IVI Service Layer Interface Specification – App Router

Prepared by

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| --- | --- | --- | --- |
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| 1.0 | 05-Jan-2022 | JPEI2 | Initial version |
| 1.1 | 14-Feb-2022 | JPEI2 | Added a new section for parameter and response structure for each feature. It needs to be updated for each feature. |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| ABBREVIATE TABLE | |  |  |
| IVI | In-Vehicle Infotainment | |  |
| IVT | In-Vehicle Token | |  |
| APIM | Azure API Manager | |  |
| IVISL | IVI Service Layer Cloud | |  |

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1. Introduction

This document describes the interfaces exposed by IVI Service Layer App Router Service, which pass through requests from IVI APKs to backend systems.

1. Security

This section of the document explains the security mechanisms.

* 1. Request Headers

In addition, ***Application-Id, Platform-Id, Device-Id*** are all required in Http Header for API communication with App Router service provided by IVI Service Layer.

***Application-Id*** is an ID to identify an application in Ford ecosystem. The client system/app need to register the system/app following Ford standard process to get a unique Application-ID.

***Platform-Id*** is an ID provided by IVI Service Layer to identify the platform client application runs on.

***Device-Id*** is a unique value assigned to individual IVI device during the IVI device’s onboarding process.

* 1. Payload Encryption

During IVI app deployment stage, an app based secret is embedded in app. This secret will be used along with other device info for first time device registration.

Unique **DeviceID** and **DeviceSecret** will be assigned to individual IVI device during the process. DeviceID and DeviceSecret will be used in the communication with other services provided by IVI Service Layer.

A common AES encryption pattern will be followed in various request and response scenarios.

1. AES Key: to be defined in each request
2. Cipher mode: **CBC**
3. IV: Take **first 16 bytes** of AES Key and **reverse it** to get IV
4. Padding: **PKCS5**
5. Data: content to be defined in each request. NOTE: If data size is larger than **$BLOCKSIZE bytes**, it will be cut into pieces of **$BLOCKSIZE** bytes or shorter, encrypted separately then joined together. For Phase1-3 vehicles, **$BLOCKSIZE=896**; for phase4+ vehicles, **$BLOCKSIZE=240.**
6. Encoding: default to **BASE64**, except when it’s clearly defined in request otherwise

Below is an example encrypt/decrypt util class written in Java.

### $BLOCKSIZE differ between Sync+ Phase1-3 and Phase4+. For Phase 1-3, $BLOCKSIZE=896; for phase4+, $BLOCKSIZE=240

public class AesTools {

    private static final int TEE\_ENCRYPT\_SYM\_LARGE = $BLOCKSIZE;

    private static final int TEE\_DECRYPT\_SYM\_LARGE = $BLOCKSIZE + 16;

    private volatile static AesTools newInstance = null;

    private AesTools() {

    }

    public static AesTools getInstance() {

        if (newInstance == null) {

            synchronized (AesTools.class) {

                if (newInstance == null) {

                    newInstance = new AesTools();

                }

            }

        }

        return newInstance;

    }

    /\*\*

     \*

     \* @param key AES key

     \* @param mode mode 1 is encrypt;2 is decrypt

     \* @param plain plain or encryptedData

     \* @return byte[] encryptedData or plain

     \*/

    public byte[] aesSymCopy(String key,int mode, byte[] plain) {

        if (key == null || key.length() % 16 != 0) {

            System.out.println("key error return null");

            return null;

        };

        byte[] iv = new byte[16];

        for (int i = 0; i < iv.length; ++i) {

            iv[i] = key.getBytes()[iv.length() - 1 - i];

        }

        int modeTee = (mode == 1) ? TEE\_ENCRYPT\_SYM\_LARGE : TEE\_DECRYPT\_SYM\_LARGE;

        if (plain.length <= modeTee) {

            return aesTool(key, mode, iv, plain);

        } else {

            byte[] buffer = null;

            byte[] blockBytes;

            int index = ((plain.length - 1) / modeTee) + 1;

            for (int i = 0; i < index; i++) {

                int startIndex = i \* modeTee;

                int endIndex = startIndex + modeTee;

                blockBytes = subBytes(plain, startIndex,

                        Math.min(endIndex, plain.length) - startIndex);

                if (buffer == null) {

                    buffer = aesTool(key, mode, iv, blockBytes);

                    if (buffer == null) {

                        throw new RuntimeException("encryptSymForLarge加密失败");

