The Derivatives Service Bureau (DSB)

FIX Certification Test

Proprietary Information

Contents

Preface

Change History

Date	Change	Version	Author	Revision Details
18 July 2017	Creation	1.0	Sheryl Tan	Initial Version
06 Sept 2017	Update	2.0	Sheryl Tan	Added 3.3.5 Retrieve ISIN Record by Attributes and 3.3.6 Search for ISIN Records by Attributes Added Business Message Reject on Error Codes Test Suite

1 Introduction

1.1 Document Purpose

This document intends to provide a comprehensive guide on the FIX Client Certification by using the FIX Conductor interface. The FIX certification process is designed to ensure that users connecting the DSB via FIX are fully integrated in a robust manner. Successful completion of the DSB's FIX Client Certification is an important milestone in being on-boarded into the DSB's production environment. The client can rerun the certification test until completion of all the required test cases. The FIX Conductor has a Reset Certification feature which will be discussed on the FIX Conductor section.

1.2 Intended Audience

Clients who use FIX that needs certification via FIX Conductor interface.

1.3 Scope

This document focuses on the use of FIX Conductor to setup the connectivity and test the functionality of the FIX Client.

1.4 Contact Information

Please direct your questions or concerns on the FIX Conductor via email to technical.support@anna-dsb.com

1.5 Functional Summary

The FIX Conductor interface provides a real time testing service for the FIX Client certification. It consists of several test cases to check the connectivity (i.e. Logon and Heartbeat) and functionality (i.e. create, search, subscribe, retrieve) of the FIX Client. It has error code test to simulate the output of the Security Request Result (560) for invalid request, system unavailable or business message reject.

Result of the test cases can be viewed on the client's Test Dashboard. The client needs to pass all of the required test cases in order to obtain the certification. Once the client has completed successfully, a certification report is made available for the client and the DSB Technical Support.

The DSB Technical Support Admin has a dashboard to verify that a client has successfully completed the test. The client can contact the DSB Technical Support Team for any issues that may arise while completing the test.

1.6 Document Structure

This document contains the following section:

Section Number	Title	Description
Section 1	Introduction	A brief introduction to this document providing background to the purpose of the document and the FIX Conductor
Section 2	Site Preparation	Provides details of the tasks required before connectivity can take place
Section 3	FIX Conductor	Documents the overview, test suites and messages of the FIX Conductor

2 Site Preparation

2.1 FIX Conductor Setup

2.1.1 Register New Client

Once a client approaches the DSB seeking FIX connectivity to the DSB production environment, the DSB Technical Support Admin will register the new client so that authorized users can access the FIX Conductor.

Client's Name, company email address and services (FIX_4.4 or FIX_5.0) to be used by the client will be based on the Onboarding Form submitted by the client.

2.2 FIX Client Setup

Clients need to undertake the following preparation to connect to the DSB's FIX Conductor interface:

- Select the FIX version to use: DSB FIX interface supports FIX5.0SP2 as well as FIX 4.4
- DSB operations will provide the following connectivity parameters as part of the client registration details for access to the FIX conductor:
  - Company identifiers (CompID); These are used throughout the FIX messages and commonly configured in the FIX engine
  - IP address of the DSB FIX Conductor
  - Port for Proxy and Simulated interface
- Make any network/firewall configuration changes required to connect to the DSB FIX Conductor.
- Verify that the DSB IP FIX Conductor addresses/port numbers are open and visible from any machine that needs to connect to the FIX service.
- Configure the local FIX engine with the DSB FIX Conductor Hostname, Port, CompID accordingly.

There are 2 types of Interface that the client needs to configure:

2.2.1 Proxy Interface

This is required for testing the Create, Search, Subscribe, Retrieve, Search by Attributes and Session Level Test Suites. FIX Client will connect to the FIX Conductor which in turn will connect to the DSB FIX servers to validate the FIX messages.

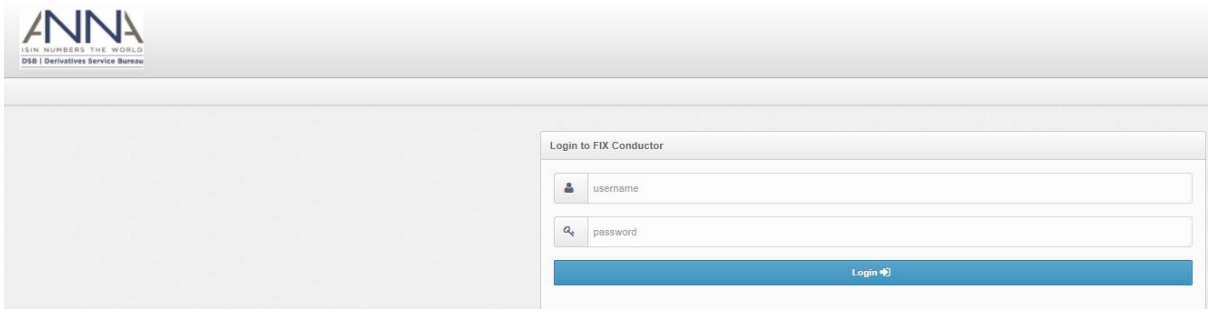
2.2.2 Simulated Interface

FIX Client will run in simulated mode to simulate the errors of the different test scenarios.
This is used for Error Codes Test Suite which is required for the client to complete the certification.

3 FIX Conductor

3.1 Login

Client enters the Username and Password to login and access the dashboard.

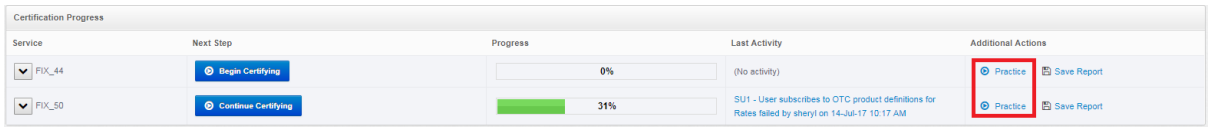


3.2 Dashboard

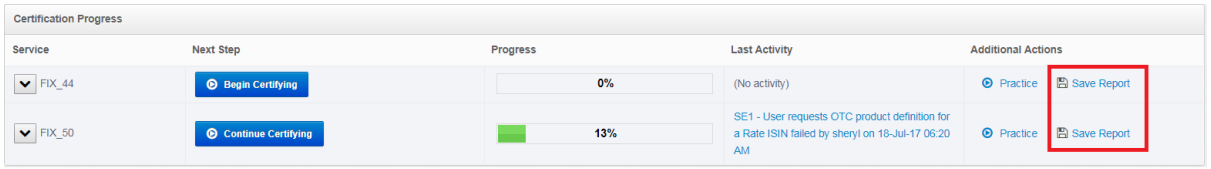
3.2.1 Certification Progress

Certification progress can be viewed at a glance on the client dashboard.
To begin the certification, client needs to click the “Begin Certifying” button on the dashboard.
The green bar displays the % progress of the certification. Client needs to finish all the required test cases to complete the certification.

Client has an option to choose “Practice” mode under Additional Actions to check the test cases.

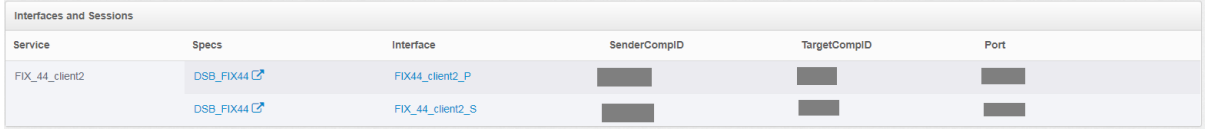


Certification Report can be generated via “Save Report”. Results of all the test cases are saved on this report.



3.2.2 Interfaces and Sessions

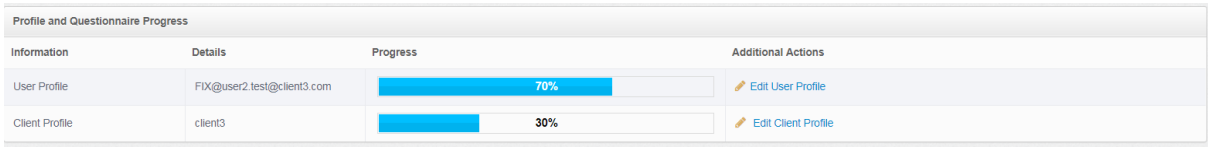
The DSB Technical Support Admin will set the interface and session of the client based on the preferred FIX version that the client will use and certify. SenderCompID, TargetCompID and port will be sent to the client once registered. Please note that the Port which will reflect in this section is not exactly the same with the proxy port and simulated port given to clients. The clients need to configure the FIX Application using the credentials that will be sent to their email.



3.2.3 Profile and Questionnaire Progress

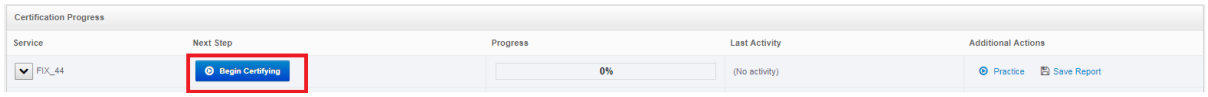
The Questionnaire is used for optional test cases wherein client will answer the questionnaire at the start of the certification and % Progress of the questionnaire will reflect on this tab. If all the test

cases are required, there will be no questionnaire progress on this section. Client can also edit the User Profile and Client Profile on this tab.

