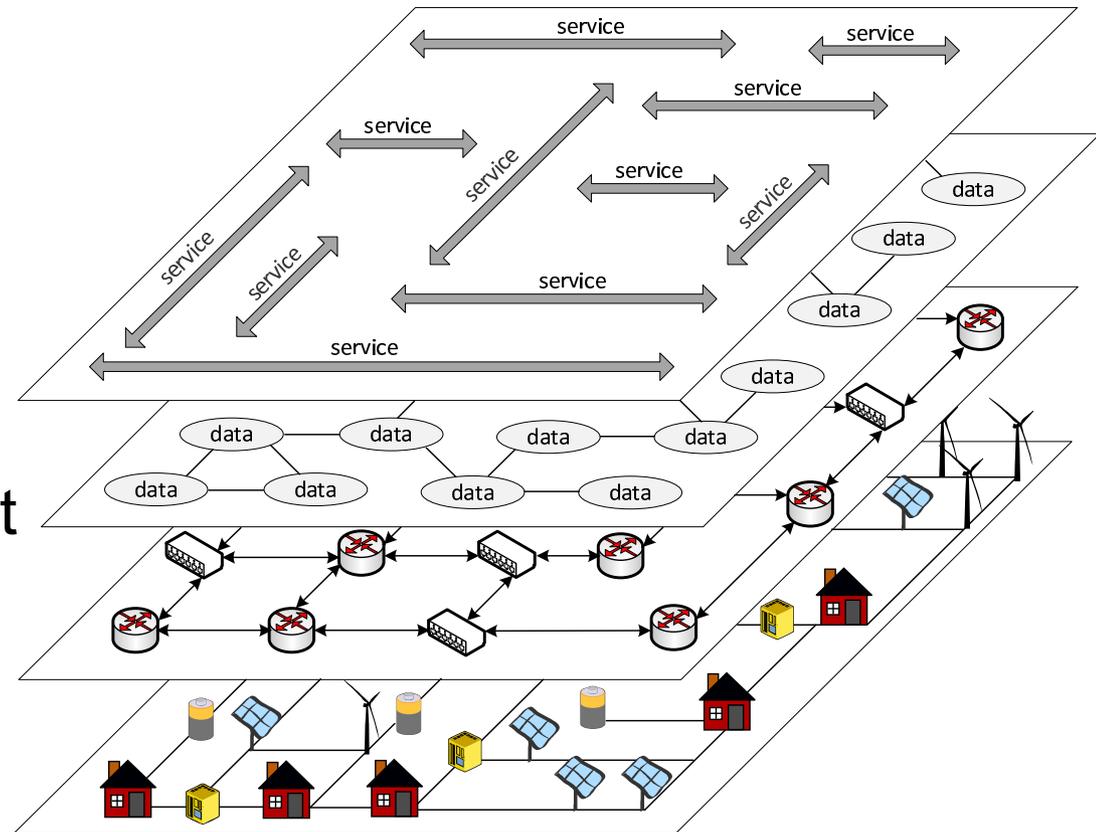


IEC 61850 – Odnosi među dokumentima



Standardizacija integracijskih sučelja

- Nove upravljačke arhitekture
- Velik broj proizvođača
- Višeslojna struktura
- Integracijski preduvjeti
- Tehnološka i platformaska neovisnost
- Dugotrajna održivost
- Jedinostveni pristup



IEC 61850 ed.1

WAMPAC



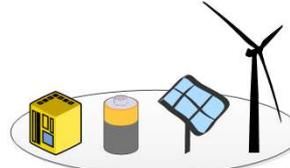
SCADA



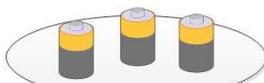
Centralized generation



Wind Power Plants



Distributed Energy resources



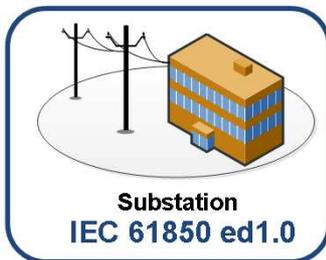
Battery Systems



Electric Vehicle Supply Equipment



Substation
IEC 61850 ed1.0



Substation
IEC 61850 ed1.0

IEC 61850
ed1.0

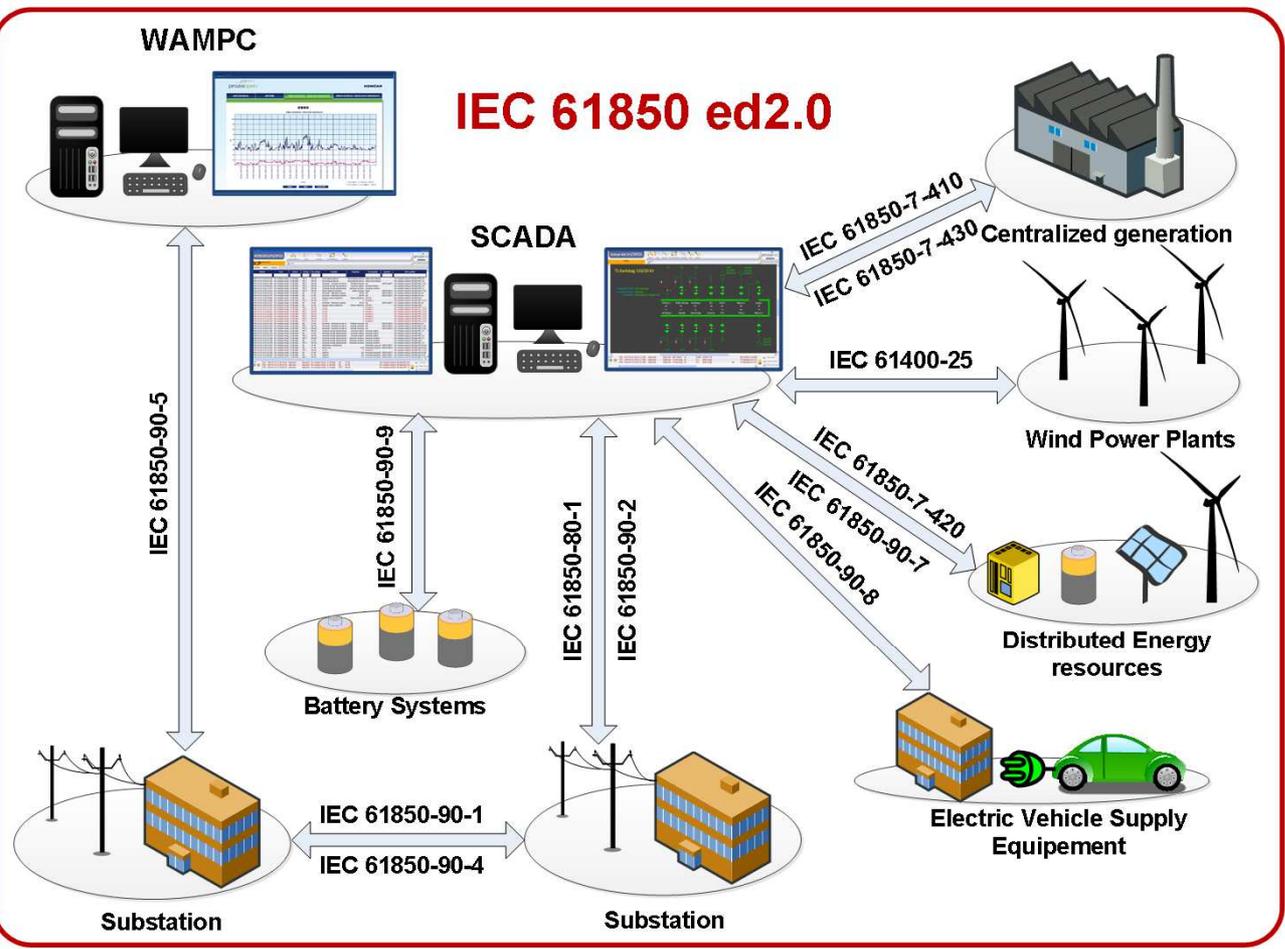
1995.-2004.

3 radne
grupe

14
dokumenata

1400
stranica

IEC 61850 ed.2

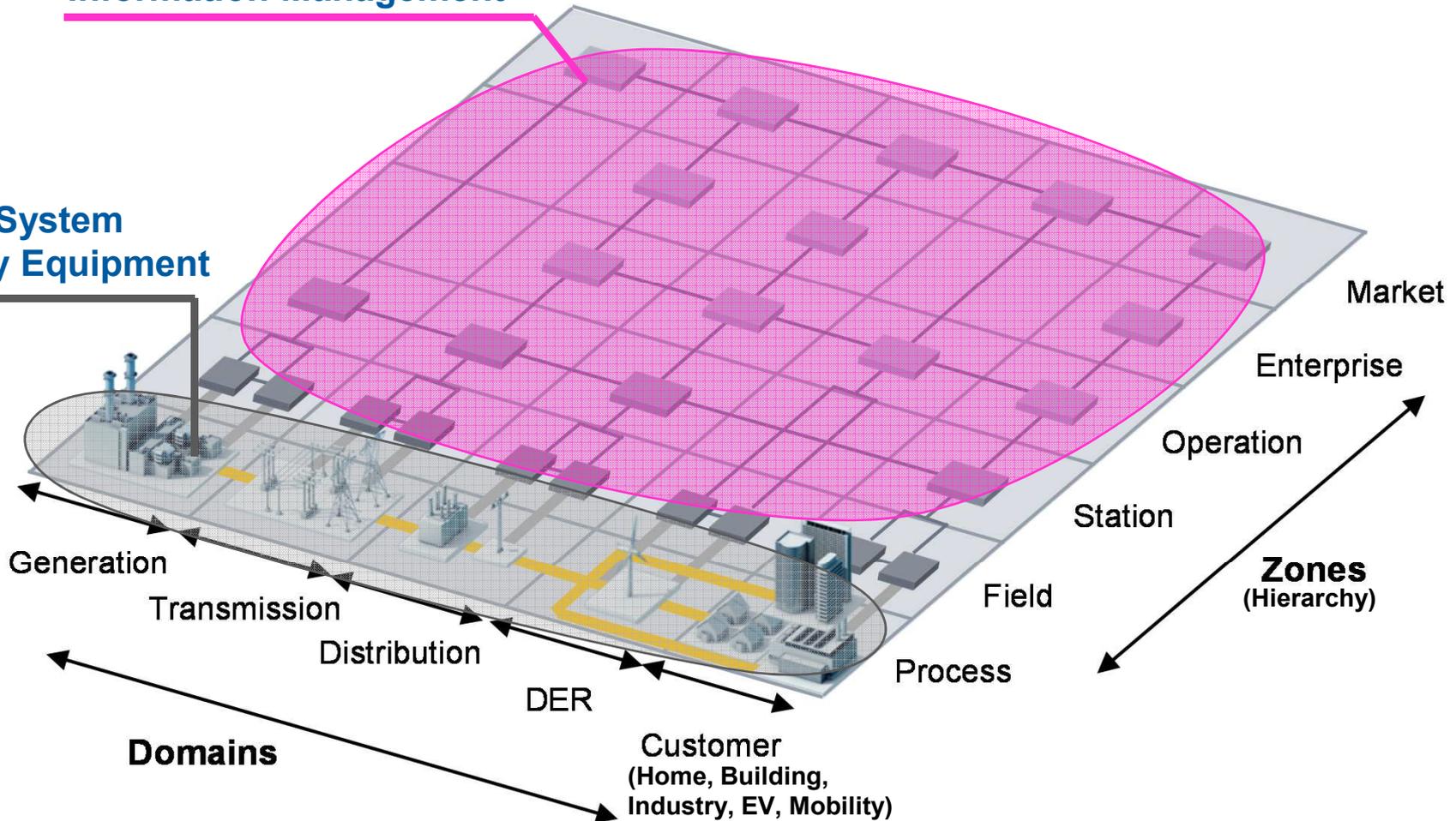


IEC 61850 ed1.0	IEC 61850 ed2.0
1995.-2004.	2005-???
3 radne grupe	5 radnih grupa
14 dokumenata	30 + dokumenata
1400 stranica	2500 + stranica

Smart Grid domene

Information Management

Power System Primary Equipment



Smart Grid domene – IEC 61850

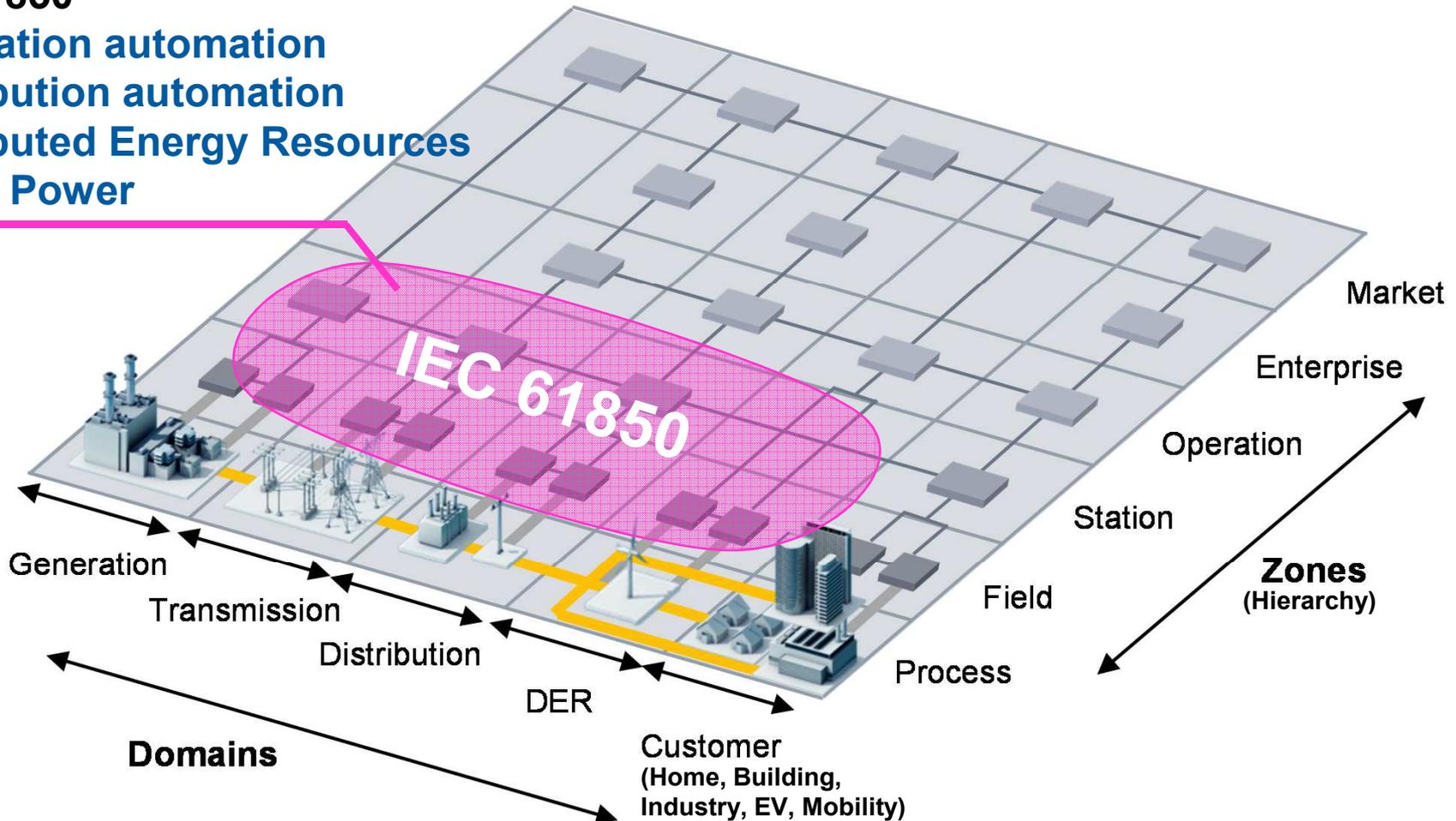
IEC 61850

Substation automation

Distribution automation

Distributed Energy Resources

Hydro Power



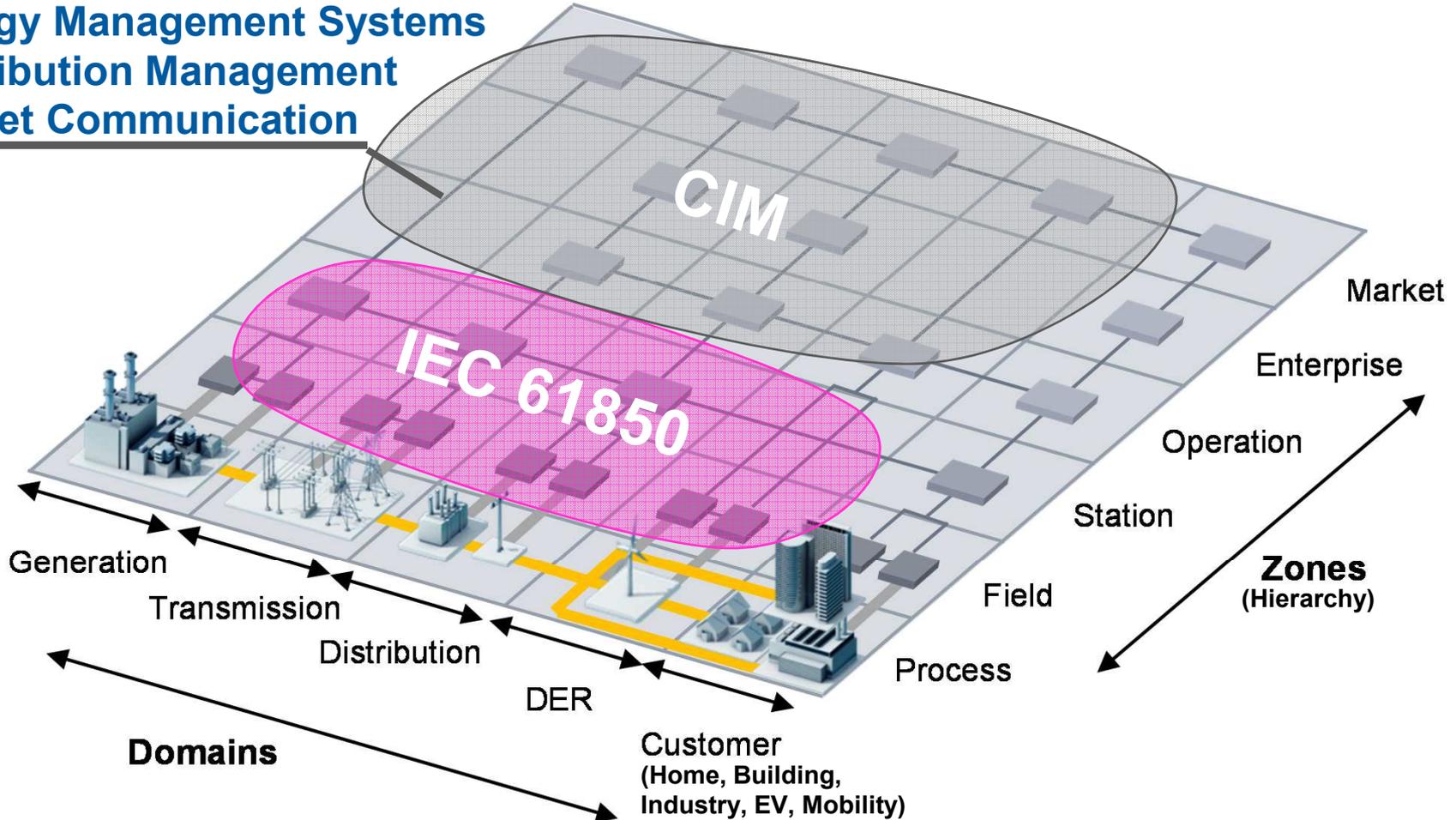
Smart Grid domene – CIM

CIM (IEC 61968, IEC 61970, IEC 62325)

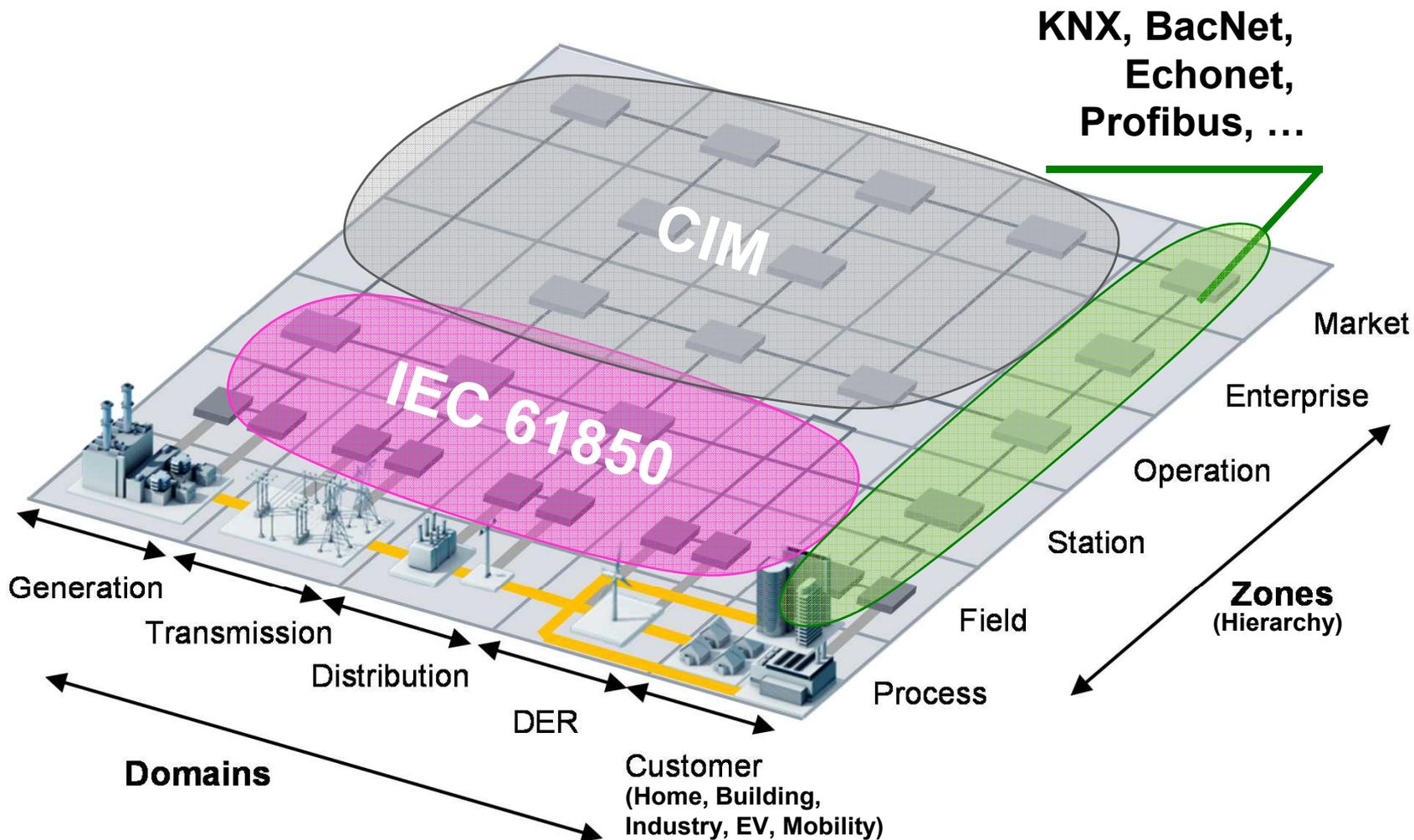
Energy Management Systems

Distribution Management

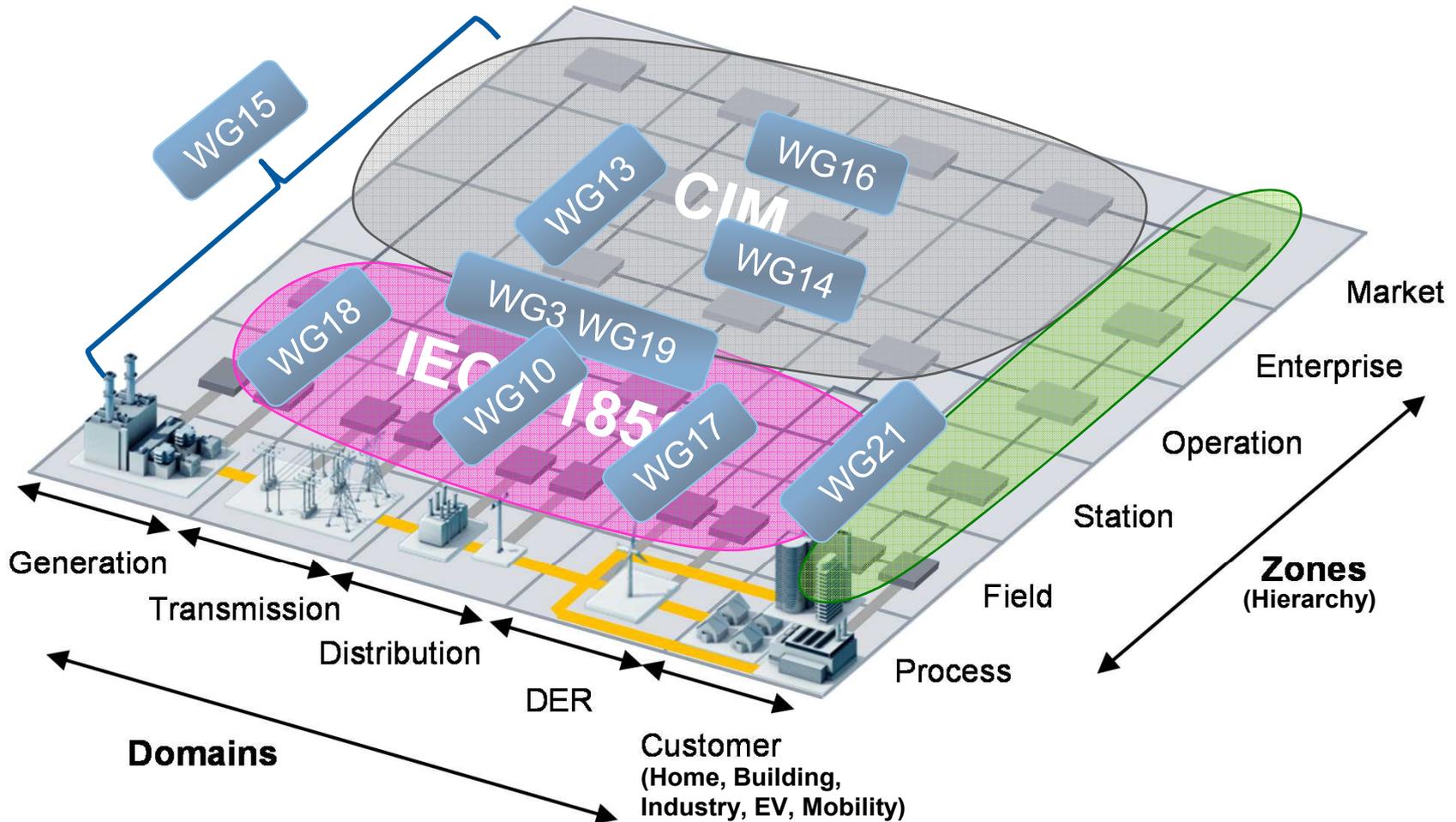
Market Communication



Smart Grid domene – Automatizacija



Smart Grid domene – IEC radne grupe

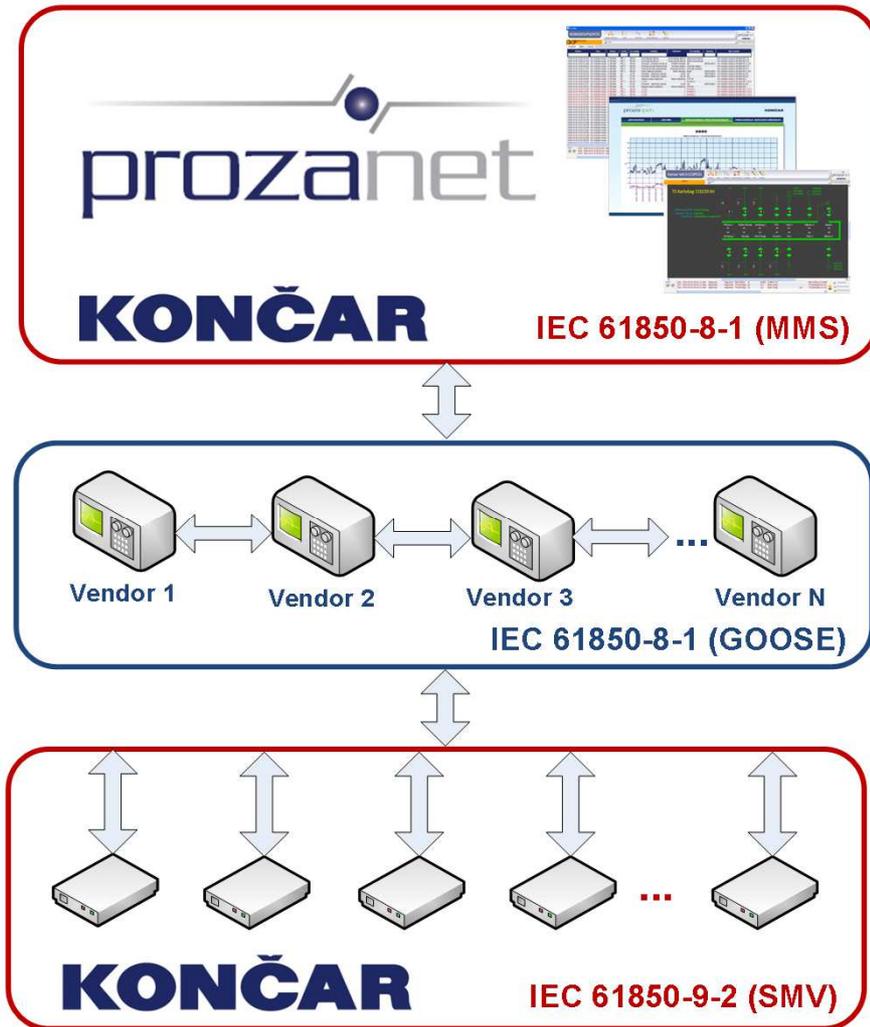


KONČAR – Sudjelovanje u standardizaciji

- WG 3 - Telecontrol & Teleprotection standards
- WG 10 - IED communications & associated data models
- WG 13 - Energy management systems
- WG 15 - Data & Communication Security
- WG 17 - Communication systems for DER
- WG 18 - Communication systems for Hydroelectric power plants
- WG 19 - Interoperability within TC57 in the long term
- WG 21 - Interfaces and protocol profiles relevant to systems connected to the electrical grid

