

WG10 Status

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Activities in WG10

- ▶ Preparation of Edition 2 of IEC 61850
- ▶ IEC 61850-80-1: Guideline for information exchange of IEC 61850 based CDC's, information addressing and services using IEC 60870-5-104/101
- ▶ IEC 61850-90-1: Use of IEC 61850 for communication between substations
- ▶ IEC 61850-90-2: Use of IEC 61850 for communication between substations and control centers



IEC 61850 release plan

Edition 2	Edition 3
<p>TISSUES</p> <ul style="list-style-type: none"> - new TISSUES are collected until CDV stage <p>Basic model extensions</p> <ul style="list-style-type: none"> - Statistical / Historical - Common usable elements from Hydro and Wind standards <p>Domain model extensions</p> <ul style="list-style-type: none"> - Power Quality Models - Monitoring extensions from IEC 62271-003 <p>Impact of SS-SS communication</p> <p>Testing</p> <ul style="list-style-type: none"> - Client conformance testing - Tool conformance testing 	<p>TISSUES</p> <p>Basic model extensions</p> <ul style="list-style-type: none"> - Description of programmable scheme logic (in SCL) (over communications) - Network and system management - Common usable elements from DER standard - Redundancy - Security aspects from IEC 62351 - Security – role based access - Time synchronization according to IEEE 1588 <p>Domain model extensions</p> <ul style="list-style-type: none"> - Low voltage applications (German Report) - Eliminate IED specific settings <p>Impact of SS-CC communication</p> <p>Testing</p> <ul style="list-style-type: none"> - Testing scenarios - System testing?
CDV 2008 / FDIS 2009	

