

**IEC60870-5-101 Slave Protocol Details
for
KALKI Protocol Gateway/GatewayLite**

Product User Guide

Version – 1.0

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1. Introduction

The purpose of this document is to describe the functionalities of IEC101 Slave protocol implemented in the Kalki Protocol Gateway / Kalki Substation GatewayLite. This will contain details of interoperability, configuration details & mapping of the data from some of the other master protocols available in Kalki Protocol Gateway.

2. Interoperability

This companion standard presents sets of parameters and alternatives from which subsets have to be selected to implement particular telecontrol systems. Certain parameter values, such as the number of octets in the COMMON 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 command and in 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 selected parameters are 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

2.1 System or device

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

2.2 Network configuration

- Point-to-point
- Multiple point-to-point
- Multipoint-party line
- Multipoint-star

2.3 Physical layer

Transmission speed (control direction)

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

Transmission speed (monitor direction)

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

2.4 Link layer

Frame format FT 1.2, single character 1 and the fixed time out interval are used exclusively in this companion standard.

Link transmission procedure

- Balanced transmission
- Unbalanced transmission

Address field of link

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

Frame length

Maximum length L (number of octets)

2.5 Application layer

2.5.1 Transmission mode for application data

Mode 1 (Least significant octet first), as defined in clause 4.10 of IEC 870-5-4, is used exclusively in this companion standard.

2.5.2 Common address of ASDU

- One octet Two octets

2.5.3 Information object address

- One octet structured
 Two octets unstructured
 Three octets

2.5.4 Cause of transmission

- One octet Two octets (with originator address)

2.5.6 Selection of standard ASDUs

2.5.6.1 Process information in monitor direction

- | | |
|--|-----------|
| <input checked="" type="checkbox"/> <1> := Single-point information | M_SP_NA_1 |
| <input checked="" 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 checked="" 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 checked="" 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 checked="" 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 checked="" 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 checked="" 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 checked="" 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 checked="" type="checkbox"/> <16> := Integrated totals with time tag	M_IT_TA_1
<input checked="" type="checkbox"/> <17> := Event of protection equipment with time tag	M_EP_TA_1
<input checked="" type="checkbox"/> <18> := Packed start events of protection equipment with time tag	M_EP_TB_1
<input checked="" type="checkbox"/> <19> := Packed output circuit information of protection equipment with time tag	M_EP_TC_1
<input checked="" type="checkbox"/> <20> := Packed single-point information with status change detection	M_PS_NA_1
<input checked="" 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

2.5.6.2 Process information in control direction

<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

2.5.6.3 System information in monitor direction

<input checked="" type="checkbox"/> <70> := End of initialization	M_EI_NA_1
---	-----------

2.5.6.4 System information in control direction

<input checked="" type="checkbox"/> <100> := Interrogation command	C_IC_NA_1
<input checked="" type="checkbox"/> <101> := Counter interrogation command	C_CI_NA_1
<input checked="" type="checkbox"/> <102> := Read command	C_RD_NA_1
<input checked="" type="checkbox"/> <103> := Clock synchronization command	C_CS_NA_1

- | | |
|--|-----------|
| <input checked="" type="checkbox"/> <104> := Test command | C_TS_NB_1 |
| <input checked="" type="checkbox"/> <105> := Reset process command | C_RP_NC_1 |
| <input checked="" type="checkbox"/> <106> := Delay acquisition command | C_CD_NA_1 |

2.5.6.5. Parameter in control direction

- | | |
|---|-----------|
| <input type="checkbox"/> <110> := Parameter of measured value, normalized value | P_ME_NA_1 |
| <input type="checkbox"/> <111> := Parameter of measured value, scaled value | P_ME_NB_1 |
| <input type="checkbox"/> <112> := Parameter of measured value, short floating point value | P_ME_NC_1 |
| <input type="checkbox"/> <113> := Parameter activation | P_AC_NA_1 |

