

5.6 Interoperability list

5.6.1 Interoperability

This companion standard presents sets of parameters and alternatives from which subsets must be selected to implement particular telecontrol systems. Certain parameter values, such as the choice of "structured" or "unstructured" fields of the INFORMATION OBJECT ADDRESS of ASDUs represent mutually exclusive alternatives. This means that only one value of the defined parameters is admitted per system. Other parameters, such as the listed set of different process information in both command and monitor direction, allow the specification of the complete set or subsets, as appropriate for given applications. This clause summarizes the parameters of the previous clauses to facilitate a suitable selection for a specific application. If a system is composed of equipment stemming from different manufacturers, it is necessary that all partners agree on the selected parameters.

The interoperability list is defined as in IEC 60870-5-101 and extended with parameters used in this standard. The text descriptions of parameters which are not applicable to this companion standard are strike-through (corresponding check box is marked black).

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Note!

In addition, the full specification of a system may require the individual selection of certain parameters for certain parts of the system, such as the individual selection of scaling factors for individually addressable measured values.

Application layer telegram formats

The selected parameters should be marked in the white boxes as follows:

- Function or ASDU is not used
- Function or ASDU is used as standardized (default)
- Function or ASDU is used in reverse mode
- Function or ASDU is used in standard and reverse mode
- Function or ASDU may need some additional application level work

The possible selection (blank, X, R, or B) is specified for each specific clause or parameter. A black check box indicates that the option cannot be selected in this companion standard.

5.6.1.1 System or device

(system-specific parameter)

- System definition
- Controlling station definition (Master)
- Controlled station definition (Slave)

5.6.1.2 Network configuration

(network-specific parameter)

- | | | | |
|-------------------------------------|-------------------------|-------------------------------------|----------------------|
| <input checked="" type="checkbox"/> | Point-to-point | <input checked="" type="checkbox"/> | Multipoint-partyline |
| <input checked="" type="checkbox"/> | Multiple point-to-point | <input checked="" type="checkbox"/> | Multipoint-star |

5.6.1.3 Physical layer

(network-specific parameter)

Transmission speed (control direction)

Unbalanced interchange Circuit V.24/V.28 Standard	Unbalanced interchange Circuit V.24/V.28 Recommended if >1 200 bit/s	Balanced interchange	Circuit X.24/X.27
<input type="checkbox"/> 100 bit/s	<input type="checkbox"/> 2400 bit/s	<input type="checkbox"/> 2400 bit/s	<input type="checkbox"/> 56000 bit/s
<input type="checkbox"/> 200 bit/s	<input type="checkbox"/> 4800 bit/s	<input type="checkbox"/> 4800 bit/s	<input type="checkbox"/> 64000 bit/s
<input type="checkbox"/> 300 bit/s	<input type="checkbox"/> 9600 bit/s	<input type="checkbox"/> 9600 bit/s	
<input type="checkbox"/> 600 bit/s		<input type="checkbox"/> 19200 bit/s	
<input type="checkbox"/> 1200 bit/s		<input type="checkbox"/> 38400 bit/s	

Transmission speed (monitor direction)

Unbalanced interchange Circuit V.24/V.28 Standard	Unbalanced interchange Circuit V.24/V.28 Recommended if >1 200 bit/s	Balanced interchange	Circuit X.24/X.27
<input type="checkbox"/> 100 bit/s	<input type="checkbox"/> 2400 bit/s	<input type="checkbox"/> 2400 bit/s	<input type="checkbox"/> 56000 bit/s
<input type="checkbox"/> 200 bit/s	<input type="checkbox"/> 4800 bit/s	<input type="checkbox"/> 4800 bit/s	<input type="checkbox"/> 64000 bit/s
<input type="checkbox"/> 300 bit/s	<input type="checkbox"/> 9600 bit/s	<input type="checkbox"/> 9600 bit/s	
<input type="checkbox"/> 600 bit/s		<input type="checkbox"/> 19200 bit/s	
<input type="checkbox"/> 1200 bit/s		<input type="checkbox"/> 38400 bit/s	

5.6.1.4 Link layer

(network-specific parameter)

Frame format FT1.2, single character 1 and the fixed time out interval are used exclusively in this companion standard.