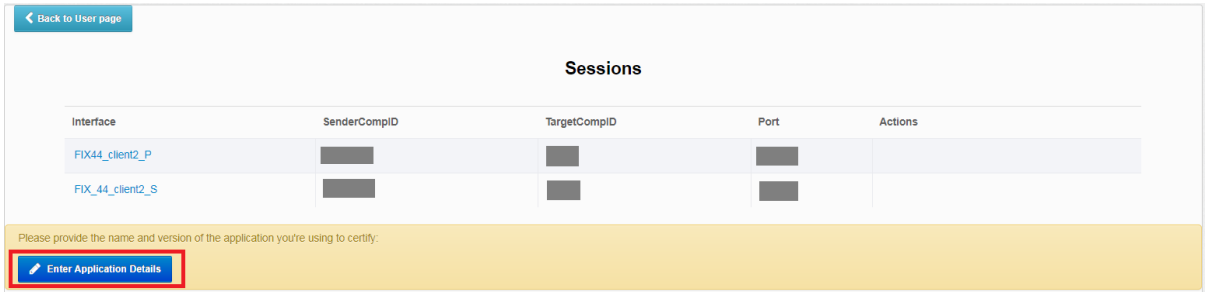


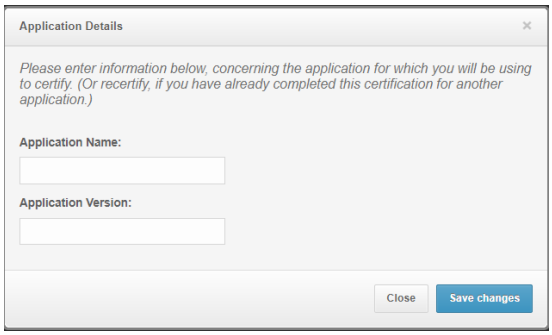
3.2.4 Test Runner

Client needs to click the “Begin Certifying” or “Continue Certifying” button next to a service name on the user dashboard to begin or continue the certification.

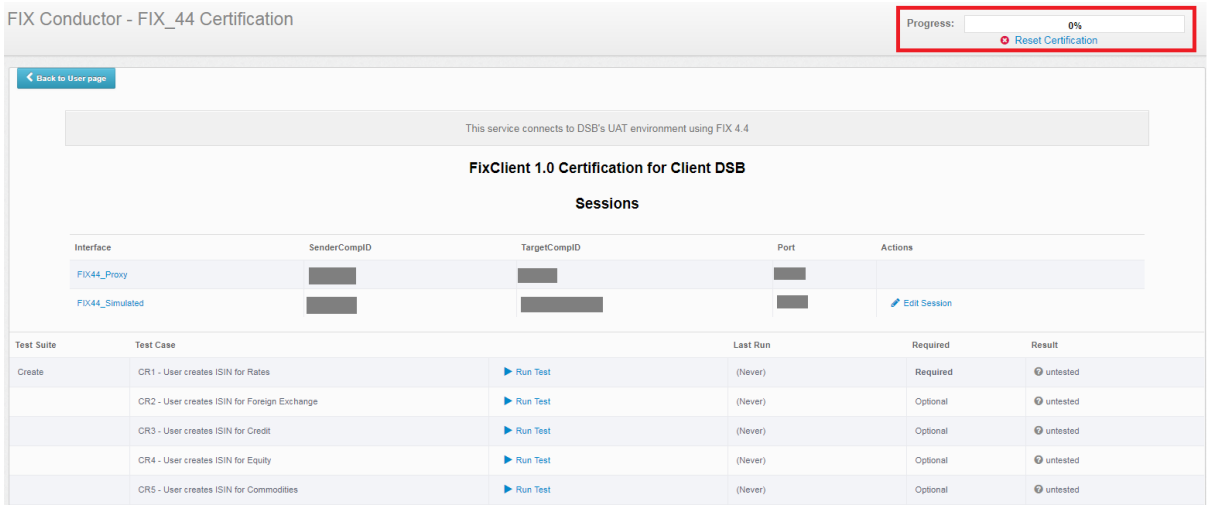


To start with the test cases, the client needs to enter the name and version of the FIX on the Application Details field as shown below.

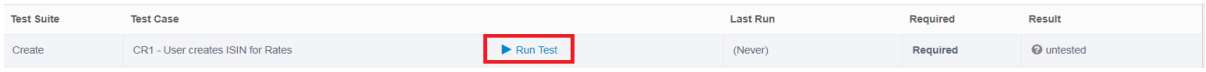




The test dashboard shows test suites broken down into test cases, with the option to run test as well as when the test was last run, required or optional test case, and the result of the test.
Client has an option to reset certification which is located at the top right side of the Test dashboard.



To access the test cases, click on the "Run Test" button next to a test case.



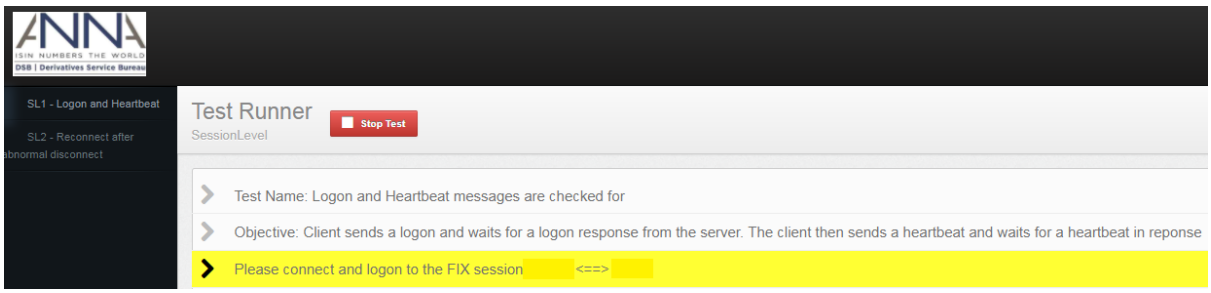
3.3 Test Suite

3.3.1 Session Level

There are 2 session level tests that are required to complete the certification.

SL1 - Logon and Heartbeat

Objective: Client sends a logon and waits for a logon response from the server. The client sends a heartbeat and wait for a heartbeat in response.



To proceed with the test, client needs to login to FIX Client so that the FIX Conductor can check the connectivity (35=A Logon) and heartbeat (35=0 Heartbeat).

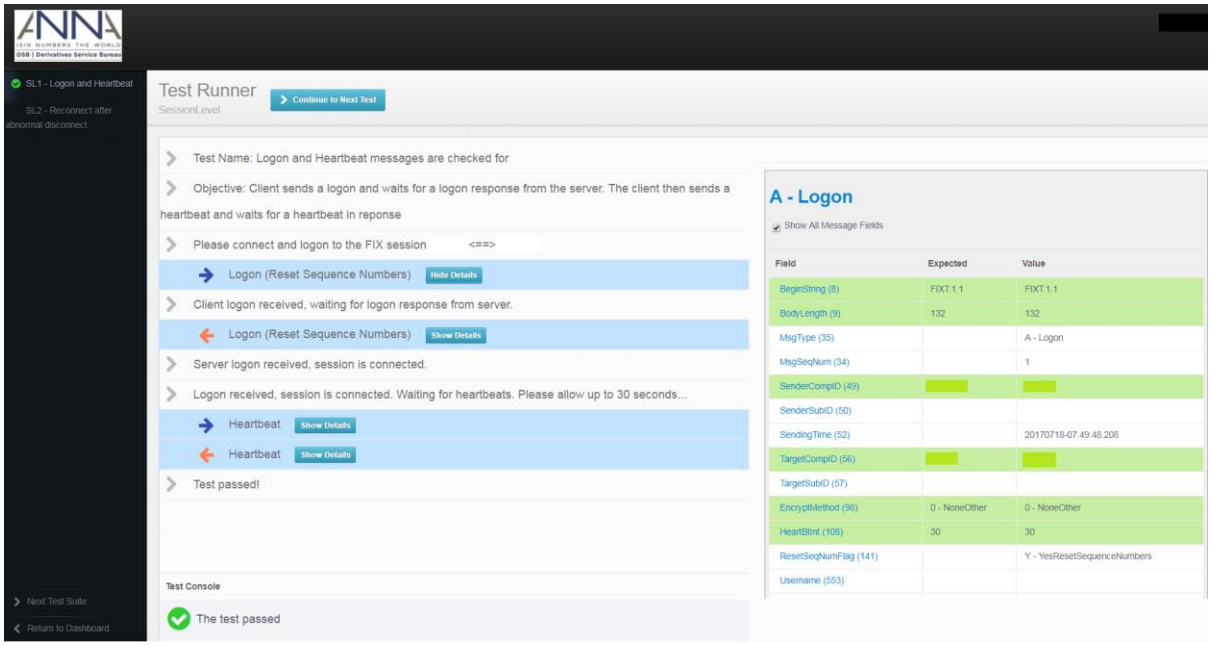
```
8=FIX.4.4^A9=126^A35=A^A34=1^A49=SenderCompID^A50=SenderSubID^A52=20170616-
09:11:00.327^A56=TargetCompID^A57=TargetSubID^A98=0^A108=30^A141=Y^A553=Username^A5
54= password^A10=100^A

8=FIX.4.4^A9=85^A35=A^A34=1^A49= SenderCompID ^A50= SenderSubID ^A52=20170616-
09:10:57.269^A56= TargetCompID^A57=TargetSubID^A98=0^A108=30^A141=Y^A10=063^A

8=FIX.4.4^A9=67^A35=0^A34=2^A49= SenderCompID^A50=SenderSubID ^A52=20170616-
09:11:31.286^A56= A56=TargetCompID^A57=TargetSubID ^A10=225^A

8=FIX.4.4^A9=67^A35=0^A34=2^A49= SenderCompID ^A50= SenderSubID ^A52=20170616-
09:11:27.563^A56= A56=TargetCompID^A57=TargetSubID ^A10=228^A
```

