HKEX
香港交易所

Fast Interface for New Issuance (FINI)

FINI API User Guide

Contents

Version(s)

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9 September 2022	**Changes:** ▪ Amended Java implementation sample source code for generating X-FINI-SIGNATURE header (See *Section 3.2.3*) ▪ Added section to explain structure of unsuccessful responses (See *Section 4.4.3*) ▪ Removed upwards price flexibility-related fields (*Enquire IPO Reference Data* and *Enquire EIPO Funding*)

13 July 2022	**Changes:** ▪ "sub" field for signing Agent Profile JWT (G1) has been amended from "hkexapi" to the user's Company ID in Client Connect (See *Section 2.3.1.2*)
27 May 2022	**Changes:** ▪ Supplemented End-to-End Encryption procedures (See *Section 3*) ▪ Added warrants fields for SPACs (*Enquire IPO Reference Data Endpoint*) ▪ Renamed several adviser fields for SFC Code of Conduct (*Enquire IPO Reference Data Endpoint*) **Minor formatting:** ▪ All data payloads unified as arrays (from objects) ▪ IPO identifier unified as "ipoID" ▪ IPO Status values updated for "Suspended" and "Cancelled"
5 January 2022	**Initial version released to market participants in preparation of market testing.**

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FINI User Guides

Document	FINI user categories
User Guide for HKSCC Participants	▪ HKSCC Participant (“CP”)
User Guide for FINI Banks	▪ Designated EIPO Bank of CPs (“DB”) ▪ Receiving Bank of IPO Issuers (“RB”)
User Guide for Sponsors, Intermediaries and Legal Advisers	▪ Designated Sponsor ▪ Other Sponsor ▪ Sponsor Counsel ▪ Issuer Counsel ▪ Designated Overall Coordinator (“DOC”) ▪ Other Overall Coordinator ▪ Distributor
API Guide [current document]	▪ All user categories above [IPO Reference Data] ▪ HKSCC Participant (“CP”) [EIPO Subscription] ▪ Designated EIPO Bank of CPs (“DB”) [EIPO Funding]

1 Introduction

The FINI API Gateway offers a range of RESTful JSON endpoints for market participants to automate different types of IPO workflows, including obtaining IPO reference data, managing EIPO subscriptions and validating EIPO funding.

This version is being released to market participants in preparation of FINI's market-wide testing, and may be further refined during market rehearsal and before FINI's roll-out.

For further information on the FINI platform and testing phases, please visit the FINI website at: https://www.hkex.com.hk/fini, or via the QR code below:

2 Connectivity Setup

- To access the FINI API Gateway, market participants are required to create an Agent profile and at most 2 Machine profiles under their Company profile on the HKEX Access Management Platform.
- After the Agent profile and Machine profile(s) have been created, FINI API users, as OAUTH client, have to pass 2 JSON Web Tokens (JWTs[1]): Agent Profile JWT (G1) and Machine Profile JWT (G2), to the HKEX Access Management (AM) server for authentication.
- If authentication is successful, the AM server will return a FINI API JWT access token to API users. FINI API users have to pass this FINI API access token in the calling FINI APIs. The integrity and validity of FINI API JWT access token will be verified at the FINI API Gateway.
- FINI API Gateway and HKEX Access Management (AM) server are assessed via Internet and TLS V1.2 will be used for encryption.

2.1 Create Agent Profile

- Each company can create at most one Agent profile for FINI API access.
- To create an Agent Profile on the HKEX Access Management Platform, FINI API users have to generate JSON Web Key (JWK[2]) with an expiry date. To enhance security, each agent key must be renewed every year. Therefore, the expiry date must not be more than one year from registration time.
- The following parameters are suggested for JWK generation:

Parameter	Value
Key Type	RSA
Key Size	2048
Key Use	Signature
Algorithm	RS256
Key ID	SHA-256 hash[3] value of JWK
Expiry Date	Key expiration time, in Epoch time format

An example of JWK public key is shown below:

```
{
   "keys": [
                        {
                        "kty": "RSA",
                        "e": "AQAB",
                        "use": "sig",
                        "kid":"eNL6Vj7vwaxjtwL+5QM=",
                        "alg": "RS256",
                        "n": "i4atD3PYe8YW7v8m....",
                        "exp": 1618307105
                        }
   ]
}
```

- To facilitate key renewal, API users can register at most 2 public keys for each Agent profile so that API users can renew and register a new public key before the existing key expires. Afterwards, API users can change their system to rotate to the new JWK in generating the G1 JWT with their own plan before the existing key expires.

[1] Refer to RFC 7519 at https://tools.ietf.org/html/rfc7519.
[2] Refer to RFC 7517 at https://datatracker.ietf.org/doc/html/rfc7517.
[3] Refer to RFC 7638 at https://datatracker.ietf.org/doc/html/rfc7638.

- Please refer to the *5. API PROFILE MAINTENANCE (for FINI only)* section of the *HKEX Access Management User Guide* for detailed steps of agent profile maintenance.

2.2 Create Machine Profile

- Each company can create at most 2 Machine profiles for FINI API access. As such, API users can set up 2 machines submitting API requests to FINI concurrently for their company.
- To create a Machine Profile on the HKEX Access Management Portal, FINI API users have to generate JSON Web Key (JWK) with an expiry date. To enhance security, each machine key must be renewed every year. Therefore, the expiry date must not be more than one year from registration time.
- The following parameters are suggested for JWK generation:

Parameter	Value
Key Type	RSA
Key Size	2048
Key Use	Signature
Algorithm	RS256
Key ID	SHA-256 hash value of JWK
Expiry Date	Key expiration time, in Epoch time format

An example of JWK public key is shown below:

```
{
   "keys": [
                        {
                        "kty": "RSA",
                        "e": "AQAB",
                        "use": "sig",
                        "kid":"eNL6Vj7vwaxjtwL+5QM=",
                        "alg": "RS256",
                        "n": "i4atD3PYe8YW7v8m....",
                        "exp": 1618307105
                        }
   ]
}
```

- To facilitate key renewal, API users can register at most 2 public keys for each Machine profile so that API users can renew and register a new public key before the existing key expires. Afterwards, API users can change their system to rotate to the new JWK in generating the G2 JWT with their own plan before the existing key expires.

2.2.1 Grant API Function to Machine Profile

- Each machine profile must be granted the appropriate identities and API roles for invoking the corresponding FINI API(s). The following FINI API Roles can be granted to a machine profile:

FINI Identity	FINI API Role	Available API Category
FINICP	▪ EU_finiIPORefDataAPI ▪ EU_finiPOSubAPI	▪ IPO Reference Data ▪ EIPO Subscriptions
FINDB	▪ EU_finiIPORefDataAPI ▪ EU_finiPOFundAPI	▪ IPO Reference Data ▪ EIPO Funding
Other FINI identities	▪ EU_finiIPORefDataAPI	▪ IPO Reference Data

- Please refer to the User Management section of the HKEX Access Management User Guide for detailed steps of agent profile maintenance.

2.3 Obtain FINI API JWT Access Token

- Before invoking FINI API, API users must call an API to obtain a FINI API JWT Access Token from the HKEX Access Management (AM) server by passing the G1 and G2 JWT tokens. If authentication is successful, AM server will return a FINI API JWT access token to API users.
- API users have to generate the G1 and G2 JWT tokens according to their formats described as follows:

2.3.1 Prepare Agent Profile JWT (G1)

2.3.1.1 Header

#	Parameter	Type	Description
1	alg	RS256	RS256 should be used for algorithm to encrypt JWT.
2	typ	JWT	

Sample Agent Profile JWT Header:

```
{
  "alg": "RS256",
  "typ": "JWT"
}
```

2.3.1.2 Payload

#	Parameter	Sample	Description
1	aud	https://<CCAM>/openam/oauth2/eu/access_token	Value of the <CCAM > may be different for production and test environments.
2	iss	<issuer>	Agent JWT Issuer value as registered in Agent Profile on the HKEX Access Management Portal.
3	exp	1610440800	Specifies the expiration time. This is the Unix epoch time. Must be less than 30 minutes from current system time
4	sub	CP123456	The user's Company ID on the HKEX Access Management Portal.

Sample of Agent Profile JWT Payload:

```
{
  "aud": "https://<fr am>/openam/oauth2/eu/access_token",
  "iss": "https://www.finibroker.com/jwtissuer",
  "exp": 1610440800,
  "sub": "CP123456"
}
```

2.3.1.3 Sign Agent Profile JWT (G1)

- Agent Profile JWT will be signed by private Agent JWK key. This value will be expected in “assertion” field in Authentication request parameter.

2.3.2 Prepare Machine Profile JWT (G2)

2.3.2.1 Header

#	Parameter	Type	Description
1	alg	RS256	RS256 should be used for algorithm to encrypt JWT.
2	typ	JWT	

Sample Machine Profile JWT Header:

```
{
  "alg": "RS256",
  "typ": "JWT"
}
```

2.3.2.2 Payload

#	Parameter	Sample	Description
1	aud	https://<CCAM>/openam/oauth2/eu/access_token	Value of the <CCAM > may be different for production and test environments.
2	iss	0fd68f99-e64d-4544-b4d6-bcc1d7c12c1e	Machine Profile UUID. Machine Profile UUID is system generated ID of Machine profile on the HKEX Access Management Portal.
3	exp	1610440800	Specifies the expiration time. This is the Unix epoch time. Must be less than 30 minutes from current system time
4	sub	0fd68f99-e64d-4544-b4d6-bcc1d7c12c1e	Machine Profile UUID. Machine Profile UUID is system generated ID of Machine profile.

Sample of Machine Profile JWT:

```
{
  "aud": "https://<fr am>/openam/oauth2/access_token",
  "iss": "0fd68f99-e64d-4544-b4d6-bcc1d7c12c1e",
  "exp": 1610440800,
  "sub": "0fd68f99-e64d-4544-b4d6-bcc1d7c12c1e"
}
```

2.3.2.3 Sign Agent Profile JWT (G2)

- Machine Profile JWT will be signed by private Machine JWK key. Public JWK will be imputed by user in CC IDP while create Machine profile. This value will be expected in “client_assertion” field in request parameter.

2.3.3 Call FINI API JWT Access Token API

- API users must call an API to obtain a FINI API JWT Access Token from the HKEX Access Management (AM) server by passing the G1 (Agent profile) and G2 (Machine profile) JWT tokens being prepared as described above. AM server will decrypt and verify the G1 JWT and G2 JWT by the using the registered Agent public key and Machine public key respectively.
- AM server will return a valid FINI API JWT access token after the G1 JWT and G2 JWT are verified.

Host Name	https://connect-am.hkex.com.hk:443			
URI	/openam/oauth2/eu/access_token			
Method	POST			
Request Header				
Parameter	**Type**	**Required**	**Sample Value**	**Description**
Content-Type	String	Y	application/x-www-form-urlencoded	
Request Parameter				
Parameter	**Type**	**Required**	**Sample Value**	**Description**
grant_type	String	Y	urn:ietf:params:oauth:grant-type:jwt-bearer	This specifies the Agent Profile assertion grant type.
assertion	String	Y	eyJhbGciOiJSUzI1NiIsInR5cCI6IkpXVCJ9.eyJhdWQiOiJodH..'	This specifies the signed Agent Profile (G1) JWT.
client_assertion_type	String	Y	urn:ietf:params:oauth:client-assertion-type:jwt-bearer	This specifies the Machine Profile client assertion type.
client_assertion	String	Y	eyJhbGciOiJSUzI1NiIsInR5cCI6IkpXVCJ9.eyJhdWQiOiJodHRwOi8vd3d3LmdhbWEtdGVjaC5jb206OTA4MC9zc28vb2F1dGgyL2FjY2Vzc190b2tlbiIsImlzcyI6InRlc3Rv…	This specifies the signed Machine Profile (G2) JWT.
Response Body				
Parameter	**Type**	**Required**	**Sample Value**	**Description**
access_token	String	Y	BNwWkbMD690HKLXhh0MOaQ0o3Hc	This is a JWT Access Token. This access token will be passed while calling FINI API.
scope	String	Y	CP00001	Company Id will be return as scope value.
token_type	String	Y	Bearer	This specify the Access Token type.
expires_in	Number	Y	30	This specify expiration of JWT Access Token in seconds.
HTTP Status Code	ForgeRock Reference link here			

Error Messages		
Error	**Error Description**	**Action**
invalid_grant	JWT assertion is expired or invalid	Agent JWT (G1) expired
invalid_client	JWT has expired	Machine Profile JWT(G2) expired
invalid_request	JWT expiration time is unreasonable	Agent/Machine Profile JWT time is over 30 minutes
invalid_grant	JWT assertion is not valid	Agent Profile JWT found invalid or not able to parse
server_error	Failed to parse json: Unexpected end-of-input in field name\n at […]	Machine Profile JWT could not parse

invalid_client	Client authentication failed	client_assertion_type is not valid
unsupported_grant_type	Unknown Grant Type, urn:ietf:params:oauth:grant-type:jwt-bearer	grant_type value is not valid

Sample Success Response (HTTP Status Code 200)

{
"access_token":
"eyJ0eXAiOiJKV1QiLCJraWQiOiI0aUNLRkIwUlhJeHl0b3IxcjNUb0JkUmlldnM9IiwiYWxnIjoiUlMyNTYifQ.eyJzdWIiOiJoa2V4YXBpIiwiY3RzIjoiT0FVVEgyX1NUQVRFTEVTU19HUkFOVCIsImF1ZGl0VHJhY2tpbmdJZCI6IjhkZTQ0OTdlLTMxYWItNDY3Yi1hMzU1LTlkNzE0OWExOTdhYS0xMzE2ODgiLCJpc3MiOiJodHRwczovL2Nvbm5lY3QtYW0udTFjcC5oa2V4LmNvbS5oazo0NDMvb3BlbmFtL29hdXRoMi9ldSIsInRva2VuTmFtZSI6ImFjY2Vzc190b2tlbiIsInRva2VuX3R5cGUiOiJCZWFyZXIiLCJhdXRoR3JhbnRJZCI6IkY0a05tTGFGYUUtellxeVpuSEZaZWl6YkgtWSIsImF1ZCI6IjE1YjIzNjljLTkyMjItNDM1Mi05ZDIzLTdjODEyYWUwNzc2ZSIsIm5iZiI6MTY0OTgzMDI3MywiZ3JhbnRfdHlwZSI6InVybjppZXRmOnBhcmFtczpvYXV0aDpncmFudC10eXBlOmp3dC1iZWFyZXIiLCJzY29wZSI6WyJDUDAwMzk4Il0sImF1dGhfdGltZSI6LTEsInJlYWxtIjoiL2V1IiwiZXhwIjoxNjQ5ODMzODczLCJpYXQiOjE2NDk4MzAyNzMsImV4cGlyZXNfaW4iOjM2MDAsImp0aSI6InNzZDhmZHR6VW5sMWY3aVBhVzVSczFNUFNzQSJ9.NHu1-0bPRMpw-e6YTZYiAcvhlrL6Zlj6NMjB84BYSdpEMX_Xxw9pPgu4IazzEsyO9G1kd4A0_EHWkiU6mW00A6LmrWhvgwRC3ve7Q_QORPa--p0MoKMlC1FQ5D7uNDd6MnlOxR04rVDGYGAON3ElTNNbxZchkQj9WhSXZlNHsVJpJKSpWcZYyinYUsLkd-xBNaEiT8hbQCwX_NqqnI-7GaQkNEl0XdmU5YQ0cBUe1DsLXwztrv7IiwKAPrfFMqWg0heAgkbgYuIuq_OVudwMqg9SDS_whzwKEZqSKw6DCndQZbo_jbAcCFS4vqlIcc5DjVfXcSqqZ-D3yYs9AcFy8g",
"scope": "CP00001",
"token_type": "Bearer",
"expires_in": 30
}

Sample Error Response (HTTP Status Code 400)

Sample 1: When Agent JWT found expired (G1).

```
{
   "error_description": "JWT assertion is expired or invalid",
   "error": "invalid_grant"
}
```

Sample 2: When Machine Profile JWT found expired (G2).

```
{
   "error_description": "JWT has expired",
   "error": "invalid_client"
}
```

Sample 3: When Agent/Machine Profile JWT time found.

```
{
   "error_description": "JWT expiration time is unreasonable.",
   "error": "invalid_request"
}
```

Sample 4: When Agent Profile JWT found invalid/Not able to parse.

```
{
   "error_description": "JWT assertion is not valid",
   "error": "invalid_grant"
}
```

Sample 5: When Machine Profile JWT could not parse.

```
{
 "error_description": "Failed to parse json: Unexpected end-of-input in field name\n at […]",
  "error": "server_error"
}
```

Sample 6: When client_assertion_type is not valid

```
{
    "error_description": "Client authentication failed",
    "error": "invalid_client"
}
```


Sample 7: When grant_type value is not valid


```
{
    "error_description": "Unknown Grant Type, urn&#x3a;ietf&#x3a;params&#x3a;oauth&#x3a;grant-type&#x3a;jwt-beare",
    "error": "unsupported_grant_type"
}
```

2.3.4 FINI API JWT Access Token

- If authentication is successful, AM server will return a FINI API JWT access token to API users. Each FINI API JWT access token has a validity of 30 seconds. Therefore, API users can reuse the same JWT access token to invoke FINI API's continuously until the access token expires. After the JWT access token expires, API users have to obtain a new access token from AM server again.
- The structure of the FINI API JWT access token is as follows:

2.3.4.1 Header

#	Name	Type	Sample Value	Description
1	typ	String	JWT	This specify the type of JWT.
2	kid	String	wU3ifIIaLOUAReRB/FG6eM1P1QM=	The kid of server's public key signing the Access Token.
3	alg	String	RS256	This specifies the algorithm used for signing the Access Token.