Link transmission

- Balanced transmission
- Unbalanced transmission

Address field of the link

- Not present (balanced transmission only)
- One octet
- Two octets
- Structured
- Unstructured

Frame length

Maximum length L (number of octets)

When using an unbalanced link layer, the following ASDU types are returned in class 2 messages (low priority) with the indicated causes of transmission:

The standard assignment of ASDUs to class 2 messages is used as follows:

Type identification	Cause of transmission
9, 11, 13, 21	<1>

A special assignment of ASDUs to class2 is used as follows:

Type identification	Cause of transmission
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5.6.1.5 Application layer

Transmission mode for application data

Mode 1 (least significant octet first), as defined in 4.10 of IEC 60870-5-4, is used exclusively in this companion standard.

Common address of ASDU

(system-specific parameter)

- One octet
- Two octets

Information object address

(system-specific parameter)

- One octet
- Two octets
- Three octets
- Structured
- Unstructured

Cause of transmission

(system-specific parameter)

- One octet
- Two octets (with originator address). Originator address is set to zero if not used

Length of APDU

(system-specific parameter)

The maximum length of APDU for both directions is 253. It is a fixed system parameter.

- Maximum length of APDU per system in control direction
- Maximum length of APDU per system in monitor direction

Selection of standard ASDUs

Process information in monitor direction

(station-specific parameter)

<input checked="" type="checkbox"/>	<1> := Single-point information	M_SP_NA_1
<input type="checkbox"/>	<2> := Single-point information with time tag	M_SP_TA_1
<input checked="" type="checkbox"/>	<3> := Double-point information	M_DP_NA_1
<input type="checkbox"/>	<4> := Double-point information with time tag	M_DP_TA_1
<input checked="" type="checkbox"/>	<5> := Step position information	M_ST_NA_1
<input type="checkbox"/>	<6> := Step position information with time tag	M_ST_TA_1
<input checked="" type="checkbox"/>	<7> := Bitstring of 32 bit	M_BO_NA_1
<input type="checkbox"/>	<8> := Bitstring of 32 bit with time tag	M_BO_TA_1
<input checked="" type="checkbox"/>	<9> := Measured value, normalized value	M_ME_NA_1
<input type="checkbox"/>	<10> := Measured value, normalized value with time tag	M_ME_TA_1
<input checked="" type="checkbox"/>	<11> := Measured value, scaled value	M_ME_NB_1
<input type="checkbox"/>	<12> := Measured value, scaled value with time tag	M_ME_TB_1
<input checked="" type="checkbox"/>	<13> := Measured value, short floating point value	M_ME_NC_1
<input type="checkbox"/>	<14> := Measured value, short floating point value with time tag	M_ME_TC_1
<input checked="" type="checkbox"/>	<15> := Integrated totals	M_IT_NA_1
<input type="checkbox"/>	<16> := Integrated totals with time tag	M_IT_TA_1
<input type="checkbox"/>	<17> := Event of protection equipment with time tag	M_EP_TA_1
<input type="checkbox"/>	<18> := Packed start events of protection equipment with time tag	M_EP_TB_1
<input type="checkbox"/>	<19> := Packed output circuit information of protection equipment with time tag	M_EP_TC_1
<input type="checkbox"/>	<20> := Packed single-point information with status change detection	M_PS_NA_1
<input type="checkbox"/>	<21> := Measured value, normalized value without quality descriptor	M_ME_ND_1
<input checked="" type="checkbox"/>	<30> := Single-point information with time tag CP56Time2a	M_SP_TB_1
<input checked="" type="checkbox"/>	<31> := Double-point information with time tag CP56Time2a	M_DP_TB_1
<input checked="" type="checkbox"/>	<32> := Step position information with time tag CP56Time2a	M_ST_TB_1
<input checked="" type="checkbox"/>	<33> := Bitstring of 32 bit with time tag CP56Time2a	M_BO_TB_1