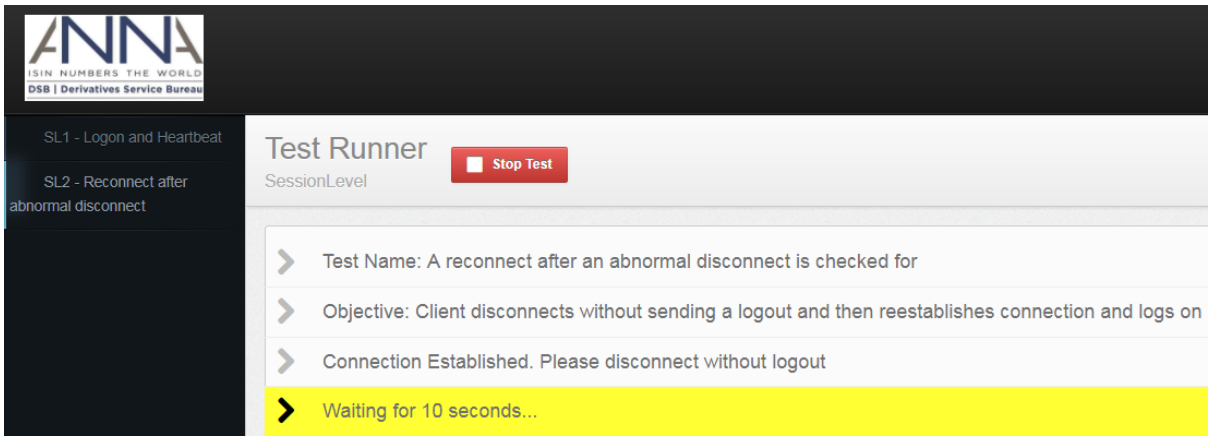
FIX Conductor will check the session connection and heartbeat response to pass this test case.



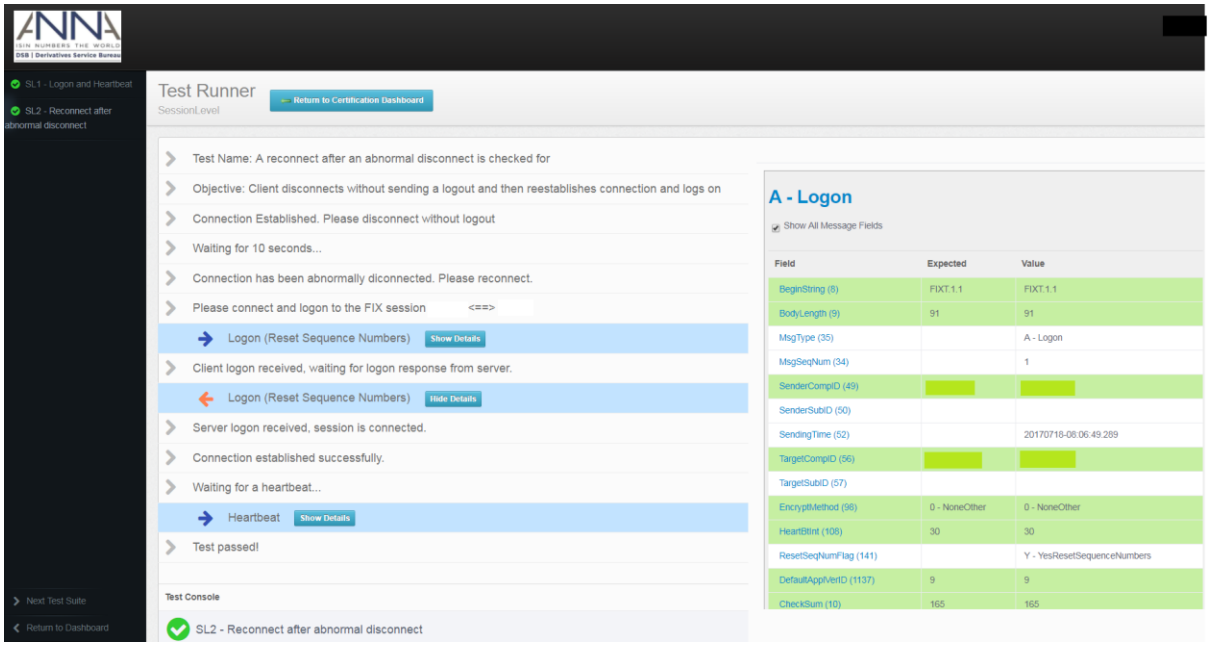
SL2 - Reconnect after abnormal disconnect

Objective: Client disconnects without sending a logout and then re-establishes connection and logs on

Client needs to disconnect on FIX Client without sending a logout.



Once disconnected, client needs to relogin on FIX Client. The FIX Conductor will check the connectivity and heartbeat.

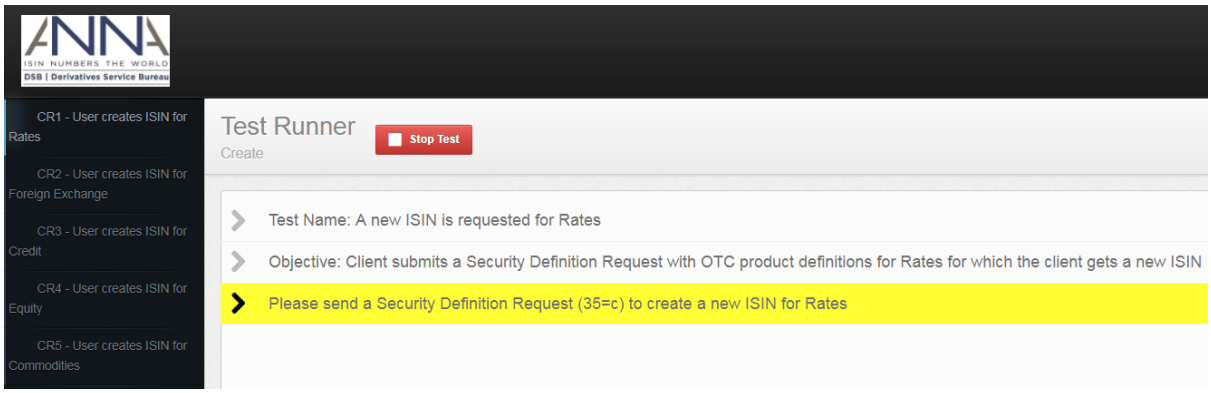


3.3.2 Create ISIN

Client needs to create an ISIN per Asset Class to test the scenarios below. Once ISIN has been created, the FIX Conductor will display the result of the test.

CASE 1: Test Passed

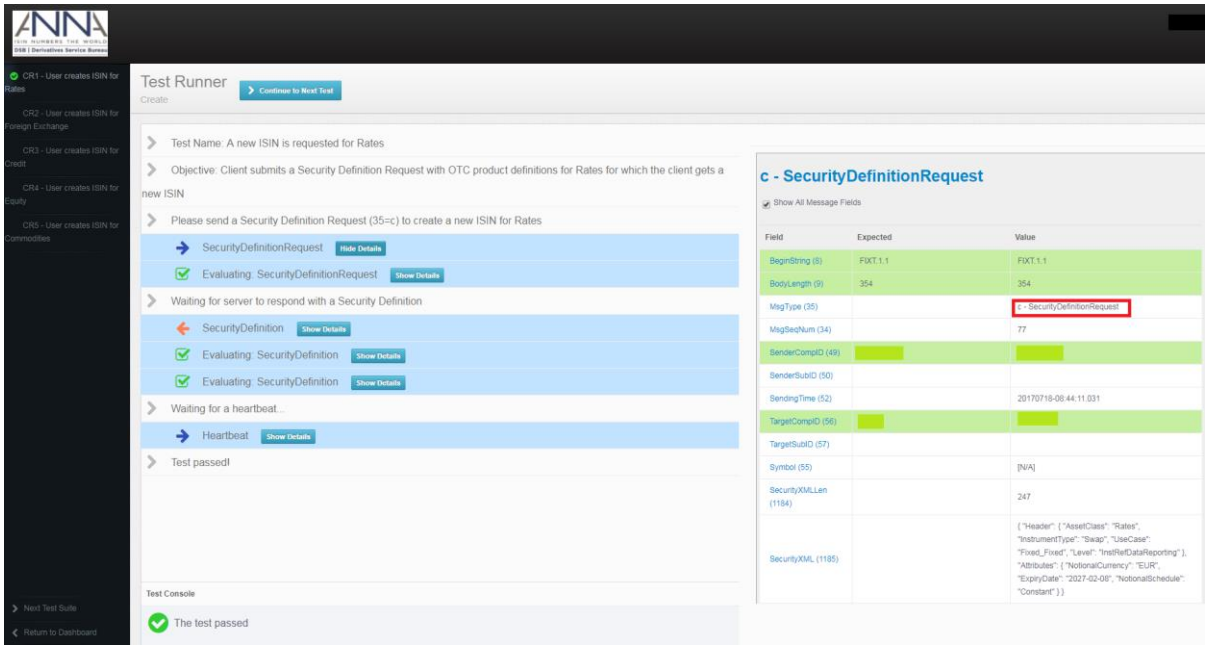
The FIX Conductor will request client to create an ISIN for the specific asset class.



