

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_aliases | 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 wccite:
/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
```

🔄Revision #7

★Created 21 March 2022 09:12:38 by Tautvilis

✍Updated 7 April 2022 08:58:31