

System Specification

EnOcean over IP Specification

V 1.0

Approved for first release:

Approved for second release:

Approved for final release:

San Ramon, CA, USA, 2016

Executive Summary

Ver.	Editor	Change	Date
0.1	TM	First Draft, based on DC input	Mar 18, 2016
0.2	TM	Second Draft after EnOcean Feedback	Mar 22, 2016
0.3	TM	DC Review Points added	May 09, 2016
0.4	TM	New format for the JSON Object table format	May 30, 2016
0.5	TM	Feedback integrated	Jun 7, 2016
0.6	LC	Editorial changes	June 22, 2016
0.7	TM	Status errors code added based on DC input	June 24, 2016
0.8	ToH	Editorial changes and cleanup	December 2016
0.9	ToH	More cleanup	December 2016
1.0	NM	Editorial modifications following approval by TWG	Mar 09, 2017

Copyright © EnOcean Alliance Inc. 2012- 2018. All rights Reserved.

Disclaimer

This information within this document is the property of the EnOcean Alliance and its use and disclosure are restricted. Elements of the EnOcean Alliance specifications may also be subject to third party intellectual property rights, including without limitation, patent, copyright or trademark rights (such a third party may or may not be a member of the EnOcean Alliance.)

The EnOcean Alliance is not responsible and shall not be held responsible in any

System Specification

manner for identifying or failing to identify any or all such third party intellectual property rights. This document and the information contained herein are provided on an "as is" basis and the EnOcean Alliance disclaims all warranties express or implied, including but not limited to

(1) any warranty that the use of the information herein will not infringe any rights of third parties (including any intellectual property rights, patent, copyright or trademark rights, or (2) any implied warranties of merchantability, fitness for a particular purpose, title or non-infringement.

In no event will the EnOcean Alliance be liable for any loss of profits, loss of business, loss of use of data, interruption of business, or for any other direct, indirect, special or exemplary, incidental, punitive or consequential damages of any kind, in contract or in tort, in connection with this document or the information contained herein, even if advised of the possibility of such loss or damage. All Company, brand and product names may be trademarks that are the sole property of their respective owners.

The above notice and this paragraph must be included on all copies of this document that are made.

The EnOcean Alliance "Certification Handbook" is available free of charge to companies, individuals and institutions for all non-commercial purposes (including educational research, technical evaluation and development of non-commercial tools or documentation.)

This specification includes intellectual property („IPR“) of the EnOcean Alliance and joint intellectual properties („joint IPR“) with contributing member companies. No part of this specification may be used in development of a product or service for sale without being a participant or promoter member of the EnOcean Alliance and/or joint owner of the appropriate joint IPR.

These errata may not have been subjected to an Intellectual Property review, and as such, may contain undeclared Necessary Claims.

EnOcean Alliance Inc.
5000 Executive Parkway, Suite 302
San Ramon, CA 94583
USA
Graham Martin
Chairman & CEO EnOcean Alliance

Table of Contents

1. Introduction.....	7
1.1. Scope and Purpose	7
1.2. Acronyms and Abbreviations.....	9
1.3. Definitions	11
1.4. Conformance Levels	11
1.5. Roadmap.....	12
1.5.1. <i>Version 1 (This Release)</i>	12
1.5.2. <i>For the future</i>	12
1.6. Documents.....	12
1.6.1. <i>EnOcean over IP Regulation – Handling of the Specifications and Regulations</i>	12
1.6.2. <i>EnOcean over IP Specification – This document</i>	12
1.6.3. <i>EnOcean over IP Profiles– EEP Description</i>	12
1.7. Contributors	13
1.8. References.....	13
1.8.1. <i>EnOcean Alliance & EnOcean GmbH Documents</i>	13
1.8.2. <i>Internet Engineering Task Force Documents</i>	13
1.8.3. <i>Others</i>	13
2. EnOcean Over IP – A REST Interface	14
2.1. Motivation	14
2.2. Implementation Requirements	14
2.3. Security recommendations.....	14
2.4. JSON-REST API	15
2.4.1. <i>Introduction to RESTful HTTP</i>	15
2.4.2. <i>Used HTTP methods</i>	16
2.4.3. <i>HTTP Responses</i>	16
2.4.4. <i>Introduction to JSON</i>	16
3. REST API Description.....	18
3.1. Introduction.....	18
3.1.1. <i>Basic JSON structures</i>	18
3.1.2. <i>Return codes of the base Object</i>	19
3.1.3. <i>Resources base path overview</i>	21
3.1.4. <i>Object overview</i>	21
3.1.5. <i>State reporting Options</i>	22

System Specification

3.1.6. <i>Streaming API Resources</i>	23
3.1.7. <i>JSON formatting and delimiting options for Streaming API</i>	23
3.2. Available JSON objects.....	24
3.2.1. <i>systemInfo object</i>	24
3.2.2. <i>profiles array object</i>	25
3.2.3. <i>profile object</i>	26
3.2.4. <i>devices array object</i>	30
3.2.5. <i>device object</i>	31
3.2.6. <i>state / states object</i>	32
3.2.7. <i>telegram / telegrams object</i>	33
3.3. System Resources	36
3.3.1. <i>GET /system/info</i>	36
3.4. Profiles Resources.....	36
3.4.1. <i>GET /profiles</i>	36
3.4.2. <i>GET /profiles/{eeplId}?version=x.x</i>	37
3.5. Devices Resource	41
3.5.1. <i>GET /devices</i>	41
3.5.2. <i>GET /devices/states</i>	41
3.5.3. <i>GET /devices/stream?direction={dir}&delimited={delimited}&output={output}</i>	43
3.5.4. <i>GET /devices/telegrams?direction={direction}</i>	47
3.5.5. <i>GET /devices/{deviceId}</i>	49
3.5.6. <i>GET /devices/{deviceId}/profile</i>	50
3.5.7. <i>GET /devices/{deviceId}/state</i>	51
3.5.8. <i>PUT /devices/{deviceId}/state</i>	52
3.5.9. <i>GET /devices/{deviceId}/stream?direction={dir}&delimited={del}&output={out}</i>	53
3.5.10. <i>GET /devices/{deviceId}/telegrams?direction={direction}</i>	54



Index of Figures

Figure 1: A possible use case. API for smartphone apps	8
Figure 2: A possible use case. API as connector to other APIs or smart home gateway	8
Figure 3: High level description of the HTTP connection	15
Figure 4: JSON Example	17
Figure 5: Response Message Structure	18
Figure 6: HTTP Keep-Alive Connection	23
Figure 7 single Line Json Example	24
Figure 8: systeminfo JSON example	25
Figure 9: profiles JSON example	26
Figure 10: profile A5-02-01 JSON example	28
Figure 11: profile D2-01-0A JSON example	30
Figure 12: devices array JSON example	30
Figure 13: device JSON example	32
Figure 14: state JSON example	33
Figure 15: telegram JSON example	35
Figure 16: /system/info JSON response	36
Figure 17: /profiles JSON response example	37
Figure 18: /profiles/A5-20-04 JSON response example	40
Figure 19: /devices/JSON response	41
Figure 20: /devices/state JSON response	43
Figure 21: /system/info JSON response	47
Figure 22: /system/telegrams JSON response	48
Figure 23: /devices/{deviceId} JSON response	49
Figure 24: /device/{deviceID}/profile JSON response	50
Figure 25: /devices/{deviceId}/state JSON response	51
Figure 26: /devices/{deviceid}/state outgoing JSON object	52
Figure 27: /devices/{deviceId}/stream JSON response	54
Figure 28: /devices/{deviceID}/telegrams JSON response	55



Index of Tables

Table 1: HTTP codes	16
Table 2: Header object description	18
Table 3 Return codes 1000-1999.....	19
Table 4 Return codes 2000-2999.....	19
Table 5: Return codes 3000-3999	20
Table 6: Return codes 8000-8001	20
Table 7: Resource overview	21
Table 8: Object overview.....	21
Table 9: systemInfo Object.....	25
Table 10: profiles array object.....	25
Table 11: variations object	25
Table 12: profile object	26
Table 13: functionGroups object.....	26
Table 14: functions object	27
Table 15: values object.....	27
Table 16: range object.....	27
Table 17: devices object.....	30
Table 18: device Object	31
Table 19: eep Object	31
Table 20: state / states Object	32
Table 21: functions array object.....	33
Table 22: telegram object	34
Table 23: functions array object.....	34
Table 24: telegramInfo object	35
Table 25: optional parameters of /profiles	37
Table 26: optional parameters of /device/stream	44
Table 27: optional parameters of /devices/telegrams.....	47
Table 28: optional parameters of /device/{deviceid}/stream.....	53

System Specification

1. Introduction

1.1. Scope and Purpose

This document is intended for consumers and producers of EAGs (EnOcean Alliance IP Gateways) to implement or use a general REST (Representational State Transfer) JSON (java script object notation) API (application programming interface), which simplifies the EnOcean Alliance World to third parties. All techniques, explained here, are based on standardized IP and EnOcean Alliance Technologies. One of the main aims of the specification is to remove the complexity of the EnOcean profiles for consumers and to allow them to use/integrate EnOcean technology simply in their products. For manufacturers of an EAG, this document specifies how different profiles and EnOcean technologies are mapped to a JSON-REST API. This document is not intended to create a User Manual or Product Specification for an EAG, the implementer may add additional features to his gateway. The specification should be a base line for an EAG, which allows a basic usage for EnOcean Alliance Products. The API does not contain any information nor has the aim to generate a logic/rule machine for automatic interaction with EnOcean devices. The API is a baseline to allow other vendors/app developer or rule machines to connect to the EAG.

Chapter 1 mentions the general scope, acronyms, definitions contributors,
Chapter 2 describes the general REST API and gives a short introduction to REST
Chapter 3 describes the available resources in details.

Possible use cases of the API are shown in Figure 1 and Figure 2. Figure 1 shows a smartphone app which is directly connected to an EAG. The smartphone displays the current status of devices and send messages to devices via the EAG.

Figure 2 shows the general possibility to use the API to connect EnOcean with other APIs for IoT/Smart Home Systems, or as direct connector for the manufacturer of a Smart Home Rule engine.