The following is a snapshot of the SecurityDefinitionRequest message (35=c) in the FIX log.

```
8=FIXT.1.1^A9=354^A35=c^A34=77^A49=SenderCompID^A50=SenderSubID^A52=20170718-
08:44:11.031^A56=TargetCompID^A57=TargetSubID^A55=[N/A]^A320=DREQ3^A321=1^A1184=247
^A1185={
        "Header": {
                "AssetClass": "Rates",
                "InstrumentType": "Swap",
                "UseCase": "Fixed_Fixed",
                "Level": "InstRefDataReporting"
        },
        "Attributes": {
                "NotionalCurrency": "EUR",
                "ExpiryDate": "2027-02-08",
                "NotionalSchedule": "Constant"
        }
}^A10=226^A
```

The FIX Conductor will check for the Security Definition Request (35=c) for the new ISIN created.



Client can validate the details of the ISIN submitted on the SecurityXML (1185) or Request Product Payload.

c - SecurityDefinitionRequest

Show All Message Fields

Field	Expected	Value
BeginString (8)	FIXT.1.1	FIXT.1.1
BodyLength (9)	354	354
MsgType (35)		c - SecurityDefinitionRequest
MsgSeqNum (34)		77
SenderCompID (49)		
SenderSubID (50)		
SendingTime (52)		20170718-08:44:11.031
TargetCompID (56)		
TargetSubID (57)		
Symbol (55)		[N/A]
SecurityXMLLen (1184)		247
SecurityXML (1185)		{ "Header": { "AssetClass": "Rates", "InstrumentType": "Swap", "UseCase": "Fixed_Fixed", "Level": "InstRefDataReporting" }, "Attributes": { "NotionalCurrency": "EUR", "ExpiryDate": "2027-02-08", "NotionalSchedule": "Constant" } }
SecurityReqID (320)	DREQ3	DREQ3
SecurityRequestType (321)	1 - RequestSecurityIdentityForSpecifications	1 - RequestSecurityIdentityForSpecifications
CheckSum (10)	226	226
SecurityRequestType		

The table below provides an explanation of the sample content:

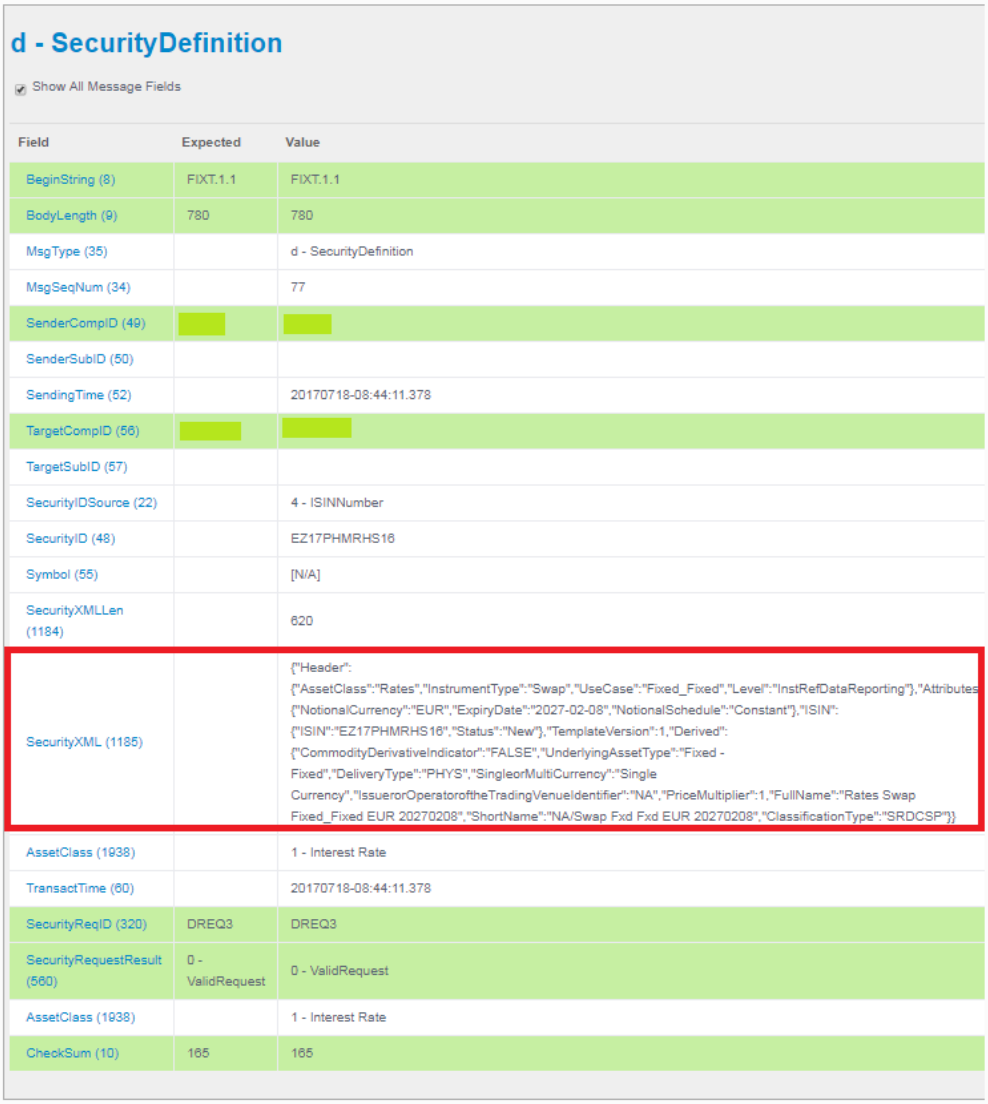
Field	Description	Comment
Begin String (8)	FIX 5.0: Always set to: FIXT.1.1 FIX 4.4: Always set to: FIX4.4	
Body Length (9)	Message length, in bytes, forward to the CheckSum field. Always the second field of the message.	
MsgType (35)	c = SecurityDefinitionRequest Request (or create) the ISIN for an OTC derivative financial instrument as identified by its unique attributes	
MsgSeqNum (34)	Integer message sequence number	
SenderCompID(49) ⇔ **TargetCompID(56)**	Client ⇔ DSB	Client Comp ID Configured for each client The DSB comp ID
SenderSubID(49) ⇔ **TargetSubID(57)**	Subclient ⇔ UAT	Client Sub Comp Configured for each client ⇔ The DSB Sub Comp ID is configured for each environment (i.e.: Demo / UAT / Prod)
SendingTime (52)	Time of message transmission	
Symbol (55)	Use: "[N/A]"	
SecurityXMLLen (1184)	Length of JSON record payload	
SecurityXML(1185)	Request Product payload	{ "Header": { "AssetClass": "Rates", "InstrumentType": "Swap", "UseCase": "Fixed_Fixed", "Level": "InstRefDataReporting" }, "Attributes": { "NotionalCurrency": "EUR", "ExpiryDate": "2027-02-08", "NotionalSchedule": "Constant" } }
SecurityReqID (320)	Identifies the request ID	
SecurityRequestType (321)	0 = Request Security Identity And Specifications 1 = Request Security Identity For Specifications Provided	
CheckSum(10)	As per FIX specification	

FIX Conductor will wait for the server to respond with a Security Definition (35=d).