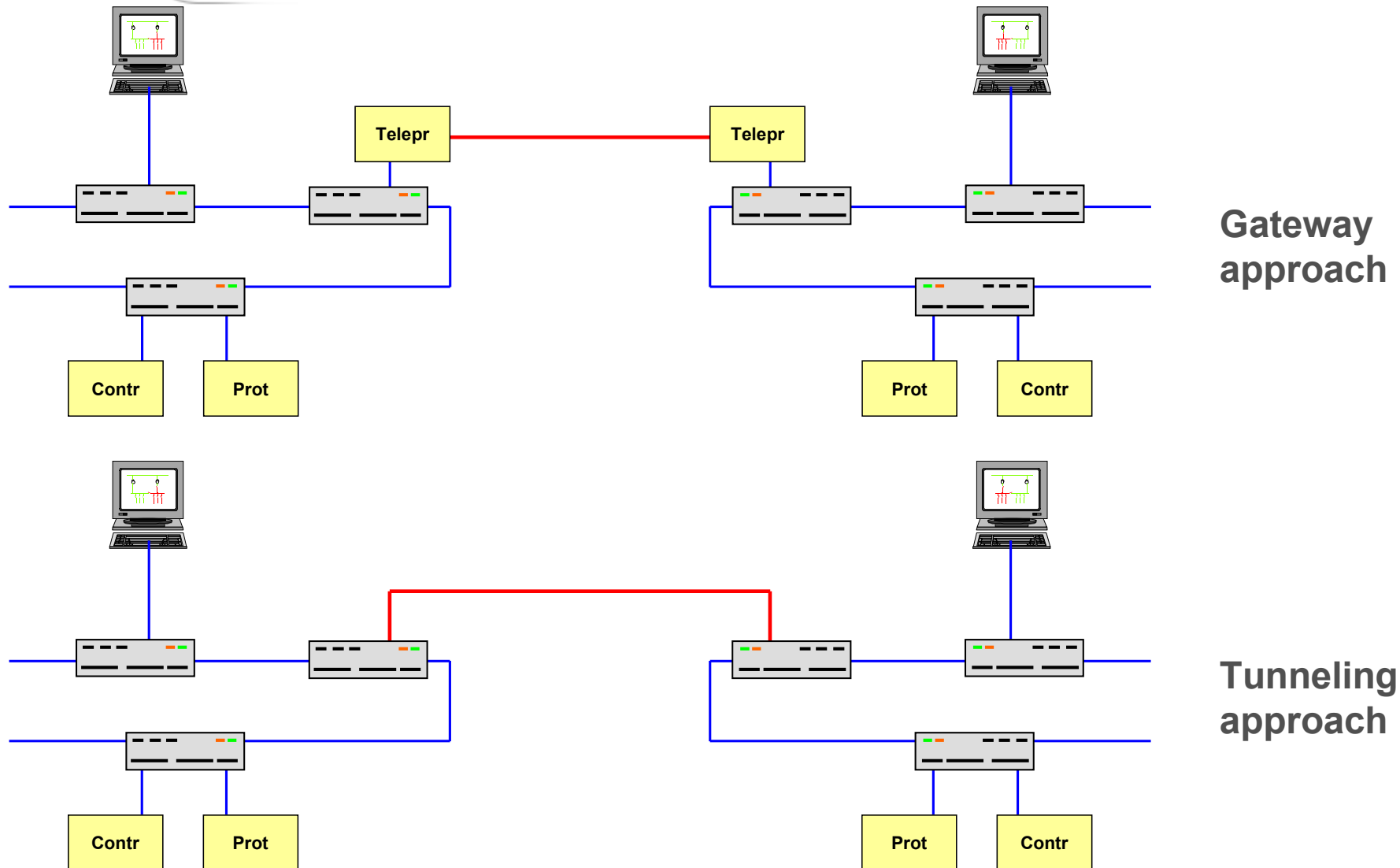


IEC 61850-90-1 Use cases

- ▶ Protection functions
 - ▶ Differential protection
 - ▶ Distance protection with permissive and blocking schemes
 - ▶ Directional and phase comparison protection
 - ▶ Transfer tripping

- ▶ Control function
 - ▶ Autoreclosing
 - ▶ Interlocking
 - ▶ Generator and load shedding