System Specification

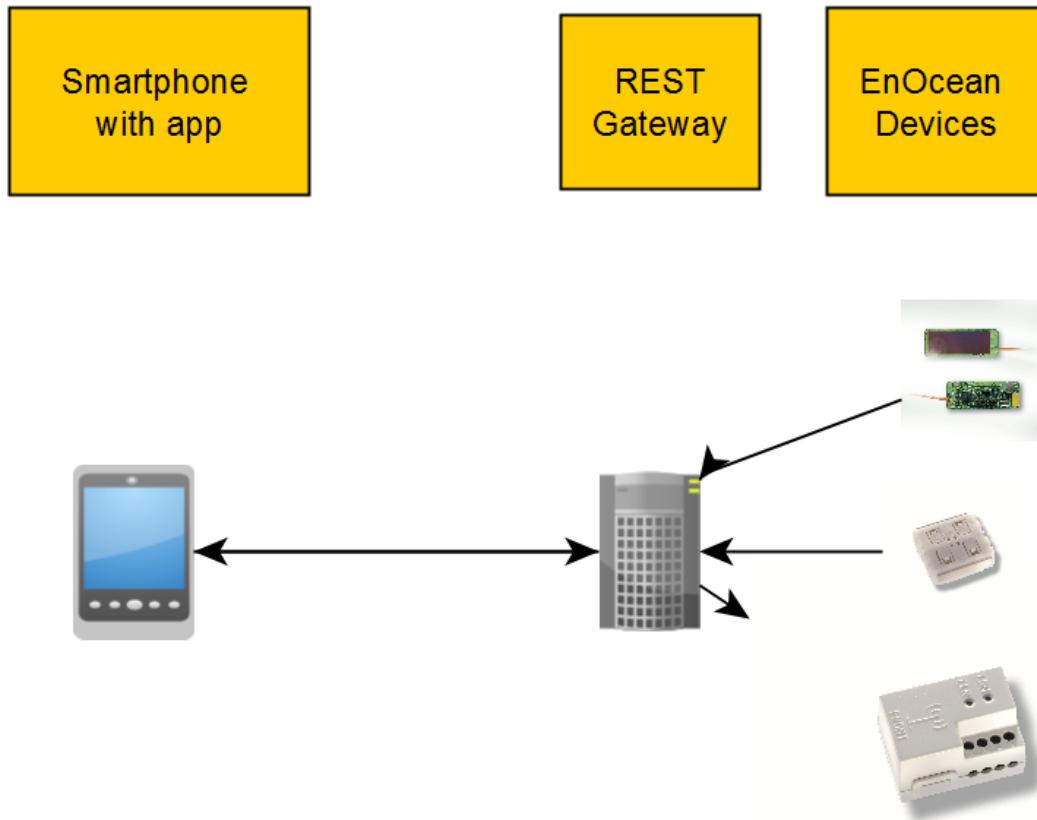


Figure 1: A possible use case. API for smartphone apps

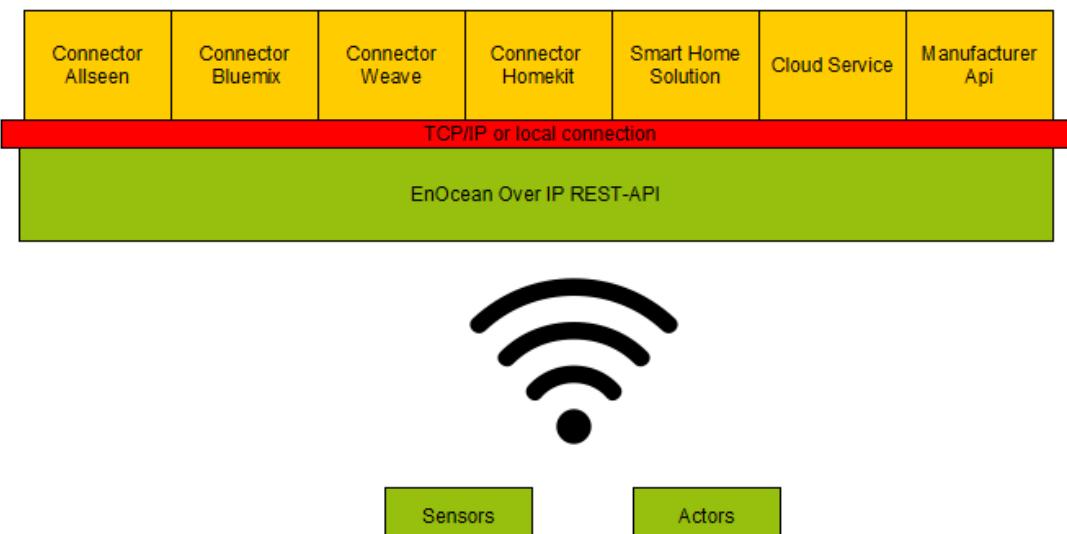


Figure 2: A possible use case. API as connector to other APIs or smart home gateway

System Specification

1.2. Acronyms and Abbreviations

System Specification

- 1 API (application programming interface) 6
- 2 EAGs (EnOcean Alliance IP Gateways) 6
- 3 EEP (EnOcean Equipment Profiles) 10
- 4 GP (Generic Profiles) 10
- 5 REST (Representational State Transfer) 6

System Specification

1.3. Definitions

- **EURID:** EnOcean Unique Radio Identifier is the address id of each EnOcean Device which cannot be modified.
- **BaseID:** is a base Address which may be used to send telegrams to different actuators using different source IDs. It is possible to transmit a telegram with the base ID of an EnOcean device as the source address and any ID up to the base ID + 127.

1.4. Conformance Levels

MUST:

This word, or the terms "REQUIRED" or "SHALL", mean that the definition is an absolute requirement of the specification.

MUST NOT:

This phrase, or the phrase "SHALL NOT", means that something is prohibited by the specification.

SHOULD

This word, or the word "RECOMMENDED", means that, in particular cases, there may be valid reasons not to follow a point of the specification. However the full implications must be understood and weighed before choosing a different course

SHOULD NOT

This phrase, or the phrase "NOT RECOMMENDED" means that, in particular cases, there may be valid reasons where certain behavior is acceptable or even useful. However the full implications must be understood and weighed before choosing to implement anything described with this phrase.

MAY

This word, or the adjective "OPTIONAL", means that an item may or may not be implemented. One vendor may choose to include the item because a particular marketplace requires it or because the vendor feels that it enhances the product while another vendor may omit the same item. In either case, both MUST be prepared to interoperate with each other, though perhaps with reduced functionality.

System Specification

1.5. Roadmap

1.5.1. Version 1 (This Release)

- Basic Description of the Rest Interface
- Description of devices
- EEP description

1.5.2. For the future

- Description of teach-in process of devices
- Description of GP
- Description of Reman/Recom
- Description of EnOcean Security
- Description of Device management

1.6. Documents

The EnOcean over IP Specification consists of the main document, this document, and an appendix which describes the profiles. The appendix and the main document have different release and maintenance cycles. The EEP appendix always references to a certain EEP version.

1.6.1. EnOcean over IP Regulation – Handling of the Specifications and Regulations

The EnOcean over IP Regulation contains information about additional steps when submitting new EEPs to show how they will be represented in the IP World. It also contains information about naming conventions.

1.6.2. EnOcean over IP Specification – This document

The EnOcean over IP Specification document describes the general REST API interface. The API Version describes the available resources and how to access them. The main document minor version will be increased to indicate minor changes and error fixes. The major version will be changed when new features are added or the Interface is changed.

1.6.3. EnOcean over IP Profiles—EEP Description

The Profiles Appendix describes the IP representation of the different EEPs. The appendix contains the IP Representation of the specified EEP version. The appendix version is always the year – number of release this year. Each profile in the EEP has its own version, which can change if minor or major problems with one profile have been found, e.g. a typo in one of the value keys (minor).

System Specification

1.7. Contributors

Following people have contributed to the *EnOcean over IP* Specification.

First Name	Surname	EnOcean Alliance Member
Timo	Hennerich	Digital Concepts GmbH
Tobias	Hennerich	Digital Concepts GmbH
Oliver	Fischer	Digital Concepts GmbH
Tobias	Meyer	EnOcean GmbH
Marian	Hönsch	EnOcean GmbH
Graham	Martin	EnOcean Alliance
Robert	Hall	EnOcean Inc
Thomas	Rieder	Vicos GmbH
Walter	Bertl	Vicos GmbH
Claus	Engelhardt	Alpha EOS

1.8. References

1.8.1. EnOcean Alliance & EnOcean GmbH Documents

- [E1] EEP (EnOcean Equipment Profiles) Specification
<http://www.enocean-alliance.org/eep/>
- [E2] EnOcean GP(Generic Profiles) 1.0
http://portal.enoceanalliance.org/DesktopModules/Inventures_Document/FileDownload.aspx?ContentID=21174
- [E3] EnOcean Remote Management Specification.
http://www.enocean.com/fileadmin/redaktion/pdf/tec_docs/RemoteManagement.pdf
- [E4] EnOcean Wireless Standard
http://www.enocean-alliance.org/en/enocean_standard/

1.8.2. Internet Engineering Task Force Documents

- [RFC1] RFC 7159: The JavaScript Object Notation (JSON) Data Interchange Format
<https://tools.ietf.org/html/rfc7159>
- [RFC2] RFC 7230: Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing
<https://tools.ietf.org/html/rfc7230>

1.8.3. Others

- [O1] JSON website
<http://www.json.org/>

System Specification

2. EnOcean Over IP – A REST Interface

2.1. Motivation

With the emergence of IoT technology it is necessary that EnOcean devices become a part of the IoT world. Due to the limitation of Energy Harvesting Devices and the EnOcean protocol, it is not possible to integrate the devices directly into the IP world with e.g. a 6LoWPAN Adaption Layer. This specification suggests and specifies a REST Gateway to allow an easy integration of an EnOcean ECO-System into an IP Network, Intranet or Internet. Another main motivation is to hide the complexity of the EnOcean Radio and the different Application Protocols (e.g. EEP/GP/ReCom) from the user of the API.

JSON-REST has been chosen as it is based on open standards, such as HTTP 1.1 and JSON, and it is field proven to be easy to use and implement.

2.2. Implementation Requirements

An EAG shall implement all resources defined in chapter 3. The JSONs shall contain all the data fields as specified. A manufacturer may extend the API, REST resources and JSON to add additional features or data to their system. It should allow multiple connections to the system, so that multiple clients may use the system at the same time.

As some EnOcean Devices only transmit periodically, the EAG needs to store the last state of the device in memory and depending on the parameters described in chapter 3.1.5. report them differently.

The EAG shall allow atomic addressing of device functions, e.g. if only the light intensity parameter is changed for one device, but the EEP contains other data fields, the EAG shall construct the whole EEP including default values for other data fields.

Due to upcoming enhancements and vendor specific extensions a client implementing the API has to respect the robustness principle ("be liberal in what you accept and conservative in what you send"). In terms of the API this especially implies a certain tolerance in consuming REST responses, which could be extended by additional data.

New versions of JSON API will always be backwards compatible using a *never remove, only add* strategy.

2.3. Security recommendations

The Security of the REST API is not part of this spec and manufacturer specific, but the EAG should use TLS/HTTPS and an authentication method, which is state of the art.



