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API Specification of HSBC Hong Kong Common QR Code for Retail Payments in Hong Kong (Merchant-Presented mode)

INTERNAL

Purpose of this document

This document provide the audience with [OpenAPI specification](#) for describing REST APIs of HSBC Collection of digital payments - HK Faster Payments System (HKFPS).

The target audience of this document is the Developer, Business Analyst and other related Project Team Member (who has the basic technical know-how of Web technology such as REST or JSON) of HSBC's client (i.e. the Merchant)

Update Log

- [Jan 18, 2021] **v2.7** Added content section [Testing](#)
- [Aug 24, 2020] **v2.6** Removed request field `country` in [qrCodeRequestModel](#)
- [Jun 22, 2020] **v2.5** Added [NOTICE](#) message in [Payment Status Notification API](#)
- [Jun 8, 2020] **v2.4**
 - Added new request message object `for_nonbill_payment` to [Payment Simulation API](#)
 - Added new API - [Refund Simulation API](#)
 - Added new Section - [Download Swagger](#)
- [Nov 8, 2019] **v2.3** Updated [API Base URL](#) including both Sandbox and Production
- [Sep 20, 2019] **v2.2** Updated [Disclaimer](#)
- [Sep 11, 2019] **v2.1**
 - Enhanced Section [API Connectivity](#)
 - Added Content Section [REFERENCE](#)
- [Aug 05, 2019] **v2.0**
 - Added New Business Capability - [Refund](#):
 - Added Refund Use Case in [API Use Case](#)
 - Added New API [Refund Request API](#)
 - Added New API [Refund Notification API](#)
 - Enhanced [Payment Status Enquiry API](#) with new optional fields related to Refund Scenario
- [Jun 5, 2019] **v1.28**
 - Added new request field `tip` in [Payment QR Code Creation API](#)
 - Added `proCode` 800050 regarding to the validation of `tip`
- [Mar 27, 2019] **v1.27**
 - Added new field `amtEditInd` in [Payment QR Code Creation API](#)
 - Remove object `for_bill_payment` in [Simulation API](#) and [Refund API](#)
- [Mar 18, 2019] **v1.26** Updated the URL of HKMA QR Code Specification
- [Jan 28, 2019] **v1.25**
 - Added optional request object `for_bill_payment` in [Simulation API](#)
 - Enhanced caption of request field `merTimeout` in [QR Code Creation API](#)

API Base URL

```
#Production  
https://cmb-api.hsbc.com.hk/glcm-mobilecoll-mchk-ea-merchantservices-prod-proxy/v1  
  
#Sandbox  
https://devclustercmb.api.p2g.netd2.hsbc.com.hk/glcm-mobilecoll-mchk-ea-merchantservices-cert-proxy/v1  
  
#Sandbox (Simulation API Only)  
https://devclustercmb.api.p2g.netd2.hsbc.com.hk/glcm-mobilecoll-mcasp-paysim-ea-merchantservices-cert-proxy/v1
```

Schemes: https

Version: 2.7

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• [Oct 16, 2018] v1.24 Added HTTP Header `message_encrypt` description in Simulation API

• [Sep 28, 2018] v1.23

- Content Enhanced in Content Section
- Updated the link of PHP JOSE library
- Changed response field `suppInfo` to optional
- Changed response field `bankTxnId` length to 16

• [Sep 24, 2018] v1.22 Changed the sample value of `bankTxnId`

• [Sep 18, 2018] v1.21 Changed the default testing value of `keyId`

• [Sep 11, 2018] v1.20

- Added message samples of field `returnReason` in response message
- Updated Image QR Code Payment Flow

• [Aug 27, 2018] v1.19

- Modified the possible value of response field `proCode` of QR Code API
- Changes field name from `debtorName` to `suppInfo` in Notification API
- Added field `suppInfo` in Enquiry API
- Added Content Section Data Type Overview

• [Aug 15, 2018] v1.18 Changed Content Type in HTTP Header of Status Notification API to `text/plain`

• [Aug 14, 2018] v1.17

- Modified the example value of field `qrCode` in QR Code API
- Content enhanced on Connectivity AT-A-Glance and FAQ section

• [Aug 8, 2018] v1.16 Removed possible value 999999 from request field `proCode` in Notification API

• [Aug 7, 2018] v1.15 Revised the whole layout of this document and separate the API onboarding procedure to another document

• [Aug 6, 2018] v1.14 Modified time format of field `bankTxnTime` in Enquiry & Status Notification API

• [Jul 11, 2018] v1.13 Changed URL endpoint of Payment Simulation API

• [Jun 29, 2018] v1.12

- Updated content section Getting Started Key Renewal Message Encryption
- Added new API Payment Simulation
- Added new validation rule of QR Code API

• [Jun 14, 2018] v1.11

- Changed maxLength of field `posMachineId` `employeeId`
- Added Possible Value of `proCode` of response of QR Code API & Enquiry API

• [Jun 13, 2018] v1.10a

- Changed datetime format to JSON standard `yyyy-MM-dd'T'HH:mm:ssZ`
- Removed Possible Value Fail from field `proCode` in Enquiry API
- Added Possible Value HK into field `country` in QR Code request API

• [Jun 6, 2018] v1.9

- Changed fields order in QR Code API
- Added `debtorName` to Notification API
- Removed `qrCodeRefId`

• [Jun 4, 2018] v1.8a

- Changed maxlen of `qrCode` `employeeId`
- Added `currency` to Enquiry & Notification API
- Added `bankTxnId` to Enquiry API
- Renamed fields `bankTxnTime` `totalAmtPaid` `subAmtPaid`

• [May 31, 2018] v1.7 Changed API endpoint names & field names including `txRef` `payMethod` `posMachineId` `employeeId`

• [May 29, 2018] v1.6 All amount fields are changed from maxlen 16 to 12 according to EMVCo standard

• [May 28, 2018] v1.5 New Fields added `merTimeout`

• [May 25, 2018] v1.4 Refined HTTP Response Code

• [May 16, 2018] v1.3 New Fields added `totalAmt` `subAmt` `fpsTxnTime`

• [May 14, 2018] v1.2 New Fields added `txChannel` `posMachineId` `employeeId` `qrCodeRefId`

• [May 4, 2018] v1.1 Final Revision

• [May 3, 2018] v1.0 Initial Version

How to Read this Document

This document will use API Use Cases to walk through the API usage concept and list the key idea by section. There is also a FAQ and List of Schema used by the API functions.

In addition, this document has links which will take you to subsequent Operation, it will have links for the data model or schema definition

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API Use Case

There are two major API use cases throughout this document:

- a Buyer visits a Merchant's online store to place order and [MAKE PAYMENT](#) with or without Scanning the Merchant-Presented QR Code which is based on HKMA and HKICL standard (also known as Common QR code specification).

NOTICE:

HKMA's url or website for Common QR Code Specification for Retail Payments in Hong Kong is [here](#). By the time of writing this document, the latest Common QR Code Specification which should include editable amount is not yet open to public for download.

Please note this url or website does not belong to HSBC, use it on your own discretion. By clicking this url or website, it means you accept this terms and conditions.

- a Buyer can request Merchant to [REFUND](#) a settled transaction. Once the refund request is submitted to HSBC, the refund process will be proceeded asynchronously.

Making a Payment

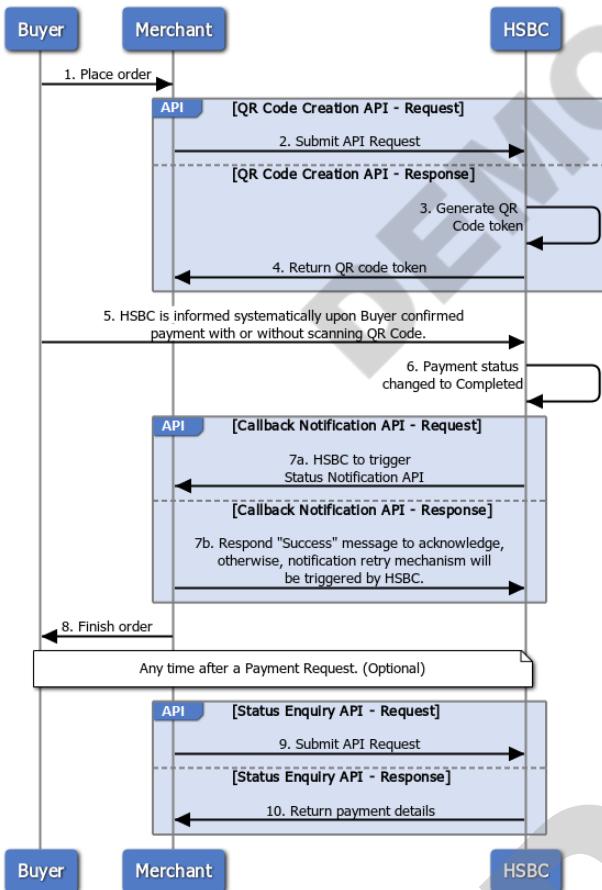
For the case where the Buyer needs to scan the QR code shown on Online Web Store, it is commonly known as e-Commerce model.

There are other use cases that may not involve QR Code Image generation, such as, conducting payment in Mobile Applications.

Regarding to the aforementioned payment models, the required API functions are illustrated in the following flow diagram:

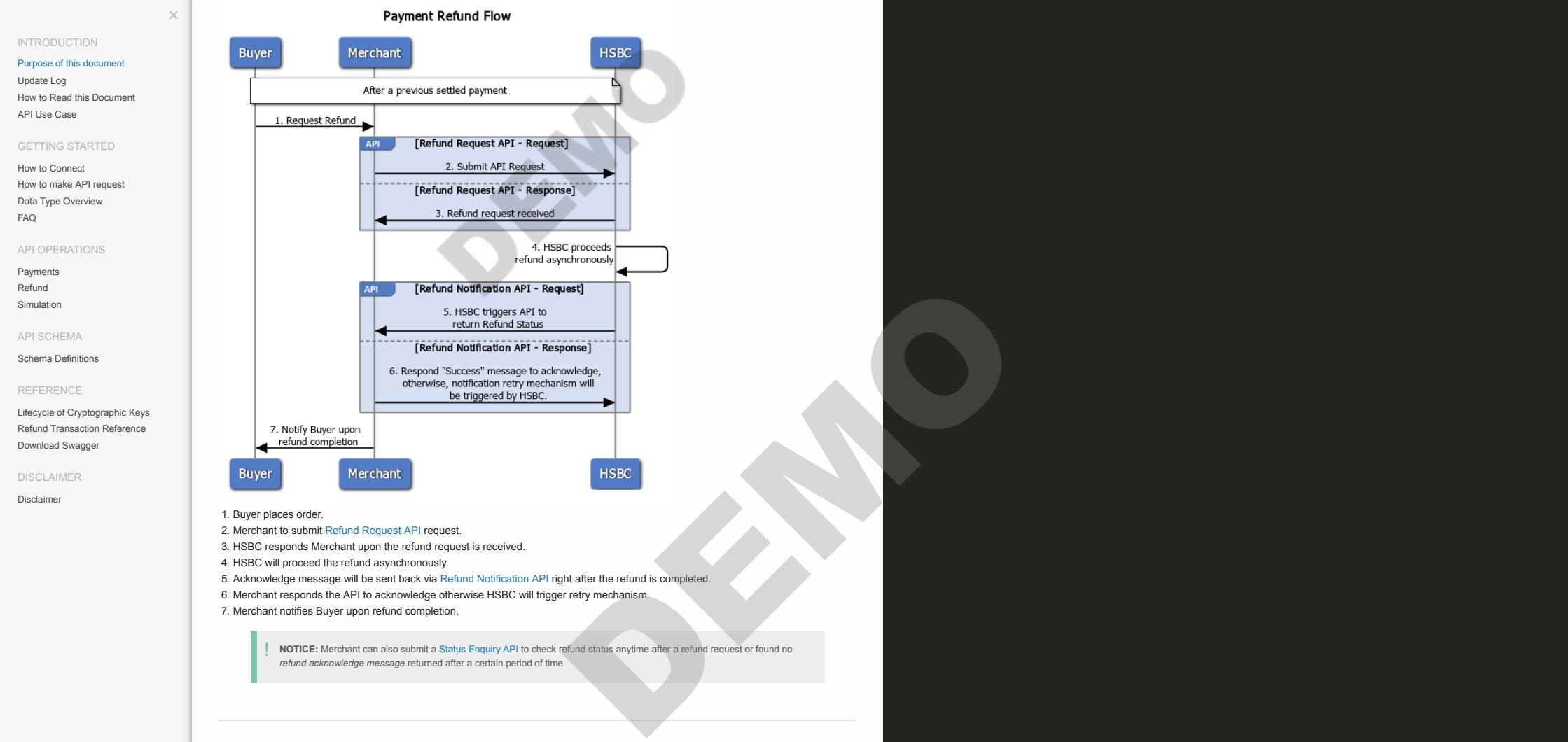


Merchant-Present QR Code Payment Flow



1. Buyer places order
2. Merchant to submit [QR Code Creation API](#) request
3. HSBC backend system to generate QR Code token
4. Return QR Code token via [QR Code Creation API](#) response
5. Merchant needs to convert the QR Code token to QR Code Image and display on its online store. HSBC will be informed systematically upon Buyer confirms payment after scanning QR code. In case the online store is a Mobile App, Buyer will be directed to its FPS Mobile Payment/Banking App for payment and there will be no QR code scanning as the QR Code token will be passed to the Buyer's App. Likewise, HSBC will be informed systematically upon Buyer confirms payment.
6. Payment completed
7. Acknowledge message will be sent back via [Status Notification API](#) right after payment status is changed to *Completed* at HSBC backend system.
8. Merchant to notify a completed order to buyer
9. Merchant can submit a [Status Enquiry API](#) to check payment status anytime after a payment request or found no *acknowledge message* returned after a certain period of time.
10. Return payment status via [Status Enquiry API](#) response