IEC 61850-90-1 Communication aspects



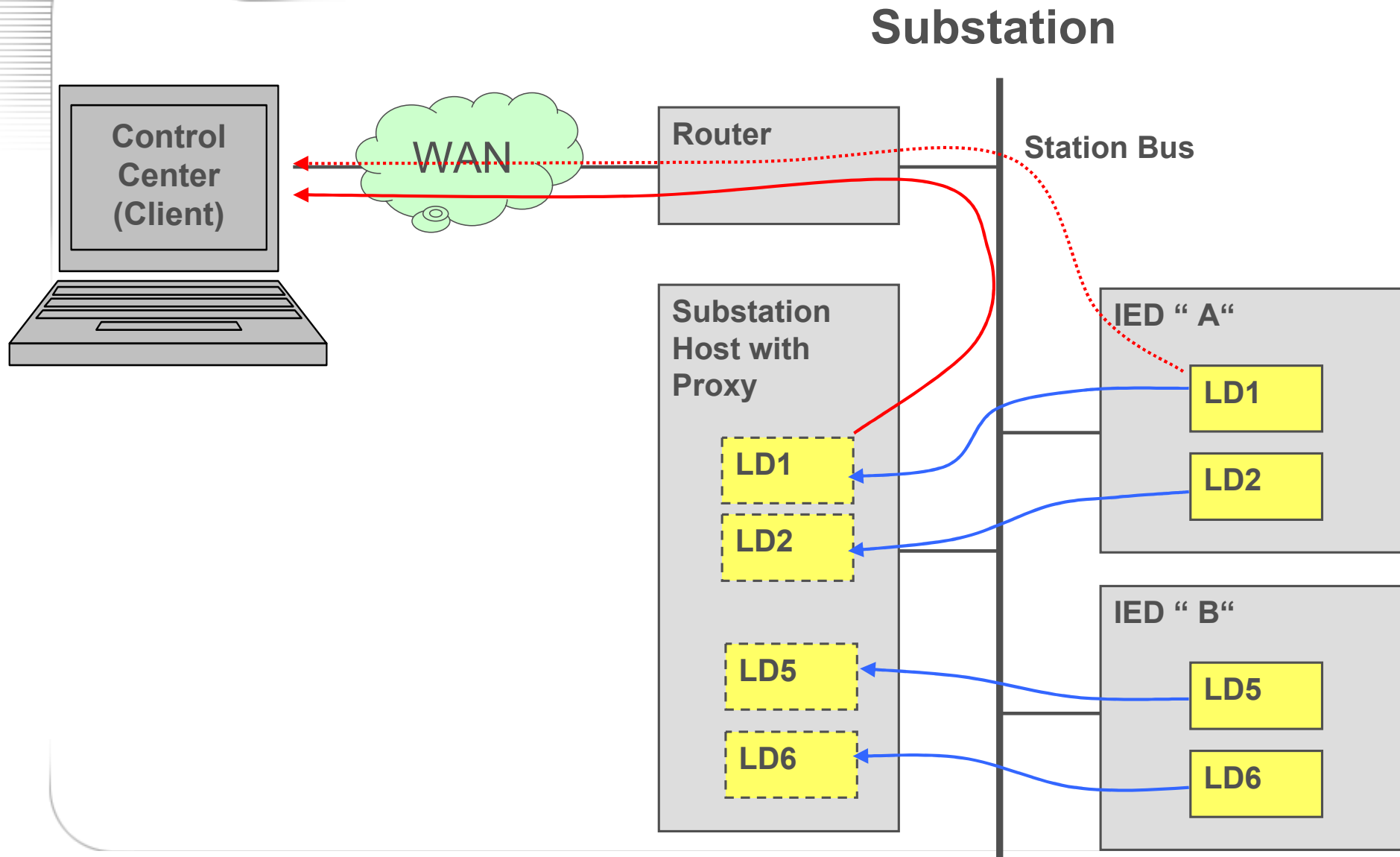


IEC 61850-90-2 Issues

- ▶ Model extensions
- ▶ Harmonization
- ▶ SCL extension
- ▶ Communication mappings
- ▶ Communication topology
 - ▶ Private dedicated link
 - ▶ Private network
 - ▶ Public network
 - ▶ Use of VPN



Seamless access to the substation





New features in Edition 2

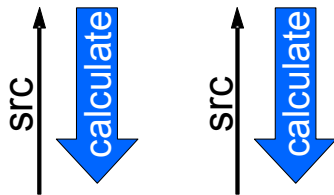
- ▶ Modeling
- ▶ Configuration language
- ▶ Communication services



Statistical and historical - principle

LN XYZ	
ClcMthd	[PRES]
Data1	MV
Data2	WYE

instantaneous values



statistical values

LN XXYZ2		LN XXYZ2	
ClcMthd	[MIN]	ClcMthd	[MAX]
ClcPerms	ING	ClcPerms	ING
ClcSrc	ORG	ClcSrc	ORG
ClcExp	SPS	ClcExp	SPS
ClcStr	SPC	ClcStr	SPC
Data1	MV	Data1	MV
Data2	WYE	Data2	WYE

Store (log entry)

statistical historical values

LOG
LogEntry
LogEntry
LogEntry



New data objects for statistical

- ▶ ClcMthd – calculation method (PRES | MIN | MAX | TOTMIN | TOTMAX | AVG | SDV | TREND)
- ▶ ClcSrc – reference to source LN
- ▶ ClcPerms – calculation period in ms
- ▶ ClcExp – calculation period expired
- ▶ ClcStr – calculation start



New and modified LNs for power quality

LN	Description
<i>Steady State</i>	
MMXU	General power parameters
MSQI	Sequence and unbalance
MHAI	Harmonics and interharmonics (according to IEC 61000-4-7)
MADV	Power in non-sinusoidal situations (according to IEEE 1459)
MFLK	Voltage Fluctuations (flicker according to IEC 61000-4-15)
<i>Events</i>	
QVVR	RMS Voltage Variations (sags/swells/momentary according to IEC 61000-4-30 and IEEE 1159)
QFVR	Frequency Variations (according to EN 50160 and 61000-4-30)
QVUB, QUNB, QIUUV	Unbalance Variations
QTRN, QVTR, QITR	Transients (according to IEEE 1159)