System Specification

2.4. JSON-REST API

2.4.1. Introduction to RESTful HTTP

REST is an architectural design to define how HTTP requests and URIs should be used. The key principles of REST are to give everything which is useable an ID, link things together, Make use of existing standards (e.g. HTTP), stateless communication and to allow a self-describing use of the URI/API.

The REST API of an EAG shall be based on standard HTTP Request (see chapter 2.4.2.). It shall provide the URI Resources described in chapter 3.3 and the Resources described in chapter 3.2. The information shall be displayed and described using JSON Format.

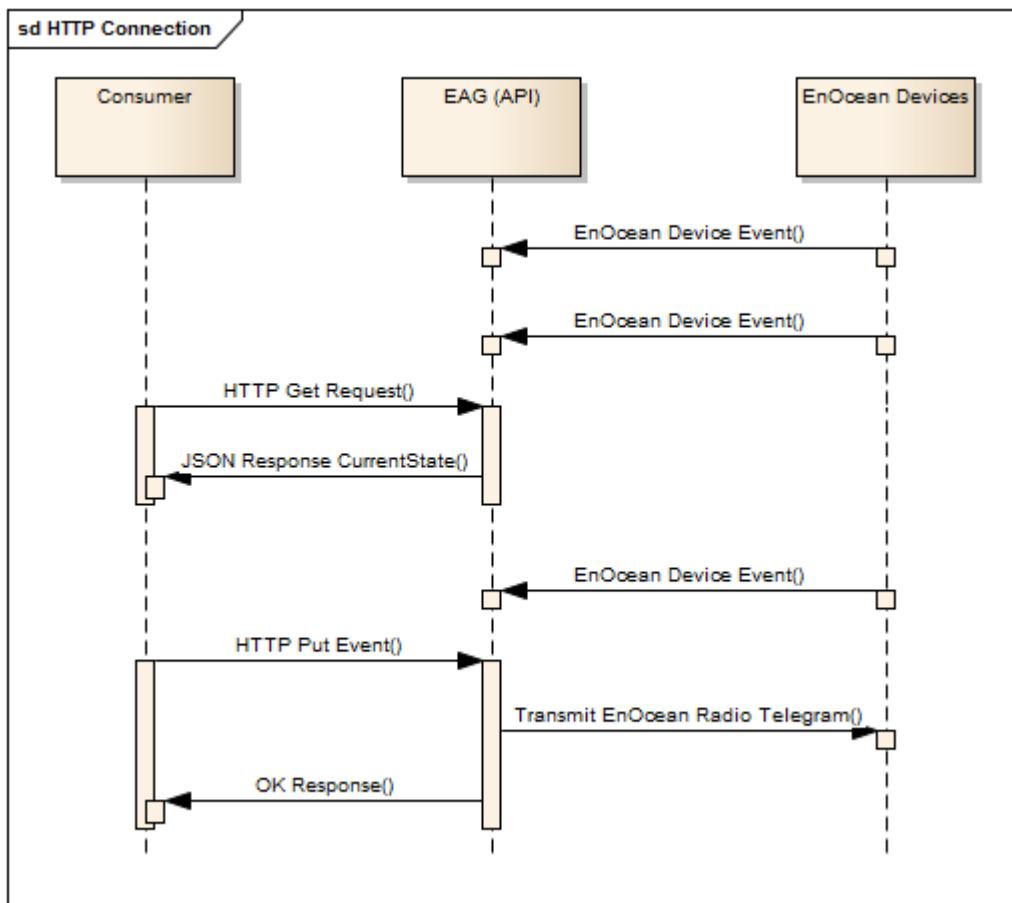


Figure 3: High level description of the HTTP connection

System Specification

2.4.2. Used HTTP methods

GET: Request information about a resource and, if available, the resource is displayed.

It is used to:

- Get the system state
- Get a profile description
- Get device Information
- Get the state of a device (Last transmitted state)

PUT: Updates (or creates) the specified resource

- Update the state of a device (triggers a transmission to the device)

2.4.3. HTTP Responses

HTTP Response Code	Description
200 (OK)	Returned when an application request is successful.
202 (Accepted)	The request has been accepted and has not been yet completed.
400 (Bad Request)	Returned when an error has occurred. In addition, an error key in the header object is transferred
401 (Unauthorized)	Returned when the application name/password is invalid.
403 (Forbidden)	Returned when an application is not allowed to make the request, such as when the application is inactive or the client's IP address is not in the list of known application addresses.
404 (Not Found)	Returned when the requested resource does not exist. For example, the profile does not exist, the device does not exist.
500 (Internal Error)	Returned when a error on Interface side has occurred. In addition, an error key in the header object is transferred

Table 1: HTTP codes

2.4.4. Introduction to JSON

JSON is a type of syntax for storing and exchanging data in lightweight data-interchange format.

System Specification

JSON Example

```
{  
    "variableName" : "AString",  
    "ArrayName" : [  
        { "Name":"RogerRabbit", "Company":"ACME"},  
        { "Name":"Brainiac", "Company":"ACME Development"}  
    ],  
    "object": {  
        "objectMember1":"Value1",  
        "objectMember2":"Value2"  
    }  
}
```

Figure 4: JSON Example

The example in Figure 4: JSON Example shows the basic structure of a JSON file. It uses '{' and '}' to start and close objects.

“Variable Name” : “Variable Value” is used to give a variable a value. Variable values can be of the type string, character, integer, Boolean, object and null.

Arrays are opened with '[' and closed with ']’.

For more information about JSON, the JSON website is a good reference [O13].

System Specification

3. REST API Description

3.1. Introduction

3.1.1. Basic JSON structures

The JSON Interface shall use UTF-8 for the encoding of the content. Each response shall contain a header and shall have the following structure

Basic Response Message

```
{  
    "header": {  
        "status": "HTTP status code",  
        "code": "Internal Gateway status code",  
        "message" : "Internal Gateway status code",  
        "content": "content of Message",  
        "gateway" : "current software version",  
        "timestamp": "transmission time in UTC format"  
    },  
    "object": [  
        {  
            "...": "...",  
            "...": "..."  
        }  
    ]  
}
```

Figure 5: Response Message Structure

Property	Type	Value / Formatting	Description	Opt
status	number	response code	HTTP Response Code	
code	number	code	Status Information Code	opt
message	string		Status information message	opt
content	string	systemInfo, profiles, profile, devices, device, telegrams, state, stream	message type	
gateway	string	Interface build	Software version of Interface	
timestamp	DateTime	yyyy-mm-ddT hh:mm:ss.sss+ hhmm	transmission time in UTC format	

Table 2: Header object description

System Specification

3.1.2. Return codes of the base Object

An EAG shall always add a code in the header object. The response codes are fragmented in four main areas.

- 1000-1999: Request OK
- 2000-2999: Error - URL or Syntax error
- 3000-3999: Error – Syntax OK but wrong content
- 8000-8999: Error – Internal error of the Gateway
- 4000-7999 and 9000-9999 are reserved.

1000-1999: Request OK

Code	HTTP Status	Meaning	Suggested Message
1000	200		OK
1002	202	Request ok, it will be executed later.	Will send telegram later
1500-1999			Reserved for manufacturer specific codes

Table 3 Return codes 1000-1999

2000-2999: Error - URL or Syntax error

Code	HTTP Status	Meaning	Suggested Message
2000	400	invalid REST Resource, e.g. /devices/<deviceId>/invalid	invalid URL %s
2001	404	unknown Path, e.g. /unknown/resource	%s not found
2002	400	e.g. DELETE /profiles/F6-02-01	unsupported request method %s
2003	400	e.g. /devices/telegrams?direction=invalid	parameter %s has unknown value %s
2004	400	POST without DATA	no data
2005	400	Malformed JSON	
2500-2999			Reserved for manufacturer specific codes

Table 4 Return codes 2000-2999

System Specification

3000-3999: Error – Syntax OK but wrong content

Code	HTTP Status	Meaning	Suggested Message
3000	400	e.g. D4-01-02	invalid EEP %s
3001	400	valid but not supported EEP	unsupported EEP %s
3100	404	e.g. /devices/unknown	unknown device %s
3101	400	device exists but is e.g. in learn in state	device %s in unsupported state
3102	400	POST of different devices with e.g. same friendlyId	duplicated ID %s
3103	400	POST of device without devicelD and without IoT label	Missing devicelD
3120	400	no function	no functions to set specified
3121	400	missing function(s)	incomplete request - function(s) missing: %s
3122	400	unknown function	unknown function %s
3123	400	duplicate function	duplicated function %s
3124	400	function without key	function without key
3125	400	function without value	missing value of function %s
3126	400	function with invalid value	invalid value %s of function %s
3127	400	function with invalid value	invalid value %s of function s, only scalar allowed
3128	400	function with value out of range	invalid value %s of function s, min: s, max:%s)
3500-3999		Reserved for manufacturer specific codes	

Table 5: Return codes 3000-3999

8000-8999: Error – Internal error of the Gateway

Code	HTTP Status	Meaning	Suggested Message
8000	500		internal error (%s)
8001	500		not implemented
8500-8999		Reserved for manufacturer specific codes	
9000-9999		Reserved	

Table 6: Return codes 8000-8001

System Specification

3.1.3. Resources base path overview

A gateway shall implement the following base resources. From each base resources sub resources are available which are listened in the containing chapter.

Resource URI	Content
/system	Contains all information about the System (Chapter 3.3.)
/profiles	Contains information about supported profiles and specific Information about specific Profile. (Chapter 3.4.)
/devices	List of all devices, state of devices and access to each device separately. (Chapter 3.5.)

Table 7: Resource overview

3.1.4. Object overview

Following objects are used and generated in the response messages. These objects are intended as help and are not resources. All the following objects shall be generated by the different resources.

Object name	Content	Generated by following Resources
systemInfo	Information about the System	/system/info
profiles	List of all available profiles of the gateway.	/profiles
profile	Information about the used EEP-Profile. This is a list of all available states which can be set/read for a certain device.	/profiles/{EEP} /devices/{ID}/profile
devices	List of all devices	/devices
device	Information about a device	/devices/{ID}
state	Current state of a device	/devices/{ID}/state /devices/states
stream	Represent a received status update / telegram of a device	/devices/stream /devices/{ID}/stream
telegrams	Log of status updates/telegrams	/devices/telegrams /devices/{ID}/telegrams

Table 8: Object overview

System Specification

3.1.5. State reporting Options

The EAG shall implement a feature which is used to decide when the state of each key is transmitted and it shall be possible to read or modify the setting. Three different options are available and shall be part of the device object. The default settings should be as described below, for each attribute, but may be modified by the manufacturer to better reflect different device types.

- **TransmitOnConnect**

If this attribute is set to true, the resources which respond with a state object, shall report the last received state. It makes sense to set this attribute to false for rocker/button switches as the last State of a rocker Switch is in most cases "release" and the control ("press") action has already happened.