                    }

                } else {

                    buffer = addAllByte(buffer, aesTool(key, mode, iv, blockBytes));

                }

            }

            return buffer;

        }

    }

    private byte[] aesTool(String key, int mode, byte[] iv, byte[] bytes) {

        byte[] encryptedData = null;

        try {

            javax.crypto.Cipher cipher = javax.crypto.Cipher

                    .getInstance("AES/CBC/PKCS5Padding");

            cipher.init(mode,

                    new SecretKeySpec(key.getBytes(), "AES"),

                    new IvParameterSpec(iv));

            encryptedData = cipher.doFinal(bytes);

        } catch (Exception e) {

            // TODO: handle exception

            System.out.println("error return null");

        }

        return encryptedData;

    }

    private static byte[] addAllByte(byte[] orig, byte[] newAdd) {

        byte[] result = new byte[orig.length + newAdd.length];

        System.arraycopy(orig, 0, result, 0, orig.length);

        System.arraycopy(newAdd, 0, result, orig.length, newAdd.length);

        return result;

    }

    private static byte[] subBytes(byte[] src, int begin, int count) {

        byte[] bs = new byte[count];

        System.arraycopy(src, begin, bs, 0, count);

        return bs;

    }

}

* 1. Request Signature

Request signature is required in specific APIs to prevent data tampering during transmission.

The whole picture looks like:

Note: for HTTP GET method, replate RequestBody with RequestParam

Base64(

SHA256(

AscendingOrder(RequestHeaderPart) + "." +

RequestURL + "." +

AscendingOrder(RequestBody) + "."

last16Digit(DeviceSecret)

)

)

Follow steps below to generate signature of a request.

Example Request URL:

/api/ivisl/app-router/v1/f/s-feedback/fdid00000000001/audio

Example Request body:

{

"param":"enctryptedstring",

"values":"base64encodingstring",

    "nonce":"123",

    "timestamp":"1570703617000"

}

1. Take request headers: Application-Id, Platform-Id, Device-Id, Token, Open-Id, then sort keys with **ascending** order

Application-Id=newapplication, Device-Id=999, Open-Id=777, Platform-Id=p01, Token=

1. Take values of each k-v pair and combine them into one string, empty if no value for that header

newapplication999777p01

1. Take request URL path string and append it to header value string with a dot ‘.’  
   newapplication999777p01./api/ivisl/app-router/v1/f/s-feedback/fdid00000000001/audio
2. Take raw request body(for GET method, take request param) except sign and file, then sort keys with **ascending** order

*nonce=123, param=encryptedstring, timestamp=1570703617000, values=base64encodingstring*

1. Take values of each k-v pair and combine them into one string

*123encryptedstring1570703617000base64encodingstring*

1. Append request body values string with a dot ‘.’

newapplication999777p01./api/ivisl/app-router/v1/f/s-feedback/fdid00000000001/audio. *123encryptedstring1570703617000base64encodingstring*

1. Take **last 16 characters** of **SHA256 HEX encoded DeviceSecret** (for example, 6088b8b6a2119acc4ebc2df13a97d5d49af71eed12643fcf275c48fb19133f24)

*275c48fb19133f24*

1. Combine both strings to *stringbeforehash with a dot* ‘.’

newapplication999777p01./api/ivisl/app-router/v1/f/s-feedback/fdid00000000001/audio. *123encryptedstring1570703617000base64encodingstring.275c48fb19133f24*

1. Hash *stringbeforehash* using **SHA256 with BASE64 encoding** to get signature.

*X23Q3gz7mY8QBOR7arfX0RksNpVDoW5hzVIW6pGVhRw*

1. Implementation

|  |  |
| --- | --- |
| Description | Provides a standard set Application Services for IVI apps to consume |
| Integration Methods | Public Restful API |
| Technology | Java API |
| Implementation | The IVISL services will be a Web API implemented in Java and hosted in PCF.  Requests to the API will be sent over HTTPS.  Client applications ­­will need to pass their Authorization token on every call so the Web API can validate the caller.  Client applications will be sent to the API using the methods Restful endpoint with JSON format  Responses from the Services will be returned as JSON format containing status code and response data which defined in this document. |
| HTTP Headers | All requests need to contain the following headers.  Content-Type : application/json; char-set=utf-8  Accept : application/json; char-set=utf-8  **Application-Id: [Identifies the app which the request is coming from]**  **Platform-Id: [Identifies the platform which the request is coming from]**  **Device-Id: [Identifies the device that the request is coming form]** |
| Query String Arguments | All query string arguments need to be URL encoded. Example  lrdt=12-21-2014%2010%3A01%3A50%20AM |