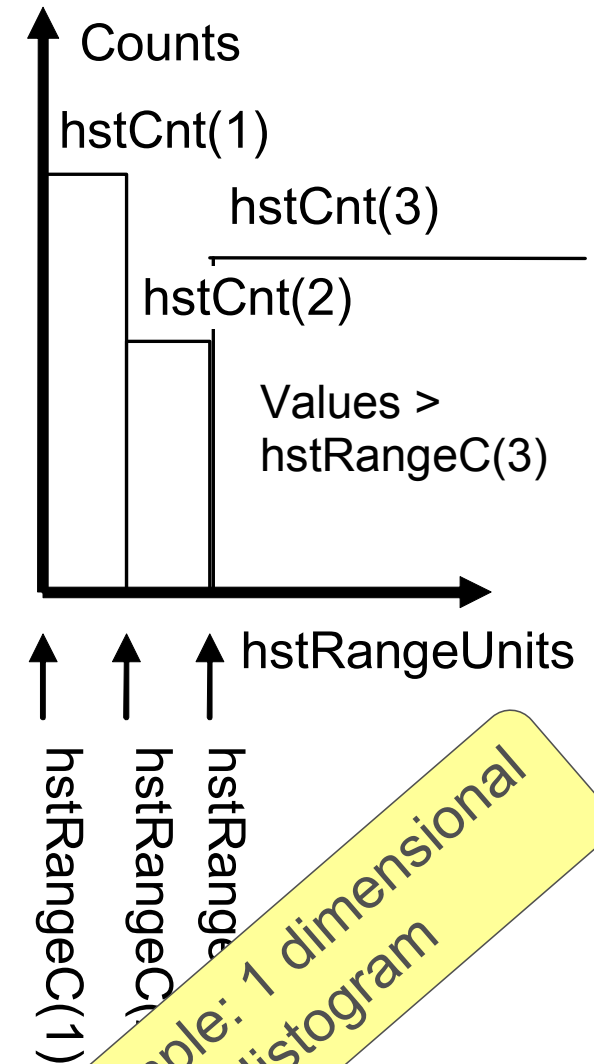
New and modified CDCs

- ▶ ENS, ENC and ENG – Status, controllable status and settings for enumerated values
- ▶ HST – Histogram
- ▶ APC and BAC – controllable analog process value and binary controlled analog value
- ▶ ORG – object reference setting group
- ▶ TSG – Time setting group
- ▶ CSG – Curve shape setting (multiple instances can be used for a three dimensional shape)
- ▶ DPL has been extended with time zone information, owner information and GPS position

CDC Histogram (HST)

HST = Histogram

Data Attr	Type
numPts	INT16U
hstCnt	ARRAY 1..numPts OF INT32
q	Quality
t	TimeStamp
hstRangeC	ARRAY 1..numPts OF Cells
xUnits	Unit
yUnits	Unit
d	Visible String255



Example: 1 dimensional Histogram

Status values

Configuration and description



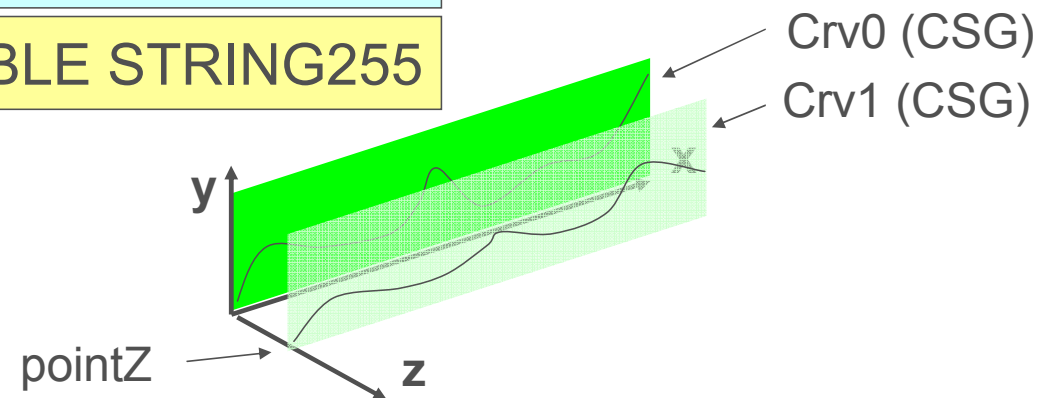
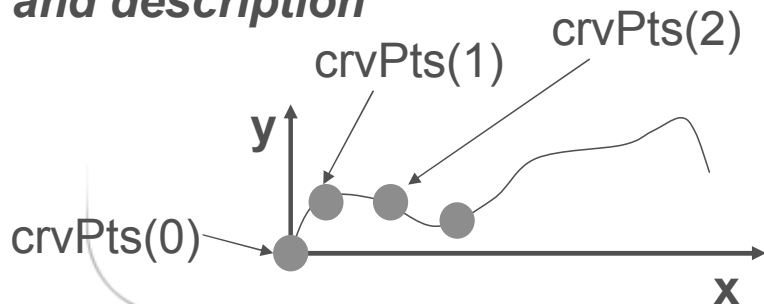
Modeling curves - CSG

