FlexAPI Reference

For VT3 series

Revision History

Revision	Date	Author	Item(s) changed	Note
1.0.1	8/2/2021	Liyb	Created this document based on <FlexAPI_Reference_for_3rd_party_platform>	
1.0.2	18/1/2022	Liyb	Added ID description for OBD parameters.	
1.0.3	20/1/2022	Tianmh	Added Sensor parameters and W2R parameters.	
1.0.4	24/1/2022	Liyb	Fixed some errors.	

1. Introduction

We introduced FlexAPI for the fast evolving IoT applications, which highly value easy integration, openness, flexibility, extensibility and programmability.

FlexAPI is designed to be efficient, clean and ready to use. It's network oriented and programming language independent, and is ideal for cloud platform integration.

FlexAPI provides unified data and control services via MQTT topics for 3rd party platforms.

For data service, each MQTT topic corresponds to a group of data, and we have ready to use reserved groups such as: GNSS, OBD, Motion, IO ,cellular,sensor, modbus(w2r).

Besides, user can use sysinfo group to obtain device basic information.

In general, reserved groups are enough for user's need.

Users can subscribe to these topics to get the latest data, and they can also set the data uploading intervals.

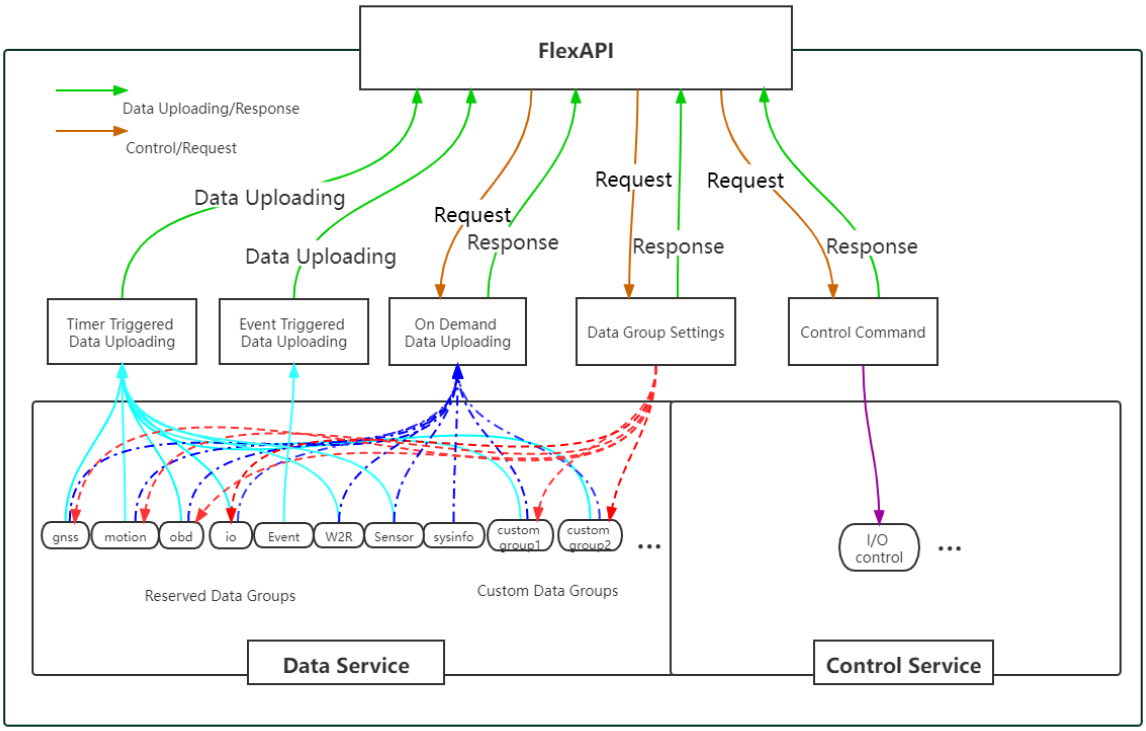
FlexAPI specially provides MQTT topics for users to actively get data on demand.

For advanced users, they can even define their interested groups and set their uploading intervals.

We employ a request & response scheme for user initiated service requests.

Request & response scheme means users need to subscribe to the response topics, and they request service by publishing a message to the request topics.

1.1 Architecture



1.2 MQTT Intro

MQTT is a widely adopted, lightweight messaging protocol designed for constrained devices.

Our MQTT implementation is based on MQTT version 3.1.1, and supports QoS 0 and 1.

For more information, see MQTT.

1.3 MQTT Server Settings

1.3.1 MQTT Server Address and Port.

FlexAPI needs remote MQTT broker address and port to connect to.

1.3.2 MQTT Authentication

1.3.2.1 Username/Password(Default)

FlexAPI needs username and password for authentication.

After network connection is established, FlexAPI will send MQTT CONNECT Control Packet to remote MQTT broker.

The payload must contain Username, Password and `unique` Client Identifier fields. see MQTT CONNECT.

FlexAPI will use `unique` Client Identifier `{client_id}` as part of MQTT topics. see FlexAPI supported Topics.

2 FlexAPI Overview

FlexAPI organizes data as groups and provides ready to use reserved groups for users to develop their applications.

FlexAPI allow users to change reserved and custom group settings.

Users can get timer triggered group data periodically and event triggered data. Besides, FlexAPI also allow users to actively get group data on demand.

For user initiated service requests we employ a request & response scheme.

Request & response scheme means users need to subscribe to the response topics, and they request service by publishing a message to the request topics.

This overview part gives summary on: FlexAPI general information, error codes and supported topics.

For Basic Usage, see 3. Basic usage.

For Advanced Usage, see 4. Advanced usage.

For FlexAPI supported Parameters, see Appendix A. FlexAPI supported Parameters.

2.1 FlexAPI Return Information and Errors

2.1.1 General Information

Parameter Name	Description	Type	Note
client_token	client token	string	A unique string for users to match responses with the corresponding requests.
result	result	object	When the request succeeds, there will be result field in response message body. API callers should check the content of the result field to determine whether the request has been successfully processed.
error	error code	string	When the request fails, it is added to the response message body. For more information, see General Error Codes
error_desc	error description	string	When the request fails, it is added to the response message body. For more information, see General Error Codes
ts	time stamp	number	UNIX timestamp since Epoch. Indicates when the message was transmitted by device.

