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datId = TimeQuality			
Attribute name	Attribute type	(Value/Value range) Description	PresCond
ClockNotSynchronized	BOOLEAN	If true indicates that the time source of timestamping is not synchronized with an external clock; If false, the time source of timestamping is synchronized to an external clock and the deviation from UTC is provided in TimeAccuracy field of the time stamp. During HoldOver mode: – clockNotSynchronized is still false until the TimeAccuracy has reached the value "unspecified", i.e. exceeds 1 second, – if the device is unable to determine whether a leap second is occurring at midnight, the clockNotSynchronized shall be set to true at midnight and remain until a synchronization occurs.	M
TimeAccuracy	INT8U	(range=[0...31]) Accuracy of the Timestamp in terms of number of significant bits in 'P_Timestamp.FractionOfSecond'. Note that the value 31 is used to mean "unspecified", and that the values 25 through 30 are invalid (as 'P_Timestamp.FractionOfSecond' size is 24 bits). "unspecified" indicates that the time accuracy is not even 1 second. The TimeAccuracy parameter can vary over time while exposing the deviation with regards to the synchronization source – while ClockNotSynchronized is false, TimeAccuracy provides the deviation from UTC., while ClockNotSynchronized is true, TimeAccuracy provides the accuracy of the internal clock.	M

6.2.3.9 Quality (P_Quality packed list)

Quality contains data that describe the quality of the data from the server. Quality of the data is also related to the mode of a logical node. Further details can be found in IEC 61850-7-4. The different quality attributes are not independent.

The default value shall be applied if the functionality of the related attribute is not supported. The mapping may specify to exclude the attribute from the message if it is not supported or if the default value applies.

Table 10 shows all attributes of P_Quality.

Table 10 – Attributes of P_Quality

datId = P_Quality			
Attribute name	Attribute type	(Value/Value range) Description	PresCond
validity	ValidityKind	Validity of the value, as condensed information for the client. In case this value is not 'good', some reasons may be found in the 'detailQual'.	M
detailQual	DetailQual	Describes some reasons in case 'validity' is not 'good'.	M
source	SourceKind	(default=process) Defines the source of a value. NOTE 1 Substitution may be done locally or via the communication services. In the second case, specific attributes with a FC=SV are used. See IEC 61850-7-3. NOTE 2 There are various means to clear a substitution. As an example, a substitution that was done following an invalid condition may be cleared automatically if the invalid condition is cleared. However, this is a local issue and therefore not within the scope of this standard.	M
test	BOOLEAN	(default=false) If true, the value is a test value. The processing of the test quality in the client shall be as described in IEC 61850-7-4. This bit shall be completely independent from the other bits within the quality descriptor.	M
operatorBlocked	BOOLEAN	(default=false) If true, further update of the value has been blocked by an operator. The value shall be the information that was acquired before blocking. If this flag is set, then the 'detailQual.oldData' shall also be set. The operator shall use the data attribute 'CDC.blkEna' to block the update of the value. NOTE Both an operator as well as an automatic function may freeze communication updating as well as input updating. In both cases, 'detailQual.oldData' will be set. If the blocking is done by an operator, then this flag is set additionally, and an operator activity is required to clear the condition. EXAMPLE An operator may freeze the update of an input, to save the old value before the auxiliary supply is switched off.	M

6.2.3.10 DetailQual (DetailQual packed list)

This type contains reason for an 'invalid' or 'questionable' value. Further information is in Annex D.

Table 11 shows all attributes of DetailQual.