<input checked="" type="checkbox"/>	<34> := Measured value, normalized value with time tag CP56Time2a	M_ME_TD_1
<input checked="" type="checkbox"/>	<35> := Measured value, scaled value with time tag CP56Time2a	M_ME_TE_1
<input checked="" type="checkbox"/>	<36> := Measured value, short floating point value with time tag CP56Time2a	M_ME_TF_1
<input checked="" type="checkbox"/>	<37> := Integrated totals with time tag CP56Time2a	M_IT_TB_1
<input type="checkbox"/>	<38> := Event of protection equipment with time tag CP56Time2a	M_EP_TD_1
<input type="checkbox"/>	<39> := Packed start events of protection equipment with time tag CP56Time2a	M_EP_TE_1
<input type="checkbox"/>	<40> := Packed output circuit information of protection equipment with time tag CP56Time2a	M_EP_TF_1

Although ASDUs <2>, <4>, <6>, <8>, <10>, <12>, <14> and <16> are not part of the IEC 60870-5-104 companion standard, they are also supported to provide compatibility with gateway devices using IEC 60870-5-101.

Process information in control direction

(station-specific parameter)

<input checked="" type="checkbox"/>	<45> := Single command	C_SC_NA_1
<input checked="" type="checkbox"/>	<46> := Double command	C_DC_NA_1
<input checked="" type="checkbox"/>	<47> := Regulating step command	C_RC_NA_1
<input checked="" type="checkbox"/>	<48> := Set point command, normalized value	C_SE_NA_1
<input checked="" type="checkbox"/>	<49> := Set point command, scaled value	C_SE_NB_1
<input checked="" type="checkbox"/>	<50> := Set point command, short floating point value	C_SE_NC_1
<input checked="" type="checkbox"/>	<51> := Bitstring of 32 bit	C_BO_NA_1
<input checked="" type="checkbox"/>	<58> := Single command with time tag CP56Time2a	C_SC_TA_1
<input checked="" type="checkbox"/>	<59> := Double command with time tag CP56Time2a	C_DC_TA_1
<input checked="" type="checkbox"/>	<60> := Regulating step command with time tag CP56Time2a	C_RC_TA_1
<input checked="" type="checkbox"/>	<61> := Set point command, normalized value with time tag CP56Time2a	C_SE_TA_1
<input checked="" type="checkbox"/>	<62> := Set point command, scaled value with time tag CP56Time2a	C_SE_TB_1
<input checked="" type="checkbox"/>	<63> := Set point command, short floating point value with time tag CP56Time2a	C_SE_TC_1
<input checked="" type="checkbox"/>	<64> := Bitstring of 32 bit with time tag CP56Time2a	C_BO_TA_1

Either the ASDUs of the set <45> – <51> or of the set <58> – <64> are used.

System information in monitor direction

(station-specific parameter)

X	<70> := End of initialization	M_EI_NA_1
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System information in control direction

(station-specific parameter)

X	<100>:= Interrogation command	C_IC_NA_1
X	<101>:= Counter interrogation command	C_CI_NA_1
X	<102>:= Read command	C_RD_NA_1
X	<103>:= Clock synchronization command	C_CS_NA_1
■	<104>:= Test command	C_TS_NA_1
X	<105>:= Reset process command	C_RP_NA_1
■	<106>:= Delay acquisition command	C_CD_NA_1
A	<107>:= Test command with time tag CP56Time2a	C_TS_TA_1

Parameter in control direction

(station-specific parameter)

A	<110>:= Parameter of measured value, normalized value	P_ME_NA_1
A	<111>:= Parameter of measured value, scaled value	P_ME_NB_1
A	<112>:= Parameter of measured value, short floating point value	P_ME_NC_1
X	<113>:= Parameter activation	P_AC_NA_1