2.1.2 General Error Codes

Error Code	Description	Error Handling
auth_failed	authentication failed	check username and password
invalid_parameter	invalid parameter	check request parameter
not_found	resource not exist	make sure related service is enabled and running
device_busy	device busy	retry request
device_error	device internal error	retry request
data_invalid	resource invalid	retry request

2.2 FlexAPI Supported Topics

2.2.1 Data Service

2.2.1.1 Timer Triggered Reserved Group Data Get

FlexAPI Reference

For VT3 series

Revision History

1. Introduction

1.1 Architecture

1.2 MQTT Intro

1.3 MQTT Server Settings

1.3.1 MQTT Server Address and Port.

1.3.2 MQTT Authentication

1.3.2.1 Username/Password(Default)

2 FlexAPI Overview

2.1 FlexAPI Return Information and Errors

2.1.1 General Information

2.1.2 General Error Codes

2.2 FlexAPI Supported Topics

2.2.1 Data Service

2.2.1.1 Timer Triggered Reserved Group Data Get

2.2.1.2 Reserved Group Settings

2.2.1.3 On Demand Reserved Group Data Get

2.2.2 Control Service

2.2.2.1 IO Control

2.2.3 Advanced Usage

2.2.3.1 Custom Group Settings

2.2.3.1.1 Create/Update Custom Group

2.2.3.1.2 Get Custom Group Settings

2.2.3.2 Timer Triggered Custom Group Data Get

2.2.3.3 On Demand Custom Group Data Get

2.3 FlexAPI Limits

3. Basic Usage

3.1 Timer Triggered Reserved Group Data Get

3.1.1 OBD Data

3.1.2 GNSS Data

3.1.3 Motion Data

3.1.4 IO Data

3.1.5 Cellular1 Data

3.1.5 Sensor Data

3.1.6 W2R Data

3.2 Reserved Group Settings

3.2.1 General Settings

3.2.3 OBD Settings

3.2.4 GNSS Settings

3.2.5 Motion Settings

3.2.6 IO Settings

3.2.7 Cellular1 Settings

3.3 On Demand Reserved Group Information Get

3.3.1 OBD Data

3.3.3 GNSS Data

3.3.4 Motion Data

3.3.5 IO Data

3.3.6 Cellular1 Data

3.3.7 System Info

3.4 Control Service
3.4.1 IO Control
4. Advanced Usage
4.1 Custom Group Settings
4.1.1 Create/Update Custom Group
4.1.2 Get Custom Group Settings
4.2 Timer Triggered Custom Group Data Get
4.3 On Demand Custom Group Data Get
5. Event Service
5.1 Event Level
5.2 Event Types
5.2.1 General event Types
5.2.2 DTC event Types
5.3 Event parameters
5.4 Event examples
5.4.1 General event
5.4.3 DTC event
5.4.3.1 OBD-II DTC
5.4.3.2 J1939 DTC
Appendix A. FlexAPI Supported Parameters
A.1 GNSS Parameters
A.2 Motion Parameters
A.3 IO Parameters
A.4 OBD Parameters
A.5 Cellular Parameters
A.6 System Parameters
A.7 Sensor Parameters
A.8 W2R Parameters

When using generic MQTT broker, users can subscribe to the following topics listed with **Topic for generic MQTT broker** to get the latest data.
*Note: The **properties for Azure Iot Hub** is only for users using Azure Iot Hub.*

Topic for generic MQTT broker	properties for Azure Iot Hub (key:value)	Data direction	Description
v1/{client_id}/obd/info	group:obd type:info	Device to Cloud	Timer triggered OBD data uploading. See OBD data.
v1/{client_id}/gnss/info	group:gnss type:info	Device to Cloud	Timer triggered GNSS data uploading. see GNSS Data.
v1/{client_id}/motion/info	group:motion type:info	Device to Cloud	Timer triggered Motion data uploading. see Motion Data.
v1/{client_id}/io/info	group:io type:info	Device to Cloud	Timer triggered IO data uploading. see IO Data.
v1/{client_id}/cellular1/info	group:cellular1 type:info	Device to Cloud	Timer triggered Cellular1 data uploading. see Cellular1 Data.
v1/{client_id}/sensor/info	group:sensor type:info	Device to Cloud	
v1/{client_id}/w2r/info	group:w2r type:info	Device to Cloud	

2.2.1.2 Reserved Group Settings

Users can use the following topics to set the data uploading intervals and define their interested data.

*Note: The **properties for Azure Iot Hub** is only for users using Azure Iot Hub.*

Topic for generic MQTT broker	properties for Azure Iot Hub (key:value)	Data direction	Description
v1/{client_id}/obd/set	group:obd cmd:set	Cloud to Device	Set OBD group request. see OBD settings.
v1/{client_id}/obd/set/resp	group:obd type:setRsp	Device to Cloud	Set OBD group response.
v1/{client_id}/gnss/set	group:gnss cmd:set	Cloud to Device	Set GNSS group request. see GNSS settings.
v1/{client_id}/gnss/set/resp	group:gnss type:setRsp	Device to Cloud	Set GNSS group response.
v1/{client_id}/motion/set	group:motion cmd:set	Cloud to Device	Set Motion group request. see Motion settings.
v1/{client_id}/motion/set/resp	group:motion type:setRsp	Device to Cloud	Set Motion group response.
v1/{client_id}/io/set	group:io cmd:set	Cloud to Device	Set IO group request. see IO settings.
v1/{client_id}/io/set/resp	group:io type:setRsp	Device to Cloud	Set IO group response.
v1/{client_id}/cellular1/set	group:cellular1 cmd:set	Cloud to Device	Set Celluar1 group request. see Cellular1 settings.
v1/{client_id}/cellular1/set/resp	group:cellular1 type:setRsp	Device to Cloud	Set Celluar1 group response.

2.2.1.3 On Demand Reserved Group Data Get

Users can use the following topics to actively get data on demand.

*Note: The **properties for Azure Iot Hub** is only for users using Azure Iot Hub.*

Topic for generic MQTT broker	properties for Azure Iot Hub (key:value)	Data direction	Description
v1/{client_id}/obd/refresh	group:obd cmd:refresh	Cloud to Device	Refresh OBD data request. see OBD data.
v1/{client_id}/obd/refresh/resp	group:obd type:refresh	Device to Cloud	Refresh OBD data response.
v1/{client_id}/gnss/refresh	group:gnss cmd:refresh	Cloud to Device	Refresh GNSS data request. see GNSS Data.
v1/{client_id}/gnss/refresh/resp	group:gnss type:refresh	Device to Cloud	Refresh GNSS data response.
v1/{client_id}/motion/refresh	group:motion cmd:refresh	Cloud to Device	Refresh Motion data request. see Motion Data.
v1/{client_id}/motion/refresh/resp	group:motion type:refresh	Device to Cloud	Refresh Motion data response.
v1/{client_id}/io/refresh	group:io cmd:refresh	Cloud to Device	Refresh IO data request. see IO Data.
v1/{client_id}/io/refresh/resp	group:io type:refresh	Device to Cloud	Refresh IO data response.
v1/{client_id}/cellular1/refresh	group:cellular1 cmd:refresh	Cloud to Device	Refresh Cellular1 data request. see Cellular1 Data.
v1/{client_id}/cellular1/refresh/resp	group:cellular1 type:refresh	Device to Cloud	Refresh Cellular1 data response.
v1/{client_id}/sysinfo/refresh	group:sysinfo cmd:refresh	Cloud to Device	Refresh system info request. see System Info.
v1/{client_id}/sysinfo/refresh/resp	group:sysinfo type:refresh	Device to Cloud	Refresh system info response.

2.2.2 Control Service

2.2.2.1 IO Control

Users can use the following topics to turn on/off the digital output.