The following is a sample of a SecurityDefinition message (35=d).

```
8=FIXT.1.1^A9=780^A35=d^A34=77^A49=TargetCompID^A50=TargetSubID^A52=20170718-
08:44:11.378^A56=SenderCompID^A57=SenderSubID^A22=4^A48=EZ17PHMRHS16^A55=[N/A]^A60=
2017071808:44:11.378^A320=DREQ3^A560=0^A1184=620^A1185={"Header":{"AssetClass":"Rat
es","InstrumentType":"Swap","UseCase":"Fixed_Fixed","Level":"InstRefDataReporting"}
,"Attributes":{"NotionalCurrency":"EUR","ExpiryDate":"2027-02-
08","NotionalSchedule":"Constant"},"ISIN":{"ISIN":"EZ17PHMRHS16","Status":"New"},"T
emplateVersion":1,"Derived":{"CommodityDerivativeIndicator":"FALSE","UnderlyingAsse
tType":"Fixed - Fixed","DeliveryType":"PHYS","SingleorMultiCurrency":"Single
Currency","IssuerorOperatoroftheTradingVenueIdentifier":"NA","PriceMultiplier":1,"F
ullName":"Rates Swap Fixed_Fixed EUR 20270208","ShortName":"NA/Swap Fxd Fxd EUR
20270208","ClassificationType":"SRDCSP"}}^A1938=1^A10=165^A
```

Simultaneously, FIX Conductor will display the details of the SecurityDefinition (35=d) message. The ISIN created will reflect on the SecurityXML (1185) which is the Record Payload.



d - SecurityDefinition

Show All Message Fields

Field	Expected	Value
BeginString (8)	FIXT.1.1	FIXT.1.1
BodyLength (9)	780	780
MsgType (35)		d - SecurityDefinition
MsgSeqNum (34)		77
SenderCompID (49)		
SenderSubID (50)		
SendingTime (52)		20170718-08:44:11.378
TargetCompID (56)		
TargetSubID (57)		
SecurityIDSource (22)		4 - ISINNumber
SecurityID (48)		EZ17PHMRHS16
Symbol (55)		[N/A]
SecurityXMLLen (1184)		620
SecurityXML (1185)		{"Header": {"AssetClass":"Rates","InstrumentType":"Swap","UseCase":"Fixed_Fixed","Level":"InstRefDataReporting"},"Attributes {"NotionalCurrency":"EUR","ExpiryDate":"2027-02-08","NotionalSchedule":"Constant"},"ISIN": {"ISIN":"EZ17PHMRHS16","Status":"New"},"TemplateVersion":1,"Derived": {"CommodityDerivativeIndicator":"FALSE","UnderlyingAssetType":"Fixed - Fixed","DeliveryType":"PHYS","SingleorMultiCurrency":"Single Currency","IssuerorOperatoroftheTradingVenueIdentifier":"NA","PriceMultiplier":1,"FullName":"Rates Swap Fixed_Fixed EUR 20270208","ShortName":"NA/Swap Fxd Fxd EUR 20270208","ClassificationType":"SRDCSP"}}
AssetClass (1938)		1 - Interest Rate
TransactTime (60)		20170718-08:44:11.378
SecurityReqID (320)	DREQ3	DREQ3
SecurityRequestResult (560)	0 - ValidRequest	0 - ValidRequest
AssetClass (1938)		1 - Interest Rate
CheckSum (10)	165	165

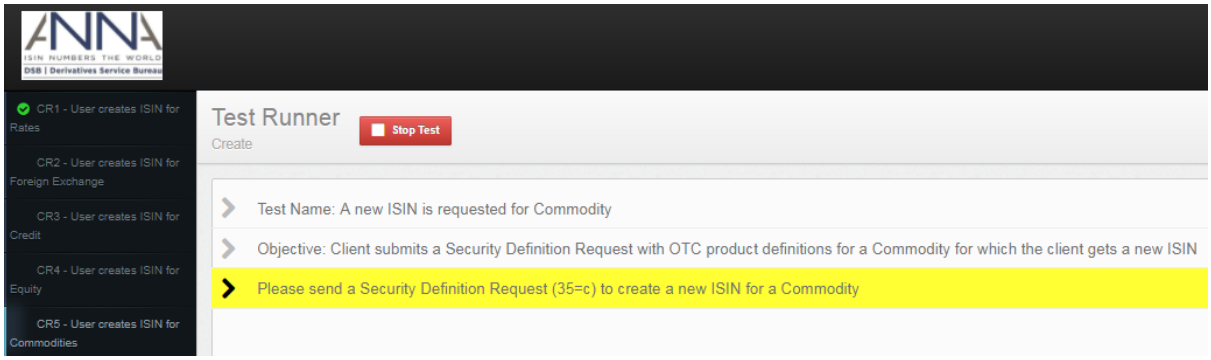
The table below provides an explanation of the sample content:

Field	Description	Comment
SecurityXML(1185)	Record Payload	{"Header":{"AssetClass":"Rates","InstrumentType":"Swap","UseCase":"Fixed_Fixed","Level":"InstRefDataReporting"},"Attributes":{"NotionalCurrency":"EUR","ExpiryDate":"2027-02-08","NotionalSchedule":"Constant"},"ISIN":{"ISIN":"EZ17PHMRHS16","Status":"New"},"TemplateVersion":1,"Derived":{"CommodityDerivativeIndicator":"FALSE","UnderlyingAssetType":"Fixed - Fixed","DeliveryType":"PHYS","SingleorMultiCurrency":"Single Currency","IssuerorOperatoroftheTradingVenueIdentifier":"NA","PriceMultiplier":1,"FullName":"Rates Swap Fixed_Fixed EUR 20270208","ShortName":"NA/Swap Fxd Fxd EUR

		20270208","ClassificationType":"SRD CSP"}}
AssetClass (1938)	Filter the request to products of a single asset class 1 = Interest rate 2 = Currency (Foreign Exchange) 3 = Credit 4 = Equity 5 = Commodity	
TransactTime (60)	Time of transaction	
SecurityRequestResult (560)	0 = Valid request 1 = Invalid or unsupported request 2 = No Instruments found that match selection criteria 3 = Not authorized to retrieve instrument data 4 = Instrument data temporarily unavailable	

CASE 2: Test Failed

Client sends an ISIN for Credit instead of Commodity Asset Class which the FIX Conductor is expecting.

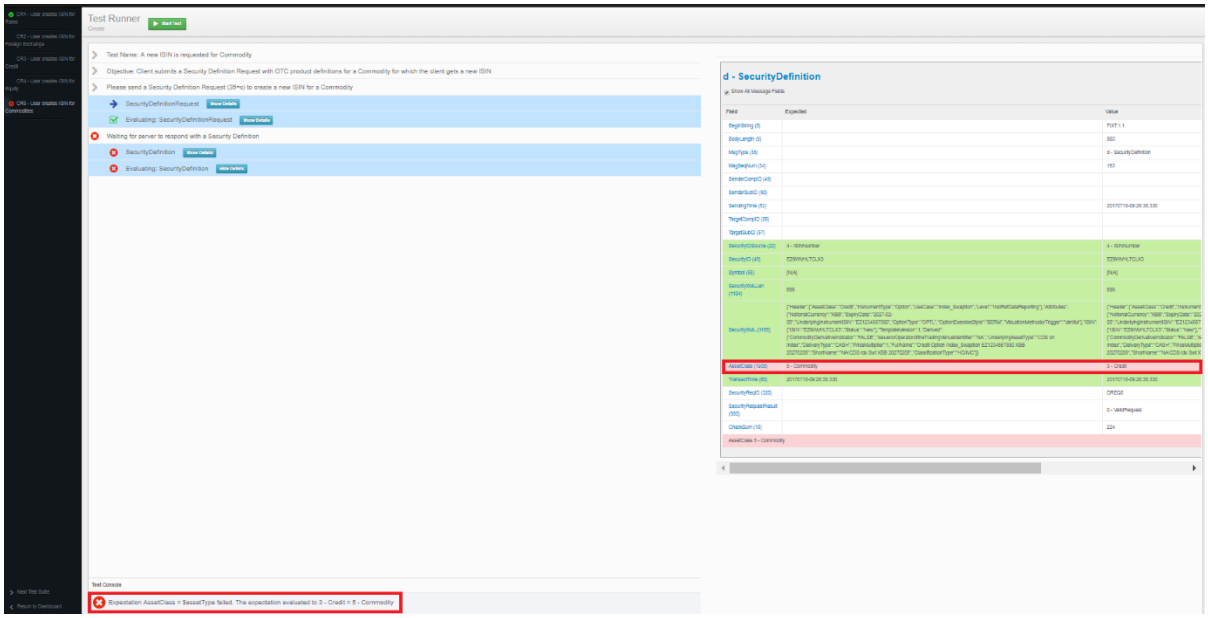


The following is a snapshot of the SecurityDefinitionRequest message (35=c) in the FIX log.

```
8=FIXT.1.1^A9=543^A35=c^A34=163^A49=SenderCompID^A50=SenderSubID^A52=20170718-
09:26:38.335^A56=TargetCompID^A57=TargetSubID^A55=[N/A]^A320=DREQ5^A321=1^A1184=435
^A1185={
    "Header": {
        "AssetClass": "Credit",
        "InstrumentType": "Option",
        "UseCase": "Index_Swaption",
        "Level": "InstRefDataReporting"
    },
    "Attributes": {
        "NotionalCurrency": "XBB",
        "ExpiryDate": "2027-02-08",
        "UnderlyingInstrumentISIN": "EZ1234567890",
        "OptionType": "OPTL",
        "OptionExerciseStyle": "BERM",
        "ValuationMethodorTrigger": "Vanilla"
    }
```

}^A10=173^A

Asset Type failed due to asset class mismatch. The FIX Conductor was expecting for Commodity but ISIN for Credit asset class was created.