KONČAR – Sudjelovanje u standardizaciji

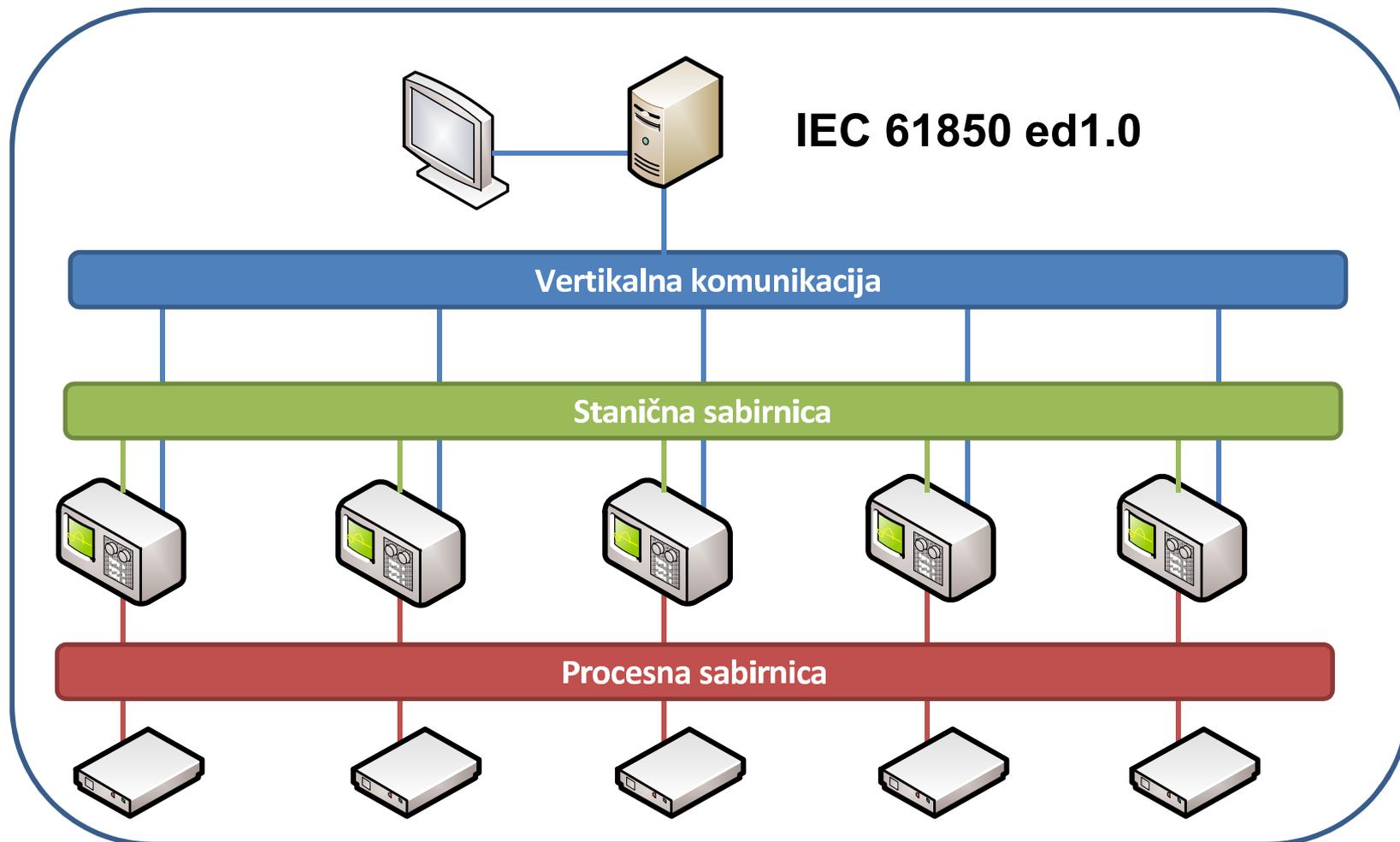
- Vlastiti razvoj
- PROZA NET SCADA
- MMS (ISO 9506)
- Automatizacija postrojenja
- Interoperabilnost
- Procesna sabirnica
- Certifikacija



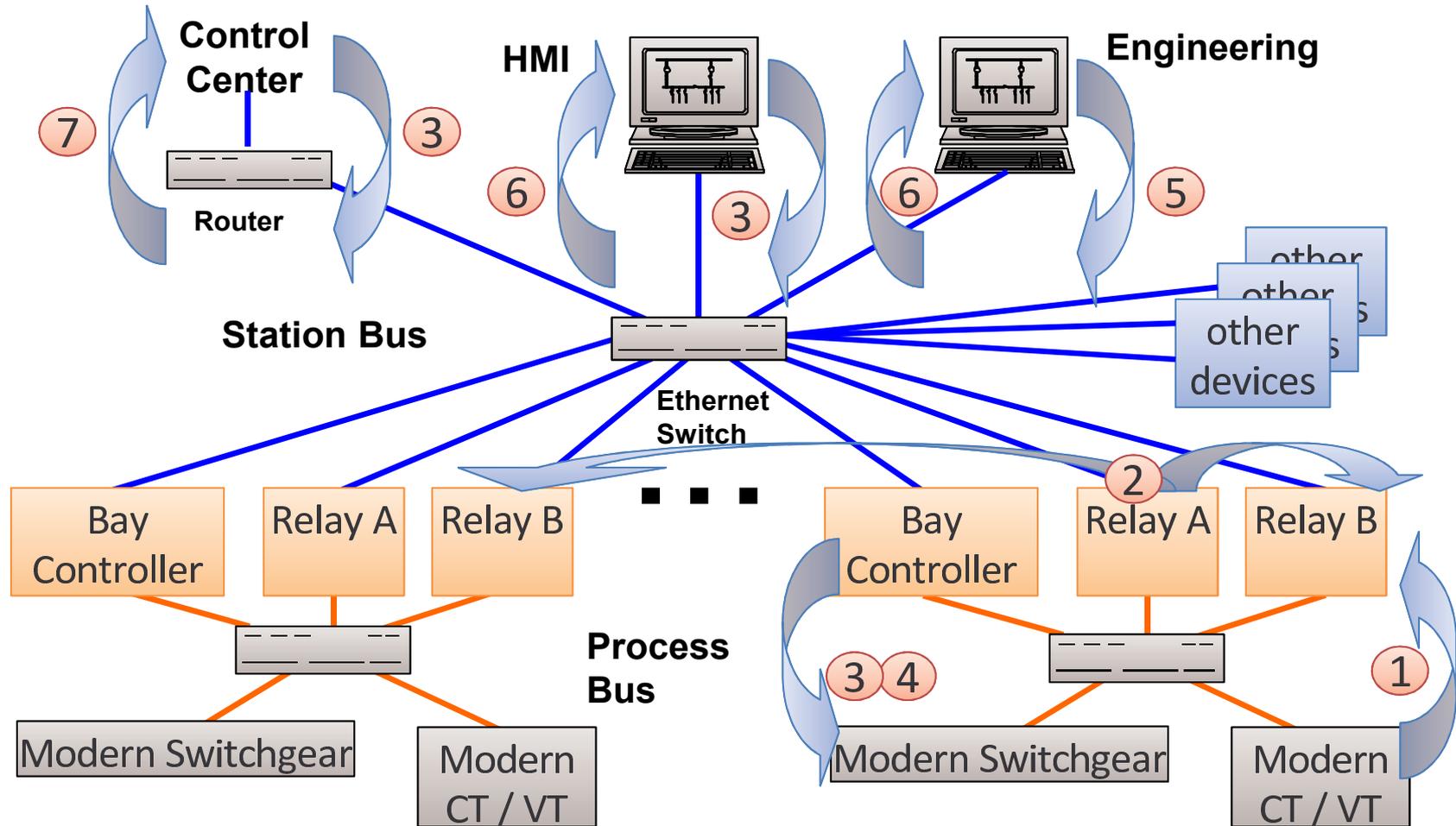
Sadržaj

- 1 • Uvod
- 2 • **Arhitektura IEC 61850 sustava**
- 3 • Informacijsko modeliranje
- 4 • Komunikacijski servisi
- 5 • Implementacijski zahtjevi
- 6 • Konfiguracija

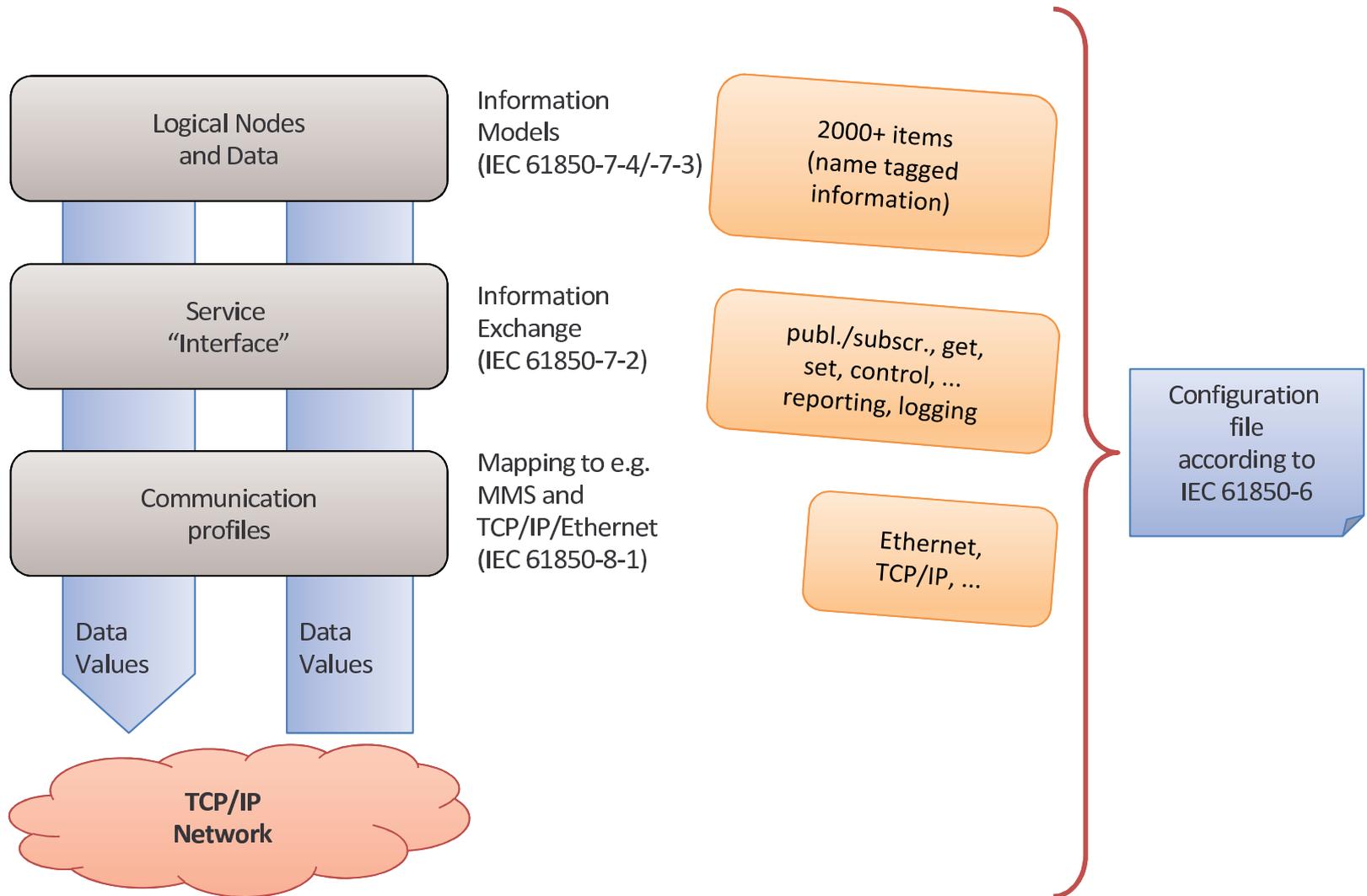
IEC 61850 – Osnovna arhitektura sustava



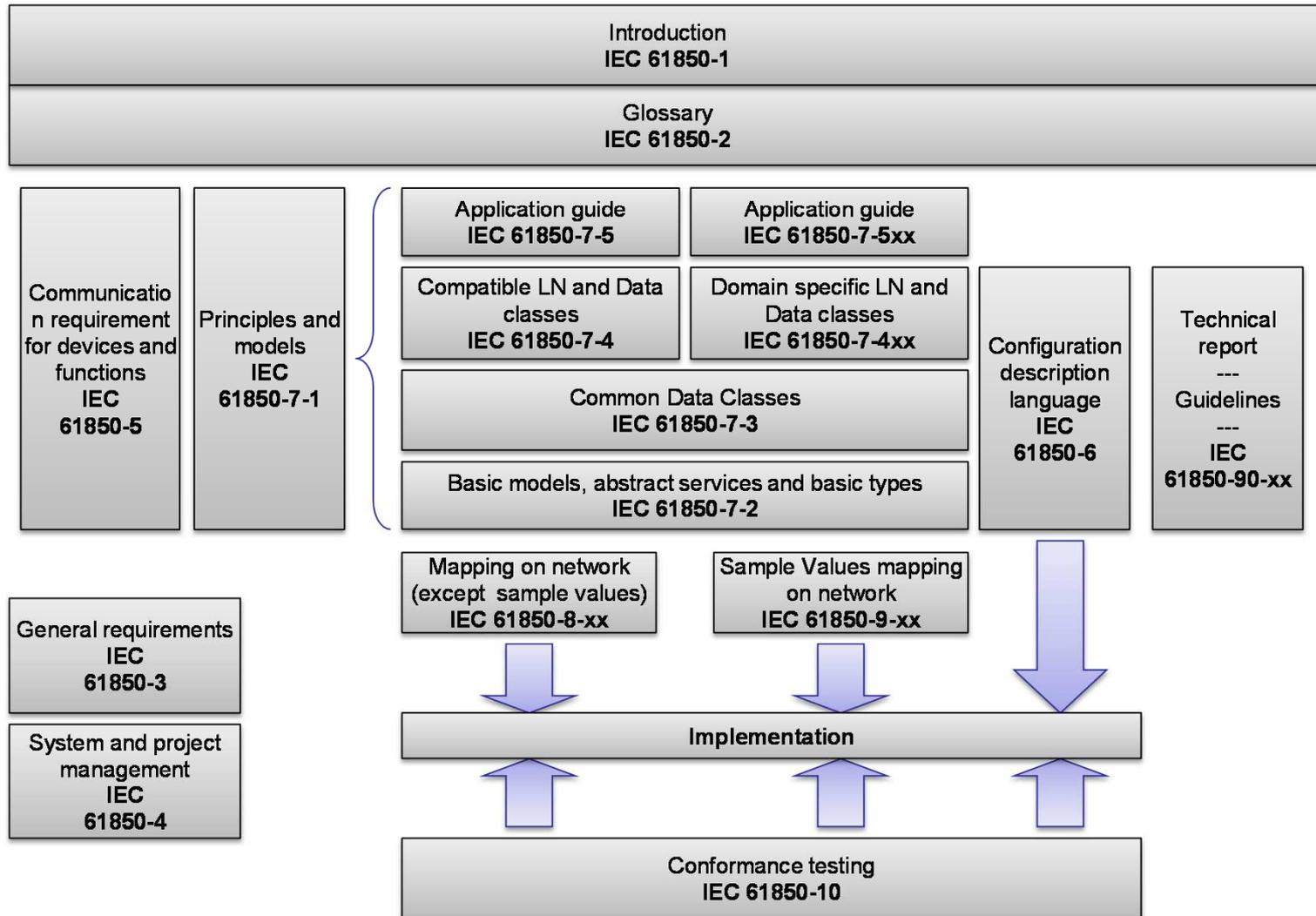
IEC 61850 – Sučelja



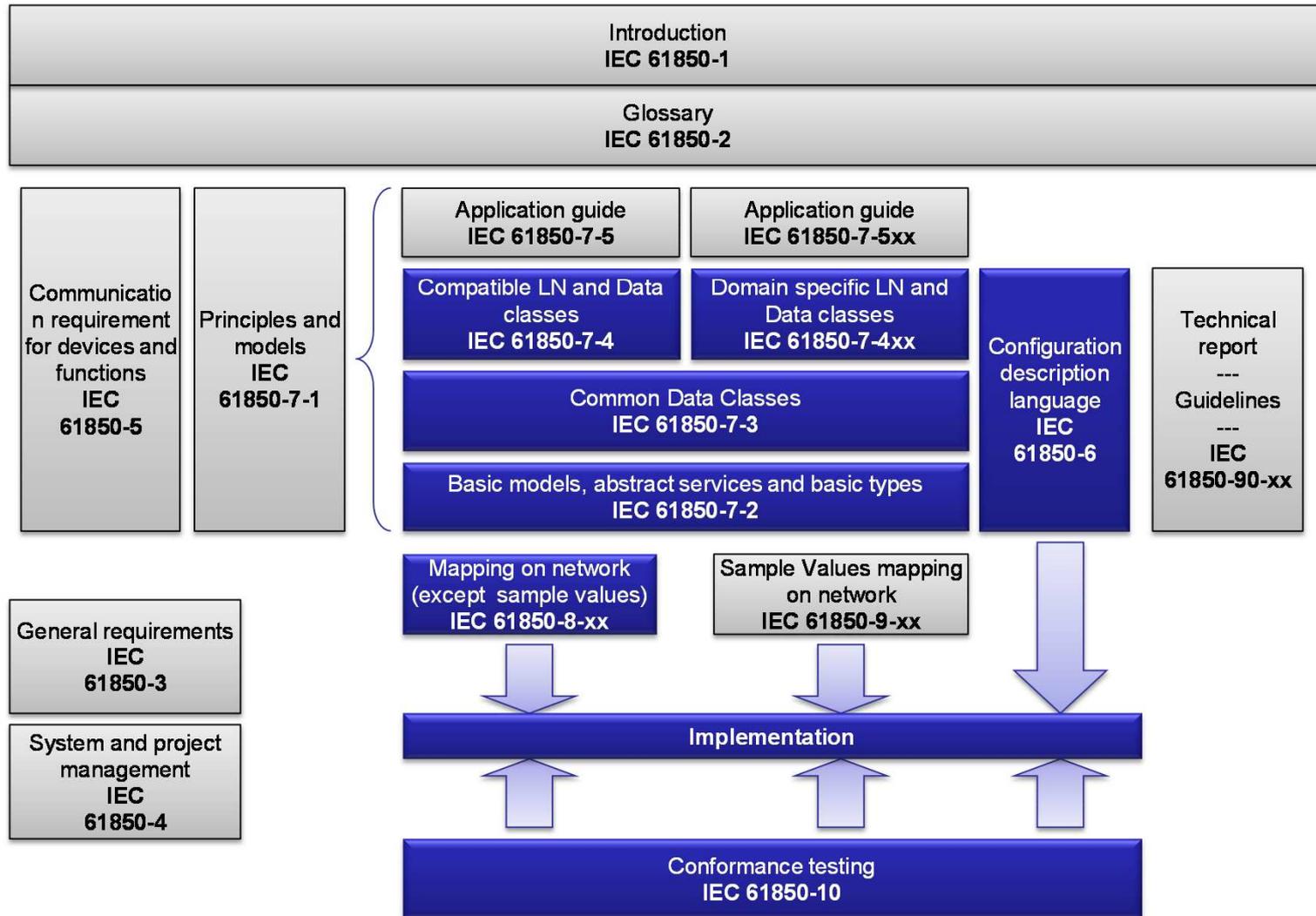
IEC 61850 – Pregled



IEC 61850 – Odnosi među dokumentima



IEC 61850 – Primjena u praksi

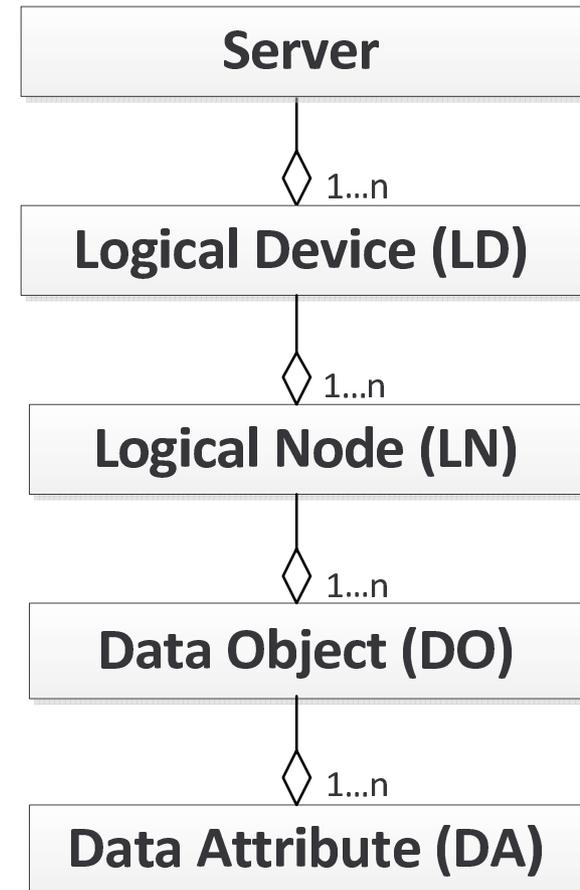
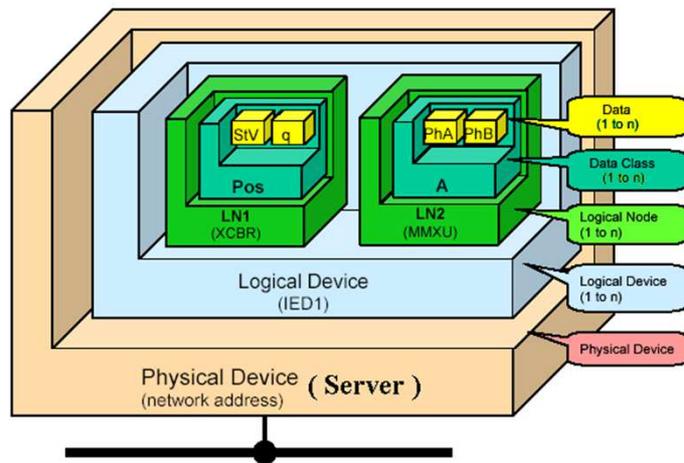


Sadržaj

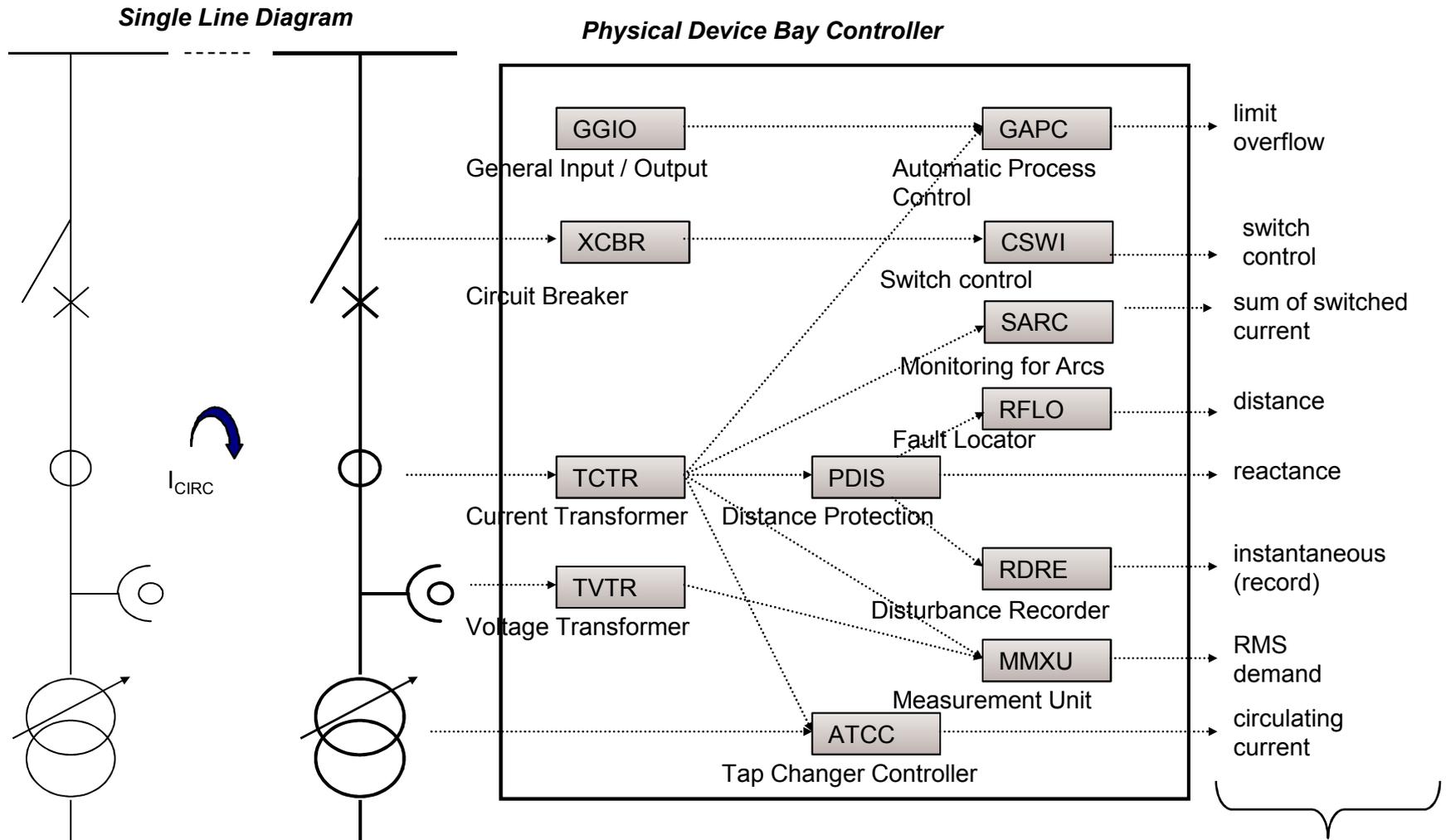
- 1 • Arhitektura
- 2 • Arhitektura IEC 61850 sustava
- 3 • Informacijsko modeliranje**
- 4 • Komunikacijski servisi
- 5 • Implementacijski zahtjevi
- 6 • Konfiguracija

IEC 61850 – Podatkovni model

- Hijerarhijski funkcijski-orijentiran model
- Objektno orijentirano modeliranje
- IEC 61850-7-2 (Osnovni model)
- IEC 61850-7-3 (Podatkovne klase)
- IEC 61850-7-4xx (Domena)