Attention: If the attribute TransmitOnConnect is not set for any device, the transfer of live states starts with the first received telegram of a known device after the connection of a client.

Default for all devices should be: On

- **TransmitOnEvent**

If this attribute is set, then the value shall be transmitted after each received telegram. The other case could be useful for some devices where not the whole range of EEPROM values is used. For example, a device uses an EEPROM which transmits temperature and moisture but the device itself has no temperature sensor. To suppress the permanent transfer of "Temp 0 degree" this value can be hidden in the API transmission.

Default for all devices should be: On

- **TransmitOnDuplicate**

If this attribute is set, then the Interface shall transmit received values of devices that have not changed. For example, a window sensor transmits cyclically every 10 minutes his "closed" state. If this attribute is not set, then the Interface suppresses the output to the API.

Since the cyclic transmission of values is often an attribute of the EnOcean protocol, as a keep alive signal, in most cases it is sufficient to only transmit a value when it changes. As it could be interesting for maintenance or security reason to get the information of duplicated telegrams, this attribute can be modified.

Default for all devices should be: Off

System Specification

3.1.6. Streaming API Resources

The Streaming API Resources keep a HTTP connection open to push updates to the client. The EAG shall implement the possibility to keep the HTTP connection open and still allow other clients to connect the EAG for REST or additional streaming API connections. A streaming API connection has the advantage compared to polling that information updates are transferred immediately after an event has happened. This also allows for an optimized usage of hardware and network connection resources and is way faster than a connection establishment with HTTP(S) for a callback.

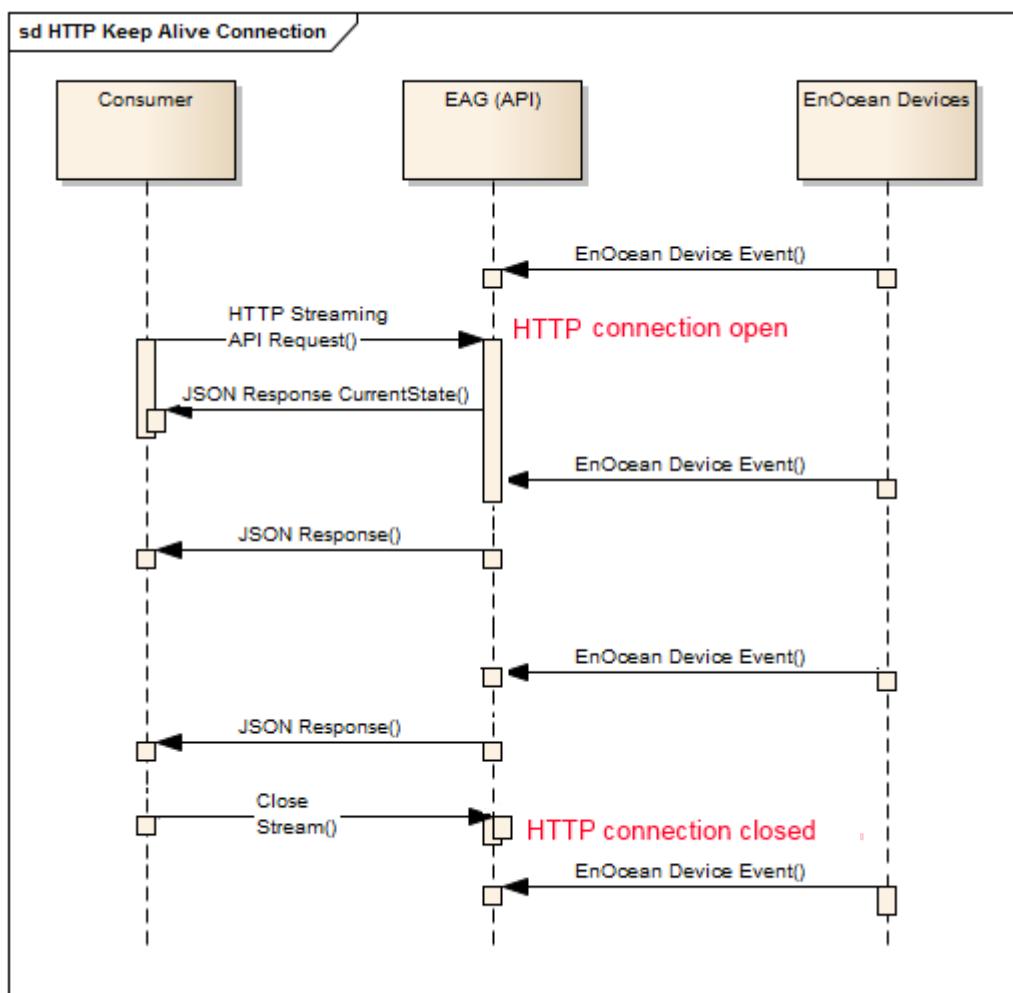


Figure 6: HTTP Keep-Alive Connection

3.1.7. JSON formatting and delimiting options for Streaming API

The URI resources which use streaming may be influenced in the way that their data is formatted and delimited.

Format

System Specification

- **formatted (default)**
The JSON Object are formatted in a way that they can be read by Humans. This option shall not be usable with newline.
- **singleLine**
Each JSON Object is given out on a single line.

```
JSON for single Line Representation
>{"header": {...}, "states" : [...]}]}
```

Figure 7 single Line Json Example

Delimiter

- **length**
Every JSON Object is announced by its length in bytes followed by a CR+LF. (identical to "lengthBytes" because of conformity to popular APIs)
- **lengthBytes**
Every JSON Object is announced by its length in bytes followed by a CR+LF.
- **lengthCharacters**
Every JSON Object is announced by its length in characters followed by a CR+LF. (The code page of stream is UTF-8 and the number of bytes per character can differ)
- **newline**
Every JSON Object is separated from the next Object by a CR+LF. The output format must be set to **singleLine**.
- **emptyLine (default)**
Every JSON Object is separated from the next Object by a CR+LF+CR+LF

3.2. Available JSON objects

3.2.1. systemInfo object

The systemInfo object is used to represent state of the system and display information about the EAG.

Used by following Resources:

- GET /system/info (Chapter 3.3.1.)

System Specification

Property	Type	Value/Formatting	Description
version	string		contains the current Software version, date and time of Interface
baseId	string	4 byte hex value	current BaseID of Interface
possibleBaseIdChanges	integer	number (10..0)	remaining number of BaseID changes (maximum 10 times, according to specifications of the chip)
eurid	string	4 byte hex value	EURID of the built-in EnOcean Device
frequency	integer	868, 902, 928	Used frequency of the Interface

Table 9: systemInfo Object

JSON for systemInfo object

```
"systemInfo" : {
    "version" : "Interface v0.9.1 2016.03.15 14:43",
    "baseId" : "FFA04700",
    "possibleBaseIdChanges" : 10,
    "eurid" : "0185408E",
    "frequency" : 868
}
```

Figure 8: systeminfo JSON example

3.2.2. profiles array object

The profiles array object is used to represent all supported profiles by the EAG.

Used by following Resources:

- GET /profiles (Chapter 3.3.1.)

Property	Type	Value/Formatting	Description
eep	String	xx-xx-xx	EnOcean Equipment Profiles, definition of EnOcean radio telegram structure
title	String	May be translated	short description of eep profile
variations	Array of objects	[{}]	Information about available versions of the profile

Table 10: profiles array object

Property	Type	Value/Formatting	Description
direction	String	from to	direction of transport (<i>from</i> or <i>to</i> device)
version	Float	x.x	Version of the EO/IP profile (not EEP version) .

Table 11: variations object

System Specification

JSON for profiles object

```

"profiles" : [ {
    "eep" : "A5-02-01",
    "title" : "Temperature Sensors, Temperature Sensor Range -40°C to 0°C",
    "variations" : [ {
        "direction" : "from",
        "version" : 1.0
    } ],
    { ...
        "eep" : "A5-02-02",
        "title" : "Temperature Sensors, Temperature Sensor Range -30°C to +10°C",
        "variations" : [ {
            "direction" : "from",
            "version" : 1.0
        } ],
        ...
    }
]
  
```

Figure 9: profiles JSON example

3.2.3. profile object

The profile object is used to represent a full description of an EEP. It can be used to query all information about a used EEP.

Used by following Resources:

- GET /profiles/{EEP} (Chapter 3.4.2.)
- GET /device/profile (Chapter 3.5.6.)

Property	Type	Value/Formatting	Description	Opt
eep	string	xx-xx-xx	EnOcean Equipment Profiles, definition of EnOcean radio telegram structure. not shown in /device/profile	
title	string	May be translated	description of eep profile not shown in /device/profile	
functionGroups	array of objects	[{}]	array of <i>functionGroup</i> objects	

Table 12: profile object

Property	Type	Value/Formatting	Description	Opt
title	String	May be translated	Title of the group	
direction	string	from to	direction of transport (<i>from</i> , <i>to</i> device or both)	
functions	array of objects	[{}]	array of function objects	

Table 13: functionGroups object

System Specification

Property	Type	Value/Formatting	Description	Opt
key	String		key value, as a function identifier	
description	String	Description of the key, may be translated to native client language.	description of function	opt
values	array of objects	[{}]	array of value objects	
defaultValue	String		In case of direction "to": Default value which will be send if no value has been set	opt

Table 14: functions object

Property	Type	Value/Formatting	Description	Opt
value	String		Value (if not present, range needs to be present!)	opt
meaning	String	Description of the value, may be translated to native client language.	meaning of value	opt
range	Object	{}	range object (if not present, value needs to present!)	opt

Table 15: values object

Property	Type	Value/Formatting	Description	Opt
min	Float		Representation of the valid range of values with increment and, where appropriate, the corresponding unit	
max	Float			
step	Float			
unit	String	[unit]		opt

Table 16: range object



System Specification

JSON for profile object

```
"profile" : {  
    "eep" : "A5-02-01",  
    "title" : "Temperature Sensors, Temperature Sensor Range -40°C to 0°C",  
    "functionGroups" : [ {  
        "direction" : "from",  
        "functions" : [ {  
            "key" : "temperature",  
            "description" : "Temperature (linear)",  
            "values" : [ {  
                "range" : {  
                    "min" : -40,  
                    "max" : 0,  
                    "step" : 0.157,  
                    "unit" : "°C"  
                } ]  
            } ]  
        } ]  
    } ]  
}
```