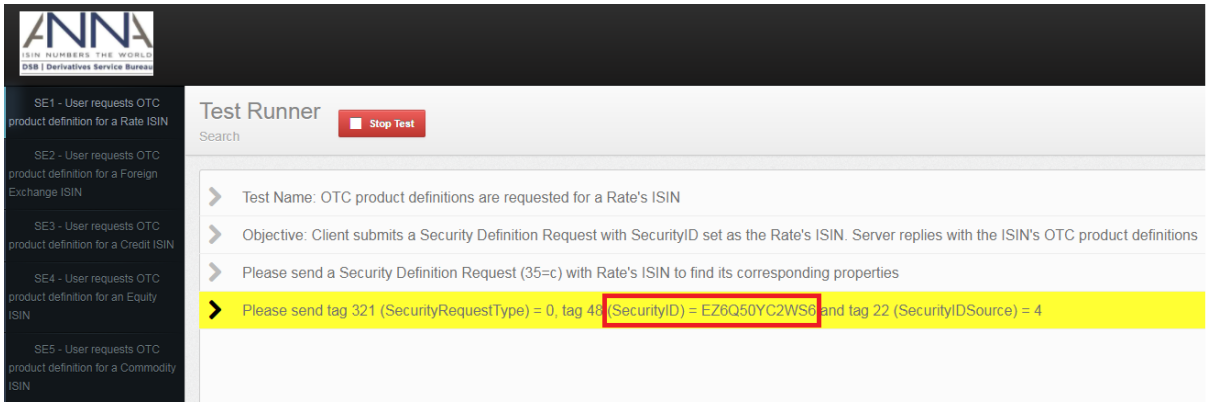


3.3.3 Search ISIN

Client submits an ISIN per asset class to request the OTC product definition for an ISIN.

CASE 1: Test Passed

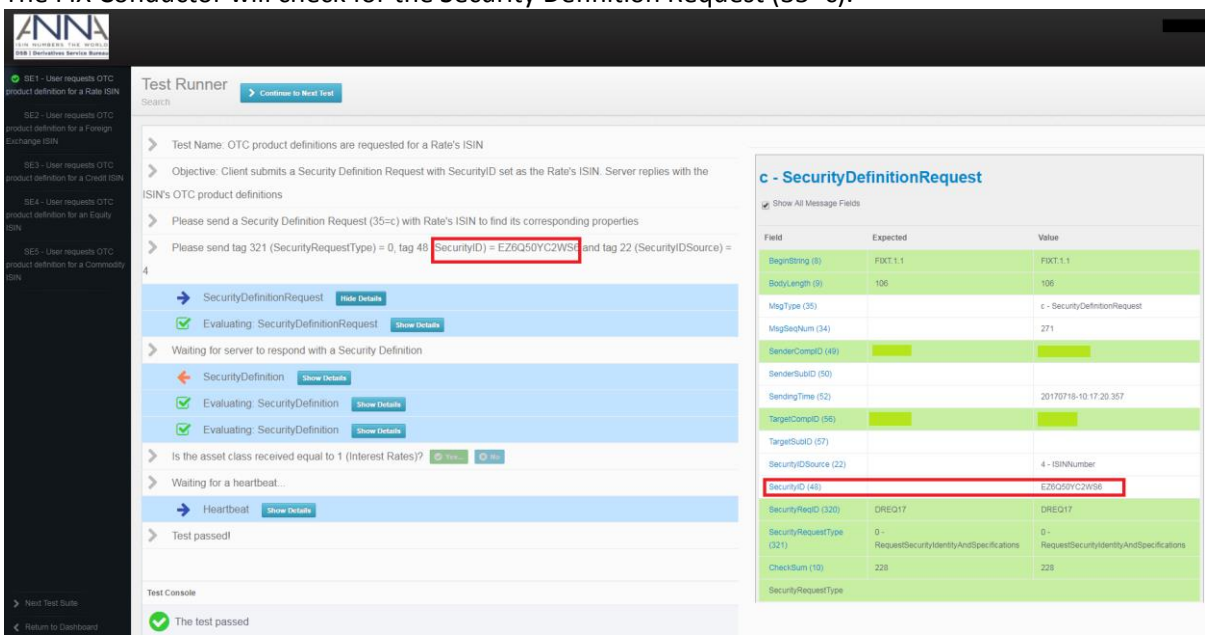
The client needs to send the ISIN provided in the FIX Conductor.



The following is a sample of a SecurityDefinitionRequest message (35=c) having an ISIN.

8=FIXT.1.1^A9=106^A35=c^A34=271^A49=SenderCompID^A50=SenderSubID^A52=20170718-10:17:20.357^A56=TargetCompID^A57=TargetSubID^A22=4^A48=EZ6Q50YC2WS6^A320=DREQ17^A321=0^A10=228^A

The FIX Conductor will check for the Security Definition Request (35=c).



The FIX Conductor will wait for the server to respond with a Security Definition (35=d).

8=FIXT.1.1^A9=930^A35=d^A34=275^A49=DSB^A50=UAT^A52=20170718-10:17:20.160^A56=ITIVITI^A57=IT^A22=4^A48=EZ6Q50YC2WS6^A55=[N/A]^A60=20170718-10:17:20.160^A320=DREQ17^A560=0^A1184=768^A1185={"Header":{"AssetClass":"Rates","InstrumentType":"Swap","UseCase":"Inflation_Swap","Level":"InstRefDataReporting"},"Attributes":{"NotionalCurrency":"SEK","ExpiryDate":"2027-12-10","ReferenceRate":"HKD-CPI","ReferenceRateTermValue":-73800066,"ReferenceRateTermUnit":"YEAR","NotionalSchedule":"Custom"},"ISIN":{"ISIN":"EZ6Q50YC2WS6","Status":"New"},"TemplateVersion":1,"Derived":{"ISOReferenceRate":"CPI","CommodityDerivativeIndicator":"FALSE","UnderlyingAssetType":"Inflation Rate Index","DeliveryType":"PHYS","SingleorMultiCurrency":"Single Currency","IssuerorOperatoroftheTradingVenueIdentifier":"NA","PriceMultiplier":1,"FullName":"Rates Swap Inflation_Swap HKD-CPI -73800066 YEAR 20271210","ShortName":"NA/Swap Infl Idx SEK 20271210","ClassificationType":"SRGYSP"}}^A1938=1^A10=203^A

Client can verify the product definition on the SecurityDefinition details in the FIX Conductor. The test passed since the asset class of the ISIN submitted matched the expected asset class.

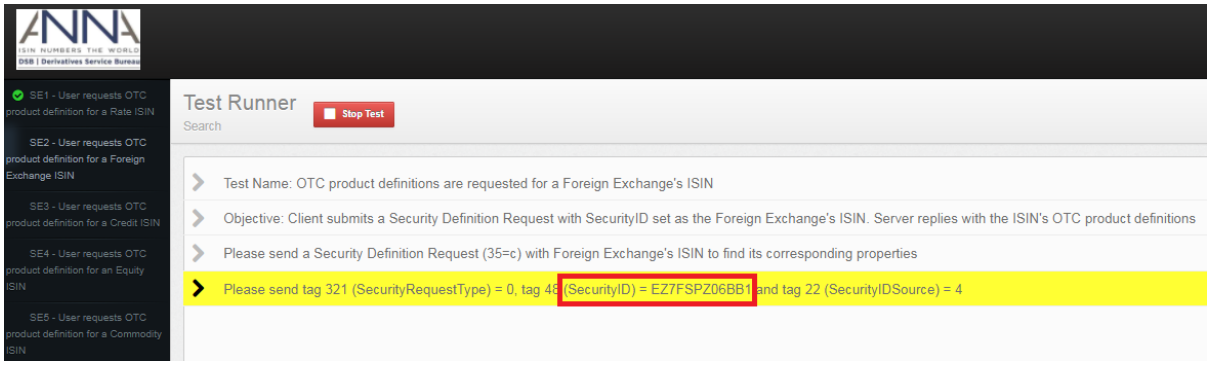
d - SecurityDefinition

Show All Message Fields

Field	Expected	Value
BeginString (8)	FIXT.1.1	FIXT.1.1
BodyLength (9)	930	930
MsgType (35)		d - SecurityDefinition
MsgSeqNum (34)		275
SenderCompID (49)		
SenderSubID (50)		
SendingTime (52)		20170718-10:17:20.160
TargetCompID (56)		
TargetSubID (57)		
SecurityIDSource (22)		4 - ISINNumber
SecurityID (48)		EZ6Q50YC2WS6
Symbol (55)		[N/A]
SecurityXMLLen (1184)		768
SecurityXML (1185)		{"Header": {"AssetClass":"Rates","InstrumentType":"Swap","UseCase":"Inflation_Swap","Level":"InstRefDataReporting"},"Att {"NotionalCurrency":"SEK","ExpiryDate":"2027-12-10","ReferenceRate":"HKD-CPI","ReferenceRateTermValue":-73800066,"ReferenceRateTermUnit":"YEAR","NotionalSchedule":"Custom"},"I {"ISIN":"EZ6Q50YC2WS6","Status":"New"},"TemplateVersion":1,"Derived": {"ISOReferenceRate":"CPI","CommodityDerivativeIndicator":"FALSE","UnderlyingAssetType":"Inflation Rate Index","DeliveryType":"PHYS","SingleorMultiCurrency":"Single Currency","IssueroroperatoroftheTradingVenueIdentifier":"NA","PriceMultiplier":1,"FullName":"Rates Swap Inflation_Swap HKD-CPI -73800066 YEAR 20271210","ShortName":"NA/Swap Infl Idx SEK 20271210","ClassificationType":"SRGYSP"}}
AssetClass (1938)		1 - Interest Rate
TransactTime (60)		20170718-10:17:20.160
SecurityReqID (320)	DREQ17	DREQ17

