Installer manual

How to integrate with By-me home automation Gateway using IPConnector interface

VIEW IoT Smart Systems

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Introduction

1. Introduction

This document describes how to integrate with the Vimar By-me home automation Gateway (article 01410/01411).

By-me home automation Gateway provides an interface for integrations with third-party clients, that can be used to read the states and to send commands to the managed devices, in a similar way to what is possible using the Vimar VIEW application. This interface, usable only in the **local network** where the By-me home automation Gateway is configured, is based on the proprietary **IP Connector** protocol and on the proprietary semantics of the **System Functions**.

For security reasons, it is required that the client using the integration interface is identified and authenticated by the By-me home automation Gateway. For this purpose, an asymmetric encryption mechanism is used which requires the client to encrypt the access credentials to the server using its private key, while the server verifies the correctness of the credentials and the identity of the client using the public key (which must be previously inserted into the By-me home automation Gateway).

The entry point to use the integration interface with the By-me home automation Gateway is the MyVIMAR portal (accessible from the homepage of the institutional website *https://vimar.com*). After executing the login to the portal and after accepting the conditions of the contract for integration with the By-me Plus system, the user will have access to all the documentation about Vimar proprietary communication protocols and to the tools/libraries/drivers that can be used to create clients capable of communicating using the interface provided by the By-me home automation Gateway.

The MyVIMAR portal must also be used to upload the public keys to be transferred to the By-me home automation Gateway(s) to be used for integration with the created client. The operation of adding a public key to a specific By-me home automation Gateway is the responsibility of the system installer and is carried out using the Vimar View Pro application.

The following flow illustrates the procedure that **System Integrators** must carry out to develop an integration with the **By-me Plus** home automation system.

1. The **System Integrator** logs in to the MyVIMAR Integration Portal using company-type credentials.
2. The **System Integrator**, in order to access the content and services within the Integration Portal, agrees to the GENERAL TERMS AND CONDITIONS OF VIMAR INTEGRATION SERVICES.
3. The **System Integrator** accesses the confidential documentation and the services necessary to carry out the integration within the Integration Portal. (*ref. to 2.1 Access to documentation*).
4. The **System Integrator** generates the private and public key pair from their PC, as described in the documentation within the Integration Portal. (*ref.to 2.2 Public keys upload*).
5. The **System Integrator** uploads the public key to the Integration Portal to enable new integrations in the By-me Plus home automation gateways (art.cat. 01410-01411) (*ref.to 2.2 Public keys upload*).
6. The **System Integrator** develops their own client that utilizes the private key (*ref. to 4. Integration client development*).
7. The System Integrator involves the Installer to enable integration in the By-me Plus home automation gateway for the system in which their client is intended to be used (*ref to 3. Insertion of public key in the By-me home automation gateway*).
   The operations that need to be performed by the Installer through the View Pro app are:
   - Enable the public key in the home automation gateway.
   - Associate the specific client in the home automation gateway.
8. **The client is developed without the use of drivers or other libraries provided by Vimar** (*ref. to 4.2 Development of a client using the IP Connector protocol*).
   The **System Integrator** has the freedom to decide how to develop their client.

8. **The client is developed using drivers or other libraries provided by Vimar** (*ref. to 4.1 Usage of Vimar drivers for Crestron systems integration*).
   The **System Integrator** utilizes the By-me App List Exporter to generate userID and password and exports the list of applications from the home automation gateway.
   The data extracted from the app are required during the driver configuration phase.

2. Usage of MyVIMAR portal

2.1 Access to documentation

Within the MyVIMAR portal it is possible to download the documentation and support files required to create a client using the integration interface provided by the By-me home automation Gateway. In details, the following files are made available:

- IP Connector protocol specification: It is a document describing the communication protocol and the related payloads (JSON messages)
- System Functions specification: It is an archive with a self-contained web page that can be consulted offline. It describes the syntax of the functions exposed by the By-me home automation Gateway to the client connected via the IP Connector protocol
- VimarCA certificate: It is a certificate (.pem) that the the client must use to verify the identity of the By-me home automation Gateway server during the communication phases with it. It is a good practice to verify that the certificate exposed by the server was created using VimarCA
- Material for Crestron integration: It is an archive containing all the material required for integrations with Crestron systems. The archive contains the Crestron drivers (including the release notes of the current version and the usage license) and a manual that describes the features implemented into drivers

IMPORTANT: All information the user can download from the MyVIMAR portal must be considered confidential and governed by the terms of the agreement signed upon first access to the portal.