1. Interface Matrix

Below table summarize all APIs provided by IVI Service Layer

|  |  |  |
| --- | --- | --- |
| **No** | **API name** | **API behavior** |
| API01 | Send data | Send data from IVI to Cloud |
| API02 | Request Data | Request data from Cloud |
| API03 | Update data | Send data from IVI to Cloud to update profile, status, etc. |

1. API Specifications

This section documents the APIs hosted by IVI Service Layer

**API Domain:**

Stage: https://stgcn.api.mps.ford.com.cn

Production: https://cn.api.mps.ford.com.cn

* 1. API01 – Send Data

IVI device can send data to cloud through this API

Attributes

|  |  |
| --- | --- |
| URL | /api/ivisl/app-router/v1/d/{serviceName}/{APIName} |
| HTTP Method | POST |
| Security Access | Authenticated Calls Only |
| Call Type | Synchronous |

Requests

Additional package data is required.

| Field | Type | Description | In | Condition | Example |
| --- | --- | --- | --- | --- | --- |
| Token | String | IVT access token | Header | Requried for SYNC+ 2.0+ when GUID or CAT2 token is mandatory in backend API |  |
| Open-Id | String | Encrypted User’s openId | Header | Requried for SYNC+ 1.0 when GUID is mandatory in backend API |  |
| <HeaderParameter> |  |  | Header | Optional |  |
| param | String | Encrypted request json payload, refer to [section 2.2 Payload Encryption](#Payload_Encryption)  Passthrough parameters in body should be included in this field. | Body | Required |  |
| nonce | String | A random string generated for each request, 16 bytes max | Body | Required | 1570703617000abc |
| timestamp | Long | Current system time in epoch ms format | Body | Required | 1570703617000 |
| sign | String | Signature of request, refer to [section 2.3 Request Signature](#Request_Signature) | Body | Required |  |

param raw data fields

| Field | Type | Description | In | Condition | Example |
| --- | --- | --- | --- | --- | --- |
| <Parameter required by backend> |  |  | Body |  |  |

Request Sample

Request body sample:

{

"param": "NV9tWirKTXYVGOgxOj+xWPx2lY5kbTBCWI7gSKLCSS1SD/gVPWlp40g0qEEQXLfzcpIHXk4+OUD/8IEa5geU6qM9PcX9oP+6OZ13RoZ4zmrucTLTr4ifKCGaBp16SWF+3OpMhale6/viXQ5GD+wBpxp15tiFe8K+IM/15jubNUc=",

"nonce":"1570703617000abc",

"timestamp": 1570703617000,

"sign": "5o/njgZHAP5rmOR9wHWKT5Zr0Ccpm2hWQsYH6jdrfUc="

}

Response

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Type | Description | Example |
| status | Integer | Status code | 130200 |
| statusDesc | String |  | Success |
| responseData |  | Depends on if backend system response has response data other than status. |  |

Response Sample

Raw response

{

"status": 130200,

"statusDesc": "Request is processed successfully"

}

* 1. API02 – Request Data

IVI device can request data from cloud through this API

Attributes

|  |  |
| --- | --- |
| URL | /api/ivisl/app-router/v1/d/{serviceName}/{APIName} |
| HTTP Method | GET |
| Security Access | Authenticated Calls Only |
| Call Type | Synchronous |