IEC 61850 – Modeliranje sustava



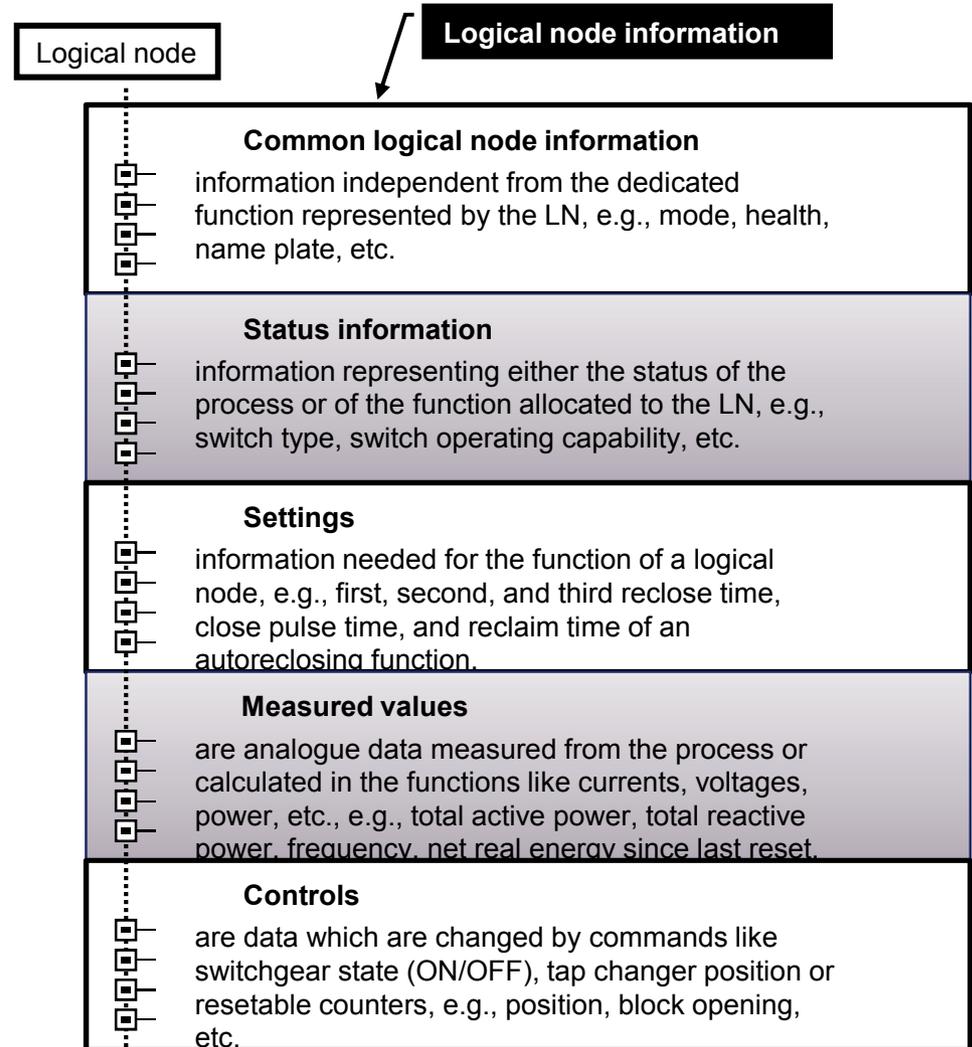
examples for some current related data

IEC 61850 – Logička čvorišta

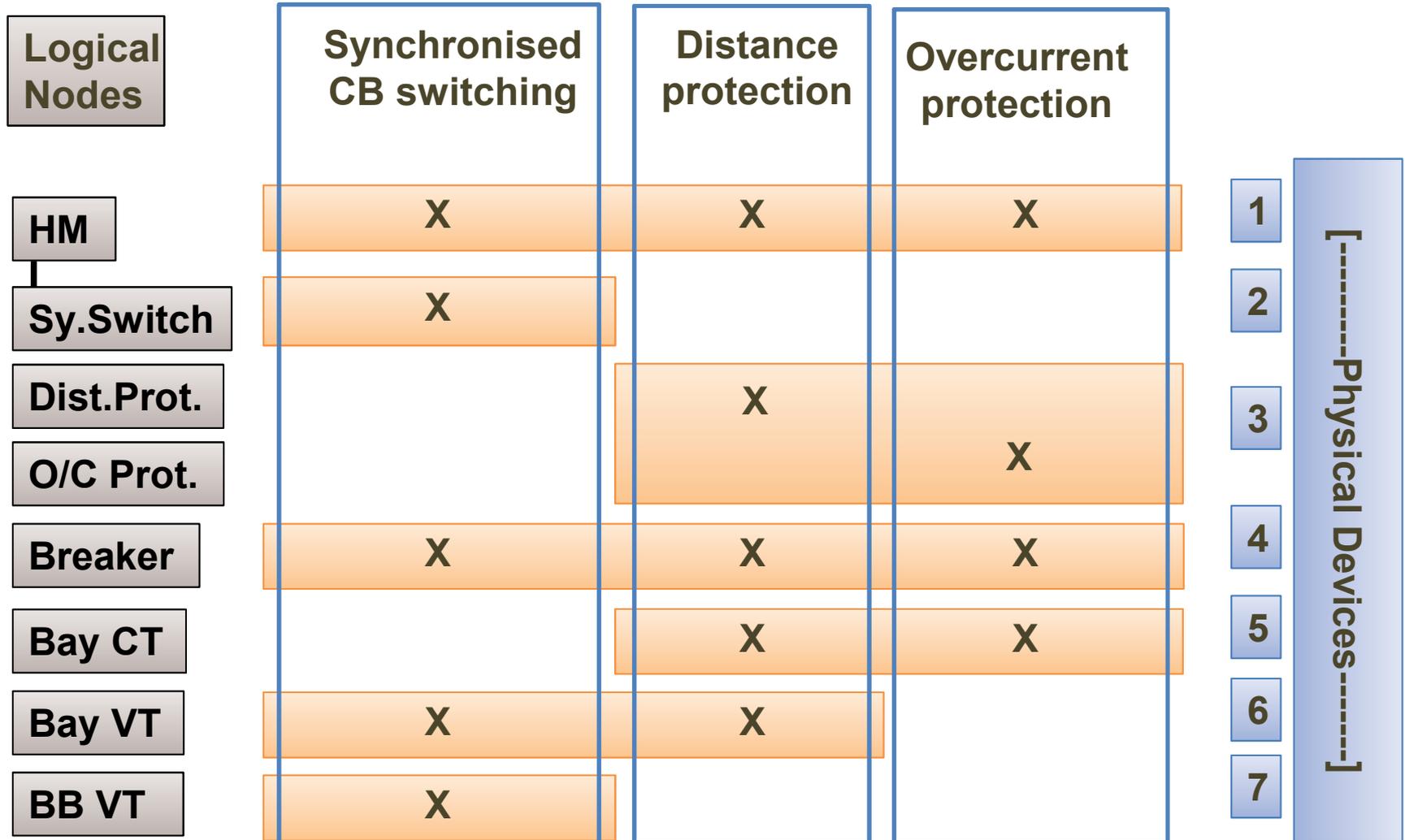
Group indicator	Logical node groups
A	Automatic Control
C	Supervisory control
D	DER
F	Functional blocks
G	Generic Function References
H	Hydro power
I	Interfacing and Archiving
K	Mechanical and non-electrical primary equipment
L	System Logical Nodes
M	Metering and Measurement
P	Protection Functions
Q	Power Quality Events Detection Related
R	Protection Related Functions
S	Supervision and Monitoring
T	Instrument Transformer and Sensors
W	Wind power
X	Switchgear
Y	Power Transformer and Related Functions
Z	Further (power system) Equipment

IEC 61850 – Logička čvorišta

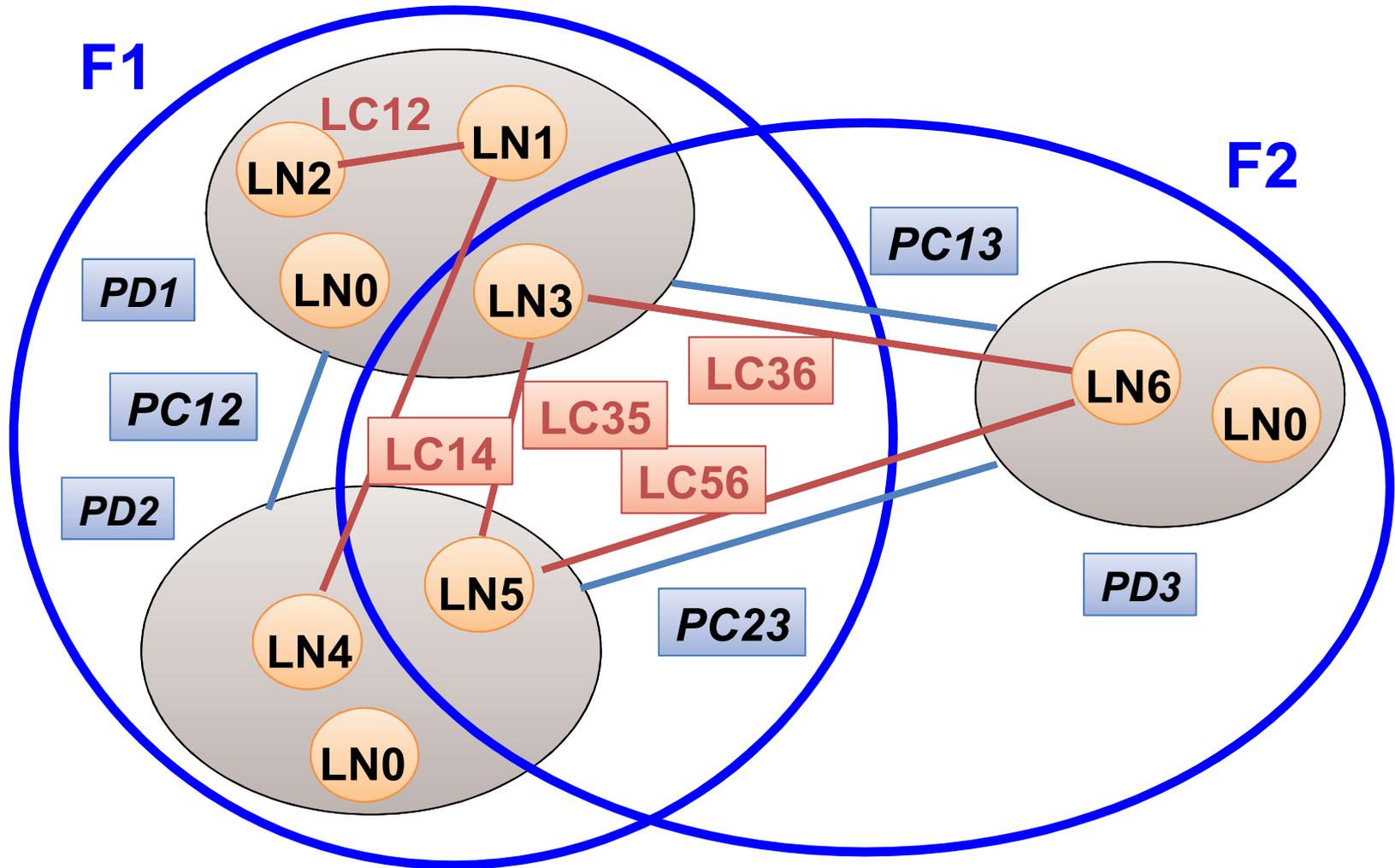
- Semantika procesnih podataka
- X(grupa)+ YY(funkcija)



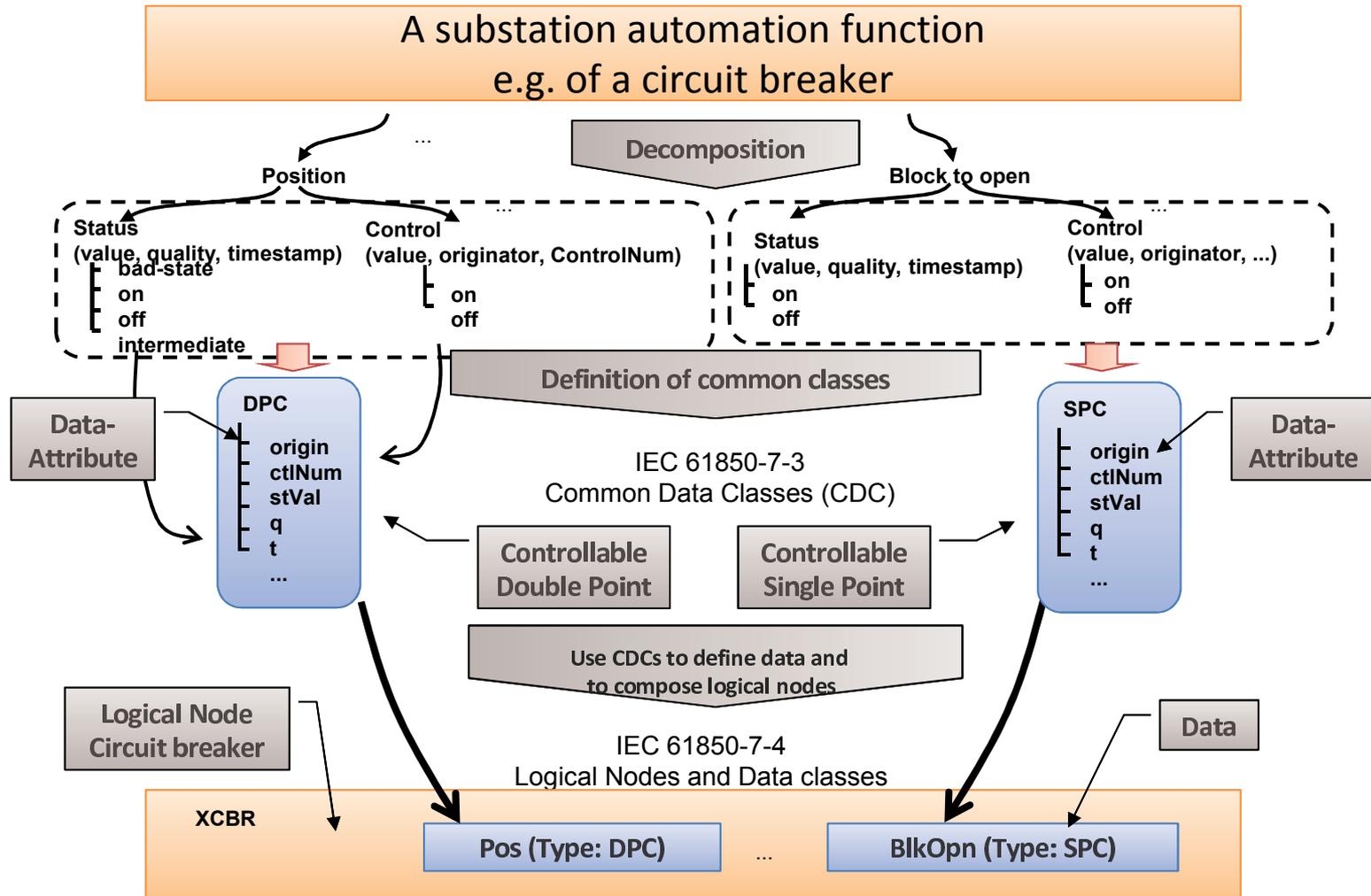
IEC 61850 – Dekompozicija funkcija



IEC 61850 – Dekompozicija funkcija



IEC 61850 – Modeliranje sustava



IEC 61850 – Modeliranje podataka

LD	LN	Data	DAttr.	FC	
E1QA5	/XCBR	.Pos	.stVal	ST	class or instance
E1QA5	/XCBR	.Pos	.q	ST	
E1QA5	/XCBR	.Pos	.t	ST	
E1QA5	/XCBR	.Pos	.ctlModel	CF	
LD5	/YPTR2	.Temp	.mVal.i .mVal.f	MX MX	instance # 2
E1QA5	/XCBR8	.Pos	.stVal	ST	instance # 8
E1QA5	/XCBR8	.Pos	.q	ST	
E1QA5	/XCBR8	.Pos	.t	ST	
E1QA5	/XCBR8	.Pos	.ctlModel	CF	
Object Name		Object Name		Object Name	
Object Name		Object Name		Object Name	
ObjectReference					

IEC 61850 – Logička čvorišta

Logical Node: Circuit breaker			Name: XCBR
Data-Class	DataName	Common Data Class (CDC)	M/O
Basic Logical Node information			
Mode	Mod	ENC - Controllable Integer Status	O
Behaviour	Beh	ENS - Integer Status	M
Health	Health	ENS - Integer Status	O
Name plate	NamPlt	LPL - Logical node name plate	O
Local control behaviour	Loc	SPS - Single point status	M
External equipment health	EEHealth	ENS - Integer Status	O
External equipment name plate	EEName	DPL - Device name plate	O
Operation counter	OpCnt	INS - Integer Status	M
Controllable Data			
Switch position	Pos	DPC - Controllable Double Point	M
Block opening	BlkOpn	SPC - Controllable Single Point	M
Block closing	BlkCls	SPC - Controllable Single Point	M
Charger motor enabled	ChMotEna	SPC - Controllable Single Point	O

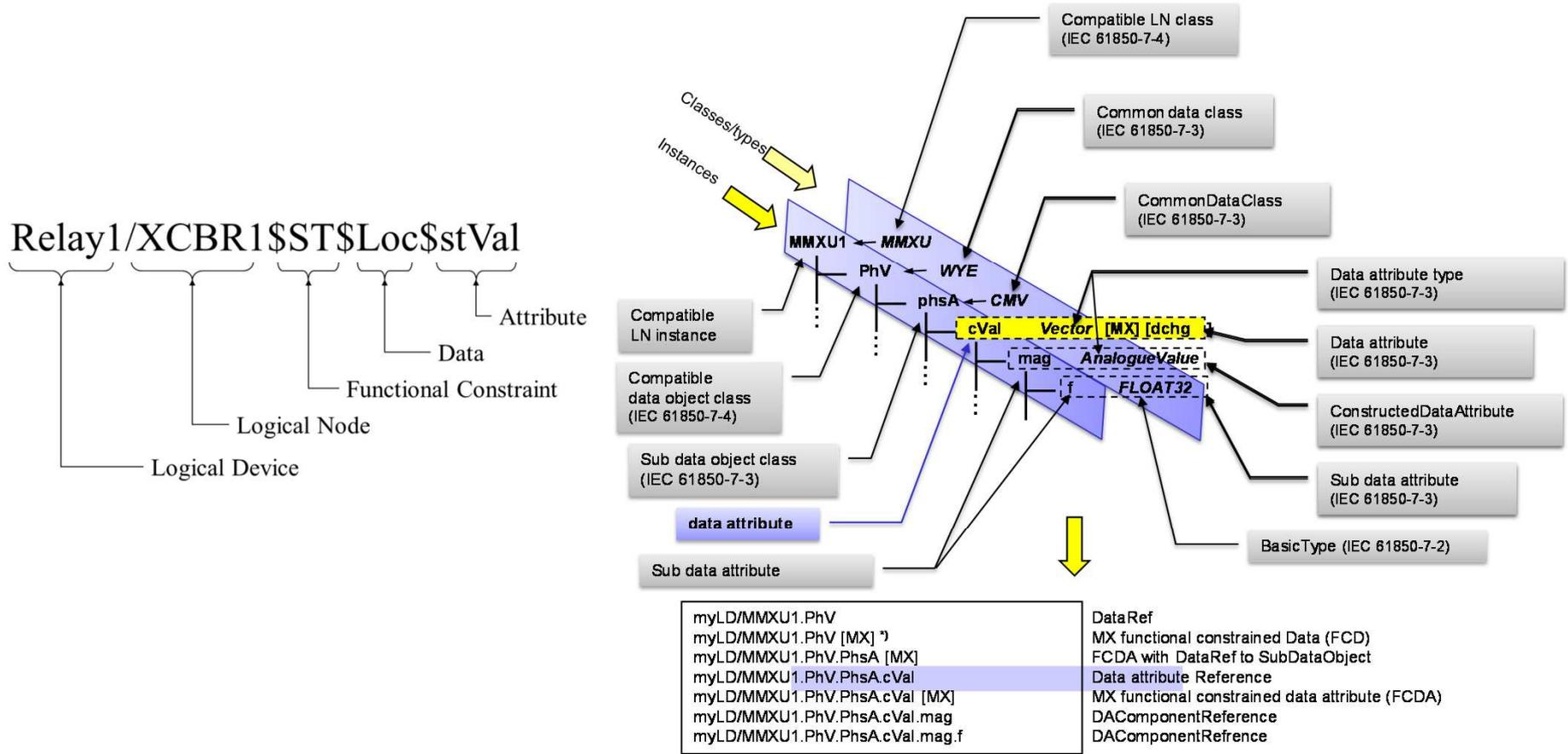
IEC 61850 – Podatkovne klase

DPC class					
Data attribute name	Type	FC	TrgOp	Value/Value range	M/O/C
DataName	Inherited from GenDataObject Class or from GenSubDataObject Class (see IEC 61850-7-2)				
DataAttribute					
<i>status and control mirror</i>					
origin	Originator	ST			AC CO O
ctlNum	INT8U	ST		0..255	AC CO O
stVal	CODED ENUM	ST	dchg	intermediate-state off on bad-state	M
q	Quality	ST	qchg		M
t	TimeStamp	ST			M
stSeld	BOOLEAN	ST	dchg		O
opRcvd	BOOLEAN	OR	dchg		O
opOk	BOOLEAN	OR	dchg		O
tOpOk	TimeStamp	OR			O
<i>substitution and blocked</i>					
subEna	BOOLEAN	SV			PICS SUBST
subVal	CODED ENUM	SV		intermediate-state off on bad-state	PICS_SUBST
subQ	Quality	SV			PICS SUBST
subID	VISIBLE STRING64	SV			PICS SUBST
blkEna	BOOLEAN	BL			O
<i>configuration, description and extension</i>					
pulseConfig	PulseConfig	CF	dchg		AC CO O
ctlModel	CtlModels	CF	dchg		M
sboTimeout	INT32U	CF	dchg		AC CO O
sboClass	SboClasses	CF	dchg		AC CO O
operTimeout	INT32U	CF	dchg		AC CO O
d	VISIBLE STRING255	DC		Text	O

IEC 61850 – Aplikacijski servisi

Services (see IEC 61850-7-2)			
The following services are inherited from IEC 61850-7-2. They are specialised by restricting the service to attributes with a functional constraint as specified below.			
Service model of IEC 61850-7-2	Service	Service applies to Attr with FC	Remark
GenCommonDataClass model	SetDataValues GetDataValues GetDataDefinition GetDataDirectory	DC, CF, SV, BL ALL ALL ALL	
Data set model	GetDataSetValues SetDataSetValues	ALL DC, CF, SV, BL	
Reporting model GSE model Sampled values model	Report SendGOOSEMessage SendGSSEMessage SendMSVMessage SendUSVMessage	ALL ST, MX ST ST, MX ST, MX	as specified within the data set that is used to define the content of the message
Control model	Select SelectWithValue Cancel Operate CommandTermination TimeActivatedOperate		
<i>parameters for control services</i>			
Service parameter name	Service parameter type	Value/Value range	
ctlVal	BOOLEAN	off (FALSE) on (TRUE)	

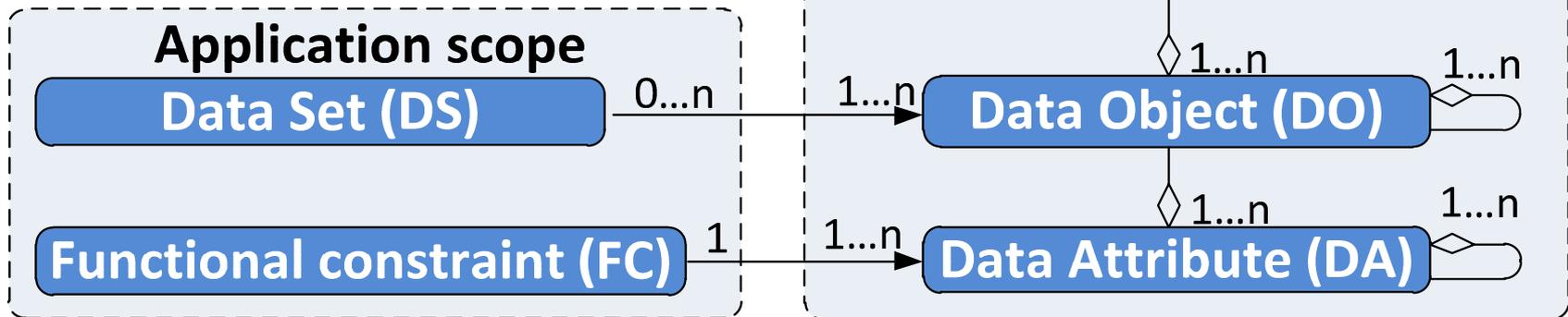
IEC 61850 – Primjer podatkovnog atributa



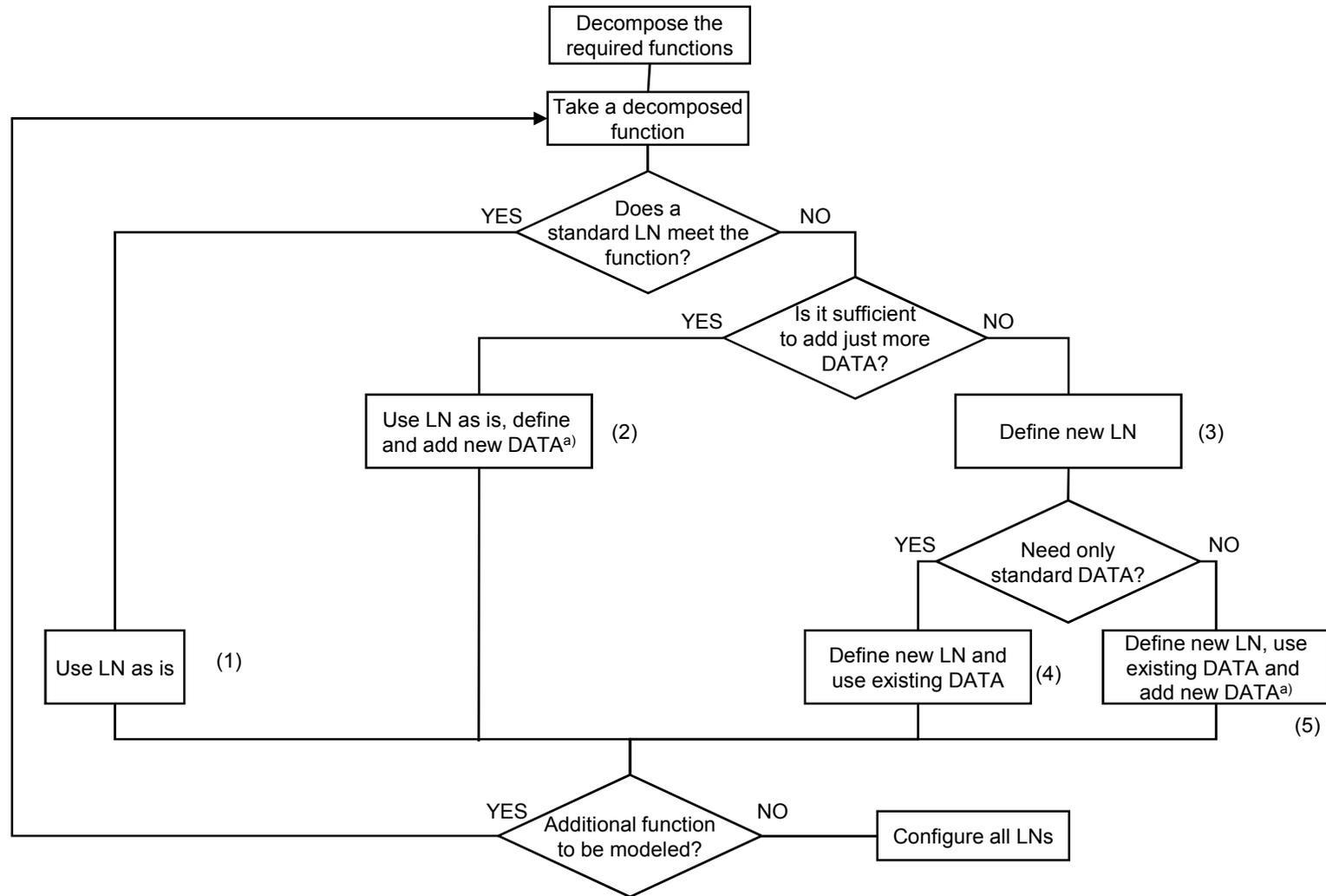
*) NOTE The notation [MX] is used for explanation purposes only. SCSMs may use a different notation.