2.2 Public keys upload

MyVIMAR portal must be used, in addition to documentation download, also to upload the public keys to be used for integration purposes; only after this operation it will be possible to upload the key into a specific By-me home automation Gateway (for further details, refer to the relevant section of this document).

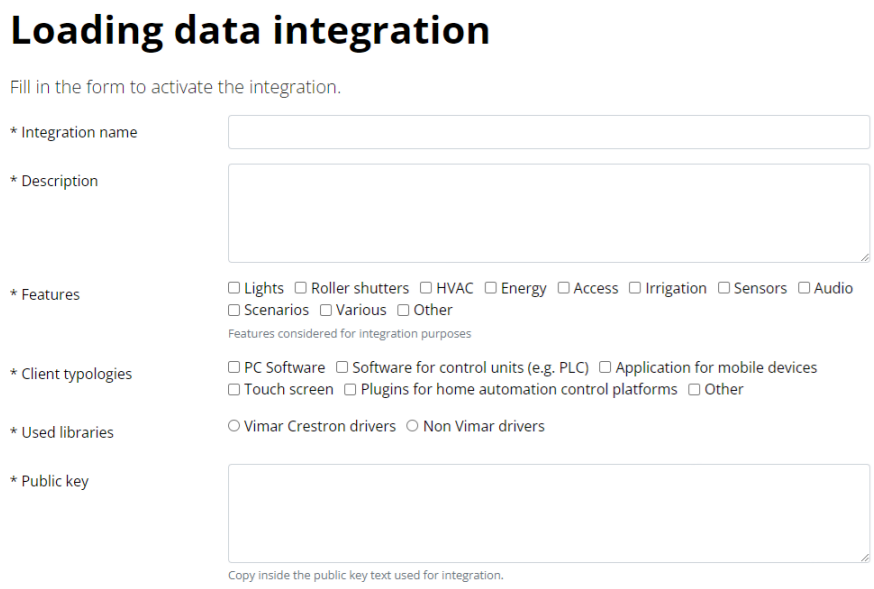
As a first operation, it is required to generate a public/private keys pair; the public key must be uploaded to the MyVIMAR portal, while the private one must be stored by the user in a safe place. An example of commands (applicable to a Linux environment) to create the keys is the following:

```
1. openssl genrsa -out thirdparty.key.pem 2048
2. openssl rsa -in thirdparty.key.pem -outform PEM -pubout -out thirdparty.pub.pem
```

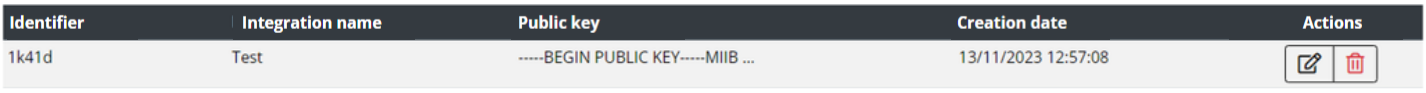
Once the public key is available, to allow to use it for integration with the By-me home automation Gateway it will be required to execute the following steps in the MyVIMAR portal:

1. Click on the button to add a new key:

2. Fill the form with all required data and click on save button:



3. After providing all the required data, the information will be showed into summary table; each key will be assigned to an identification code, to be provided to system installer to execute the next integration phases:



3. Insertion of public key in the By-me home automation Gateway

After creating the public key and uploading it to the MyVIMAR portal, the last step to be executed to enable the integration interface of the By-me home automation Gateway is the upload of such public key into the device itself.

The operation must be executed by the system **installer**, using the **View Pro** application, entering the public key identification code provided by the user (obtained from the MyVIMAR portal); at the end of this procedure the By-me home automation Gateway will enable the integration interface. In details, the installer must execute the following steps:

1. Click on the plant name
2. Click on symbol next to the name of the By-me home automation Gateway
3. Click on DEVICE MAINTENANCE ➡ THIRD PARTY CLIENT MANAGEMENT ➡ ASSOCIATE NEW CLIENT ➡ ADD INTEGRATION
4. Fill the “identifier” field with identification code provided by the integrator

The above procedure must be executed for each instance of By-me home automation Gateway to be used for integration purposes.

