14.3 IEC 60870-5-101 Slave

Configuring datapoints (slave)

To use IEC 60870-5-101 Slave in WCC Lite, it has to be configured via an Excel configuration. This configuration contains two Excel sheets where parameters have to be filled in *Devices* and *Signals.*

IEC 60870-5-101 slave parameters for Devices tab

Parameter	Type	Description	Required	Default value (when not specified)	Range	
					Min	Max
name	string	User-friendly name for a device	Yes			
description	string	Description of a device	No			
device_alias	string	Alphanumeric string to identify a device	Yes			
enable	boolean	Enabling/disabling of a device	No	1	0	1
protocol	string	Protocol to be used	Yes		IEC 60870-5-101 slave	
device	string	Communication port	Yes		PORT1	PORT2
baudrate	integer	Communication speed, baud/s	No	9600	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	
databits	integer	Data bit count for communication	No	8	6	9
stopbits	integer	Stop bit count for communication	No	1	1	2
parity	string	Communication parity option	No	none	none, even, odd	
flowcontrol	string	Number of requests, before link is considered lost (device status signals are changed) and reconnect attempt will be issued	No	none	none	
link_address	integer	Destination address when in transmit and source address when broadcasting	Yes		0	65535
link_size	integer	Link address size in bytes	No	1	1	2
asdu_size	integer	Common address size in bytes	No	1	1	3

				Default value	Range	
					Min	Max
ioa_size	integer	Information object address (IOA) size in bytes	No	2	1	3
cot_size	integer	Cause of transmission (COT) size in bytes	No	1	1	2
time_sync	boolean	Allow time synchronization, 1 to enable and 0 to disable	No	0	0	1
message_size	integer	Maximum length of a message	Yes		0	255
cache_size	integer	Maximum number of events to store in a buffer	No	100	0	1000
respond_delay	integer	Time in microseconds to wait before sending responses	Yes		0	1000000
single_byte_ack	boolean	Use single character acknowledge, 1 to enable and 0 to disable	No	0	0	1
keep_alive_timeout	integer	Time interval in seconds before serial connection is considered offline	No	60		

keep_alive_timeout timer is used for connection tracker to display protocol status. This parameter has no effect on protocol functionality and is only used to track it's status in connection tracker.

IEC 60870-5-101 slave parameters for Signals tab

Parameter	Type	Description	Required	Default value (when not specified)	Range	
					Min	Max
signal_name	string	User-friendly signal name	Yes			
device_alias	string	Alphanumeric string to identify a device	Yes			
signal_alias	string	Unique alphanumeric name of the signal to be Yes used	Yes			
source_device_alias	string	device_alias of a source device	For commands			
source_signal_alias	string	signal_alias of a source signal	For commands			
enable	boolean	Enabling/disabling of an individual signal	No	1	0	1
log	integer	Allow signal to be logged. If **log is 0 signal** will not be logged. If **log is more than 0** signal will be logged	No	0		
gi	boolean	Including/excluding (1 or 0) signal from General Interrogation	No	0	0	1

common_address	integer	Address of a destination device	Yes			
info_address	integer	Information object address	Yes			
data_type	integer	ASDU type identificator	Yes			

IEC 608705101 has an additional signal which can be configured to show communication status. It is used to indicate if the slave device has disconnected from the master (WCC Lite). To configure such a signal, two columns should be filled with particular values. To a newly created additional signal, one should make **job_todo** equal to device_status and **tag_job_todo** equal to communication_status.

Debugging an IEC 60870-5-101 slave application

If the configuration for IEC 60870-5-101 devices is set up, the handler for the protocol will start automatically. If the configuration is missing or contains errors, the protocol will not start. It is done intentionally to decrease unnecessary memory usage.

If IEC 60870-5-101 does not work properly (e.g. no communication between devices, data is corrupted, etc.), a user can launch a debug session from the command-line interface and find out why the link is not functioning properly. To launch a debugging session, a user should stop the *iec101-slave* process and run the *iec101-slave* command with respective flags as shown in the table below.

Procedure for IEC 60870-5-101 slave service debugging:

- **Step 1**: Service must be stopped by entering the following command into the wcclite: **/etc/init.d/iec101-slave stop**
- **Step 2**: After service is stopped it must be started with the preferred configuration file (JSON files found in /etc/ folder) and a debug level 7:**iec101-slave-c /etc/iec101-slave/iec101slave.json -d7** Additional output forming options described here: Command line arguments.
- **Step 3**: Once the problem is diagnosed normal operations can be resumed with the following command: **/etc/init.d/iec101-slave start**

IEC 60870-5-101 command line debugging options

```
-h [ —help ] Display help information
-V [ —version ] Show version
-d<debug level> Set debugging level
-c [ —config ] Config path
-r [ —raw ] Show raw telegram data
-f [ —frame ] Show frame data
-R [ —readyfile ] Ready notification file
```