File transfer

(station-specific parameter)

B	<120>:= File ready	F_FR_NA_1
B	<121>:= Section ready	F_SR_NA_1
B	<122>:= Call directory, select file, call file, call section	F_SC_NA_1
B	<123>:= Last section, last segment	F_LS_NA_1
B	<124>:= Ack file, ack section	F_AF_NA_1
B	<125>:= Segment	F_SG_NA_1

Type identifica- tion	Cause of transmission
<61> C_SE_TA_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<62> C_SE_TB_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<63> C_SE_TC_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<64> C_BO_TA_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<70> M_EL_NA_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<100> C_IC_NA_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<101> C_CL_NA_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<102> C_RD_NA_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<103> C_CS_NA_1	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<104> C_TS_NA_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<105> C_RP_NA_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<106> C_CB_NA_1	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<107> C_TS_TA_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<110> P_ME_NA_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<111> P_ME_NB_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<112> P_ME_NC_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<113> P_AC_NA_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<120> F_FR_NA_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<121> F_SR_NA_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<122> F_SC_NA_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<123> F_LS_NA_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<124> F_AF_NA_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<125> F_SG_NA_1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<126> F_DR_TA_1*	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<127> F_SC_NB_1*	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

* Blank or X only.

5.6.1.6 Basic application functions

Station initialization

(station-specific parameter)

Remote initialization

Cyclic data transmission

(station-specific parameter)

Cyclic data transmission

Read procedure

(station-specific parameter)

Read procedure

Spontaneous transmission

(station-specific parameter)

Spontaneous transmission

Double transmission of information objects with cause of transmission spontaneous

(station-specific parameter)

The following type identifications may be transmitted in succession caused by a single status change of an information object. The particular information object addresses for which double transmission is enabled are defined in a project-specific list.

- Single-point information M_SP_NA_1, M_SP_TA_1, M_SP_TB_1 and M_PS_NA_1
- Double-point information M_DP_NA_1, M_DP_TA_1 and M_DP_TB_1
- Step position information M_ST_NA_1, M_ST_TA_1 and M_ST_TB_1
- Bitstring of 32 bit M_BO_NA_1, M_BO_TA_1 and M_BO_TB_1 (if defined for a specific project)
- Measured value, normalized value M_ME_NA_1, M_ME_TA_1, M_ME_ND_1 and M_ME_TD_1
- Measured value, scaled value M_ME_NB_1, M_ME_TB_1 and M_ME_TE_1
- Measured value, short floating point number M_ME_NC_1, M_ME_TC_1 and M_ME_TF_1

Station interrogation

(station-specific parameter or object-specific parameter)

global

group 1

group 7

group 13

<input checked="" type="checkbox"/>	group 2	<input checked="" type="checkbox"/>	group 8	<input checked="" type="checkbox"/>	group 14
<input checked="" type="checkbox"/>	group 3	<input checked="" type="checkbox"/>	group 9	<input checked="" type="checkbox"/>	group 15
<input checked="" type="checkbox"/>	group 4	<input checked="" type="checkbox"/>	group 10	<input checked="" type="checkbox"/>	group 16
<input checked="" type="checkbox"/>	group 5	<input checked="" type="checkbox"/>	group 11		
<input checked="" type="checkbox"/>	group 6	<input checked="" type="checkbox"/>	group 12		

Clock synchronization

(station-specific parameter)

- Clock synchronization
- Day of week used
- RES1, GEN (time tag substituted/ not substituted) used
- SU-bit (summertime) used

Command transmission

(station-specific parameter)

- Direct command transmission
 - Direct set-point command transmission
 - Select and execute command
 - Select and execute set-point command
 - C_SE ACTTERM used
 - No additional definition
 - Short-pulse duration (duration determined by a system parameter in the controlled station)
 - Long-pulse duration (duration determined by a system parameter in the controlled station)
 - Persistent output
 - Supervision of maximum delay in command direction of commands and set point commands
- 255 Maximum allowable delay of commands and set point commands
sec