IEC 61850 – Podatkovni model (proširenja)

- Domenska proširenja
 - Trafostanice (-7-4)
 - Hidroelektrane (-7-410)
 - Distribuirani izvori (-7-420)
 - DC/AC pretvarači (-90-7)
 - Punionice elektromobila (-90-8)
 - Baterijski sustavi (-90-9)



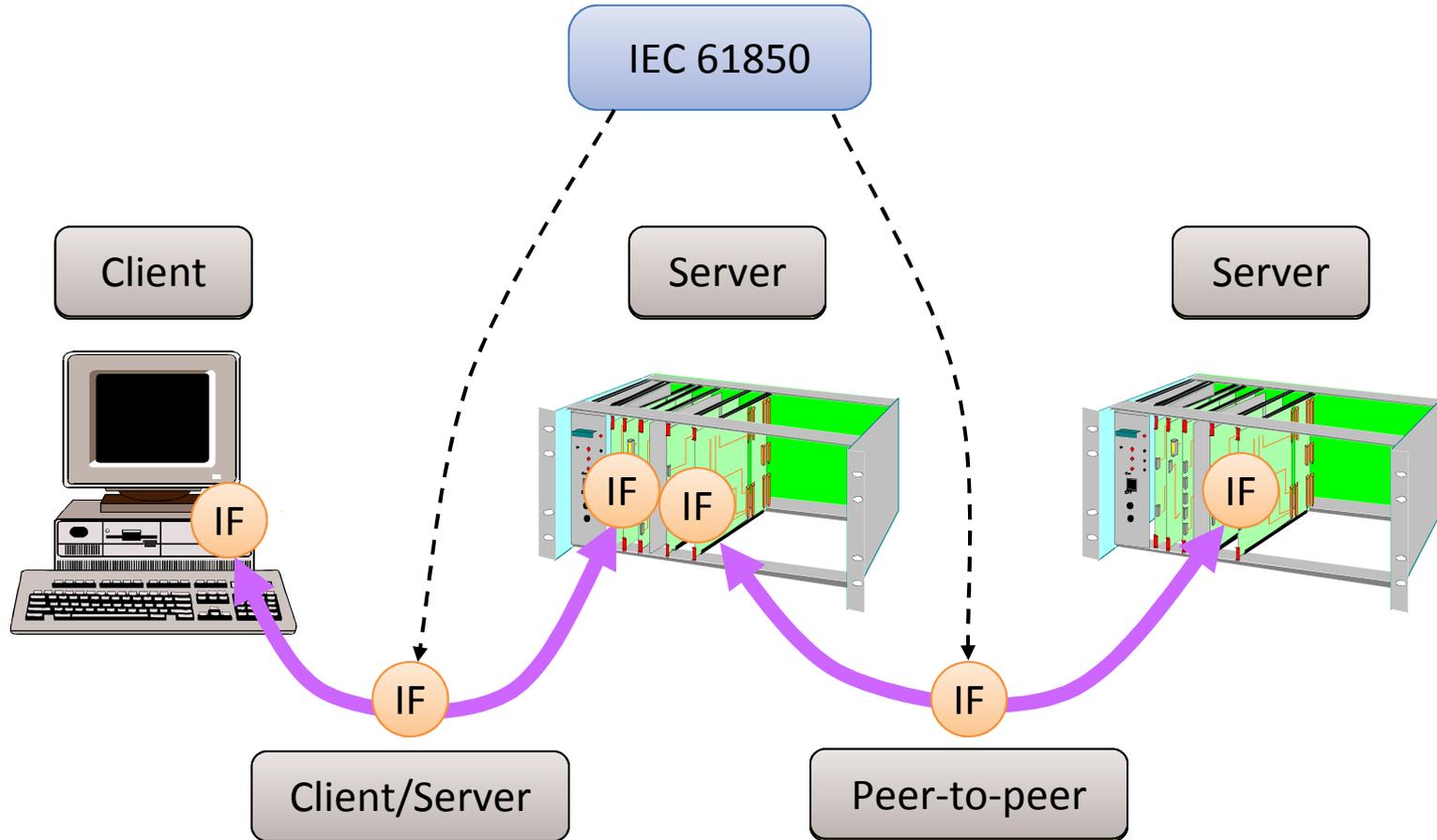
IEC 61850 – Pravila proširenja modela



Sadržaj

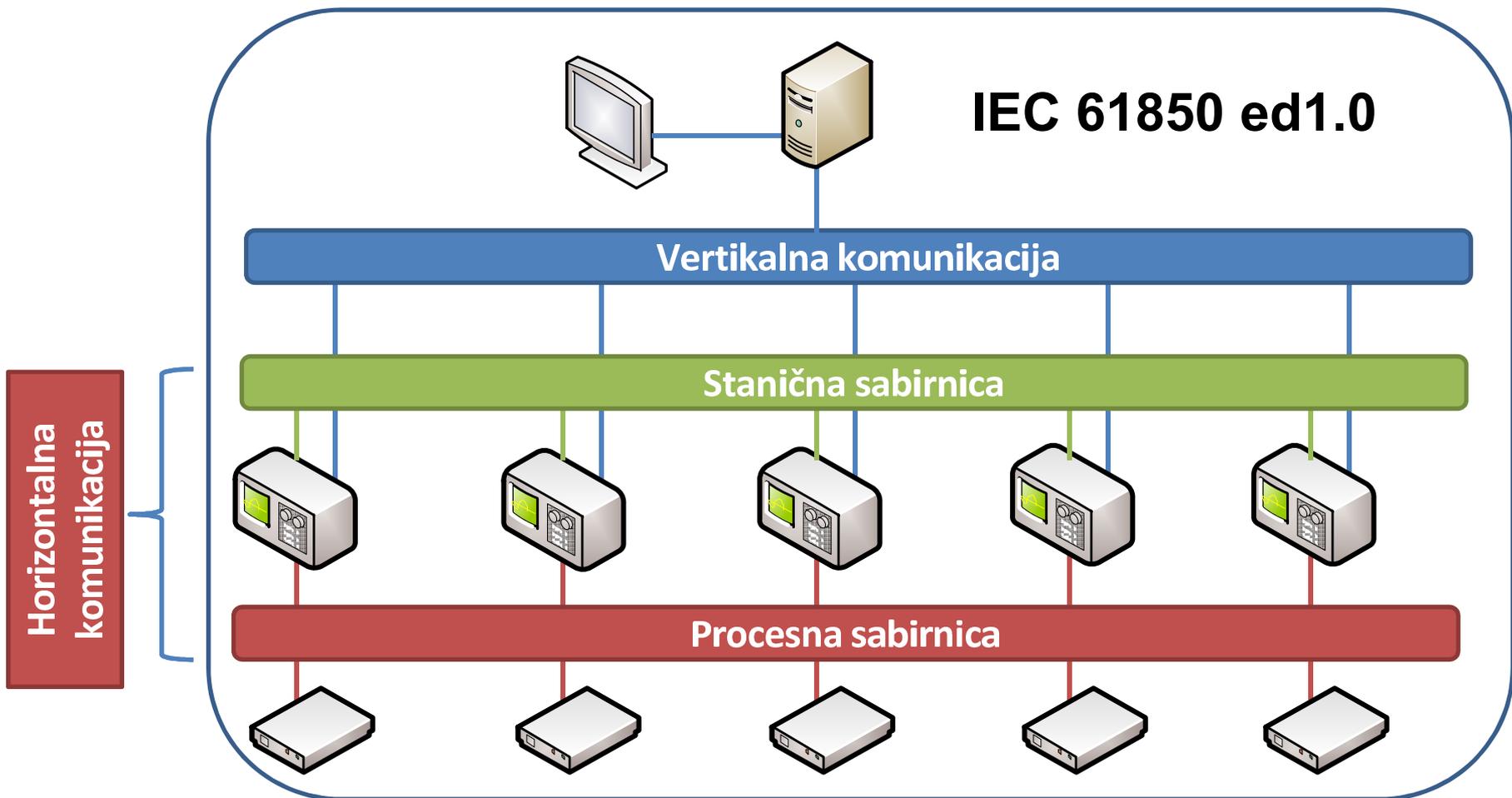
- 1 • Arhitektura
- 2 • Arhitektura IEC 61850 sustava
- 3 • Informacijsko modeliranje
- 4 • Komunikacijski servisi**
- 5 • Implementacijski zahtjev
- 6 • Konfiguracija

IEC 61850 – Razmjena informacija



IF = interface

IEC 61850 – Osnovna arhitektura sustava



IEC 61850 – Razmjena informacija

Vertical ACSI

Association

Server/LD/LN/DO/DS

Setting-Group-Control-Block

Control

Report-Control-Block

Log-Control-Block

Horizontal ACSI

GOOSE

Multicast SV Control-Block

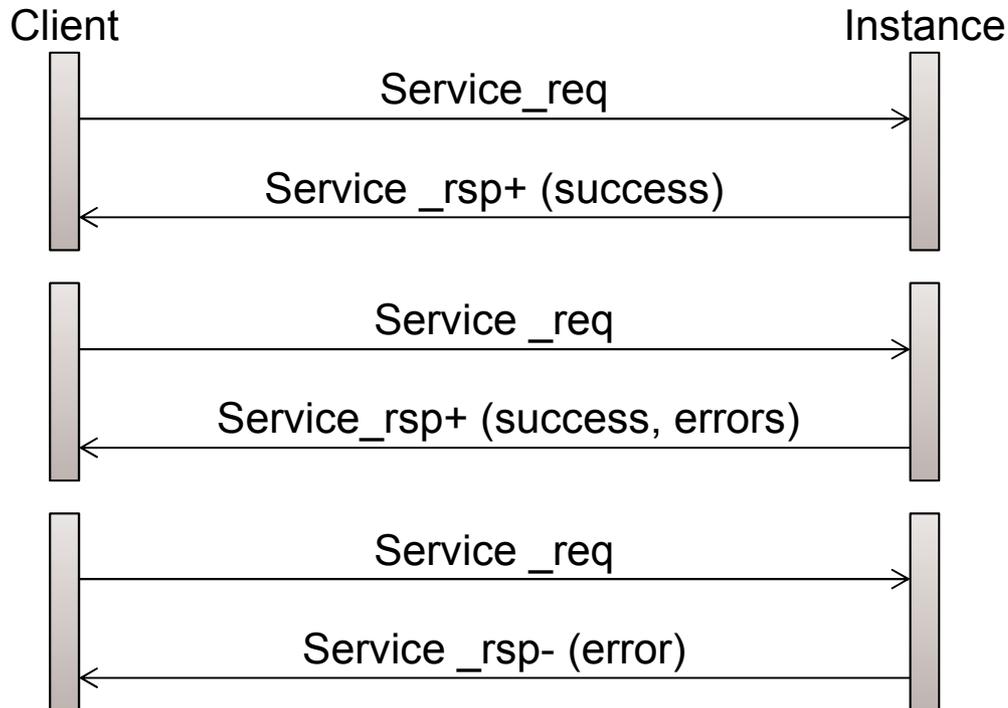
Unicast SV Control-Block

Other ACSI

File transfer

Time synchronization

IEC 61850 – ACSI definicija



Parameter name

Request

Parameter 1...

Parameter n

Response+

Parameter 1...

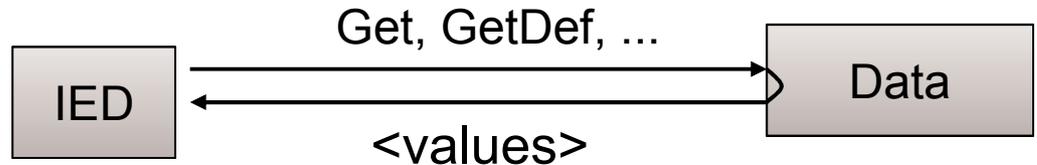
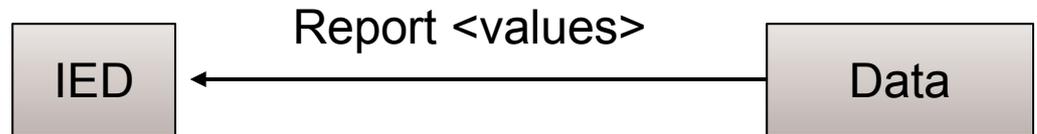
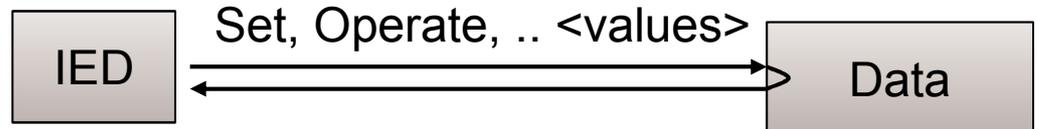
Parameter n

Response-

IEC 61850 – Razmjena informacija

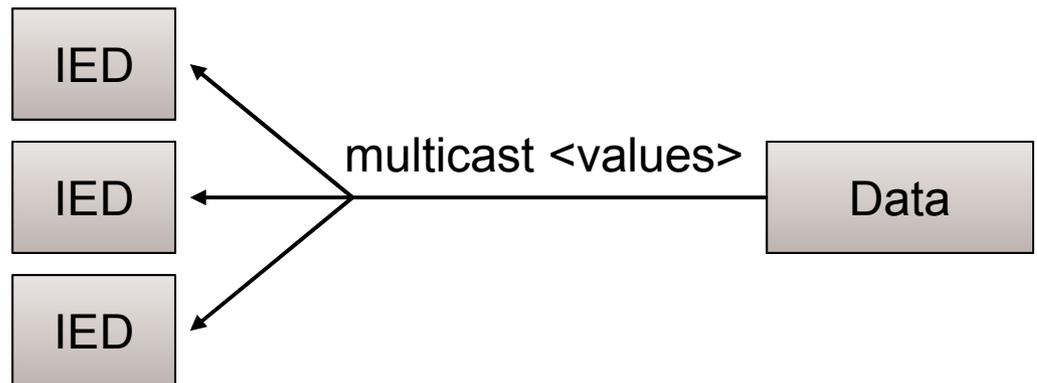
■ Primanje:

- spontano
- na zahtjev
- na pretplatu

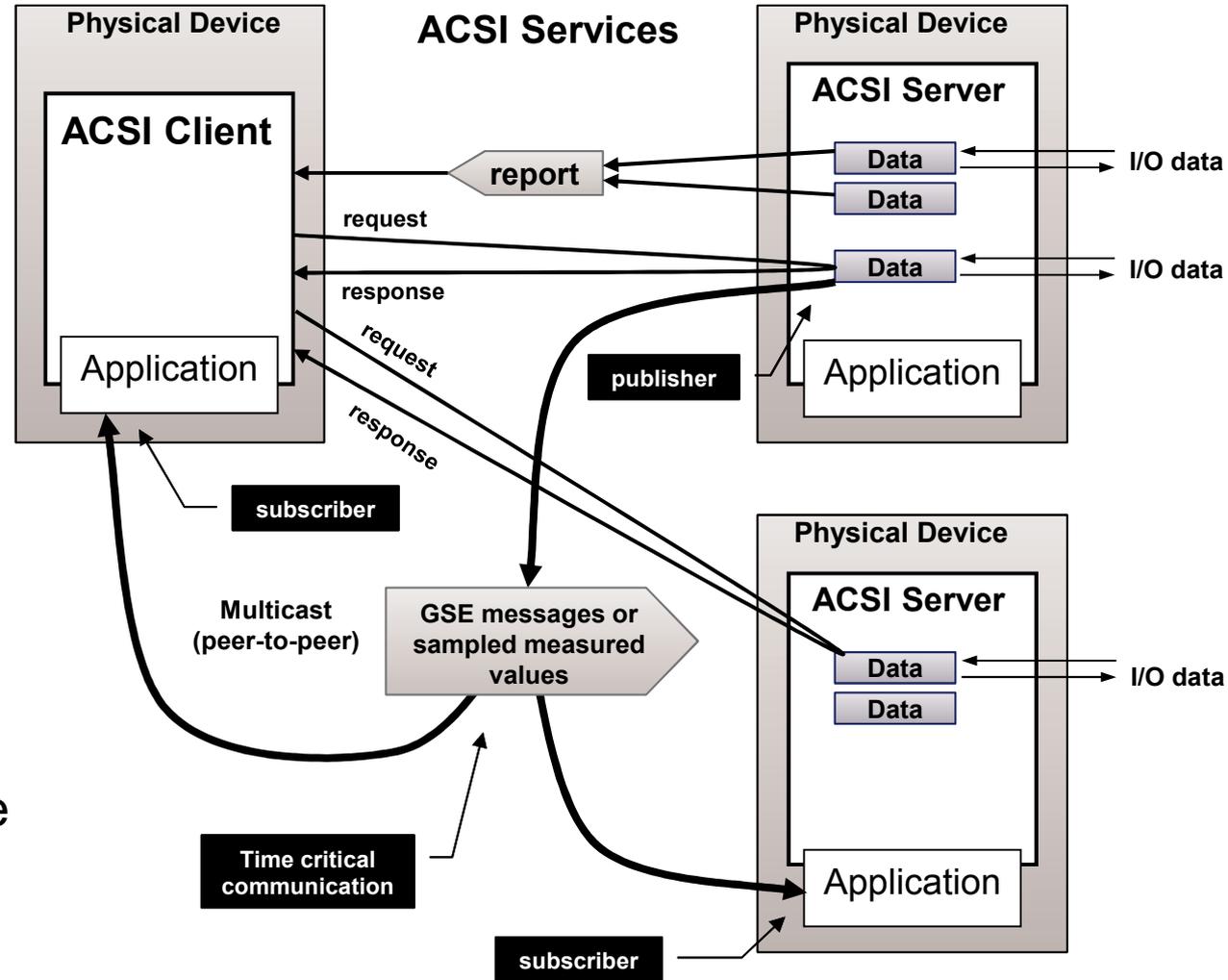


■ Slanje:

- na zahtjev
- na pretplatu

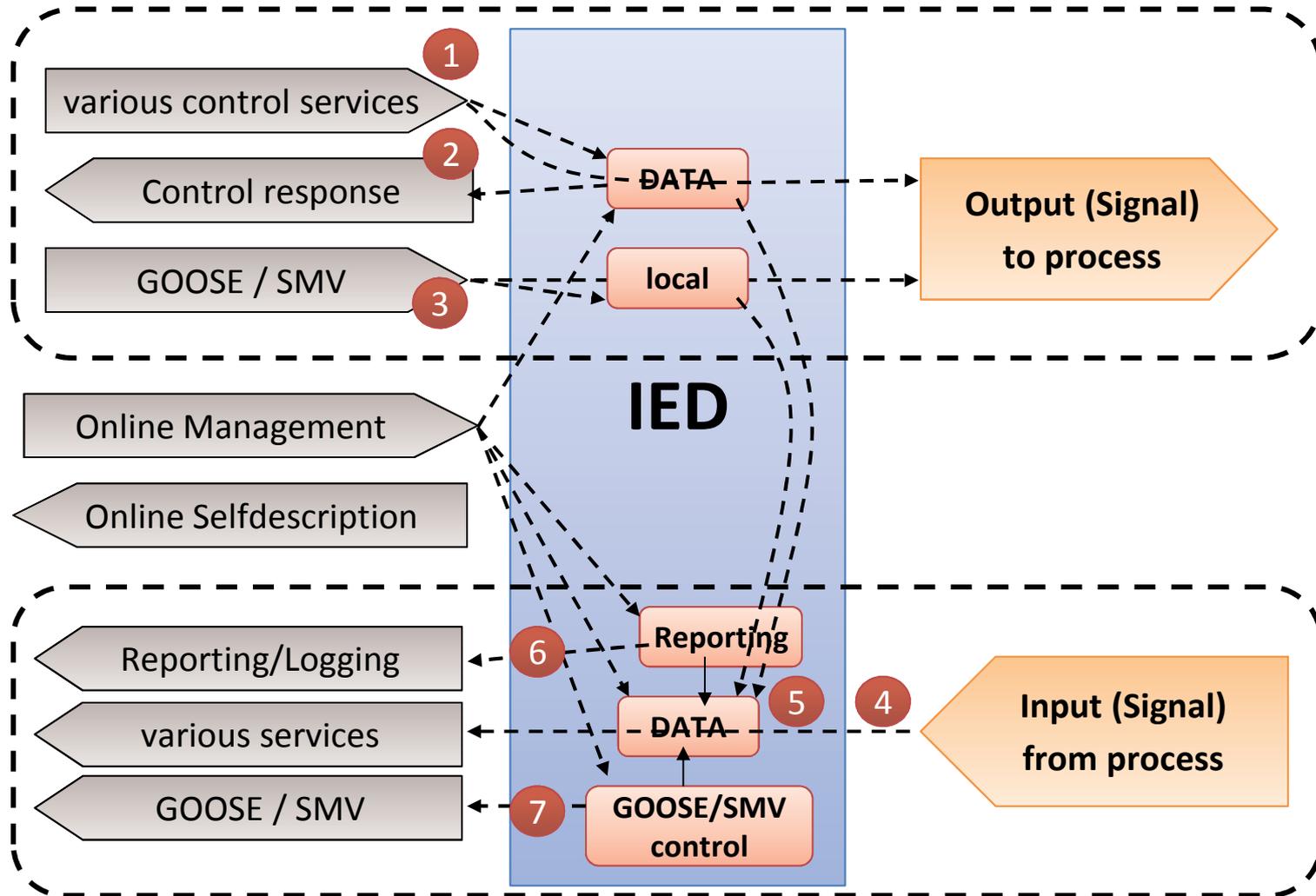


IEC 61850 – Razmjena informacija

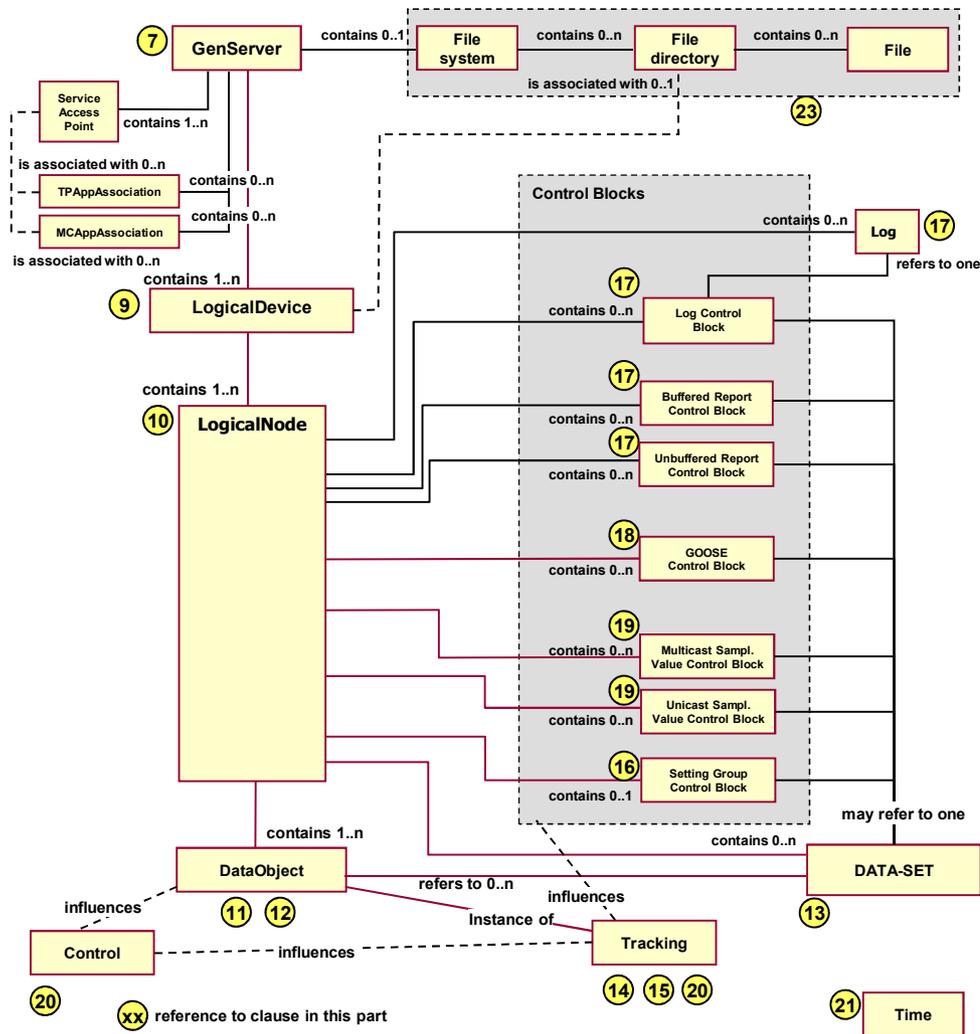


- Vertical ACSI:
 - clijent/server
- Horizontal ACSI:
 - publish/subscribe

IEC 61850 – Razmjena informacija

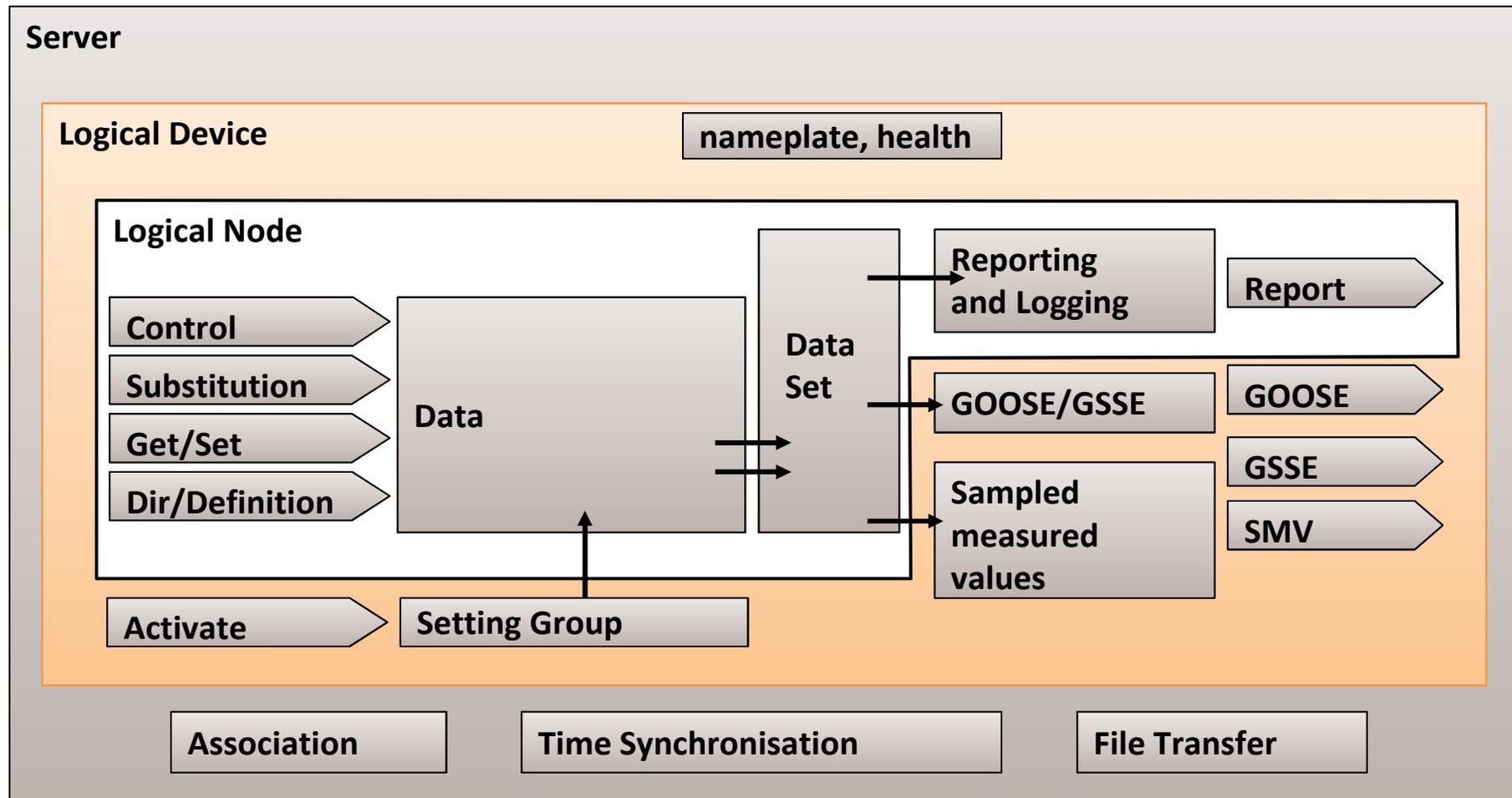


IEC 61850 – Informacijski model + ACSI servisi

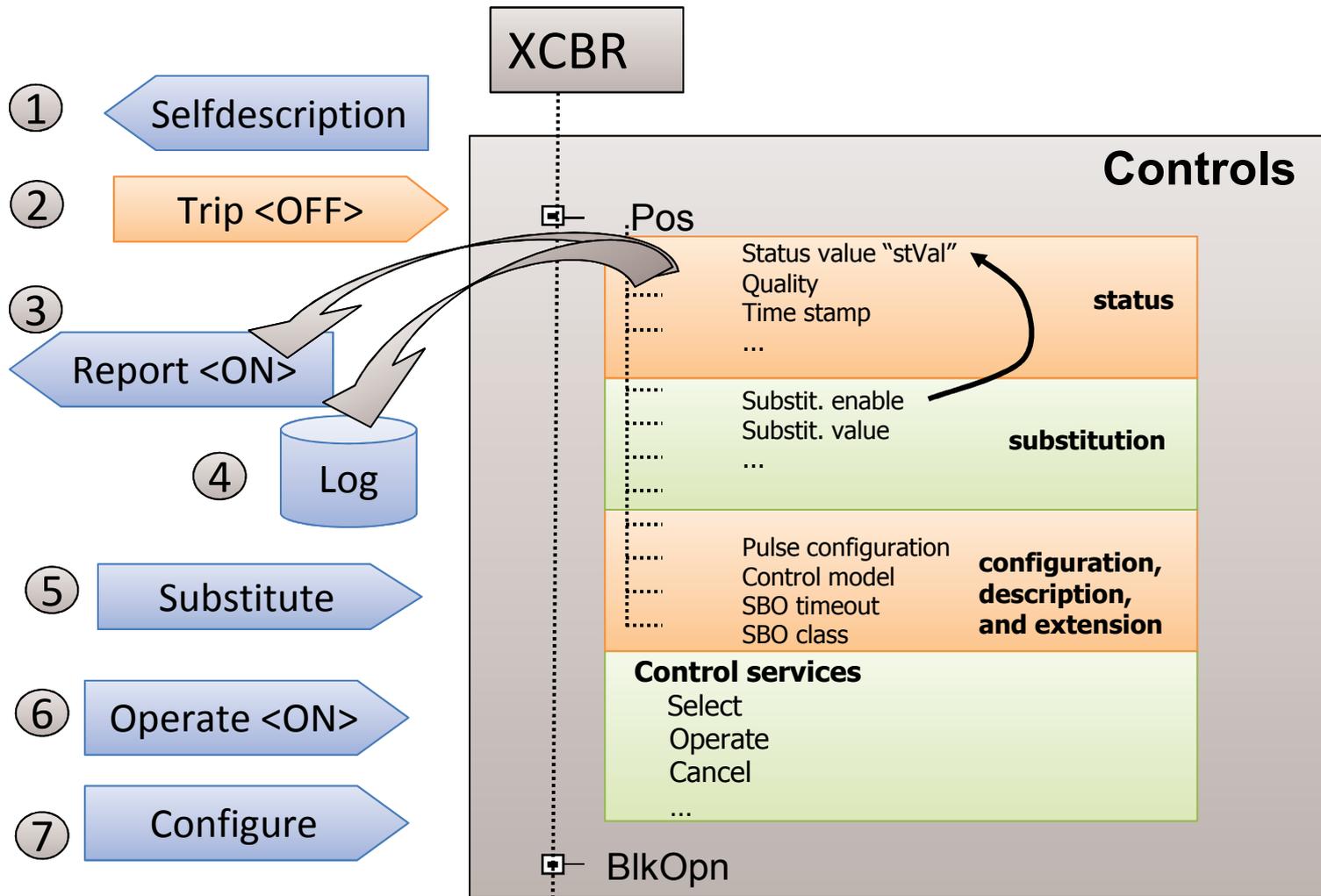


ACSI Services (7-2)
LogicalDeviceDirectory
GetAllDataValues
GetDataValues
SetDataValues
GetDataDirectory
GetDataDefinition
GetDataSetValues
DataSetValues
CreateDataSet
DeleteDataSet
GetDataSetDirectory
Report (Buffered and Unbuffered)
GetBRCBValues/GetURCBValues
SetBRCBValues/SetURCBValues
GetLCBValues
SetLCBValues
QueryLogByTime
QueryLogAfter
GetLogStatusValues
Select
SelectWithValue
Cancel
Operate
Command-Termination