Sample Access Token Header Example

```
{
  "typ": "JWT",
  "kid": "wU3ifIIaLOUAReRB/FG6eM1P1QM=",
  "alg": "RS256"
}
```

2.3.4.2 Payload

Attributes defined in the FINI API JWT Access Token Payload:

#	Name	Type	Sample Value	Description
1	sub	String	(usr!CP123456)	This specify "sub" field of agent JWT.
2	cts	String	OAUTH2_STATELESS_GRANT	This specify the core token service.
3	auditTrackingId	String	123e724e-68e1-45dd-bc9c-7757b048bc6e-3351	This specify the Audit tracking id.
4	subname	String	CP123456	This specify "subname" field of agent JWT.
5	iss	String	https://connect-am.hkex.com.hk:443/openam/oauth2/eu	This specify Agent issuer.Default value of "iss" will be like below. http://<CCAM >/openam/oauth2/eu
6	tokenName	String	access_token	This specify the token name.
7	token_type	String	Bearer	This specify the return token type.
8	authGrantId	String	30nsq6cTJZwcJ-MGKYBwCSGSRcg	This specify the authentication grant id.
9	aud	String	<Machine-UUID>	This specify subject of Machine profile JWT.
10	nbf	Number	1618307105	The "nbf" (not before) claim identifies the time before which the JWT MUST NOT be accepted for processing.
11	grant_type	String	urn:ietf:params:oauth:grant-type:jwt-bearer	This specify the Agent profile grant type.
12	scope	String[]	["CP00001"]	This specify scope associated with respective Machine profile. Company Id will be set as scope value.
13	auth_time	Number	-1	Time when the authentication has been performed.

14	realm	String	/	This specify the realm path.
15	exp	Number	1618310705	The "exp" (expiration time) claim identifies the expiration time on or after which the JWT MUST NOT be accepted for processing.
16	iat	Number	1618307105	The "iat" (issued at) claim identifies the time at which the JWT was issued.
17	expires_in	Number	30	This specify maximum time (Seconds) that the access token will be valid for use within the application.
18	jti	String	QbmfS_qm04lTprLHUtS8mVxw1Po	This specify JWT id. Each Access Token has unique jti.

Sample Access Token (decoded) Example


```
{
 "sub": "(usr!CP123456)",
 "cts": "OAUTH2_STATELESS_GRANT",
 "auditTrackingId": "123e724e-68e1-45dd-bc9c-7757b048bc6e-3351",
 "subname": "CP123456",
"iss": "https://connect-am.hkex.com.hk:443/openam/oauth2",
 "tokenName": "access_token",
 "token_type": "Bearer",
 "authGrantId": "30nsq6cTJZwcJ-MGKYBwCSGSRcg",
 "aud": "0fd68f99-e64d-4544-b4d6-bcc1d7c12c1e",
 "nbf": 1618307105,
 "grant_type": "urn:ietf:params:oauth:grant-type:jwt-bearer",
 "scope": [
  "CP00001"
 ],
 "auth_time": -1,
 "realm": "/",
 "exp": 1618310705,
 "iat": 1618307105,
 "expires_in": 30,
 "jti": "QbmfS_qm04lTprLHUtS8mVxw1Po"
}
```

2.4 Invoke FINI APIs

2.4.1 HTTP Request

- To invoke FINI APIs, API user must send a valid and active FINI API JWT access token in the “Authorization” request header as bearer token.
- API users must not modify the contents of the access token when passing it to invoke a FINI API.
- Sample of FINI API JWT access token:

```
Bearer BNwWkbMD690HKLXhh0MOaQ0o3Hc
```

- The HTTP Request Headers are required to be set as follows:

Name	Description	Sample Value
Method	HTTP Method of the API request	GET or POST
Accept	Content type	application/json
Authorization	FINI API JWT access token	Bearer eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzI1NiJ9.eyJzdWIiOiIxMjM0NTY3ODkwIiwibmFtZSI6IkpvaG4gRG9lIiwiYWRtaW4iOnRydWUsImp0aSI6IjM5ZDg5MDc0LTI0NWQtNGQxNC04MzQ2LTI2MzQzYjdlNTc2YyIsImlhdCI6MTYxNDA0OTg1MSwiZXhwIjoxNjE0MDUzNDUxfQ.roqk6lSljCMDlQBBf4fd5CvTL1odneLj6LKSgHqXm8c

- The production domain name of FINI API endpoints will be provided in a future iteration.

2.4.2 HTTP Status Code

- FINI API Gateway will return one of the following HTTP status code after an API request is invoked:

Status Code	Status	Description
200	OK	The request has succeeded
400	Bad Request	Invalid request
401	Unauthorized	The FINI API JWT access token is invalid
403	Forbidden	The client does not have access rights to the content
404	Not Found	The server cannot find the requested resource
429	Too Many Requests	Rate limiting
500	Internal Server Error	Internal Server Error
503	Service Unavailable	API Service is not available
504	Gateway Timeout	Timeout at the API Gateway

3 End-to-End Encryption

API endpoints with Personal Identifiable Information (PII) must adopt end-to-end encryption for both request and responses on a data field level. The endpoints include:

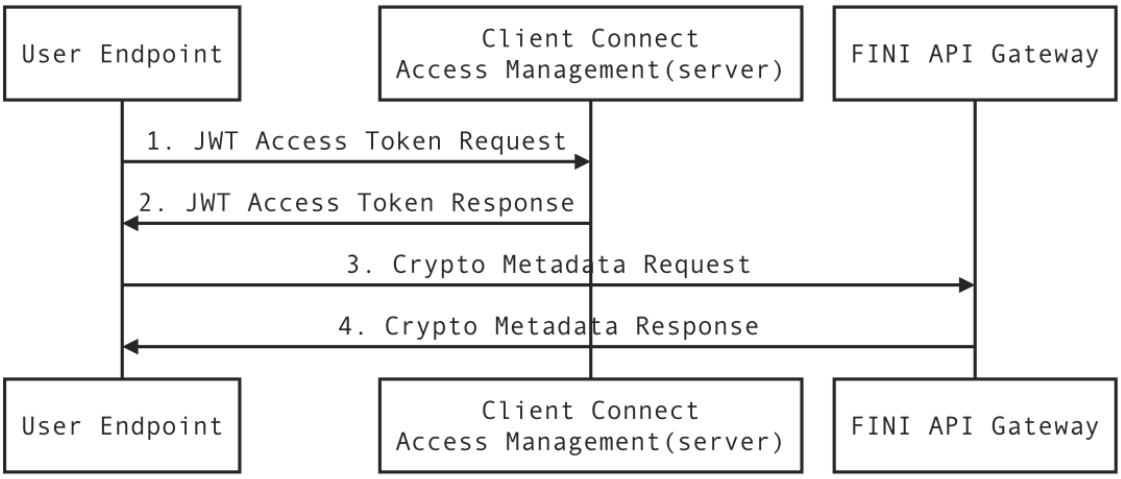
- Add EIPO Subscription Entries (see *Section 7.1*);
- Change EIPO Subscription Entries (see *Section 7.2*);
- Invalidate EIPO Subscription Entries (see *Section 7.3*); and
- Enquire EIPO Subscription Entries (see *Section 7.4*).

Only the following PII data fields have to be encrypted in the API request and response, while other fields should not be encrypted:

- ID Type of the applicant (idType)
- Issuing authority of the applicant's identification document (idCountryJurisdiction)
- ID number of the applicant's identification document.(idNum)
- Full English name of the applicant (fullNameEng)
- Full Chinese or non-English name of the applicant (fullNameChi)

3.1 Obtaining Crypto Metadata for Encryption

It is required to obtain Crypto Metadata, which includes FINI public key and Timestamp, for every API encryption request by calling Crypto Metadata Request API. The system sequence diagram below illustrates the data flow for obtaining crypto metadata for encrypting API data fields:



3.1.1 Request

GET **/api/crypto/meta**

For invoking Crypto Metadata Request API, API user must obtain and send a valid and active FINI API JWT access token as described in *Section 2.3*.

3.1.2 Response

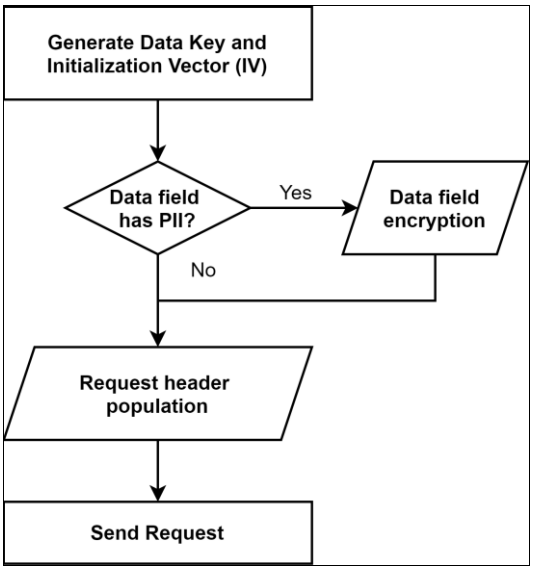
#	Field	Type	Length	Description	Sample
1	code	String	6	0 to indicate 'successful response'.	0
2	message	String	100	Empty string, i.e. "" to indicate successful response.	
3	data	Object		The crypto metadata including the public key and timestamp	
3.1	publicKey	String	1000	The X.509 RSA public key to be used in FINI, encoded in base64 format	MIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAuh/iUUOPQEk/2HzBNcFMprLMmp0Z/kUj69+eP2d03gkOFShOfb/wI2Nmm3m7fwI/oFfab2qQgj4+I0F4zJzL9pd+QXSU+dmeEokXMVZpeqCr1zDn4I66usFNC4NWQcP9XQpVxjmTzK6e1LOpEk3wvRyW+mGqAJqPJvmatVmYXKvpmHdaOXN9vdK15o6cYm5aEPg1+ih05+N+UI3QeEYjv3O/b7wpvExBr52w0Z6MELYeOEdWrvp7U3p8eJGaaXTLkoqemIBWKfCefxqcn/tgW4o/X6h0J38XhrQLULSGtPUBAl3B4mfH504HI3cdX7pqnsgikNnwWqfjew89z+gvFQIDAQAB
3.2	serverTimestamp	Integer	13	The FINI timestamp in Epoch milliseconds format	1640070861735


```
{
"code": "0",
"message": "",
"data": {
                    "publicKey":"MIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAuh/iUUOPQEk/2HzBNcFMprLMmp0Z/kUj69+eP2d03gkOFShOfb/wI2Nmm3m7fwI/oFfab2qQgj4+I0F4zJzL9pd+QXSU+dmeEokXMVZpeqCr1zDn4I66usFNC4NWQcP9XQpVxjmTzK6e1LOpEk3wvRyW+mGqAJqPJvmatVmYXKvpmHdaOXN9vdK15o6cYm5aEPg1+ih05+N+UI3QeEYjv3O/b7wpvExBr52w0Z6MELYeOEdWrvp7U3p8eJGaaXTLkoqemIBWKfCefxqcn/tgW4o/X6h0J38XhrQLULSGtPUBAl3B4mfH504HI3cdX7pqnsgikNnwWqfjew89z+gvFQIDAQAB",
                    "serverTimestamp": 1640070861735
                    }
}
```


Note: The **publicKey** and **time difference** (in millisecond format) between FINI server time and API machine system time should be cached in the API machine's memory. The time difference is calculated by subtracting the FINI timestamp by API machine system time (in millisecond format).

3.2 Encrypting API Requests

The flowchart below illustrates the high-level workflow for encrypting API data fields:



A pseudorandom number generator that generates outputs from a non-deterministic source is strongly recommended for the Data Key and Initialization Vector (IV) and encryption of the data payload.

Recommended library for Java:

Language	Library	Notes
Java	java.security.SecureRandom	In Java 8 or later, use SecureRandom.getInstanceStrong(). Meets RFC 4086's Random Requirements for Security.

3.2.1 Generate Data Key and Initialization Vector (IV)

A 32-byte **Data Key** ("DataKeyBase64Str") and 12-byte **IV** ("IVBase64Str") must be generated on the client side to encrypt the PII data fields in each API request and decrypt the PII data fields in the API response.

Field	Bytes	Description	Sample
DataKeyBase64Str	32	A **Data Key** that is cryptographically secure encoded in Base64 format.	IhJpZKbn9MnhWDz9UTPdNt6qllACKSWj4t1rN198QAg=
IVBase64Str	12	An **IV** that is cryptographically secure encoded in Base64 format.	aSdkeptMB9NXdYJx

Java implementation sample source code

```
int ivSize = 12;
byte[] iv = new byte[ivSize];
GCMParameterSpec ivKey;
SecretKey sKey;

// create a SecureRandom object for randomness
SecureRandom random = SecureRandom.getInstanceStrong();

// create Initialization Vector
random.nextBytes(iv);
ivKey = new GCMParameterSpec(128, iv);
String ivBas64Str = Base64.getEncoder().encodeToString(ivKey.getIV());

// create a KeyGenerator object with AES algorithm
KeyGenerator keyGen = KeyGenerator.getInstance("AES");
```

```
// generate Data Key
keyGen.init(256, random);
dataKey = keyGen.generateKey();
byte[] keyData = dataKey.getEncoded();

String dataKeyBase64Str = Base64.getEncoder().encodeToString(keyData);
```

3.2.2 Encrypting Data Fields

The data payload should be encrypted using the Data Key / IV, based on the following settings:

Configuration	Value
Algorithm	AES
Mode	GCM
Padding	NoPadding

The prefix **"%enc_%"** should then be appended to the final encrypted value to indicate the value is encrypted. Empty string (“”) is still required to be encrypted with the same algorithm, On the other hand, "null" data value does not need to be encrypted but will be included in generating the signed signature (X-FINI-SIGNATURE) header of the message.

Unencrypted sample request from the 7.1 Add EIPO Subscription Entries API endpoint (**red text** = to be encrypted):

```
{
        "data": [{
                "requestID": 1,
                "ipoID": "1234",
                "idList": [{
                        "idType": "1",
                        "idCountryJurisdiction": "HKG",
                        "idNum": "M011336(5)",
                        "fullNameEng": "Annabelle Wang",
                        "fullNameChi": "汪會夢"
                }],
                "appQuantity": "1000",
                "firmID": "00000",
                "ownRef": "f992b5c2-fd16-4e57-8387-738cb7aa75fb"
        }
    ]
}
```

Encrypted sample request from the *Section 7.1* Add EIPO Subscription Entries API endpoint (**red text** = encrypted fields):


```
{
        "data": [{
                "requestID":"1",
                "ipoID":"1234",
                "idList":[{
                        "idType":"%enc_%eapFkonN3fzIDdSEkiD9EQg=",
                        "idCountryJurisdiction":"%enc_%ACzvoa5ZmoiXFScyhNbRKtxUgw==",
                        "idNum":"%enc_%BVeZ9hPEphW7EeSiE2UMP6bnM/QbklYusbM=",
                        "fullNameEng":"%enc_%CQnGpkKS/FHrGOMgkJROsmXZe+kEXEZ61hEcNn/P",
                        "fullNameChi":"%enc_%rtYCIbx0dZksk9K1QLpNT3zAjRi2YaZuWQ=="
                }],
                "appQuantity":"1000",
                "firmID":"00000",
                "ownRef":"f992b5c2-fd16-4e57-8387-738cb7aa75fb"
        }
    ]
}
```


Java implementation sample source code

```
// Encrypt data field
byte[] clean = plainTextValue.getBytes();
SecretKeySpec secretKeySpec = new SecretKeySpec(dataKey.getEncoded(), "AES");

Cipher cipher = Cipher.getInstance("AES/GCM/NoPadding");
cipher.init(Cipher.ENCRYPT_MODE, secretKeySpec, ivKey);
byte[] encryptedByteArray = cipher.doFinal(clean);
String encryptedValueBase64 = "%enc_%" + Base64.getEncoder().encodeToString(encryptedByteArray);
```

3.2.3 Providing Encryption HTTP Request Headers

The encryption data key and signature of the API request must be prepared and sent to FINI with the following HTTP headers and their values (**red text** = header value):

<table>
<tr><th>#</th><th>Header Key</th><th>Description</th><th>Sample</th></tr>
<tr><td>1</td><td>Authorization</td><td>FINI API JWT Access token obtained from the HKEX Access Management server (Section 2.3)</td><td>Bearer eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzI1NiJ9.eyJzdWIiOiIxMjM0NTY3ODkwIiwibmFtZSI6IkpvaG4gRG9lIiwiYWRtaW4iOnRydWUsImp0aSI6IjM5ZDg5MDc0LTI0NWQtNGQxNC04MzQ2LTI2MzQzYjdlNTc2YyIsImlhdCI6MTYxNDA0OTg1MSwiZXhwIjoxNjE0MDUzNDUxfQ.roqk6lSljCMDlQBBf4fd5CvTL1odneLj6LKSgHqXm8c</td></tr>
<tr><td>2</td><td>X-FINI-ENCRYPTED-KEY</td><td>Encrypted key as the concatenation of the Data Key and IV (Section 3.2.1) with "#" as the delimiter, encrypted under the following configurations:

<table>
<tr><th>Configuration</th><th>Value</th></tr>
<tr><td>Algorithm</td><td>RSA</td></tr>
<tr><td>Mode</td><td>None</td></tr>
<tr><td>Padding</td><td>PKCS1Padding</td></tr>
</table>
</td><td>Step-by-step construction per below:

<table>
<tr><td>Data Key</td><td>IhJpZKbn9MnhWDz9UTPdNt6qlIACKSWj4t1rN198QAg=</td></tr>
<tr><td>IV</td><td>aSdkeptMB9NXdYJx</td></tr>
<tr><td>Concatenation of Data Key and IV (delimited by #)</td><td>IhJpZKbn9MnhWDz9UTPdNt6qlIACKSWj4t1rN198QAg=#aSdkeptMB9NXdYJx</td></tr>
<tr><td>Header value (after encryption)</td><td>nQdkoc21+zKTy6Ri480Wk7UFhku3MH6/MyyzR5XnoQ9BD0MBGySW2KCtZ0Nv25eA/jq6FFy+jG45NR50R/zmRSPHGUcEU4WDOmjdVEWnf0IV2+VpnardkdeONGC94LxWm2wxyE2IKl3WhnDY7EXvB9Oj3bWZAyHdd9fE17d5kqnvGbXpA+R5qLS9d2WDnRa3y+JcbvoZm5Y3qBVZYv7h6G99dIipiFSrWs3KZlfzMeeQp6VaP6Hg8jZeM5sfUlh6KC</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td><table><tr><td></td><td>348wgYfXjbfQ6iV3lwjKoeUJGO2fy15zUwTLoqhlV5cCjFA1l6Xvko0nnQcvl4vRiUfwVQuP2llkO/6PVnXg==</td></tr></table></td></tr>
<tr><td>3</td><td>X-FINI-REQUEST-ID</td><td>Unique ID generated under the GUID v4 standard without any hyphens. FINI will reject any duplicate Request ID in the same day.</td><td>26219512b1da421eafc8560638ff69af</td></tr>
<tr><td>4</td><td>X-FINI-TIMESTAMP</td><td>Request timestamp calculated as the sum between:
Time difference in millisecond format between the local / server timestamps in the Crypto Metadata Response (Section 3.1.2)
Local timestamp in millisecond format</td><td>Step-by-step construction per below:<table><tr><td>Time difference</td><td>15</td></tr><tr><td>Local timestamp</td><td>1641264153167</td></tr><tr><td>X-FINI-TIMESTAMP value</td><td>1641264153182</td></tr></table></td></tr>
<tr><td>5</td><td>X-FINI-SIGNATURE</td><td>Signed signature in base64 format, as the concatenation of the following values:
String body of the encrypted fields
X-FINI-REQUEST-ID
X-FINI-TIMESTAMP
The signature should then be encrypted under the following configurations:<table><tr><th>Configuration</th><th>Value</th></tr><tr><td>Algorithm</td><td>HMACSHA256</td></tr><tr><td>Signature Key</td><td>Data Key from Section 3.2.1</td></tr></table></td><td>Step-by-step construction per below:<table><tr><td>Encrypted payload</td><td>{"data":[{"requestID":"1","ipoID":"1234","idList":[{"idType":"%enc_%eapFkonN3fzIDdSEkiD9EQg=","idCountryJurisdiction":"%enc_%ACzvoa5ZmoiXFScyhNbRKtxUgw==","idNum":"%enc_%BVeZ9hPEphW7EeSiE2UMP6bnM/QbklYusbM=","fullNameEng":"%enc_%CQnGpkKS/FHrGOMgkJROsmXZe+kEXEZ61hEcNn/P","fullNameChi":"%enc_%rtYCIbx0dZksk9K1QLpNT3zAjRi2YaZuWQ=="}],"appQuantity":"1000","firmID":"00000","ownRef":"f992b5c2-fd16-4e57-8387-738cb7aa75fb"}]}</td></tr><tr><td>X-FINI-REQUEST-ID</td><td>26219512b1da421eafc8560638ff69af</td></tr><tr><td>X-FINI-TIMESTAMP</td><td>1641264153182</td></tr><tr><td>Header value (after hasing and encryption)</td><td>JcKBK3rJwmVlqjKE7+EisQpsu4KNtHt3Mzrwtx+0Q4E=</td></tr></table></td></tr>
<tr><td>6</td><td>X-FINI-ENCRYPTION-CLIENT</td><td>A field to indicate the request includes an encrypted payload.

If the request doesn’t include an encrypted payload, the header is not required.</td><td>YES</td></tr>
</table>

Java implementation sample source code for generating X-FINI-ENCRYPTED-KEY header

```
//Concatenation of Data Key and IV (delimited by #), X-FINI-ENCRYPTED-KEY
String e_key_str = dataKeyBase64Str + "#" + ivBase64Str;

// Generate X-FINI-ENCRYPTED-KEY header
Cipher cipher = Cipher.getInstance("RSA");
cipher.init(Cipher.ENCRYPT_MODE, getPublicKey(publicKeyFINI));
byte[] eBytes = cipher.doFinal(e_key_str.getBytes());
String X_FINI_ENCRYPTED_KEY = Base64.getEncoder().encodeToString(eBytes);
```

Java implementation sample source code for generating X-FINI-SIGNATURE header

```
// Generate X-FINI-SIGNATURE header

String algorithm = "HMACSHA256";
byte[] keyBytes = Base64.getDecoder().decode(dataKeyBase64Str);
Key key = new SecretKeySpec(keyBytes, 0, keyBytes.length, algorithm);
Mac mac = Mac.getInstance(algorithm);
mac.init(key);

String X_FINI_SIGNATURE = Base64.getEncoder().encodeToString(mac.doFinal((payload + requestID + timestamp) .getBytes()));
```

3.3 Decrypting API Responses

This section covers the step-by-step workflow for decrypting API responses containing encrypted data fields

3.3.1 Verify Signature

Before decrypting any fields, you should verify signature first. Compare **Local Signature** ("localSignature") and **Remote Signature** ("remoteSignature"), **if the 2 signatures do not match, it indicates a tampered response**.

Field	Description	Sample
localSignature	Computed by signing the response body using HMACSHA256, with the **Data Key** (*Section 3.1.2*) as the signature key	ij0GF6CE7RK2KDPL39UxvxBMSYdQth1M5RpCihQUImk=
remoteSignature	Obtain the value from response header **X-FINI-SIGNATURE**	ij0GF6CE7RK2KDPL39UxvxBMSYdQth1M5RpCihQUImk=

3.3.2 Decrypt Response Body

An API response with the field **"X-FINI-ENCRYPTION-SERVER"** implies a response body with encrypted fields.

Sample response from the 7.4 Enquire EIPO Subscription Entries API endpoint (**red text** = encrypted fields):


```
{
    "code": "0",
    "message": "",
    "data": [{
        "stkCode": "9988",
        "isin": "KYG017191142",
        "status": "25",
        "subFlowStatus": "3",
        "recordID": "2462303930948573A ",
        "idList": [{
            "idType": "%enc_%eapFkonN3fzIDdSEkiD9EQg=",
            "idCountryJurisdiction": "%enc_%ACzvoa5ZmoiXFScyhNbRKtxUgw==",
            "idNum": "%enc_%CVaa9BTCphW3EeMJV/bYQyR4JnsJbluxoAI=",
            "fullNameEng": "%enc_%Cw/JqQCj8VSuddUvgb64LzNdhVcNoMVtvs2a+w==",
            "fullNameChi": "%enc_%of4bIoRQdqsJKkXZ1yd4okbiVffjc4oMhg=="
        }],
        "appQuantity": "1000",
        "allotQuantity": "100",
        "firmID": "00000",
        "ownRef": null,
        "unsuccessfulReason": "0",
        "intDuplicateIndicator": "0",
        "exception": []
    }
    ],
    "totalSize": 1,
    "timestamp": "2021-08-26 12:30:29",
    "nextCursor": "0",
    "exception":[]
}
```

Each encrypted field should have its prefix **"%enc_%"** removed, then decrypted using the **Data Key** and **IV** (*Section 3.1.2*) with the following configurations:

Configuration	Value
Algorithm	AES
Mode	GCM
Padding	NoPadding

Worked example using the **"fullNameEng"** field (**red text** = encrypted value):

Encrypted field in API response	"fullNameEng":"**%enc_%Cw/JqQCj8VSuddUvgb64LzNdhVcNoMVtvs2a+w==**"
Encrypted value	**Cw/JqQCj8VSuddUvgb64LzNdhVcNoMVtvs2a+w==**
Decrypted Value	Chan Tai Man

Java implementation sample source code

```
// Decrypt data field
SecretKeySpec secretKeySpec = new SecretKeySpec(dataKey.getEncoded(), "AES");

Cipher cipher = Cipher.getInstance("AES/GCM/NoPadding");
cipher.init(Cipher.DECRYPT_MODE, secretKeySpec, ivKey);
String encryptedTextValue  = Base64.getDecoder().decode(encryptedTextValueBase64);
byte[] decryptedByteArray = cipher.doFinal(encryptedTextValue);
String decryptedValue = new String(decryptedByteArray);
```

3.4 End-to-End Encryption Error Codes and Messages

If the encryption API request is not submitted correctly with the required headers or data, errors will occur during end-to-end encryption or decryption processing in FINI. The following is a list of error codes and messages which may be returned in FINI API response due to incorrect encryption API request:

Code	Message
411001	Missing X-FINI-REQUEST-ID in the header
411002	Duplicate Request ID
411003	Missing X-FINI-TIMESTAMP in the header
411004	Request timestamp expired
411005	Missing X-FINI-SIGNATURE in the header
411006	Missing X-FINI-ENCRYPTED-KEY in the header
411007	Public key is wrong, FINI can't decrypt the encrypted key, please re-fetch crypto meta
411008	Signature error
411009	No such field {json_key}
411010	Cipher text format is wrong
411011	FINI can't decrypt the cipher text of the field {json_key}
411999	Crypto process exception

4 Formats and Conventions

4.1 Identifiers

4.1.1 IPOs

- IPOs are identified using an **ipoID** ("ipoID"), which is different from an IPO's Stock Code ("stkCode") or **ISIN** ("isin"). The design is intended to avoid situations where Stock Codes and ISINs are being reused, e.g. an IPO relaunching under different IPO cases within a short period of time. The use of ipoIDs is unique to the FINI API Gateway, and the identifiers can be queried through the Enquire IPO List API endpoint.

  /api/ipos/refdata/v1?ipoID=**1234**

4.1.2 EIPO Subscriptions

- EIPO subscriptions are identified using a **Record ID** ("recordID"), which is a globally unique reference number generated by the system upon successful validation and submission. It contains: (i) a 16-digit integer; and (ii) a suffix indicating the method through which the subscription is created.[4]

  /api/eipo/subscriptions/query/v1?recordID=**2486466216549731A**

4.1.3 EIPO Funding

- Each HKSCC Participant's EIPO subscription list within an IPO is identified using a Transaction Reference ("transactionRef"). Each reference is a globally unique reference number generated by the system upon an HKSCC Participant making a first subscription within an IPO. It contains a 13-digit integer.

  /api/eipo/funding/query/v1?transactionRef=**5224703318532**

[4] **"O"** = Online input, **"B"** = Bulk upload, and **"A"** = API.

4.2 Data Formats

All request and response fields are determined by a data type and max length:

<table>
<tr><th>Type</th><th>Length</th><th>Description</th><th>Example</th></tr>
<tr><td>String</td><td>[n]</td><td>Field with alphanumeric characters of n characters, fully UTF-8 encoded. (1)</td><td>Request field "fullName" has the following parameters:

<table><tr><th>Format</th><th>Length</th></tr><tr><td>String</td><td>20</td></tr></table>
Successful examples:
▪ "fullName":"David Chan Tai Man"
▪ "fullName":"陳大文"

Unsuccessful examples:
▪ "fullName":"David Chan Tai Man FOO" (exceeds length)
▪ "fullName":"David Chan Tai Man &#65533;" (invalid character)</td></tr>
<tr><td>Integer</td><td>[n]</td><td>Field with numeric characters of up to n digits.

The FINI API Gateway supports all unsigned 64-bit integers, with a range between 0 and 18446744073709551615.

Certain numeric fields are classified as string, as their sizes may</td><td>Request field "pageSize" has the following parameters:

<table><tr><th>Format</th><th>Length</th></tr><tr><td>Integer</td><td>18</td></tr></table>
Successful examples:
▪ "pageSize":9
▪ "pageSize":18446744073709551614

Unsuccessful examples:
▪ "pageSize":18446744073709551616 (overflow)
▪ "pageSize":-1 (underflow)</td></tr>
<tr><td>Decimal</td><td>[n1],[n2]</td><td>Field with an integer component (n1 - n2) and a decimal component (n2), separated by a comma.

The decimal component (n2) is the max number of digits after the separator.

The integer component (n1) - the decimal component (n2) is the max number of digits before the separator/</td><td>Request field "priceMax" has the following parameters:

<table><tr><th>Format</th><th>Length</th></tr><tr><td>Decimal</td><td>12,3</td></tr></table>
Numerical range:
▪ Min: 0.000
▪ Max: 999999999.999</td></tr>
<tr><td>Array</td><td>[n]</td><td>Field holding n variables, separated by commas (",") and enclosed by square brackets ("[" and "]")</td><td>Request field "idList" has the following parameters:

<table><tr><th colspan="2">#</th><th>Field</th><th>Format</th><th>Length</th></tr><tr><td>1</td><td></td><td>idList</td><td>Array</td><td>2</td></tr><tr><td></td><td>1.1</td><td>idType</td><td>String</td><td>2</td></tr><tr><td></td><td>1.2</td><td>idNum</td><td>String</td><td>10</td></tr></table></td></tr>
</table>

			Successful example: "idList":[{"idType":"2", "idNum":"GJ377364"}, {"idType":"2", "idNum":"RQ347486"}] Unsuccessful example: "idList":[{"idType":"2", "idNum":"GJ377364"}, {"idType":"2", "idNum":"RQ347486"}, {"idType":"2", "idNum":"XX323346"}]

(1) Unless specified, the all UTF-8 characters should be accepted, with the exception of the following characters / character sets:

Unicode	Description
1F000-1F02F	Mahjong Tiles
1F030-1F09F	Domino Tiles
1F0A0-1F0FF	Playing Cards
1F100-1F1FF	Enclosed Alphanumeric Supplement
1F200-1F2FF	Enclosed Ideographic Supplement
1F300-1F5FF	Miscellaneous Symbols and Pictographs
1F600-1F64F	Emoticons (Emoji)
1F650-1F67F	Ornamental Dingbats
1F680-1F6FF	Transport and Map Symbols
1F700-1F77F	Alchemical Symbols
1F780-1F7FF	Geometric Shapes Extended
1F800-1F8FF	Supplemental Arrows-C
1F900-1F9FF	Supplemental Symbols and Pictographs
1FA00-1FA6F	Chess Symbols
1FA70-1FAFF	Symbols and Pictographs Extended-A
1FB00-1FBFF	Symbols for Legacy Computing
E0000-E007F	Tags
E0100-E01EF	Variation Selectors Supplement
F0000-FFFFF	Supplementary Private Use Area-A
100000-10FF	FFSupplementary Private Use Area-B
005B	Left Square Bracket "["
005D	Right Square Bracket "]"
005E	Circumflex Accent "^"

4.3 Request Field Conventions

4.3.1 Leading/Trailing Spaces

- All request fields with leading or trailing spaces are trimmed before validation and processing

Example 1: Trailing spaces exceeding field length

- Request field "fullName" has the following parameters:

Type	Length
String	20

The following request would be successfully processed:

Request

```
"fullName":"Mary Lee Sum See     "
```
<- field length of 21 string characters

Response

```
"fullName":"Mary Lee Sum See"
```
<- field trimmed to 16 string characters

Example 2: Matched field after trimming trailing spaces

- A GET API endpoint uses "stkCode" as a primary key to enquire other fields ("priceMin", "priceMax" and "priceFinal"), and has the following parameters:

Type	Length
String	10

The following request would be successfully processed:

Database

```
"stkCode":"9988"
"priceMin":1.1
"priceMax":1.5
"priceFinal":null
```

Request

```
"stkCode":"9988    "
```
<- matches "stkCode":"9988" after trimming

Response

```
"data":[
                    "stkCode":"9988",
                    "priceMin":1.1
                    "priceMax":1.5
                    "priceFinal":null
]
```
<- successful response

Example 3: Leading spaces exceeding field length

- Request field "idType" uses an ID Code (digits 1-8) and has the following parameters:

Type	Length
String	2

The following request would be successfully processed:

Request

```
"idType":"  1"
```
<- field with 2 leading spaces and 1 digit

Response

```
"idType":"1"
```
<- field trimmed to 1 digit

Example 4: Matched field after trimming leading and trailing spaces

- Request field "idType" uses an ID Code (digits 1-8) and has the following parameters:

Type	Length
String	2

The following request would be successfully processed:

Request

```
"idType":" 1 "
```
<- field with 2 leading/trailing spaces and 1 digit

Response

```
"idType":"1"
```
<- field trimmed to 1 digit

4.3.2 Irrelevant Fields

- Irrelevant fields are ignored by the FINI API Gateway without any processing

Example:

- A GET API endpoint has the following URI (assume both are mandatory fields):

```
GET /api/ipos/v1?size={integer}&nextCursor={string}
```

The following request would be successfully processed:

Request

```
GET /api/ipos/v1?size=10&nextCursor=abc&food=Delicious
```
<- redundant field **food=Delicious**

Outcome

✓ Both **size** and **nextCursor** fields are processed, ignoring **food**

4.3.3 Repeated Fields

- Repeated fields will only have its first instance validated and processed by the FINI API Gateway

Example 1: All repeated fields are valid

- A GET API endpoint has the following URI (assume both are mandatory fields):

```
GET /api/ipos/v1?size={integer}&nextCursor={string}
```

The following request would be successfully processed:

Request

```
GET /api/ipos/v1?size=10&nextCursor=abc&size=100
```

<- repeated **size** field

Outcome

✓ Processed as **size=10**, **size=100** is ignored

Example 2: First instance is invalid, repeated instance(s) are valid

- A GET API endpoint has the following URI (assume both are mandatory fields):

```
GET /api/ipos/v1?size={integer}&nextCursor={string}
```

The following request would be successfully processed:

Request

```
GET /api/ipos/v1?size=abc&nextCursor=abc&size=100
```

<- first repeated **size** field

Outcome

X Processed as **size=abc**, **size=100** is ignored. API request is rejected for being invalid.