*Note: The **properties for Azure Iot Hub** is only for users using Azure Iot Hub.*

Topic for generic MQTT broker	properties for Azure Iot Hub (key:value)	Data direction	Description
v1/{client_id}/io/control	group:io cmd:control	Cloud to Device	IO control request. see IO Control.
v1/{client_id}/io/control/resp	group:io type:controlRsp	Device to Cloud	IO control response.

2.2.3 Advanced Usage

Advanced users can use the following topics to define their interested groups and set their uploading intervals.

*Note: The **properties for Azure Iot Hub** is only for users using Azure Iot Hub.*

2.2.3.1 Custom Group Settings

2.2.3.1.1 Create/Update Custom Group

Topic for generic MQTT broker	properties for Azure Iot Hub (key:value)	Data direction	Description
v1/{client_id}/group/set	group:group cmd:set	Cloud to Device	Create/Update group request. see Create/Update custom group.
v1/{client_id}/group/set/resp	group:group type:setRsp	Device to Cloud	Create/Update group response.

2.2.3.1.2 Get Custom Group Settings

Topic for generic MQTT broker	properties for Azure Iot Hub (key:value)	Data direction	Description
v1/{client_id}/group/get	group:group cmd:get	Cloud to Device	Get group settings request. see Get custom group settings.
v1/{client_id}/group/get/resp	group:group type:getRsp	Device to Cloud	Get group settings response.

2.2.3.2 Timer Triggered Custom Group Data Get

Topic for generic MQTT broker	properties for Azure Iot Hub (key:value)	Data direction	Description
v1/{client_id}/{group_name}/info	group: {group_name} type:info	Device to Cloud	Timer triggered custom group data uploading. see Timer triggered custom group data get.

2.2.3.3 On Demand Custom Group Data Get

Topic for generic MQTT broker	properties for Azure Iot Hub (key:value)	Data direction	Description
v1/{client_id}/{group_name}/refresh	group: {group_name} cmd:refresh	Cloud to Device	Refresh group data request. see On demand custom group data get.
v1/{client_id}/{group_name}/refresh/resp	group: {group_name} type:refresh	Device to Cloud	Refresh group data response.

2.3 FlexAPI Limits

Resource	Limit
Minimum retry interval of `settings`, `refresh`, `get` requests	3 s
Minimum retry interval of `io control` request	5 s
`client_id` size	SN of VT3 series
`client_token` size	up to 32 bytes of arbitrary string
Available custom groups	up to 8
Maximum data items per group	32

3. Basic Usage

3.1 Timer Triggered Reserved Group Data Get

3.1.1 OBD Data

Once you have subscribed to this topic, you will periodically receive the related data.

Topic: `v1/{client_id}/obd/info`

Payload:

```
{
    "obd.ts" : 1592820539,
    "obd.rpm" : 1234,
    "obd.speed" : 20
}
```

Parameter description, See General Information & OBD Parameters.

Use OBD settings to modify group setting(`interval` & `interest`).

3.1.2 GNSS Data

Once you have subscribed to this topic, you will periodically receive the related data.

Topic: `v1/{client_id}/gnss/info`

Payload:

```
{
    "gnss.ts" : 1592820539,
    "gnss.latitude": 40.232213,
    "gnss.longitude": 116.34366,
    "gnss.altitude": 346.0,
    "gnss.speed": 87.6,
    "gnss.heading": 234.0,
    "gnss.hdop": 1.2,
    "gnss.fix": 3,
    "gnss.num_sv": 7
}
```

Parameter description, See General Information & GNSS Parameters.

Use GNSS settings to modify group setting(`interval` & `interest`).

3.1.3 Motion Data

Once you have subscribed to this topic, you will periodically receive the related data.

Topic: `v1/{client_id}/motion/info`

Payload:

```
{
    "motion.ts": 1592820539,
    "motion.ax": 0.08,
    "motion.ay": 0.0,
    "motion.az": 0.0,
    "motion.gx": 0.15,
    "motion.gy": 0.03,
    "motion.gz": -0.47
}
```

Parameter description, See General Information & Motion Parameters.

Use Motion settings to modify group setting(`interval` & `interest`).

3.1.4 IO Data

Once you have subscribed to this topic, you will periodically receive the related data.

Topic: `v1/{client_id}/io/info`

Payload:

```
{
    "io.ts": 1592820539,
    "io.AI1": 0.0,
    "io.DI1": 0,
    "io.DI1_pullup": 0,
    "io.DI2": 0,
    "io.DI2_pullup": 0,
    "io.DI3": 0,
    "io.DI3_pullup": 0,
    "io.DI4": 0,
    "io.DI4_pullup": 0,
    "io.DO1": 0,
    "io.DO2": 0,
    "io.DO3": 0,
    "io.IGT": 0
}
```

Parameter description, See General Information & IO Parameters.

Use IO settings to modify group setting(`interval` & `interest`).

3.1.5 Cellular1 Data

Once you have subscribed to this topic, the MQTT broker will periodically receive the related data.

Topic: `v1/{client_id}/cellular1/info`

Payload:

```
{
    "modem1.ts": 1598425365,
    "modem1.imei": "862104021247207",
    "modem1.imsi": "460013231603009",
    "modem1.iccid": "89860118802836799717",
    "modem1.signal_lvl": 28,
    "modem1.reg_status": 1,
    "modem1.operator": "46001",
    "modem1.network": 3,
    "modem1.lac": "EA00",
    "modem1.cell_id": "71CF520",
    "cellular1.status": 3,
    "cellular1.ip": "10.210.255.168",
    "cellular1.netmask": "255.255.255.255",
    "cellular1.gateway": "1.1.1.3",
    "cellular1.dns1": "119.7.7.7",
    "cellular1.up_at": 1598424985
}
```

Parameter description, See General Information & Cellular Parameters.

Use Cellular settings to modify group setting(`interval` & `interest`).

3.1.5 Sensor Data

Once you have subscribed to this topic, the MQTT broker will periodically receive the related data.

The VT series uses group sensor to upload the data from sensors to MQTT broker.At present, only iButton/temperature sensor connected with 1-wire bus are supported.

Topic: `v1/{client_id}/sensor/info`

Payload:

```
{
  "sensor.ts" : 1642662299,
  "sensor.data" : [ {
    "type" : "1w_TP",
    "id" : "7c00000c0370db28",
    "value" : 25
  } ]
}
```

Parameter description, See [Sensor Parameters](#).

3.1.6 W2R Data

Once you have subscribed to this topic, the MQTT broker will periodically receive the related data. The VT series uses group W2R to upload the data from wired or wireless interface to MQTT broker. At present, **only modbus(interface: serial4) is supported**.