For further details regarding the use of the View Pro application to upload the public key, refer to the relevant manual.

4. Integration client development

The development of the integration solution using the interface provided by the By-me home automation Gateway is completely under responsibility of the user who wants to carry out the integration.

Based on the type of system to be integrated with By-me Plus, there are different possible solutions:

- If the need is to integrate with Crestron systems, it is possible to develop an application that uses the drivers developed by Vimar for this purpose
- Otherwise it is required to develop an application, using the IP Connector protocol, implementing the functions required by the specific integration to be achieved

The next sections will describe each of the possible integration client implementation solutions.

4.1 Usage of Vimar drivers for Crestron systems integration

If the need is to integrate By-me Plus with Crestron systems using IP communication, it is possible to download, from MyVIMAR portal, drivers implementing all the integration functions.

These drivers, once imported into the Crestron programming software, provide the user with some elementary "blocks" implementing all the main functions made available by the By-me home automation Gateway for integration purposes. It will be up to the user to put together these elementary objects in a complex program and to define the graphic interface to be used for this purpose, according to the mechanisms provided by Crestron systems.

The drivers require some input data from the By-me Plus system, such as connection data, authentication data and information required to identify the functions to be used for integration purposes. Such data can be obtained by the user through the use of the Vimar **By-me App List Exporter** application, through which it is possible:

- Executed the initial association phases with the By-me home automation Gateway, obtaining all the connection and authentication data
- Extract the identification data of the functions to be used for the integration

For further details regarding the use of the **By-me App List Exporter** application, refer to the relevant manual.

4.2 Development of a client using the IP Connector protocol

The most generic integration solution is represented by the development, under the user responsibility, of a client that uses the integration interface made available by the By-me home automation Gateway through the implementation of the IP Connector protocol. This solution allows the user to choose any programming language and provides the possibility of just implementing the functions required by the specific application.

This section shows an example of communication between a hypothetical integration client and a By-me home automation Gateway, with the aim of documenting the most critical steps of the usage of integration interface during the start-up and normal usage phases. For the complete details about the communication protocol, its mechanisms and the features it supports, refer to the IP Connector protocol specification.

A client using the integration interface via the IP Connector protocol must be configured in the same LAN network as the By-me home automation Gateway. The usage of integration interface has two main phases:

- Initial association phase
- Operational phase

The next subsections will describe the critical point of each phase.

Integration client development

4.2.1 Initial association phase

In the first phase the client must execute the first association operation with the By-me home automation Gateway. To complete this procedure, it is required to use the **setup code**, a numerical code consisting of 4 digits, needed to complete the association. This value must be retrieved by the system installer using the View Pro application (refer to the relevant installer manual for further details).

At this point, the client must proceed with the steps requested by the IP Connector protocol (for further details refer to the protocol specification):

- Execution of search procedure to retrieve the port to be used to create the session
- Opening of a WSS connection using the port retrieved in the previous step and execution of `session` command:

1. `[REQUEST] [SESSION]: {"type":"request","function":"session","source":"y1EXMuCugU","target":"A32101FBB00064","token":"rRcaKdNVfz","msgid":"3","args":[{"communication":{"communicationmode":4,"ipaddress":"192.168.0.100","ipport":0}}],"params":[]}`
2. `[RESPONSE] [SESSION]: {"error":0,"function":"session","msgid":"3","result":[{"communication":{"ipport":21038}}],"source":"A32101FBB00064","target":"y1EXMuCugU","type":"response"}`

- Just after receiving the response to the session command, the WSS connection will be terminated. The obtained response provides to the client a new port, to be used to open the real session
- Opening of a WSS connection using the port retrieved in the previous step and execution of attach command:

