

# Requirement Specification for Module `socket_protocol`

August 11, 2025

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## 1 SEC-0001: Message Object

### 1.1 REQ-0001: Status

The Status shall hold some general information (in most cases it is used by the responder). Examples: Okay, Service or Data unknown, Operation not permitted, Authentication required, /Idots

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|                     |                                                                                                      |
|---------------------|------------------------------------------------------------------------------------------------------|
| <i>Reason</i>       | Give the possibility to transfer additional status information (e.g. to explain negative responses). |
| <i>Fitcriterion</i> | A Status is part of the Message Object and it is holding the Status information.                     |

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### 1.2 REQ-0002: Service-ID

The Service-ID shall hold information about the type of the request /corresponding response. Examples: read request, write request, read response, write response, /Idots

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|---------------------|------------------------------------------------------------------------------------------|
| <i>Reason</i>       | Give the requestor the possibility to use different types (Services) for a transfer.     |
| <i>Fitcriterion</i> | A Service-ID is part of the Message Object and it is holding the Service-ID information. |

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### 1.3 REQ-0003: Data-ID

The Data-ID shall hold information to differtiate the data for a specific Service.

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|---------------------|------------------------------------------------------------------------------------|
| <i>Reason</i>       | Give the possibility to transfer different information for each Service.           |
| <i>Fitcriterion</i> | A Data-ID is part of the Message Object and it is holding the Data-ID information. |

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### 1.4 REQ-0004: Data

The Data shall hold the data to be transfered. For the most requests not data is transmitted.

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|                     |                                                                            |
|---------------------|----------------------------------------------------------------------------|
| <i>Reason</i>       | Give the possibility to transfer Data.                                     |
| <i>Fitcriterion</i> | Data is part of the Message Object and it is holding the Data information. |

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## 2 SEC-0002: Communication

### 2.1 REQ-0005: A full Message Object including the defined properties and data shall be transfered.

Every Communication shall transfer a complete message with its content.

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|                     |                                                                                      |
|---------------------|--------------------------------------------------------------------------------------|
| <i>Reason</i>       | See Reasons for every single information of the Message Object.                      |
| <i>Fitcriterion</i> | Send two different messages and compare the received message with each sent message. |

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## 2.2 REQ-0006: A checksum shall ensure the correct transmission

If the checksum does not fit to the checksum of the transferred data, the message will be ignored, because the complete content including the Service- and Data-ID is possibly corrupted.

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|---------------------|--------------------------------------------------------------------|
| <i>Reason</i>       | Ensure correct data transfer.                                      |
| <i>Fitcriterion</i> | Corrupted message is not in the receive buffer after transmission. |

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## 2.3 REQ-0007: An authentication between server and client shall be possible including status feedback methods

The Client shall have a method to initiate the authentication. In case that the server and the client do have identical secrets, the authentication shall be successful.

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|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Reason</i>       | Message protection (e.g. for secure functions or data)                                                                                     |
| <i>Fitcriterion</i> | Check authentication method feedback (client) and authentication feedback (client and server), in case of differing and identical secrets. |

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## 2.4 REQ-0014: An automatic authentication shall be available

An authentication is executed by the client on every connect.

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|---------------------|-------------------------------------------------------------------------------------|
| <i>Reason</i>       | Simplify handling for authentication.                                               |
| <i>Fitcriterion</i> | Check authentication feedback (client and server) after connect has been triggered. |

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## 2.5 REQ-0008: Communication (rx and tx) shall be disabled, if a secret is given but no authentication had been successfully performed.

Communication (rx and tx) shall be disabled, if a secret is given. Except of a response for registered services, saying that a Authentication is required.

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|---------------------|---------------------------------------------------------------------------------|
| <i>Reason</i>       | Message protection (e.g. for secure functions or data)                          |
| <i>Fitcriterion</i> | RX and TX is not possible, till a successful authentication has been performed. |

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## 2.6 REQ-0009: A whitelist for communication (rx and tx) shall be available to enable communication for unauthorised counterparts

It shall be possible to add a specific message, identified by Service-ID and Data-ID, to a whitelist. All messages added to that whitelist shall be transmitted and received, if no authentication was successful performed.

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|---------------------|-------------------------------------------------------------------------------------------------------------------|
| <i>Reason</i>       | Give the user the possibility to define messages which will not be protected behind the authentication mechanism. |
| <i>Fitcriterion</i> | Transmission and Reception will be enabled, after the message has been added to the whitelist.                    |

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## 2.7 REQ-0010: Define a channel name for the server and client after connection is established

After the connection is established, the client will initiate the channel name exchange. The channel name defined on the client side will be dominant.

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|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Reason</i>       | Structured logging by creating logger childs for each channel.                                                                                                                                                                                                                                               |
| <i>Fitcriterion</i> | Perform a channel name exchange with no channel name definition, differing channel name definition and identical channel name definition. In all cases, the channel name of the client will be used. Perform two channel name exchanges with only one channel name definition. This definition will be used. |

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## 2.8 REQ-0011: The User shall be able to define a new service

The service is defined by a Request Service-ID and a Response Service-ID.

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|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Reason</i>       | Definition of Request and Response SIDs.                                                                                                                                                           |
| <i>Fitcriterion</i> | Define a service and check, that the server will respond on the new Service-ID. The Status shall be 'Request has no callback. Data buffered.', because no callback is registered for that request. |

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## 2.9 REQ-0012: Registration of already registered request Service-ID or response Service-ID shall not be possible

An exception shall be raised, if a service registration with an existing request SID or response SID is performed.

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|---------------------|----------------------------------------------------------------------------------------------|
| <i>Reason</i>       | Changing existing services will create strange situations with already registered callbacks. |
| <i>Fitcriterion</i> | Catch exception for registration of existing request and response SID.                       |

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### 3 SEC-0003: Callbacks

- 3.1 REQ-0013: It shall be possible to register a callback for a specific Service- and Data-ID
- 3.2 REQ-0015: It shall be possible to register a callback for a specific Service-ID and all Data-IDs
- 3.3 REQ-0016: It shall be possible to register a callback for a specific Data-IDs and all Service-IDs
- 3.4 REQ-0017: It shall be possible to register a callback for all incoming messages
- 3.5 REQ-0018: Callback choice, if several callbacks are available (caused by wildcard callbacks)

### 4 SEC-0004: Some additional Information and Passthrough Methods

- 4.1 REQ-0020: Connection established information
- 4.2 REQ-0021: Is connected information
- 4.3 REQ-0022: Reconnect Method

### 5 SEC-0005: Depreceated struct protocol

- 5.1 REQ-0023: A full Message Object including the defined properties and data shall be transferred.

Every Communication shall transfer a complete message with its content.

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|                     |                                                                                      |
|---------------------|--------------------------------------------------------------------------------------|
| <i>Reason</i>       | See Reasons for every single information of the Message Object.                      |
| <i>Fitcriterion</i> | Send two different messages and compare the received message with each sent message. |

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