2.5.6.6 File Transfer

- | | |
|--|-----------|
| <input type="checkbox"/> <120> := File ready | F_FR_NA_1 |
| <input type="checkbox"/> <121> := Section ready | F_SR_NA_1 |
| <input type="checkbox"/> <122> := Call directory, select file, call file, call section | F_SC_NA_1 |
| <input type="checkbox"/> <123> := Last section, last segment | F_LS_NA_1 |
| <input type="checkbox"/> <124> := Ack file, ack section | F_AF_NA_1 |
| <input type="checkbox"/> <125> := Segment | F_SG_NA_1 |
| <input type="checkbox"/> <126> := Directory | F_DR_TA_1 |

2.5.7. Type identifier and cause of transmission assignments

Shaded boxes are not required.

Black boxes are not permitted in this companion standard

Blank: functions or ASDU not used.

Mark Type Identification/Cause of transmission combinations:

'X' if only used in the standard direction

'R' if only used in the reverse direction

'B' if used in both directions

Type identification		Cause of transmission																		
		periodic, cyclic	background scan	spontaneous	initialized	request or requested	activation	activation confirmation	deactivation	deactivation confirmation	activation termination	return info caused by a remote cmd	return info caused by a local cmd	file transfer	interrogated by group <number>	request by group <id> counter request	unknown type identification	unknown cause of transmission	unknown common address of ASDU	unknown information object address
		1	2	3	4	5	6	7	8	9	10	11	12	13	20 to 36	37 to 41	44	45	46	47
<1>	M_SP_NA_1					X									X					
<2>	M_SP_TA_1			X								X	X							
<3>	M_DP_NA_1					X									X					
<4>	M_DP_TA_1			X								X	X							
<5>	M_ST_NA_1					X									X					
<6>	M_ST_TA_1			X								X	X							
<7>	M_BO_NA_1					X									X					
<8>	M_BO_TA_1			X																
<9>	M_ME_NA_1	X				X									X					
<10>	M_ME_TA_1			X																
<11>	M_ME_NB_1	X				X									X					
<12>	M_ME_TB_1			X																
<13>	M_ME_NC_1	X				X									X					
<14>	M_ME_TC_1			X																
<15>	M_IT_NA_1															X				
<16>	M_IT_TA_1			X																
<17>	M_EP_TA_1																			

Type identification		Cause of transmission																			
		periodic, cyclic	background scan	spontaneous	initialized	request or requested	activation	activation confirmation	deactivation	deactivation confirmation	activation termination	return info caused by a remote cmd	return info caused by a local cmd	file transfer	interrogated by group <number>	request by group <n> counter request	unknown type identification	unknown cause of transmission	unknown common address of ASDU	unknown information object address	
		1	2	3	4	5	6	7	8	9	10	11	12	13	20 to 36	37 to 41	44	45	46	47	
<18>	M_EP_TB_1																				
<19>	M_EP_TC_1																				
<20>	M_PS_NA_1																				
<21>	M_ME_ND_1																				
<30>	M_SP_TB_1			X								X	X								
<31>	M_DP_TB_1			X								X	X								
<32>	M_ST_TB_1			X								X	X								
<33>	M_BO_TB_1			X																	
<34>	M_ME_TD_1			X																	
<35>	M_ME_TE_1			X																	
<36>	M_ME_TF_1			X																	
<37>	M_IT_TB_1			X												X					
<38>	M_EP_TD_1																				
<39>	M_EP_TE_1																				
<40>	M_EP_TF_1																				
<45>	C_SC_NA_1						X	X	X	X	X										
<46>	C_DC_NA_1						X	X	X	X	X										
<47>	C_RC_NA_1						X	X	X	X	X										
<48>	C_SE_NA_1						X	X	X	X	X										
<49>	C_SE_NB_1						X	X	X	X	X										
<50>	C_SE_NC_1						X	X	X	X	X										
<51>	C_BO_NA_1						X	X			X										
<58>	C_SC_TA_1																				
<59>	C_DC_TA_1																				
<60>	C_RC_TA_1																				
<61>	C_SE_TA_1																				
<62>	C_SE_TB_1																				
<63>	C_SE_TC_1																				