Transmission of integrated totals

(station-specific parameter or object-specific parameter)

- Mode A: local freeze with spontaneous transmission

- Mode B: local freeze with counter interrogation
- Mode C: freeze and transmit by counter interrogation commands
- Mode D: freeze by counter interrogation command, frozen values reported spontaneously
- Counter read
- Counter freeze without reset
- Counter freeze with reset
- Counter reset
- General request counter
- Request counter group 1
- Request counter group 2
- Request counter group 3
- Request counter group 4

Parameter loading

(object-specific parameter)

- A Threshold value
- A Smoothing factor
- A Low limit for transmission of measured value
- A High limit for transmission of measured value

Parameter activation

(object-specific parameter)

- X Act/deact of persistent cyclic or periodic transmission of the addressed object

Test procedure

(object-specific parameter)

- A Test procedure

File transfer

(object-specific parameter)

File transfer in monitor direction

- Transparent file
- Transmission of disturbance data of protection equipment
- Transmission of sequences of events
- Transmission of sequences of recorded analogue values

File transfer in control direction

- Transparent file

Background scan

(station-specific parameter)

- Background scan

Acquisition of transmission delay

(station-specific parameter)

- Acquisition of transmission delay

Definition of time-outs

Parameter	Default value	Remarks	Selected value
t_0	30 s	Time-out of connection establishment	1-255 s
t_1	15 s	Time-out of send or test APDUs	1-255 s
t_2	10 s	Time-out for acknowledges in case of no data messages $t_2 < t_1$	1-255 s
t_3	20 s	Time-out for sending test frames in case of a long idle state	1-255 s

Maximum range for timeouts t_0 to t_2 : 1 s to 255 s, accuracy 1 s.

Maximum number of outstanding I format APDUs k and latest acknowledge APDUs (w)

Parameter	Default value	Remarks	Selected value
k	12 APDUs	Maximum difference receive sequence number to send state variable	1-32767
w	8 APDUs	Latest acknowledge after receiving w I format APDUs	1-32767

Maximum range of values k : 1 to 32767 ($2^{15}-1$) APDUs, accuracy 1 APDU

Maximum range of values w : 1 to 32767 APDUs, accuracy 1 APDU (Recommendation: w should not exceed two-thirds of k).

Portnumber

Parameter	Value	Remarks
Portnumber	2404	Configurable with an optional definition to the station attribute IA.

Redundant connections

1...12 Number N of redundancy group connections used

RFC 2200 suite

RFC 2200 is an official Internet Standard which describes the state of standardization of protocols used on the Internet as determined by the Internet Architecture Board (IAB). It offers a broad spectrum of actual standards used on the Internet. The suitable selection of documents from RFC 2200 defined in this standard for given projects has to be chosen by the user of this standard.

- Ethernet 802.3
- Serial X.21 interface
- Other selection from RFC 2200:

List of valid documents from RFC 2200

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
7. etc.

5.7 Description of the SPA bus messages

In distribution automation systems, the SPA-bus protocol may be required to access device information that is not mapped to the IEC 60870-5-101 protocol. This information includes several device specific parameters and recorded disturbance data. Two ASDU types from the private range have been selected to enable transparent transfer of the SPA-bus messages.

ASDU 133 - SPA-bus message

TYPE IDENT 133: C_SB_NA_1

SPA-bus message

Single information object (SQ = 1)

Table 5.19: ASDU C_SB_NA_1 – SPA-bus message

1	0	0	0	0	1	0	1	TYPE IDENTIFICATION
1				N*				VARIABLE STRUCTURE QUAL- DATA UNIT IFIER
								CAUSE OF TRANSMISSION IDENTIFIER
								COMMON ADDRESS OF ASDU