Refund a settled Transaction



Simulate a Payment and Refund in Sandbox Environment

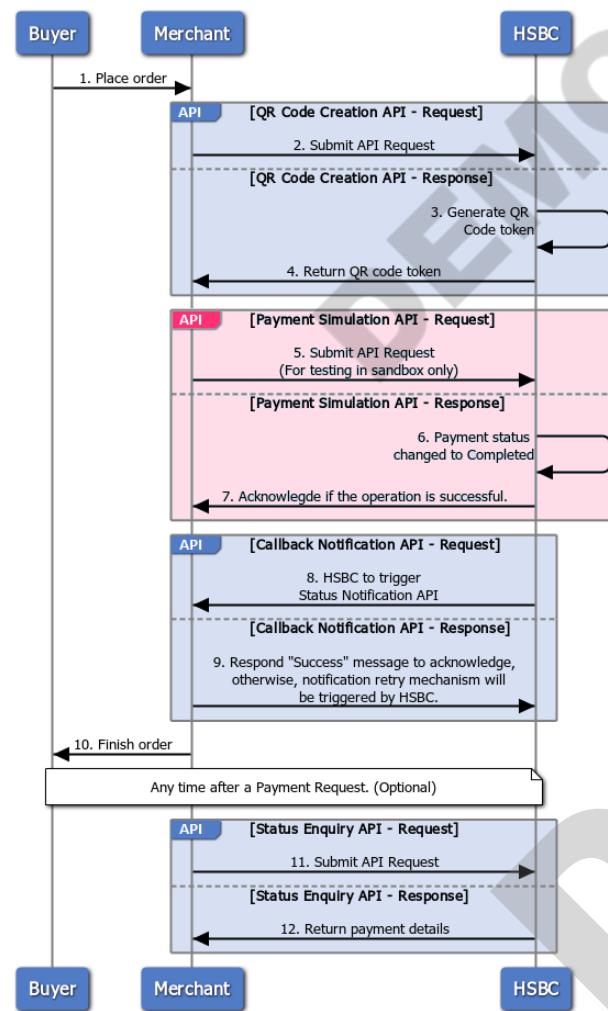
Sandbox Environment is offered for testing purpose. It comes with two additional features:

- Bypass [Data Encryption](#) which helps developer to focus testing on API connectivity first;
- As a self-served basis, developer or tester can submit [Simulation API](#) to simulate a payment or refund.

[Payment Simulation API](#) should be submitted right after a QR Code is requested, please see the flow diagram here:



Merchant-Present QR Code Payment Flow (For Testing)



Refund Simulation API should be submitted after the completion of a payment just like the original Refund Request API.

Here is the Summary of the Simulation API Usability over different testing scenario:

Steps	Testing Scenario #1 (Self-Served Basis)	Testing Scenario #2 (with HSBC Support)
i.	Submit QR Code Creation	Submit QR Code Creation
ii.	Submit Payment Simulation API	Contact HSBC support team to scan and pay QR Code with actual App
iii.	Verify Payment Notification	Verify Payment Notification
iv.	Submit Refund Simulation	Submit Refund Request, then contact HSBC support team to reconcile with downstream refund backend systems
v.	Verify Refund Notification	Verify Refund Notification



Here is the Summary of the API Usability over different Payment Models:

APIs	E/M-Commerce	m-POS	Online Bill Payment
Payment QR Code Creation API	✓	✓	✗
Payment Status Enquiry API	✓	✓	✗
Payment Status Notification API	✓	✓	✓
Payment Simulation API	✓	✓	✓
Refund Request API	✓	✓	Available when Opt In
Refund Notification API	✓	✓	Available when Opt In
Refund Simulation API	✓	✓	Available when Opt In

✓ = Always Available ✗ = Not Available

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How to Connect

API Connectivity refers to all measures and their components that establishes connection between HSBC, the API Provider and Merchant, the API Consumer.

	Definition	Components
API Authentication	Locate API Gateway Policy of the corresponding user	<ul style="list-style-type: none">Client IDClient Secret
User Identification	A Merchant Profile	<ul style="list-style-type: none">Merchant IDMerchant Profile
Connection Security	HTTPS Connection (TLS 1.2) and Network Whitelisting	<ul style="list-style-type: none">SSL CertificateNetwork Whitelist
Message Security	Digital Signing and Data Encryption	<ul style="list-style-type: none">A pair of Private Key & Public Key Certificate (PKI Model)JWS Key IDJWE Key ID

API Authentication

Client ID & Client Secret		
Purpose	API Gateway locates the corresponding policy of the specific API consumer	
Components	• Client ID	• Client Secret
Where to get it?	Delivered by HSBC via secure email during onboarding procedure	
Implementation	In HTTP header: <code>x-hsbc-client-id: [Client ID]</code>	In HTTP header: <code>x-hsbc-client-secret: [Client Secret]</code>

User Identification

Merchant Profile & Merchant ID

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Merchant Profile & Merchant ID		
Purpose	<ul style="list-style-type: none">Merchant Profile contains all necessary information from a Merchant in order to enable payment service.	<ul style="list-style-type: none">Merchant ID is used for Merchant identification in each API call.
Components	<ul style="list-style-type: none">Merchant Profile	<ul style="list-style-type: none">Merchant ID
Where to get it?	<ul style="list-style-type: none">Set up by HSBC team after collect information from Merchant	<ul style="list-style-type: none">Delivered by HSBC via secure email during onboarding procedure
Implementation	<i>nil</i>	Pass value in API request message body

Connection Security

SSL Certificate & Network Whitelist		
Purpose	<ul style="list-style-type: none">Request HSBC API over HTTPS connection (TLS 1.2)	<ul style="list-style-type: none">Accept Callback API request over HTTPS connection (TLS 1.2)
Components	<ul style="list-style-type: none">Public SSL Certificate issued by HSBC	<ul style="list-style-type: none">Merchant's web server or domain whose HTTPS connection is enabledNetwork Whitelist on HSBC system
Where to get it?	<ul style="list-style-type: none">Downloaded automatically by Browsers or API Tools, if any problem found, please contact HSBC	<i>nil</i>
Implementation	<i>nil</i>	<ul style="list-style-type: none">Merchant's domain URL will be configured in HSBC's network whitelist by HSBC team

Message Security - Data Encryption and Signing

On top of the Transport Layer Security, HSBC adopts additional security on the message being passed through the connection session. Data Encryption actually serves as a locked briefcase containing the data (the API message) within the HTTPS "tunnel". In other word, the communication has double protection.

DO YOU KNOW?

Javascript Object Signing and Encryption (JOSE™), is a framework intended to provide methods to securely transfer information between parties. The JOSE framework provides a collection of specifications, including JSON Web Signature (JWS™) and JSON Web Encryption (JWE™), to serve this purpose.

HSBC uses [JWS](#) to sign message payload and [JWE](#) to encrypt the signed message while these two objects are created by using a pair of [Private Key & Public Key Certificate \(PKI Model\)](#).

Private Key & Public Key Certificate (PKI Model)		
Purpose	<ul style="list-style-type: none">Digitally sign a API request messageDecrypt a API response message	<ul style="list-style-type: none">Encrypt the signed API request messageVerify a signed API response message
Components	<ul style="list-style-type: none">Private Key issued by Merchant	<ul style="list-style-type: none">Public Key Certificate issued by HSBC
Where to get it?	<ul style="list-style-type: none">Created by any Public Key Infrastructure (PKI) Keytool™ and OpenSSL™. Technical detail is i	

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Private Key & Public Key Certificate (PKI Model)

Implementation Please see the technical detail in [here](#)

NOTICE:

Technically, X.509 certificate can be served as a SSL Certificate as well as a Public Key Certificate for Data Encryption. However, HSBC recommends Merchant to use a different X.509 Certificate for Data Encryption for segregation of certificate usage.

Moreover, the Public Key Certificate does not have to be CA-signed. However, if Merchant decides to enhance security, a CA-Signed Certificate is always welcome.

keyID of JWS™ & JWE™

Purpose	<ul style="list-style-type: none">The unique identifier to bind Merchant's Private Key in order to create a JWS object - a signed Message PayloadThe unique identifier to bind HSBC's Public Key Certificate in order to create a JWE object - an encrypted JWS object
Components	<ul style="list-style-type: none">keyID of JWS™keyID of JWE™
Where to get it?	<ul style="list-style-type: none">Mutual agreed between Merchant and HSBCMutual agreed between Merchant and HSBC
Implementation	Define in program coding, see demo in here

NOTICE:

For security purposes, [HSBC's Public Key Certificate](#) and its associated [keyID](#) will be renewed every year and a Certificate Renewal process will be triggered. More detail is covered in section [Key Renewal](#)

How to Sign and Encrypt Outgoing Message

Every message sent to HSBC must be signed and encrypted. From the point of view of a Merchant, an **Outgoing Message** means:

- the Request Message of a Normal API, or
- the Respond Message of a Callback API.