Topic: `v1/{client_id}/w2r/info`

Payload:

```
{
  "w2r.ts" : 1642665195,
  "w2r.if" : "serial4",
  "w2r.proto" : "modbus",
  "w2r.rmt" : [ [ 1, 3, 31, 0 ], [ 1, 3, 30, 0 ], [ 1, 3, 26, 0 ], [ 1, 3, 25, 0
], [ 1, 3, 24, 0 ], [ 1, 3, 23, 0 ], [ 1, 3, 22, 0 ], [ 1, 3, 21, 0 ], [ 1, 3,
20, 0 ], [ 1, 3, 19, 0 ], [ 1, 3, 18, 0 ], [ 1, 3, 17, 0 ], [ 1, 3, 13, 0 ], [
1, 3, 12, 0 ], [ 1, 3, 11, 0 ], [ 1, 3, 10, 0 ], [ 1, 3, 8, 0 ], [ 1, 3, 7, 0 ],
[ 1, 3, 5, 0 ], [ 1, 3, 4, 0 ], [ 1, 3, 3, 0 ], [ 1, 3, 2, 0 ], [ 1, 3, 1, 0 ] ]
}
```

The format of the w2r.rmt value is as follows,

> [[slave address,function code,register address,data], [slave address,function code,register address,data], [slave address,function code,register address,data], ...,[slave address,function code,register address,data]]

Parameter description, See W2R Parameters.

3.2 Reserved Group Settings

3.2.1 General Settings

Parameter Name	Description	Type	Range	Units	Optional	Note
client_token	A unique string for users to match responses with the corresponding requests.	string			mandatory	
interval	uploading interval	int	[0,3600]	s	optional	0: disable timer upload
interest	interest parameter List of interested item, each item is represented as key: alias. alias is used in reported messages to rewrite key, a value of "" means no alias. For example, set interest with alias: {"obd.mil": "MIL", "obd.dtcs": "dtcNum"} reported data: {"MIL": "1", "dtcNum": "3"} set interest without alias: {"obd.mil": "", "obd.dtcs": ""} reported data: {"obd.mil": "1", "obd.dtcs": "3"}	object			optional	'key': FlexAPI Supported parameters 'alias': parameter alias OBD group, see OBD Parameters GNSS group, see GNSS Parameters Motion group, see Motion Parameters IO group, see IO Parameters

For `interval` and `interest` parameters, there are four use cases which apply to both reserved and custom groups.

Case 1. Disable Group Data Uploading

Specify only `interval` field and set its value to 0 in message body.

Request Topic: `v1/{client_id}/{group_name}/set`

Note: `group_name` is obd, gnss, motion, io, summary, or custom group name.

Request Payload:

```
{
   "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
   "interval": 0
}
```

Response Topic: `v1/{client_id}/{group_name}/set/resp`

Response Payload:

Success:

```
{
   "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
   "result": {
      "interval": 0
   }
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see [General Information](#).

Case 2. Change Only Group Data Uploading Interval

Specify only `interval` field in message body.

Request Topic: `v1/{client_id}/{group_name}/set`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "interval": 60
}
```

Response Topic: `v1/{client_id}/{group_name}/set/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "result": {
        "interval": 60
    }
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see [General Information](#).

Case 3. Change only group data interest

Specify only `interest` field in message body.

Request Topic: `v1/{client_id}/{group_name}/set`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "interest": {"gnss.latitude": "lat", "gnss.longitude": "lon",
"obd.speed": "speed", "obd.odo": ""}
}
```

Response Topic: `v1/{client_id}/{group_name}/set/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "result": {
        "interest": {"gnss.latitude": "lat", "gnss.longitude": "lon",
"obd.speed": "speed", "obd.odo": ""}
    }
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see [General Information](#).

Case 4. Change Both Interest and Uploading Interval

Specify both `interest` and `interval` fields in message body.

Request Topic: `v1/{client_id}/{group_name}/set`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "interval": 60,
    "interest": {"gnss.latitude": "lat", "gnss.longitude": "lon",
"obd.speed": "speed", "obd.odo": ""}
}
```

Response Topic: `v1/{client_id}/{group_name}/set/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "result": {
       "interval": 60,
       "interest": {"gnss.latitude": "lat", "gnss.longitude": "lon",
"obd.speed": "speed", "obd.odo": ""}
    }
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see [General Information](#).

3.2.3 OBD Settings

Publish a message to this topic to set your interested data and uploading interval.

Default interval is 10s. Default interest is available parameters from the [OBD Parameters](#).

Request Topic: `v1/{client_id}/obd/set`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "interval": 60,
    "interest": {"obd.mil": "MIL", "obd.dtcs": "dtcNum", "obd.rpm":
"engineSpeed"}
}
```

Response Topic: `v1/{client_id}/obd/set/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "result": {
        "interval": 60,
        "interest": {"obd.mil": "MIL", "obd.dtcs": "dtcNum", "obd.rpm":
"engineSpeed"}
    }
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see [General Information](#).

3.2.4 GNSS Settings

Publish a message to this topic to set your interested data and uploading interval.

default interval is 10s. default interest is available parameters from the [GNSS Parameters](#).

Request Topic: `v1/{client_id}/gnss/set`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "interval": 60,
    "interest": {"gnss.latitude": "lat", "gnss.longitude": "lon",
"gnss.altitude": "alt"}
}
```

Response Topic: `v1/{client_id}/gnss/set/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "result": {
        "interval": 60,
        "interest": {"gnss.latitude": "lat", "gnss.longitude": "lon",
"gnss.altitude": "alt"}
    }
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see [General Information](#).

3.2.5 Motion Settings

Publish a message to this topic to set your interested data and uploading interval.

default interval is 10s. default interest is available parameters from the [Motion Parameters](#).

Request Topic: `v1/{client_id}/motion/set`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "interval": 60,
    "interest": {"motion.ax": "acceleration_x", "motion.ay": "acceleration_y",
"motion.az": "acceleration_z"}
}
```

Response Topic: `v1/{client_id}/motion/set/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "result": {
        "interval": 60,
        "interest": {"motion.ax": "acceleration_x", "motion.ay":
"acceleration_y", "motion.az": "acceleration_z"}
    }
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see [General Information](#).

3.2.6 IO Settings

Publish a message to this topic to set your interested data and uploading interval.

default interval is 10s. default interest is available parameters from the [IO Parameters](#).

Request Topic: `v1/{client_id}/io/set`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "interval": 60,
    "interest": {"io.AI1": "ai1", "io.AI2": "ai2", "io.AI3": "ai3"}
}
```

Response Topic: `v1/{client_id}/io/set/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "result": {
        "interval": 60,
        "interest": {"io.AI1": "ai1", "io.AI2": "ai2", "io.AI3": "ai3"}
    }
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see [General Information](#).

3.2.7 Cellular1 Settings

Publish a message to this topic to set your interested data and uploading interval.

default interval is 30s. default interest is available parameters from the [Cellular Parameters](#).

Request Topic: `v1/{client_id}/cellular1/set`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "interval": 60,
    "interest": {"modem1.active_sim": "active_sim", "modem1.signal_lvl":
"signal_lvl", "cellular1.status": "status"}
}
```

Response Topic: `v1/{client_id}/cellular1/set/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "result": {
        "interval": 60,
        "interest": {"modem1.active_sim": "active_sim", "modem1.signal_lvl":
"signal_lvl", "cellular1.status": "status"}
    }
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see [General Information](#).

3.3 On Demand Reserved Group Information Get

3.3.1 OBD Data

Publish a message to get OBD data on demand.

Request Topic: `v1/{client_id}/obd/refresh`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J"
}
```

Response Topic: `v1/{client_id}/obd/refresh/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "result": {
        "obd.rpm": 34245,
        "obd.speed": 53255
    }
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, reference General Information & OBD Parameters.

