14.6 IEC 60870-5-104 Slave

IEC 60870-5-104 Slave is designed not to lose data acquired from Master protocols. The data that arrives from Master protocols is stored in the cache. This data is checked every second to manage further data sending. The data that leaves IEC 60870-5-104 Slave has output caches. They’re built to provide switching between multiple sessions (redundant SCADA). If a new connection arrives, the old one is dropped, but data, that is stored in a cache, not sent and not confirmed by SCADA is transferred to the new connection.

Configuring IEC 104 Slave datapoints

To use IEC 60870-5-104 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 60870-5-104 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 60870-5-104 slave	
asdu_size	integer	Common address size in bytes	No	2	1	2
time_sync	boolean	Enable/disable (1 or 0) time synchronization	Yes			
port	integer	TCP port	No	2404	0	65535
ioa_size	integer	Information object address (IOA) size in bytes	No	3	1	3
swt	integer	Send window (SWT)	No	12		
rwt	integer	Receive window (RWT)	No	8		
cot_size	integer	Cause of transmission (COT) size in bytes	No	2	1	2
host	string	Space-separated remote host IP addresses (ipv4)	Yes			
bind_address	string	Bind to local IP address (ipv4)	No	0.0.0.0		
t1	integer	Acknowledge timeout t1 (sec)	No	15	1	255
t2	integer	Connection ACKRSN clock t2 (sec), t2 should be less than t1	No	10	1	254

t3	integer	Connection TESTFR clock t3 (sec)	No	20	1	172800
message_size	boolean	The maximum length of a message	Yes		0	255
cache_size	integer	Amount of data to be cached	Yes		0	1000
tls	boolean	Enable/disable the use of TLS	No	0	0	1
tls_local_certificate	string	Local certificate for TLS connection	Yes (for TLS)			
tls_peer_certificate	string	Certificate authority file for TLS connection	No			
tls_private_key	string	A file consisting of the private key for TLS connection	No			
command_timeout_ms	integer	Time to execute a command before responding negatively.	No	30000	0	
command_age_ms	integer	The amount of time shift allowed for the command to still be executed.	No	0	0	

IEC 60870-5-104 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	0	1
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 id.	Yes			

select_ms	integer	Time limit in milliseconds for command execution. Command select has to be performed before execution if this parameter is specified. Direct command execution can be performed only if this field is left empty or set to zero.	No	0		

Debugging an IEC 60870-5-104 Slave application

If the configuration for IEC 60870-5-104 devices is set up, the handler for the protocol will start automatically. If a configuration is missing or contains errors, the protocol will not start. It is done intentionally to decrease unnecessary memory usage.

If IEC 60870-5-104 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 or use WCC Utility to do that.

To launch a debugging session, a user should stop the *iec104-slave* process and run the *iec104-slave* command with respective flags.

- Step 1: Service must be stopped by entering the following command into the wcclite: **/etc/init.d/iec104-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: **iec104-slave-c /etc/iec104-slave/0_0_0_0_502.json -d7;** (0_0_0_0 - bind_address, 502 - port)
- Step 3: Once the problem is diagnosed normal operations can be resumed with the following command: **/etc/init.d/iec107-slave start**

IEC 60870-5-10 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
-e [ –redis ] Show redis message
-R [ –readyfile ] Ready notification file
```

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