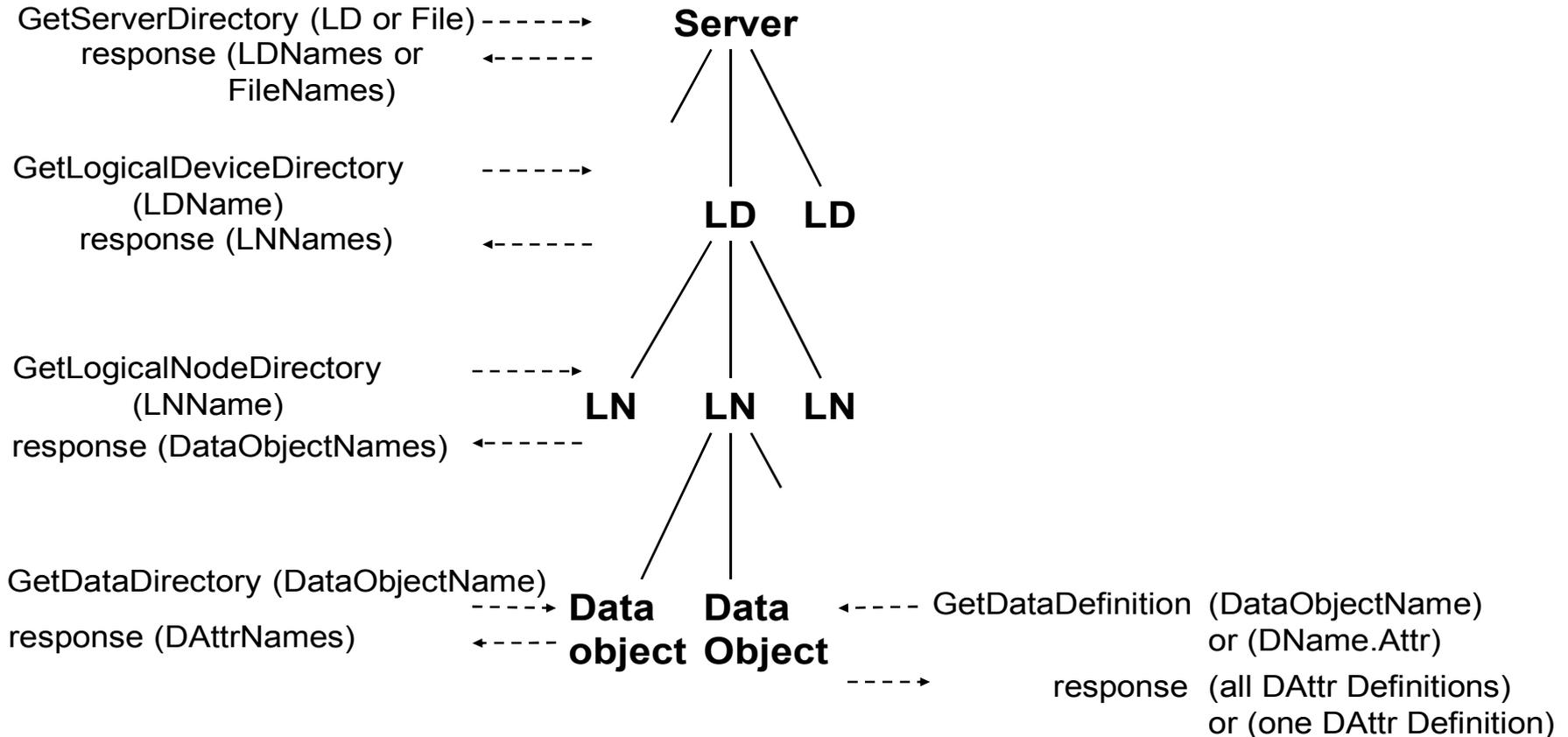
IEC 61850 – Informacijski model + ACSI servisi



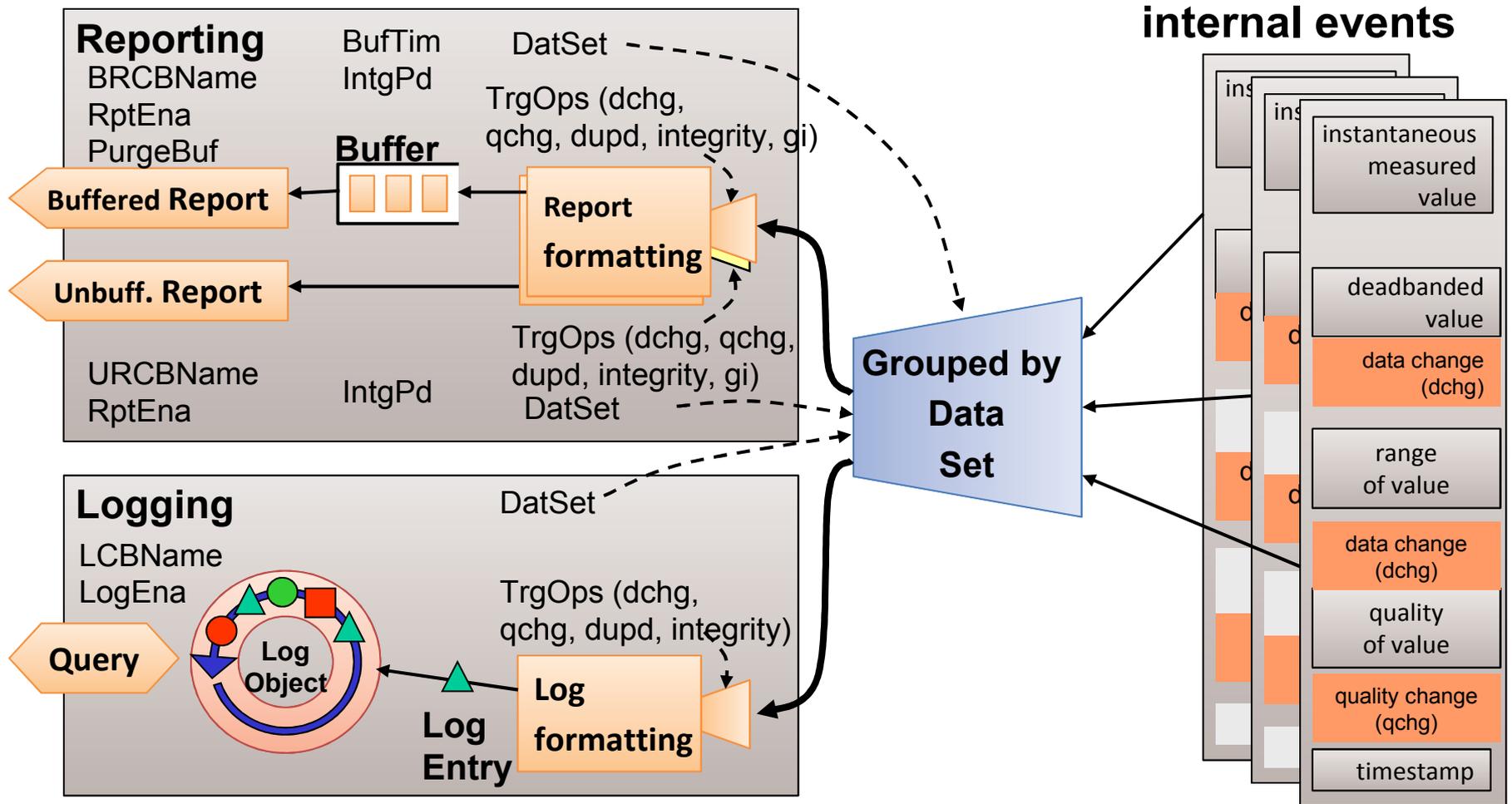
IEC 61850 – Informacijski model + ACSI servisi



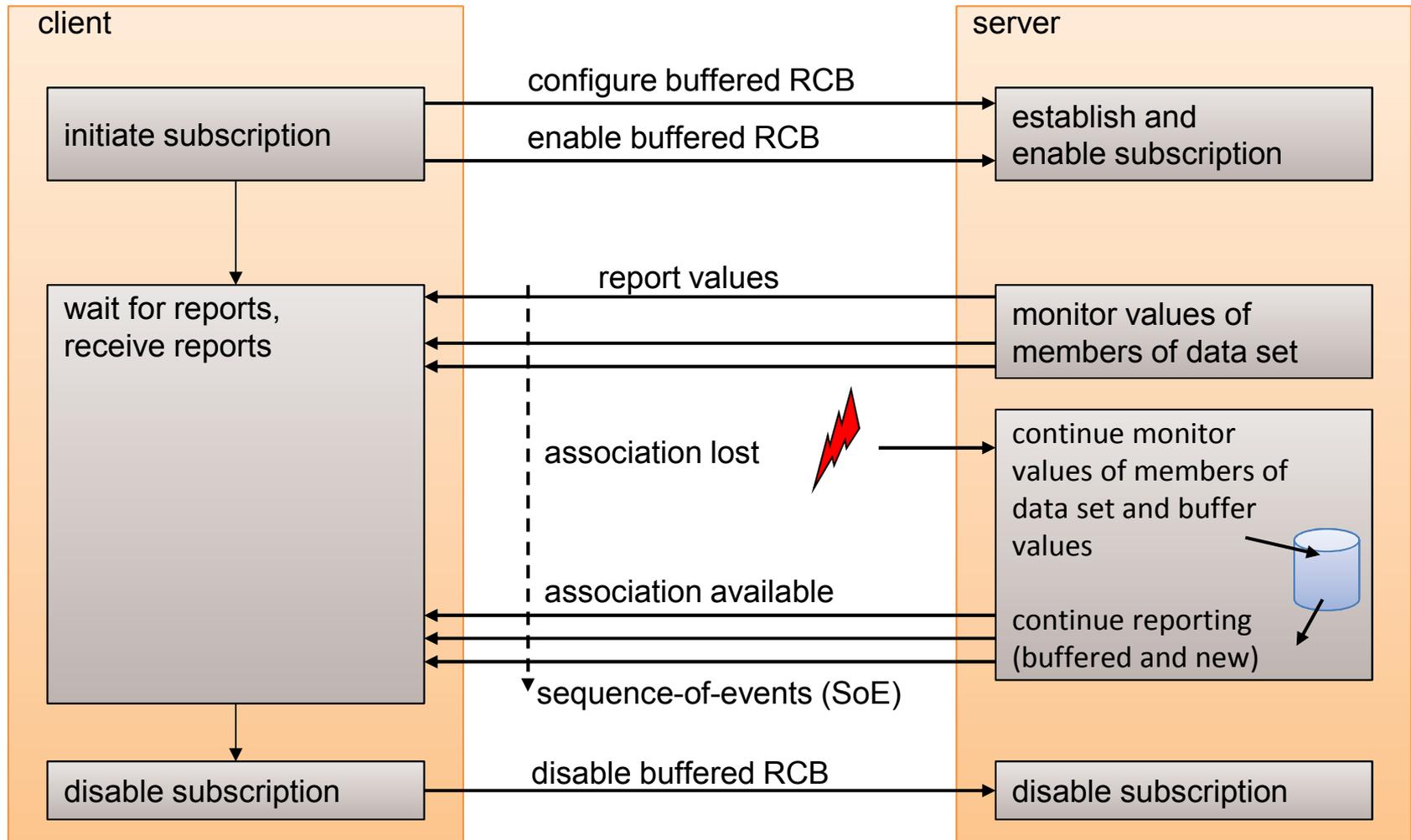
IEC 61850 – Pregled i upravljanje modelom



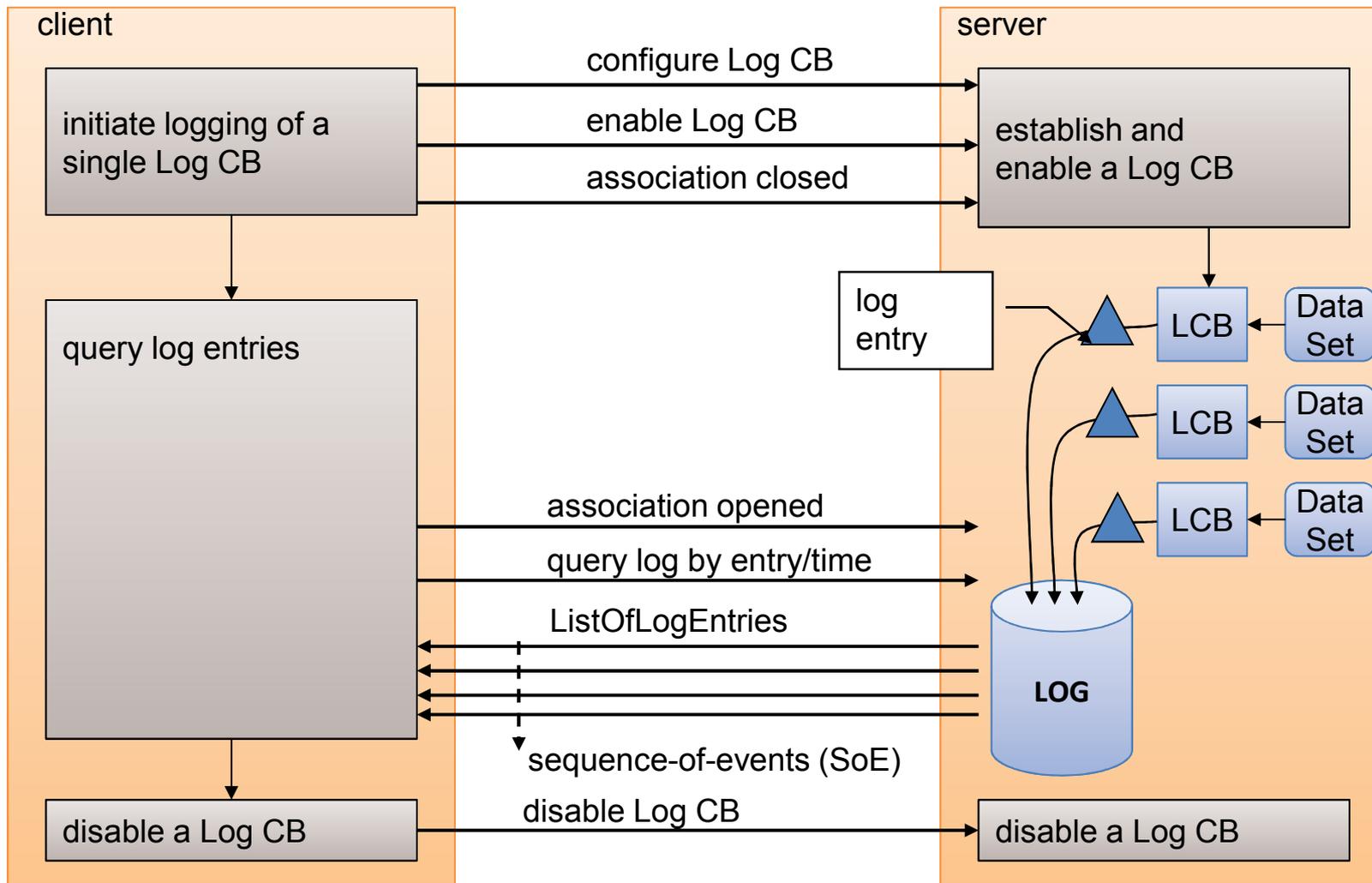
IEC 61850 – Reporting & Logging



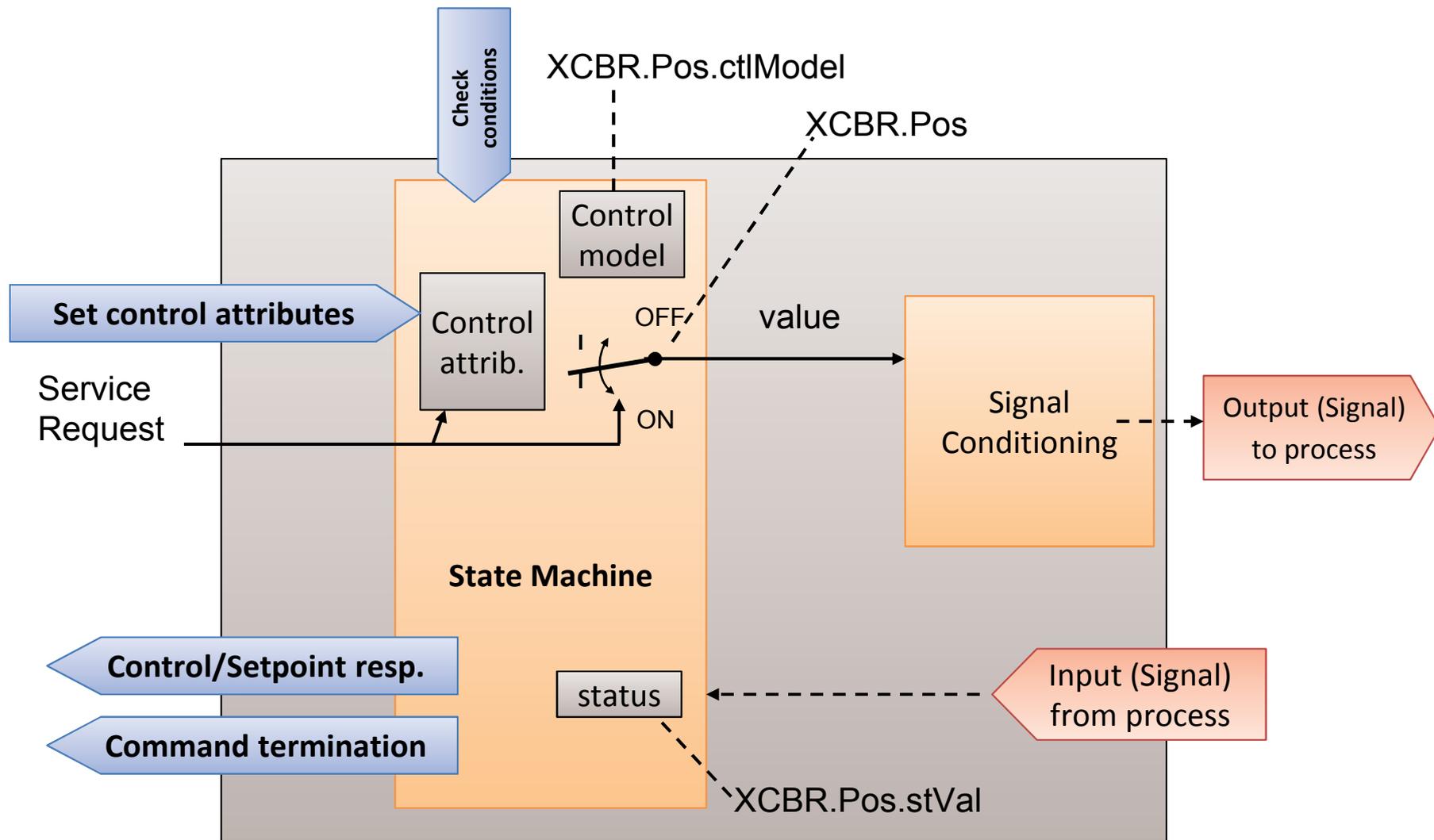
IEC 61850 – Reporting



IEC 61850 – Logging

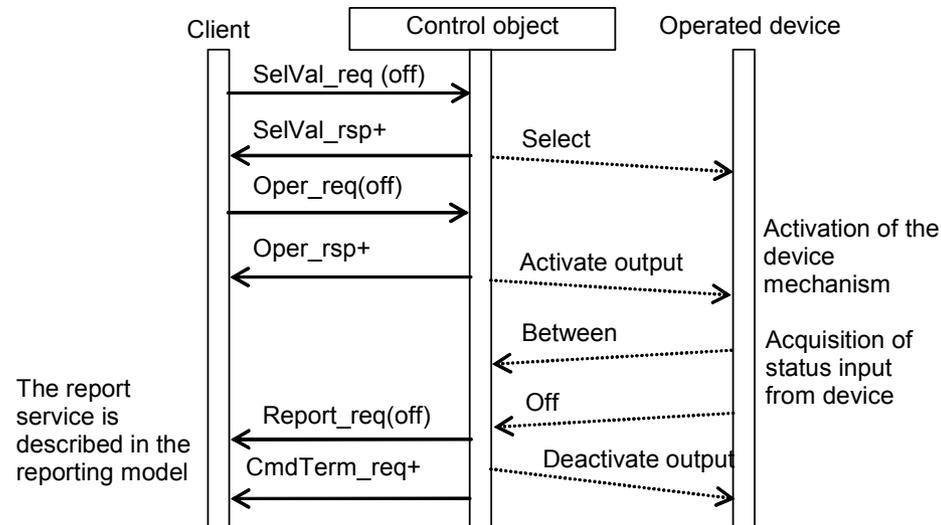
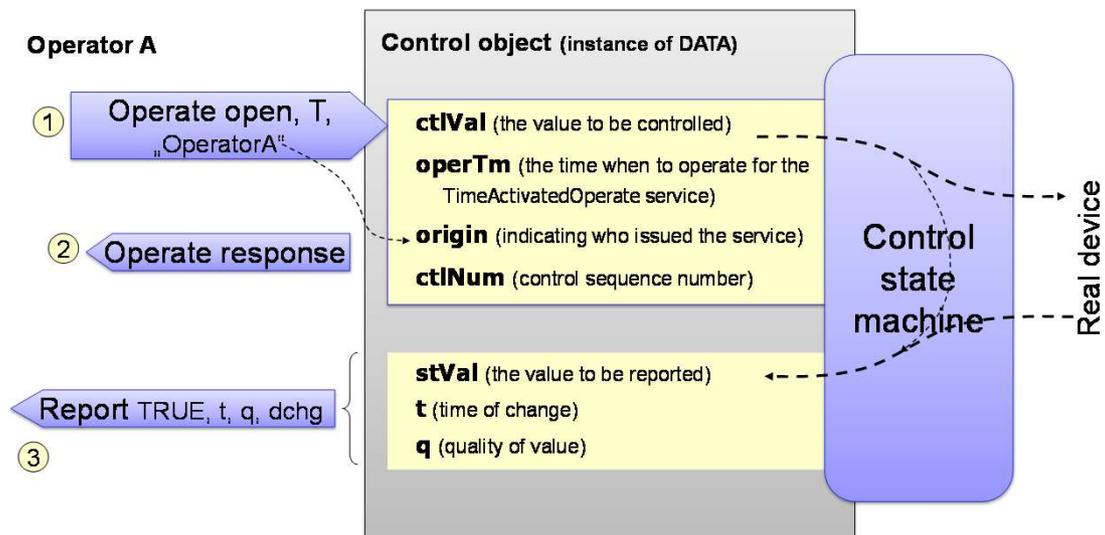


IEC 61850 – Upravljanje

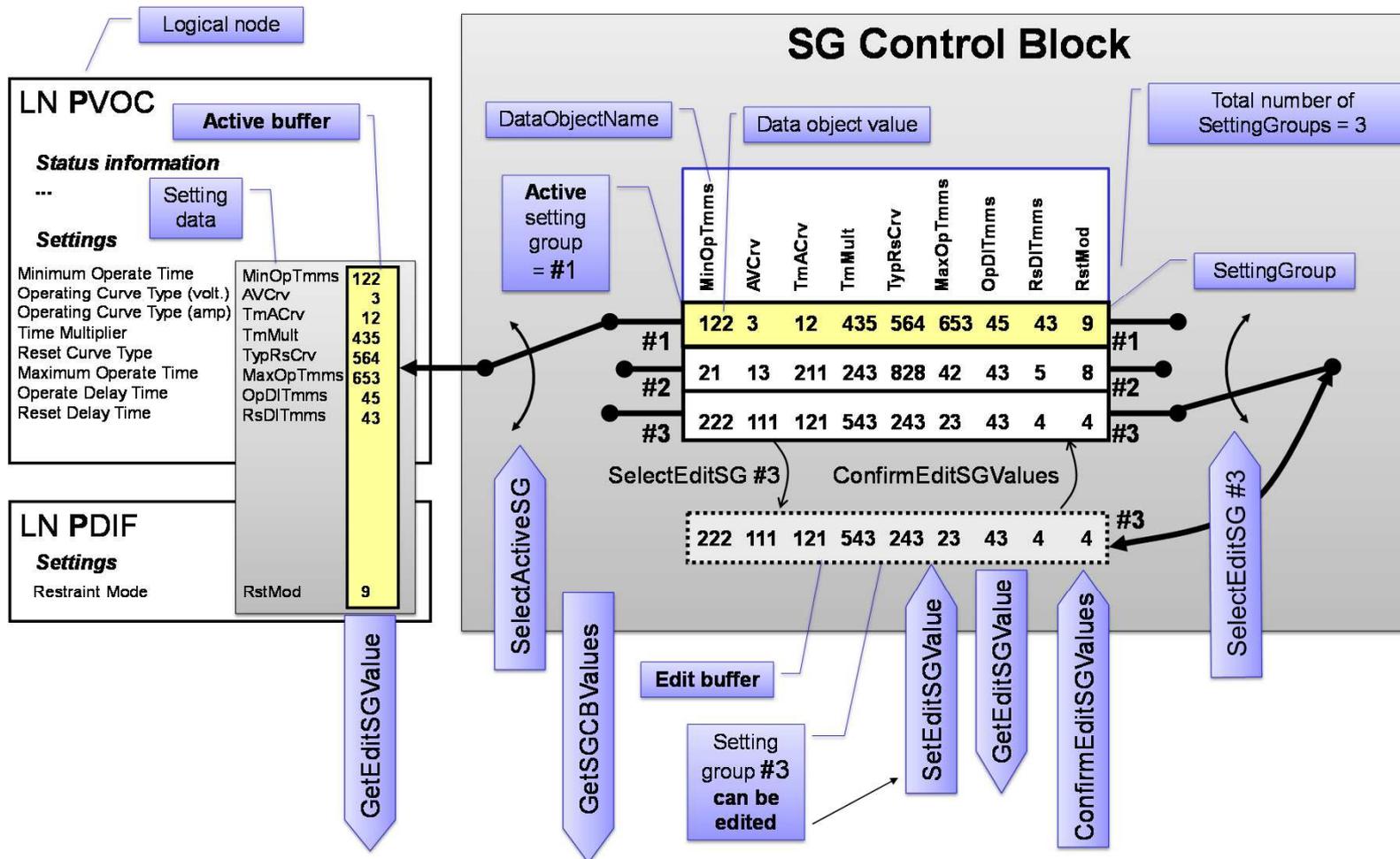


IEC 61850 – Upravljanje (detaljno)