Type identification		Cause of transmission																		
		periodic, cyclic	background scan	spontaneous	initialized	request or requested	activation	activation confirmation	deactivation	deactivation confirmation	activation termination	return info caused by a remote cmd	return info caused by a local cmd	file transfer	interrogated by group <number>	request by group <n> counter request	unknown type identification	unknown cause of transmission	unknown common address of ASDU	unknown information object address
		1	2	3	4	5	6	7	8	9	10	11	12	13	20 to 36	37 to 41	44	45	46	47
<64>	C_BO_TA_1																			
<70>	M_EI_NA_1*)				X															
<100>	C_IC_NA_1						X	X	X	X	X									
<101>	C_CI_NA_1						X	X			X									
<102>	C_RD_NA_1					X														
<103>	C_CS_NA_1			X			X	X												
<104>	C_TS_NA_1						X	X												
<105>	C_RP_NA_1						X	X												
<106>	C_CD_NA_1						X	X												
<107>	C_TS_TA_1						X	X												
<110>	P_ME_NA_1																			
<111>	P_ME_NB_1																			
<112>	P_ME_NC_1																			
<113>	P_AC_NA_1																			
<120>	F_FR_NA_1																			
<121>	F_SR_NA_1																			
<122>	F_SC_NA_1																			
<123>	F_LS_NA_1																			
<124>	F_AF_NA_1																			
<125>	F_SG_NA_1																			
<126>	F_DR_TA_1*)																			
* Blank or X only																				

2.6. Basic application functions

2.6.1. Station initialization

- Remote initialization

2.6.2. Cyclic data transmission

- Cyclic Data transmission

2.6.3. Read procedure

- Read Procedure

2.6.4. Spontaneous transmission

- Spontaneous transmission

2.6.5. Double transmission of information objects with cause of transmission spontaneous

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

2.6.6. Station interrogation

- | | | |
|---|--|--|
| <input checked="" type="checkbox"/> global | | |
| <input checked="" type="checkbox"/> group 1 | <input checked="" type="checkbox"/> group 7 | <input checked="" type="checkbox"/> 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 | Addresses per group have to be defined |

2.6.7. Clock synchronization

- Clock synchronization

2.6.8. Command transmission

- | | |
|---|--|
| <input checked="" type="checkbox"/> Direct command transmission | <input checked="" type="checkbox"/> Select and execute command |
| <input checked="" type="checkbox"/> Direct set point command transmission | <input checked="" type="checkbox"/> Select and execute set point command |
| <input checked="" type="checkbox"/> No additional definition | <input checked="" type="checkbox"/> C_SE_ACTTERM used |
| <input type="checkbox"/> Short pulse duration (duration determined by a system parameter in the outstation) | |
| <input type="checkbox"/> Long pulse duration (duration determined by a system parameter in the outstation) | |
| <input checked="" type="checkbox"/> Persistent output | |

2.6.9. Transmission of integrated totals

- | | |
|--|---|
| <input checked="" type="checkbox"/> Counter request | <input checked="" type="checkbox"/> General request counter |
| <input checked="" type="checkbox"/> Counter freeze without reset | <input checked="" type="checkbox"/> Request counter group 1 |
| <input checked="" type="checkbox"/> Counter freeze with reset | <input checked="" type="checkbox"/> Request counter group 2 |
| <input checked="" type="checkbox"/> Counter reset | <input checked="" type="checkbox"/> Request counter group 3 |
| | <input checked="" type="checkbox"/> Request counter group 4 |

Addresses per group have to be defined

2.6.10. Parameter loading

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

2.6.11. Parameter activation

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

2.6.12. File transfer

File transfer in monitor direction

- File transfer in monitor direction
- File transfer in control direction

3. Configuration Details

Configuration of KSGl is done through the configuration utility named “EasyConnect”. The IEC101 slave configuration is divided into 3 parts – channel configuration, node configuration & configuration of mapping for IEC101 slave.