3.3.3 GNSS Data

Publish a message to get GNSS data on demand.

Request Topic: `v1/{client_id}/gnss/refresh`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J"
}
```

Response Topic: `v1/{client_id}/gnss/refresh/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "result": {
        "gnss.latitude": 40.232213,
        "gnss.longitude": 116.34366,
        "gnss.altitude": 346.0,
        "gnss.speed": 87.6,
        "gnss.heading": 234.0,
        "gnss.hdop": 1.2,
        "gnss.pdop": 2.1,
        "gnss.hacc": 1.0,
        "gnss.fix": 3,
        "gnss.num_sv": 7,
        "gnss.date": "2020-4-17",
        "gnss.time": "10:16:21"
    }
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, reference General Information & GNSS Parameters.

3.3.4 Motion Data

Publish a message to get motion data on demand.

Request Topic: `v1/{client_id}/motion/refresh`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J"
}
```

Response Topic: `v1/{client_id}/motion/refresh/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "result": {
        "motion.ax": 0.08,
        "motion.ay": 0.0,
        "motion.az": 0.0,
        "motion.gx": 0.15,
        "motion.gy": 0.03,
        "motion.gz": -0.47,
        "motion.roll": -0.65,
        "motion.pitch": 1.03,
        "motion.yaw": 302.49
    }
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, reference General Information & Motion Parameters.

3.3.5 IO Data

Publish a message to get IO data on demand.

Request Topic: `v1/{client_id}/io/refresh`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J"
}
```

Response Topic: `v1/{client_id}/io/refresh/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "result": {
        "io.AI1": 0.0,
        "io.DI1": 0,
        "io.DI1_pullup": 0,
        "io.DI2": 0,
        "io.DI2_pullup": 0,
        "io.DI3": 0,
        "io.DI3_pullup": 0,
        "io.DI4": 0,
        "io.DI4_pullup": 0,
        "io.DO1": 0,
        "io.DO2": 0,
        "io.DO3": 0
    }
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, reference General Information & IO Parameters.

3.3.6 Cellular1 Data

Publish a message to get cellular data on demand.

Request Topic: `v1/{client_id}/cellular1/refresh`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J"
}
```

Response Topic: `v1/{client_id}/cellular1/refresh/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "result": {
        "modem1.ts": 1598425245,
        "modem1.imei": "862104021247207",
        "modem1.imsi": "460013231603009",
        "modem1.iccid": "89860118802836799717",
        "modem1.signal_lvl": 29,
        "modem1.reg_status": 1,
        "modem1.operator": "46001",
        "modem1.network": 3,
        "modem1.lac": "EA00",
        "modem1.cell_id": "71CF520",
        "cellular1.ts": 1598425316,
        "cellular1.status": 3,
        "cellular1.ip": "10.210.255.168",
        "cellular1.netmask": "255.255.255.255",
        "cellular1.gateway": "1.1.1.3",
        "cellular1.dns1": "119.7.7.7",
        "cellular1.up_at": 1598424985
    }
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, reference General Information & Cellular Parameters.

3.3.7 System Info

Publish a message to get system info on demand.

Request Topic: `v1/{client_id}/sysinfo/refresh`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J"
}
```

Response Topic: `v1/{client_id}/sysinfo/refresh/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "result": {
        "sysinfo.ts": 1598424935,
        "sysinfo.model_name": "VT310",
        "sysinfo.oem_name": "inhand",
        "sysinfo.serial_number": "VF3102020122201",
        "sysinfo.firmware_version": "VT3_V1.0.22",
        "sysinfo.product_number": "FQ58",
        "sysinfo.description": "www.inhand.com.cn"
    }
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, reference General Information & System Parameters.

3.4 Control Service

3.4.1 IO Control

Publish a message to this topic to turn on/off the digital output.

Request Topic: `v1/{client_id}/io/control`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS606lMhW3muUv73ycUT7J",
    "io.DO1": 0,
    "io.DO2": 0,
    "io.DO3": 0
}
```

Response Topic: `v1/{client_id}/io/control/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS606lMhW3muUv73ycUT7J",
    "result": {
        "io.DO1": 0,
        "io.DO2": 0,
        "io.DO3": 0
    }
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS606lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see General Information & IO Parameters digital output part。

4. Advanced Usage

4.1 Custom Group Settings

4.1.1 Create/Update Custom Group

Use the following topics to define your interested groups and set their uploading intervals.

For `interval` and `interest` parameters, there are four use cases. See [General settings](#).

Request Topic: `v1/{client_id}/group/set`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "settings": [{
            "group_name": "group1",
            "interval": 60,
            "interest": {"gnss.latitude": "lat","gnss.longitude":
"lon","gnss.altitude": "alt","obd.speed": "speed","obd.odo": "odo"}
        },{
            "group_name": "group2",
            "interval": 30,
            "interest": {"io.DI1": "DI1","io.DI2": "DI2","io.DI3":
"DI3","io.DI4": "DI4","io.DO1": "DO1","io.DO2": "DO2","io.DO3": "DO3"}
        }
    ]
}
```

Response Topic: `v1/{client_id}/group/set/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "result": [{
            "group_name": "group1",
            "interval": 60,
            "interest": {"gnss.latitude": "lat","gnss.longitude":
"lon","gnss.altitude": "alt","obd.speed": "speed","obd.odo": "odo"}
        },{
            "group_name": "group2",
            "interval": 30,
            "interest": {"io.DI1": "DI1","io.DI2": "DI2","io.DI3":
"DI3","io.DI4": "DI4","io.DO1": "DO1","io.DO2": "DO2","io.DO3": "DO3"}
        }
    ]
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see General Information & General settings.

4.1.2 Get Custom Group Settings

Use the following topics to get custom group settings.

Request Topic: `v1/{client_id}/group/get`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J"
}
```

Response Topic: `v1/{client_id}/group/get/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "result": [{
        "group_name": "group1",
        "interval": 60,
        "interest": {"gnss.latitude": "lat","gnss.longitude":
"lon","gnss.altitude": "alt","obd.speed": "speed","obd.odo": "odo"}
    },{
        "group_name": "group2",
        "interval": 30,
        "interest": {"io.DI1": "DI1","io.DI2": "DI2","io.DI3": "DI3","io.DI4":
"DI4","io.DO1": "DO1","io.DO2": "DO2","io.DO3": "DO3"}
    }]
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS6O6lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see General Information & General settings.

4.2 Timer Triggered Custom Group Data Get

Once you have subscribed to this topic, you will periodically receive the related data.

Topic: `v1/{client_id}/{group_name}/info`

Payload:

```
{
    "lat": 40.232213,
    "ai1": 1.0,
    "obd.speed": 50
}
```

Parameter description, see [General Information] & [FlexAPI supported Parameters].

4.3 On Demand Custom Group Data Get

Publish a message to get `group_name` data on demand.