CSG Curve Shape Setting

Data Attr	Type
pointZ	FLOAT32
xUnit	Unit
xD	VISIBLE STRING255
yUnit	Unit
yD	VISIBLE STRING255
numPts	INT16U
crvPts	ARRAY 1..numPts OF Point
d	VISIBLE STRING255

Setting (or setting group)

Configuration and description





Device name plate - DPL

- ▶ Product related data (Vendor, HW and SW revision, serial number, model)
- ▶ Operator related data (Location, owner, name of electric power system, role of the device, primary and secondary operator)
- ▶ GPS position (Latitude, longitude and altitude)
- ▶ Time zone information (Offset to UTC, support of daylight saving time, daylight saving time active)
- ▶ Unique identification of an asset or device (master resource ID)



Common LN and LLN0

- ▶ Common LN
 - ▶ InRef – Reference to a object (dataAttribute) that is bound to an input of the LN
 - ▶ GrRef – used as a reference to a higher level logical device for implementing a functional hierarchy
- ▶ LLN0
 - ▶ Two data objects (TSG) to set time for switch between standard and daylight saving time



SCL – New File Types

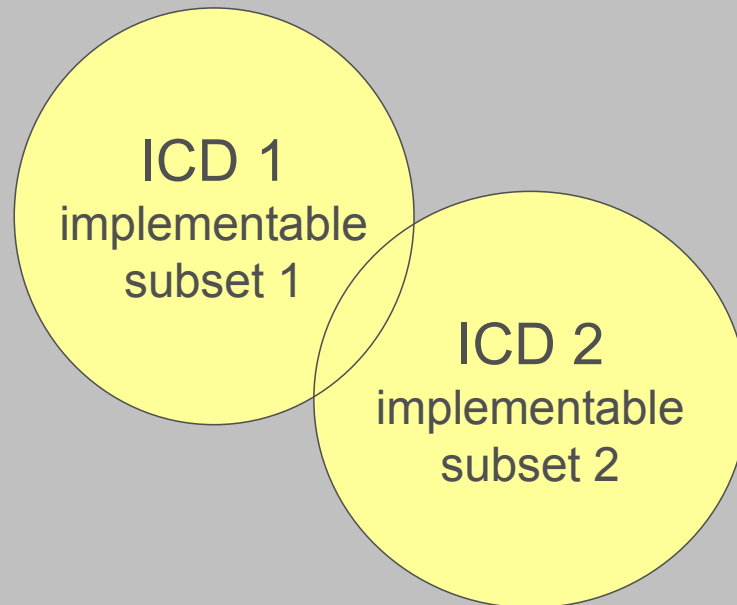
- ▶ New file types have been introduced to extend the usage of SCL
- ▶ .iid – to support exchange of IED modifications on an IED instance engineered specifically for a project back from the IED tool to the system tool
- ▶ .sed – to support exchange of system interfacing information between two projects handling two systems which need to exchange data