3.1. Channel Configurations

Channel configuration involves configuration of the following parameters.

3.1.1. ChannelNumber

Description: Indicates the Unique Identification Number For Channel

Default: Depends up on the order of creation

Range: 1-4,8,16 (Depends upon converter model)

3.1.2. Channel State

Description: Indicates Whether the Channel is active or not.

Default: 1

Range: 0 or 1.

3.1.3. Channel Mode

Description: Indicates the type of Link

Default: Unbalanced

Range: Unbalanced, Balanced.

3.1.4. First Char Wait

Description: Indicates the time delay between receiving a character and transmitting the next character

Default: 1 millisecond

Range: 0-100 milliseconds

3.1.5. Channel Type

Description: Indicates the type of Channel

Default: RS232

Range: RS232/RS485

3.1.6. Baud

Description: Indicates the baud Rate

Default: 9600

Range: 600-19200

3.1.7. Data Bits

Description: Indicates the number of Data Bits

Default: 8

Range: 7,8

3.1.8. Stop Bits

Description: Indicates the number of Stop Bits

Default: 1

Range: 1,2

3.1.9. Parity

Description: Indicates the parity Type

Default: Even

Range: Even, Odd, None

3.1.10. Port

Description: Indicates the name of the Port

Default: Com1.

Range: Com1-16.

3.1.11. Flow Control

Description: Indicates the type of flow control.

Default: None

Range: None, Hardware, Software

3.1.12. CTS Delay

Description: Indicates the delay between rising of CTS signal by the modem and starting of a new transmission

Default: 30

Range: 0-100milliseconds

3.1.13. Post Transmission Delay

Description: Indicates the delay between releasing of RTS and end of a transmission.

Default: 0 milliseconds

Range: 0-100 milliseconds

3.1.14. Time Out

Description: Indicates the application layer incremental timeout in milliseconds

Default: 30000 milliseconds

Range: 0-100000 milliseconds

3.1.15. Frame Timeout

Description: Indicates the maximum time to allow receiving an entire frame.

Default: 15000 milliseconds

Range: 0-50000 milliseconds

3.1.16. Confirm Timeout

Description: Maximum time to wait for a link layer confirmation.

Default: 2000 milliseconds

Range: 0-50000 milliseconds

3.1.17. Retries

Description: Indicates the maximum number of retries.

Default: 3

Range: 0-10

3.1.18. Link Confirm Mode

Description: Specifies when to ask for link layer confirmations.

Default: Always.

Range: Never, Always

3.1.19. Single Char Acknowledgement

Description: Enable/Disable Single Character Acknowledgement

Default: Disable.

Range: Enable/Disable.

3.1.20. Single Char Response

Description: Enable/Disable Single Character Response.

Default: Disable.

Range: Enable/Disable.

3.1.21. Test Frame Period

Description: Indicates the time between test frames when a balanced link Mode is selected.

Default: 0 seconds

Range: 0-1800 seconds

3.1.22. Link Address Size

Description: Indicates the size of link address. Link address is specified under node configuration depending on this attribute.

Default: 1

Range: 1,2

3.2. Node Configurations

3.2.1. Node Number

Description: Indicates the Unique Identification Number For Node

Default: Depends up on the order of creation.

Range: 1-64,128,256(Depends upon converter model).

3.2.2. Node State

Description: Indicates whether Node is active or not.

Default: 1

Range: 0 or 1.

3.2.3. Link Address

Description: Indicates the link address specified in IEC60870-5-101. The size of the link address comes under channel configuration parameters.

Default: 1

Range: 0-255 or 0-65535

3.2.4. COT Size

Description: Indicates the Number of Octets for Cause of Transmission Octets.