Figure 10: profile A5-02-01 JSON example

JSON for profile object

```
"profile" : {  
    "eep" : "D2-01-0A",  
    "title" : "Electronic switches and dimmers with Energy Measurement and Local Control",  
    "functionGroups" : [ {  
        "title" : "Actuator Set Output",  
        "direction" : "to",  
        "functions" : [ {  
            "key" : "switch",  
            "values" : [ {  
                "value" : "off",  
                "meaning" : "Output value OFF"  
            }, {  
                "value" : "on",  
                "meaning" : "Output value ON"  
            } ]  
        } ]  
    }, {  
        "title" : "Configure Actuator",  
        "direction" : "to",  
        "functions" : [ {  
            "key" : "defaultState",  
            "values" : [ {  
                "value" : "off",  
                "meaning" : "Default state: OFF"  
            }, {  
                "value" : "on",  
                "meaning" : "Default state: ON"  
            }, {  
                "value" : "previousState",  
                "meaning" : "Default state: remember previous state"  
            } ],  
            "defaultValue" : "previousState"  
        }, {  
            "key" : "localControl",  
            "values" : [ {  
                "value" : "off",  
                "meaning" : "Disable local control"  
            }, {  
                "value" : "on",  
                "meaning" : "Enable local control"  
            } ],  
            "defaultValue" : "on"  
        } ]  
    } ]  
}
```

System Specification

```

}, {
  "key" : "powerFailureDetection",
  "values" : [ {
    "value" : "off",
    "meaning" : "Disable Power Failure Detection"
  }, {
    "value" : "on",
    "meaning" : "Enable Power Failure Detection"
  }],
  "defaultValue" : "on"
}, {
  "key" : "taughtInDevices",
  "values" : [ {
    "value" : "off",
    "meaning" : "Disable taught-in devices (with different EEP)"
  }, {
    "value" : "on",
    "meaning" : "Enable taught-in devices (with different EEP)"
  }],
  "defaultValue" : "on"
}, {
  "key" : "userInterfaceIndication",
  "values" : [ {
    "value" : "day",
    "meaning" : "User interface indication: day operation"
  }, {
    "value" : "night",
    "meaning" : "User interface indication: night operation"
  }],
  "defaultValue" : "day"
}
}, {
  "title" : "Actuator Status Response",
  "direction" : "from",
  "functions" : [ {
    "key" : "localControl",
    "values" : [ {
      "value" : "off",
      "meaning" : "Local control disabled / not supported"
    }, {
      "value" : "on",
      "meaning" : "Local control enabled"
    }]
  }, {
    "key" : "powerFailureDetected",
    "values" : [ {
      "value" : "false",
      "meaning" : "Power Failure not detected/not supported/disabled"
    }, {
      "value" : "true",
      "meaning" : "Power Failure Detected"
    }]
  }, {
    "key" : "powerFailureDetection",
    "values" : [ {
      "value" : "off",
      "meaning" : "Power Failure Detection disabled/not supported"
    }, {
      "value" : "on",
      "meaning" : "Power Failure Detection enabled"
    }]
  }, {
    "key" : "switch",
    "values" : [ {
      "value" : "off",
      "meaning" : "Output value OFF"
    }, {
      "value" : "on",
      "meaning" : "Output value ON"
    }]
  }
]

```

System Specification

```

        }
    },
    "title" : "Actuator Query",
    "direction" : "to",
    "functions" : [ {
        "key" : "query",
        "values" : [ {
            "value" : "status",
            "meaning" : "Query status"
        }]
    }],
    "version" : 0.9
}

```

Figure 11: profile D2-01-0A JSON example

3.2.4. devices array object

The devices array object is used to represent an array of all learned in devices to the EAG.

Used by following Resources:

- GET /devices (Chapter 3.5.1.)

Property	Type	Value/Formatting	Description
deviceId	String	4 byte hex value (8 characters with leading zeros)	SenderId of EnOcean device, EnOcean modules usually send telegrams with their unique 32-bit Chip ID. In the other case, these are the Base ID of the EnOcean device.
friendlyId	String		user-assigned name of EnOcean device
physicalDevice	String		group name of actuators and sensors of the same physical device

Table 17: devices object

JSON for devices array object

```

"devices" : [ {
    "deviceId" : "FEFFFF60",
    "friendlyId" : "BathroomSwitch"
},
{
    "deviceId" : "01843197",
    "friendlyId" : "OutDoorToiletTemperature"
}, {
    "deviceId" : "00435678",
    "friendlyId" : "ButtonSwitch",
    "physicalDevice" : "MultiDevice"
}, {
    "deviceId" : "00435679",
    "friendlyId" : "Controler",
    "physicalDevice" : "MultiDevice"
} ]
}

```

Figure 12: devices array JSON example

System Specification

3.2.5. device object

The device object is used to represent all information about a specific device.

Used by following Resources:

- GET /devices (Chapter 3.5.1.)

Property	Type	Value/Formatting	Description	Opt
deviceId	string	4 byte hex value	SenderID of EnOcean device, EnOcean modules usually send telegrams with their unique 32-bit Chip ID. In the other case, these are the Base ID of the EnOcean device.	
friendlyId	string		user-assigned name of EnOcean device	
physicalDevice	string		group name of actuators and sensors of the same physical device	opt
eeps	array	[{}]	EEPS supported by the device	
manufacturer	string		Based on manufacturer ID if send	opt
location	string		Location of the device	opt
dbm	integer		dBm of last received telegram	opt
firstSeen	DateTime	yyyy-mm-ddT hh:mm:ss.sss+hhmm	timestamp on which the device has been detected for the first time	
lastSeen	DateTime	yyyy-mm-ddT hh:mm:ss.sss+hhmm	timestamp on which the device has been seen last time	opt

Table 18: device Object

Property	Type	Value/Formatting	Description
eep	String	XX-XX.XX	EnOcean Equipment Profiles, definition of EnOcean radio telegram structure
version	string	x.x	API Version of the profile
direction	String	from to both	Supported directions
baseIdChannel	integer		BaseID Channel transmitted to device, this channel (0 - 128) is automatically assigned from Interface.

Table 19: eep Object

System Specification

JSON for device object

```

"device" : {
    "deviceId" : "01910188",
    "friendlyId" : "Opus-Bridge-2K",
    "eeps" : [ {
        "eep" : "D2-01-11",
        "version" : 0.9,
        "direction" : "both"
    }, {
        "eep" : "F6-02-01",
        "version" : 0.9,
        "direction" : "from"
    }, {
        "eep" : "F6-03-01",
        "version" : 0.9,
        "direction" : "from"
    } ],
    "manufacturer" : "Jaeger Direkt",
    "firstSeen" : "2016-10-27T07:59:07.137+0200",
    "lastSeen" : "2016-11-30T12:51:33.350+0100",
    "dbm" : -70
}

```

Figure 13: device JSON example

3.2.6. state / states object

The state object is used to represent the current/last known state of a device.

Used by following Resources:

- GET /devices/states (Chapter 3.5.1.)
- GET /devices/{id}/state (Chapter 3.5.7.)
- GET /devices/stream (Chapter 3.5.3.)
- GET /devices//{id}/stream (Chapter 3.5.1.)

Property	Type	Value/Formatting	Description
deviceId	string	4 byte hex value	SenderID of EnOcean device, EnOcean modules usually send telegrams with their unique 32-bit Chip ID. In the other case, these are the Base ID of the EnOcean device.
friendlyId	string		user-assigned name of EnOcean device
physicalDevice	string		group name of actuators and sensors of the same physical device
functions	array of objects	[{}]	array of function objects

Table 20: state / states Object



System Specification

Property	Type	Value/Formatting	Description	Opt
key	string			
channel	integer			opt
value	float			
unit	string	[unit]		opt
meaning	string	Description of the value, may be translated to native client language.		opt
timestamp	DateTime	yyyy-mm-ddT hh:mm:ss.sss+ hhmm		
age	integer	In ms		

Table 21: functions array object

JSON for state object

```

"state" : {
  "deviceId" : "01910188",
  "friendlyId" : "Opus-Bridge-2K",
  "functions" : [ {
    "key" : "switch",
    "channel" : 1,
    "value" : "on",
    "meaning" : "Output value ON",
    "timestamp" : "2016-11-30T13:39:32.250+0100",
    "age" : 411515
  }, {
    "key" : "switch",
    "channel" : 0,
    "value" : "off",
    "meaning" : "Output value OFF",
    "timestamp" : "2016-11-30T12:51:33.217+0100",
    "age" : 3290548
  } ]
}

```

Figure 14: state JSON example

3.2.7. telegram / telegrams object

The states object is used in streaming rest calls to represent updates of devices

Used by following Resources:

- GET /devices/stream (Chapter 3.5.3.)
- GET /devices/{id}/stream (Chapter 3.5.1.)
- GET /devices/telegrams (Chapter 3.5.4.)
- GET /devices/{id}/telegrams (Chapter 3.5.10.)



System Specification

Property	Type	Value/Formatting	Description
deviceId	4 byte hex value	xxxxxxxx	SenderID of EnOcean device, EnOcean modules usually send telegrams with their unique 32-bit Chip ID. In the other case, these are the Base ID of the EnOcean device.
friendlyId	string		user-assigned name of EnOcean device
physicalDevice	string		group name of actuators and sensors of the same physical device
timestamp	DateTime	yyyy-mm-ddT hh:mm:ss.sss+hhmm	telegram transmission time in UTC format
direction	string	from to	direction of transport (<i>from</i> device sent / <i>to</i> device sent)
functions	array of objects	[{}]	array of function objects
telegramInfo	object	{}	telegramInfo object

Table 22: telegram object

Property	Type	Value/Formatting	Description	Opt
key	string			
channel	integer		Group of state functions, consisting of a <i>key</i> value and its last saved <i>value</i> , the receiving <i>timestamp</i> and and the appropriate <i>age</i> in milliseconds of the last message that contains the value. Additional optional parameters are represented by: <i>meaning</i> (conceptual sense of a value), <i>channel</i> (the addressed channel) and the associated <i>unit</i>	opt
value	float			
unit	string	[<i>unit</i>]		opt
meaning	string	Description of the value, may be translated to native client language.		opt
timestamp	DateTime	yyyy-mm-ddT hh:mm:ss.sss+hhmm		
age	integer			

Table 23: functions array object



System Specification

Property	Type	value/formatting	description
data	string	x byte hex value	Payload of ERP telegrams or ESP packets
status	integer		identifies if the subtelegram is transmitted from a repeater and the type of integrity control mechanism used (note: not present in a switch telegram)
dbm	integer		signal strength of received / transmitted telegram
rorg	string	1 byte hex value	identifier for subtelegram type

Table 24: telegramInfo object

JSON for telegram Object

```
"telegram" : {  
    "deviceId" : "01843197",  
    "friendlyId" : "temp",  
    "physicalDevice" : "testdevice",  
    "timestamp" : "2016-03-16T18:12:16.134+0100",  
    "direction" : "from",  
    "functions" : [ {  
        "key" : "humidity",  
        "value" : "0",  
        "unit" : "%"  
    }, {  
        "key" : "temperature",  
        "value" : "0",  
        "unit" : "°C"  
    } ],  
    "telegramInfo" : {  
        "data" : "0000000A",  
        "status" : "0",  
        "dbm" : -65,  
        "rorg" : "A5"  
    }  
}
```

Figure 15: telegram JSON example

System Specification

3.3. System Resources

3.3.1. GET /system/info

This command requests information about the system.

```
GET http://hostname:port/system/info
```

```
{
  "header" : {
    "httpStatus" : 200,
    "content" : "systemInfo",
    "gateway" : "Interface",
    "timestamp" : "2016-03-15T13:13:49.916+0100"
  },
  "systemInfo" : {
    "version" : "Interface v0.9.1 2016.03.15 14:43",
    "baseId" : "FFA04700",
    "possibleBaseIdChanges" : 10,
    "eurid" : "0185408E",
    "frequency" : 868
  }
}
```

Figure 16: /system/info JSON response

3.4. Profiles Resources

3.4.1. GET /profiles

This command returns an overview of all supported profiles and the profile version of the EAG Interface.