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Table 11 – Attributes of DetailQual

datId = DetailQual			
Attribute name	Attribute type	(Value/Value range) Description	PresCond
overflow	BOOLEAN	(default=false) If true, the value of the attribute to which the quality has been associated is beyond the capability of being represented properly (used for measurand information only). EXAMPLE A measured value may exceed the range that may be represented by the selected data type, for example the data type is a 16-bit unsigned integer and the value exceeds 65 535.	M
outOfRange	BOOLEAN	(default=false) If true, the attribute to which the quality has been associated is beyond a predefined range of values. The server shall decide if validity shall be set to invalid or questionable (used for measurand information only). EXAMPLE A measured value may exceed a predefined range, however the selected data type can still represent the value, for example the data type is a 16-bit unsigned integer, the predefined range is 0 to 40 000, if the value is between 40 001 and 65 535 it is considered to be out of range.	M
badReference	BOOLEAN	(default=false) If true, the value may not be a correct value due to a reference being out of calibration. The server shall decide if validity shall be set to invalid or questionable (used for measurand information and binary counter information only).	M
oscillatory	BOOLEAN	(default=false) To prevent overloading of event driven communication channels, it is desirable to detect and suppress oscillating (fast changing) binary inputs. If a signal changes in a defined time twice in the same direction (from 0 to 1 or from 1 to 0), then it shall be defined as an oscillation and this attribute shall be set to true. If a configured number of transient changes is detected, they shall be suppressed. In this time, the 'Quality.validity' shall be set to 'questionable'. If the signal is still in the oscillating state after the defined number of changes, the value shall be left in the state it was in when this flag was set. In this case, the 'Quality.validity' shall be changed from 'questionable' to 'invalid' and kept so as long as the signal is oscillating. If the configuration is such that all transient changes should be suppressed, the 'Quality.validity' shall be set immediately to 'invalid' and this flag to true (used for status information only).	M
failure	BOOLEAN	(default=false) If true, a supervision function has detected an internal or external failure.	M
oldData	BOOLEAN	(default=false) If true, an update is not made during a specific time interval. The value may be an old value that may have changed in the meantime. This specific time interval may be defined by an allowed-age attribute. NOTE "Fail silent" errors, where the equipment stops sending data, will cause	M

datId = DetailQual			
Attribute name	Attribute type	(Value/Value range) Description	PresCond
		setting this flag to true. In this case, the last received information was correct.	
inconsistent	BOOLEAN	(default=false) If true, an evaluation function has detected an inconsistency.	M
inaccurate	BOOLEAN	(default=false) If true, the value does not meet the stated accuracy of the source. EXAMPLE The measured value of power factor may be noisy (inaccurate) when the current is very small.	M

6.2.3.11 EntryTime (P_EntryTime basic)

GMT time and date used internally by an IED, mainly in the context of reporting and logging. A pair of values {EntryID, EntryTime} should guarantee an entry/item/row (in a report or log) to be unique. The concrete type is defined by an SCSM.

The NULL EntryTime has all fields set to 0 (zero).

NOTE In an SCSM, this EntryTime type may or may not be the same as Timestamp type used for common data classes in IEC 61850-7-3 and definition of compatible data object classes in IEC 61850-7-4.

6.2.3.12 TriggerConditions (P_TriggerConditions packed list)

Configuration options for control blocks, used to specify one or more conditions under which reports or logs shall be generated.

Table 12 shows all attributes of P_TriggerConditions.

Table 12 – Attributes of P_TriggerConditions

datId = P_TriggerConditions			
Attribute name	Attribute type	(Value/Value range) Description	PresCond
data-change	BOOLEAN	If true, a value change of a process-related data attribute, tagged with dchg, will trigger the generation of a report or log entry, otherwise no entry should be generated on value change.	M
quality-change	BOOLEAN	If true, a value change of a quality-related data attribute, tagged with qchg, will trigger the generation of a report or log entry, otherwise no entry should be generated on quality change.	M
data-update	BOOLEAN	If true, a value freezing of a freezable data attribute (e.g., frozen counters) or a value update of any other data attribute, tagged with dupd, will trigger the generation of a report or log entry, otherwise no entry should be generated on value update. This trigger condition may be used to issue sending a report or storing a log entry into a log when a value has changed or has been "overwritten" with the same value as before. It may then be a trigger for reporting or logging of the statistics values (which may be calculated and updated periodically), independently of whether the value has changed or not.	M
integrity	BOOLEAN	If true, the control block in the server shall generate periodical report or log entries on	M