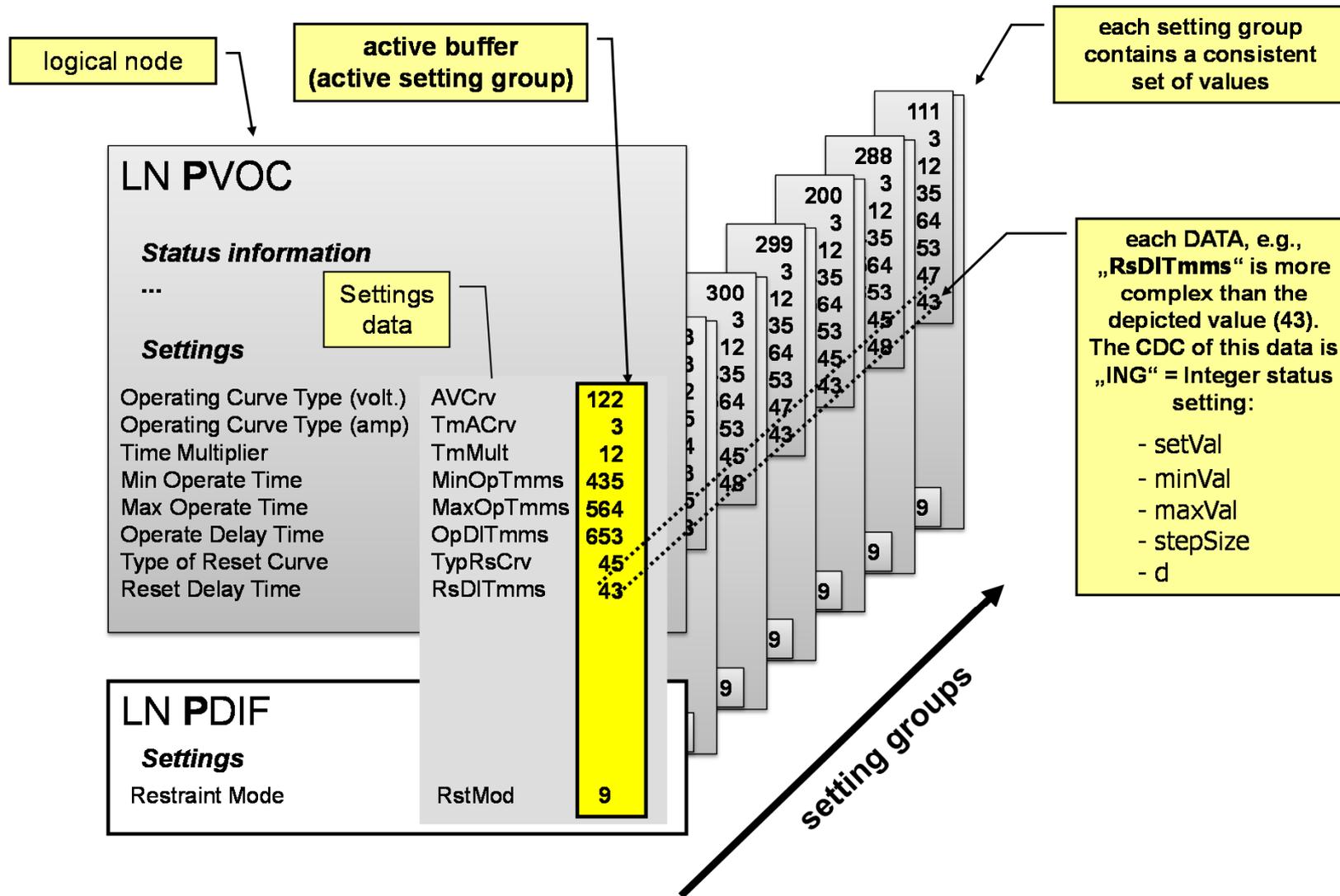
- Tipovi
- SBO / Security
- Složenosti
- Nadležnosti



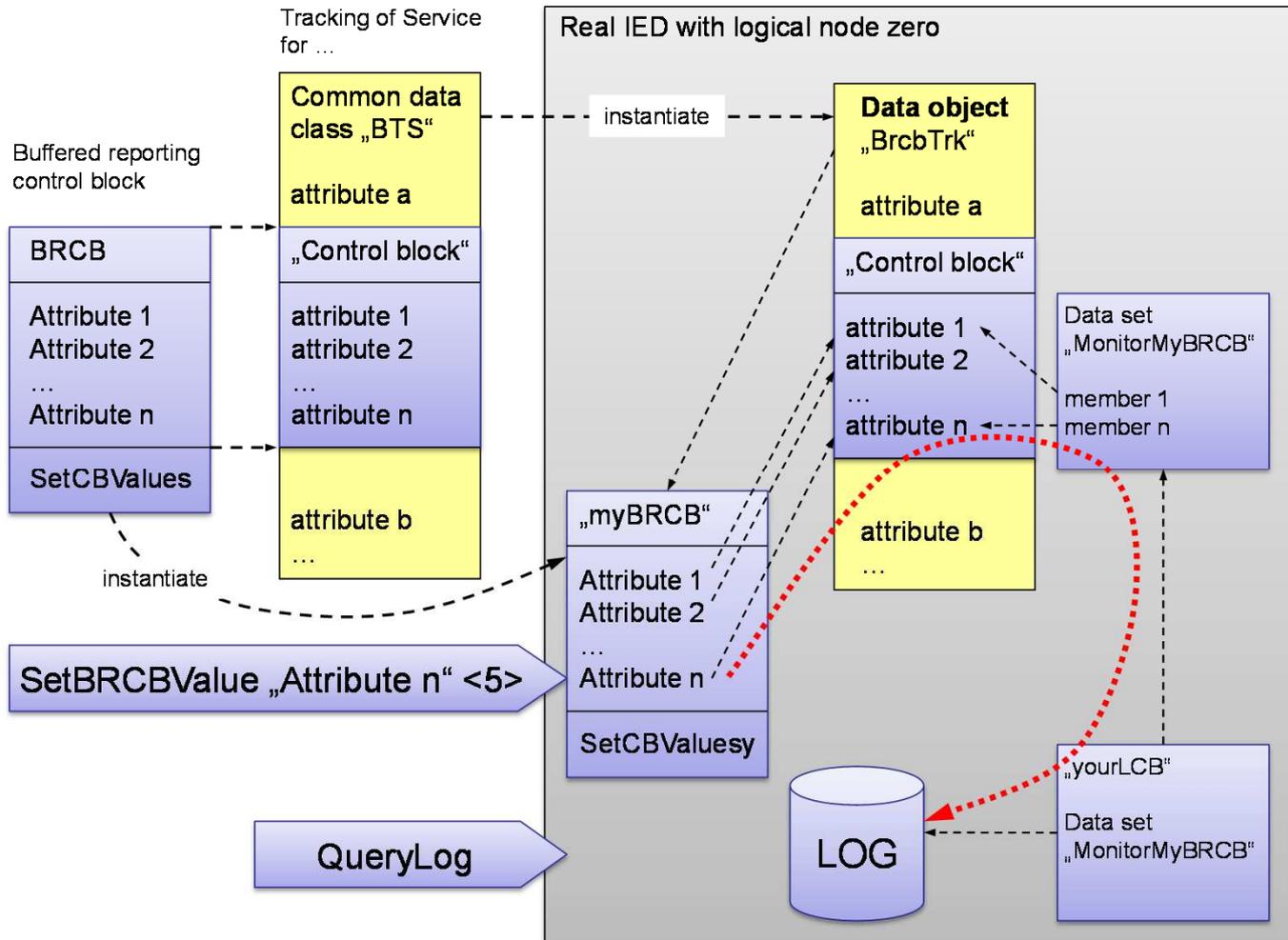
IEC 61850 – Postavne vrijednosti



IEC 61850 – Postavne vrijednosti

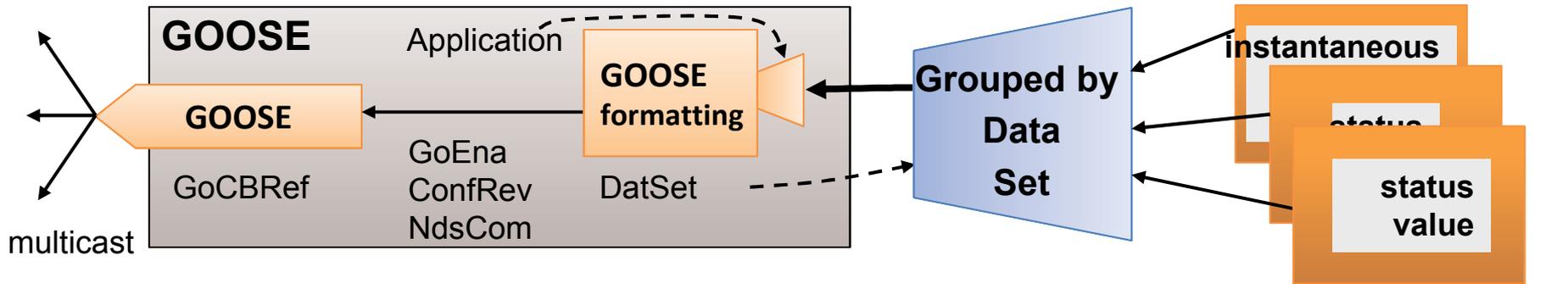


IEC 61850 – Praćenje ACSI servisa



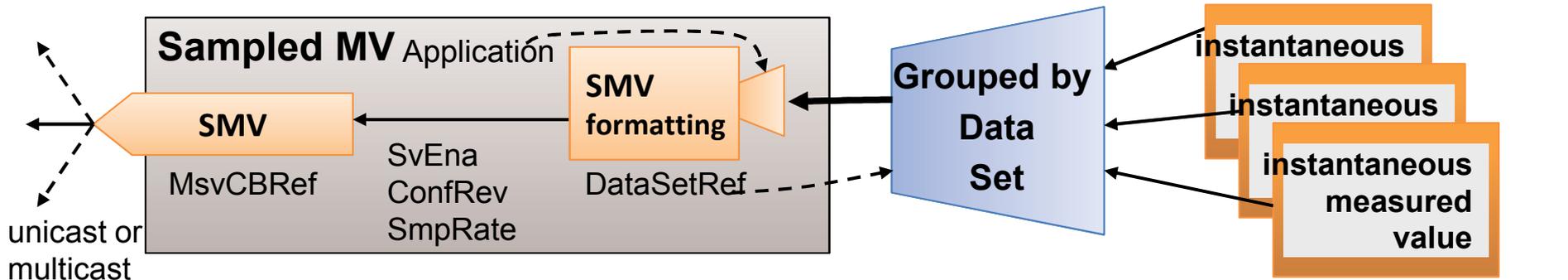
IEC 61850 – Horizontalna komunikacija

publisher



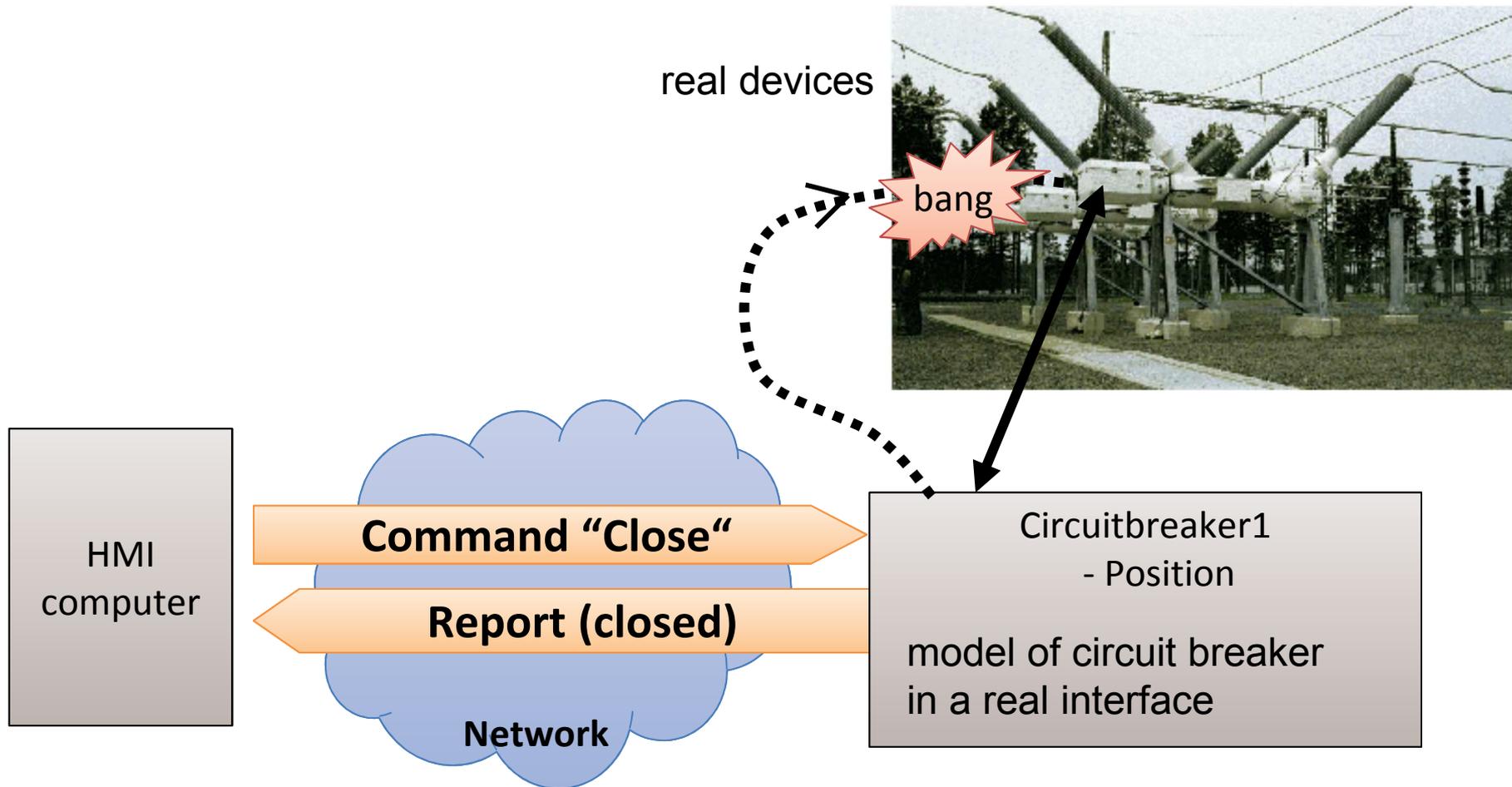
any data value

publisher



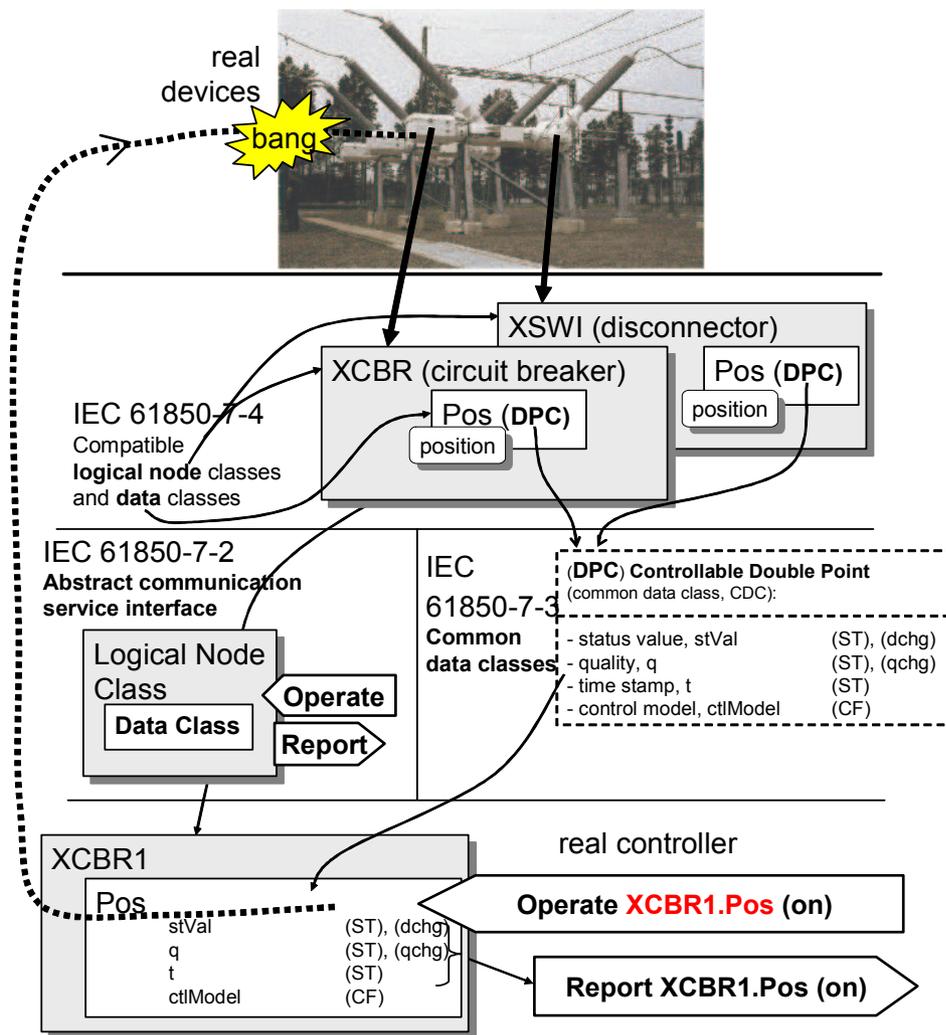
samples of measured values

IEC 61850 – Uobičajena primjena



IEC 61850 – Uobičajena primjena (detaljno)

- Odnos među dijelovima standarda
- Funkcionalnosti upravljanog sustava



Usporedba metoda dohvata podataka

Retrieval method	Time-critical information exchange	Can lose changes (of sequence)	Multiple clients to receive information	Last change of data stored by	Typical client (but not exclusive)
Polling (GetDataValues)	NO	YES	YES	–	Browser
Unbuffered Reporting	YES	YES	NO	–	Real-time GUI
Buffered Reporting	YES	NO	NO	Server	Data concentrator
Log (used for SOE logging)	NO	NO	YES	Client	Engineering stations

Sadržaj

- 1 • Arhitektura
- 2 • Arhitektura IEC 61850 sustava
- 3 • Informacijsko modeliranje
- 4 • Komunikacijski servisi
- 5 • **Implementacijski zahtjevi**
- 6 • Konfiguracija

IEC 61850 – Implementacija

Vertical ACSI

Association

Server/LD/LN/DO/DS

Setting-Group-Control-Block

Control

Report-Control-Block

Log-Control-Block

Horizontal ACSI

GOOSE

Multicast SV Control-Block

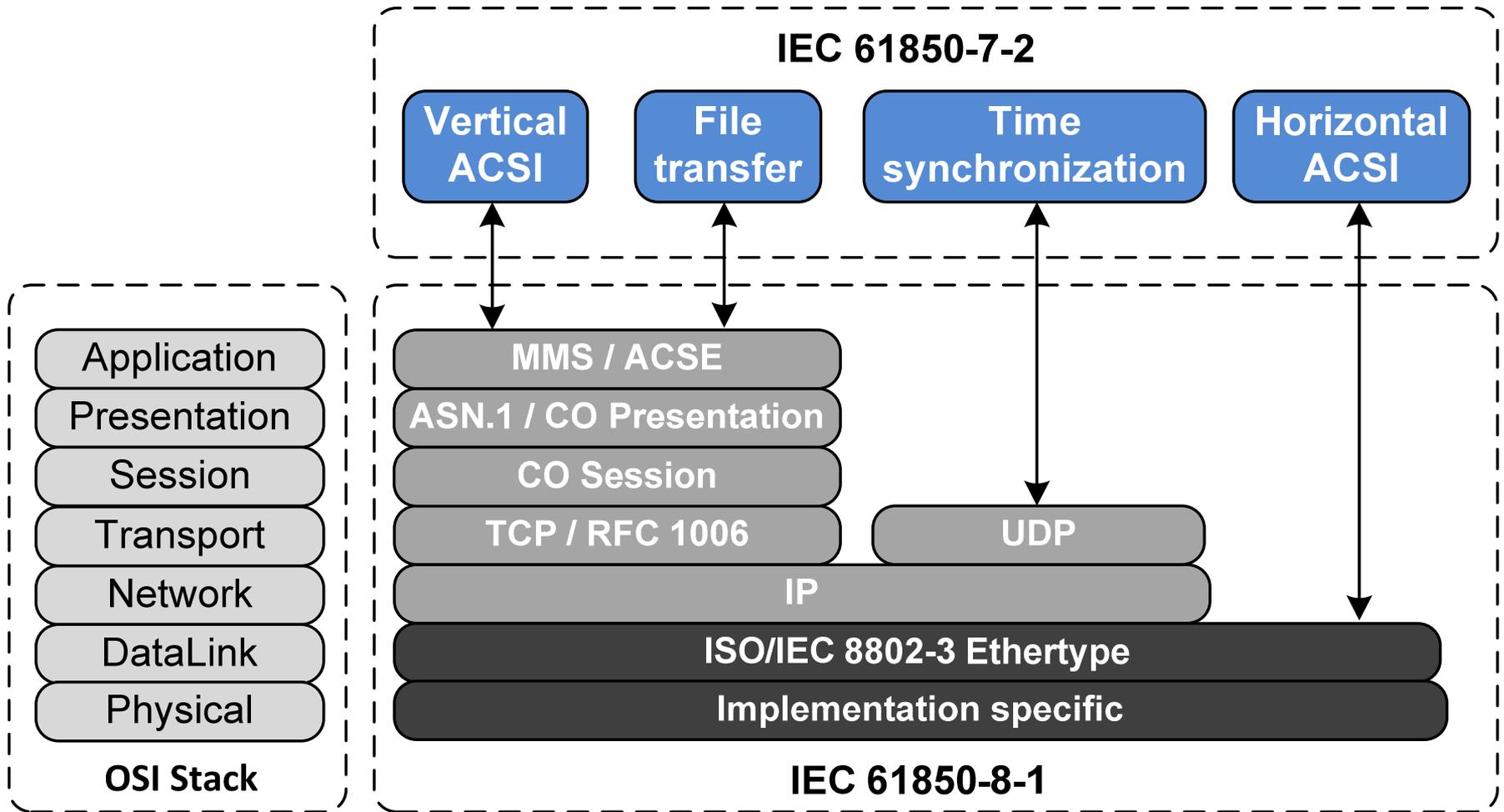
Unicast SV Control-Block

Other ACSI

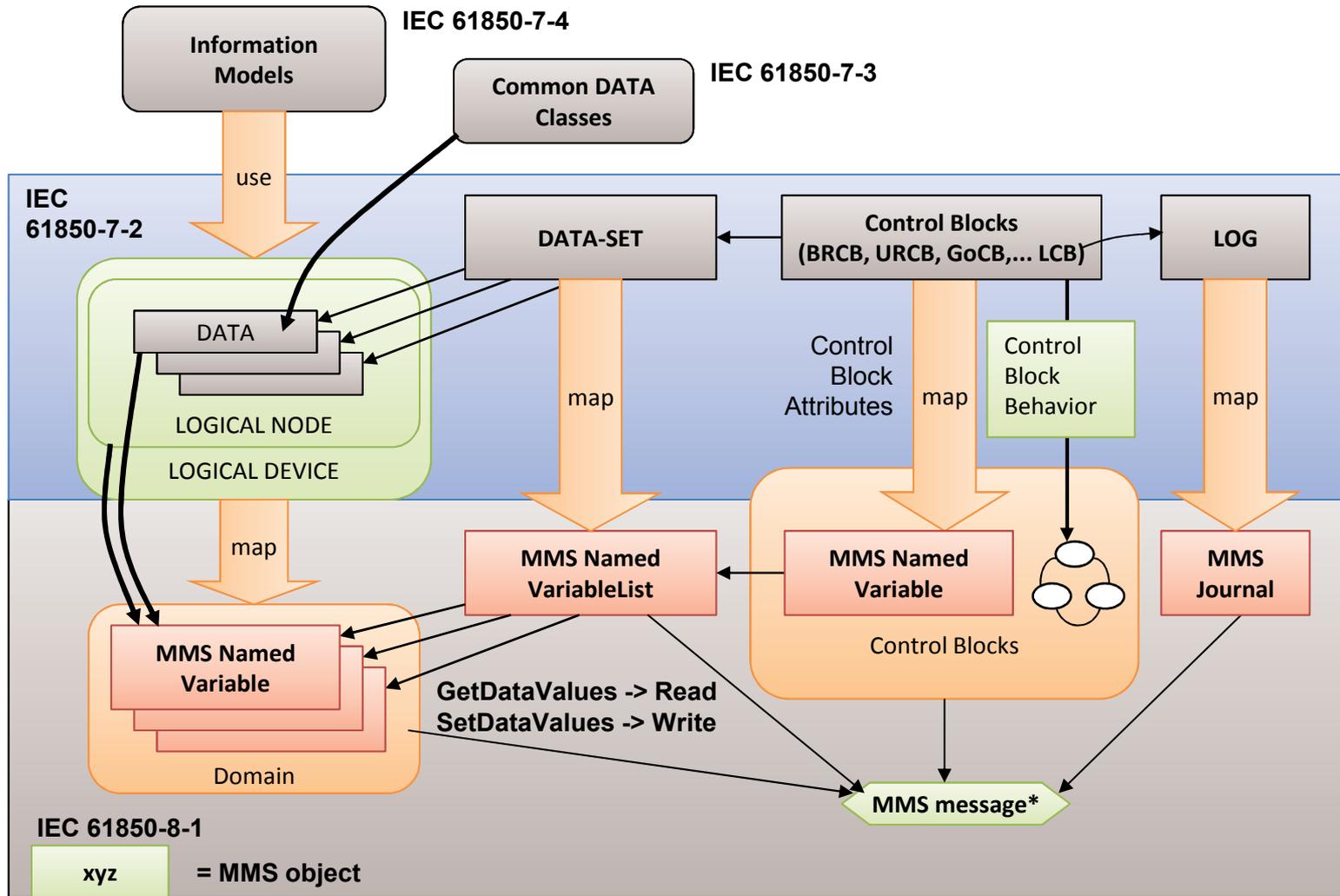
File transfer

Time synchronization

IEC 61850 – Implementacija



IEC 61850 – Implementacija (MMS)



IEC 61850 – Implementacija (MMS)

What to be mapped?	Maps to
Logical device (contains logical nodes); IEC 61850-7-2	MMS domain
Logical nodes (contains data); IEC 61850-7-4	MMS named variable
Data; IEC 61850-7-4	MMS named variable (and structured components of the named variable representing the “logical node data”)
Data attribute; IEC 61850-7-3	MMS named variable (and structured components of the named variable representing the “data”)
Data set: IEC 61850-7-2	MMS named variable list
Control blocks (attributes); IEC 61850-7-2	MMS named variable
Control blocks (behaviour); IEC 61850-7-2	Needs to be programmed as defined in IEC 61850-7-2
Log; IEC 61850-7-2	MMS journal

IEC 61850 – Implementacija (MMS)

Identifier (Tag)
Length
Content

A3	52	
A0	50	
A1	05	
80	03	XX XX XX
A0	47	
8A	11	XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX
84	03	07 30 00
8C	06	XX XX XX XX XX XX
84	02	03 08
A2	1D	
A2	08	
85	01	03
8A	03	XX XX XX
84	02	06 40
84	03	03 00 00
91	08	XX XX XX XX XX XX XX XX
84	02	02 40

1 octet for the tag;
1 octet for length;
2 octets for value

```

MMSpdu ::= CHOICE { ...
. unconfirmed-PDU [IMPLICIT SEQUENCE { ...
. . . CHOICE { ...
. . . . informationReport [0] IMPLICIT SEQUENCE { ...
. . . . . variableAccessSpecification CHOICE { ...
. . . . . . variableListName [1] CHOICE { ...
. . . . . . . vmdSpecific [0] IMPLICIT VisibleString <RPT>}
. . . . . . . }, -- end of variableAccessSpecification
. . . . . listOfAccessResult [0] IMPLICIT SEQUENCE OF CHOICE { ...
. . . . . . CHOICE {... visible-string [10] IMPLICIT VisibleString <LLN0$RP$AllRptsCo>}, -- RptID
. . . . . . . CHOICE {... bit-string [4] IMPLICIT BIT STRING <0011 0000 0>}, -- OptFlds
. . . . . . . CHOICE {... binary-time [12] IMPLICIT BINARY TIME <DD DD MS MS MS MS>}, -- TimeOfEntry
. . . . . . . CHOICE {... bit-string [4] IMPLICIT BIT STRING <0000 1>}, -- InclBS
. . . . . . . } -- Value(s) - here only one
. . . . . } -- Value
. . . . . } -- origin
. . . . . } -- origin.orCat
. . . . . } -- origin.orIdent
. . . . . } -- stVal
. . . . . } -- q
. . . . . } -- t
. . . . . } -- end of „Value“
. . . . . } -- end of ListOfAccessResult
. . . . . } -- end of informationReport
. . . . . }
. . . } -- end of unconfirmedPDU
. . } -- end of MMSpdu
    
```