To help you understand how to construct a Signed and Encrypted Message, let's take the Java program below as an example. Do not worry if you are not familiar with Java, the idea is to let you know the steps and all needed components:

NOTICE: These Java codes are for demonstration only and it's not *plug and play*.

```
private JWSObject signMessage(String messagePayload, KeyStore ks, String keyAlias, String keyPw)
    throws UnrecoverableKeyException, KeyStoreException, NoSuchAlgorithmException, JOSEException {
    #1 Payload payload = new Payload(messagePayload);

    #2 JWSSigner header = new JWSSigner.Builder(JWSAlgorithm.RS256).keyID("0001").build();
    #3 JWSObject jwsObject = new JWSObject(header, payload);

    #4 PrivateKey privateKey = (PrivateKey) ks.getKey(keyAlias, keyPw.toCharArray());
    #5 JWSSigner signer = new RSASSASigner(privateKey);
    jwsObject.sign(signer);

    return jwsObject;
}
```

1. Prepare your **Message Payload**, that is, the plain [json](#) request message
2. Create **JWS Header** using [RS256](#) signing algorithm and **JWS keyID**, in this case, [0001](#)
3. Create **JWS Object** by combining JWS Header and Message
4. Retrieve your **Private Key** as the signer
5. Create **Signed JWS Object** by signing it with the Private Key

Next, you are going to **Encrypt** the Signed JWS Object:

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```
private JWEObject getEncryptedJWEObject(JWSObject jwsObject, RSAPublicKey key)
throws JOSEException {
#1 Payload jwepayload = new Payload(jwsObject.serialize());

#2 JWEHeader jweheader = new JWEHeader.Builder(JWEAlgorithm.RSA_OAEP_256, EncryptionMethod.A128GCM).keyID("0002").build();
#3 JWEObject jweObject = new JWEObject(jweheader, jwepayload);

#4 JWEEncrypter encrypter = new RSAEncrypter(key);
#5 jweObject.encrypt(encrypter);

return jweObject;
}
```

1. Prepare your **JWE Payload**, that is, the **Signed JWS Object**
2. Create **JWE Header**. The algorithm used to encrypt the message body is **A128GCM** while the algorithm used to encrypt the encryption key is **RSA_OAEP_256**. **JWE keyID** is **0002**.
3. Create **JWE Object** by combining JWE Header and JWE Payload
4. Retrieve **HSBC's Public Key** as the encrypter
5. Create **Encrypted JWE Object** by encrypted it with HSBC's Public Key

Yes, you are now ready to put the Encrypted JWE Object as the message body (*you may need to first serialize it into String format, depends on your program code design*) of any API call.

How to Decrypt Message and Verify Signature of an Incoming Message

Every message sent from HSBC must be decrypted and verified. From the point of view of a Merchant, an **Incoming Message** means:

- the Respond Message of a Normal API, or
- the Request Message of a Callback API.

Let's look into the following example to see how you decrypt a response message from HSBC:

```
private String decryptMessage(String respMsgPayload, KeyStoreFactory keyStore)
throws KeyStoreException, NoSuchAlgorithmException, CertificateException, IOException,
java.text.ParseException, UnrecoverableKeyException, JOSEException {
#1 JWEObject jweObject = JWEObject.parse(respMsgPayload);

#2 PrivateKey privateKey = (PrivateKey) keyStore.getKey("merchant_private_key_alias");

#3 JWEDecrypter decrypter = new RSADecrypter(privateKey);
jweObject.decrypt(decrypter);

#4 String signedMessage = jweObject.getPayload().toString();
return signedMessage;
}
```

1. Create **Encrypted JWE Object** by parsing the encrypted response message payload
2. Retrieve **Private Key** as the decrypter
3. Decrypt the JWE Object using your Private Key
4. Get the **Signed Message** from the decrypted JWE Object

You are now able to extract the plain **json** message. Yet, before that, you **must** verify the signature to guarantee data integrity.

```
private String verifySignature(String signedMessage, KeyStore ks, String keyAlias)
throws KeyStoreException, JOSEException, ParseException {
#1 JWSObject jwsObject = JWSObject.parse(signedMessage);

Certificate certificate = ks.getCertificate(keyAlias);
#2 JWSSigner verifier = new RSASSASigner((RSAPublicKey) certificate.getPublicKey());

#3 if (!jwsObject.verify(verifier)) {
    throw new ValidationException("Invalid Signature");
}
#4 return jwsObject.getPayload().toString();
}
```

1. Create **JWS Object** by parsing the **Signed Message**
2. Retrieve **HSBC's Public Key** as the verifier
3. Verify the signed **JWS Object**. Invoke error handling if invalid signature
4. Get the plain **json** message for further actions

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Summary

Components \ Steps	Message Signing	Message Encryption	Message Decryption	Verify Signature
JWS Object	Signing Algorithm: RS256			
JWE Object		JWE Algorithm: RSA_OAEP_256		
KeyID	0002	0002		
Merchant's Private Key	Used as Signer		Used as Decrypter	
HSBC's Public Key		Used as Encrypter		Used as Verifier

How to Make API Request

API request can be submitted without Message Encryption, in case you want to:

- understand the basic API Call quick;
- test API connectivity before spending substantial development effort on Message Encryption.

However, data encryption is actually a required data security imposed by HSBC standard, Merchant has to invoke the encryption logic before moving to Production and fully tested during testing phase.

Make Your API Request with Plain Messages

NOTICE:

Skipping message encryption is the flexibility provided in Sandbox Environment for testing purpose.

Submit API request using cURL™ as an example

cURL™ is a simple command line tool that enables you to make any HTTP request. Merchant can choose any other GUI tool such as Postman™ and SoapUI™.

Step 1. Run this command in your system platform:

```
#1 curl -X POST "https://devclustercmb.api.p2g.netd2.hsbc.com.hk/glcm-mobilecoll-mchks-ea-merchantservices-cert"
#2 -H "message_encrypt: false"
#3 -H "x-HSBC-client-id: 8b915a4f5b5047f091f210e2232b5ced"
#4 -H "x-HSBC-client-secret: 1bb456a541dc416db6016b5f9583c606"
#5 -H "Content-Type: application/json"
#6 -d "{\"txRef\": \"0002900F0645771050000001\", \"merId\": \"0002900F0645774\"}"
```

1. Submit `POST` request to the API URL endpoint
2. Put the secret header `message_encrypt: false` to indicate this API request is without message encryption. This header is only applicable in Sandbox environment.
3. Put `Client ID` in HTTP header `x-HSBC-client-id`
4. Put `Client Secret` in HTTP header `x-HSBC-client-secret`
5. Set `Content-Type` to JSON format
6. Plain `json` message payload

Step 2. Receive response message in plain `json` format.

Making API Request with Message Encryption

Step 1. Run this cURL™ command in your system platform:

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#1 curl -X POST "https://devclustercmb.api.p2g.netd2.hsbc.com.hk/glcm-mobilecoll-mchka-merchantservices-cer
#2 -H "x-HSBC-client-id: 8b915a4fb5047f091f210e223b5ced"
#3 -H "x-HSBC-client-secret: 1bb456a541dc416d6016b5f9583c606"
#4 -H "Content-Type: application/json"
#5 -d "eyJraWQiOiiwMDAXIiwiZW5jIjoiTETyOEdTSImFsZyI6IlJTQS1PQUVLT1NiJ9.W4nobHoVXUMOXGM5I-WGPZt8sj-hsd_s"

1. Submit **POST** request to the API URL endpoint
2. Put **Client ID** in HTTP header **x-HSBC-client-id**
3. Put **Client Secret** in HTTP header **x-HSBC-client-secret**
4. Set **Content-Type** to JSON format
5. Encrypted Message Payload.

NOTICE:
Data Encryption invokes compulsory prerequisites, [JOSE library](#) and program coding, please make sure the section [Message Security](#) has been gone through thoroughly.

Step 2. For a successful request (HTTP Status Code 200), an encrypted response message will be returned, otherwise, a plain **json** with failure message will be returned.

Data Type Overview

Data Type Control:

Data Type	Allowed Characters	Definition & Important Notice
String (For general field)	AlphaNumeric and Symbols	General field means field which is NOT a critical field. HSBC system will execute characters checking upon all string fields we received in order to tackle security vulnerability, such as Cross-site Scripting. Yet, we recommend you to try use AlphaNumeric only for most cases.
String (For critical field)	0-9, a-z, A-Z, -, .	Critical field is used to be either a key or search criteria in HSBC backend system and hence tight restriction is applied to the allowed characters. Moreover, the starting and ending space of the string value will be trimmed before stored in HSBC system. For example, string " example 12 34 " will be trimmed to "example 12 34". List of Critical Fields: txnRef merId posMachineId employeeId
Integer	0-9	Instead of having Max Length check for String, integer range will be checked, e.g. 0 ≤ x ≤ 9999

Field Mandatory Control:

Field Mandatory Type	Definition & Important Notice
Mandatory	Annotated with required tag in field definition section. Field & value must be present in the request with valid JSON format.
Optional	Annotated with optional tag in field definition section. If you don't want to pass fields that are optional, your handler should not pass neither empty strings {"example":""} nor blank value {"example":" "}.
Conditional	Annotated with conditional tag in field definition section. Required under a specific condition whose logic is

Time Zone Control:

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Aspect			Format	Definition & Important Notice
In Request Message	yyyy-MM-dd'T'HH:mm:ssZ			Time zone is expected to be <code>GMT+8</code> (Hong Kong local time). Merchant is required to perform any necessary time zone conversion before submit request if needed.
In Response Message	yyyy-MM-dd'T'HH:mm:ss±hh:mm			Timezone returned in <code>api_gw</code> object is generated from HSBC API Gateway which located in Cloud and hence is calculated in <code>GMT+0</code> . On the other hand, time field in <code>response</code> object will be returned together with timezone information. For more details, please read each field definition carefully.

FAQ

SSL Connection Questions

Where can I find HSBC SSL server certificates?

Merchant developer is able to export SSL server certificates that has been installed in your browser. By doing this, visit the **domain** of the corresponding API endpoint in your browser. For example, to get the SSL certificate of sandbox environment, use domain name <https://devclustercmb.api.p2g.netd2.hsbc.com.hk/>

Message Encryption Questions

What certificates will I need to work for Message Encryption in HSBC's sandbox and production environments?

A self-sign certificate is acceptable. However, if Merchant decides to enhance security, a CA-Signed Certificate is always welcome.

Javascript Object Signing and Encryption (JOSE) Framework Questions

Where can I get more information about JOSE Framework?

If you want to fully understand the framework, you can read [here](#) for more details.

Please note the url does not belongs to HSBC, use it on your own discretion. By clicking the url or website, it means you accept this terms and conditions.

Where can I download JOSE libraries for development?

For your reference, you may find the following JOSE libraries of different programming languages.

- [Ruby](#)
- [Python](#)
- [PHP](#)
- [Java](#)
- [Node](#)
- [.NET](#)

Please note those urls or websites do not belong to HSBC, use it on your own discretion. By clicking those urls or websites, it means you accept this terms and conditions.

QR Code Image Generation Question

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Contains resource collections for QR Code payment, enquiry and notification.

Payments

Payment QR Code Creation API

POST /payment/qrCode

DESCRIPTION

This API creates QR Code token with the aim of making payment. Once this API request is submitted from merchants, HSBC payment platform will return QR Code token to Merchant according to the Common QR code specification. Merchant needs to convert the QR Code token to QR Code Image and display on its online store. HSBC will be informed systematically upon Buyer confirms payment after scanning QR code. In case the online store is a Mobile App, Buyer will be directed to its FPS Mobile Payment/Banking App for payment and there will be no QR code scanning as the QR Code token will be passed to the Buyer's App. Likewise, HSBC will be informed systematically upon Buyer confirms payment.

REQUEST PARAMETERS

x-hsbc-client-id [Client ID]
required
in header

x-hsbc-client-secret [Client Secret]
required
in header

Content-Type application/json
required
in header

REQUEST BODY

qrCodeRequestModel Data Encryption is enforced. API Schema intends to demonstrate the skeleton of the message payload only.
*Click link to navigate Schema Definition

RESPONSES

200 OK qrCodeResponseModel Successful operation.

Data Encryption is enforced. API Schema intends to demonstrate the skeleton of the message payload only.

400 Bad Request exceptionModel Bad Request.

403 Forbidden

Authorizat

404 Not Found

Empty

Request Content-Types: application/json

Request Example

```
{  
    "merId": "0002900F0645774",  
    "txnRef": "0002900F06457710500000001",  
    "txnChannel": "01",  
    "txntime": "2018-06-11T14:10:25Z",  
    "merTimeout": 1440,  
    "payMethod": [  
        "HKFPS"  
    ],  
    "currency": "HKD",  
    "amount": 1050,  
    "tip": 200,  
    "amtEditInd": "Y",  
    "notifyUrl": "https://merchant.com/returnStatus",  
    "goodsdes": "Description of goods.",  
    "posMachineId": "00112233-4455-6677-8899-aabbccddeeff",  
    "employeeId": "00112233-4455-6677-8899-xyzxxxxyzz"  
}
```

Response Content-Types: application/json

Response Example (200 OK)