CASE 2: Test Failed

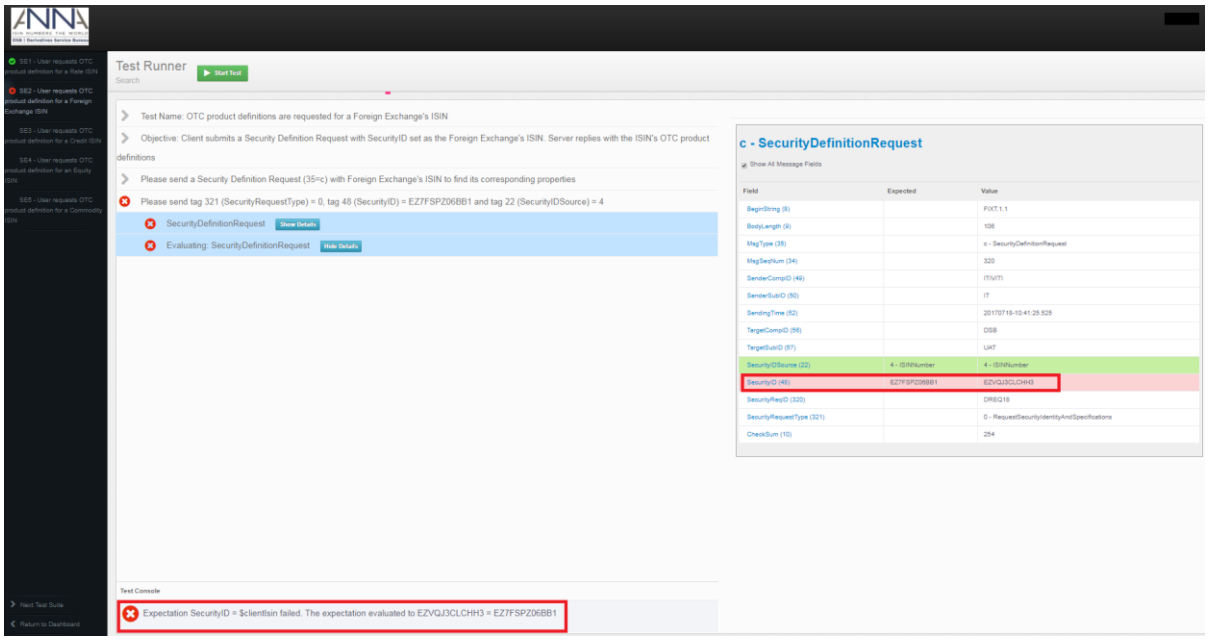
Client inputs an ISIN except the Security ID listed in the FIX Conductor.



The following is a sample of a SecurityDefinitionRequest message (35=c) having an ISIN.

```
8=FIXT.1.1^A9=106^A35=c^A34=320^A49=SenderCompID^A50=SenderSubID^A52=20170718-
10:41:25.525^A56=TargetCompID^A57=TargetSubID^A22=4^A48=EZVQJ3CLCHH3^A320=DREQ18^A3
21=0^A10=254^A
```

The Test failed due to security ID did not match.

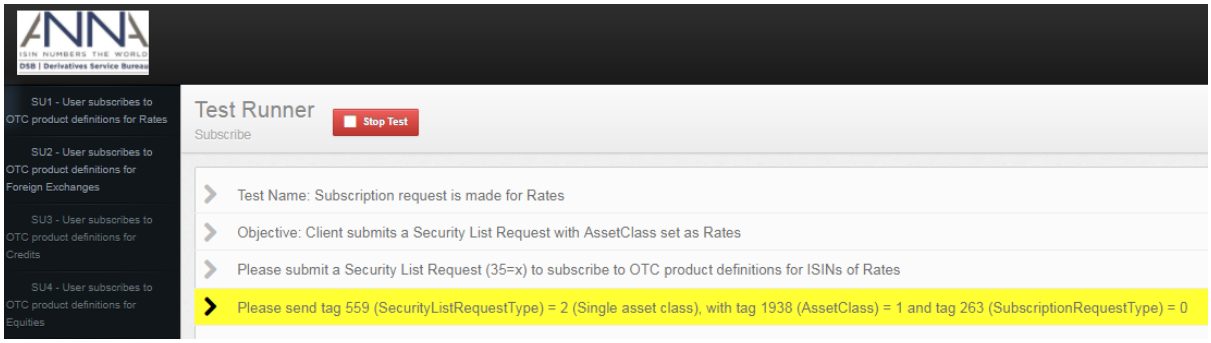


3.3.4 Subscribe

Client needs to subscribe to Asset Class and send SubscriptionRequestType listed in the FIX Conductor.

CASE 1: Test Passed

Client should subscribe to Rates Asset Class (1938=1) and send SubscriptionRequestType (263=0).



The table below provides an explanation of the sample content:

Name	Data Type	Tag	Rq	Description
SecurityListRequestType	Int	559	Y	2= Product: Filter the request to products of a single asset class 4 = All Securities (that were created today, i.e. since midnight).
AssetClass	String	1938	N	Filter the request to products of a single asset class 1 = Interest rate 2 = Currency (Foreign Exchange) 3 = Credit 4 = Equity 5 = Commodity
SubscriptionRequestType	Char	263	Y	0 = Snapshot 1 = Snapshot + updates 2 = Unsubscribe

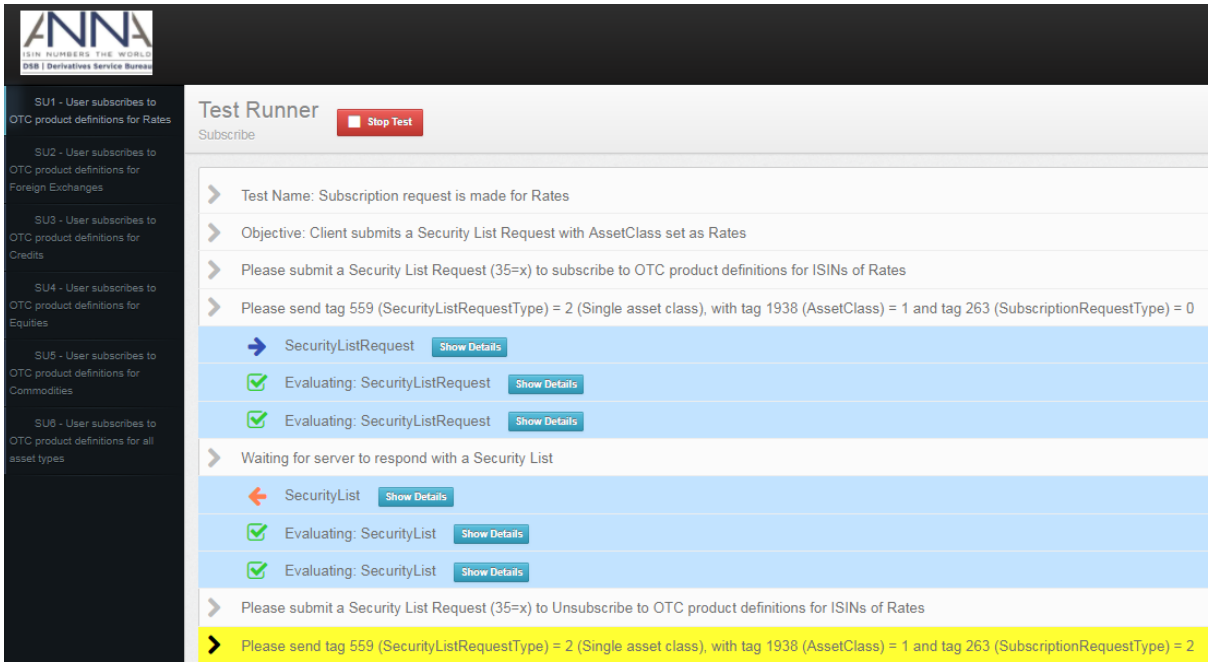
The following is a sample of a SecurityListRequest message (35=x). The request is for a snapshot of Rates asset class.

8=FIXT.1.1^A9=98^A35=x^A34=348^A49=SenderCompID^A50=SenderSubID^A52=20170718-10:55:06.757^A56=TargetCompID^A57=TargetSubID^A263=0^A320=LREQ19^A559=2^A1938=1^A10=143^A

The following is a sample of a SecurityList message (35=y).