Default: 2 bytes

Range: 1 byte or 2 bytes.

3.2.5. IOA Size

Description: This indicates the size of information object address.

Default: 2

Range: 1,2,3

3.2.6. ASDU Size

Description: This indicates the size of ASDU in octets as specified in IEC60870-5-101.

Default: 2

Range: 1,2

3.2.7. ASDU Address

Description: This indicates the value of ASDU address specified in IEC60870-5-101.

Default: 1

Range: 0-255 or 0-65535 (Depends on the number of Octets).

3.2.8. Cyclic Interval

Description: Indicates the Period for cyclic data transmission.

- When it is '0' the cyclic transmission will be disabled.
- In cyclic transmission the data that is configured as class-2 will only get updated.

Default: 10 seconds

Range: 0-3600 seconds

3.2.9. Clock Valid

Description: Time to allow between clock syncs before setting clock invalid bit.

Default: 10 minutes

Range: 0-1440 minutes

3.2.10. Select Timeout

Description: Indicates maximum allowed delay between a select and the corresponding execute

Default: 2 seconds

Range: 1-180 seconds

3.2.11. Number of Single Point Events

Description: Indicates the Max count of Events stored for single point events.

Default: 100

Range: 0-2000

3.2.12. Event storage Mode

Description: There are two event storage modes – Sequence Of Events and Most Recent.

- All Events are stored in SOE Mode.
- In Most Recent Mode any latest event over writes an already stored event of a particular point.

Default: Sequence of Events.

Range: Sequence of Events /Most Recent

3.2.13. Number of Double Point Events

Description: Indicates the Max count of Events stored for double point events.

Default: 100

*Range:*0-2000.

3.2.14. Number of Step Position Events

Description: Indicates the Max count of Events to be stored for step position events.

Default: 10

Range: 0-200.

3.2.15. Number of Analog Value Events

Description: Indicates the Max count of Events to be stored for analog value events.

Default: 100.

Range: 0-2000

3.2.16. Event Time Stamp

Description: There are two types of time stamp formats - 24 Bit Time Stamp and 56 Bit Time Stamp.

- 24 bit time stamp is in hh:mm:ss and Milliseconds format.
- 56 Bit Time Stamp is in yy:mm::dd, hh:mm:ss and Milliseconds format.

Default: 56 Bit Time Stamp

Range: 24 Bit Time Stamp / 56 Bit Time Stamp

3.2.17. CSE Activation Termination

Description: Indicates whether activation termination is required on CSE commands.

Default: Enable

Range: Enable / Disable

3.2.18. CMD Activation Termination

Description: Indicates whether activation termination is required for all other Commands.

Default: Enable.

Range: Enable / Disable.

3.3. Mapping Attributes

3.3.1. ASDU Types

You can configure the different ASDU types of IEC101 here. The following are major ASDU types available for configuration.

3.3.1.1. Single Indications

When you configure this point you will get the following ASDU types of IEC101.

- M_SP_NA_1 (ASDU type 1) → the data will be updated in this format when you give general interrogation.
- M_SP_TA_1 (ASDU type 2) → the data will be updated in this format when the data is reported spontaneously & Event time stamp attribute is configured as 24 bits.
- M_SP_TB_1 (ASDU type 30) → the data will be updated in this format when the data is reported spontaneously & Event time stamp attribute is configured as 56 bits.

3.3.1.2. Double Indications

When you configure this point you will get the following ASDU types of IEC101.

- M_DP_NA_1 (ASDU type 3) → the data will be updated in this format when you give general interrogation.
- M_DP_TA_1 (ASDU type 4) → the data will be updated in this format when the data is reported spontaneously & Event time stamp attribute is configured as 24 bits.
- M_DP_TB_1 (ASDU type 31) → the data will be updated in this format when the data is reported spontaneously & Event time stamp attribute is configured as 56 bits.