```
{  
    "api_gw": {  
        "messageId": "89817674-da00-4883",  
        "returnCode": "200",  
        "returnReason": "Successful operation",  
        "sentTime": "2016-11-15T10:00:00.000Z",  
        "recvTime": "2016-11-15T10:00:00.000Z"  
    },  
    "merId": "0002900F06457710500000001",  
    "txnid": "0002900F06457710500000001",  
    "txntime": "2018-06-11T14:10:25Z",  
    "merTimeout": 1440,  
    "payMethod": [  
        "HKFPS"  
    ],  
    "currency": "HKD",  
    "amount": 1050,  
    "tip": 200,  
    "amtEditInd": "Y",  
    "notifyUrl": "https://merchant.com/returnStatus",  
    "goodsdes": "Description of goods.",  
    "posMachineId": "00112233-4455-6677-8899-aabbccddeeff",  
    "employeeId": "00112233-4455-6677-8899-xyzxxxxyzz"  
}
```



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Payment Status Enquiry API

Payments

POST /payment/enquiry

DESCRIPTION

Merchant can optionally initiate payment status enquiry at any time after a payment request is submitted. This is used when Merchant wants to check payment status any time after a payment request or find no acknowledge message returned after a certain period of time. HSBC payment platform will return the latest transaction status according to the transaction ID Merchant provided.

x-hsbc-client-id
[Client ID]
required
in header

x-hsbc-client-secret
[Client Secret]
required
in header

REQUEST PARAMETERS

Content-Type
application/json
required
in header

REQUEST BODY

txnEnqRequestModel
*Click link to navigate Schema Definition
Data Encryption is enforced. API Schema intends to demonstrate the skeleton of the message payload only.

RESPONSES

200 OK
txnEnqResponseModel

Successful operation.

Data Encryption is enforced. API Schema intends to demonstrate the skeleton of the message payload only.

400 Bad Request
exceptionModel

Bad Request.

403 Forbidden

Authorization credentials are missing or invalid.

404 Not Found

Empty

500 Internal Server Error

The re

{ "qrCode":

"00020101021226460012hk.com.hkiclo210201807111010512180731112742520400005303344540510.505802HK5902NA6002HK62290 }

}

Response Example (400 Bad Request)

```
{ "api_gw": { "messageId": "89817674-da00-4883", "returnCode": "400", "returnReason": "Return Reason Message here", "sentTime": "2016-11-15T10:00:00.000Z", "responseTime": "2016-11-15T10:00:00.000Z" } }
```

Request Content-Types: application/json

Request Example

```
{ "txRef": "0002900F06457710500000001", "merId": "0002900F0645774" }
```

Response Content-Types: application/json

Response Example (200 OK)

```
{ "api_gw": { "messageId": "89817674-da00-4883", "returnCode": "200", "returnReason": "Successful operation", "sentTime": "2016-11-15T10:00:00.000Z", "responseTime": "2016-11-15T10:00:00.000Z" }, "response": { "txRef": "0002900F06457710500000001", "merId": "0002900F0645774", "status": "Success", "amount": 200, "refId": 2500, "refund": 2000, "txRef": "HC80502097323467", "merId": "0002900F0645774" } }
```

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Payment Status Notification API

Payments

POST /<Callback URL predefined by Merchant>

DESCRIPTION

Payment status will be returned to Merchant by asynchronous callback once HSBC receives a payment request. After HSBC payment platform completes reconciliation with HKFPS and receives payment result, HSBC will push the result back to Merchant by calling this API.

Implementation	This is a Callback API. HSBC will trigger this API call and defines the interface with OpenAPI standard. Merchant is required to provide implementation.
Retry Mechanism	If no success response is received, up to 4 retries will be triggered in every 2 minutes. Maximum 5 calls including the 1st attempt.
Endpoint Definition	Field <code>notifyUrl</code> from Payment QR Code Creation API will be used as URL endpoint of the corresponding transaction.
Exception Handling	Only success case will be returned. Merchant can submit a Payment Status Enquiry API request if found no acknowledgement message returned after a certain period of time.

IMPORTANT NOTICE:

Field values returned from the Notification must be verified alternately.

REQUEST PARAMETERS

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```
"refundTxnTime": "2018-06-11T14:10:25+08:00",
"subAmtPaid": 2500,
"suppInfo": "Supplementary Information",
"arrayOfRefundAmt": [
  {
    "refundTxnId": "HC1196080000319R",
    "refundTxnTime": "2018-06-11T18:12:44+08:00",
    "subAmtRefund": 2500,
    "refundStatus": "SUCCESS"
  }
],
"bankTxnId": "HC80502057680987",
"bankTxnTime": "2018-06-11T15:11:12+08:00",
"subAmtPaid": 2500,
"suppInfo": "Supplementary Information",
"arrayOfRefundAmt": [
  {
    "refundTxnId": "HC1196080002256R",
    "refundTxnTime": "2018-06-11T21:20:11+08:00",
    "subAmtRefund": 2000,
    "refundStatus": "PENDING"
  }
]
```

Response Example (400 Bad Request)

```
{
  "api_gw": {
    "messageId": "89817674-da00-4883",
    "returnCode": "400",
    "returnReason": "Return Reason Message here",
    "sentTime": "2016-11-15T10:00:00.000Z",
    "responseTime": "2016-11-15T10:00:00.000Z"
  }
}
```

xt/plain

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REQUEST BODY

Content-Type: text/plain

required
in header

statusReturnRequestModel

*Click link to navigate Schema Definition

Data Encryption is enforced. API Schema intends to demonstrate the skeleton of the message payload only.

RESPONSES

200 OK

statusReturnResponseModel

Successful operation.

Data Encryption is enforced. API Schema intends to demonstrate the skeleton of the message payload only.

Refund

Contains resource collections for Refund and Refund Notification.

Request Example

```
{  
    "merId": "0002900F0645774",  
    "txnRef": "0002900F06457710500000001",  
    "currency": "HKD",  
    "amount": 1050,  
    "proCode": "000000",  
    "proMsg": "Transaction Successful",  
    "bankTxnId": "HC80502097323467",  
    "bankTxnTime": "2018-06-11T14:10:25+08:00",  
    "suppInfo": "Supplementary Information"  
}
```

Response Content-Types: application/json

Response Example (200 OK)

```
{  
    "status": "SUCCESS"  
}
```

Refund Request API

POST /refund/request

DESCRIPTION

Merchant can request to refund a settled transaction by calling this API. It is a common practice that the refund amount should not exceed the original payment amount and we therefore ensure the same in our API logic. Once the refund request is submitted, HSBC payment platform will proceed the refund asynchronously, and a [Refund Status Notification](#) will be pushed to Merchant once the refund transaction is completed. This version of API support making only one successful Refund request for the same original transaction.

IMPORTANT NOTICE:

The downstream systems invoked in the refund request scenario is not available for testing purpose, and hence the [Refund Simulation API](#) is offered in the Sandbox environment. Please see [inside](#) for more details.

REQUEST PARAMETERS

x-hsbc-client-id [Client ID]

required
in header

x-hsbc-client-secret [Client Secret]

required
in header

Content-Type application/json

required
in header

REQUEST BODY

refundRqRequestModel

*Click link to navigate Schema Definition

Data Encryption is enforced. API Schema intends to demonstrate the skeleton of the message payload only.

Request Content-Types: application/json

Request Example

```
{  
    "txnrRef": "0002900F06457710500000001",  
    "merId": "0002900F0645774",  
    "bankTxnId": "HC80502097323467",  
    "txnrAmt": 5000,  
    "refundAmt": 4000,  
    "notifyUrl": "https://merchant.com/returnRefundStatus"  
}
```

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Refund Notification API

Response Content-Types: application/json

Response Example (200 OK)

```
{
  "api_gw": {
    "messageId": "89817674-da00-4883",
    "returnCode": "200",
    "returnReason": "Successful operation",
    "sentTime": "2016-11-15T10:00:00.000Z",
    "responseTime": "2016-11-15T10:00:00.000Z"
  },
  "response": {
    "bankTxnId": "HC80502097323467",
    "refundTxnId": "HC1196080000319R",
    "proCode": "000000",
    "proMsg": "Refund Request Submitted"
  }
}
```

Response Example (400 Bad Request)

```
{
  "api_gw": {
    "messageId": "89817674-da00-4883",
    "returnCode": "400",
    "returnReason": "Return Reason Message here",
    "sentTime": "2016-11-15T10:00:00.000Z",
    "responseTime": "2016-11-15T10:00:00.000Z"
  }
}
```

POST /<Callback URL predefined by Merchant>

DESCRIPTION

Refund status will be returned to Merchant by asynchronous callback once the refund request has been processed. HSBC will push the result back to Merchant by calling this API.

Implementation	This is a Callback API. HSBC will trigger this API call and defines the interface with OpenAPI standard. Merchant is required to provide implementation.
Retry Mechanism	If no success response is received, up to 4 retries will be triggered in every 2 minutes. Maximum 5 calls including the 1st attempt.
Endpoint Definition	Field <code>notifyUrl</code> from Refund Request API will be used as URL endpoint of the corresponding refund transaction.
Exception Handling	Merchant can submit a Payment Enquiry API request if found no acknowledge message returned after a certain period of time.

REQUEST PARAMETERS

Content-Type
required
in header

REQUEST BODY

refundNotificationRequestModel
*Click link to navigate Schema Definition

Request Content-Types: text/plain

Request Example

```
{
  "merId": "0002900F0645774",
  "txnRef": "0002900F06457710500000001",
  "bankTxnId": "HC80502097323467",
  "refundTxnId": "HC1196080000319R",
  "refundTxnTime": "2018-06-11T14:10:25+08:00",
  "refundTxnStatus": "PENDING"
}
```

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RESPONSES

200 OK
refundNotificationResponseModel

Successful operation.

Data Encryption is enforced. API Schema intends to demonstrate the skeleton of the message payload only.

Simulation

Contains resource collections for Simulating a Payment and Refund Request.

Payment Simulation API

POST /hk/payment/simulation

**Please be reminded a different BASE URL is used by Simulation APIs.*

DESCRIPTION

To simulate the process which the buyer confirms the payment with or without scanning the QR Code.

This is only available in Sandbox Environment. Please see details in [here](#).

REQUEST PARAMETERS

x-hsbc-client-id	[Client ID]
required	in header
x-hsbc-client-secret	[Client Secret]
required	in header
Content-Type	application/json
required	in header
message_encrypt	false
required	in header

REQUEST BODY

paySimRequestModel

Data Encryption is not required.

*Click link to navigate Schema Definition

RESPONSES

200 OK
paySimResponseModel

Successful operation.

Data Encryption is not required.

400 Bad Request
exceptionModel

Bad Request.

403 Forbidden

Authoriz...

404 Not Found

Empty

500 Internal Server Error

The re...

Response Content-Types: application/json

Response Example (200 OK)

```
{ "status": "SUCCESS" }
```

Request Content-Types: application/json

Request Example

```
{ "txRef": "0002900F064577105000000001", "merId": "0002900F0645774", "is_notification_encrypted": "Y", "for_bill_payment": { "currency": "HKD", "amount": 123450, "suppInfo": "Supplementary Information" }, "for_nonbill_payment": { "currency": "HKD", "amount": 123450, "suppInfo": "Supplementary Information" } }
```

Response Content-Types: application/json

Response Example (200 OK)

```
{ "api_gw": { "messageId": "89817674-da00-4883", "returnCode": "200", "returnReason": "Successful operation", "sentTime": "2016-11-15T10:00:00.000Z", "responseTime": "2016-11-15T10:00:00.000Z" } }
```

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Refund Simulation API

Simulation

POST /hk/refund/simulation

*Please be reminded a different BASE URL is used by Simulation APIs.

DESCRIPTION

This API aims to simulate the [Refund Request API](#) in Sandbox environment while the testing data will not processed in the refund downstream system.

IMPORTANT NOTICE:

Except the API endpoint, the API usage flow, business checking logic and message structure are identical to [Refund Request API](#).

Merchant is suggested to call this API during development phase and switch the API endpoint back to [Refund Request API](#) until the testing phase is completed.

REQUEST PARAMETERS

x-hsbc-client-id [Client ID]

required
in header

x-hsbc-client-secret [Client Secret]

required
in header

Content-Type application/json

required
in header

REQUEST BODY

refundRqRequestModel

*Click link to navigate Schema Definition

Data Encryption is enforced. API Schema intends to demonstrate the skeleton of the message payload only.

RESPONSES

200 OK

refundRqResponseModel

Successful operation.

Data Encryption is enforced. API Schema intends to demonstrate the skeleton of the message payload only.