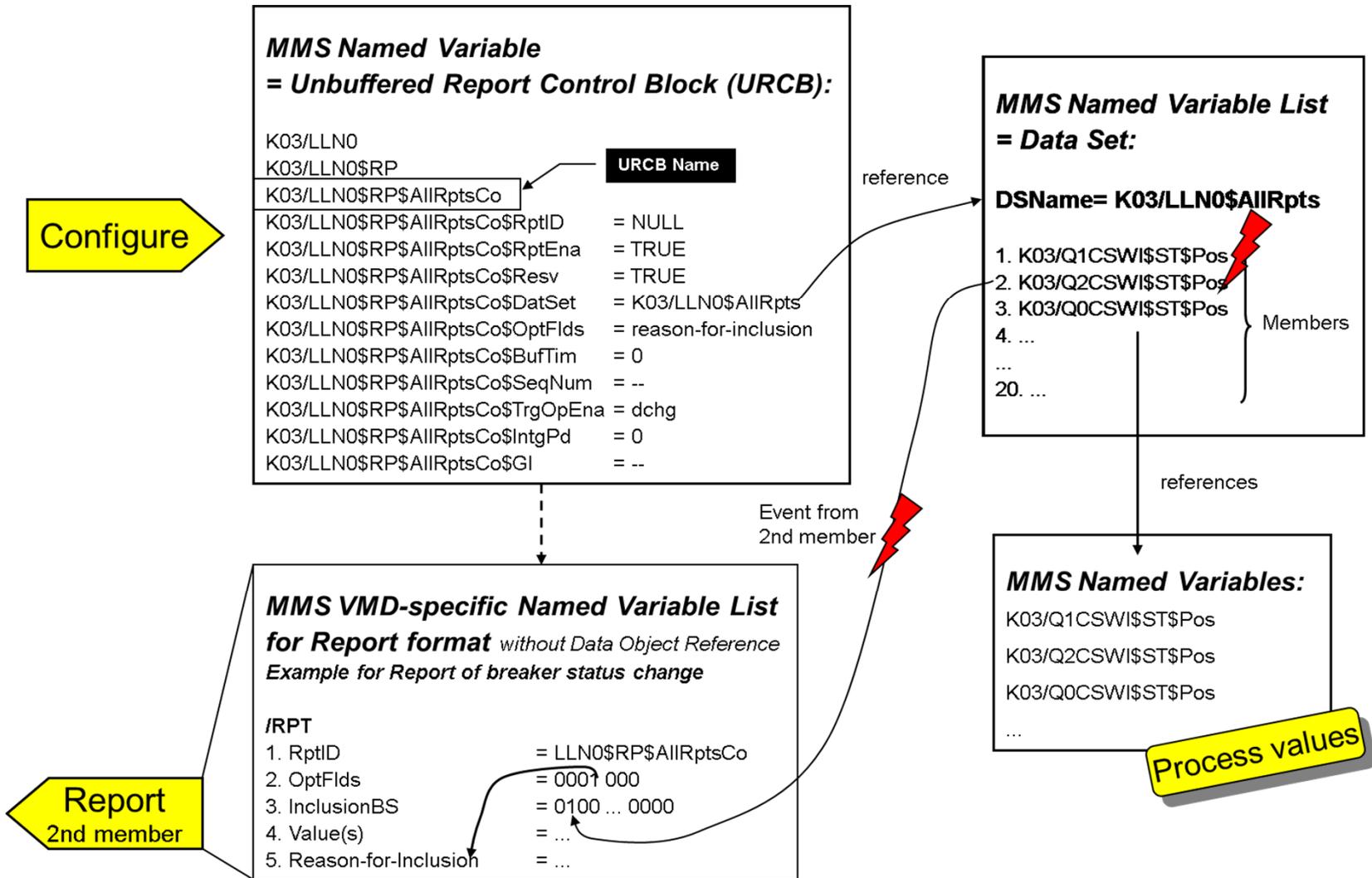
Interpretation of received message
(Tag values -> ASN.1 syntax (Schema))



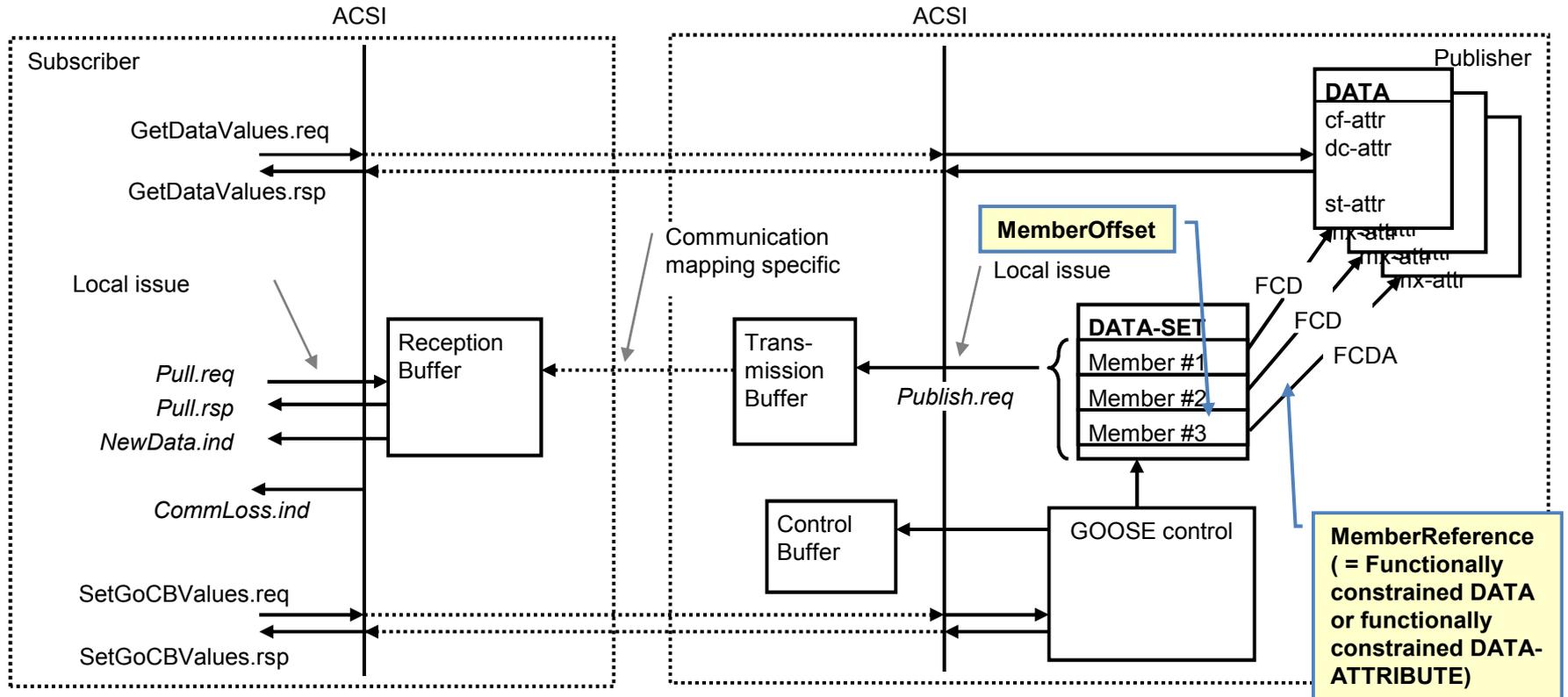
MMS Syntax (written in ASN.1) defined in ISO 9506-2



IEC 61850 – Implementacija (MMS)

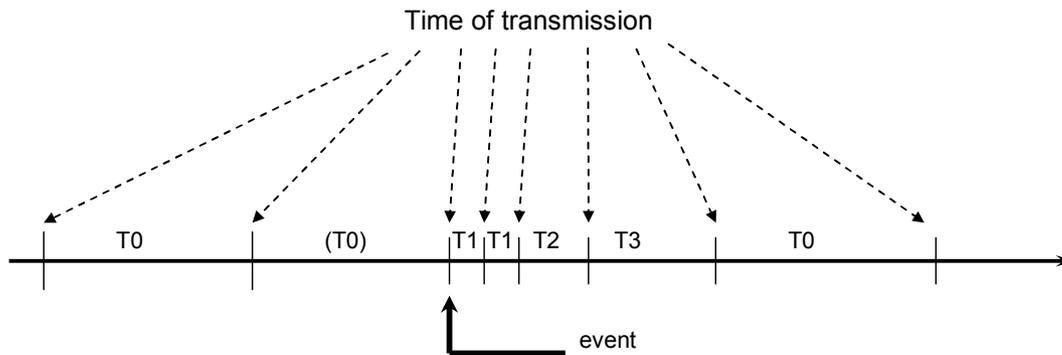


IEC 61850 – Implementacija (GOOSE)



IEC 61850 – Implementacija (GOOSE)

- Multicast
- Publish/subscribe
- Cikličko slanje

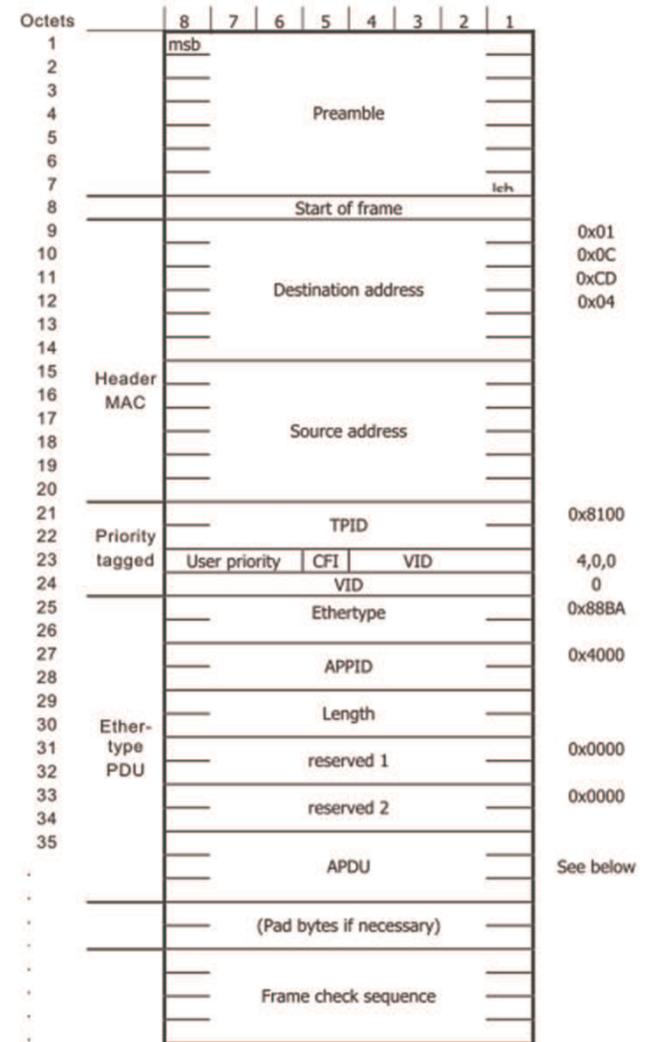
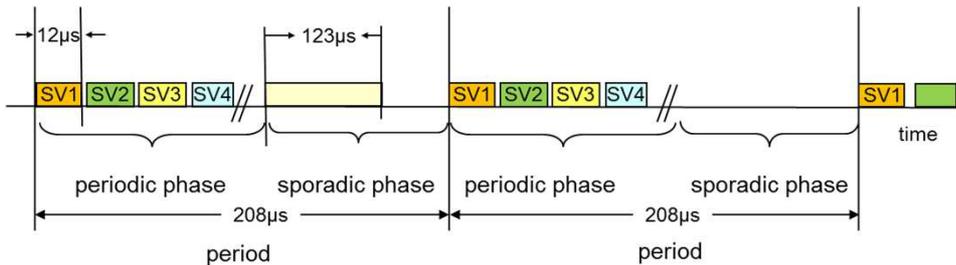


- T0 retransmission in stable conditions (no event for a long time).
 (T0) retransmission in stable conditions may be shortened by an event.
 T1 shortest retransmission time after the event.
 T2, T3 retransmission times until achieving the stable conditions time.

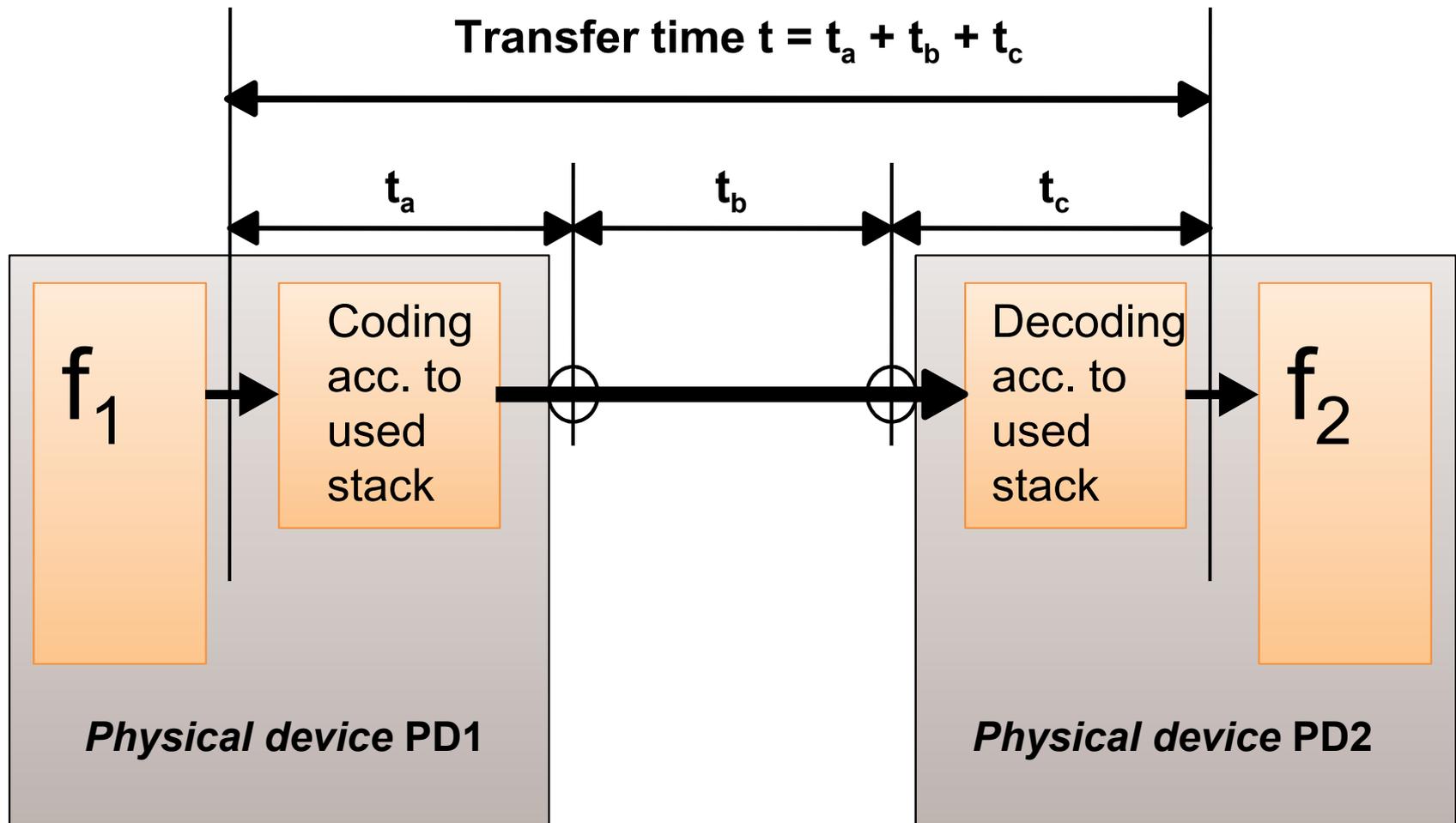
Octets	8	7	6	5	4	3	2	1	Notes
	Preamble								
	Start of frame								
0	Destination address								Refer to "Address Fields" section.
1									
2									
3									
4									
5									
6									
7	Source address								
8									
9									
10	Header MAC								
11									
12	TPID (see Figure C.4)								Refer to "Priority Tagging/VirtualLAN" section.
13	Priority tagged								
14	TCI (see Table C.1)								
15	Ethertype (see Table C.2)								Refer to "Ethertype and Other Header Information" section.
16	Length Start								
17									
18	Length (m + 8)								
19	Reserved 1 (see Figure C.5)								
20	Reserved 2								
21	APDU (of length m)								
22	Extension field (of length s)								See to IEC62351-6 (optional field)
23									
24	m + 27								
25	+ s								
26								
27	(Pad bytes if necessary)								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								
41								
42								
43								
44								
45								
46								
47								
48								
49								
50								
51								
52								
53								
54								
55								
56								
57								
58								
59								
60								
61								
62								
63								
64								
65								
66								
67								
68								
69								
70								
71								
72								
73								
74								
75								
76								
77								
78								
79								
80								
81								
82								
83								
84								
85								
86								
87								
88								
89								
90								
91								
92								
93								
94								
95								
96								
97								
98								
99								
100								
101								
102								
103								
104								
105								
106								
107								
108								
109								
110								
111								
112								
113								
114								
115								
116								
117								
118								
119								
120								
121								
122								
123								
124								
125								
126								
127								
128								
129								
130								
131								
132								
133								
134								
135								
136								
137								
138								
139								
140								
141								
142								
143								
144								
145								
146								
147								
148								
149								
150								
151								
152								
153								
154								
155								
156								
157								
158								
159								
160								
161								
162								
163								
164								
165								
166								
167								
168								
169								
170								
171								
172								
173								
174								
175								
176								
177								
178								
179								
180								
181								
182								
183								
184								
185								
186								
187								
188								
189								
190								
191								
192								
193								
194								
195								
196								
197								
198								
199								
200								
201								
202								
203								
204								
205								
206								
207								
208								
209								
210								
211								
212								
213								
214								
215								
216								
217								
218								
219								
220								
221								
222								
223								
224								
225								
226								
227								
228								
229								
230								
231								
232								
233								
234								
235								
236								
237								
238								
239								
240								
241								
242								
243								
244								
245								
246								
247								
248								
249								
250								
251								
252								
253								
254								
255								
256								
257								
258								
259								
260								
261								
262								
263								
264								
265								
266								
267								
268								
269								
270								
271								
272								
273								
274								
275								
276								
277								
278								
279								
280								
281								
282								
283								
284								
285								
286								
287								
288								
289								
290								
291								
292								
293								
294								
295								
296								
297								
298								
299								
300								
301								
302								
303								
304								
305								
306								
307								
308								
309								
310								
311								
312								
313								
314								
315								
316								
317								
318								
319								
320								
321								
322								
323								
324								
325								
326								
327								
328								
329								
330								
331								
332								
333								
334								
335								
336								
337								
338								
339								
340								
341								
342								
343								
344								
345								
346								
347								
348								
349								
350								
351								
352								
353								
354								
355								
356								
357								
358								
359								
360								
361								
362								
363								
364								
365								
366								
367								
368								
369								
370								
371								
372								
373								
374								
375								
376								
377								
378								
379								
380								
381								
382								
383								
384								
385</									

IEC 61850 – Implementacija (SMV)

- 4800 Hz za zaštitne funkcije
- 14400 Hz za mjerenje kvalitete eklektične mreže
- Multicast
- Publish/subscribe
- Cikličko slanje



IEC 61850 – Vremena dostave poruka



IEC 61850 – Vremenske klase poruka

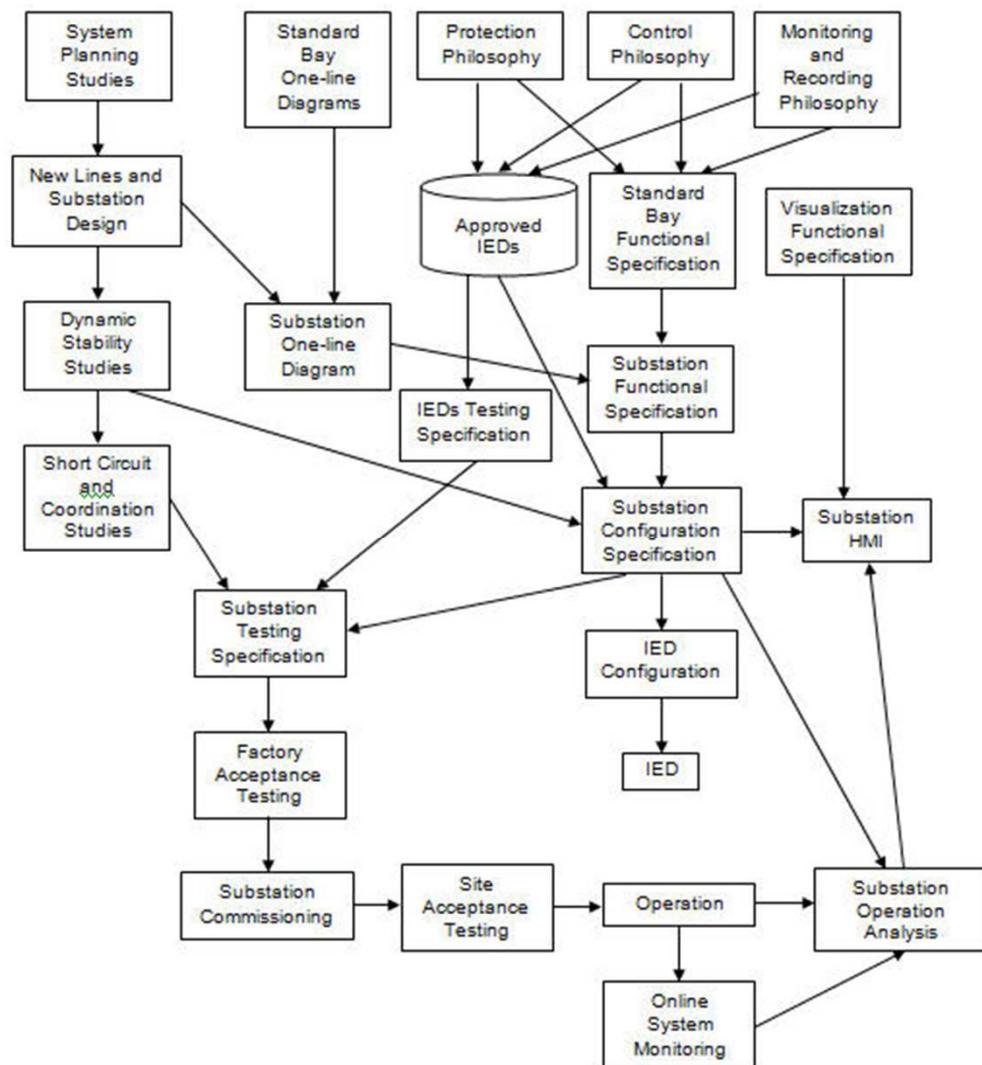
Transfer time class	Transfer time [ms]	Application examples: Transfer of
TT0	>1 000	Files, events, log contents
TT1	1 000	Events, alarms
TT2	500	Operator commands
TT3	100	Slow automatic interactions
TT4	20	Fast automatic interactions
TT5	10	Releases, Status changes
TT6	3	Trips, Blockings

Sadržaj

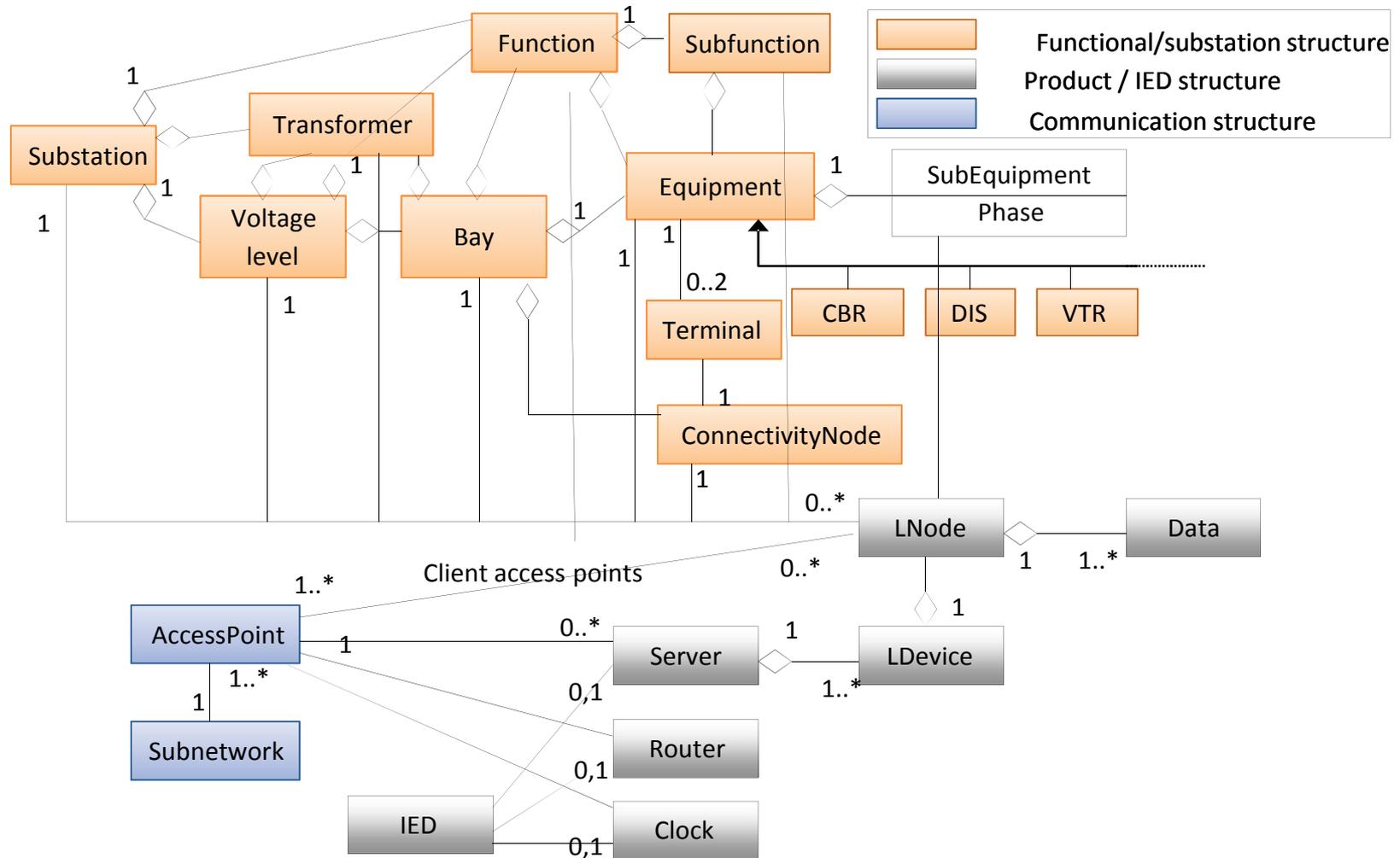
- 1 • Arhitektura
- 2 • Arhitektura IEC 61850 sustava
- 3 • Informacijsko modeliranje
- 4 • Komunikacijski servisi
- 5 • Implementacijski zahtjevi
- 6 • **Konfiguracija**

IEC 61850 – Inženjering sustava

- Planiranje postrojenja
- Studija stabilnosti
- Proračuni TS i KS
- Jednopolna shema
- Naručivanje opreme
- Provjera izvodljivosti
- Konfiguracija
- FAT
- SAT
- Analiza rada sustava



IEC 61850-6 – Model sustava



IEC 61850-6 – SCL

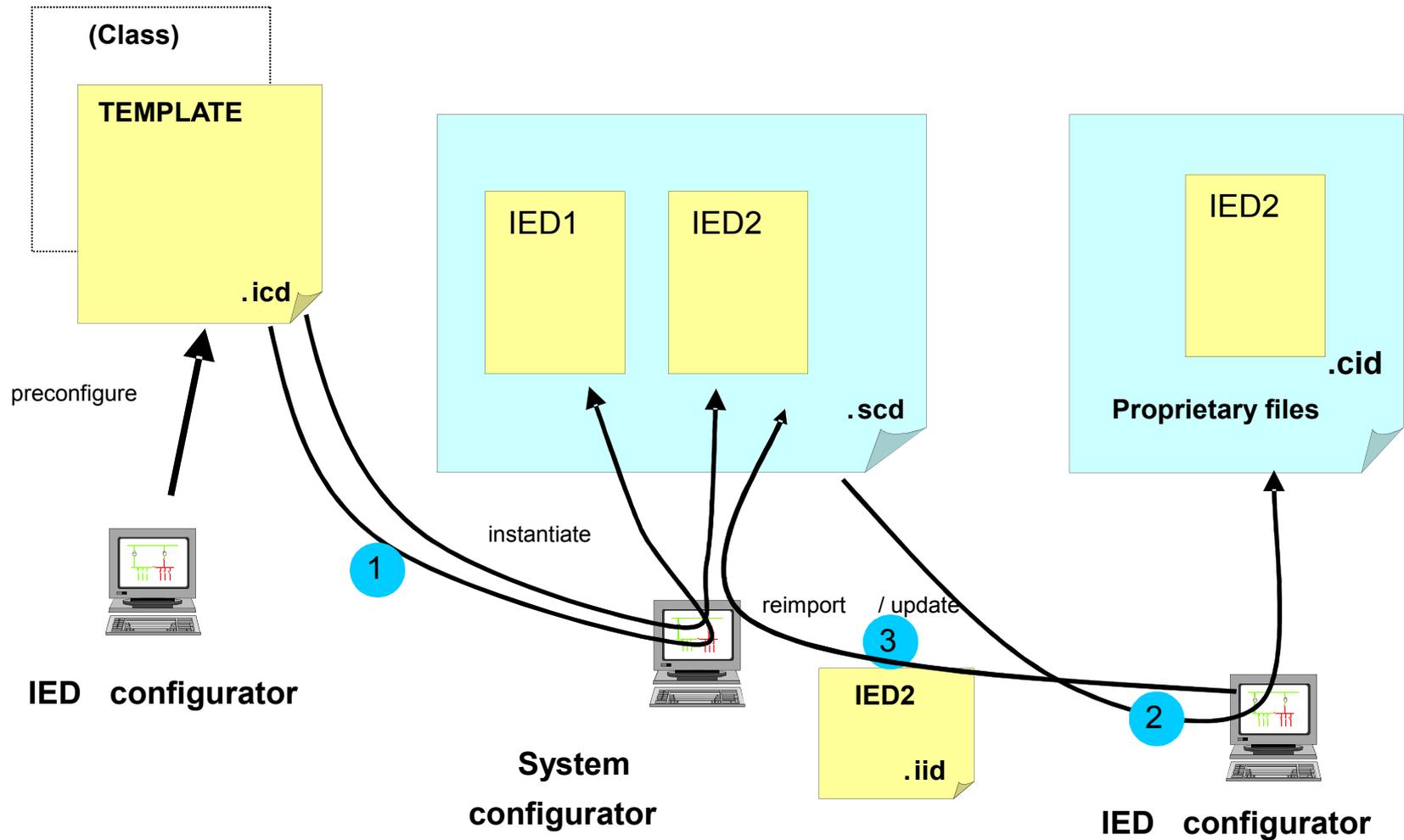
- XML (eXtensible Markup Language) -> Notacija
- IED (Intelligent Electronic Device) -> Releji, upravljački uređaji
- SCL (System Configuration description Language) -> Jezik
 - SSD (System Specification Description) -> Sučelja opreme
 - ICD (IED Capability Description) -> Mogućnosti uređaja
 - IID (Instantiated IED Description) -> Trenutna konfiguracija
 - CID (Configured IED Description) -> Konačna konfiguracija
 - SCD (System Configuration Description) -> Konačna konfiguracija
 - SED (System Exchange Description) -> Sučelja za proširenja