Clarification of .icd file

IED class

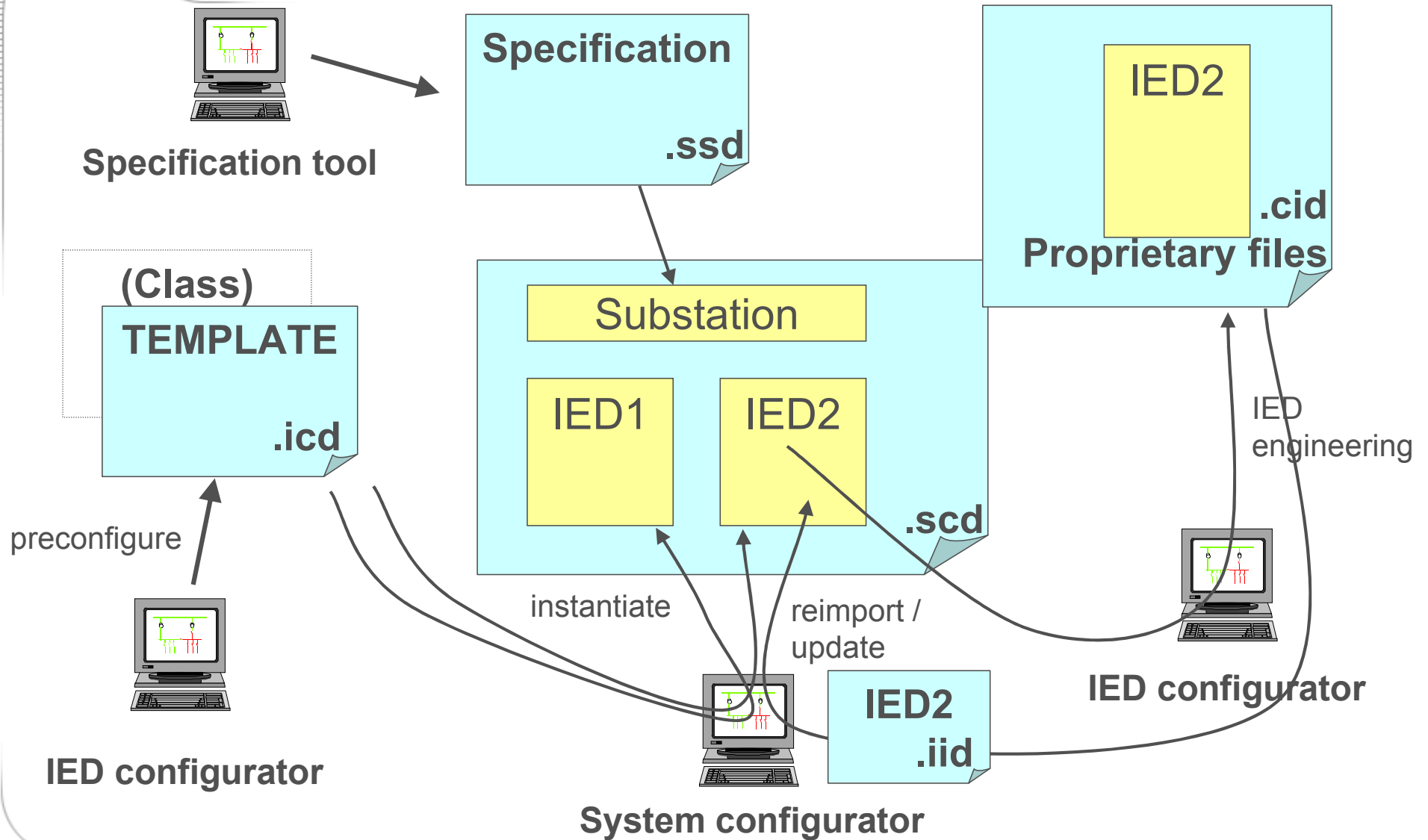
all functional capabilities
not implementable



- ▶ For flexible IEDs, there exists multiple .icd files
- ▶ An flexible IED can be seen as a IED class that supports many functionalities, but not all at the same time
- ▶ An .icd file represents a implementable subset of an IED class



Use of SCL – summary





SCL – Data exchange between projects

- ▶ Engineering of online data flow between projects
- ▶ Example of projects
 - ▶ Two substations exchanging data for e.g. line protection
 - ▶ Two voltage levels within the substation
- ▶ Rules
 - ▶ An IED belongs to one project
 - ▶ A project can transfer rights for dataflow engineering to another project
 - ▶ Transfer is done with .sed (System Exchange Description) file



SCL conformance statements

- ▶ IED configurator conformance statements
 - ▶ .icd export
 - ▶ .scd import
 - ▶ .iid export
 - ▶ Tool functionality