400 Bad Request
exceptionModel

Bad R

403 Forbidden

Author

404 Not Found

Empty

Response Example (400 Bad Request)

```
{
  "api_gw": {
    "messageId": "89817674-da00-4883",
    "returnCode": "400",
    "returnReason": "Return Reason Message here",
    "sentTime": "2016-11-15T10:00:00.000Z",
    "responseTime": "2016-11-15T10:00:00.000Z"
  }
}
```

Request Content-Types: application/json

Request Example

```
{
  "txRef": "0002900F06457710500000001",
  "merId": "0002900F0645774",
  "bankTxnId": "HC0502097323467",
  "txnAmt": 5000,
  "refundAmt": 4000,
  "notifyUrl": "https://merchant.com/returnRefundStatus"
}
```

Response Content-Types: application/json

Response Example (200 OK)

```
{
  "api_gw": {
    "messageId": "89817674-da00-4883",
    "returnCode": "200",
    "returnReason": "Successful operation",
    "sentTime": "2016-11-15T10:00:00.000Z",
    "responseTime": "2016-11-15T10:00:00.000Z"
  }
}
```

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Schema Definitions

commonRespObj: object

PROPERTIES

messageId: string range: (up to 36 chars) required

System generated unique message ID only for HSBC internal reference use

returnCode: string range: (up to 3 chars) required

System Return Code

Possible Value	Definition
200	Successful operation
400	Bad Request (With detail message in field <code>returnReason</code>)
	Internal Error.
500	<p>Important Notices: If any tier comes before the API Cloud Foundry is unavailable, such as the API Gateway, there will be no json respond message returned.</p> <p>Furthermore, the respond message of 500 will be ignored by some common HTTP libraries, in such case, the respond message body can be considered as a hint for troubleshooting during development and testing phase.</p>

returnReason: string range: (up to 200 chars) required

Corresponding Text message of returnCode

Corr. Return Code	Return Message Sample	Definition
200		A successful API operation in terms of Authorization, Connectivity and valid JSON Message Structure.
400	Successful operation	Any checking failure on Business Logic level will be still considered a successful API operation yet the Business Logic checking result will be returned in <code>response</code> object.
400	Client ID - Merchant ID mapping is not correct/updated!	The binding of Client ID, Merchant ID and Merchant Public Certificate is incorrect or not up-to-date.
400	object has missing required properties <code>field name</code>	Fail to pass JSON Field Mandatory Check.
400	instance type <code>data type</code> does not match any allowed primitive type	Fail to pass JSON Type Check.
400	string <code>field value</code> is too long	Fail to pass JSON Length Check.



Response Example (400 Bad Request)

```
{  
  "api_gw": {  
    "messageId": "89917674-da00-4883",  
    "returnCode": "400",  
    "returnReason": "Return Reason Message here",  
    "sentTime": "2016-11-15T10:00:00.000Z",  
    "responseTime": "2016-11-15T10:00:00.000Z"  
  }  
}
```

Example

```
{  
  "messageId": "89917674-da00-4883",  
  "returnCode": "200",  
  "returnReason": "Successful operation",  
  "sentTime": "2016-11-15T10:00:00.000Z",  
  "responseTime": "2016-11-15T10:00:00.000Z"  
}
```

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Corr.
Return Message Sample

Code	Definition
400	instance failed to match at least one required schema among <code>no. of conditional field</code> Fail to pass JSON Conditional Field Check.
500	java.net.ConnectException: Connection refused: connect Notices: Message can be varied depended on the dependent system (<i>which across the entire system pipeline</i>) which returns this message. Yet, all reasons can be concluded into Internal Error or System Unavailable.

sentTime: string range: (up to 27 chars) required
Time of request received by HSBC system from client, only for HSBC internal reference use

- This is a system time of HSBC API gateway which located in Cloud, timezone is calculated in `GMT+0`

responseTime: string range: (up to 27 chars) required
Time of HSBC system provides response to client, only for HSBC internal reference use

- This is a system time of HSBC API gateway which located in Cloud, timezone is calculated in `GMT+0`

exceptionModel: object

PROPERTIES

api_gw: commonRespObj required

qrCodeRequestModel: object

PROPERTIES

merId: string (Critical Field) range: (up to 15 chars) required
Merchant ID

- Distributed by HSBC to merchant for identifying each merchant's identity

txnRef: string (Critical Field) range: (up to 25 chars) required
Unique ID referred to a specific transaction

- Required Merchant to generate a unique ID for each transaction.
- A uniqueness checking will be taken place based on each merId, duplicate ID will be rejected.
- This reference will be seen in HSBC's Daily Collection Detail Report and Global Information Reporting (GIR) Bank Statement.

txnChannel: string enum: [01, 02] range: (up to 2 chars) required
Transaction Channel

Possible Value	Definition
01	POS
02	e-Commerce

DEMO

Example

```
{  
  "api_gw": {  
    "messageId": "89817674-da00-4883",  
    "returnCode": "400",  
    "returnReason": "Return Reason Message here",  
    "sentTime": "2016-11-15T10:00:00.000Z",  
    "responseTime": "2016-11-15T10:00:00.000Z"  
  }  
}
```

Example

```
{  
  "merId": "0002900F0645774",  
  "txRef": "0002900F06457710500000001",  
  "txChannel": "01",  
  "txTime": "2018-06-11T14:10:25Z",  
  "merTimeout": 1440,  
  "payMethod": [  
    "HKFPS"  
,  
    "currency": "HKD",  
    "amount": 1050,  
    "tip": 200,  
    "amtEditInd": "Y",  
    "notifyUrl": "https://merchant.com/returnStatus",  
    "goodsDes": "Description of goods.",  
    "posMachineId": "0011233-4455-6677-8899-aabbccddeeff",  
    "employeeId": "0011233-4455-6677-8899-xyzxxxxyzz"  
  ]  
}
```

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txnTime: string range: (up to 20 chars) required

Time of sending out this request transaction

- Client system time. The timezone is expected to be `GMT+8` (Hong Kong local time). Merchant is required to do any timezone conversion if needed. Format: `yyyy-MM-dd'T'HH:mm:ssZ`

merTimeout: integer range: $0 \leq x \leq 9999$ optional

Merchant Time-out Period

- For dynamic QR code, a merchant may specify the latest time which the merchant system will wait for the payment.

NOTICE: If QR Code is scanned after the specified time-out time, it will be rejected by Mobile Banking App.

- Specify in minutes (i.e. 2 for 2 mins, and 1440 for 1 day, and 9999 for around 7 days, i.e. 1 week)
- The time period will be incremented at the time when HSBC system receives this API request
- If this field is not provided, or value = 0, it means no time-out will be specified in the generated QR code

payMethod: string[] required

Payment Method

Possible Value	Definition
HKFPS	HK Faster Payments System

- Multiple Payment Method will be supported in later version.

ITEMS

string

currency: string enum: [HKD, CNY] range: (up to 3 chars) required

Payment Currency (Format: `ISO 4217 Alpha`)

Possible Value	Definition
HKD	Hong Kong dollar
CNY	Renminbi

amount: integer range: $1 \leq x \leq 999999999999$ required

Payment Amount

- Format: Eliminate punctuation and sign, support 2 decimal places according to ISO 4217, e.g. \$10.50 = 1050

NOTICE: This is the total amount summed by both Payment Amount and Tip. For example, if tip is `$2.00` and payment amount is `$8.50`, total is `$10.50` and the value of this field should be `1050`

tip: integer range: $1 \leq x \leq 999999999999$ optional

Tip for a payment

- Tip amount must not exceed Payment Amount
- Format: Eliminate punctuation and sign, support 2 decimal places according to ISO 4217, e.g. \$10.50 = 1050

NOTICE: If there is a tip, all `amount` fields used in all APIs will include this tip

amtEditInd: string enum: [Y, N] range: (up to 1 chars) optional

Amount Editable Indicator

- To indicate if the payment amount can be editable in the midst of one payment

NOTICE: Payment amount is editable only when both this indicator is `Y` and merchant has indicated in their application form that QR amount amendment is allowed

notifyUrl: string range: (up to 128 chars) required

URL provided by Merchant for returning status used by Payment System

goodsDes: string range: (up to 128 chars) optional

Description of goods

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posMachineId: string (Critical Field) range: (up to 36 chars) conditional
Unique ID of a POS device

- Required when "txnChannel" = "01"

employeeId: string (Critical Field) range: (up to 36 chars) conditional
ID of a staff member who handles a specific POS transaction

- Required when "txnChannel" = "01"

qrCodeResponseModel: object

PROPERTIES

api_gw: commonRespObj required

response: qrCodeResponseModel_response required

qrCodeResponseModel_response:

PROPERTIES

txnRef: string (Critical Field) range: (up to 25 chars) required
Returning back the original Transaction Reference No. provided by merchant

currency: string range: (up to 3 chars) required
Returning back Payment Currency

- Format: ISO 4217 Alpha (e.g. HKD = Hong Kong Dollar)

amount: integer range: 1 ≤ x ≤ 99999999999 required
Returning back Payment Amount

proCode: string range: (up to 6 chars) required
Process Return Code

Possible Value	Definition
000000	Transaction Successful
800050	Tip amount exceeds Payment amount
900030	Duplicate Transaction Reference
900040	Payment Currency and Settlement Curre
900050	Transaction Channel Not Available with

- Other than "000000", all other return codes indicate a fail case.

Example

```
{  
  "api_gw": {  
    "messageId": "89817674-da00-4883",  
    "returnCode": "200",  
    "returnReason": "Successful operation",  
    "sentTime": "2016-11-15T10:00:00.000Z",  
    "responseTime": "2016-11-15T10:00:00.000Z"  
  },  
  "response": {  
    "txRef": "0002900F0645771050000001",  
    "currency": "HKD",  
    "amount": 1050,  
    "proCode": "000000",  
    "proMsg": "Transaction Successful",  
    "qrCode":  
      "00020101021226460012hk.com.hkiclo2102018071101051218073111274252040005303344540510.505802HK5902NA6002HK6229C  
  }  
}
```

Example

```
{  
  "txRef": "0002900F0645771050000001",  
  "currency": "HKD",  
  "amount": 1050,  
  "proCode": "000000",  
  "proMsg": "Transaction Successful",  
  "qrCode":  
    "00020101021226460012hk.com.hkiclo2102018071101051218073111274252040005303344540510.505802HK5902NA6002HK6229C  
}
```

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txnEnqRequestModel: object

PROPERTIES

txnRef: string (Critical Field) range: (up to 25 chars) required
Merchant to provide transaction ID that referred to a specific transaction

merId: string (Critical Field) range: (up to 15 chars) required
Merchant to provide Merchant ID for identification

txnEnqResponseModel: object

PROPERTIES

api_gw: commonRespObj required
response: txnEnqResponseModel_response required

Example

```
{  
  "txnRef": "0002900F06457710500000001",  
  "merId": "0002900F0645774"  
}
```

Example

```
{  
  "api_gw": {  
    "messageId": "89817674-da00-4883",  
    "returnCode": "200",  
    "returnReason": "Successful operation",  
    "sentTime": "2016-11-15T10:00:00.000Z",  
    "responseTime": "2016-11-15T10:00:00.000Z"  
  },  
  "response": {  
    "txnRef": "0002900F06457710500000001",  
    "protoCode": "000000",  
    "protoMsg": "Payment Success",  
    "currency": "HKD",  
    "totalAmtPaid": 5000,  
    "totalAmtRefunded": 2500,  
    "totalAmtPendingRefund": 2000,  
    "arrayOfSubAmt": [  
      {  
        "bankTxnId": "HC80502097323467",  
        "bankTxnTime": "2018-06-11T14:10:25+08:00",  
        "subAmtPaid": 2500,  
        "suppInfo": "Supplementary Information",  
        "arrayOfRefundAmt": [  
          {  
            "refundTxnId": "HC119608000319R",  
            "refundTxnTime": "2018-06-11T18:12:44+08:00",  
            "subAmtRefund": 2500,  
            "refundStatus": "SUCCESS"  
          }  
        ],  
        "bankTxnId": "HC80502057680987",  
        "bankTxnTime": "2018-06-11T15:11:12+08:00",  
        "subAmtPaid": 2500,  
        "suppInfo": "Supplementary Information",  
        "arrayOfRefundAmt": [  
          {  
            "refundTxnId": "HC1196080002256R",  
            "refundTxnTime": "2018-06-11T21:20:11+08:00",  
            "subAmtRefund": 2000,  
            "refundStatus": "PENDING"  
          }  
        ]  
      }  
    ]  
  }  
}
```