Example 3: First instance valid, repeated fields are invalid

- A GET API endpoint has the following URI (assume both are mandatory fields):

```
GET /api/ipos/v1?size={integer}&nextCursor={string}
```

The following request would be successfully processed:

Request

```
GET /api/ipos/v1?size=10&nextCursor=abc&size=infinite
```

<- repeated **size** field

Outcome

✓ Processed as **size=10**, **size=infinite** is ignored

4.3.4 Optional Fields

- Optional fields that are not provided will be treated as null

Example:

- A POST API endpoint has the following request fields:

Field	Required?	Type	Length
fullName	Mandatory	String	20
idNum	Mandatory	String	10
ownRef	Optional	String	20

The following request would be successfully processed:

Request

```
"data":[{
                    "fullName":"Company ABC"
                    "idNum":"KM21512456"
}]
```

<- ownRef not provided

Response

```
"code":"0"
"message":""
[…]
```

<- "code":"0" to indicate successful processing

Database

```
"fullName":"Company ABC"
"idNum":"KM21512456"
"ownRef":null
```

<- ownRef will be stored as null

4.4 Response Field Conventions

4.4.1 Empty Fields, Arrays and Objects

- Empty response fields will be treated as follows:
  - **Strings, integers and decimals** – null
  - **Array of an object** – empty array []
  - **Object** – empty object {}

Example:

- A GET API endpoint has the following response fields:

Field	Type	Length
idList	Array	4
idNum	String	10

If both fields are blank, the following response would be provided:

Response

```
"data":[{
                    "idList":[]
                    "idNum":null
}]
```

<- "idList" returns an empty array, and "idNum" returns null

4.4.2 Successful Responses

- All successful responses are indicated with a "0" in code ("code":"0") and empty string in message ("message":"")

Successful example:

Response

```
{
"code":"0",
"message":"",
"data":[{
                    "stkCode":"9988",
                    "status":"40",
                    "companyEngFull":"Alibaba Group Holding Limited"

}],
"totalSize": 1,
"timestamp": "2022-05-06 07:01:40",
"nextCursor":"0",
"exception":[]
}
```

Unsuccessful example:

Response

```
{
"code":"400000",
"message":"Invalid Parameters",
"data":[],
"totalSize": 0,
```

```
"timestamp":"2021-04-29 15:00:00",
"nextCursor": "0",
"exception":[{
                    "recordErrorCode":"401900",
                    "recordErrorMsg":"Invalid size format (must be an
unsigned 64-bit integer)"}]
}
```

4.4.3 Unsuccessful Responses

- All unsuccessful responses are indicated by:
  - The "code" field with a value that is not "0" (example, "code":"400000")
  - The "message" field with a value that is non-blank (example, "message":"Invalid Parameters")
- Error messages presented by the FINI API Gateway are divided into two categories:
  - **Message-level error** – placed outside the data payload to indicate the request has been wholly rejected
  - **Entry-level error** – used if the endpoint involves bulk processing, placed inside the data payload to indicate the request has been partially or wholly rejected

Example 1: Message-level error with a request wholly rejected

Response

<table>
<tr>
<td>{
"code":"400000",
"message":"Invalid Parameter(s)",
"data":[],
"totalSize":1,
"timestamp": "2022-03-24 04:22:18",
"exception":[{
"recordErrorCode":"405904",
"recordErrorMsg":"Invalid array size for data (must be 1 to 1000)"
}]
}</td>
<td><- Indicates there is an error in the request
<- Shows the specific error identified
<- Indicates there is a message-level error

<- Shows the message-level error identified</td>
</tr>
</table>

Example 2: Entry-level error with a request partially rejected

Response

<table>
<tr>
<td>{
"code":"400000",
"message":"Invalid Parameter(s)",
"data":[{
"requestID":"565485",
"recordID":null,
"exception":[{
"recordErrorCode":"405904",
"recordErrorMsg":"Invalid array size for idList (must be 1 to 4)"
}]
},
{
"requestID":"565486",
"recordID":"6498821129182047A",
"exception":[]
}
],
"totalSize":2,
"timestamp": "2022-03-24 04:23:41",
"exception":[]
}</td>
<td><- Indicates there is an error in the request
<- Shows the specific error identified

<- Shows the error identified in the first entry

<- Indicates the second entry has been accepted

<- Indicates there is no message-level error</td>
</tr>
</table>

Example 3: Entry-level error with a request wholly rejected

Response

{	
"code":"400000",	**<- Indicates there is an error in the request**
"message":"Invalid Parameter(s)",	**<- Shows the specific error identified**
"data":[{	
"requestID":"565487",	
"recordID":null,	
"exception":[{	**<- Shows the error identified in the first entry**
"recordErrorCode":"405904",	
"recordErrorMsg":"Invalid array size for idList (must be 1 to 4)"	
}]	
},	
{	
"requestID":"565488",	
"recordID":null,	
"exception":[{	**<- Shows the error identified in the second entry**
"recordErrorCode":"405904",	
"recordErrorMsg":"Invalid array size for idList (must be 1 to 4)"	
}]	
}	
],	
"totalSize":2,	
"timestamp": "2022-03-24 04:26:13",	
"exception":[]	**<- Indicates there is no message-level error**
}	

5 API Endpoints

5.1 Overview

The FINI API Gateway operates based on 3 main categories:

Category	Required function in ForgeRock	Description
/api/ipos/*	EU_finiIPORefDataAPI	API endpoints for **all FINI users** that return data on the specific IPO-related reference data, such as the stock code, offer size and price information
/api/eipo/subscriptions/*	EU_finiPOSubAPI	API endpoints for **HKSCC Participants users** to operate public offer subscriptions in the EIPO Channel, which includes add, change, invalidate and enquire subscriptions
/api/eipo/funding/*	EU_finiPOFundAPI	API endpoints for **EIPO Designated Bank users** to operate EIPO funding-related functions, such as confirm and enquire funding statuses.

The 3 main categories cover to 8 API endpoints within the FINI API Gateway:

API endpoint	Function	Method	Description
/api/ipos/list/v1	**Enquire IPO List**	GET	Returns a list of IPO(s) available on FINI.
/api/ipos/refdata/v1	**Enquire IPO Reference Data**	GET	Returns the latest full set of reference data of a requested IPO.
/api/eipo/subscriptions/add/v1	**Add EIPO Subscription Entries**	POST	Allows users to add EIPO entries to IPOs that are open for subscription.
/api/eipo/subscriptions/change/v1	**Change EIPO Subscription Entries**	POST	Allows users to amend existing EIPO entries recorded on FINI.
/api/eipo/subscriptions/invalidate/v1	**Invalidate EIPO Subscription Entries**	POST	Allows users to cancel existing EIPO entries recorded on FINI. No deletion is performed.
/api/eipo/subscriptions/query/v1	**Enquire EIPO Subscription Entries**	POST	Returns a list of EIPO subscription(s) based on an IPO or by specific Record IDs.
/api/eipo/funding/confirm/v1	**Confirm EIPO Funding**	POST	Allows users to confirm or reject the pre-funding related to an HKSCC Participant's EIPO subscription list.
/api/eipo/funding/query/v1	**Enquire EIPO Funding**	POST	Returns a list of HKSCC Participants' pre-funding requirements based on an IPO or by specific Transaction References.

5.2 Throttles

- The FINI API Gateway imposes request throttling with a threshold that refreshes every 60 seconds. Each company registered on the HKEX Access Management Portal is subject to a threshold of **480 requests per 60 seconds**.
- A global throttle is also applied for each API endpoint, based on the expected peak traffic. It is strongly recommended that API machines do not exceed **60 requests per 60 seconds** to avoid triggering the API Gateway's throttles.

6 IPO Reference Data

6.1 Enquire IPO List

6.1.1 Request

GET **/api/ipos/list/v1**

#	Field	Type	Length	Required	Description
1	size	Integer	18	No	Expected page size of the API response. Must be between 1 and 1,000. If null or blank, default as 100.
2	nextCursor	String	20	Yes	Key reference (ipoID) from which the response message should start. "0" should be used to start from the first index.

```
GET /api/ipos/listv1?size=5&nextCursor=0
```

6.1.2 Response

#	Field	Type	Length	Description
1	code	String	6	0 to indicate 'successful response'.
2	message	String	100	Empty string, i.e. "" to indicate successful response.
3	data	Array		
3.1	ipoID	String	20	A unique, sequentially-generated value assigned to each IPO case stored on FINI. Used as the identifier for IPOs within the FINI API Gateway.
3.2	stkCode	String	10	The IPO's stock code.
3.3	isin	String	12	The IPO's ISIN.
3.4	status	String	2	The status of the IPO, expressed in status codes: Status / Description 25 Deal Initiated 30 Public Offer Closed 35 Application Validated 45 Allotment Confirmed 50 Money Settlement 55 Allocation Confirmed 60 Placing Approved 65 Allotment Results Approved 70 Trading Started 80 Suspended 90 Cancelled
4	totalSize	Integer	18	Total size of the API response.
5	timestamp	String	19	Timestamp of the API response, in YYYY-MM-DD HH:MM:SS format.
6	nextCursor	String	20	The key reference (ipoID) immediately after the final result of response. If there are no further records, "0" will be returned.
7	exception	Array		To indicate whether the entire request failed any validation checks: ▪ Empty array = no error(s) were identified across the entire request ▪ Non-empty array = the entire request was rejected due to a single or multiple error(s), with each error expressed as an individual object
7.1	recordErrorCode	String	6	
7.2	recordErrorMsg	String	100	

```
{
    "code": "0",
    "message": "",
    "data": [{
            "ipoID": "1234",
            "stkCode": "9988",
            "isin": "KYG017191142",
            "status": "25"
        },
        {
            "ipoID": "1235",
            "stkCode": "9633",
            "isin": "CNE100004272",
            "status": "30"
        },
        {
            "ipoID": "1236",
            "stkCode": "9618",
            "isin": "KYG8208B1014",
            "status": "45"
        },
        {
            "ipoID": "1237",
            "stkCode": "6618",
            "isin": "KYG5074A1004",
            "status": "60"
        },
        {
            "ipoID": "1238",
            "stkCode": "1024",
            "isin": "KYG532631028",
            "status": "70"
        }
    ],
    "totalSize": 5,
    "timeStamp": "2021-08-25 16:22:13",
    "nextCursor": "11",
    "exception": []
}
```

6.2 Enquire IPO Reference Data

6.2.1 Request

GET	/api/ipos/refdata/v1

#	Field	Type	Length	Required	Description
1	ipoID	String	20	Yes	Must be a valid ipoID from the Enquire IPO List API endpoint.

```
GET /api/ipos/refdata/v1?ipoID=1234
```

6.2.2 Response

#	Field	Type	Length	Description
1	code	String	6	0 to indicate 'successful response'.
2	message	String	100	Empty string, i.e. "" to indicate successful response.
3	data	Array		
3.1	ipoID	String	20	The unique identifier assigned to the IPO case.
3.2	stkCode	String	10	The IPO's stock code.
3.3	Status	String	2	The status of the IPO, expressed in status codes: Status / Description 25 Deal Initiated 30 Public Offer Closed 35 Application Validated 45 Allotment Confirmed 50 Money Settlement 55 Allocation Confirmed 60 Placing Approved 65 Allotment Results Approved 70 Trading Started 80 Suspended 90 Cancelled
3.4	companyEngFull	String	80	The IPO's company full English name.
3.5	companyEngShort	String	15	The IPO's company short English name.
3.6	companyChiFull	String	80	The IPO's company full Chinese name.
3.7	companyChiShort	String	8	The IPO's company short Chinese name.
3.8	placeOfCorp	String	2	The IPO company's place of incorporation, expressed by location codes: Code / Description 1 Bermuda 2 Cayman Islands 3 Hong Kong, China 4 People's Republic of China 5 Australia 6 British Virgin Islands 7 Canada – Alberta 8 Canada – British Columbia 9 Canada – Ontario 10 England 11 Israel 12 Italy 13 Japan 14 Jersey 15 Luxembourg 16 Singapore

<table>
<tr><td></td><td></td><td></td><td></td><td><table><tr><td>17</td><td>US - Delaware</td></tr><tr><td>99</td><td>Others</td></tr></table></td></tr>
<tr><td>3.9</td><td>isin</td><td>String</td><td>12</td><td>The IPO’s ISIN.</td></tr>
<tr><td>3.10</td><td>nomValue</td><td>Decimal</td><td>15,12</td><td>The nominal or par value of the IPO company’s securities.</td></tr>
<tr><td>3.11</td><td>nomCur</td><td>Integer</td><td>3</td><td>The currency denomination of the IPO company’s nominal or par value, expressed as codes.
<table><tr><th>Code</th><th>Description</th></tr><tr><td>1</td><td>HKD</td></tr><tr><td>2</td><td>CNY</td></tr><tr><td>3</td><td>USD</td></tr><tr><td>4</td><td>EUR</td></tr><tr><td>5</td><td>AED</td></tr><tr><td>6</td><td>AFN</td></tr><tr><td>7</td><td>ALL</td></tr><tr><td>8</td><td>AMD</td></tr><tr><td>9</td><td>ANG</td></tr><tr><td>10</td><td>AOA</td></tr><tr><td>11</td><td>ARS</td></tr><tr><td>12</td><td>AUD</td></tr><tr><td>13</td><td>AWG</td></tr><tr><td>14</td><td>AZN</td></tr><tr><td>15</td><td>BAM</td></tr><tr><td>16</td><td>BBD</td></tr><tr><td>17</td><td>BDT</td></tr><tr><td>18</td><td>BGN</td></tr><tr><td>19</td><td>BHD</td></tr><tr><td>20</td><td>BIF</td></tr><tr><td>21</td><td>BMD</td></tr><tr><td>22</td><td>BND</td></tr><tr><td>23</td><td>BOB</td></tr><tr><td>24</td><td>BOV</td></tr><tr><td>25</td><td>BRL</td></tr><tr><td>26</td><td>BSD</td></tr><tr><td>27</td><td>BTN</td></tr><tr><td>28</td><td>BWP</td></tr><tr><td>29</td><td>BYN</td></tr><tr><td>30</td><td>BZD</td></tr><tr><td>31</td><td>CAD</td></tr><tr><td>32</td><td>CDF</td></tr><tr><td>33</td><td>CHE</td></tr><tr><td>34</td><td>CHF</td></tr><tr><td>35</td><td>CHW</td></tr><tr><td>36</td><td>CLF</td></tr><tr><td>37</td><td>CLP</td></tr><tr><td>38</td><td>COP</td></tr></table></td></tr>
</table>

				39	COU
				40	CRC
				41	CUC
				42	CUP
				43	CVE
				44	CZK
				45	DJF
				46	DKK
				47	DOP
				48	DZD
				49	EGP
				50	ERN
				51	ETB
				52	FJD
				53	FKP
				54	GBP
				55	GEL
				56	GHS
				57	GIP
				58	GMD
				59	GNF
				60	GTQ
				61	GYD
				62	HNL
				63	HRK
				64	HTG
				65	HUF
				66	IDR
				67	ILS
				68	INR
				69	IQD
				70	IRR
				71	ISK
				72	JMD
				73	JOD
				74	JPY
				75	KES
				76	KGS
				77	KHR
				78	KMF
				79	KPW
				80	KRW
				81	KWD
				82	KYD
				83	KZT

84	LAK
85	LBP
86	LKR
87	LRD
88	LSL
89	LYD
90	MAD
91	MDL
92	MGA
93	MKD
94	MMK
95	MNT
96	MOP
97	MRU
98	MUR
99	MVR
100	MWK
101	MXN
102	MXV
103	MYR
104	MZN
105	NAD
106	NGN
107	NIO
108	NOK
109	NPR
110	NZD
111	OMR
112	PAB
113	PEN
114	PGK
115	PHP
116	PKR
117	PLN
118	PYG
119	QAR
120	RON
121	RSD
122	RUB
123	RWF
124	SAR
125	SBD
126	SCR
127	SDG
128	SEK