- ▶ System configurator conformance statements
 - ▶ .icd and .iid import and usage
 - ▶ Communication engineering
 - ▶ Data flow engineering
 - ▶ .scd substation section handling
 - ▶ .scd modifications, export and import
 - ▶ .sed handling



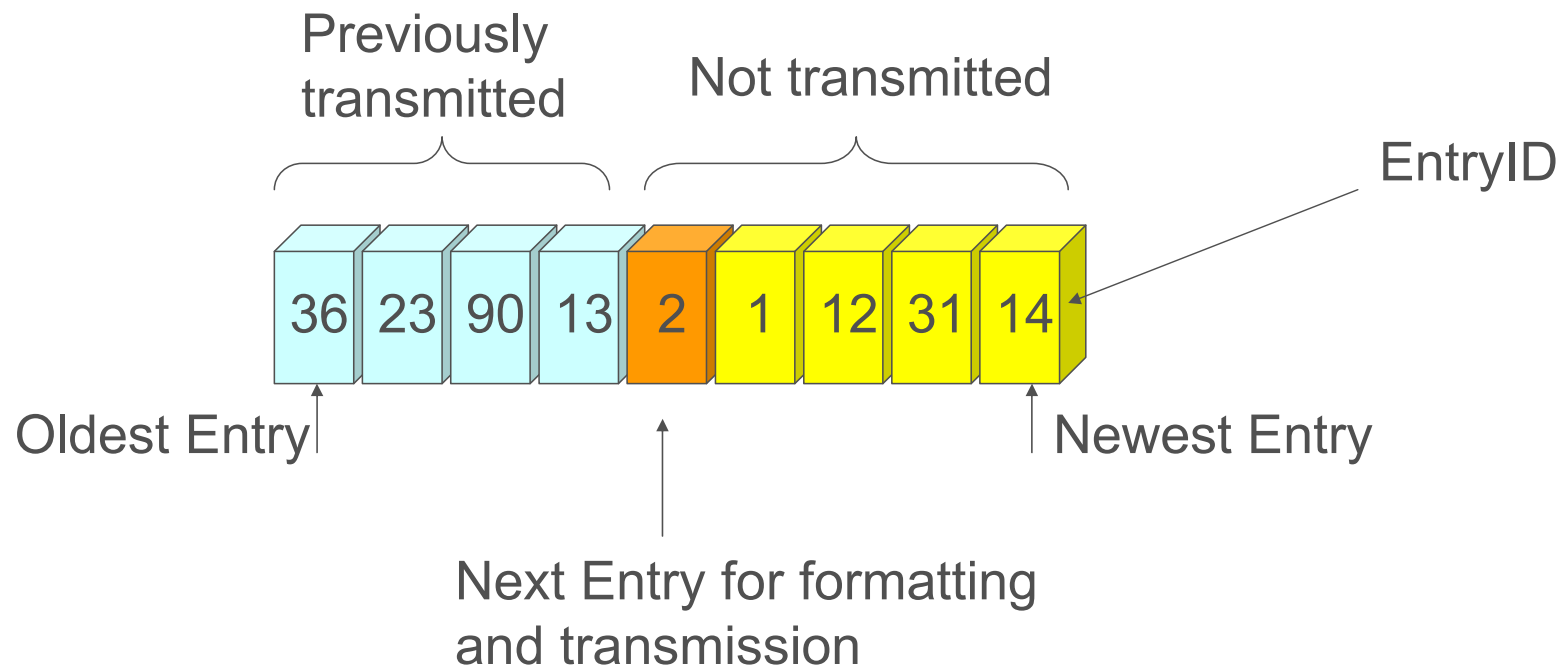
Updates to IEC 61850-7-2

- ▶ Improved specification of buffered reporting
 - ▶ Resynchronization after communication interruption
 - ▶ Indication of buffer overflow
 - ▶ General interrogation and buffered reporting
- ▶ GSSE has been moved in Annex
 - ▶ GOOSE shall be the preferred service to be supported in the future



Buffered reporting - states

- ▶ Disabled – events are buffered
- ▶ Resynch – resynchronization to start transmission at a specific entry
- ▶ Enabled – reports are transmitted to the associated client