System Specification

```
GET http://hostname:port/profiles
{
  "header" : {
    "httpStatus" : 200,
    "content" : "profiles",
    "gateway" : "interface",
    "timestamp" : "2016-05-09T16:25:04.671+0200"
  },
  "profiles" : [ {
    "eep" : "A5-02-01",
    "title" : "Temperature Sensors, Temperature Sensor Range -40°C to 0°C",
    "variations" : [ {
      "direction" : "from",
      "version" : 1.0
    } ]
  }, {
    "eep" : "A5-02-02",
    "title" : "Temperature Sensors, Temperature Sensor Range -30°C to +10°C",
    "variations" : [ {
      "direction" : "from",
      "version" : 1.0
    } ]
  },
  ...
  {
    "eep" : "D2-01-08",
    "title" : "Electronic switches and dimmers with Energy Measurement and Local Control",
    "variations" : [ {
      "direction" : "both",
      "version" : 1.0
    } ]
  }
}
```

Figure 17: /profiles JSON response example

3.4.2. GET /profiles/{eepId}?version=x.x

This command returns information about a certain profile.

Format of {eepId} = RORG-FUNC-TYPE of the EEP to be shown in detail.

Parameters	Type	Value/formatting	Description
version	String	x.x	Profile description version to use

Table 25: optional parameters of /profiles

```
GET http://hostname:port/profiles/A5-20-04
"profile" : {
  "eep" : "A5-20-04",
  "title" : "HVAC Components, Heating Radiator Valve Actuating Drive with Feed and Room Temperature Measurement, Local Set Point Control and Display",
  "functionGroups" : [ {
    "direction" : "from",
    "functions" : [ {
      "key" : "errorCode",
      "values" : [ {
        "value" : "batteryEmpty",
        "meaning" : "Battery is empty"
      }, {
        "value" : "blockedValve",
        "meaning" : "Valve is blocked"
      } ]
    } ]
  }]
```



System Specification

```
        "meaning" : "Blocked valve"
    }, {
        "value" : "endpointDetectionError",
        "meaning" : "End point detection error"
    }, {
        "value" : "frostProtection",
        "meaning" : "Frost protection"
    }, {
        "value" : "measurementError",
        "meaning" : "Measurement error"
    }, {
        "value" : "noError",
        "meaning" : "No error reported"
    }, {
        "value" : "noReponseFromController",
        "meaning" : "No response from controller"
    }, {
        "value" : "noValve",
        "meaning" : "No valve"
    }, {
        "value" : "notTaughtIn",
        "meaning" : "Not taught in"
    }, {
        "value" : "teachInError",
        "meaning" : "Teach-in error"
    } ]
}, {
    "key" : "feedTemperature",
    "description" : "Current feed temperature value",
    "values" : [ {
        "range" : {
            "min" : 20,
            "max" : 80,
            "step" : 0.235,
            "unit" : "°C"
        }
    } ]
}, {
    "key" : "locked",
    "description" : "Shows if all buttons on the actuator are locked",
    "values" : [ {
        "value" : "false",
        "meaning" : "Manual room temperature selection enabled"
    }, {
        "value" : "true",
        "meaning" : "Manual room temperature selection disabled"
    } ]
}, {
    "key" : "measurement",
    "description" : "Measure feed + room temperature",
    "values" : [ {
        "value" : "off",
        "meaning" : "Measure feed + room temperature is inactive"
    }, {
        "value" : "on",
        "meaning" : "Measure feed + room temperature is active"
    } ]
}, {
    "key" : "query",
    "description" : "Request for status from the controller",
    "values" : [ {
        "value" : "noChange",
        "meaning" : "No change"
    }, {
        "value" : "status",
        "meaning" : "Status requested"
    } ]
}, {
    "key" : "roomTemperature",
```



System Specification

```
"description" : "Current room temperature",
"values" : [ {
  "range" : {
    "min" : 10,
    "max" : 30,
    "step" : 0.078,
    "unit" : "°C"
  }
} ],
}, {
  "key" : "temperatureSetPoint",
  "description" : "Current temperature set point",
  "values" : [ {
    "range" : {
      "min" : 10,
      "max" : 30,
      "step" : 0.078,
      "unit" : "°C"
    }
  }
],
}, {
  "key" : "valve",
  "description" : "Current valve position",
  "values" : [ {
    "range" : {
      "min" : 0,
      "max" : 100,
      "step" : 1,
      "unit" : "%"
    }
  }
],
}, {
  "direction" : "to",
  "functions" : [ {
    "key" : "command",
    "description" : "Initiates certain temporary service operations",
    "values" : [ {
      "value" : "closeValve",
      "meaning" : "Close valve"
    },
    {
      "value" : "noChange",
      "meaning" : "No change"
    },
    {
      "value" : "openValve",
      "meaning" : "Open valve"
    },
    {
      "value" : "runInit",
      "meaning" : "Run initialisation"
    }
  ],
    "defaultValue" : "noChange"
  },
  {
    "key" : "displayOrientation",
    "description" : "Adjusts the display orientation",
    "values" : [ {
      "range" : {
        "min" : 0,
        "max" : 270,
        "step" : 90,
        "unit" : "°"
      }
    }],
    "defaultValue" : 0
  },
  {
    "key" : "locked",
    "description" : "Set the button lock status",
    "values" : [ {
      "value" : "false",
      "meaning" : "Manual room temperature selection enabled"
    }
  ]
}
```



System Specification

```

        },
        "value" : "true",
        "meaning" : "Manual room temperature selection disabled"
    } ],
    "defaultValue" : "false"
}, {
    "key" : "measurement",
    "description" : "Measure feed + room temperature",
    "values" : [ {
        "value" : "off",
        "meaning" : "Disable measurement for energy saving"
    }, {
        "value" : "on",
        "meaning" : "Enable feed + room temperature measurement"
    } ],
    "defaultValue" : "on"
}, {
    "key" : "temperatureSetPoint",
    "description" : "Temperature set point",
    "values" : [ {
        "range" : {
            "min" : 10,
            "max" : 30,
            "step" : 0.078,
            "unit" : "°C"
        }
    } ]
}, {
    "key" : "valve",
    "description" : "Valve position",
    "values" : [ {
        "range" : {
            "min" : 0,
            "max" : 100,
            "step" : 1,
            "unit" : "%"
        }
    } ]
}, {
    "key" : "wakeUpCycle",
    "description" : "Defines the cyclic wake-up time",
    "values" : [ {
        "meaning" : "Cyclic wake-up time, 30 secs - 25 min in 30 seconds steps",
        "range" : {
            "min" : 30,
            "max" : 1500,
            "step" : 30,
            "unit" : "s"
        }
    }, {
        "meaning" : "Cyclic wake-up time, 3-42 hours in 3 hours steps",
        "range" : {
            "min" : 10800,
            "max" : 151200,
            "step" : 10800,
            "unit" : "s"
        }
    }, {
        "value" : "10",
        "meaning" : "Minimal cyclic wake-up time = 10 seconds"
    } ],
    "defaultValue" : 600
} ]
}
}

```

Figure 18: /profiles/A5-20-04 JSON response example

System Specification

3.5. Devices Resource

3.5.1. GET /devices

This command returns a list of known devices for this EAG.

GET <http://hostname:port/devices>

```
{
  "header" : {
    "httpStatus" : 200,
    "content" : "devices",
    "gateway" : "Interface",
    "timestamp" : "2001-01-01T01:22:04.802+0100"
  },
  "devices" : [ {
    "deviceId" : "FEFFFF60",
    "friendlyId" : "BathroomLightSwitch"
  }, {
    "deviceId" : "0014AAD8",
    "friendlyId" : "IlluminationSensor"
  }, {
    "deviceId" : "01843197",
    "friendlyId" : "OutdoorBathRoomTemperatureSensor"
  } ]
}
```

Figure 19: /devices/JSON response

3.5.2. GET /devices/states

This command returns the current state of all known devices.

GET <http://hostname:port/devices/states>

```
{
  "header" : {
    "httpStatus" : 200,
    "content" : "states",
    "gateway" : "interface",
    "timestamp" : "2015-10-15T11:22:45.594+0200"
  },
  "states" : [ {
    "deviceId" : "00851E54",
    "friendlyId" : "piotek",
    "functions" : [ {
      "key" : "pirStatus",
      "value" : "off",
      "meaning" : "PIR off",
      "timestamp" : "2016-05-09T16:33:36.984+0200",
      "age" : 9533
    }, {
      "key" : "supplyVoltage",
      "value" : 2.18,
      "unit" : "V",
      "timestamp" : "2016-05-09T16:33:36.984+0200",
      "age" : 9533
    } ]
  }
}
```

System Specification

```

}, {
  "deviceId" : "0181A5BC",
  "friendlyId" : "EnOceanTemperature",
  "functions" : [ {
    "key" : "temperature",
    "value" : 25.57,
    "unit" : "°C",
    "timestamp" : "2016-05-09T16:27:08.441+0200",
    "age" : 398076
  } ]
}, {
  "deviceId" : "01844BB0",
  "friendlyId" : "contact",
  "functions" : [ {
    "key" : "contact",
    "value" : "open",
    "meaning" : "Open",
    "timestamp" : "2016-05-09T16:22:54.496+0200",
    "age" : 652021
  } ]
}, {
  "deviceId" : "0180ADC2",
  "friendlyId" : "Z12aTempOutsideEast",
  "functions" : [ {
    "key" : "temperature",
    "value" : 26.67,
    "unit" : "°C",
    "timestamp" : "2016-05-09T16:30:18.140+0200",
    "age" : 208377
  } ]
}, {
  "deviceId" : "0185570D",
  "friendlyId" : "VT5-1_Left",
  "physicalDevice" : "RoomPanel_FTR55D",
  "functions" : [ {
    "key" : "slideSwitch",
    "value" : "posDayOn",
    "meaning" : "Slide switch On/Day",
    "timestamp" : "2016-05-09T16:20:54.113+0200",
    "age" : 772404
  }, {
    "key" : "temperature",
    "value" : 24.31,
    "unit" : "°C",
    "timestamp" : "2016-05-09T16:20:54.113+0200",
    "age" : 772404
  }, {
    "key" : "temperatureSetPoint",
    "value" : 18.35,
    "unit" : "°C",
    "timestamp" : "2016-05-09T16:20:54.113+0200",
    "age" : 772404
  } ]
}, {
  "deviceId" : "018F8927",
  "friendlyId" : "VT5-1_Right",
  "physicalDevice" : "TempSensor_FTF65S",
  "functions" : [ {
    "key" : "temperature",
    "value" : 23.53,
    "unit" : "°C",
    "timestamp" : "2016-05-09T16:28:40.853+0200",
    "age" : 305664
  } ]
}, {
  "deviceId" : "018FF884",
  "friendlyId" : "SR06-LCD-2T",
  "functions" : [ {
    "key" : "setPoint",
    "value" :
  } ]
}