129	SGD
130	SHP
131	SLL
132	SOS
133	SRD
134	SSP
135	STN
136	SYP
137	SZL
138	THB
139	TJS
140	TMT
141	TND
142	TOP
143	TRY
144	TTD
145	TWD
146	TZS
147	UAH
148	UGX
149	USN
150	UYI
151	UYU
152	UZS
153	VES
154	VND
155	VUV
156	WST
157	XAF
158	XAG
159	XAU
160	XBA
161	XBB
162	XBC
163	XBD
164	XCD
165	XDR
166	XFU
167	XOF
168	XPD
169	XPF
170	XPT
171	XSU
172	XTS
173	XUA

<table>
<tr><td></td><td></td><td></td><td></td><td>
<table>
<tr><td>174</td><td>XXX</td></tr>
<tr><td>175</td><td>YER</td></tr>
<tr><td>176</td><td>ZAR</td></tr>
<tr><td>177</td><td>ZMW</td></tr>
<tr><td>999</td><td>Others</td></tr>
</table>
</td></tr>
<tr><td>3.12</td><td>hkAddress</td><td>Array</td><td>4</td><td>The IPO company’s principal address in Hong Kong, expressed in a nested format, e.g.:

“hkAddress”:[
{“id”:”1”,”line”:”26/F Tower One, Times Square” },
{“id”:”2”,”line”:”1 Matheson Street” },
{“id”:”3”,”line”:”Causeway Bay” },
{“id”:”4”,”line”:”Hong Kong” }]</td></tr>
<tr><td>3.13</td><td>warrants</td><td>Array</td><td>10</td><td>The list series of warrants to belisted by the IPO company, expressed in a nested format.</td></tr>
<tr><td>3.13.1</td><td>warrantNameEngShort</td><td>String</td><td>15</td><td>The warrant’s full English name.</td></tr>
<tr><td>3.13.2</td><td>warrantNameEngFull</td><td>String</td><td>100</td><td>The warrant’s short English name.</td></tr>
<tr><td>3.13.3</td><td>warrantCode</td><td>String</td><td>10</td><td>The warrant’s security code.</td></tr>
<tr><td>3.13.4</td><td>isin</td><td>String</td><td>12</td><td>The warrant’s ISIN.</td></tr>
<tr><td>3.13.5</td><td>boardLot</td><td>Integer</td><td>6</td><td>The minimum trading unit of the warrant.</td></tr>
<tr><td>3.13.6</td><td>subscriptionPrice</td><td>Decimal</td><td>12,3</td><td>The subscription price of the warrant.</td></tr>
<tr><td>3.13.7</td><td>faceValue</td><td>Integer</td><td>2</td><td>To indicate the denomination method of the warrant’s face value, expressed in codes:

<table>
<tr><th>Code</th><th>Description</th></tr>
<tr><td>1</td><td>Dollar Amount</td></tr>
<tr><td>2</td><td>Unit Number</td></tr>
</table>
</td></tr>
<tr><td>3.13.8</td><td>totalWarrants</td><td>Integer</td><td>20</td><td>The number of warrants to be issued.</td></tr>
<tr><td>3.14</td><td>offerType</td><td>Integer</td><td>2</td><td>The listing method of the IPO, expressed as codes:

<table>
<tr><th>Code</th><th>Description</th></tr>
<tr><td>1</td><td>Global offer (placing and public offer)</td></tr>
<tr><td>2</td><td>By placing only</td></tr>
<tr><td>3</td><td>By public offer only</td></tr>
<tr><td>4</td><td>By introduction</td></tr>
<tr><td>5</td><td>Transfer from GEM</td></tr>
</table>
</td></tr>
<tr><td>3.15</td><td>listSecurities</td><td>Integer</td><td>2</td><td>The security type of the IPO, expressed as codes:

<table>
<tr><th>Code</th><th>Description</th></tr>
<tr><td>1</td><td>Ordinary shares</td></tr>
<tr><td>2</td><td>Ordinary shares (H shares)</td></tr>
<tr><td>3</td><td>Ordinary shares (conversion from B to H shares)</td></tr>
<tr><td>4</td><td>Preference shares</td></tr>
<tr><td>5</td><td>Real Estate Investment Trust</td></tr>
<tr><td>6</td><td>Exchange Traded Product</td></tr>
<tr><td>7</td><td>Depositary Receipts</td></tr>
<tr><td>8</td><td>Share Stapled Units</td></tr>
<tr><td>99</td><td>Other</td></tr>
</table>
</td></tr>
<tr><td>3.16</td><td>listPlatform</td><td>Integer</td><td>2</td><td>The listing board of the IPO, expressed as codes:

<table>
<tr><th>Code</th><th>Description</th></tr>
<tr><td>1</td><td>Main board</td></tr>
<tr><td>2</td><td>GEM</td></tr>
</table>
</td></tr>
<tr><td>3.17</td><td>primaryExchange</td><td>Array of String</td><td>17*2</td><td>An array listing the primary exchange(s) of the IPO company, expressed as exchange codes:

<table>
<tr><th>Code</th><th>Description</th></tr>
</table>
</td></tr>
</table>

				0 The Stock Exchange of Hong Kong (SEHK) 1 The Amsterdam Stock Exchange (NYSE Euronext - Amsterdam) 2 The Australian Securities Exchange (ASX) 3 The Brazilian Securities, Commodities and Futures Exchange (BM&FBOVESPA) 4 The Frankfurt Stock Exchange (Deutsche Böurse) 5 The Italian Stock Exchange (Borsa Italiana) 6 The London Stock Exchange (LSE) 7 The Madrid Stock Exchange (Bolsa de Madrid) 8 NASDAQ OMX (US) 9 The New York Stock Exchange (NYSE Euronext (US)) 10 The Paris Stock Exchange (NYSE Euronext – Paris) 11 The Singapore Exchange (SGX) 12 The Stockholm Stock Exchange (NASDAQ OMX – Stockholm) 13 The Swiss Exchange (SIX Swiss Exchange) 14 The Tokyo Stock Exchange (TSE) 15 The Toronto Stock Exchange (TMX) 99 Other
3.18	dualPrimaryExchange	String	80	If the IPO company is operating a dual-primary listing, a list of the primary exchanges expressed as a string separated by commas.
3.19	biotechIndicator	String	1	If the IPO company is listing as a biotech company, then "1". Else, the response will return "0".
3.20	regsIndicator	String	1	This field is obsolete, and it is always populated as “0”
3.21	specialistTechIndicator	String	1	If the IPO company is listing as a "Specialist Technology Company", then "1". Else, the response will return "0".
3.22	wvrRatio	String	5	If the IPO company has weighted voting rights securities, then the voting ratio expressed in "[n],[n]", where each [n] is an integer with up to 2 digits. If the IPO company does not have any weighted voting rights securities, the response will return null.
3.23	tradeCurrency	String	3	The IPO’s trading currency, expressed as currency codes: **Currency** / **Description** HKD Hong Kong Dollar CNY Chinese Yuan USD United States Dollar
3.24	boardLot	Integer	6	The minimum trading unit of the IPO company.
3.25	downwardPriceFlex	Decimal	3,0	The percentage at which the IPO company may price its IPO below the minimum offer price. Example: "10" = 10%.
3.26	priceMin	Decimal	12,3	The minimum offer price of the IPO.
3.27	priceMax	Decimal	12,3	The maximum offer price of the IPO.
3.28	priceFinal	Decimal	12,3	The final offer price of the IPO.
3.29	clawback	Array	100	The thresholds for triggering a clawback and their corresponding retail allocations expressed in percentages. Here, ratio = each threshold and allocation = percentage allocation to the public offer (Example: "10" = 10%). Expressed in a nested format, e.g.: "clawback":[{"id":"1","ratio":"1","allocation":"10"}, {"id":"2","ratio":"15","allocation":"30"}, {"id":"3","ratio":"50","allocation":"40"}, {"id":"4","ratio":"100","allocation":"100"}]
3.30	preIpoShares	String	20	The number of securities issued by the IPO company before the commencement of the IPO.
3.31	ipoShares	String	20	The expected number of securities to be issued by the IPO company following the completion of the IPO.
3.32	poSharesInitial	String	20	The number of securities initially allocated to the public offer.
3.33	poApplicationQuantity	String	20	Number of securities validly subscribed by the public offer.
3.34	poOversubscriptionRatio	Decimal	9,2	poApplicationQuantity divided by poSharesInitial.

3.35	poSharesFinal	String	20	The final number of securities allocated to the public offer.
3.36	ioSharesInitial	String	20	The number of securities initially allocated to the institutional offer.
3.37	ioApplicationQuantity	String	20	Number of securities validly subscribed by the institutional offer.
3.38	ioOversubscriptionRatio	Decimal	9,2	ioApplicationQuantity divided by ioSharesInitial.
3.39	ioOfferSharesFinal	String	20	The final number of securities allocated to the institutional offer.
3.40	poReallocationCap	Decimal	5,2	The percentage cap at which the IPO company may allocate its securities to the public offer at its own discretion.
3.41	upsizeOption	Decimal	5,2	The IPO's offer size adjustment option, expressed in percentage terms (Example: "10" = 10%).
3.42	upsizePoShares	String	20	The additional number of securities issued to the public offer using the IPO's offer size adjustment option.
3.43	upsizeIoShares	String	20	The additional number of securities issued to the institutional offer using the IPO's offer size adjustment option.
3.44	overallotOption	Decimal	5,2	The IPO's over-allotment option, expressed in percentage terms (Example: "10" = 10%).
3.44a	poOverallotIndicator	String	1	IPO Initiation Field #38 (PO Over-allotment Indicator) is ticked = "1", not ticked = "0". If PO Over-allotment Indicator is not applicable, the response will return null.
3.45	overallotPoShares	String	20	The additional number of securities issued to the public offer using the IPO's over-allotment option.
3.46	overallotIoShares	String	20	The additional number of securities issued to the institutional offer using the IPO's over-allotment option.
3.47	overallPoShares	String	20	The final size of the public offer, calculated as poSharesFinal + upsizePoShares + overallotPoShares.
3.48	overallIoShares	String	20	The final size of the institutional offer, calculated as ioSharesFinal + upsizeIoShares + overallotIoShares.
3.49	overallIpoShares	String	20	The final size of the IPO, calculated as overallPoShares + overallIoShares.
3.50	totalIssuedCapitalListing	String	20	The IPO company's total issued number of securities upon listing.
3.51	totalIssuedHsharesListing	String	20	The IPO company's total issued number of H-shares upon listing.
3.52	totalIssuedNonwvrsharesListing	String	20	The IPO company's total issued number of non-weighted voting rights securities upon listing.
3.53	denomTable	Array	200	An array of denominations at which a public offer subscriber may subscribe for the IPO. Here, shares = number of securities for subscription and value = the maximum value payable upon application. Expressed in a nested format, e.g.: "denomTable":[{"id":"1","shares":"100","value":"101.01"}, {"id":"2","shares":"200","value":"202.02"}, {"id":"3","shares":"300","value":"303.03"}, {"id":"4","shares":"400","value":"404.03"}, {"id":"5","shares":"500","value":"505.04"}, {"id":"6","shares":"600","value":"606.05"}, {"id":"7","shares":"700","value":"707.06"}, {"id":"8","shares":"800","value":"808.06"}, {"id":"9","shares":"900","value":"909.07"}, {"id":"10","shares":"1000","value":"1010.08"}, {"id":"11","shares":"2000","value":"2020.15"}]
3.54	designatedSponsor	String	80	The designated sponsor of the IPO.
3.55	sponsors	Array	100	The other joint sponsors of the IPO. Here, member = the company name of a joint sponsor. Presented in a nested JSON format, e.g. "sponsors":[{"id":"1","member":"Goldman Sachs (Asia)"}, {"id":"2","member":"Morgan Stanley (Asia)"}, {"id":"3","member":"JP Morgan (Asia)"}, {"id":"4","member":"BOCI Securities"}]
3.56	legalSponsor	Array	100	The list of legal counsels retained by the sponsors of the IPO. Here, member = the firm name of a sponsor counsel. Presented in a nested JSON format, e.g. "legalSponsor":[{"id":"1","member":"Freshfields Bruckhaus Deringer"},

				{"id":"2","member":"Clifford Chance"}, {"id":"3","member":"Deacons"}]
3.57	legalIssuer	String	80	The issuer's legal counsel.
3.58	underwriters	Array	100	The list of underwriters within the IPO. Here, member = the company name of an underwriter. Presented in a nested JSON format, e.g. "underwriters":[{"id":"1","member":"Goldman Sachs (Asia)"}, {"id":"2","member":"Morgan Stanley (Asia)"}, {"id":"3","member":"JP Morgan (Asia)"}, {"id":"4","member":"BOCI Securities"}]
3.59	advisers	Array	100	The list of advisers within the IPO. Here, member = the company name of an adviser. Presented in a nested JSON format, e.g. "advisers":[{"id":"1","member":"Goldman Sachs (Asia)"}, {"id":"2","member":"Morgan Stanley (Asia)"}, {"id":"3","member":"JP Morgan (Asia)"}, {"id":"4","member":"BOCI Securities"}]
3.60	overallCoordinators	Array	100	The list of Overall Coordinators within the IPO. Here, the company of an overall coordinator. Presented in a nested JSON format, e.g. "overallCoordinators":[{"id":"1","member":"Goldman Sachs (Asia)"}, {"id":"2","member":"Morgan Stanley (Asia)"}, {"id":"3","member":"JP Morgan (Asia)"}, {"id":"4","member":"BOCI Securities"}]
3.61	distributors	Array	100	The list of distributors within the IPO. Here, member = the company name of a distributor. Presented in a nested JSON format, e.g. "distributors":[{"id":"1","member":"Goldman Sachs (Asia)"}, {"id":"2","member":"Morgan Stanley (Asia)"}, {"id":"3","member":"JP Morgan (Asia)"}, {"id":"4","member":"BOCI Securities"}]
3.62	hkSharereg	String	80	The HK share registrar of the IPO.
3.63	bookOpenDate	String	19	The time and date for opening the IPO's public offer for subscriptions, in YYYY-MM-DD HH:MM:SS format.
3.64	bookCloseDate	String	19	The time and date for closing the IPO's public offer from subscriptions, in YYYY-MM-DD HH:MM:SS format.
3.65	pricingDate	String	10	The latest time and date for determining the final price of the IPO, in YYYY-MM-DD format.
3.66	allotmentDate	String	10	The expected date for broadcasting the public offer allotment results of the IPO, in YYYY-MM-DD format.
3.67	listingDate	String	19	The expected time and date at which the IPO commences trading, in YYYY-MM-DD HH:MM:SS format.
3.68	siInputDate	String	10	The expected date for HKSCC to permit the inputting of settlement instructions into CCASS in relation to the IPO, in YYYY-MM-DD format.
3.69	placingSharesDeliveryDate	String	19	The latest time and date for delivering the institutional offer shares to CCASS.
3.70	prefOfferIndicator	String	1	If the IPO company has preferential offers, then "1". Else, the response will return "0".
3.71	brokerage	Decimal	8,5	The percentage of the allotment value payable to the allottee's broker, example: "10" = 10%.
3.72	sfcLevy	Decimal	8,5	The percentage of the allotment value payable to the SFC, example: "10" = 10%.
3.73	sehkTradingFee	Decimal	8,5	The percentage of the allotment value payable to SEHK, example: "10" = 10%.
3.74	afrcTransactionLevy	Decimal	8,5	The percentage of the allotment value payable to Financial Reporting Council, example: "10" = 10%.
4	totalSize	Integer	18	Total size of the API response.