IEC 61850-6 – Odnos među SCL dokumentima

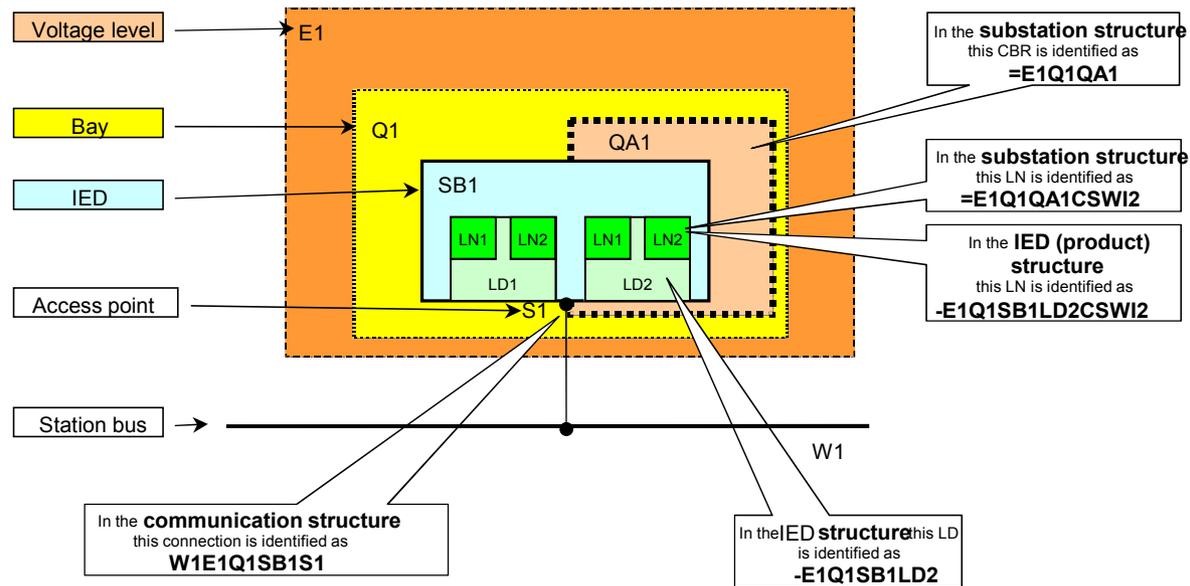
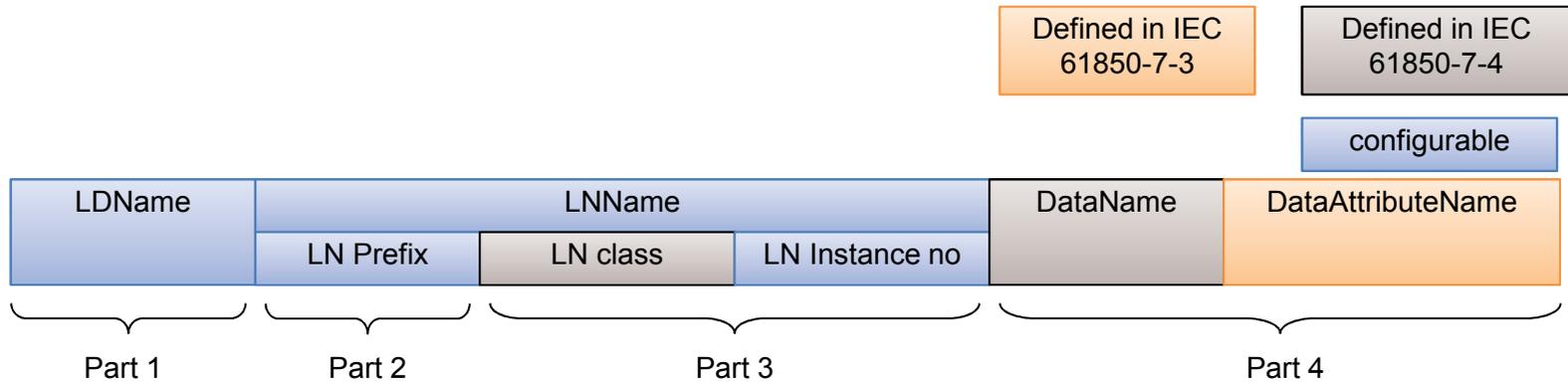
	Phase	Bay	PAC Devices	Plant Application / Substation	What it means
A	Standard scheme – template	G	G	G	Totally generic SSD
B	Standard scheme – defined	S	G	G	All HW interfaces fixed SSD
C	Standard scheme – applied	S	S	G	IEDs fixed ICD, IID
D	Standard scheme: Instantiated Instantiated with small variations	S	S	S	Everything fixed, also settings (standard scheme applied in reality) SCD, CID

S = specific; G = generic; B and C can be one step.

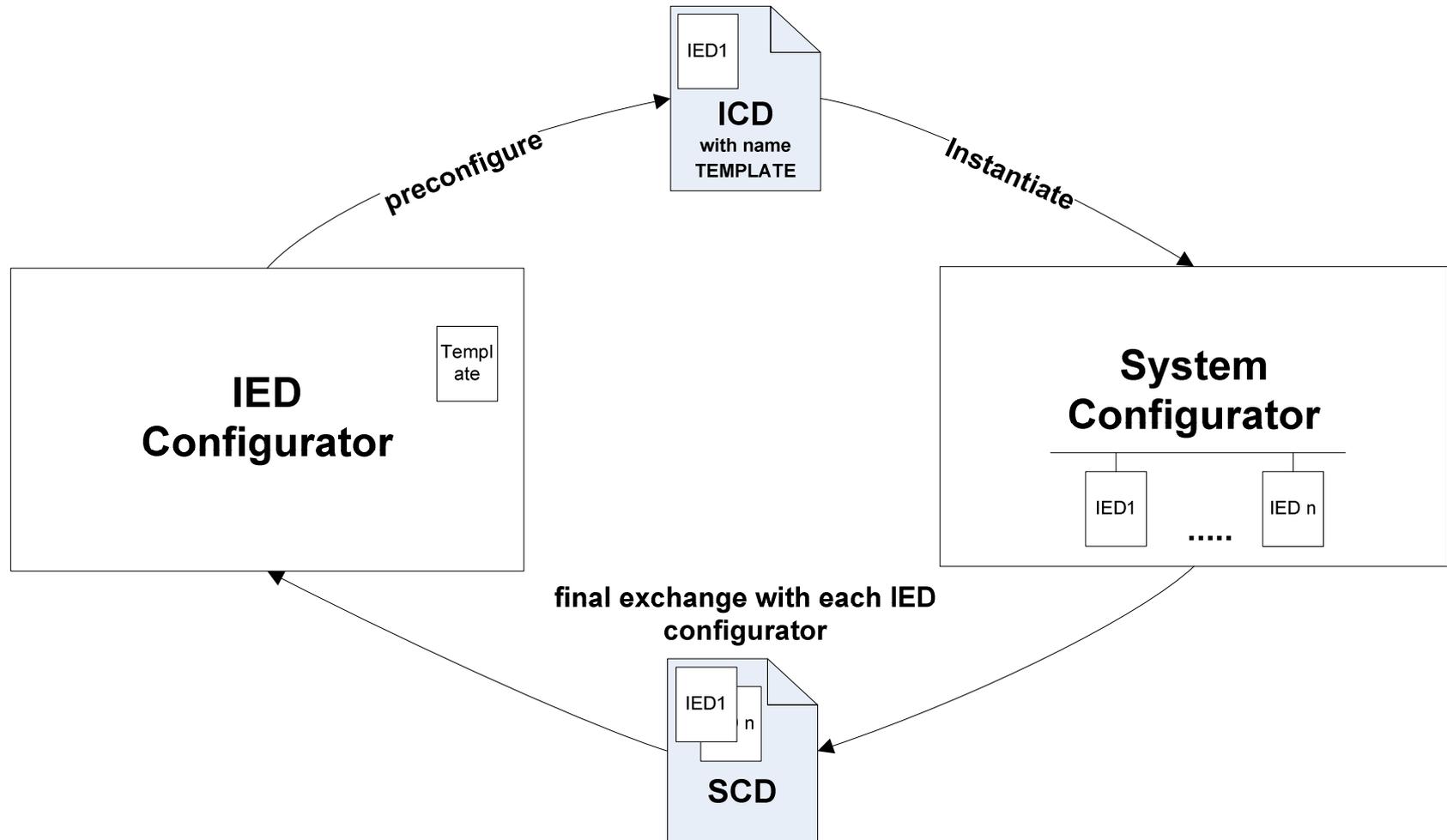
IEC 61850-6 – Uređivanje datoteka



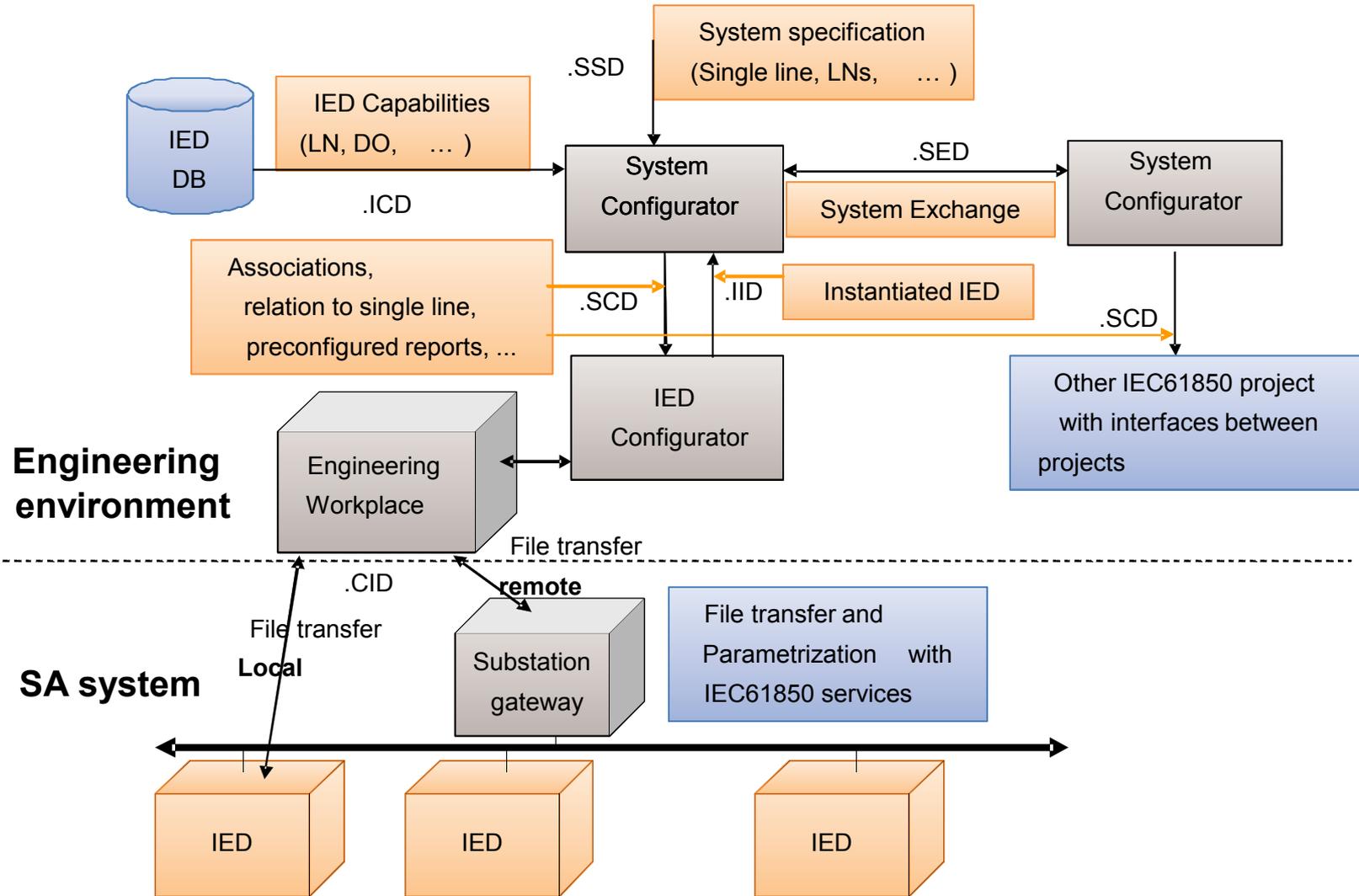
IEC 61850-6 – Identifikacija signala



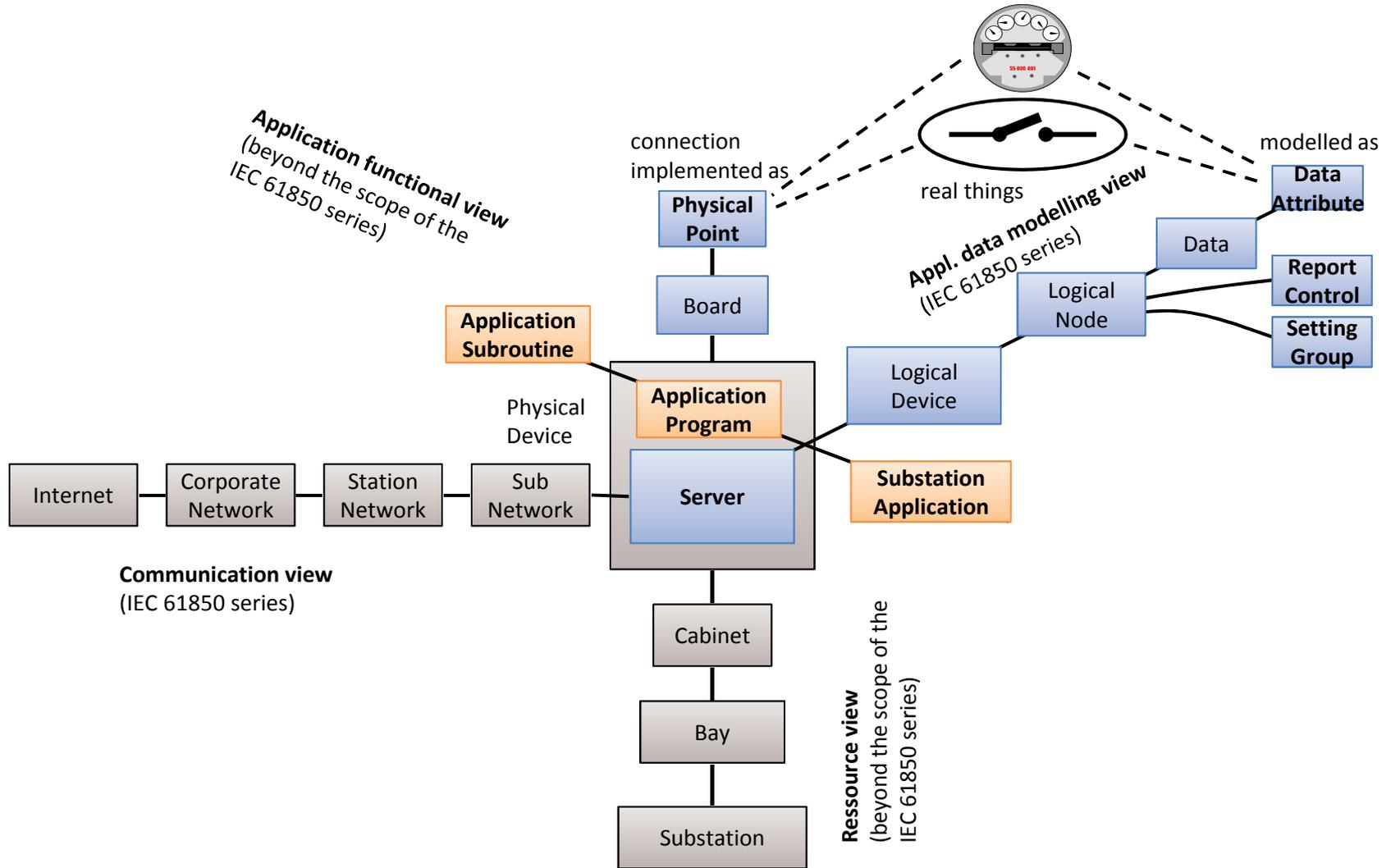
IEC 61850-6 – Konfiguracijski ciklus



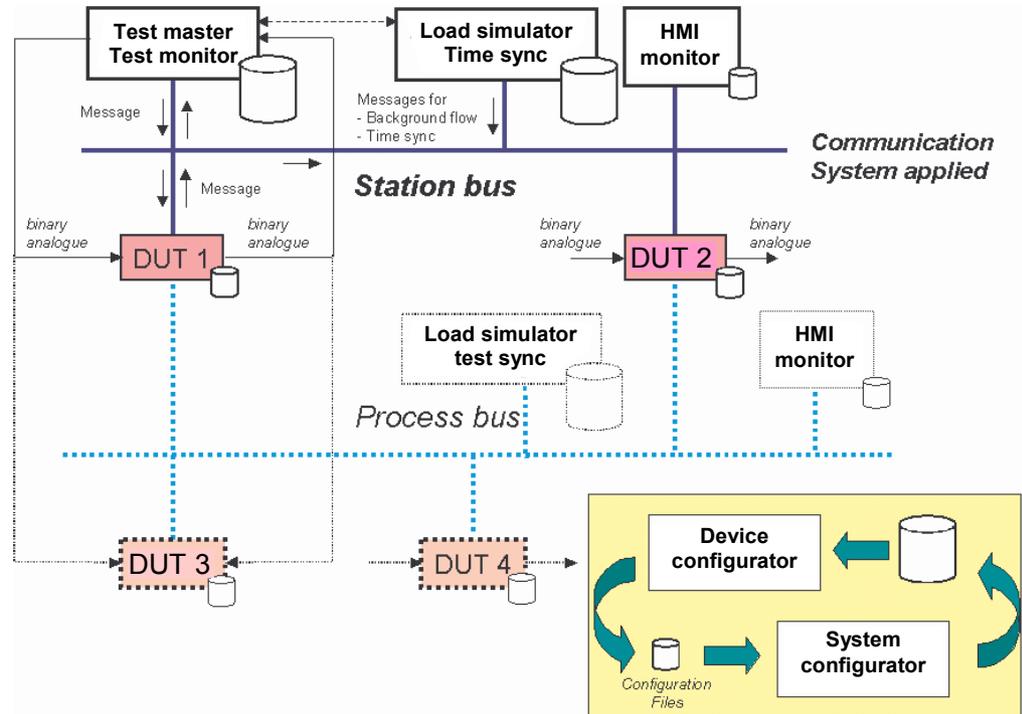
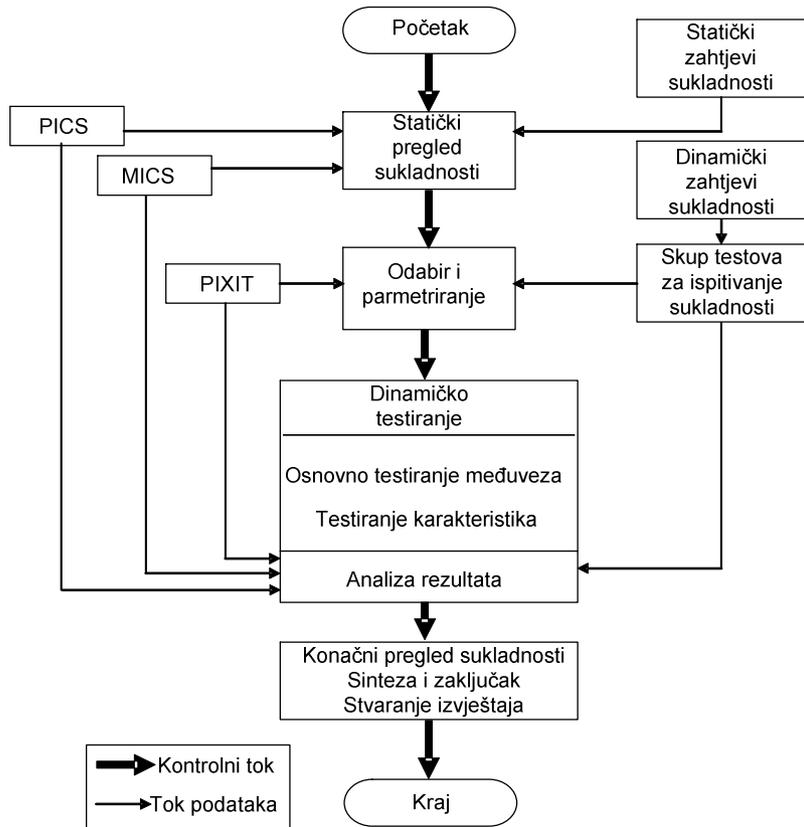
IEC 61850 – Rad sa SCL datotekama



IEC 61850 – Perspektive sustava



IEC 61850-10 – Provjera sukladnosti



IEC 599/05

IEC 61850-10 – Opis testiranja

depicted in Annex A.

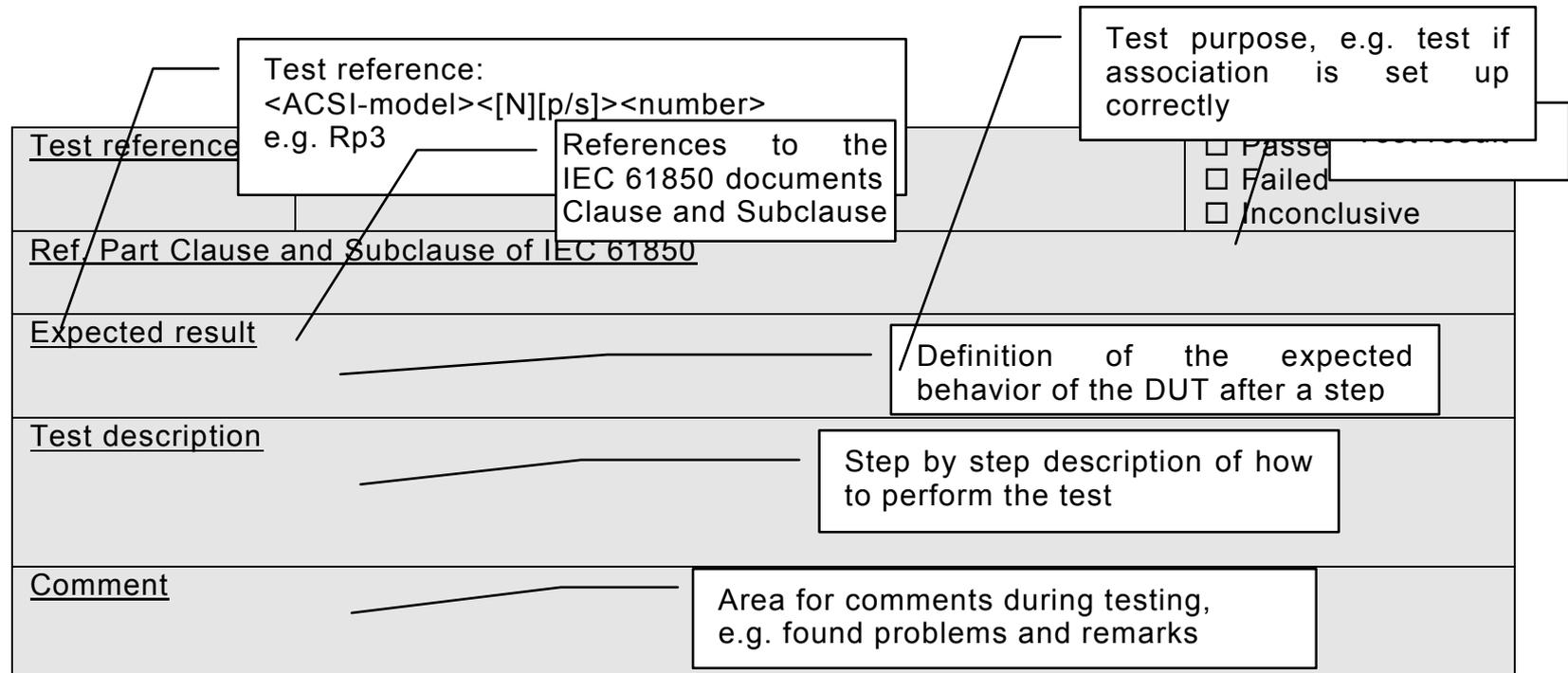


Figure 3 – Test procedure format

IEC 600/05

IEC 61850-10 – Certifikati

- UCAIUG (US)
- KEMA (NL)
- TUEV-SUED (DE)
- Server/klijent
- PICS/MICS/PIXIT
- Komunikacija-funkcija
- IEC 61850-100-1 (draft)



IEC 61850 Certificate Level A¹

Page 1/2

International Usersgroup
No. 74100372-MOC/INC 11-1382

Issued to:
Schweitzer Engineering Laboratories, Inc
2350 NE Hopkins Court
Pullman, WA 99163-5603
USA

For the product:
SEL-710 Motor Protection Relay
Version R406

Issued by: 

**The product has not shown to be non-conforming to:
IEC 61850-6, 7-1, 7-2, 7-3, 7-4 and 8-1
Communication networks and systems in substations**

The conformance test has been performed according to IEC 61850-10 with product's protocol, model and technical issue implementation conformance statements: "IEC61850 PICS SEL-710, version 20110606", "IEC61850 MICS SEL-710, version 20110606", "IEC61850 TICS SEL-710, version 20110606" and product's extra information for testing: "IEC61850 PIXIT SEL-710, version 20110606".

The following IEC 61850 conformance blocks have been tested with a positive result (number of relevant and executed test cases / total number of test cases as defined in the UCA International Users Group Device Test procedures v2.2b):

1 Basic Exchange (15/24)	9b GOOSE Subscribe (10/10)
2 Data Sets (3/6)	12a Direct Control (7/11)
5 Unbuffered Reporting (13/18)	12c Enhanced Direct Control (7/13)
6 Buffered Reporting (16/20)	12d Enhanced SBO Control (12/19)
9a GOOSE Publish (5/12)	13 Time Synchronization (3/5)

This Certificate includes a summary of the test results as carried out at KEMA in the Netherlands with UniCasim 61850 version 3.21.02 with test suite 3.21.02 and UniCA 61850 analyzer 4.22.03. The test is based on the UCA International Users Group Device Test Procedures version 2.2b. This document has been issued for information purposes only, and the original paper copy of the KEMA report, No. 74100372-MOC/INC 11-1381 will prevail.

The test has been carried out on one single specimen of the product as referred above and submitted to KEMA by SEL. The manufacturer's production process has not been assessed. This Certificate does not imply that KEMA has certified or approved any product other than the specimen tested.

Arnhem, 14 June 2011


M. Adriaansen
Regional Director Management & Operations Consulting


R. Schimmel
Certification manager

¹ Level A - Independent Test lab with certified ISO 9000 or ISO 17025 Quality System

Copyright © KEMA Nederland B.V., Arnhem, the Netherlands. All rights reserved. Please note that any electronic version of this KEMA certificate is provided to KEMA's customer for convenience purposes only. It is prohibited to update or change it in any manner whatsoever, including but not limited to dividing it into parts. In case of a conflict between the electronic version and the original version, the original paper version issued by KEMA will prevail.

KEMA Nederland B.V.
Utrechtseweg 310, 6812 AR Arnhem P.O.Box 9035, 6800 ET Arnhem The Netherlands
T +31 26 356 20 25 F +31 26 351 36 83 sales@kema.com www.kema.com