1. `[REQUEST] [ATTACH]: {"type":"request","function":"attach","source":"y1EXMuCugU","target":"A32101FBB00064","token":"rRcaKdNVfz","msgid":"4","args":[{"credential":{"username":"VIMARDEV","useruid":"","password":"MP4Vrsq9A/FyvapWs1QEJtOqKTASLTVWiG7WoYwB-BU8q/pSeaC06jHyrUwRAqnf6Je9tp8hHhkPnE/6l++nPpQuk1mO6VkHK/MLAkCWdz/aRzOVuOE6OmfYUsyF0I6a7zhDh8oemtJHGDDafrnxbDLZcTI/BdIAFxWzU8/EVCT/hRNL1MCifZ32OtgESKHF/3CcleqaD2nvVWXob/JX1q/jKEcHO0s6WJq8luMwif6uvr+0shl9LF2bO3WbbFn59PPN4bmF9cKLL/SmQEOuXh2Ld9syWhLvoK4tKiEl7V3snAoC75+xyxzGSpIA6KDY2VocNUmcw2ggCNxORjf3DTQ==","clientinfo":{"clienttag":"thirdpartyapp","sfmodelversion":"1.6.0","protocolversion":"2.5"},"communication":{"ipaddress":"192.168.0.100"}}],"params":[]}`
2. `[RESPONSE] [ATTACH]: {"error":0,"function":"attach","msgid":"4","result":[{"password":"7pyW@yF@QYj6He5#","permissions":["LIGHT_CONTROL","SHUTTER_CONTROL","CLIMATE_CONTROL","LOAD_CONTROL","IRRIGATION_CONTROL","PROGRAM_CONTROL","ACCESS_CONTROL","ACTUATOR_CONTROL","CONSUMPTION_CONTROL","MULTIMEDIA_CONTROL","SENSOR_CONTROL","SCENE_CONTROL","LOGIN","UNDEFINED"],"plantname":"P441 - Team X++ #2","plantuid":"dd8bfe3d-87e5-4af1-9ef0-3abb90390b7d","secureinfo":{"publickey":"-----BEGIN PUBLIC KEY-----\nMIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAuMZzgfnlQTVsooeqYWkr\nk+cJe0viay3SKtkiXHvwjQx+igIBWAm4eIfMWzZp/rEhl740vAedO7Ki5F8w1FsA\n3QzSsdofT/rdgG4btYpsuuU4vUFzc0DZQOvEzpa3dvGVFuvzo6VCS5DZPsoQYL8e\nMa5RjbjenWqHMl-F0ABLvNtvPeoU2EMfGSkeMJRjwQeeGyqd0AEpUkCe22ucccRoa\nVPcKQwiPcf27eDDAOtoTadg8AfiUSolp4pXJdYr+lvpKwadMgrkHtqPRgXmlF02w\nqd5Hv07dmAUQ+9lhVNFtA4ts9XE/FXXjU3uilg9tn8koyaUeN2oxdKLrlZ2qLx4n\nnQIDAQAB\n-----END PUBLIC KEY-----\n"},"serverinfo":{"dbmodelversion":"15.0.8","deviceuid":"A32101FBB00064","dictionaryHash":"20481a21d31a0958f54b029fe322d192","firmwareversion":"0.3.5-gitca05edb","hardwareversion":"00000017","hash":"3618503957","mac":"fc:bc:9c:00:08:7d","model":"AG+","protocolversion":"2.2","sfmodelversion":"v1.3.5","softwareversion":"1.11.20-20220309173953"},"sfcategory":["BigData","ConfGateway","InfoGateway","LogicProgram","Plant"],"token":"Qqu%Lxu6kSuj","username":"Test","usertype":"ThirdParty","useruid":"ad397cd9-ef8a-411d-82c8-01b3ba9e818f"}],"source":"A32101FBB00064","target":"y1EXMuCugU","type":"response"}`

As specified in the section 3.4.2 of the IP Connector protocol, in the first `attach` request the client must:

- Fill the `username` field with the identifier of the public key to be used for the integration (obtainable from the MyVIMAR portal and used by the installer to add the public key to the By-me home automation Gateway)
- Fill the `userid` field with an empty string
- Fill the `password` field with the setup code received from the installer. This numerical value must be signed with the private key and then base64 encoded. The output of the signing and encoding procedure performed by the client must be equal to the output of the following command (executed in a Linux environment):

```
echo -n <SETUP-CODE> | openssl pkeyutl -sign -inkey <PRIVATE-KEY> | base64 | tr -d '\n'
```

NOTE: Check that the setup code is still valid when this phase is executed (because it has a time limit).

