Documento de Interoperabilidade do Protocolo IEC/60870-5-101 no SAGE

MAIO 2003

Documento de Interoperabilidade

A comunicação do SAGE, sob o protocolo IEC/60870-5-101, pode ser estabelecida em canais de comunicação serial assíncrona ou em conexões do protocolo TCP/IP.

As opções de uso do protocolo IEC/60870-5-101 em canais de comunicação serial assíncrona estão listadas no documento de interoperabilidade abaixo. Além disso, estão disponíveis no SAGE três modalidades de transporte do IEC/60870-5-101 sobre TCP/IP:

1 - *application level* do IEC/60870-5-101 sobre TCP/IP
2 - *link-level* em modo balanceado do IEC/60870-5-101 sobre TCP/IP
3 - *link-level* e *application level* sobre TCP/IP conforme a IEC/60870-5-104

A comunicação do SAGE sob o protocolo IEC/60870-5-104, conforme regulamentação do IEC para uso em transporte TCP-IP, está descrita em documento específico. No presente documento, as alternativas de uso do IEC/60870-5-101 sobre TCP-IP, são baseadas em práticas 'de fato', não regulamentadas pelo referido consórcio internacional.

A seguir é apresentado o questionário preenchido de interoperabilidade. Os itens marcados com "x" indicam a implementação da função no SAGE. Os itens sublinhados, quando presentes, informam a opção mais recomendada pelo CEPEL para comunicação com o SAGE.

1 Network configuration

(network-specific parameter)

[x] Point-to-point	[x] Multipont-party line
[x] Multiple point-to point	[ ] Multipont-star

2 Phisical Layer

(network-specific parameter)

Transmission speed (control drirection)

Unbalance interchange circuit V.24 / V.28 Standard	Unbalanced interchange circuit V.24 / V.28 Recommended if > 1200 bit/s	Balanced interchange circuit X.24 / X.27	
[ ] 100 bit/s	[x] 2400 bit/s	[ ] 2400 bit/s	[ ] 56000 bit/s
[ ] 200 bit/s	[x] 4800 bit/s	[ ] 4800 bit/s	[ ] 64000 bit/s
[ ] 300 bit/s	[x] 9600 bit/s	[ ] 9600 bit/s	
[ ] 600 bit/s	[x] 19200 bit/s	[ ] 19200 bit/s	
[x] 1200 bit/s		[ ] 38400 bis/s	

Transmission speed (monitor drirection)

Unbalance interchange circuit V.24 / V.28 Standard	Unbalanced interchange circuit V.24 / V.28 Recommended if > 1200 bit/s	Balanced interchange circuit X.24 / X.27	
[ ] 100 bit/s	[x] 2400 bit/s	[ ] 2400 bit/s	[ ] 56000 bit/s
[ ] 200 bit/s	[x] 4800 bit/s	[ ] 4800 bit/s	[ ] 64000 bit/s
[ ] 300 bit/s	[x] 9600 bit/s	[ ] 9600 bit/	
[ ] 600 bit/s	[x] 19200 bit/s	[ ] 19200 bit/s	
[x] 1200 bit/s		[ ] 38400 bis/s	

3 Link Layer

(network-specific parameter)

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

Link transmission procedure

[x] Balanced transmission
[x] Unbalanced transmission

Frame length

__255___ Maximum length L (number of octets)

Address field of the link

[ ] Not present (balanced transmission only)
[x] One octet
[ ] Two octetes
[ ] Structured
[x] Unstructured

4 Application Layer

Transmission mode of application data

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

Common address of ASDU
(system-specific parameter)

[x] One octet [x] Two octets

Information object address
(system-specific parameter)

[ ] 1 octet [ ] Structured
[x] 2 octets [x] Unstructured
[x } 3 octets

Cause of transmission
(system-specific parameter)

[x] One octet [ ] Two octets (with originator address)

Selection od standard ASDUs

Process information in monitor direction
(station-specific parameter)