```

System Specification

```

    "value" : 0.00,
    "unit" : "°C",
    "timestamp" : "2016-05-09T10:21:37.043+0200",
    "age" : 22329474
  }, {
    "key" : "temperature",
    "value" : 22.90,
    "unit" : "°C",
    "timestamp" : "2016-05-09T10:21:37.043+0200",
    "age" : 22329475
  } ]
}, {
  "deviceId" : "018720FE",
  "friendlyId" : "afrisoCo2",
  "functions" : [ [
    {
      "key" : "co2",
      "value" : 470.59,
      "unit" : "ppm",
      "timestamp" : "2016-05-09T16:30:31.381+0200",
      "age" : 195137
    }
  ] ],
  "deviceId" : "01870183",
  "friendlyId" : "myPlug",
  "functions" : [ [
    {
      "key" : "energy",
      "value" : 1172.99993,
      "unit" : "Wh",
      "timestamp" : "2016-05-09T16:33:12.474+0200",
      "age" : 34044
    },
    {
      "key" : "power",
      "value" : 0.00,
      "unit" : "W",
      "timestamp" : "2016-05-09T16:32:55.432+0200",
      "age" : 51086
    }
  ] ]
}

```

Figure 20: /devices/state JSON response

3.5.3. GET /devices/stream?direction={dir}&delimited={delimited}&output={output}

This command gets the actual status of devices and informs the client of any changes via a stream of telegram objects. The stream uses the chunked transfer encoding of the HTTP[RFC2].

System Specification

Parameter	Datatype	Valid values	Default	Functionality
direction	String	from to both	both	Defines which state changes are shown. From the device(from), send from the EAG to the device(to), or both
delimited	String	length lengthBytes lengthCharacters newline emptyLine	emptyLine	Modifes the delimiter between array entries see chapter 3.1.7.
output	String	formatted singleLine	formatted	Modifes the formatting between received events see chapter 3.1.7.

Table 26: optional parameters of /device/stream

GET <http://hostname:port/devices/stream>

```
{
  "header" : {
    "httpStatus" : 200,
    "content" : "states",
    "gateway" : "interface",
    "timestamp" : "2016-05-09T16:34:52.056+0200"
  },
  "states" : [ {
    "deviceId" : "00851E54",
    "friendlyId" : "piotek",
    "functions" : [ {
      "key" : "pirStatus",
      "value" : "off",
      "meaning" : "PIR off",
      "timestamp" : "2016-05-09T16:34:37.316+0200",
      "age" : 14740
    }, {
      "key" : "supplyVoltage",
      "value" : 2.18,
      "unit" : "V",
      "timestamp" : "2016-05-09T16:34:37.316+0200",
      "age" : 14740
    } ]
  }, {
    "deviceId" : "0181A5BC",
    "friendlyId" : "EnOceanTemperature",
    "functions" : [ {
      "key" : "temperature",
      "value" : 25.57,
      "unit" : "°C",
      "timestamp" : "2016-05-09T16:27:08.441+0200",
      "age" : 463615
    } ]
  }, {
    "deviceId" : "01844BB0",
    "friendlyId" : "contact",
    "functions" : [ {
      "key" : "contact",
      "value" : "open",
      "meaning" : "Open",
      "timestamp" : "2016-05-09T16:22:54.496+0200",
      "age" : 14740
    } ]
  }
}
```

System Specification

```

        "age" : 717561
    } ]
}, {
    "deviceId" : "0180ADC2",
    "friendlyId" : "Z12aTempOutsideEast",
    "functions" : [ [
        "key" : "temperature",
        "value" : 26.67,
        "unit" : "°C",
        "timestamp" : "2016-05-09T16:30:18.140+0200",
        "age" : 273917
    } ]
}, {
    "deviceId" : "0185570D",
    "friendlyId" : "VT5-1_Left",
    "physicalDevice" : "RoomPanel_FTR55D",
    "functions" : [ [
        "key" : "slideSwitch",
        "value" : "pos0DayOn",
        "meaning" : "Slide switch On/Day",
        "timestamp" : "2016-05-09T16:20:54.113+0200",
        "age" : 837944
    }, {
        "key" : "temperature",
        "value" : 24.31,
        "unit" : "°C",
        "timestamp" : "2016-05-09T16:20:54.113+0200",
        "age" : 837944
    }, {
        "key" : "temperatureSetPoint",
        "value" : 18.35,
        "unit" : "°C",
        "timestamp" : "2016-05-09T16:20:54.113+0200",
        "age" : 837944
    } ]
}, {
    "deviceId" : "018F8927",
    "friendlyId" : "VT5-1_Right",
    "physicalDevice" : "TempSensor_FTF65S",
    "functions" : [ [
        "key" : "temperature",
        "value" : 23.53,
        "unit" : "°C",
        "timestamp" : "2016-05-09T16:28:40.853+0200",
        "age" : 371204
    } ]
}, {
    "deviceId" : "018FF884",
    "friendlyId" : "SR06-LCD-2T",
    "functions" : [ [
        "key" : "setPoint",
        "value" : 0.00,
        "unit" : "°C",
        "timestamp" : "2016-05-09T10:21:37.043+0200",
        "age" : 22395014
    }, {
        "key" : "temperature",
        "value" : 22.90,
        "unit" : "°C",
        "timestamp" : "2016-05-09T10:21:37.043+0200",
        "age" : 22395014
    } ]
}, {
    "deviceId" : "018720FE",
    "friendlyId" : "afrisoCo2",
    "functions" : [ [
        "key" : "co2",
        "value" : 470.59,
        "unit" : "ppm",

```

System Specification

```

        "timestamp" : "2016-05-09T16:30:31.381+0200",
        "age" : 260677
    } ]
}, {
    "deviceId" : "01870183",
    "friendlyId" : "myPlug",
    "functions" : [ [
        {
            "key" : "energy",
            "value" : 1172.99993,
            "unit" : "Wh",
            "timestamp" : "2016-05-09T16:34:12.655+0200",
            "age" : 39403
        }, {
            "key" : "power",
            "value" : 0.00,
            "unit" : "W",
            "timestamp" : "2016-05-09T16:33:55.602+0200",
            "age" : 56456
        }
    ] ]
}
{
    "header" : {
        "content" : "telegram",
        "gateway" : "DC-GW/EO-IP v0.99.0b",
        "timestamp" : "2016-05-09T16:35:06.498+0200"
    },
    "telegram" : {
        "deviceId" : "018720FE",
        "friendlyId" : "afrisoCo2",
        "timestamp" : "2016-05-09T16:35:06.498+0200",
        "direction" : "from",
        "functions" : [ [
            {
                "key" : "co2",
                "value" : 431.37,
                "unit" : "ppm"
            }
        ] ],
        "telegramInfo" : {
            "data" : "00003708",
            "status" : "0",
            "dbm" : -68,
            "rorg" : "A5"
        }
    }
}
{
    "header" : {
        "content" : "telegram",
        "gateway" : "DC-GW/EO-IP v0.99.0b",
        "timestamp" : "2016-05-09T16:35:07.479+0200"
    },
    "telegram" : {
        "deviceId" : "00851E54",
        "friendlyId" : "piotek",
        "timestamp" : "2016-05-09T16:35:07.479+0200",
        "direction" : "from",
        "functions" : [ [
            {
                "key" : "supplyVoltage",
                "value" : 2.18,
                "unit" : "V"
            },
            {
                "key" : "pirStatus",
                "value" : "off",
                "meaning" : "PIR off"
            }
        ] ],
        "telegramInfo" : {
            "data" : "6D05050F",
            "status" : "0"
        }
    }
}

```

System Specification

```

    "status" : "0",
    "dbm" : -74,
    "rorg" : "A5"
}
}
}
```

Figure 21: /system/info JSON response

3.5.4. GET /devices/telegrams?direction={*direction*}

This command shows the last available telegrams of all devices. The number of telegrams kept in the history depends on the EAG implementer.

Parameter	Datatype	Valid values	Default	Functionality
direction	String	from to both	Both	Defines which state changes are shown. From the device(from), send from the EAG to the device(to), or both

Table 27: optional parameters of /devices/telegrams

GET <http://hostname:port/telegrams>

```
{
  "header" : {
    "httpStatus" : 200,
    "content" : "telegrams",
    "gateway" : "DC-GW/EO-IP v0.99.0b",
    "timestamp" : "2016-05-09T16:37:33.609+0200"
  },
  "telegrams" : [ {
    "deviceId" : "0181A5BC",
    "friendlyId" : "EnOceanTemperature",
    "timestamp" : "2016-05-09T12:57:08.358+0200",
    "direction" : "from",
    "functions" : [ {
      "key" : "temperature",
      "value" : 25.10,
      "unit" : "°C"
    }],
    "telegramInfo" : {
      "data" : "00005F08",
      "status" : "0",
      "dbm" : -80,
      "rorg" : "A5"
    }
  },
  {
    "deviceId" : "01870183",
    "friendlyId" : "myPlug",
    "timestamp" : "2016-05-09T12:57:21.943+0200",
    "direction" : "from",
    "functions" : [ {
      "key" : "power",
      "value" : 0.00,
      "unit" : "W"
    }],
    "telegramInfo" : {
      "data" : "076000000000",
      "status" : "0",
      "dbm" : -74,
      "rorg" : "A5"
    }
  }
]
```

System Specification

```

        "dbm" : -74,
        "rorg" : "D2"
    },
    {
        "deviceId" : "00851E54",
        "friendlyId" : "piotek",
        "timestamp" : "2016-05-09T12:57:27.145+0200",
        "direction" : "from",
        "functions" : [ [
            "key" : "supplyVoltage",
            "value" : 2.18,
            "unit" : "V"
        ], [
            "key" : "pirStatus",
            "value" : "off",
            "meaning" : "PIR off"
        ] ],
        "telegramInfo" : {
            "data" : "6D05050F",
            "status" : "0",
            "dbm" : -73,
            "rorg" : "A5"
        }
    },
    {
        "deviceId" : "01870183",
        "friendlyId" : "myPlug",
        "timestamp" : "2016-05-09T12:57:38.990+0200",
        "direction" : "from",
        "functions" : [ [
            "key" : "energy",
            "value" : 1172.99993,
            "unit" : "Wh"
        ] ],
        "telegramInfo" : {
            "data" : "072000000495",
            "status" : "0",
            "dbm" : -74,
            "rorg" : "D2"
        }
    },
    ...
]

```

Figure 22: /system/telegrams JSON response

System Specification

3.5.5. GET /devices/{deviceId}

This command returns information about a specific device.