3.3.1.3. Step position information

When you configure this point you will get the following ASDU types of IEC101.

M_ST_NA_1 (ASDU type 5) → the data will be updated in this format when you give general interrogation.

M_ST_TA_1 (ASDU type 6) → the data will be updated in this format when the data is reported spontaneously & Event time stamp attribute is configured as 24 bits.

M_ST_TB_1 (ASDU type 32) → the data will be updated in this format when the data is reported spontaneously & Event time stamp attribute is configured as 56 bits.

3.3.1.4. Measured Value (N)

When you configure this point you will get the following ASDU types of IEC101.

M_ME_NA_1 (ASDU type 9) → the data will be updated in this format when you give general interrogation.

M_ME_TA_1 (ASDU type 10) → the data will be updated in this format when the data is reported spontaneously & Event time stamp attribute is configured as 24 bits.

M_ME_TD_1 (ASDU type 34) → the data will be updated in this format when the data is reported spontaneously & Event time stamp attribute is configured as 56 bits.

3.3.1.4. Measured Value (S)

When you configure this point you will get the following ASDU types of IEC101.

M_ME_NB_1 (ASDU type 11) → the data will be updated in this format when you give general interrogation.

M_ME_TB_1 (ASDU type 12) → the data will be updated in this format when the data is reported spontaneously & Event time stamp attribute is configured as 24 bits.

M_ME_TE_1 (ASDU type 35) → the data will be updated in this format when the data is reported spontaneously & Event time stamp attribute is configured as 56 bits.

3.3.1.5. Measured Value (F)

When you configure this point you will get the following ASDU types of IEC101.

M_ME_NC_1 (ASDU type 13) → the data will be updated in this format when you give general interrogation.

M_ME_TC_1 (ASDU type 14) → the data will be updated in this format when the data is reported spontaneously & Event time stamp attribute is configured as 24 bits.

M_ME_TF_1 (ASDU type 36) → the data will be updated in this format when the data is reported spontaneously & Event time stamp attribute is configured as 56 bits.

3.3.1.6. Integrated Totals

When you configure this point you will get the following ASDU types of IEC101.

M_IT_NA_1 (ASDU type 15) → the data will be updated in this format when you give general interrogation.

M_IT_TA_1 (ASDU type 16) → the data will be updated in this format when the data is reported spontaneously & Event time stamp attribute is configured as 24 bits.

M_IT_TB_1 (ASDU type 37) → the data will be updated in this format when the data is reported spontaneously & Event time stamp attribute is configured as 56 bits.

3.3.1.7. Bitstring of 32 bit

When you configure this point you will get the following ASDU types of IEC101.

M_BO_NA_1 (ASDU type 7) → the data will be updated in this format when you give general interrogation.

M_BO_TA_1 (ASDU type 8) → the data will be updated in this format when the data is reported spontaneously & Event time stamp attribute is configured as 24 bits.

M_BO_TB_1 (ASDU type 33) → the data will be updated in this format when the data is reported spontaneously & Event time stamp attribute is configured as 56 bits.

3.3.1.8. Single Commands

The IEC101 slave supports C_SC_NA_1 (ASDU type 45) command. It will support SBO & direct operate command variations.

3.3.1.9. Double Commands

The IEC101 slave supports C_DC_NA_1 (ASDU type 46) command. It will support SBO & direct operate command variations.

3.3.1.10. Regulating step Commands

The IEC101 slave supports C_RC_NA_1 (ASDU type 47) command. It will support SBO & direct operate command variations.

3.3.1.11. Setpoint Command (N)

The IEC101 slave supports C_SE_NA_1 (ASDU type 48) command. It will support SBO & direct operate command variations.

3.3.1.12. Setpoint Command (S)

The IEC101 slave supports C_SE_NB_1 (ASDU type 49) command. It will support SBO & direct operate command variations.