[x]	<1>	:= Single-point information	M_SP_NA_1
[x]	<2>	:= Single-point information with time tag	M_SP_TA_1
[x]	<3>	:= Double-point information	M_DP_NA_1
[x]	<4>	:= Double-point information with time tag	M_DP_TA_1
[x]	<5>	:= Step position information	M_ST_NA_1
[x]	<6>	:= Step position information with time tag	M_ST_TA_1
[x]	<7>	:= Bitstring of 32 bit	M_BO_NA_1
[x]	<8>	:= Bitstring of 32 bit with time tag	M_BO_TA_1
[x]	<9>	:= Measured value, normalized value	M_ME_NA_1
[x]	<10>	:= Measured value, normalized value with time tag	M_ME_TA_1
[x]	<11>	:= Measured value, scaled value	M_ME_NB_1
[x]	<12>	:= Measured value, scaled value with time tag	M_ME_TB_1
[x]	<13>	:= Measured value, short floating point value	M_ME_NC_1
[x]	<14>	:= Measured value, short floating point value with time tag	M_ME_TC_1
[x]	<15>	:= Integrated totals	M_IT_NA_1
[x]	<16>	:= Integrated totals with time tag	M_IN_TA_1
[ ]	<17>	:= Event of protection equipment with time tag	M_EP_TA_1
[ ]	<18>	:= Packed start events of protection equipment with time tag	M_EP_TB_1
[ ]	<19>	:= Packed output circuit info of protection equip. with time tag	M_EP_TC_1
[ ]	<20>	:= Packed single-point information with status change detection	M_PS_NA_1
[ ]	<21>	:= Measured value, normalized value without quality descriptor	M_ME_ND_1
[x]	<30>	:= Single-point information with time tag CP56Time2a	M_SP_TB_1
[x]	<31>	:= Double-point information with time tag CP56Time2a	M_DP_TB_1
[x]	<32>	:= Step position information with time tag CP56Time2a	M_ST_TB_1
[x]	<33>	:= Bitstring of 32 bit with time tag CP56Time2a	M_BO_TB_1
[x]	<34>	:= Measured value, normalized value with time tag CP56Time2a	M_ME_TD_1
[x]	<35>	:= Measured value, scaled value with time tag CP56Time2a	M_ME_TE_1
[x]	<36>	:= Measured, short floating point value with time tag CP56Time2a	M_ME_TF_1
[x]	<37>	:= Integrated totals with time tag CP56Time2a	M_IT_TB_1
[ ]	<38>	:= Event of protection equipment with time tag CP56Time2a	M_EP_TD_1
[ ]	<39>	:= Packed start events of prot. equip. with time tag CP56Time2a	M_EP_TE_1
[ ]	<40>	:= Packed output circuit info of prot. equip. w tim-tag CP56Time2a	M_EP_TF_1

Process information in control direction
(station-specific parameter)

[x]	<45>	:= Single command	C_SC_NA_1
[x]	<46>	:= Double command	C_DC_NA_1
[x]	<47>	:= Regulating step command	C_RC_NA_1
[x]	<48>	:= Set point command, normalized value	C_SE_NA_1
[x]	<49>	:= Set point command, scaled value	C_SE_NB_1
[ ]	<50>	:= Set point command, short floating point value	C_SE_NC_1
[x]	<51>	:= Bitstring of 32 bit	C_BO_NA_1

System information in monitor direction
(station-specific parameter)

[x]	<70>	:= End of initialization	M_EI_NA_1

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
[ ] <102>	:= Read command	C_RD_NA_1
[x] <103>	:= Clock syncrhronization command	C_CS_NA_1
[x] <104>	:= Test command	C_TS_NB_1
[x] <105>	:= Reset process command	C_RP_NC_1
[ ] <106>	:= Delay acquisition command	C_CD_NA_1

Parameter in control direction
(station-specific parameter)

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

File transfer
(station-specific parameter)

[ ] <120>	:= File ready	F_FR_NA_1
[ ] <121>	:= Section ready	F_SR_NA_1
[ ] <122>	:= Call directory, select file, call file call section	F_SC_NA_1
[ ] <123>	:= Last section, last segment	F_LS_NA_1
[ ] <124>	:= Ack file, ack section	F_AF_NA_1
[ ] <125>	:= Segment	F_SG_NA_1
[ ] <126>	:= Directory	F_DR_TA_1

5 Basic Application Functions

Station initialization
(station-specific parameter)

[x] Remote initialization

General interrogation
(system- or station-specific parameter)

[x] Global

[ ] Group 1	[ ] Group 7	[ ] Group 13
[ ] Group 2	[ ] Group 8	[ ] Group 14
[ ] Group 3	[ ] Group 9	[ ] Group 15
[ ] Group 4	[ ] Group 10	[ ] Group 16
[ ] Group 5	[ ] Group 11	
[ ] Group 6	[ ] Group 12	Addresses per group have to be defined

Clock synchronization
(station-specific parameter)

[x] Clock synchronization

Command transmission
(object-specific parameter)

[x] Direct command transmission
[x] Direct set point command transmission
[x] Select and execute command
[x] Select and execute set point command
[x] C_SE ACTTERM used
[x] No additional definition
[x] Short pulse duration (duration determined by a system parameter in the outstation)
[x] Long pulse duration (duration determined by a system parameter in the outstation)
[x] Persistent output

Transmission of integrated totals
(station- or object-specific parameter)

[x] Counter request
[x] Counter freeze without reset
[ ] Counter freeze with reset
[ ] Counter reset
[x] General request counter
[ ] Request counter group 1
[ ] Request counter group 2
[ ] Request counter group 3
[ ] Request counter group 4

Addresses per group have to be defined

Parameter loading
(object-specific parameter)

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

Parameter activation
(object-specific parameter)

[ ] Act/deact of persistent cyclic or periodic transmission of the addressed object

File transfer
(station-specific parameter)

[ ] File transfer in monitor direction
[ ] File transfer in control direction