5	timestamp	String	19	Timestamp of the API response, in YYYY-MM-DD HH:MM:SS format.
6	exception	Array		To indicate whether the entire request failed any validation checks: ▪ Empty array = no error(s) were identified across the entire request ▪ Non-empty array = the entire request was rejected due to a single or multiple error(s), with each error expressed as an individual object
6.1	recordErrorCode	String	6	
6.2	recordErrorMsg	String	100	


```
{
    "code": "0",
    "message": "",
    "data": [{
        "stkCode": "9988",
        "status": "40",
        "companyEngFull": "Alibaba Group Holding Limited",
        "companyEngShort": "BABA",
        "companyChiFull": "阿里巴巴集團控股有限公司",
        "companyChiShort": "阿里巴巴",
        "placeOfCorp": "1",
        "isin": "KYG017191142",
        "nomValue": "0.000000000025",
        "nomCur": "2",
        "hkAddress": [{
            "id": "1",
            "line": "26/F Tower One, Times Square"
        },
        {
            "id": "2",
            "line": "1 Matheson Street"
        },
        {
            "id": "3",
            "line": "Causeway Bay"
        },
        {
            "id": "4",
            "line": "Hong Kong"
        }
        ],
        "warrants": [{
            "warrantNameEngShort": "BABA-WRT 1",
            "warrantNameEngFull": "Alibaba Warrant 1",
            "warrantCode": "4988",
            "isin": "",
            "boardLot": 100000,
            "subscriptionPrice": 2.000,
            "faceValue": "Dollar Amount",
            "totalWarrants": 10000000
        },
        {
            "warrantNameEngShort": "BABA-WRT 2",
            "warrantNameEngFull": "Alibaba Warrant 2",
            "warrantCode": "4999",
            "isin": "",
            "boardLot": 100000,
            "subscriptionPrice": 4.000,
            "faceValue": "Dollar Amount",
            "totalWarrants": 40000000
        }
        ],
        "offerType": 1,
```

```
"listSecurities": 1,
"listPlatform": 1,
"primaryExchange": ["10"],
"dualPrimaryExchange": null,
"biotechIndicator": "0",
"regsIndicator": "0",
"specialistTechIndicator": "0",
"wvrRatio": "1,10",
"tradeCurrency": "HKD",
"boardLot": 100,
"downwardPriceFlex": 10,
"priceMin": 0.000,
"priceMax": 188.000,
"priceFinal": null,
"clawback": [{
                "id": "1",
                "threshold": 1,
                "allocation": 2.5
        },
        {
                "id": "2",
                "threshold": 15,
                "allocation": 5
        },
        {
                "id": "3",
                "threshold": 50,
                "allocation": 7.5
        },
        {
                "id": "4",
                "threshold": 100,
                "allocation": 10
        }
],
"preIpoShares": "80000000",
"ipoShares": "500000000",
"poSharesInitial": "12500000",
"poApplicationQuantity": "530465900",
"poOversubscriptionRatio": 42.44,
"poSharesFinal": "50000000",
"ioSharesInitial": "487500000",
"ioApplicationQuantity": "487500000",
"ioOversubscriptionRatio": 1.00,
"ioOfferSharesFinal": "450000000",
"poReallocationCap": 20,
"upsizeOption": 20,
"upsizePoShares": null,
"upsizeIoShares": null,
"overallotOption": 15,
"poOverallotIndicator": “0”,
"overallotPoShares": null,
"overallotIoShares": null,
"overallPoShares": null,
"overallIoShares": null,
"overallIpoShares ": null,
"totalIssuedCapitalListing": null,
"totalIssuedHsharesListing": null,
"totalIssuedNonwvrsharesListing": null,
"denomTable": [{
                "id": "1",
                "shares": 100,
                "value": 188997.91
```

```
},
{
                "id": "2",
                "shares": 200,
                "value": 37995.82
},
{
                "id": "3",
                "shares": 300,
                "value": 56993.72
},
{
                "id": "4",
                "shares": 400,
                "value": 75991.63
},
{
                "id": "5",
                "shares": 500,
                "value": 94989.54
},
{
                "id": "6",
                "shares": 600,
                "value": 113987.45
},
{
                "id": "7",
                "shares": 700,
                "value": 132985.35
},
{
                "id": "8",
                "shares": 800,
                "value": 151983.26
},
{
                "id": "9",
                "shares": 900,
                "value": 170981.17
},
{
                "id": "10",
                "shares": 1000,
                "value": 189979.08
},
{
                "id": "11",
                "shares": 2000,
                "value": 379958.15
},
{
                "id": "12",
                "shares": 3000,
                "value": 569937.23
},
{
                "id": "13",
                "shares": 4000,
                "value": 759937.30
},
{
                "id": "14",
```

```
                "shares": 5000,
                "value": 949895.38
            },
            {
                "id": "15",
                "shares": 6000,
                "value": 1139874.46
            },
            {
                "id": "16",
                "shares": 7000,
                "value": 1329853.53
            },
            {
                "id": "17",
                "shares": 8000,
                "value": 1519832.61
            },
            {
                "id": "18",
                "shares": 9000,
                "value": 1709811.68
            },
            {
                "id": "19",
                "shares": 10000,
                "value": 1899790.76
            }
        ],
        "designatedSponsor": "Credit Suisse (Hong Kong) Limited",
        "sponsors": [{
            "id": "1",
            "member": "China International Capital Corporation"
        }],
        "legalSponsor": [{
                "id": "1",
                "member": "Clifford Chance"
            },
            {
                "id": "2",
                "member": "Deacons"
            }
        ],
        "legalIssuer": "Freshfields Bruckhaus Deringer",
        "underwriters": [],
        "advisers": [],
        "overallCoordinators": [{
                "id": "1",
                "member": "Credit Suisse (Hong Kong) Limited"
            },
            {
                "id": "2",
                "member": "China International Capital Corporation"
            }
        ],
        "distributors": [{
                "id": "1",
                "member": "Citigroup Global Markets Asia"
            },
            {
                "id": "2",
                "member": "JP Morgan"
            },
```

```
                                                {
                                                    "id": "3",
                                                    "member": "The Hongkong and Shanghai Banking"
                                                }
                                        ],
                                        "hkSharereg": "Computershare Investor Services HK",
                                        "bookOpenDate": "2021-04-26 09:00:00",
                                        "bookCloseDate": "2021-04-29 12:00:00",
                                        "pricingDate": "2021-04-30",
                                        "allotmentDate": "2021-04-30",
                                        "listingDate": "2021-05-04 09:00:00",
                                        "siInputDate": "2021-05-03",
                                        "placingSharesDeliveryDate": "2021-05-04 09:00:00",
                                        "prefOfferIndicator": "0",
                                        "brokerage": 1.00000,
                                        "sfcLevy": 0.00270,
                                        "sehkTradingFee": 0.00500,
                                        "afrcTransactionLevy": 0.00015
                    }],
                    "totalSize": 1,
                    "timestamp": "2021-04-29 15:00:00",
                    "exception":[]
}
```

7 EIPO Subscription

All EIPO Subscription-related requests and responses must be signed, with PII values encrypted / decrypted based on the procedures set out in 3 End-to-End Encryption. All data field descriptions below are based upon the decrypted values to illustrate the business-level validations required.

7.1 Add EIPO Subscription Entries

7.1.1 Request

POST **/api/eipo/subscriptions/add/v1**

#	Field	Type	Length	Required	Description
1	data	Array		Yes	Min 1 object, max 1,000 objects. Each object should contain 1 subscriptions (i.e. each request may process up to 1,000 subscriptions).
1.1	requestID	Integer	7	Yes	A unique reference within the bulk request for pairing with a response message. Must contain numeric characters only.
1.2	ipoID	String	20	Yes	Must be a valid ipoID from the Enquire IPO List API endpoint.
1.3	idList	Array		Yes	Min 1 object, max 4 objects. Each object contains the information of 1 applicant, e.g. 2 joint account holders should include 2 objects.
1.3.1	idType	String	2	Yes	The ID Type of the applicant, expressed in ID Codes: ID Type / Description 1 HKID 2 National identification document 3 Passport 4 LEI registration document 5 Certificate of incorporation 6 Business registration certificate 7 Other official incorporation document 8 Broker-to-Client Assigned Number If idList [Field 1.5] contains > 1 object, then must be 1, 2 or 3.
1.3.2	idCountryJurisdiction	String	3	Yes	The issuing authority of the applicant's identification document. Based on ISO-3166 Alpha-3 codes, or 'OTH' to represent "Other". Restrictions: If idType [Field #1.3.1] = **1**, must be "HKG". If idType [Field #1.3.1] = **8**, must be "OTH".
1.3.3	idNum	String	40	Yes	The ID number of the applicant's identification document. Restrictions: If idType [Field #1.3.1] = **1**, then must be a concatenation (no spaces) of: (i) **Prefix:** 1-2 upper case alphabetical characters (ii) **ID number:** 6 integers (iii) **Check digit:** 0 to 9, or "A", enclosed by parentheses Successful Examples: Y123456(7), YZ123456(7), Y123456(A) Unsuccessful Examples: Y123456, Y123456? If idType [Field #1.3.1] = **2** and idCountryJurisdiction = 'CHN', idNum must be either 15 or 18 characers. If idType [Field #1.3.1] = **4**, idNum must be exactly 20 uppercase alphanumeric characters. If idType [Field #1.3.1] = **8**, idNum must be in "xxxxxx.##########" format, where: ▪ "x" = a text string of exactly 6 uppercase alphanumeric characters

					▪ “.” = a delimiter to separate “x” and “#” ▪ “#” = a positive integer up to 10 characters **Successful Examples**: “ABC123.1123456789”, “ABC123.112345678”, “ABC123.112345” **Unsuccessful Examples**: “ABC123.0000000001”, “ABC123.0000000000”, If idType [Field #1.3.1] = **3**, **5**, **6** or **7**, any text input is permitted.
1.3.4	fullNameEng	String	150	No	The full English name of the applicant. Only English alphanumeric characters are permitted. Mandatory if fullNameChi [Field #1.5.5] = null or blank. If IdType [Field #1.3.1] = **8**, fullNameEng must be blank or null.
1.3.5	fullNameChi	String	150	No	The full Chinese or non-English name of the applicant. Fully UTF-8 encoded. Mandatory if fullNameEng [Field #1.5.4] = null or blank. If IdType [Field #1.3.1] = **8**, fullNameChi must be blank or null.
1.4	appQuantity	String	20	Yes	The number of securities being subscribed by the applicant. Must be a ‘shares’ parameter from denomTable in the Enquire IPO Reference Data API.
1.5	firmID	String	5	Yes	The SEHK Participant ID for identifying the recipient of any brokerage fees. Must be a valid SEHK Participant ID (with no leading zeroes), or ‘00000’ for HKSCC.
1.6	ownRef	String	40	No	Free text field for own reference.


```
{
    "data": [{
        "requestID": 1,
        "ipoID": "1234",
        "idList": [{
            "idType": "1",
            "idCountryJurisdiction": "HKG",
            "idNum": "A123456(9)",
            "fullNameEng": "Chan Tai Man",
            "fullNameChi": "陳大文"
        },
        {
            "idType": "1",
            "idCountryJurisdiction": "HKG ",
            "idNum": "B234567(1)",
            "fullNameEng": "Chan Siu Man",
            "fullNameChi": "陳小文"
        }
        ],
        "appQuantity": "1000",
        "firmID": "00000",
        "ownRef": null
    },
    {
        "requestID": 2,
        "ipoID": "1234",
```

```
                                        "idList": [{
                                                "idType": "4",
                                                "idCountryJurisdiction": "OTH",
                                                "idNum": "A1B200D4E5F6G7H8I9J0",
                                                "fullNameEng": "Alpha Company Ltd",
                                                "fullNameChi": "甲有限公司"
                                        }],
                                        "appQuantity": "5000",
                                        "firmID": "00000"
                        },
                        {
                                        "requestID": 3,
                                        "ipoID": "1234",
                                        "idList": [{
                                                "idType": "1",
                                                "idCountryJurisdiction": "HKG",
                                                "idNum": "C345678(A)",
                                                "fullNameEng": "",
                                                "fullNameChi": "Rémy Victor"
                                        }],
                                        "appQuantity": "500000",
                                        "firmID": "00000",
                                        "ownRef": "Favourite client"
                        }
        ]
}
```


7.1.2 Response

#	Field	Type	Length	Description
1	code	String	6	0 to indicate 'successful response'.
2	message	String	100	Empty string, i.e. "" to indicate successful response.
3	data	Array		
3.1	requestID	Integer	7	The requestID from the original API request.
3.2	recordID	String	17	A Record ID generated for each subscription that has passed all validation checks. It contains: (i) a sequentially-generated 16-digit integer; and (ii) a suffix indicating the method through which the subscription was is created (**"O"** = Online input, **"B"** = Bulk upload, and **"A"** = API.). A response without a recordID indicates that the subscription failed ≥1 validation check(s).
3.3	exception	Array		To indicate whether an individual request has failed any validation checks: ▪ Empty array = the individual request has passed all validation checks ▪ Non-empty array = the individual request has a single or multiple errors, with each error expressed as an individual object
3.3.1	recordErrorCode	String	6	
3.3.2	recordErrorMsg	String	100	
4	totalSize	Integer	18	Total size of the API response.
5	timestamp	String	19	Timestamp of the API response, in YYYY-MM-DD HH:MM:SS format.
6	exception	Array		To indicate whether the entire request failed any structural or permission-related validation checks: ▪ Empty array = no structural or permission-related error(s) were identified across the entire request ▪ Non-empty array = the entire request was rejected due to a single or multiple structural or permission-related error(s), with each error expressed as an individual object

6.1	recordErrorCode	String	6	
6.2	recordErrorMsg	String	100	


```
{
        "code": "0",
        "message": "",
        "data": [
                {
                        "requestID": 1,
                        "recordID": "1234567890123456A",
                        "exception": []
                },
                {
                        "requestID": 2,
                        "recordID": "1234567890123457A",
                        "exception": []
                },
                {
                        "requestID": 3,
                        "recordID": "123456789018858A",
                        "exception": []
                }
        ],
        "totalSize": 3,
        "timestamp": "2021-08-26 09:13:22",
        "exception": []
}
```

7.2 Change EIPO Subscription Entries

7.2.1 Request

POST **/api/eipo/subscriptions/change/v1**

#	Field	Type	Length	Required	Description
1	data	Array		Yes	Min 1 object, max 1,000 objects. Each object should contain 1 subscriptions (i.e. each request may process up to 1,000 subscriptions).
1.1	recordID	String	17	Yes	To indicate the subscription that is being amended. Must be a valid Record ID within own subscription list, under "Authorised" sub-flow status.
1.2	idList	Array		Yes	Min 1 object, max 4 objects. Each object should contain the subscription information of 1 applicant, e.g. a joint account subscription with 2 applicants should include 2 objects.
1.2.1	idType	String	2	Yes	The ID Type of the applicant, expressed in ID Codes: **ID Type** / **Description** 1 – HKID 2 – National identification document 3 – Passport 4 – LEI registration document 5 – Certificate of incorporation 6 – Business registration certificate 7 – Other official incorporation document 8 – Broker-to-Client Assigned Number If idList [Field 1.2] contains > 1 object, then must be 1, 2 or 3.
1.2.2	idCountryJurisdiction	String	3	Yes	The issuing authority of the applicant's identification document. Based on ISO-3166 Alpha-3 codes, or 'OTH' to represent "Other". Restrictions: If idType [Field #1.2.1] = **1**, must be "HKG". If idType [Field #1.2.1] = **8**, must be "OTH".
1.2.3	idNum	String	40	Yes	The ID number of the applicant's identification document. Restrictions: If idType [Field #1.2.1] = **1**, then must be a concatenation (no spaces) of: (iv) **Prefix:** 1-2 upper case alphabetical characters (v) **ID number:** 6 integers (vi) **Check digit:** 0 to 9, or "A", enclosed by parentheses **Successful Examples**: Y123456(7), YZ123456(7), Y123456(A) **Unsuccessful Examples**: Y123456, Y123456? If idType [Field #1.2.1] = **2** and idCountryJurisdiction = 'CHN', idNum must be either 15 or 18 characers. If idType [Field #1.2.1] = **4**, then must be exactly 20 uppercase alphanumeric characters. If idType [Field #1.2.1] = **8**, must be in "xxxxxx.##########" format, where: ▪ "x" = a text string of exactly 6 uppercase alphanumeric characters ▪ "." = a delimiter to separate "x" and "#" ▪ "#" = a positive integer up to 10 characters **Successful Examples**: "ABC123.1123456789", "ABC123.112345678", **Unsuccessful Examples**: "ABC123.0000000001", "ABC123.0000000000",

					“ABC123.112345” | If idType [Field #1.2.1] = **2**, **3**, **5**, **6** or **7**, any text input is permitted.
1.2.4	fullNameEng	String	150	No	The full English name of the applicant. Only English alphanumeric characters are permitted. Mandatory if fullNameChi [Field #1.2.5] = null or blank. If IdType [Field #1.2.1] = **8**, fullNameEng must be blank or null.
1.2.5	fullNameChi	String	150	No	The full Chinese or non-English name of the applicant. Fully UTF-8 encoded. Mandatory if fullNameEng [Field #1.2.4] = null or blank. If IdType [Field #1.2.1] = **8**, fullNameChi must be blank or null.
1.3	appQuantity	String	20	Yes	The number of securities being subscribed by the applicant. Must be a ‘shares’ parameter from denomTable in the Enquire IPO Reference Data API.
1.4	firmID	String	5	Yes	The SEHK Participant ID for identifying the recipient of any brokerage fees. Must be a valid SEHK Participant ID (with no leading zeroes), or ‘00000’ for HKSCC.
1.5	ownRef	String	40	No	Free text field for own reference.


```
{
    "data": [{
        "recordID": "1234567890123456A",
        "idList": [{
            "idType": "1",
            "idCountryJurisdiction": "HKG",
            "idNum": "A123456(9)",
            "fullNameEng": "Chan Tai Man",
            "fullNameChi": "陳大文"
        },
        {
            "idType": "1",
            "idCountryJurisdiction": "HKG ",
            "idNum": "B234567(1)",
            "fullNameEng": "Chan Siu Man",
            "fullNameChi": "陳小文"
        },
        {
            "idType": "1",
            "idCountryJurisdiction": "HKG ",
            "idNum": "B234567(1)",
            "fullNameEng": "Mary Lee Sum See",
            "fullNameChi": "李心思"
        }],
        "appQuantity": "1000",
        "firmID": "00000",
        "ownRef": null
    }
```

```
        ]
}
```