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txnEnqResponseModel_response:

PROPERTIES

txnRef: string (Critical Field) range: (up to 25 chars) required

Returning back the original Transaction Reference No. provided by merchant

proCode: string range: (up to 6 chars) required

Process Return Code

proCode	proMsg	Definition
000000	Payment Success	Only Single Payment in the said transaction and it is completed
100010	Pending	Only Single Payment in the said transaction and it is pending
200010	Multiple Transactions or Refund Request Found	For any case when multi-transactions or refund request is found. Required Merchant to look into the sub-array for details
900010	Transaction Record Not Found	Self-explanatory

proMsg: string range: (up to 128 chars) required

Corresponding Text Message of Process Return Code

currency: string range: (up to 3 chars) required

Payment Currency

- Format: ISO 4217 Alpha

totalAmtPaid: integer range: 1 ≤ x ≤ 999999999999 required

Total amount of money paid by payer

- Format: Eliminate punctuation and sign, support 2 decimal places, e.g. \$10.50 = 1050

NOTICE: This amount is to indicate if one customer accidentally submit a full payment more than once but not a partial payment which will be supported in later version.

totalAmtRefunded: integer range: 1 ≤ x ≤ 99999999999 optional

Total Amount of all completed refund

- Format: Eliminate punctuation and sign, support 2 decimal places, e.g. \$10.50 = 1050

NOTICE: Pending refund is excluded.

totalAmtPendingRefund: integer range: 1 ≤ x ≤ 99999999999 optional

Total Amount of pending refund

- Format: Eliminate punctuation and sign, support 2 decimal places, e.g. \$10.50 = 1050

arrayOfSubAmt: Array< subAmountObj > required

ITEMS

subAmountObj

subAmountObj: object

PROPERTIES

bankTxnId: string range: (up to 16 chars) required

HSBC transaction reference id for the inward credit payment

- This transaction reference id will be seen in HSBC's Daily Collection Statement. It contains 16 characters with prefix HC such as HC

Example

```
{  
  "txRef": "0002900F06457710500000001",  
  "proCode": "000000",  
  "proMsg": "Payment Success",  
  "currency": "HKD",  
  "totalAmtPaid": 5000,  
  "totalAmtRefunded": 2500,  
  "totalAmtPendingRefund": 2000,  
  "arrayOfSubAmt": [  
    {  
      "bankTxnId": "HC80502097323467",  
      "bankTxnTime": "2018-06-11T14:10:25+08:00",  
      "subAmtPaid": 2500,  
      "suppInfo": "Supplementary Information",  
      "arrayOfRefundAmt": [  
        {  
          "refundTxnId": "HC119608000319R",  
          "refundTxnTime": "2018-06-11T18:12:44+08:00",  
          "subAmtRefund": 2500,  
          "refundStatus": "SUCCESS"  
        }  
      ]  
    },  
    {  
      "bankTxnId": "HC80502057680987",  
      "bankTxnTime": "2018-06-11T15:11:12+08:00",  
      "subAmtPaid": 2500,  
      "suppInfo": "Supplementary Information",  
      "arrayOfRefundAmt": [  
        {  
          "refundTxnId": "HC1196080002256R",  
          "refundTxnTime": "2018-06-11T21:20:11+08:00",  
          "subAmtRefund": 2000,  
          "refundStatus": "PENDING"  
        }  
      ]  
    }  
  ]  
}
```

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bankTxnTime: string range: (up to 25 chars) **required**
HSBC Transaction time for the inward credit payment

- Bank system local time. A **GMT+8** timezone information is appended to the end of the timestamp to indicate this time is a Hong Kong local time. Format : `yyyy-MM-dd'T'HH:mm:ss±hh:mm`

subAmtPaid: integer range: $1 \leq x \leq 999999999999$ **required**
Amount of money paid by payer per payment submission

- Format: Eliminate punctuation and sign, support 2 decimal places, e.g. \$10.50 = 1050

supInfo: string range: (up to 140 chars) **optional**
Supplementary Info

- If this field does not contain any value, it will not be returned in the response message.

arrayOfRefundAmt: Array<**refundAmountObj**> **optional**

ITEMS
`refundAmountObj`

refundAmountObj: object

PROPERTIES

refundTxnId: string range: (up to 16 chars) **optional**
Refund transaction reference ID. Please see [here](#) for Format details.

refundTxnTime: string range: (up to 25 chars) **required**
Bank Transaction time of the corresponding refund process

- Bank system local time. A **GMT+8** timezone information is appended to the end of the timestamp to indicate this time is a Hong Kong local time. Format : `yyyy-MM-dd'T'HH:mm:ss±hh:mm`

subAmtRefund: integer range: $1 \leq x \leq 999999999999$ **required**
Amount of requested Refund

- Format: Eliminate punctuation and sign, support 2 decimal places, e.g. \$10.50 = 1050

refundStatus: string range: (up to 140 chars) **required**
Status of Corresponding requested Refund

Possible Value	Definition
SUCCESS	Refund Completed
REJECTED	Refund Rejected
PENDING	Refund process is pending

refundRqRequestModel: object

PROPERTIES

txRef: string (**Critical Field**) range: (up to 25 chars) **required**
Merchant provides the original transaction reference that refers to

merId: string (**Critical Field**) range: (up to 15 chars) **required**
Merchant provides Merchant ID for identification

bankTxnId: string range: (up to 16 chars) **required**
Merchant provides HSBC transaction ID that refers to a specific in

{
 "refundTxnId": "HC1196080000319R",
 "refundTxnTime": "2018-06-11T18:12:44+08:00",
 "subAmtRefund": 2500,
 "refundStatus": "SUCCESS"
}
}

Example

```
{  
    "refundTxnId": "HC1196080000319R",  
    "refundTxnTime": "2018-06-11T18:12:44+08:00",  
    "subAmtRefund": 2500,  
    "refundStatus": "SUCCESS"  
}
```

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06457710500000001",
"645774",
"02097323467",
"/merchant.com/returnRefundStatus"

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refundRqResponseModel: object

PROPERTIES

api_gw: commonRespObj **required**

response: refundRqResponseModel_response **required**

refundRqResponseModel_response:

PROPERTIES

bankTxnId: string range: (up to 16 chars) **required**

Returning back the original HSBC transaction ID provided by merchant

refundTxnId: string range: (up to 16 chars) **optional**

Returning back a refund transaction ID that refer to a specific refund transaction. Please see [here](#) for Format details.

proCode: string range: (up to 6 chars) **required**

Process Return Code

Possible Value	Return Message	Remark
000000	Refund Request Submitted	
800010	Refund Request Not Allowed: Prior refund found	When you make additional refund request for the same transaction which already has a processed refund request or a refund request under processing, the system will return this code.
800020	Refund Request Not Allowed: 31 calendar days acceptable refund period is over. Please note the day when the original successful transaction is made is taken as day 1.	

Example

```
{  
  "api_gw": {  
    "messageId": "89817674-da00-4883",  
    "returnCode": "200",  
    "returnReason": "Successful operation",  
    "sentTime": "2016-11-15T10:00:00.000Z",  
    "responseTime": "2016-11-15T10:00:00.000Z"  
  },  
  "response": {  
    "bankTxnId": "HC80502097323467",  
    "refundTxnId": "HC1196080000319R",  
    "proCode": "000000",  
    "proMsg": "Refund Request Submitted"  
  }  
}
```

Example

```
{  
  "bankTxnId": "HC80502097323467",  
  "refundTxnId": "HC1196080000319R",  
  "proCode": "000000",  
  "proMsg": "Refund Request Submitted"  
}
```

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Possible Value	Return Message	Remark
800030	Refund Request Not Allowed: Not Supported in Current Channel	Offline and batch mode bill payment are not supported.
800040	Refund Amount exceed Original Payment Transaction	Please verify <code>txnAmt</code> and <code>refundAmt</code>
900060	Payment Transaction Not Found or is Not Matched	Please check <code>bankTxnId</code>
900070	Payment Transaction Amount is Not Matched	Please ensure <code>txnAmt</code> = the original received amount which can be found in Payment Status Notification API or Business Collect Report

proMsg: string range: (up to 128 chars) required
Corresponding Text Message of Process Return Code

paySimRequestModel: object

PROPERTIES

txnRef: string range: (up to 25 chars) required
Merchant to provide transaction ID that referred to a specific transaction

merId: string range: (up to 15 chars) required
Merchant to provide Merchant ID for identification

is_notification_encrypted: string enum: [Y, N] range: (up to 1 chars) required
Flag to indicate if the Status Notification message is encrypted or not

for_bill_payment: simBillPaymentObj conditional

for_nonbill_payment: simBillPaymentObj conditional

NOTICE:
Only choose between either a Bill Payment or a Non-Bill Payment

simBillPaymentObj: object

PROPERTIES

currency: string enum: [HKD, CNY] range: (up to 3 chars) required
Payment Currency for Bill Payment Simulation

Possible Value	Definition
HKD	Hong Kong dollar
CNY	Renminbi

- Format: ISO 4217 Alpha

amount: integer range: 1 ≤ x ≤ 99999999999 required
Payment Amount for Bill Payment Simulation

- Format: Eliminate punctuation and sign, support 2 decimal places according to ISO 4217, e.g. \$10.50 = 1050

suppInfo: string range: (up to 140 chars) required
Supplementary Info for Bill Payment Simulation

- This value will be shown in subsequent Push Notification.

Example

```
{  
  "txtnRef": "0002900F06457710500000001",  
  "merId": "0002900F0645774",  
  "is_notification_encrypted": "Y",  
  "for_bill_payment": {  
    "currency": "HKD",  
    "amount": 123450,  
    "suppInfo": "Supplementary Information"  
  },  
  "for_nonbill_payment": {  
    "currency": "HKD",  
    "amount": 123450,  
    "suppInfo": "Supplementary Information"  
  }  
}
```

Example

```
{  
  "currency": "HKD",  
  "amount": 123450,  
  "suppInfo": "Supplementary Information"  
}
```

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paySimResponseModel: object

PROPERTIES

api_gw: commonRespObj required

response: paySimResponseModel_response required

Example

```
{  
  "api_gw": {  
    "messageId": "99817674-da00-4883",  
    "returnCode": "200",  
    "returnReason": "Successful operation",  
    "sentTime": "2016-11-15T10:00:00Z",  
    "responseTime": "2016-11-15T10:00:00.000Z"  
  },  
  "response": {  
    "procode": "000000",  
    "txRef": "0002900F06457710500000001",  
    "proMsg": "Payment Success"  
  }  
}
```

paySimResponseModel_response:

PROPERTIES

txRef: string (Critical Field) range: (up to 25 chars) required

Returning back the Transaction Reference No. provided by merchant

proCode: string range: (up to 6 chars) required

Process Return Code

Possible Value	Definition
000000	Payment Success
900010	Transaction Record Not Found
900050	Transaction Channel Not Available with the corresponding Merchant

proMsg: string range: (up to 128 chars) required

Corresponding Text Message of Process Return Code

Example

```
{  
  "proCode": "000000",  
  "txRef": "0002900F06457710500000001",  
  "proMsg": "Payment Success"  
}
```

statusReturnRequestModel: object

PROPERTIES

merId: string (Critical Field) range: (up to 15 chars) required

Returning back Merchant ID for Merchant identification.

txRef: string (Critical Field) range: (up to 25 chars) required

Returning back Transaction Reference No.