3.3.1.13. Setpoint Command (F)

The IEC101 slave supports C_SE_NC_1 (ASDU type 50) command. It will support SBO & direct operate command variations.

3.3.1.14. Setpoint Command (B)

The IEC101 slave supports C_BO_NA_1 (ASDU type 51) command. It will support SBO & direct operate command variations.

3.3.2. Information Object Address

This specifies the Information object address of the data point of IEC101 slave to which the master data is mapped.

3.3.3. No of Points

This specifies the total number of points. Maximum number of points can be no. of points of master profile row to which the slave row is mapped.

3.3.4. Group Mask

This specifies the group mask (0 → 16) for the specific data points. ‘0’ indicates that the specific point will be updated in the master by general interrogation only. The other values indicate the specific point can be updated in the master by general interrogation and specific group interrogation.

3.3.5. Class Mask

We can classify the points into different classes (class-1 & class-2) using this functionality. If we define the points as class-1 it will have high priority and will get updated spontaneously. If the specific point is class-2, it can be updated on a cyclic basis.

4. Mapping Details from other protocols: -

This section gives detailed idea of the data types in other master protocols, which can be mapped, to specific IEC104 slave types.

IEC101 slave Types	14-M1	14-M2	14-M3	14-M4 14-M5 14-M6	14-M7	14-M8	14-C1	14-C2	14-C3	14-C4 14-C5 14-C6	14-C7
IEC101/ 104 master types	14-M1	14-M2	14-M3	14-M4 14-M5 14-M6	14-M7	14-M8	14-C1	14-C2	14-C3	14-C4 14-C5 14-C6	14-C7
IEC103 master types	103-T1 103-T2	103-T1 103-T2	103-T3 103-T4 103-T9	103-T3 103-T4 103-T9	103-T3 103-T4 103-T9	103-T3 103-T4 103-T9	103-T20	103-T20	103-T20	--	--
Modbus master types	MB-T1 MB-T2	MB-T3 MB-T4	MB-T5 MB-T6	MB-T5 MB-T6	MB-T5 MB-T6	MB-T5 MB-T6	MB-T7 MB-T8	MB-T9 MB-T10	MB-T7 MB-T8 MB-T9 MB-T10	MB-T11 MB-T12	MB-T11 MB-T12
DNP3.0 master types	DN-T1 DN-T3	DN-T1 DN-T3	DN-T2 DN-T4	DN-T2 DN-T4	DN-T2 DN-T4	DN-T2 DN-T4	DN-T5	DN-T5	DN-T5	DN-T6	DN-T6
SPA master types	SP-T1	SP-T2	SP-T3	SP-T3	SP-T4	SP-T3	SP-T5	SP-T6	SP-T5 SP-T6	SP-T7	SP-T7
Courier master types	CR-T1	CR-T2	CR-T3	CR-T3	CR-T3	CR-T3	CR-T4	CR-T5	CR-T4 CR-T5	CR-T6	CR-T6

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IEC101/104 Type Details	
IEC101/104 types	Type Details
14_M1	Single Indication
14_M2	Double Indication
14_M3	Step position information
14_M4	Measured value, normalized value
14_M5	Measured value, Scaled value
14_M6	Measured value, short floating point value
14_M7	Integrated totals
14_M8	Bitstring of 32 bit
14_C1	Single command
14_C2	Double command
14_C3	Regulating step command
14_C4	Set point command, normalised value
14_C5	Set point command, Scaled value
14_C6	Set point command, short floating point value
14_C7	Set point command, Bitstring of 32 bit