- The response obtained for the `attach` command will provide to the the client the credentials (in the `userid` and `password` fields) to be used during the operational phase
- Closing of the previously opened session, using `detach` command:

1. `[REQUEST] [DETACH]: {"type":"request","function":"detach","source":"y1EXMuCugU","target":"A32101FBB00064","token":"Qqu%Lxu6kSuj","msgid":"8","args":[{"user":"logout"}],"params":[]}`
2. `[RESPONSE] [DETACH]: {"error":0,"function":"detach","msgid":"8","result":[],"source":"A32101FBB00064","target":"y1EXMuCugU","type":"response"}`

Integration client development

4.2.2 Operational phase

After the first association phase, the client is fully operational. It is possible to execute the following steps:

• Execution of the search/session/attach phases as already performed in the initial association phase:

1. [REQUEST] [SESSION]: {"type":"request","function":"session","source":"W28WnK1Wam","target":"A32101FBB00064","token":"P54AhHJtAg","msgid":"1","args":[{"communication":{"communicationmode":4,"ipaddress":"192.168.0.100","ipport":0}}],"params":[]}
2. [RESPONSE] [SESSION]: {"error":0,"function":"session","msgid":"1","result":[{"communication":{"ipport":21009}}],"source":"A32101FBB00064","target":"W28WnK1Wam","type":"response"}
3. [REQUEST] [ATTACH]: {"type":"request","function":"attach","source":"W28WnK1Wam","target":"A32101FBB00064","token":"P54AhHJtAg","msgid":"2","args":[{"credential":{"username":"VIMARDEV","useruid":"ad397cd9-ef8a-411d-82c8-01b3ba9e818f","password":"brNSlQxD+6wjheJAeu01e3ePK0/5JBsOLLpZrmVh0rPOynwQkNqmLAn1tm9N1yGVZrWx+6K0/c7IeKv2zZIfHOfHsIiASX1V35Z5ZhUXyVqtN0OOu55eWgYyYFvay9YtfLgJfCPA8jJgzyeQr8Tm4kSUpmT5WtejZvgP7k/NhgMJBBJ6/NQFV3HlfjVTnWGZKWoIZyzKwOpcOXhPZZypLbNnSysF4RQn0w6+VUcJZZ3+vT+mbyCDc13Kyt0PkcBs3xCMC7kuGGDJadxxDg+HYfaeeVgdJzqlQRUGalsqQPFCJcrEI1qgvgKWCWPKoYpL4GOZFagyxsH4HJw2IQ8Rpg=="},"clientinfo":{"clienttag":"thirdpartyapp","sfmodelversion":"1.6.0","protocolversion":"2.5"},"communication":{"ipaddress":"192.168.0.100"}}],"params":[]}
4. [RESPONSE] [ATTACH]: {"error":0,"function":"attach","msgid":"2","result":[{"password":"POKOAMQq**2uRbvl","permissions":["LIGHT_CONTROL","SHUTTER_CONTROL","CLIMATE_CONTROL","LOAD_CONTROL","IRRIGATION_CONTROL","PROGRAM_CONTROL","ACCESS_CONTROL","ACTUATOR_CONTROL","CONSUMPTION_CONTROL","MULTIMEDIA_CONTROL","SENSOR_CONTROL","SCENE_CONTROL","LOGIN","UNDEFINED"],"plantname":"P441 - Team X++ #2","plantuid":"dd8bfe3d-87e5-4af1-9ef0-3abb90390b7d","secureinfo":{"publickey":"-----BEGIN PUBLIC KEY-----\nMIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAuMZzgfnlQTVsooeqYWkr\nk+cJe0viay3SKtkiXHvwjQx+igIBWAm4eIfMWzZp/rEhl740vAedO7Ki5F8w1FsA\n3QzSsdofT/rdgG4btYpsuuU4vUFzc0DZQOvEzpa3dvGVFuvzo6VCS5DZPsoQYL8e\nMa5RjbjenWqHMl-F0ABLvNtvPeoU2EMfGSkeMJRjwQeeGyqd0AEpUkCe22ucccRoa\nVPcKQwiPcf27eDDAOtoTadg8AfiUSolp4pXJdYr+lvpKwadMgrkHtqPRgXmlF02w\nqd5Hv07dmAUQ+9lhVNFtA4ts9XE/FXXjU3uilg9tn8koyaUeN2oxdKLr1Z2qLx4n\nnQIDAQAB\n-----END PUBLIC KEY-----\n"},"serverinfo":{"dbmodelversion":"15.0.8","deviceuid":"A32101FBB00064","dictionaryHash":"20481a21d31a0958f54b029fe322d192","firmwareversion":"0.3.5-gitca05edb","hardwareversion":"00000017","hash":"3618503957","mac":"fc:bc:9c:00:08:7d","model":"AG+","protocolversion":"2.2","sfmodelversion":"v1.3.5","softwareversion":"1.11.20-20220309173953"},"sfcategory":["BigData","ConfGateway","InfoGateway","LogicProgram","Plant"],"token":"DOK9C3TKyyNF","username":"Test","usertype":"ThirdParty","useruid":"ad397cd9-ef8a-411d-82c8-01b3ba9e818f"}],"source":"A32101FBB00064","target":"W28WnK1Wam","type":"response"}