Request Topic: `v1/{client_id}/{group_name}/refresh`

Request Payload:

```
{
    "client_token": "3bzJQ2OOUkLS606lMhW3muUv73ycUT7J"
}
```

Response Topic: `v1/{client_id}/{group_name}/refresh/resp`

Response Payload:

Success:

```
{
    "client_token": "3bzJQ2OOUkLS606lMhW3muUv73ycUT7J",
    "result": {
        "lat": 40.232213,
        "ai1": 1.0,
        "obd.speed": 50
    }
}
```

Failure:

```
{
    "client_token": "3bzJQ2OOUkLS606lMhW3muUv73ycUT7J",
    "error": "invalid_parameter",
    "error_desc": "Invalid request parameter"
}
```

Parameter description, see [General Information] & [FlexAPI supported Parameters].

5. Event Service

5.1 Event Level

Level Name	Value	Description
Emergency	5	System is unusable.
Alert	4	Action must be taken immediately.
Error	3	Error conditions.
Warning	2	Warning conditions.
Notice	1	Normal but significant condition.

5.2 Event Types

5.2.1 General event Types

Event Name	Event Type	Description	Level	Note
Ignition On	IGON	The ignition input has transitioned from low to high.	1	
Ignition Off	IGOFF	The ignition input has transitioned from high to low.	1	
system go sleep	SYS_SLEEP	The device entered deep sleep mode.	1	
system wakeup	SYS_WKUP	The device recovered from deep sleep mode.	1	
DI value changed	DI_CHG	The value of Digital Input pin is changed.	1	

5.2.2 DTC event Types

Event Name	Event Type	Description	Level	Note
OBDII DTC	OBDII_DTC_{dtc}	OBDII diagnostic trouble code event.	2	dtc: diagnostic trouble code string. see OBD-II DTC
J1939 DTC	J1939_DTC_{spn}	J1939 diagnostic trouble code event.	2	spn: see J1939 DTC

5.3 Event parameters

Parameter Name	Description	Type	Range	Units	Optional	Note
starts_at	Event start time	number		s		UNIX timestamp, in seconds since the epoch
ends_at	Event end time	number		s	Optional	UNIX timestamp, in seconds since the epoch. When the event is cleared, it is added to the event message body
status	Event status	string	raise|clear			raise：event occur clear：event recovery
type	Event type	string				see Event Types
level	Event level	number				see Event Level
gnss.xxx	Additional location information(if any)				Optional	Location information associated with the event. see GNSS Parameters
motion.xxx	Additional motion information(if any)				Optional	Motion information associated with the event. see Motion Parameters
obd.xxx	Additional obd information(if any)				Optional	OBD information associated with the event. see OBD Parameters

Parameter Name	Description	Type	Range	Units	Optional	Note
io.xxx	Additional io information(if any)				Optional	IO information associated with the event. see IO Parameters

5.4 Event examples

5.4.1 General event

Once you have subscribed to this topic, you will receive the related event information.

Topic: `v1/{client_id}/event/notice`

Payload:

```
{
  "starts_at" : 1642666533,
  "status" : "raise",
  "type" : "IGON",
  "level" : 1,
  "gnss.latitude" : 30.587996,
  "gnss.longitude" : 104.053223,
  "gnss.altitude" : 460.100006,
  "gnss.speed" : 0,
  "gnss.heading" : 0,
  "gnss.hdop" : 1.6,
  "io.ts" : 1642666533,
  "io.AI1" : 0,
  "io.DI1" : 0,
  "io.DI2" : 1,
  "io.DI3" : 0,
  "io.DI4" : 0,
  "io.DI1_pullup" : 0,
  "io.DI2_pullup" : 1,
  "io.DI3_pullup" : 0,
  "io.DI4_pullup" : 0,
  "io.DO1" : 0,
  "io.DO2" : 0,
  "io.DO3" : 0,
  "io.IGT" : 1,
  "motion.ax" : 0.171776,
  "motion.ay" : 0.127612,
  "motion.az" : -0.959652,
  "motion.gx" : 0.35,
  "motion.gy" : 0.56,
  "motion.gz" : -0.49
}
```

Parameter description, See Event parameters & FlexAPI supported Parameters.

5.4.3 DTC event

Once you have subscribed to this topic, you will receive the related event information.

5.4.3.1 OBD-II DTC

Topic: `v1/{client_id}/event/notice`

Event occur:

Payload:

```
{
    "starts_at": 1609901565,
    "status": "raise",
    "type": "OBDII_DTC_P070F",
    "level": 2,
    "dtc": "P070F",
    "desc": "Transmission Fluid Level Too Low",
    "gnss.longitude": -111.33,
    "gnss.latitude": 38.2222,
    "gnss.altitude": 230,
    "gnss.heading": 42.5,
    "gnss.speed": 55,
    "gnss.hdop": 2.1,
    "obd.speed": 55,
    "obd.f_lvl": 21,
    "obd.odo": 2025,
    "motion.ax": 0.0,
    "motion.ay": 0.0,
    "motion.az": 0.0,
    "motion.gx": 0.0,
    "motion.gy": 0.0,
    "motion.gz": 0.0
}
```

Event recovery:

Payload:

```
{
    "starts_at": 1609901565,
    "ends_at": 1609901820,
    "status": "clear",
    "type": "OBDII_DTC_P070F",
    "level": 2,
    "dtc": "P070F",
    "desc": "Transmission Fluid Level Too Low",
    "gnss.longitude": -111.33,
    "gnss.latitude": 38.2222,
    "gnss.altitude": 230,
    "gnss.heading": 42.5,
    "gnss.speed": 0,
    "gnss.hdop": 2.1,
    "obd.speed": 0,
    "obd.f_lvl": 21,
    "obd.odo": 2025,
    "motion.ax": 0.0,
```

```
    "motion.ay": 0.0,
    "motion.az": 0.0,
    "motion.gx": 0.0,
    "motion.gy": 0.0,
    "motion.gz": 0.0
}
```

Parameter description:

Parameter Name	Description	Type	Range	Units	Optional	Note
dtc	Diagnostic trouble code	string				
desc	Diagnostic trouble code description	string			optional	

More parameter description, See [Event parameters] & [FlexAPI supported Parameters].