currency: string range: (up to 3 chars) required

Returning back Payment Currency

- Format: ISO 4217 Alpha (e.g. HKD = Hong Kong Dollar)

amount: integer range: 1 ≤ x ≤ 99999999999 required

Returning back Payment Amount

- Format: Eliminate punctuation and sign, support 2 decimal place

proCode: string range: (up to 6 chars) required

Process Return Code

Example

```
{  
  "merId": "0002900F0645774",  
  "txRef": "0002900F06457710500000001",  
  "currency": "HKD",  
  "amount": 1050,  
  "proCode": "000000",  
  "proMsg": "Transaction Successful",  
  "bankTxnId": "C80502097323467",  
  "bankTxnTime": "2018-06-11T14:10:25+08:00",  
  "suppInfo": "Supplementary Information"  
}
```

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Possible Value	Definition
000000	Transaction Successful

proMsg: string range: (up to 128 chars) required
Corresponding Text Message of Process Return Code

bankTxnId: string range: (up to 16 chars) required
Returning HSBC transaction reference id for the inward credit payment

- This transaction reference id will be seen in HSBC's Daily Collection Detail Report and Global Information Reporting (GIR) Bank Statement. It contains 16 characters with prefix HC such as HCxxxxxxxxxxxx where x refers to alphanumeric characters.

bankTxnTime: string range: (up to 25 chars) required
Returning HSBC Transaction time for the inward credit payment

- Bank system local time. A GMT+8 timezone information is appended to the end of the timestamp to indicate this time is a Hong Kong local time. Format : `yyyy-MM-dd'T'HH:mm:ss±hh:mm`

suppInfo: string range: (up to 140 chars) optional
Supplementary Info

- If this field does not contain any value, it will not be passed in the request message.

statusReturnResponseModel: object

PROPERTIES

status: string range: (up to 30 chars) required
Return Message

refundNotificationRequestModel: object

PROPERTIES

merId: string (Critical Field) range: (up to 15 chars) required
Returning back Merchant ID for Merchant identification.

txnRef: string (Critical Field) range: (up to 25 chars) required
Returning back Original Transaction Reference No.

bankTxnId: string range: (up to 16 chars) required
Returning back HSBC transaction ID that refers to a specific inward credit payment.

refundTxnId: string range: (up to 16 chars) optional
Returning back refund transaction ID that refers to a specific refund transaction. Please see [here](#) for Format details.

refundTxnTime: string range: (up to 25 chars) required
Returning refund completion Transaction time

- Bank system local time. A GMT+8 timezone information is appended to the end of the timestamp to indicate this time is a Hong Kong local time. Format: `yyyy-MM-dd'T'HH:mm:ss±hh:mm`

refundAmt: integer range: $1 \leq x \leq 999999999999$ required
Returning back Refund Amount

- Format: Eliminate punctuation and sign, support 2 decimal places

proCode: string range: (up to 6 chars) required
Process Return Code

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Possible Value	Definition
000000	SUCCESS
100010	REJECTED
100020	PENDING

proMsg: string range: (up to 128 chars) required
Corresponding Text Message of Process Return Code

refundNotificationResponseModel: object

PROPERTIES

status: string range: (up to 30 chars) required
Return Message

Example

```
{  
  "status": "SUCCESS"  
}
```

Lifecycle of Cryptographic Keys

This section highlights the Lifecycle of cryptographic keys in the following steps:

1. Generate keys pair (Private Key and Public Key Certificate)
2. *Optional:* Export CSR (Certificate Signing Request) and get signed with CA (Certificate Authority)

DO YOU KNOW?

In public key infrastructure (PKI) systems, a certificate signing request is a message sent from an applicant to a certificate authority in order to apply for a digital identity certificate. It usually contains the public key for which the certificate should be issued.

3. Exchange Certificate with HSBC
4. Key Maintenance
5. Key Renewal Process

Command line tool **Java Keytool™** is used in the demonstration. The tool can generate public key / private key pairs and store them into a Java Keystore. The Keytool executable is distributed with the **Java SDK (or JRE)™**, so if you have an SDK installed you will also have the Keytool executable. Yet, Merchant is free to choose any other tool to generate and manage keys, such as **OpenSSL™**.

Key Generation and Certificate Exchange with HSBC

1. Create a new keys pair (Private Key and Public Key Certificate) with a new or existing Keystore.

```
keytool -genkey  
-alias merchant_key_pair  
-keyalg RSA  
-keystore merchant_keystore.jks  
-keysize 2048  
-validity 3650  
-storepass <your keystore password>
```

- **-genkey** - command to generate keys pair.
- **-alias** - define the alias name (or unique identifier) of the key.
- **-keyalg** - key algorithm, it must be **RSA** regarding to HSBC **256**.
- **-keystore** - file name of the keystore. If the file already exists, it will be updated. If the file does not exist, a new keystore with the defined name will be created.

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DO YOU KNOW?

Keystore is a password-protected repository of keys and certificates. File with extension `.jks` means it is a Java Keystore which is originally supported and executable with Java™.

There are several keystore formats in the industry like `[PKCS12]` with file extension `.p12` which is executable with Microsoft Windows™, merchant can always pick the one most fit their application.

- **-keysize** - key size, it must be `[2048]` regarding to HSBC standard.
- **-validity** - the validity period of the private key and its associated certificate. The unit is `[day]`, 3650 means 10 years.
- **-storepass** - password of the keystore.

1.1. Provide `Distinguished Name` information after running the command:

```
Information required for CSR generation
-----
What is your first and last name?
[Unknown]: MERCHANT INFO
What is the name of your organizational unit?
[Unknown]: MERCHANT INFO
What is the name of your organization?
[Unknown]: MERCHANT INFO
What is the name of your City or Locality?
[Unknown]: HK
What is the name of your State or Province?
[Unknown]: HK
What is the two-letter country code for this unit?
[Unknown]: HK
Is CN=XXX, OU=XXX, O=XXX, L=HK, ST=HK, C=HK correct? (type "yes" or "no")
[no]: yes

Enter key password for <merchant_key_pair>
    (RETURN if same as keystore password):
Re-enter new password:
```

NOTICE: Private Key password and Keystore password can be the same or Merchant can set them differently to be more secure.

2. **Optional:** Export CSR and get signed with CA. This step can be skipped if Merchant decides to work with a Self-Signed Certificate.

```
keytool -certreq
    -alias merchant_key_pair
    -keyalg RSA
    -file merchant_csr.csr
    -keystore merchant_keystore.jks
```

- **-certreq** - command to generate and export CSR.
- **-alias** - the name of the associated keys pair.
- **-keyalg** - key algorithm, it must be `[RSA]` regarding to HSBC standard.
- **-file** - file name of the CSR. This will be generated at the location where the command is run.
- **-keystore** - specify the keystore which you are working on.

2.1. Select and purchase a plan at Certificate Authority and then submit the CSR accordingly. After a signed Certificate is issued by CA, import the Certificate back to Merchant's keystore.

```
keytool -import
    -alias merchant_signed_cert_0001
    -trustcacerts -file CA_signed_cert.p7b
    -keystore merchant_keystore.jks
```

- **-import** - command to import object into a specific keystore.
- **-alias** - define the alias name (or unique identifier) of the signed Certificate.
- **-trustcacerts** - file name of the signed Certificate in Merchant's local file system.

NOTICE: `[PKCS#7]` is one of the common formats that contains certificates and has a file extension of `.p7b` or `.p7c`.
The certificate format may be varied depending on the choice of the issuing CA.

- **-keystore** - specify the keystore which you are working on.

3. Export Certificate and send to HSBC for key exchange.

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DO YOU KNOW:

A Certificate or Public Key Certificate is an electronic document that contains a public key and additional information that prove the ownership and maintain integrity of the public key. This is essential for the sender to ensure the key is not altered by any chance during delivery.

```
keytool -export  
-alias merchant_key_pair  
-file merchant_cert_0001.cer  
-keystore merchant_keystore.jks
```

- **-export** - command to export object from a specific keystore.
- **-alias** - the name of the associated keys pair.

NOTICE: If Merchant associates the original keys pair `merchant_key_pair`, the exported Certificate is without CA-signed, and hence, Self-Signed. However, if Merchant associates the imported Certificate `merchant_signed_cert_0001` mentioned in step #2, the exported Certificate is CA-signed.

- **-file** - specify the file name of the Certificate where the file will be exported to Merchant's local file system.

NOTICE: The default Certificate file encoding is binary. HSBC accepts both binary and base64 encoding. To export a printable base64 encoding file, please attach an extra parameter `-rfc` in the command.
e.g. `-file merchant_cert_0001.crt -rfc`.

- **-keystore** - specify the keystore which you are working on.

4. Import HSBC's Certificate into merchant's Keystore.

```
keytool -import  
-alias hsbc_cert_0002  
-file hsbc_cert_0002.cer  
-keystore merchant_keystore.jks
```

- **-import** - command to import object into a specific keystore.
- **-alias** - define the alias name of HSBC's Certificate in your keystore.
- **-file** - specify the file name of HSBC's Certificate in Merchant's local file system.
- **-keystore** - specify the keystore which you are working on.

5. **Optional:** List keystore objects. Merchant is suggested to verify that all required objects are properly maintained. 2 - 3 entries should be found in your Java Keystore: (*Entries may be varied if other key repository format is used*)

Alias name	Corresponding Object	Remark
merchant_key_pair	<ul style="list-style-type: none">Merchant's Private KeyMerchant's Public Certificate (Self-Signed)	These two objects appear to be one entry in a JAVA Keystore. Merchant can still export them separately into two objects (files) on your local file system depending on your application design.
merchant_signed_cert_0001	<ul style="list-style-type: none">Merchant's Public Certificate (CA-Signed)	Not exist if Merchant skips step #2
hsbc_cert_0002	<ul style="list-style-type: none">HSBC's Public Certificate	

```
keytool -list -v -keystore merchant_keystore.jks
```

Keystore type: JKS
Keystore provider: SUN

Your keystore contains 3 entries

Alias name: merchant_key_pair
Creation date: Jan 1, 2020
Entry type: PrivateKeyEntry

<Other Information>

Alias name: merchant_signed_cert_0001
Creation date: Jan 1, 2020
Entry type: trustedCertEntry

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<Other Information>

Alias name: **hsbc_cert_0002**
Creation date: Jan 1, 2020
Entry type: trustedCertEntry
<Other Information>

Certificates and Keys Maintenance

Here are some recommendations to Merchant of how to properly maintain certificates and keys:

Component	Storage	Validity
Merchant's Private Key	Private Key should be maintained and handled with the most secure approach that a Merchant can apply. The most common and yet secure enough approach is: <ul style="list-style-type: none">• key password - Do not save the password in plain text or hard-coded in application. Recommend to encrypt it by any Password Encryption Tools• key storage - Store inside password-protected key repository, such as JKS or PKCS12 keystore. Keystore password should also be encrypted.	No restriction on the Validity Period. However, if Merchant suspects there is any chance that the key is leaked or for any other security reason, a new Private Key and its associated Public Key Certificate should be generated.
Merchant's Public Key Certificate	Since Public Key Certificate is publicly distributed, a comparative moderate secure storage approach is acceptable. Merchant can store the physical file in any system's file system or store all keys and certificates in one single key repository for a centralised key management.	For a self-signed Certificate, the same condition has been mentioned as above. However, the validity period of a CA-signed Certificate is depended on the purchase plan of the issuing CA. The most common standard is 1 to 2 years.
HSBC's Public Key Certificate	Same as the above	1 Year NOTICE: Technically, the validity period is usually 1 Year plus 1 to 2 months more. The spare period is a buffer for a merchant to switch a "to-be-expired" Certificate to the new one during the Certificate Renewal Process. More technical detail will be covered in later section.