Modbus Type Details		
Modbus types	Type Details	Supported Formats
MB-T1	Single Indication, Read Coil status	NA
MB-T2	Single Indication, Read Discrete inputs	NA
MB-T3	Double Indication, Read Coil status	NA
MB-T4	Double Indication, Read Discrete inputs	NA
MB-T5	Analog I/P, Read Input Registers	NA
MB-T6	Analog I/P, Read Holding Registers	Signed Single Register Unsigned Single Register Signed 32 bit Register (lsw – msw) Signed 32 bit Register (msw – lsw) Unsigned 32 bit Register (lsw – msw) Unsigned 32 bit Register (msw – lsw) Float (lsw – msw) Float (msw – lsw) Double
MB-T7	Single Command, Force single coil	NA
MB-T8	Single Command, Force multiple coils	NA
MB-T9	Double Command, Force single coil	NA
MB-T10	Double Command, Force multiple coils	NA
MB-T11	Analog O/P, Force single register	Signed Single Register Unsigned Single Register
MB-T12	Analog O/P, Force multiple registers	Signed Single Register Unsigned Single Register Signed 32 bit Register (lsw – msw) Signed 32 bit Register (msw – lsw) Unsigned 32 bit Register (lsw – msw) Unsigned 32 bit Register (msw – lsw) Float (lsw – msw) Float (msw – lsw)

IEC103 Type Details

IEC103 types	Type Details
103-T1	Time Tagged Message (103 TYPE = 1)
103-T2	Time Tagged Message With Relative Time(103 TYPE = 2)
103-T3	Measurands I (103 TYPE = 3)
103-T4	Time Tagged Measurands with Relative Time. (103 TYPE = 4)
103-T5	Identification (103 TYPE = 5)
103-T9	Measurands II (103 TYPE = 9)
103-T20	Write general commands (103 TYPE = 20)
103-T21	Directory

DNP3.0 Type Details	
DNP3.0 types	Type Details
DN-T1	Binary Input
DN-T2	Analog Input
DN-T3	Binary Output Status
DN-T4	Analog Output Status
DN-T5	Binary Output Command
DN-T6	Analog Output Command

SPA Type Details				
SPA types	Type Details	Supported Data Types	Supported Data Formats	Update Methods
SP-T1	Single Indications	I, O, S, V, M, C	Bits, Hex, Real, Long Int	Polling , Events , polling & events
SP-T2	Double Indications	I, O, S, V, M, C	Bits, Hex, Real, Long Int	Polling , Events , polling & events
SP-T3	Analog Inputs	I, O, S, V, M, C	Bits, Hex, Real, Long Int	Polling
SP-T4	Pulse Counters	I, O, S, V, M, C	Bits, Hex, Real, Long Int	Polling
SP-T5	Object Commands	I, O, S, V, M, C	Bits, Hex, Real, Long Int	NA
SP-T6	Double Commands	I, O, S, V, M, C	Bits, Hex, Real, Long Int	NA
SP-T7	Analog Outputs	I, O, S, V, M, C	Bits, Hex, Real, Long Int	NA

Courier Type Details			
Courier types	Type Details	Supported Data Formats	Update Methods
CR-T1	Single Indications	NA	Polling , Events , polling & events
CR-T2	Double Indications	NA	Polling , Events , polling & events
CR-T3	Analog Inputs	UnsignedInteger (1Byte) – 24H UnsignedInteger (2Bytes) – 25H UnsignedInteger (4Bytes) – 26H SignedInteger (1Byte) – 28H SignedInteger (2Bytes) – 29H SignedInteger (4Bytes) – 2AH CourierNumber (4Bytes) – 2CH Extended Courier (6Bytes) --30 H IEEE floating Format (4Bytes)--34 H	Polling
CR-T4	Single Commands	Indexed String Courier Number	NA
CR-T5	Double Commands	Indexed String Courier Number Two bits setting command	NA
CR-T6	Analog Outputs	UnsignedInteger (1Byte) – 24H UnsignedInteger (2Bytes) – 25H UnsignedInteger (4Bytes) – 26H SignedInteger (1Byte) – 28H SignedInteger (2Bytes) – 29H SignedInteger (4Bytes) – 2AH CourierNumber (4Bytes) – 2CH Extended Courier (6Bytes) --30 H IEEE floating Format (4Bytes)--34 H	NA