Requests

| Field | Type | Description | In | Condition | Example |
| --- | --- | --- | --- | --- | --- |
| Token | String | IVT access token | Header | Requried for SYNC+ 2.0+ when GUID or CAT2 token is mandatory in backend API |  |
| Open-Id | String | Encrypted User’s openId | Header | Requried for SYNC+ 1.0 when GUID is mandatory in backend API |  |
| <HeaderParameter> |  |  | Header |  |  |
| param | String | Encrypted request json payload, refer to [section 2.2 Payload Encryption](#Payload_Encryption).  Passthrough parameters in Parameter should be included in this field. | param | Required |  |
| nonce | String | A random string generated for each request, 16 bytes max | param | Required | 1570703617000abc |
| timestamp | Long | Current system time in epoch ms format | param | Required | 1570703617000 |
| sign | String | Signature of request, refer to [section 2.3 Request Signature](#Request_Signature) | param | Required |  |

param raw data fields

| Field | Type | Description | In | Condition | Example |
| --- | --- | --- | --- | --- | --- |
| <Parameter required by backend> |  |  | Param |  |  |

Request Sample

Request body sample:

https://{domain}/api/ivisl/app-router/v1/d/{serviceName}/{APIName}?param= NV9tWirKTXYVGOgxOj%2BxWPx2lY5kbTBCWI7gSKLCSS1SD%2FgVPWlp40g0qEEQXLfzcpIHXk4%2BOUD%2F8IEa5geU6qM9PcX9oP%2B6OZ13RoZ4zmrucTLTr4ifKCGaBp16SWF%2B3OpMhale6%2FviXQ5GD%2BwBpxp15tiFe8K%2BIM%2F15jubNUc%3D&nonce=1570703617000abc&timestamp=1570703617000&sign=5o%2FnjgZHAP5rmOR9wHWKT5Zr0Ccpm2hWQsYH6jdrfUc%3D

Response

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Type | Description | Example |
| status | Number | Status code | 130200 |
| statusDesc | String |  | Success |
| responseData | String | Depends on if data needs encryption |  |

Response Sample

Raw response

{

"status": 103200,

"statusDesc": "Request is processed successfully",

"responseData": "NV9tWirKTXYVGOgxOj+xWPx2lY5kbTBCWI7gSKLCSS1SD/gVPWlp40g0qEEQXLfzcpIHXk4+OUD/8IEa5geU6qM9PcX9oP+6OZ13RoZ4zmrucTLTr4ifKCGaBp16SWF+MenK022aGcoZCmdUuv3vzlsGbw58RREQV7ylwRSjDzUGv1ZHyVu4DEfpo0LIQ0/orGPV7J77OiUryUP2flMQ81UwqlX0xPgdXD9I7jyGHnQ7GK/CJZ84rFBZcIxx/u0uhiXSs9EHPpCcAwqp2Tifo46S7oJS6qeLO6aaAJNbKHA="

}

* 1. API03 – Update Data

IVI device can send data to cloud through this API, to update profile, status, ect.

Attributes

|  |  |
| --- | --- |
| URL | /api/ivisl/app-router/v1/d/{serviceName}/{APIName} |
| HTTP Method | PUT |
| Security Access | Authenticated Calls Only |
| Call Type | Synchronous |

Requests

Additional package data is required.

| Field | Type | Description | In | Condition | Example |
| --- | --- | --- | --- | --- | --- |
| Token | String | IVT access token | Header | Requried for SYNC+ 2.0+ when GUID or CAT2 token is mandatory in backend API |  |
| Open-Id | String | Encrypted User’s openId | Header | Requried for SYNC+ 1.0 when GUID is mandatory in backend API |  |
| <HeaderParameter> |  |  | Header | Optional |  |
| param | String | Encrypted request json payload, refer to [section 2.2 Payload Encryption](#Payload_Encryption).  Passthrough parameters in body should be included in this field. | Body | Requried |  |
| nonce | String | A random string generated for each request, 16 bytes max | Body | Required | 1570703617000abc |
| timestamp | Long | Current system time in epoch ms format | Body | Required | 1570703617000 |
| sign | String | Signature of request, refer to [section 2.3 Request Signature](#Request_Signature) | Body | Required |  |

param raw data fields

| Field | Type | Description | In | Condition | Example |
| --- | --- | --- | --- | --- | --- |
| <Parameter required by backend> |  |  | Body |  |  |

Request Sample

Request body sample:

{

"param": "NV9tWirKTXYVGOgxOj+xWPx2lY5kbTBCWI7gSKLCSS1SD/gVPWlp40g0qEEQXLfzcpIHXk4+OUD/8IEa5geU6qM9PcX9oP+6OZ13RoZ4zmrucTLTr4ifKCGaBp16SWF+3OpMhale6/viXQ5GD+wBpxp15tiFe8K+IM/15jubNUc=",

"nonce":"1570703617000abc",

"timestamp": 1570703617000,

"sign": "5o/njgZHAP5rmOR9wHWKT5Zr0Ccpm2hWQsYH6jdrfUc="

}

Response

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Type | Description | Example |
| status | Integer | Status code | 130200 |
| statusDesc | String |  | Success |
| responseData |  | Depends on if backend system response has response data other than status. |  |

Response Sample

Raw response

{

"status": 130200,

"statusDesc": "Request is processed successfully"

}

1. Staus Code
   1. HTTP Status Code

|  |  |  |
| --- | --- | --- |
| Code | Description | Retry Suggestion\* |
| 200 | Success (Response body should contain an application status code) |  |
| 201 | Created |  |
| 207 | Mutltiple status, refer to response body for more detailed info. Could be result of partial failure in backend requests. |  |
| 400 | Bad request(Response body should contain an application status code) | No, please ensure request data is valid before requesting cloud |
| 401 | Unauthorized – if the Authorization token is invalid or has expired | No |
| 403 | Forbidden | No |
| 404 | Unknown API or the API is off | No |
| 406 | Not Acceptable | No |
| 415 | Unsupported Media Type |  |
| 429 | Too Many Requests |  |
| 500 | Internal server error | Yes, suggest retry 3 times with time interval more than 10 seconds |
| 502 | Unexpected error from backend system | Yes, suggest retry 3 times with time interval more than 10 seconds |
| 503 | The server is currently unable to handle the request due to a temporary overloading or maintenance of the server. | Yes, suggest retry 3 times with time interval more than 10 seconds |
| 504 | Backend system did not respond within time limit | Yes, suggest retry 3 times with time interval more than 10 seconds |

\*Kindly note that retry suggestion is only for reference.

* Not retry means that please do not use the same parameter to call IVISL API again.
* IVI retry mechanism, including retry times and retry interval should be based on business need.
  1. Application Status Codes

Application status codes are for business returned in response body(NOT in http header).

|  |  |  |
| --- | --- | --- |
| Code | Description | Retry? |
| 130200 | Request is processed   successfully | No |
| 130207 | Request is partially successful, refer to responseData for more details | Yes, just retry error response data |
| 130400 | Invalid parameter(parameter name list which are invalid) | No, please ensure request data is valid before requesting cloud |
| 130401 | Platform Id authentication fail | No |
| 130402 | Onboarding key not found | No |
| 130403 | App Id authentication fail | No |
| 130404 | invalid deviceId | No |
| 130405 | illegal transaction id. | No, IVISL APK register device or renew key |
| 130406 | sign check fail. | No |
| 130407 | Request time is invalid. | No, please get a new timestamp |
| 130408 | Duplicate Request | No, please generate a new nonce. |
| 130409 | Decrypted content is invalid | No |
| 130429 | Too Many Requests | No |
| 130500 | Service internal error | Yes |
| 130501 | Backend service error | Yes |
| 130502 | No data found | No |
| 130503 | Csdn response description | No |
| 130504 | Invalid token when calling csdn | No |
| 130505 | VIN is invalid | No |
| 130506 | No user found | No |
| 130600 | Refresh token may be rovoked. Please request a new In-Vehicle token | No, Account APK retrieve a new IVT suite. |
| 130601 | User is inactive | No |
| 130602 | The vehicle is not bound with user | No |
| 130603 | Cannot revoke token by this userId | No |
| 130604 | Cannot revoke token on other's vehicle | No |
| 130605 | Inactive llid | No, user consent apk retrieve new llid first. |
| 130701 | Encryption key is invalid | No, functional app decides if pop up message to inform customer to contact call center |
| 130702 | Communication key is expired | No, IVISL APK renew key |
| 130703 | Device hasn't been registered. | No, IVISL APK register device |
| 130704 | Communication key not found | No, functional app decides if pop up message to inform customer to contact call center |
| 130705 | Device has been registered. | No, functional app decides if pop up message to inform customer to contact call center |
| 130801 | Device authentication fail | Yes |