{deviceId} is either the 4 byte hex ID or the friendlyID of the device.

```
GET http://hostname:port/devices/VT5-1_Right
```

```
{
  "header" : {
    "httpStatus" : 200,
    "content" : "device",
    "gateway" : "interface",
    "timestamp" : "2016-05-09T13:13:40.876+0200"
  },
  "device" : {
    "deviceId" : "018F8927",
    "friendlyId" : "VT5-1_Right",
    "physicalDevice" : "TempSensor_FTF65S",
    "eeps" : [ {
      "eep" : "A5-02-05",
      "version" : 1.0,
      "direction" : "from"
    }],
    "manufacturer" : "Eltako",
    "firstSeen" : "2016-01-15T09:21:48.447+0100",
    "lastSeen" : "2016-05-09T13:03:16.862+0200"
  }
}
```

Figure 23: /devices/{deviceId} JSON response

System Specification

3.5.6. GET /devices/{deviceID}/profile

This command returns the EEP used by this device.

```
GET http://hostname:port/devices/VT5-1_Left/profile
```

```
{
  "header" : {
    "httpStatus" : 200,
    "content" : "profile",
    "gateway" : "inteface",
    "timestamp" : "2016-05-09T16:41:08.961+0200"
  },
  "profile" : {
    "functionGroups" : [ {
      "direction" : "from",
      "functions" : [ {
        "key" : "slideSwitch",
        "description" : "Slide switch 0/I or Slide switch Day/Night",
        "values" : [ {
          "value" : "pos0DayOn",
          "meaning" : "Slide switch On/Day"
        }, {
          "value" : "pos1NightOff",
          "meaning" : "Slide switch Off/Night"
        } ]
      }, {
        "key" : "temperature",
        "description" : "Temperature (linear)",
        "values" : [ {
          "range" : {
            "min" : 0,
            "max" : 40,
            "step" : 0.157,
            "unit" : "°C"
          }
        } ]
      }, {
        "key" : "temperatureSetPoint",
        "description" : "Temperature Set point (linear)",
        "values" : [ {
          "range" : {
            "min" : 0,
            "max" : 40,
            "step" : 0.157,
            "unit" : "°C"
          }
        } ]
      } ]
    }
  }
}
```

Figure 24: /device/{deviceID}/profile JSON response

System Specification

3.5.7. GET /devices/{deviceId}/state

This command gets the last state of a device. The state transmission depends on different settings, described in chapter 3.1.5.

```
GET http://hostname:port/devices/0185570D/state
```

```
{
  "header" : {
    "httpStatus" : 200,
    "content" : "state",
    "gateway" : "interface",
    "timestamp" : "2016-05-09T16:45:28.737+0200"
  },
  "state" : {
    "deviceId" : "0185570D",
    "friendlyId" : "VT5-1_Left",
    "physicalDevice" : "RoomPanel_FTR55D",
    "functions" : [ {
      "key" : "slideSwitch",
      "value" : "pos0DayOn",
      "meaning" : "Slide switch On/Day",
      "timestamp" : "2016-05-09T16:37:57.513+0200",
      "age" : 451224
    }, {
      "key" : "temperature",
      "value" : 24.16,
      "unit" : "°C",
      "timestamp" : "2016-05-09T16:37:57.513+0200",
      "age" : 451225
    }, {
      "key" : "temperatureSetPoint",
      "value" : 18.35,
      "unit" : "°C",
      "timestamp" : "2016-05-09T16:37:57.513+0200",
      "age" : 451225
    } ]
  }
}
```

Figure 25: /devices/{deviceId}/state JSON response



System Specification

3.5.8. PUT /devices/{deviceid}/state

This request puts/changes the state of a device. If not all keys are modified for one request the EAG shall use the default values, as defined in the profile.

```
PUT http://hostname:port/devices/ Hora/state
```

```
{  
  "state" : {  
    "functions" : [  
      {  
        "key" : "valve",  
        "value" : 25  
      },  
      {  
        "key" : "temperatureSetPoint",  
        "value" : "23.5"  
      },  
      {  
        "key" : "measurementStatus",  
        "value" : "active"  
      },  
      {  
        "key" : "wakeUpCycle",  
        "value" : 1  
      },  
      {  
        "key" : "displayOrientation",  
        "value" : 0  
      },  
      {  
        "key" : "buttonLockControl",  
        "value" : "unlocked"  
      },  
      {  
        "key" : "command",  
        "value" : 0  
      }  
    ]  
  }  
}
```

Figure 26: /devices/{deviceid}/state outgoing JSON object

System Specification

3.5.9. GET /devices/{deviceid}/stream?direction={dir}&delimited={del}&output={out}

This command gets the actual status of the device and updates the client of changes via a stream of telegram objects.

Parameter	Datatype	Valid values	Default	functionality
direction	String	from to both	Both	Defines which state changes are shown. From the device(from), send from the EAG to the device(to), or both
delimited	String	length lengthBytes lengthCharacters newline emptyLine	emptyLine	Modifies the delimiter between array entries see chapter 3.1.7.
output	String	formatted singleLine	formatted	Modifies the formatting between received events see chapter 3.1.7.

Table 28: optional parameters of /device/{deviceid}/stream

GET <http://hostname:port/devices/Hora/stream>

```
{
  "header" : {
    "httpStatus" : 200,
    "content" : "states",
    "timestamp" : "2015-10-15T09:33:40.760+0200"
  },
  "states" : [ {
    "deviceId" : "0193CC15",
    "friendlyId" : "Hora",
    "functions" : [ {
      "key" : "buttonLockStatus",
      "value" : "unlocked",
      "meaning" : "Unlocked",
      "timestamp" : "2015-10-15T09:29:57.771+0200",
      "age" : "222989"
    }, {
      "key" : "feedTemperature",
      "value" : "20.24",
      "unit" : "°C",
      "timestamp" : "2015-10-15T09:29:57.771+0200",
      "age" : "222989"
    }, {
      "key" : "roomTemperature",
      "value" : "21.02",
      "unit" : "°C",
      "timestamp" : "2015-10-15T09:29:57.771+0200",
      "age" : "222989"
    }, {
      "key" : "valve",
      "value" : "31",
      "unit" : "%",
      "timestamp" : "2015-10-15T09:29:57.771+0200",
      "age" : "222989"
    } ]
  }
}
```

System Specification

```

    }
}

{
  "header" : {
    "content" : "telegram",
    "timestamp" : "2015-10-15T09:34:34.845+0200"
  },
  "telegram" : {
    "deviceId" : "0193CC15",
    "friendlyId" : "Hora",
    "timestamp" : "2015-10-15T09:34:34.845+0200",
    "direction" : "from",
    "functions" : [ {
      "key" : "valve",
      "value" : "48",
      "unit" : "%"
    }],
    "telegramInfo" : {
      "data" : "30018C08",
      "status" : "0",
      "dbm" : -67,
      "rorg" : "A5"
    }
  }
}

```

Figure 27: /devices/{deviceId}/stream JSON response

3.5.10. GET /devices/{deviceId}/telegrams?direction={*direction*}

This command shows the last available telegrams for the device. The number of telegrams kept in the history may differ between implementations.

Parameter	Datatype	Valid values	Default	Functionality
direction	String	from to both	both	Defines which state changes are shown. From the device(from), send from the EAG to the device(to), or both

```

GET http://hostname:port/0193CC15/telegrams
{
  "header" : {
    "httpStatus" : 200,
    "content" : "telegrams",
    "gateway" : "DCGW v0.98.4",
    "timestamp" : "2015-07-16T08:50:39.165+0200"
  },
  "telegrams" : [ {
    "deviceId" : "0193CC15",
    "friendlyId" : "Room3_Heating",
    "physicalDevice" : "Room3_SmartDrive_MX",
    "timestamp" : "2015-07-16T08:12:15.976+0200",
    "direction" : "from",
    "functions" : [ {
      "key" : "valve",
      "value" : "0",
      "unit" : "%"
    }, {
      "key" : "temperatureSetPoint",
      "value" : "20.98",
      "unit" : "C"
    } ]
  }]
}

```

System Specification

```

    "unit" : "°C"
  },
  {
    "key" : "roomTemperature",
    "value" : "26.16",
    "unit" : "°C"
  },
  {
    "key" : "statusRequest",
    "value" : "0",
    "meaning" : "No change"
  },
  {
    "key" : "buttonLockStatus",
    "value" : "unlocked",
    "meaning" : "Unlocked"
  },
  {
    "key" : "measurementStatus",
    "value" : "active",
    "meaning" : "Measurement enabled"
  }],
  "telegramInfo" : {
    "data" : "8CCE0A",
    "status" : "0",
    "dbm" : -60,
    "rorg" : "A5"
  }
},
{
  "deviceId" : "0193CC15",
  "friendlyId" : "Room3_Heating",
  "physicalDevice" : "Room3_SmartDrive_MX",
  "timestamp" : "2015-07-16T08:18:19.034+0200",
  "direction" : "from",
  "functions" : [ [
    {
      "key" : "feedTemperature",
      "value" : "25.88",
      "unit" : "°C"
    },
    {
      "key" : "roomTemperature",
      "value" : "26.39",
      "unit" : "°C"
    }
  ] ],
  "telegramInfo" : {
    "data" : "19D108",
    "status" : "0",
    "dbm" : -60,
    "rorg" : "A5"
  }
},
{
  "deviceId" : "0193CC15",
  "friendlyId" : "Room3_Heating",
  "physicalDevice" : "Room3_SmartDrive_MX",
  "timestamp" : "2015-07-16T08:45:32.884+0200",
  "direction" : "from",
  "functions" : [ [
    {
      "key" : "roomTemperature",
      "value" : "26.78",
      "unit" : "°C"
    }
  ] ],
  "telegramInfo" : {
    "data" : "19D608",
    "status" : "0",
    "dbm" : -61,
    "rorg" : "A5"
  }
}
]
}

```

Figure 28: /devices/{deviceID}/telegrams JSON response