5.4.3.2 J1939 DTC

Topic: `v1/{client_id}/event/notice`

Event occur:

Payload:

```
{
    "starts_at": 1609901565,
    "status": "raise",
    "type": "J1939_DTC_173",
    "level": 2,
    "src_addr": 0,
    "fmi": 3,
    "oc": 1,
    "spn": 173,
    "gnss.longitude": -111.33,
    "gnss.latitude": 38.2222,
    "gnss.altitude": 230,
    "gnss.heading": 42.5,
    "gnss.speed": 0,
    "gnss.hdop": 2.1,
    "obd.speed": 0,
    "obd.f_lvl": 21,
    "obd.odo": 2000,
    "motion.ax": 0.0,
    "motion.ay": 0.0,
    "motion.az": 0.0,
    "motion.gx": 0.0,
    "motion.gy": 0.0,
    "motion.gz": 0.0
}
```

Event recovery:

Payload:

```
{
    "starts_at": 1609901565,
    "ends_at": 1609901820,
    "status": "clear",
    "type": "J1939_DTC_173",
    "level": 2,
    "src_addr": 0,
    "fmi": 3,
    "oc": 1,
    "spn": 173,
    "gnss.longitude": -111.33,
    "gnss.latitude": 38.2222,
    "gnss.altitude": 230,
    "gnss.heading": 42.5,
    "gnss.speed": 0,
    "gnss.hdop": 2.1,
    "obd.speed": 0,
    "obd.f_lvl": 21,
    "obd.odo": 2000,
    "motion.ax": 0.0,
    "motion.ay": 0.0,
    "motion.az": 0.0,
    "motion.gx": 0.0,
    "motion.gy": 0.0,
    "motion.gz": 0.0
}
```


Parameter description:

Parameter Name	Description	Type	Range	Units	Optional	Note
src_addr	Source Address	int				
fmi	Failure Mode Indicator	int				
oc	Occurrence Count	int				
spn	Suspect Parameter Number	int				

More parameter description, See Event parameters & FlexAPI supported Parameters.

Appendix A. FlexAPI Supported Parameters

A.1 GNSS Parameters

Parameter Name	Description	Type	Range	Units	Optional	Note
gnss.ts	The last time the GNSS info was updated	int		s		UNIX timestamp, in seconds since the epoch
gnss.latitude	latitude	float		deg	mandatory	
gnss.longitude	longitude	float		deg	mandatory	
gnss.altitude	altitude	float		deg	mandatory	
gnss.speed	speed	float		km/h	mandatory	
gnss.heading	heading	float	[0.0,360.0]	°		
gnss.hdop	Horizontal DOP	float				
gnss.fix	GNSS fix status	int	0: NoFix; 1: DR Only 2: 2D; 3: 3D 4: GNSS+DR; 5: Time Only			
gnss.num_sv	number of satellites used	int	[0,12]			

A.2 Motion Parameters

Parameter Name	Description	Type	Range	Units	Optional	Note
motion.ts	The last time the Motion info was updated	int		s		UNIX timestamp, in seconds since the epoch
motion.ax	x-axis accelerometer	float		g	mandatory	accelerometer
motion.ay	y-axis accelerometer	float		g	mandatory	accelerometer
motion.az	z-axis accelerometer	float		g	mandatory	accelerometer
motion.gx	x-axis gyroscope	float		deg/s	mandatory	gyroscope
motion.gy	y-axis gyroscope	float		deg/s	mandatory	gyroscope
motion.gz	z-axis gyroscope	float		deg/s	mandatory	gyroscope

A.3 IO Parameters

Parameter Name	Description	Type	Range	Units	Optional	Note
io.ts	The last time the IO info was updated	int		s		UNIX timestamp, in seconds since the epoch
io.AI{n}	Analog Input n	float	[0,36.0] null: invalid	V	mandatory	n: [1,1]
io.DI{n}	Digital Input n	int	0: low 1: high null: invalid		mandatory	n: [1,4]
io.DI{n}_pullup	Digital Input pullup n	int	0: down 1: up null: invalid		mandatory	n: [1,4]
io.DO{n}	Digital Output n	int	0: low 1: high null: invalid		mandatory	n: [1,3]
io.IGT	Digital Input for ignition signal	int	0: low 1: high null: invalid			

A.4 OBD Parameters

Parameter Name	Description	Type	J1939 PGN:SPN	J1979 SID: PID	J1708 MID:PID	Range	Units	Note
obd.ts	The last time the OBD info was updated	int	N/A	N/A	N/A	N/A	s	UNIX timestamp, in seconds since the epoch
obd.vin	Vehicle Identification Number	string	65260:237	09h:02h	128:237			
obd.e_load	Engine Load	double	61443:92	01h:04h	128:92	[0,250.00] 0: stopped >0: started	%	
obd.c_temp	Engine Coolant Temp	int	65262:110	01h:05h	128:110	[-40,215]	℃	
obd.rpm	Engine Speed	double	61444:190	01h:0Ch	128:190	[0,16383.75]	RPM	
obd.speed	Vehicle Speed	int	65265:84	01h:0Dh	128:84	[0,255]	km/h	
obd.f_lvl	Fuel Level	double	65276:96	01h:2Fh	140:96	[0,100.00]	%	
obd.f_rate	Fuel Rate	double	65266:183	01h:5Eh	128:183	[0,3276.75]	l/h	
obd.dtcs	DTC Count	int	65230:1218	01h:01h	Not Supported	[0,250]		
obd.mil	MIL Status	boolean	65226:1213	01h:01h	Not Supported	0:off 1:on		
obd.b_volt	Battery Voltage	double	65271:168	0x01:0x42	128:168	[0,3212.75]	V	
obd.a_temp	Ambient Air Temp	int	65269:171	01h:46h	140:171	[-273,1734]	℃	
obd.o_temp	Engine Oil Temp	int	65262:175	01h:5Ch	128:175	[-273,1734]	℃	
obd.up_time	Engine Start Time	int	64952:3301	01h:1Fh	Not Supported	[0,65535]	sec	
obd.m_dist	Distance traveled while MIL is Activated	int	49408:3069	01h:21h	Not Supported	[0,65535]	km	
obd.d_dist	Distance traveled since DTCs cleared	int	49408:3294	01h:31h	Not Supported	[0,65535]	km	
obd.m_time	Engine run time while MIL activated	int	49408:3295	Not Supported	Not Supported	[0,65535]	min	
obd.d_time	Engine run time since DTCs cleared	int	49408:3296	Not Supported	Not Supported	[0,65535]	min	
obd.f_press	Fuel Pressure	int	64929:3480	01h:0Ah	128:94	[0,6425]	kPa	
obd.t_pos	Throttle Position	double	65266:51	01h:11h	128:51	[0,100.00]	%	
obd.brake	Brake Switch Status	boolean	65265:597	Not Supported	128:65	0:brake pedal released 1:brake pedal depressed		
obd.parking	Parking Brake Switch Status	boolean	65265:70	Not Supported	128:70	0:parking brake not set 1:parking brake set		
obd.s_w_angle	Steering Wheel Angle	double	61449:1807	Not Supported	Not Supported	[-31.374,31.374]	rad	
obd.f_econ	Fuel Economy	double	65266:185	Not Supported	128:185	[0,125.50]	km/L	
obd.odo	Odometer	double	65248:245	01h:a6h	128:245	[0,526385151.875]	km	
obd.a_pos	Accelerator Pedal Position	double	61443:91	Not Supported	128:91	[0,100.00]	%	
obd.t_dist	trip distance	double	65248:244	01h：21h	128:244	[0,526385151.875]	km	
obd.i_temp	Intake Manifold Temp	int	65270:105	01h:0Fh	128:105	[-40,215]	℃	
obd.i_press	Intake Manifold Pressure	int	65270:102	01h:0Bh	Not Supported	[0,255]	kPa	
obd.b_press	Barometirc Pressure	int	65269:108	01h:33h	128:108	[0,255]	kPa	
obd.f_r_press	Fuel Rail Pressure	int	64765:5313	01h:23h	Not Supported	[0,65530]	kPa	
obd.r_torque	Engine reference Torque	int	65251:544	01h:63h	Not Supported	[0,64255]	Nm	
obd.f_torque	Engine friction Torque	float	65247:514	01h:8Eh	Not Supported	[-125.00,125.00]	%	
obd.max_avl_torque	Engine Maximum Available Torque	float	61443:3357	Not Supported	Not Supported	[0,100.00]	%	
obd.a_torque	Engine actual Torque	float	61444:513	01h:62h	128:93	[-125.00,125.00]	%	
obd.d_e_f_vol	Diesel Exhaust Fluid Volume	float	65110:1761	Not Supported	Not Supported	[0,100.00]	%	