7.2.2 Response

#	Field	Type	Length	Description
1	code	String	6	0 to indicate 'successful response'.
2	message	String	100	Empty string, i.e. "" to indicate successful response.
3	data	Array		
3.1	recordID	String	17	The recordID from the original API request.
3.2	exception	Array		To indicate whether an individual request has failed any validation checks: ▪ Empty array = the individual request has passed all validation checks ▪ Non-empty array = the individual request has a single or multiple errors, with each error expressed as an individual object
3.2.1	recordErrorCode	String	6	
3.2.2	recordErrorMsg	String	100	
4	totalSize	Integer	18	Total size of the API response.
5	timestamp	String	19	Timestamp of the API response, in YYYY-MM-DD HH:MM:SS format.
6	exception	Array		To indicate whether the entire request failed any structural or permission-related validation checks: ▪ Empty array = no structural or permission-related error(s) were identified across the entire request ▪ Non-empty array = the entire request was rejected due to a single or multiple structural or permission-related error(s), with each error expressed as an individual object
6.1	recordErrorCode	String	6	
6.2	recordErrorMsg	String	100	

```
{
        "code": "0",
        "message": "",
        "data": [
                {
                        "recordID": "1234567890123456A",
                        "exception": []
                }
        ],
        "totalSize": 1,
        "timestamp": "2021-08-26 10:15:39",
        "exception": []
}
```

7.3 Invalidate EIPO Subscription Entries

7.3.1 Request

POST **/api/eipo/subscriptions/invalidate/v1**

#	Field	Type	Length	Required	Description
1	data	Array		Yes	Min 1 object, max 1,000 objects. Each object should contain 1 subscriptions (i.e. each request may process up to 1,000 subscriptions).
1.1	recordID	String	17	Yes	To indicate the subscription that is being amended. Must be a valid Record ID within own subscription list, under "Authorised" sub-flow status.


```
{
        "data": [
                {
                        "recordID": "1234567890123456A"
                }
        ]
}
```


7.3.2 Response

#	Field	Type	Length	Description
1	code	String	6	0 to indicate 'successful response'.
2	message	String	100	Empty string, i.e. "" to indicate successful response.
3	data	Array		
3.1	recordID	String	17	The recordID from the original API request.
3.2	exception	Array		To indicate whether an individual request has failed any validation checks: ▪ Empty array = the individual request has passed all validation checks ▪ Non-empty array = the individual request has a single or multiple errors, with each error expressed as an individual object
3.2.1	recordErrorCode	String	6	
3.2.2	recordErrorMsg	String	100	
4	totalSize	Integer	18	Total size of the API response.
5	timestamp	String	19	Timestamp of the API response, in YYYY-MM-DD HH:MM:SS format.
6	exception	Array		To indicate whether the entire request failed any structural or permission-related validation checks: ▪ Empty array = no structural or permission-related error(s) were identified across the entire request ▪ Non-empty array = the entire request was rejected due to a single or multiple structural or permission-related error(s), with each error expressed as an individual object
6.1	recordErrorCode	String	6	
6.2	recordErrorMsg	String	100	


```
{
        "code": "0",
        "message": "",
        "data": [
                {
                        "recordID": "1234567890123456A",
                        "exception": []
                }
        ],
        "totalSize": 1,
```

```
                    "timestamp": "2021-08-26 11:28:09"
                    "exception": []
}
```

7.4 Enquire EIPO Subscription Entries

7.4.1 Request

POST **/api/eipo/subscriptions/query/v1**

#	Field	Type	Length	Required	Description
1	data	Object		Yes	
1.1	ipoID	String	20	No	Must be a valid ipoID from the Enquire IPO List API endpoint. Mandatory if recordID [Field #1.2] = null or blank.
1.2	recordID	Array of String	1000*17	No	Must be a valid Record ID within own subscription list, under "Authorised" sub-flow status. Mandatory if ipoID [Field #1.1] = null or blank.
1.3	subFlowStatus	String	2	No	To filter response by a subscription's status, either by "3" (Authorised, i.e. active subscription) or "4" (Invalidated, i.e. previously active, now removed from subscription list).
2	size	Integer	18	No	Expected page size of the API response. Must be between 1 and 1,000. If null or blank, default as 100.
3	nextCursor	String	20	Yes	Key reference (recordID) from which the response message should start. "0" should be used to start from the first index.


```
{
        "data": {
                "ipoID":"1234",
                "recordID": [],
                "subFlowStatus": null
        },
        "size": 100,
        "nextCursor": "0"
}
```

```
{
        "data": {
                "ipoID":"1234",
                "recordID":["2462303930948573A","4317515259216099A","5365467074774676A"],
                "subFlowStatus": null
        },
        "size": 100,
        "nextCursor": "6962170439634540A"
}
```

```
{
        "data": {
                "ipoID":"1234",
                "recordID":["2462303930948573A","4317515259216099A","5365467074774676A"],
                "subFlowStatus":"3"
        },
        "size": 100,
        "nextCursor": "6962170439634540A"
}
```

7.4.2 Response

<table>
<tr><th>#</th><th>Field</th><th>Type</th><th>Length</th><th>Description</th></tr>
<tr><td>1</td><td>code</td><td>String</td><td>6</td><td>0 to indicate ‘successful response’.</td></tr>
<tr><td>2</td><td>message</td><td>String</td><td>100</td><td>Empty string, i.e. "" to indicate successful response.</td></tr>
<tr><td>3</td><td>data</td><td>Array</td><td></td><td></td></tr>
<tr><td>3.1</td><td>stkCode</td><td>String</td><td>10</td><td>The IPO’s stock code.</td></tr>
<tr><td>3.2</td><td>isin</td><td>String</td><td>12</td><td>The IPO’s ISIN.</td></tr>
<tr><td>3.3</td><td>status</td><td>String</td><td>2</td><td>The status of the IPO, expressed in status codes:

<table><tr><th>Status</th><th>Description</th></tr><tr><td>25</td><td>Deal Initiated</td></tr><tr><td>30</td><td>Public Offer Closed</td></tr><tr><td>35</td><td>Application Validated</td></tr><tr><td>45</td><td>Allotment Confirmed</td></tr><tr><td>50</td><td>Money Settlement</td></tr><tr><td>55</td><td>Allocation Confirmed</td></tr><tr><td>60</td><td>Placing Approved</td></tr><tr><td>65</td><td>Allotment Results Approved</td></tr><tr><td>70</td><td>Trading Started</td></tr><tr><td>80</td><td>Suspended</td></tr><tr><td>90</td><td>Cancelled</td></tr></table></td></tr>
<tr><td>3.4</td><td>subFlowStatus</td><td>String</td><td>2</td><td>The status of the subscription, expressed in status codes:

<table><tr><th>Status</th><th>Description</th></tr><tr><td>3</td><td>Authorised, i.e. active subscription</td></tr><tr><td>4</td><td>Invalidated, i.e. previously active, now removed from subscription list</td></tr></table></td></tr>
<tr><td>3.5</td><td>recordID</td><td>String</td><td>17</td><td>The subscription’s Record ID.</td></tr>
<tr><td>3.6</td><td>idList</td><td>Array</td><td></td><td>Min 1 object, max 4 objects. Each object contains the information of 1 applicant, e.g. 2 joint account holders should include 2 objects.</td></tr>
<tr><td>3.6.1</td><td>idType</td><td>String</td><td>2</td><td>The ID Type of the applicant, expressed in ID Codes:

<table><tr><th>ID Type</th><th>Description</th></tr><tr><td>1</td><td>HKID</td></tr><tr><td>2</td><td>National identification document</td></tr><tr><td>3</td><td>Passport</td></tr><tr><td>4</td><td>LEI registration document</td></tr><tr><td>5</td><td>Certificate of incorporation</td></tr><tr><td>6</td><td>Business registration certificate</td></tr><tr><td>7</td><td>Other official incorporation document</td></tr><tr><td>8</td><td>Broker-to-Client Assigned Number</td></tr></table></td></tr>
<tr><td>3.6.2</td><td>idCountryJurisdiction</td><td>String</td><td>3</td><td>The issuing authority of the applicant’s identification document. Based on ISO-3166 Alpha-3 codes, or ‘OTH’ to represent "Other".</td></tr>
<tr><td>3.6.3</td><td>idNum</td><td>String</td><td>40</td><td>The ID number of the applicant’s identification document.</td></tr>
<tr><td>3.6.4</td><td>fullNameEng</td><td>String</td><td>150</td><td>The full English name of the applicant.</td></tr>
<tr><td>3.6.5</td><td>fullNameChi</td><td>String</td><td>150</td><td>The full Chinese or non-English name of the applicant.</td></tr>
<tr><td>3.7</td><td>appQuantity</td><td>String</td><td>20</td><td>The number of securities being subscribed by the applicant</td></tr>
<tr><td>3.8</td><td>allotQuantity</td><td>String</td><td>20</td><td>The number of securities allotted to the applicant.</td></tr>
<tr><td>3.9</td><td>firmID</td><td>String</td><td>5</td><td>The SEHK Participant ID for identifying the recipient of any brokerage fees.</td></tr>
<tr><td>3.10</td><td>ownRef</td><td>String</td><td>40</td><td>Free text field for own reference.</td></tr>
<tr><td>3.11</td><td>unsuccessfulReason</td><td>String</td><td>2</td><td>To indicate the applicable reason for which the subscription was unsuccessful, expressed in reason codes:

<table><tr><th>ID Type</th><th>Description</th></tr><tr><td>0</td><td>Allotted</td></tr><tr><td>1</td><td>Not allotted</td></tr><tr><td>2</td><td>Failed pre-funding</td></tr><tr><td>3</td><td>Duplicate application</td></tr><tr><td>4</td><td>Incomplete information</td></tr></table></td></tr>
</table>

				5 Invalid BCAN 6 EIPO default 99 Others
3.12	intDuplicateIndicator	String	1	If the subscription has been identified as a duplicate within the HKSCC Participant's subscription list, then "1". Else, the response will return "0".
3.13	exception	Array		To indicate whether an individual request has failed any validation checks: ▪ Empty array = the individual request has passed all validation checks ▪ Non-empty array = the individual request has a single or multiple errors, with each error expressed as an individual object
3.13.1	recordErrorCode	String	6	
3.13.2	recordErrorMsg	String	100	
4	totalSize	Integer	18	Total size of the API response.
5	timestamp	String	19	Timestamp of the API response, in YYYY-MM-DD HH:MM:SS.
6	nextCursor	String	20	The key reference (recordID) immediately after the final result of response. If there are no further records, "0" will be returned.
7	exception	Array		To indicate whether the entire request failed any structural or permission-related validation checks: ▪ Empty array = no structural or permission-related error(s) were identified across the entire request ▪ Non-empty array = the entire request was rejected due to a single or multiple structural or permission-related error(s), with each error expressed as an individual object
7.1	recordErrorCode	String	6	
7.2	recordErrorMsg	String	100	


```
{
    "code": "0",
    "message": "",
    "data": [{
        "stkCode": "9988",
        "isin": "KYG017191142",
        "status": "25",
        "subFlowStatus": "3",
        "recordID": "2462303930948573A ",
        "idList": [{
            "idType": "1",
            "idCountryJurisdiction": "HKG",
            "idNum": "A123456(9)",
            "fullNameEng": "Chan Tai Man",
            "fullNameChi": "陳大文"
        },
        {
            "idType": "1",
            "idCountryJurisdiction": "HKG ",
            "idNum": "B234567(1)",
            "fullNameEng": "Chan Siu Man",
            "fullNameChi": "陳小文"
        },
        {
            "idType": "1",
            "idCountryJurisdiction": "HKG ",
            "idNum": "B234567(1)",
            "fullNameEng": "Mary Lee Sum See",
            "fullNameChi": "李心思"
        }],
        "appQuantity": "1000",
        "allotQuantity": "100",
```

```
                "firmID": "00000",
                "ownRef": null,
                "unsuccessfulReason": "0",
                "intDuplicateIndicator": "0",
                "exception": []
        },
        {
                "stkCode": "9988",
                "isin": "KYG017191142",
                "status": "25",
                "subFlowStatus": "3",
                "recordID": "4317515259216099A ",
                "idList": [{
                        "idType": "4",
                        "idCountryJurisdiction": "OTH",
                        "idNum": "A1B200D4E5F6G7H8I9J0",
                        "fullNameEng": "Alpha Company Ltd",
                        "fullNameChi": "甲有限公司"
                }],
                "appQuantity": "5000",
                "allotQuantity": "500",
                "firmID": "00000",
                "ownRef": null,
                "unsuccessfulReason": "0",
                "intDuplicateIndicator": "0",
                "exception": []
        },
        {
                "stkCode": "9988",
                "isin": "KYG017191142",
                "status": "25",
                "subFlowStatus": "3",
                "recordID": "5365467074774676A ",
                "idList": [{
                        "idType": "1",
                        "idCountryJurisdiction": "HKG",
                        "idNum": "C345678(A)",
                        "fullNameEng": "",
                        "fullNameChi": "Rémy Victor"
                }],
                "appQuantity": "500000",
                "allotQuantity": "50000",
                "firmID": "00000",
                "ownRef": null,
                "unsuccessfulReason": "0",
                "intDuplicateIndicator": "0",
                "exception": []
        }],
        "totalSize": 3,
        "timestamp": "2021-08-26 12:30:29",
        "nextCursor": "0",
        "exception":[]
}
```

8 EIPO Funding

8.1 Enquire EIPO Funding

8.1.1 Request

POST **/api/eipo/funding/query/v1**

#	Field	Type	Length	Required	Description
1	data	Object		Yes	
1.1	ipoID	String	20	No	Must be a valid ipoID from the Enquire IPO List API endpoint. Mandatory if transactionRef [Field #1.2] = null or blank.
1.2	transactionRef	Array of String	1000*13	No	Must be a valid transactionRef assigned to the HKSCC Participant's EIPO subscriptions within an IPO. Mandatory if ipoID [Field #1.1] = null or blank.
1.3	preFundingStatus	String	2	No	Sub-flow status of the Transaction Reference, expressed as status codes: Code / Description 10 Pending 15 Not Applicable 20 Confirmed 30 Rejected 40 Invalidated During the public offer book open (before the Pre-funding Requirement is finalised), this field returns as null.
2	size	Integer	18	No	Expected page size of the API response. Must be between 1 and 1,000. If null or blank, default as 100.
3	nextCursor	String	20	Yes	Timestamp of the API response, in YYYY-MM-DD HH:MM:SS format.


```
{
    "data": {
        "ipoID":"1234",
        "transactionRef": [],
        "preFundingStatus": null
    },
    "size": 100,
    "nextCursor": "0"
}
```

```
{
    "data": {
        "ipoID":"1234",
        "transactionRef": ["1241677736293","1614124660146","4557626203254"],
        "preFundingStatus": null
    },
    "size": 100,
    "nextCursor": "2244"
}
```

```
{
                "data": {
                                "ipoID":"1234",
                                "transactionRef": ["1241677736293","1614124660146","4557626203254"],
                                "preFundingStatus": "10"
                },
                "size": 100,
                "nextCursor": "5835245508721"
}
```


8.1.2 Response

#	Field	Type	Length	Description
1	code	String	6	0 to indicate 'successful response'.
2	message	String	100	Empty string, i.e. "" to indicate successful response.
3	data	Array		
3.1	ipoID	String	20	A unique, sequentially-generated value assigned to each IPO case stored on FINI. Used as the identifier for IPOs within the FINI API Gateway.
3.2	stkCode	String	10	The IPO's stock code.
3.3	isin	String	12	The IPO's ISIN.
3.4	status	String	2	The status of the IPO, expressed in status codes: Status / Description 25 Deal Initiated 30 Public Offer Closed 35 Application Validated 45 Allotment Confirmed 50 Money Settlement 55 Allocation Confirmed 60 Placing Approved 65 Allotment Results Approved 70 Trading Started 80 Suspended 90 Cancelled
3.5	transactionRef	String	13	The Transaction Reference assigned to the HKSCC Participant's EIPO subscriptions within the IPO.
3.6	preFundingStatus	String	2	Sub-flow status of the Transaction Reference, expressed as status codes: Code / Description 10 Pending 15 Not Applicable 20 Confirmed 30 Rejected 40 Invalidated During the public offer book open (before the Pre-funding Requirement is finalised), this field returns as null.
3.7	settlementStatus	String	2	Settlement status of the Transaction Reference, expressed as status codes: Code / Description 10 Pending 15 Not Applicable 20 Settled 30 Rejected 40 Defaulted Before the public offer allotment is made available, this field returns as null.
3.8	ipoInfo	Object		
3.8.1	tradeCurrency	String	3	The IPO's trading currency, expressed as currency codes:

				<table><tr><th>Currency</th><th>Description</th></tr><tr><td>HKD</td><td>Hong Kong Dollar</td></tr><tr><td>CNY</td><td>Chinese Yuan</td></tr><tr><td>USD</td><td>United States Dollar</td></tr></table>
3.8.2	priceMin	Decimal	12,3	The minimum offer price of the IPO.
3.8.3	downwardPriceFlex	Decimal	3,0	The percentage at which the IPO company may price its IPO below the minimum offer price. Example: "10" = 10%.
3.8.4	priceFloor	Decimal	12,3	The lowest possible price for the IPO, calculated as priceMin * (1 – downwardPriceFlex).
3.8.5	priceMax	Decimal	12,3	The maximum offer price of the IPO.
3.8.6	priceFinal	Decimal	12,3	The final offer price of the IPO.
3.8.7	poMaxValue	Decimal	20,2	The highest value the IPO company is able to allocate to the public offer.
3.8.8	prefundingDate	String	19	The date for confirming the HKSCC Participants' pre-funding requirements.
3.9	fundingInfo	Object		
3.9.1	partID	String	6	The HKSCC Participant's ID within CCASS.
3.9.2	partName	String	15	The HKSCC Participant's company short name.
3.9.3	poMaxOptIn	String	1	To indicate whether the HKSCC Participant has opted in to poMax for the pre-funding requirement calculations. "Y" = Yes, "N" = No.
3.9.4	totalAppQuantity	String	20	The total number of securities subscribed by the HKSCC Participant within the IPO.
3.9.5	appValue	Decimal	20,2	The total value of securities subscribed by the HKSCC Participant within the IPO.
3.9.6	prefundingReq	Decimal	20,2	The HKSCC Participant's pre-funding requirement. If the HKSCC Participant's poMaxOptIn = "Y", then it is calculated as the lower figure between poMax Value and appValue. If the HKSCC Participant's poMaxOptIn = "N", then it is the appValue.
3.9.7	totalAllotQuantity	String	20	The total number of securities allotted to the HKSCC Participant within the IPO.
3.9.8	allotValue	Decimal	20,2	The total value of securities allotted the HKSCC Participant within the IPO.
3.10	bankAccInfo	Object		
3.10.1	cpBankCode	String	3	The bank code of the HKSCC Participant's designated bank account from which the pre-funding requirement should be transferred.
3.10.2	cpBranchCode	String	3	The branch code of the HKSCC Participant's designated bank account from which the pre-funding requirement should be transferred.
3.10.3	cpBankAcctNum	String	9	The bank account number of the HKSCC Participant's designated bank account from which the pre-funding requirement should be transferred.
3.10.4	nomBankCode	String	3	The bank code of the EIPO Designated Bank's nominee bank account to which the pre-funding requirement should be transferred.
3.10.5	nomBranchCode	String	3	The branch code of the EIPO Designated Bank's nominee bank account to which the pre-funding requirement should be transferred.
3.10.6	nomBankAcctNum	String	28	The bank account number of the EIPO Designated Bank's nominee bank account to which the pre-funding requirement should be transferred.
3.11.7	debtorRef	String	40	The debtor reference of the EIPO Designated Bank's nominee bank account to which the pre-funding requirement should be transferred.
3.11	exception	Array		To indicate whether an individual request has failed any validation checks: ▪ Empty array = the individual request has passed all validation checks ▪ Non-empty array = the individual request has a single or multiple errors, with each error expressed as an individual object
3.11.1	recordErrorCode	String	6	
3.11.2	recordErrorMsg	String	100	
4	totalSize	Integer	18	Total size of the API response.
5	timestamp	String	19	Timestamp of the API response, in YYYY-MM-DD HH:MM:SS format.
6	nextCursor	String	20	The key reference (transactionRef) immediately after the final result of response. If there are no further records, "0" will be returned.
7	exception	Array		To indicate whether the entire request failed any structural or permission-related validation checks: ▪ Empty array = no structural or permission-related error(s) were identified across the entire request

				▪ Non-empty array = the entire request was rejected due to a single or multiple structural or permission-related error(s), with each error expressed as an individual object
7.1	recordErrorCode	String	6	
7.2	recordErrorMsg	String	100	


```
{
"code": "0",
                "message": "",
                "data": [{
                                "ipoID": "1234",
                                "stkCode": "9988",
                                "isin":"KYG017191142",
                                "status": "25",
                                "transactionRef": "1241677736293",
                                "preFundingStatus": "10",
                                "settlementStatus": null,
                                "ipoInfo": {
                                                "tradeCurrency": "HKD",
                                                "priceMin": 0.000,
                                                "downwardPriceFlex": 0,
                                                "priceFloor": 0.000,
                                                "priceMax": 188.000,
                                                "priceFinal": 176,
                                                "poMaxValue": 10449004280.00,
                                                "prefundingDate": "2020-09-30"
                                },
                                "fundingInfo": {
                                                "partID": "B01130",
                                                "partName": "BOCI SECURITIES",
                                                "poMaxOptIn": "Y",
                                                "totalAppQuantity": "1000000",
                                                "appValue": 208980085.60,
                                                "prefundingReq": 208980085.60,
                                                "totalAllotQuantity": null,
                                                "allotValue": null
                                },
                                "bankAccInfo": {
                                                "cpBankCode": "012",
                                                "cpBranchCode": "001",
                                                "cpBankAcctNum": "929874231",
                                                "nomBankCode": "012",
                                                "nomBranchCode": "004",
                                                "nomBankAcctNum": "612352324",
                                                "debtorRef": "ABCEDFGH"
                                },
                                 "exception": []
                },
                {
                                "ipoID": "1234",
                                "stkCode": "9988",
                                "isin":"KYG017191142",
                                "status": "25",
                                "transactionRef": "1614124660146",
                                "preFundingStatus": "10",
                                "settlementStatus": "",
                                "ipoInfo": {
                                                "tradeCurrency": "HKD",
                                                "priceMin": 0.000,
                                                "downwardPriceFlex": 0,
                                                "priceFloor": 0.000,
                                                "priceMax": 188.000,
```

```
                                                "priceFinal": 176,
                                                "poMaxValue": 10449004280.00,
                                                "prefundingDate": "2020-09-30"
                                        },
                                        "fundingInfo": {
                                                "partID": "B01345",
                                                "partName": " PHILLIPSECHKLTD ",
                                                "poMaxOptIn": "Y",
                                                "totalAppQuantity": 3400200,
                                                "appValue": 710574087.06,
                                                "prefundingReq": 710574087.06,
                                                "totalAllotQuantity": null,
                                                "allotValue": null
                                        },
                                        "bankAccInfo": {
                                                "cpBankCode": "012",
                                                "cpBranchCode": "001",
                                                "cpBankAcctNum": "827634232",
                                                "nomBankCode": "012",
                                                "nomBranchCode": "004",
                                                "nomBankAcctNum": "612352324",
                                                "debtorRef": "BCDEFGHI"
                                        },
                                         "exception": []
                        }
                        ],
                        "totalSize": 2,
                        "timestamp": "2021-09-30 08:12:33",
                        "nextCursor": "0",
                        "exception": []
}
```

8.2 Confirm EIPO Funding

8.2.1 Request

POST `/api/eipo/funding/confirm/v1`

#	Field	Type	Length	Required	Description
1	data	Array		Yes	Min 1 object, max 1,000 objects. Each object should contain 1 subscriptions (i.e. each request may process up to 1,000 subscriptions).
1.1	transactionRef	String	13	Yes	Must be a valid Transaction Reference with a preFundingStatus = "10"
1.2	preFundingStatus	String	2	Yes	The target pre-funding status to be amended by the API request. **Status** – **Description** 20 – Confirm pre-funding 30 – Reject pre-funding


```
{
        "data": [{
                "transactionRef": "6398340114921",
                "preFundingStatus": "20"
            },
            {
                "transactionRef": "6398340114936",
                "preFundingStatus": "20"
            },
            {
                "transactionRef": "6398340114947",
                "preFundingStatus": "20"
            },
            {
                "transactionRef": "6398340114959",
                "preFundingStatus": "20"
            },
            {
                "transactionRef": "6398340114972",
                "preFundingStatus": "30"
            }
        ]
}
```

8.2.2 Response

#	Field	Type	Length	Description
1	code	String	6	0 to indicate 'successful response'.
2	message	String	100	Empty string, i.e. "" to indicate successful response.
3	data	Array		
3.1	transactionRef	String	13	The transactionRef from the original API request.
3.2	preFundingStatus	String	2	The latest preFundingStatus after processing the API request.
3.3	exception	Array		To indicate whether an individual request has failed any validation checks: ▪ Empty array = the individual request has passed all validation checks ▪ Non-empty array = the individual request has a single or multiple errors, with each error expressed as an individual object
3.31	recordErrorCode	String	6	
3.32	recordErrorMsg	String	100	
4	totalSize	Integer	18	Total size of the API response.
5	timestamp	String	19	Timestamp of the API response, in YYYY-MM-DD HH:MM:SS format.
6	exception	Array		To indicate whether the entire request failed any structural or permission-related validation checks: ▪ Empty array = no structural or permission-related error(s) were identified across the entire request ▪ Non-empty array = the entire request was rejected due to a single or multiple structural or permission-related error(s), with each error expressed as an individual object
6.1	recordErrorCode	String	6	
6.2	recordErrorMsg	String	100	


```
{
    "code": "0",
    "message": "",
    "data": [{
        "transactionRef": "6398340114921",
        "preFundingStatus": "20",
        "exception": []
    },
    {
        "transactionRef": "6398340114936",
        "preFundingStatus": "20",
        "exception": []
    },
    {
        "transactionRef": "6398340114947",
        "preFundingStatus": "20",
        "exception": []
    },
    {
        "transactionRef": "6398340114959",
        "preFundingStatus": "20",
        "exception": []
    },
    {
        "transactionRef": "6398340114972",
        "preFundingStatus": "30",
        "exception": []
    }
    ],
    "totalSize": 5,
    "timestamp": "2021-09-30 11:55:21",
```

```
                "exception": []
}
```

9 FAQs for External User Testing (EUT) & Production

9.1 FINI API Connectivity

1. How to ensure the connectivity to FINI API Gateway is successful after VPN is established?

Any typical browser request on the EIPO Listing API endpoint without JWT can get a JSON return.

EUT: https://fini.u4cp.hkex.com.hk/api/ipos/list/v1
Production: https://fini.hkex.com.hk/api/ipos/list/v1


```
{
  "code" : "1G001",
  "message" : "Bad Parameter Input",
  "data" : [ ],
  "totalSize" : 0,
  "timestamp" : "2023-02-14 11:24:38",
  "exception" : [ ]
}
```


2. Where can the Participants input/maintain Agent profile and Machine profile information for JSON Web Token (JWT)?

EUT: https://connect.u4cp.hkex.com.hk
Production: https://connect.hkex.com.hk

Under Support -> Manage Access Rights

3. Why does Development Tool Postman / Browser return invalid SSL in EUT environment when accessing the FINI API endpoints?

Self-signed CA Certificate approach is used for EUT, participants can suppress the SSL checking in the setting of Postman and accept the SSL warning from Browser. API program should also accept the self-signed CA certificate when connecting to FINI API Gateway.

4. Can I use IP address instead of domain name for the API requests?

No. FINI will reject API request accessing by IP address.

5. Can I perform load/performance testing on FINI EUT or Production environment?

No. There is throttle control, participants will find their IP is blocked and restricted to access FINI APIs.

9.2 FINI API Authentication

1. Does FINI API support SAML authentication?

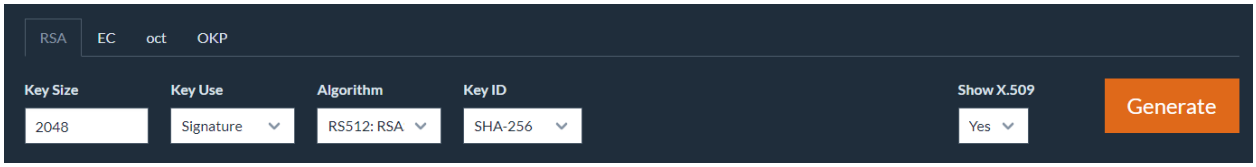
No. FINI API uses OATH2.0 for authentication.

2. How to generate public and private key pair set for testing purpose?

Developer is recommended to use self-developed application for public and private key pair set generation.

For quick testing purpose, there are also free resources from the internet for public and private key pair generation.

e.g.
https://mkjwk.org/
Corresponding Key parameter requirement
Key Size: 2048
Key Use: Signature
Algorithm: RS256
Key ID: SHA-256
Show X.509: Yes



3. How do the Participants update their Key (Key Rotation every year) without application outage?

Both Agent Profile and Machine Profile allow at most two key pairs to be registered and used simultaneously. Participants can consider updating one by one to minimize impact.

4. Can multiple program instances use the same JWT (from HKEX AM) for API requests?

Not recommended.

5. What is the JWT (from HKEX AM) expiry time?

The JWT expiry time is 30s.

9.3 EIPO Subscription Entries APIs encryption

1. Why does JAVA SecureRandom.getInstanceStrong() that recommended by the API Workshop unable to work on Linux environment?

The SecureRandom.getInstanceStrong() works on Windows platform only, please consider using SecureRandom.getInstance("NativePRNGNonBlocking") on Linux.

2. What is the reason of error message “Crypto process exception”?

Please check if encryption has been done for the following two API endpoints on Personal Data fields according to the API Specification.

api/eipo/subscriptions/add/v1
api/eipo/subscriptions/change/v1

3.	**As long as no personal data should be encrypted for Enquire/Invalidate EIPO Subscription Entries APIs, what is the reason of having error message "Crypto process exception"?**
	Please check X-FINI-ENCRYPTION-CLIENT in HTTP header, which must be set to "N" for Enquire/Invalidate EIPO.
4.	**How often is the changing of public Key from Crypto Metadata Request API?**
	The public key may be changed/updated from time to time without notification. Please retrieve the key for every single request that requires encryption.

9.4 FINI API endpoint validation

1.	**What is the reason for always getting Signature Error for EIPO Subscription Entries API?**
	Please ensure the 3 major components must be included for the Signature calculation. Payload + Request ID + Timestamp
2.	**What is the reason always getting Signature Error when I use development tool Postman for all encryption needed APIs?**
	Postman probably adds additional line break for the input payload, this makes discrepancy between the Signature calculation value. Developer should ensure the Signature calculation on the payload is identical to the Postman submitted one.
3.	**What is the reason of error message "Bad Parameter Input"?**
	If the input JSON payload (POST Request) fails to pass the basic syntax validation leading FINI cannot parse the JSON content OR missing mandatory parameters in the endpoint URL(GET Request). Then the general validation message "Bad Parameter Input" will be found, thus the whole API request will be rejected.
4.	**What if requestID value is duplicated in the same Add EIPO Subscription Entries API request?**
	All the particular duplicated records in the request will be rejected, other records with unique requestID will be handled as usual.
5.	**Can I use same requestID value in different Add EIPO Subscription Entries API requests?**
	Yes. The duplication checking on requestID only happens in the same Add EIPO Subscription Entries API request.
6.	**Will the whole Add EIPO Subscription Entries API request be rejected if there is certain number of records are invalid?**
	No. FINI will reject only those invalid records, if the whole Add EIPO Subscription Entries API request can pass the basic syntax validation.
7.	**What will happen if the same EIPO applicant content was submitted by the same/different Add EIPO Subscription Entries API requests from the same CP?**
	There is no immediate EIPO application duplication checking on the Add EIPO Subscription Entries API request. All those requests, having duplications, will be submitted and recorded in FINI but the flag

	intDuplicateIndicator will be updated as “1” from Enquire EIPO Subscription Entries endpoint return. In case no further action is taken by CP, **all** duplicated records will be rejected only on the EIPO Public Offer Close Day.
8.	**What will happen if the same EIPO applicant content was submitted by different CPs?**
	The duplicated records will be rejected on the EIPO Public Offer Close Day.
9.	**Is there any full list of FINI validation can be provided?**
	There is no FINI validation full list for the public, participants have to retrieve the validation error message from the JSON response to understand the cause of rejection. Generally, participants can check the HTTP response value (Section 2.4.2) to determine the follow up action. HTTP 200 with JSON response is usually related business validation. IT team should follow up for other HTTP response values like 400, 403, 404..etc.

9.5 Miscellaneous

1.	**Why does FINI always return “Authorization in Input JSON is EMPTY”?**
	Please use protocol HTTP 1.1 instead of HTTP 2.0
2.	**What encoding should be used for the Chinese Name in the EIPO Subscription Entries?**
	UTF-8
3.	**I am using encoding UTF-8 as input source however the Chinese Characters still cannot be recorded by FINI correctly. Unexpected Characters are found in the EIPO Subscription Entries result.**
	If participants use JAVA for their application development, please ensure the JVM handles the input source UTF-8 flawlessly by checking if the JVM starts with parameter “-Dfile.encoding=UTF-8”.
4.	**Is it a must to verify the remote Signature in HTTP Header X-FINI-SIGNATURE?**
	This is our recommendation for the Participants to detect if any tampered response.
5.	**What is the purpose of Enquire EIPO Funding API?**
	If FINI BANK users would like to exercise the EIPO Funding Confirmation, corresponding record transactionRef is the mandatory value that can only be obtained via Enquire EIPO Funding API.
6.	**What should be done if there is “Time Out”/”No Response” situation for Add EIPO Subscription Entries API request? Should I re-submit immediately?**
	Users have to verify if corresponding API requests are received and processed by FINI via FINI Portal (IPO Card) or Enquire EIPO Subscription Entries API (by ipoID) before any re-try/re-submit action. All those requests, having duplications, will be submitted and recorded in FINI but rejected only on the EIPO Public Offer Close Day. Please refer to Section 9.4 Q7.
7.	**Can I retrieve applicant’s allotment result via Enquire EIPO Subscription Entries API?**

Yes. Enquire EIPO Subscription Entries API can show allotment quantity after the release of allotment result.