* 1. Exception Layout

Exception will use fixed type with specific description, please check the below:

Response

|  |  |  |  |
| --- | --- | --- | --- |
| Field | Type | Description | Example |
| status | Integer | Status code | 130500 |
| statusDesc | String |  |  |
| error | Object | If status is 130500, error includes backend system error details. Otherwise, no error field.  Only applicable to Lidget 2.0 API. |  |

Response Sample

{

"status": 130500,

"statusDesc": "An exception occurs within the system"

}

{

"status": 130501,

"statusDesc": "Backend Service Error",

"error": {

"statusContext": "CFS",

“httpCode”: 400,

“errorResponse”: “backend service error response body”

}

}

1. Request & Response Structure for Specific Feature
   1. Carrier Data Usage API

Please refer to Section 5.1 Send Data for API specification

### Path

/api/ivisl/app-router/v1/d/s-csa/pushSubscriptionUsage

### Header

Token filed is optional.

### Param

| Field | Type | Description | In | Condition |
| --- | --- | --- | --- | --- |
| vin | String | vin | Param | Requried |
| requestTimestamp | String | request time in epoch ms format | Param | Required |
| startTime | String | sync subscription cycle start time in epoch ms format | Param | Requried |
| endTime | String | sync subscription cycle end time in epoch ms format | Param | Required |
| carrierUsage | Array | Please refer to CSA swagger for array details  carrierUsage in **PushSubscriptionUsageRequestJson** | Param | Required |

### Response

{

"status": 130200,

"statusDesc": "Request is processed successfully"

}

* 1. Subscription Status API

Please refer to Section 5.1 Send Data for API specification

### Path

/api/ivisl/app-router/v1/d/s-csa/retrieveSubscriptionUsage

### Header

Token is optional.

### Param

| Field | Type | Description | In | Condition |
| --- | --- | --- | --- | --- |
| vin | String | vin | Param | Requried |
| requestTimestamp | String | request time in epoch ms format | Param | Required |

### Raw Response

{

"status": 130200,

"statusDesc": "Request is processed successfully"

"responseData": "NV9tWirKTXYVGOgxOj+xWPx2lY5kbTBCWI7gSKLCSS1SD/gVPWlp40g0qEEQXLfzcpIHXk4+OUD/8IEa5geU6qM9PcX9oP+6OZ13RoZ4zmrucTLTr4ifKCGaBp16SWF+MenK022aGcoZCmdUuv3vzlsGbw58RREQV7ylwRSjDzUGv1ZHyVu4DEfpo0LIQ0/orGPV7J77OiUryUP2flMQ81UwqlX0xPgdXD9I7jyGHnQ7GK/CJZ84rFBZcIxx/u0uhiXSs9EHPpCcAwqp2Tifo46S7oJS6qeLO6aaAJNbKHA="

}

Decrypted responseData” is content in “value” filed of CSA **RetrieveSubscriptionUsageResponse**. Please refer to CSA API swagger for details.

* 1. One Time Access Code API

Please refer to Section 5.1 Send Data for API specification

### Path

/api/ivisl/app-router/v1/d/s-csa/accesscode

### Header

Token is optional.

### Param

| Field | Type | Description | In | Condition |
| --- | --- | --- | --- | --- |
| vin | String | vin | Param | Requried |

### Response

{

"status": 130200,

"statusDesc": "Request is processed successfully"

"responseData": "NV9tWirKTXYVGOgxOj+xWPx2lY5kbTBCWI7gSKLCSS1SD/gVPWlp40g0qEEQXLfzcpIHXk4+OUD/8IEa5geU6qM9PcX9oP+6OZ13RoZ4zmrucTLTr4ifKCGaBp16SWF+MenK022aGcoZCmdUuv3vzlsGbw58RREQV7ylwRSjDzUGv1ZHyVu4DEfpo0LIQ0/orGPV7J77OiUryUP2flMQ81UwqlX0xPgdXD9I7jyGHnQ7GK/CJZ84rFBZcIxx/u0uhiXSs9EHPpCcAwqp2Tifo46S7oJS6qeLO6aaAJNbKHA="

}

Decrypted responseData” is content in “value” filed of CSA **AccesscodeResponse**. Please refer to CSA API swagger for details.