As specified in the section 3.4.2 of the IP Connector protocol, in the attach requests subsequent to the first the client must:

- Fill the username field with the identifier of the public key to be used for the integration (obtainable from the MyVIMAR portal and used by the installer to add the public key to the By-me home automation Gateway)
- Fill the userid field with the value provided by the server after first login
- Fill the password field with the value received by the server after first login. Also this value must be signed with the private key and then base64 encoded. The output of the signing and encoding procedure performed by the client must be equal to the output of the following command (executed in a Linux environment):

```
echo -n <PASSWORD> | openssl pkeyutl -sign -inkey <PRIVATE-KEY> | base64 | tr -d '\n'
```

• Once the attach operation is completed, the client is correctly connected to the By-me home automation Gateway and it can execute the several commands foreseen by the protocol. As example, to retrieve the list of functions (System Functions) available in the system, the client must execute the following command:

1. [REQUEST] [SFDISCOVERY]: {"type":"request","function":"sfdiscovery","source":"W28WnK1Wam","target":"A32101FBB00064","token":"DOK9C3TKyyNF","msgid":"4","args":[{"sfcategory":"Plant"}],"params":[{"idambient":[]}]}
2. [RESPONSE] [SFDISCOVERY]: {"error":0,"function":"sfdiscovery","msgid":"4","result":[{"idambient":0,"sf":[{"dictKey":16777217,"elements":[{"enable":true,"sfetype":"SFE_Cmd_AmbientSetpoint","value":""},{"enable":false,"sfetype":"SFE_Cmd_FanMode","value":""},{"enable":false,"sfetype":"SFE_Cmd_FanSpeed","value":""},{"enable":false,"sfetype":"SFE_Cmd_FanSpeed3V","value":""},{"enable":false,"sfetype":"SFE_Cmd_HVACMode","value":""},{"enable":true,"sfetype":"SFE_Cmd_HVACModeDeadZone","value":""},{"enable":true,"sfetype":"SFE_Cmd_TimedManual","value":""},{"enable":true,"sfetype":"SFE_State_AmbientSetpoint","value":"20.0"},{"enable":true,"sfetype":"SFE_State_AmbientTemperature","value":"27.4"},{"enable":true,"sfetype":"SFE_State_ChangeOverMode","value":"Dead zone"},{"enable":false,"sfetype":"SFE_State_FanMode","value":"Automatic"},{"enable":false,"sfetype":"SFE_State_FanSpeed","value":"33"},{"enable":false,"sfetype":"SFE_State_FanSpeed3V","value":"V1"},{"enable":true,"sfetype":"SFE_State_HVACMode","value":"Manual"},{"enable":true,"sfetype":"SFE_State_OffBehaviour","value":"Absence"},{"enable":true,"sfetype":"SFE_State_OnBehaviour","value":"Auto"},{"enable":true,"sfetype":"SFE_State_OutStatus","value":"Off"},{"enable":true,"sfetype":"SFE_State_TimedManual","value":"60"}],"idsf":1001,"name":"Bepp","sftype":"SF_Clima","sstype":"SS_Clima_Zone"}]}],"source":"A32101FBB00064","target":"W28WnK1Wam","type":"response"}

If the server does not receive any message from the client for more than 120 seconds, the connection is terminated. To prevent this, the client can send a keepalive command to extend the connection lifetime for additional 120 seconds.

• When the connection to the By-me home automation Gateway is no longer required, the client can execute the disconnection operation using the detach command:

1. [REQUEST] [DETACH]: {"type":"request","function":"detach","source":"W28WnK1Wam","target":"A32101FBB00064","token":"DOK9C3TKyyNF","msgid":"5","args":[{"user":"logout"}],"params":[]}
2. [RESPONSE] [DETACH]: {"error":0,"function":"detach","msgid":"5","result":[],"source":"A32101FBB00064","target":"W28WnK1Wam","type":"response"}

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