Certificates and Keys Renewal

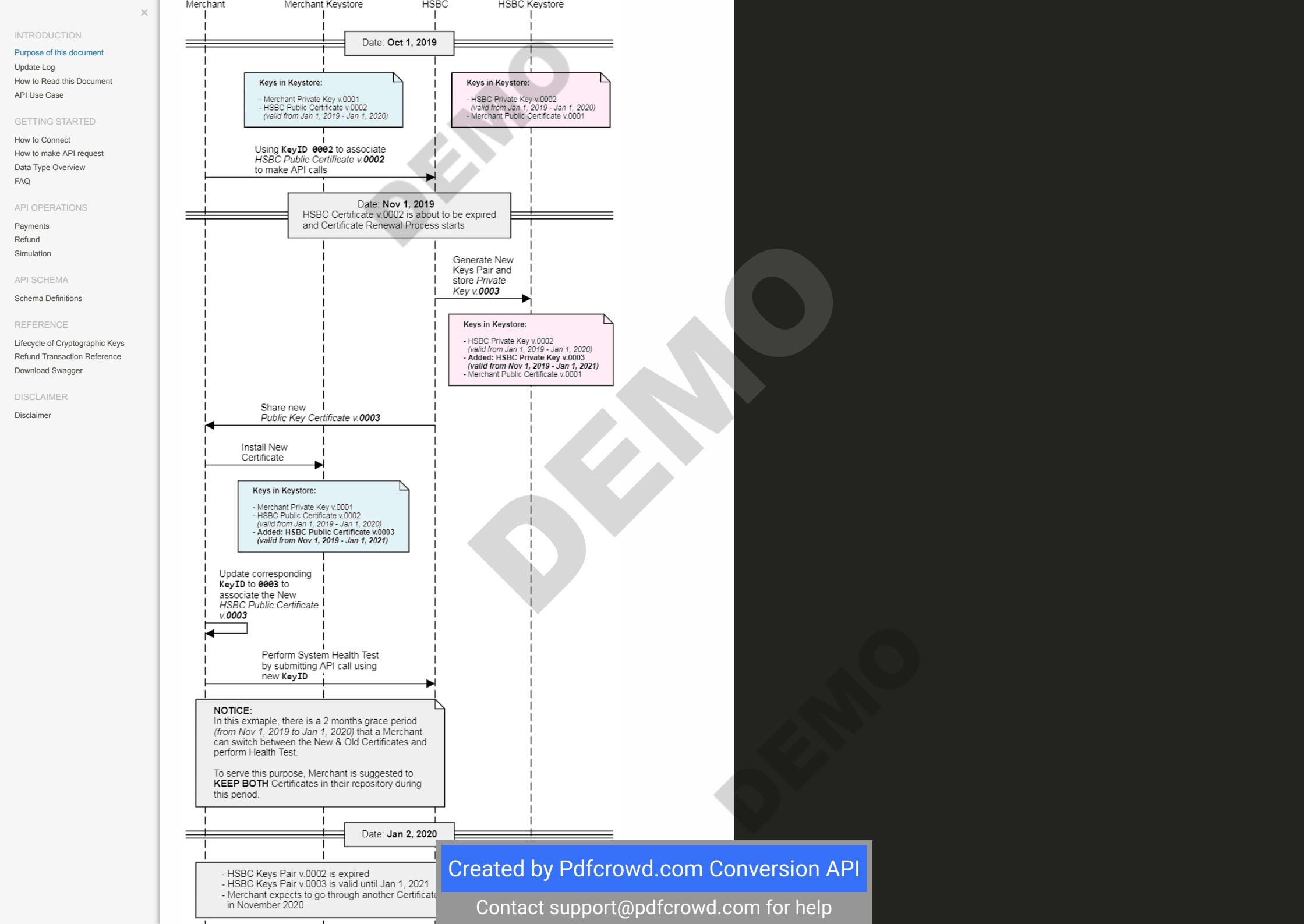
Every Public Key Certificate has an expiration date and when either Merchant's or HSBC's Certificate is about to expire, a key renewal process will be taken place. Please see the below Key Renewal Process Flow for your reference:

- SOME RULES YOU SHOULD KNOW:**
- **Keys Repository:** This is a make-up for demonstration purpose only.
 - **Keys Name:** Using a [Key Name](#) [KeyID](#) naming convention is for a simpler demonstration. The suggested identifier of one key should be the alias name inside a key repository.
 - **KeyID Value:** HSBC uses naming convention [0001](#), [0002](#), [0003](#)...[n + 1](#), when every time HSBC certificate is renewed, the [KeyID](#) value will be [n + 1](#).
 - **KeyID Binding:** The binding between [KeyID](#) and corresponding [Keys Pair](#) in merchant's system can make use of any key/value logic, such as Database table. In our example below, [KeyID 000X](#) binds to [Private Key v.000X](#) and [Public Certificate v.000X](#), etc.
 - **Validity Date:** All dates are make-up for demonstration purpose only.

HSBC Public Key Certificate Re

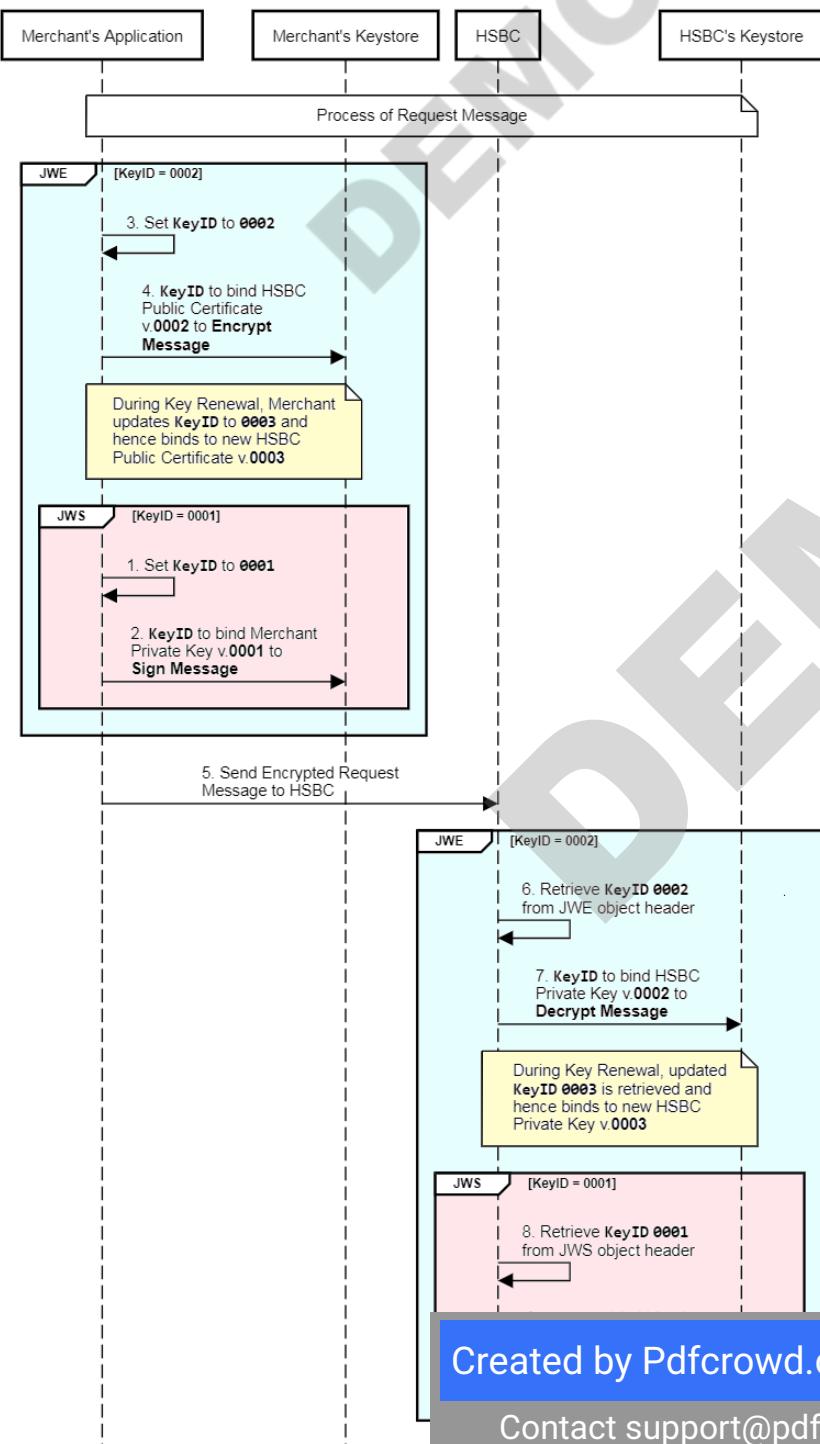
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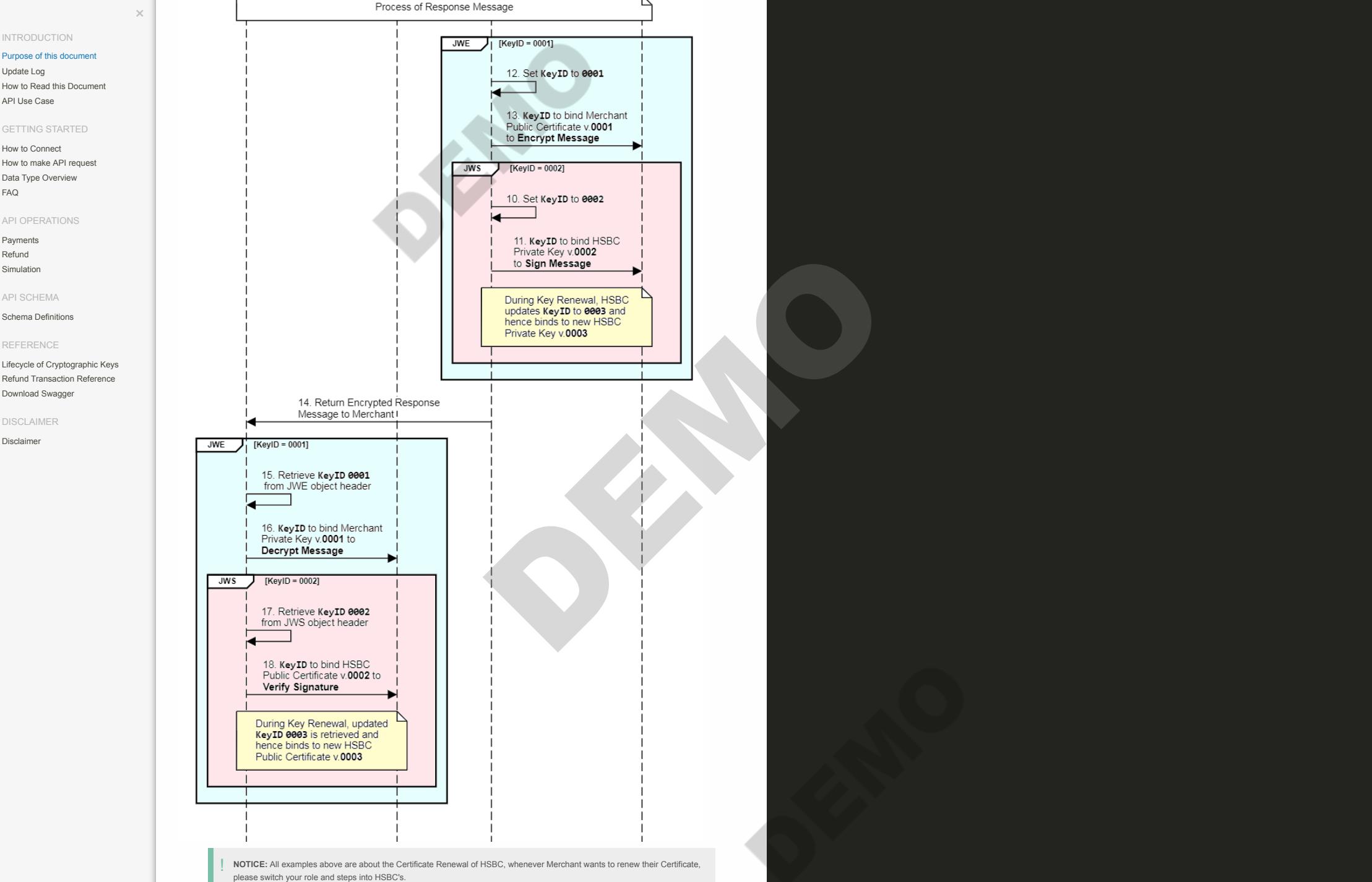
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Below is the technical flow showing how Certificates, Alias Names and KeyIDs work together during a normal process or a key renewal process:





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1-digit month	Definition
1	January
2	February
3	March
4	April
5	May
6	June
7	July
8	August
9	September
A	October
B	November
C	December

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