Buffered reporting - resynchronization

- ▶ A client can set the Entry ID where transmission shall restart following the enabling of the report
- ▶ A client can purge the buffer
- ▶ Changing some of the parameters of a BRCB (e.g. dataset reference) result in a purge of the buffer



Buffered reporting – General interrogation

- ▶ General interrogation (GI) is only possible, when reporting is enabled
- ▶ With a new GI, a previously buffered and pending GI is deleted
- ▶ When reporting is disabled, a pending GI is deleted

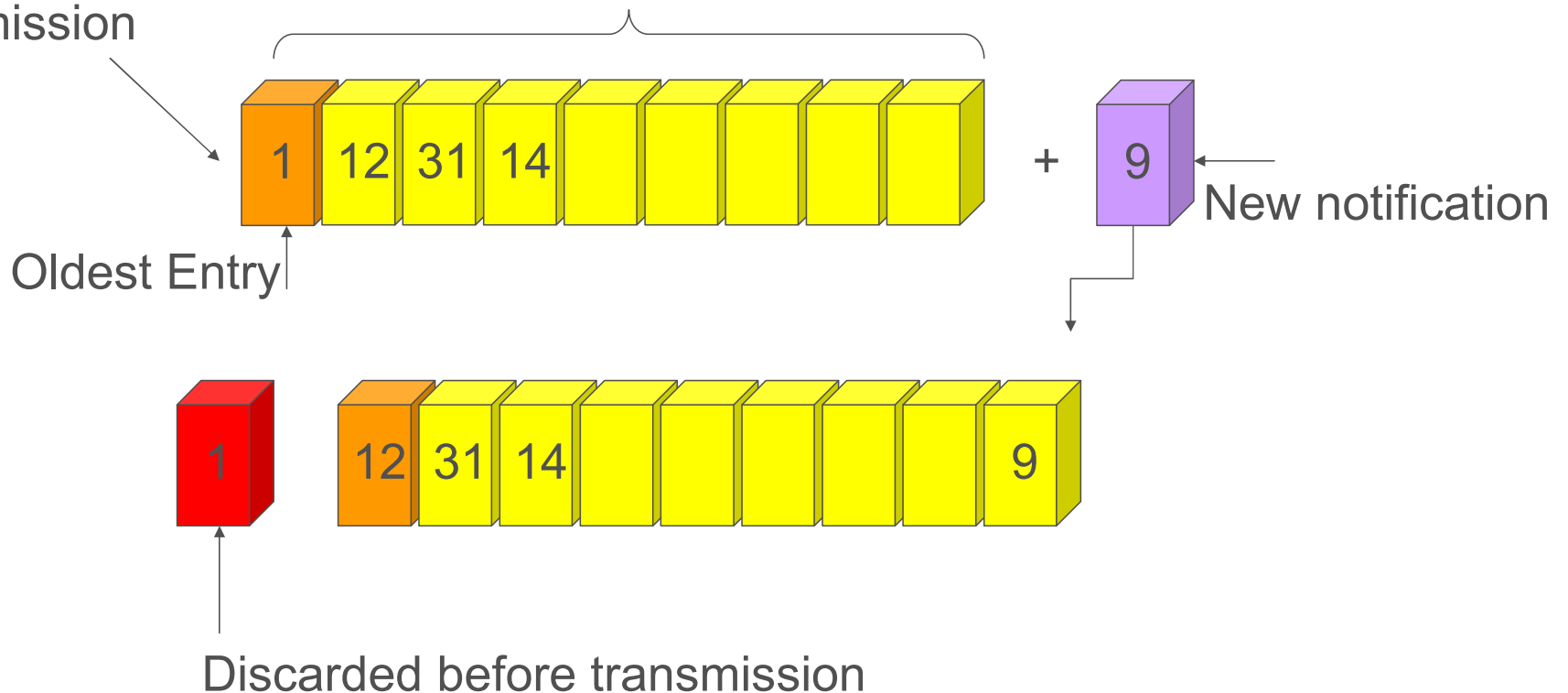


Buffered reporting – Buffer overflow

- ▶ Oldest entries shall be discarded
- ▶ The first report that is sent following a loss of information due to buffer overflow is indicating BufOvfl = TRUE

Next Entry for formatting and transmission

Not transmitted



**Thank you for your attention.
Any questions?**