Parameter Name	Description	Type	J1939 PGN:SPN	J1979 SID: PID	J1708 MID:PID	Range	Units	Note
obd.mf_mon	Misfire Monitor Status	int	65230:1221	01h:01h	Not Supported	0:not completed 1:completed		
obd.f_s_mon	Fuel System Monitor Status	int	65230:1221	01h:01h	Not Supported	0:not completed 1:completed		
obd.c_c_mon	Comprehensive Component Monitor Status	int	65230:1221	01h:01h	Not Supported	0:not completed 1:completed		
obd.c_mon	Catalyst Monitor Status	int	65230:1222	01h:01h	Not Supported	0:not completed 1:completed		
obd.h_c_mon	Heated Catalyst Monitor Status	int	65230:1222	01h:01h	Not Supported	0:not completed 1:completed		
obd.e_s_mon	Evaporative System Monitor Status	int	65230:1222	01h:01h	Not Supported	0:not completed 1:completed		
obd.s_a_s_mon	Secondary Air System Monitor Status	int	65230:1222	01h:01h	Not Supported	0:not completed 1:completed		
obd.a_s_r_mon	A/C System Refrigerant Monitor Status	int	65230:1222	01h:01h	Not Supported	0:not completed 1:completed		
obd.e_g_s_mon	Exhaust Gas Sensor Monitor Status	int	65230:1222	01h:01h	Not Supported	0:not completed 1:completed		
obd.e_g_s_h_mon	Exhaust Gas Sensor heater Monitor Status	int	65230:1222	01h:01h	Not Supported	0:not completed 1:completed		
obd.e_v_s_mon	EGR/VVT System Monitor Status	int	65230:1222	01h:01h	Not Supported	0:not completed 1:completed		
obd.c_s_a_s_mon	Cold Start Aid System Monitor Status	int	65230:1222	Not Supported	Not Supported	0:not completed 1:completed		
obd.b_p_c_s_mon	Boost Pressure Control System Monitor Status	int	65230:1222	01h:01h	Not Supported	0:not completed 1:completed		
obd.dpf_mon	DPF Monitor Status	int	65230:1222	Not Supported	Not Supported	0:not completed 1:completed		
obd.n_c_mon	NOx Catalyst Monitor Status	int	65230:1222	01h:01h	Not Supported	0:not completed 1:completed		
obd.nmhc_mon	NMHC Catalyst Monitor Status	int	65230:1222	01h:01h	Not Supported	0:not completed 1:completed		
obd.o_s_mon	Oxygen Sensor Monitor Status	int	Not Supported	01h:01h	Not Supported	0:not completed 1:completed		
obd.o_s_h_mon	Oxygen Sensor heater Monitor Status	int	Not Supported	01h:01h	Not Supported	0:not completed 1:completed		
obd.brake_prim_press	Brake Primary Pressure	float	Not Supported	Not Supported	140:117		kPa	unavailable
obd.brake_sec_press	Brake Secondary Pressure	float	Not Supported	Not Supported	140:118		kPa	unavailable
obd.e_hours	"Engine Total Hours of Operation	int	65253:247	Not Supported	Not Supported		h	
obd.ab_level	Aftertreatment 1 Diesel Exhaust Fluid Tank Volume	float	65110:1761	Not Supported	Not Supported		%	

A.5 Cellular Parameters

Parameter Name	Description	Type	Range	Units	Optional	Note
modem1.ts	The last time the modem1 info was updated	int		s		UNIX timestamp, in seconds since the epoch
modem1.imei	IMEI code	string				
modem1.imsi	IMSI code	string				
modem1.iccid	ICCID code	string				
modem1.phone_num	phone number	string				
modem1.signal_lvl	signal level	number		asu		
modem1.reg_status	register status	number	[0,6]			0: Not registered, ME is not currently searching an operator to register to 1: Registered, home network 2: Not registered, but ME is currently trying to attach or searching an operator to register to 3: Registration denied 4: Unknown, e.g. out of LTE coverage 5: Registered, roaming
modem1.operator	operator	string				
modem1.network	network type	number	[0,3]			0: NA, 1: 2G, 2: 3G, 3: 4G
modem1.lac	LAC	string				hexadecimal
modem1.cell_id	Cell ID	string				hexadecimal
modem1.rssi	RSSI(Received Signal Strength Indication)	number		dBm		
modem1.rsrp	RSRP(Reference Signal Receiving Power)	number		dBm		
modem1.rsrq	RSRQ(Reference Signal Receiving Quality)	number		dB		
modem1.sinr	SINR(Signal to Interference plus Noise Ratio)	number		dB		
cellular1.status	cellular1 network status	number	[0,3]			0: destroy 1: create 2: down 3: up

Parameter Name	Description	Type	Range	Units	Optional	Note
cellular1.ip	cellular1 ip address	string				
cellular1.netmask	cellular1 netmask	string				
cellular1.gateway	cellular1 gateway	string				
cellular1.dns1	cellular1 dns1	string				
cellular1.up_at	cellular1 connected time	number		s		

A.6 System Parameters

Parameter Name	Description	Type	Range	Units	Optional	Note
sysinfo.ts	The last time the sysinfo info was updated	int		s		UNIX timestamp, in seconds since the epoch
sysinfo.model_name	model name	string				
sysinfo.oem_name	OEM name	string				
sysinfo.serial_number	serial number	string				
sysinfo.firmware_version	firmware version	string				
sysinfo.product_number	product number	string				
sysinfo.description	description	string				

A.7 Sensor Parameters

Parameter Name	Description	Type	Range	Units	Optional	Note
sensor.ts	The last time the sensor info was updated	int		s		UNIX timestamp, in seconds since the epoch
sensor.data	sensor data	string				
type	sensor type	string				1W_TP：temperature sensor
id	sensor id	string				
value	sensor value	string		℃		This parameter is sent only when the sensor type is temperature sensor

A.8 W2R Parameters

Parameter Name	Description	Type	Range	Units	Optional	Note
w2r.ts	The last time the w2r info was updated	int		s		UNIX timestamp, in seconds since the epoch
w2r.if	interface name	string				
w2r.proto	protocol type	string				Only modbus(RS485) is supported.
w2r.rmt	data from interface.					Only modbus(RS485) is supported.