8=FIXT.1.1^A9=2286^A35=y^A34=352^A49=TargetCompID^A50=TargetSubID^A52=20170718-10:55:08.765^A56=SenderCompID^A57=SenderSubID^A60=20170718-10:55:08.764^A320=LREQ19^A393=3^A560=0^A146=3^A55=[N/A]^A48=EZ95C0ZXR6B5^A22=4^A1938=1^A1184=620^A1185={"Header":{"AssetClass":"Rates","InstrumentType":"Swap","UseCase":"Fixed_Fixed","Level":"InstRefDataReporting"},"Attributes":{"NotionalCurrency":"EUR","ExpiryDate":"2027-02-07","NotionalSchedule":"Constant"},"ISIN":{"ISIN":"EZ95C0ZXR6B5","Status":"New"},"TemplateVersion":1,"Derived":{"CommodityDerivativeIndicator":"FALSE","UnderlyingAssetType":"Fixed - Fixed","DeliveryType":"PHYS","SingleorMultiCurrency":"Single Currency","IssuerorOperatoroftheTradingVenueIdentifier":"NA","PriceMultiplier":1,"FullName":"Rates Swap Fixed_Fixed EUR 20270207","ShortName":"NA/Swap Fxd Fxd EUR 20270207","ClassificationType":"SRDCSP"}}^A55=[N/A]^A48=EZ17PHMRHS16^A22=4^A1938=1^A1184=620^A1185={"Header":{"AssetClass":"Rates","InstrumentType":"Swap","UseCase":"Fixed_Fixed","Level":"InstRefDataReporting"},"Attributes":{"NotionalCurrency":"EUR","ExpiryDate":"2027-02-08","NotionalSchedule":"Constant"},"ISIN":{"ISIN":"EZ17PHMRHS16","Status":"New"},"TemplateVersion":1,"Derived":{"CommodityDerivativeIndicator":"FALSE","UnderlyingAssetType":"Fixed - Fixed","DeliveryType":"PHYS","SingleorMultiCurrency":"Single Currency","IssuerorOperatoroftheTradingVenueIdentifier":"NA","PriceMultiplier":1,"FullName":"Rates Swap Fixed_Fixed EUR 20270208","ShortName":"NA/Swap Fxd Fxd EUR 20270208","ClassificationType":"SRDCSP"}}^A55=[N/A]^A48=EZ6Q50YC2WS6^A22=4^A1938=1^A1184=768^A1185={"Header":{"AssetClass":"Rates","InstrumentType":"Swap","UseCase":"Inflation_Swap","Level":"InstRefDataReporting"},"Attributes":{"NotionalCurrency":"SEK","ExpiryDate":"2027-12-10","ReferenceRate":"HKD-CPI","ReferenceRateTermValue":-73800066,"ReferenceRateTermUnit":"YEAR","NotionalSchedule":"Custom"},"ISIN":{"ISIN":"EZ6Q50YC2WS6","Status":"New"},"TemplateVersion":1,"Derived":{"ISOReferenceRate":"CPI","CommodityDerivativeIndicator":"FALSE","UnderlyingAssetType":"Inflation Rate Index","DeliveryType":"PHYS","SingleorMultiCurrency":"Single Currency","IssuerorOperatoroftheTradingVenueIdentifier":"NA","PriceMultiplier":1,"FullName":"Rates Swap Inflation_Swap HKD-CPI -73800066 YEAR 20271210","ShortName":"NA/Swap Infl Idx SEK 20271210","ClassificationType":"SRGYSP"}}^A10=000^A

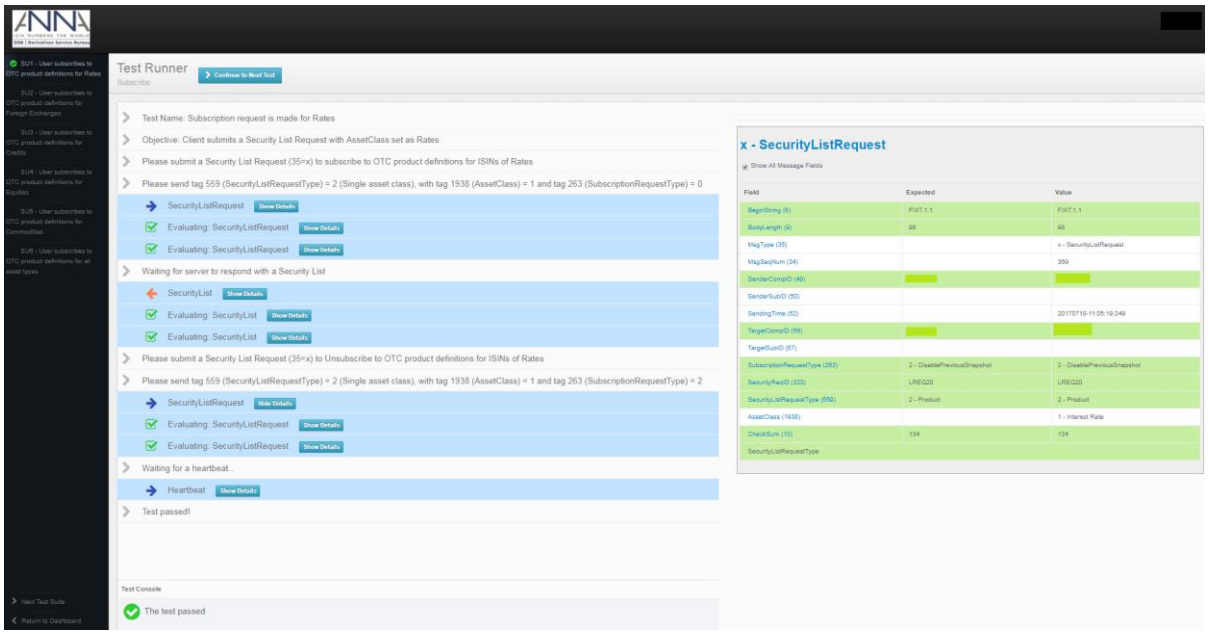
Client needs to Unsubscribe (SubscriptionRequestType 263=2) to OTC product definition for Rates to proceed on the next test case.



The following is a sample of a SecurityListRequest message (35=x) with SubscriptionRequestType (263=2).

```
8=FIXT.1.1^A9=98^A35=x^A34=369^A49=SenderCompID^A50=SenderSubID^A52=20170718-
11:05:19.049^A56=TargetCompID^A57=TargetSubID^A263=2^A320=LREQ20^A559=2^A1938=1^A10
=134^A
```

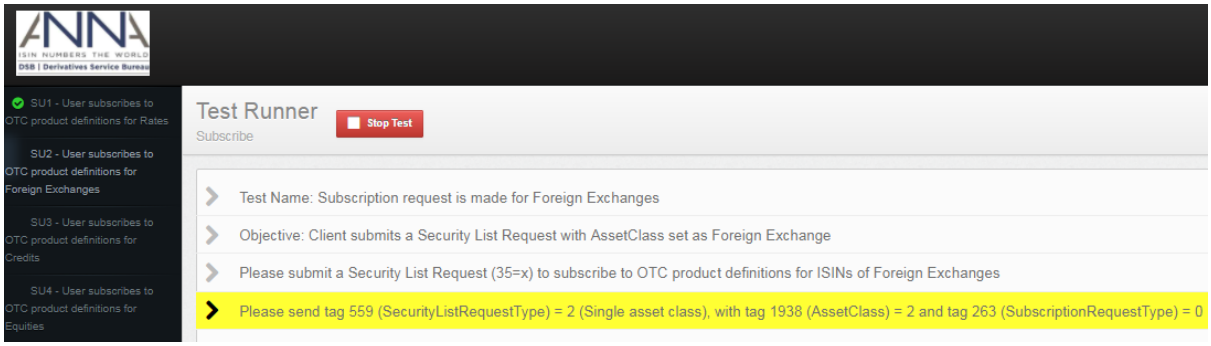
The Test Console shows that the test passed.



CASE 2: Test Failed

If the Client subscribes to any Asset Class and SubscriptionRequestType that are not listed in the FIX Conductor, the test will fail.

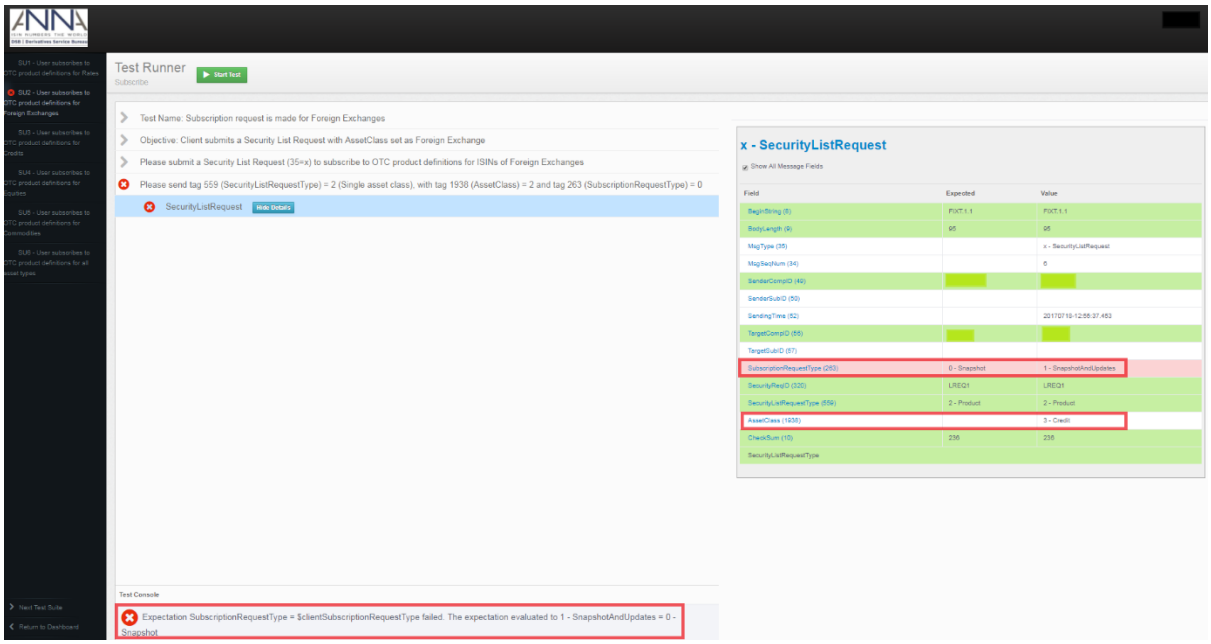
In this example, the client should send Foreign Exchange Asset Class (1938=2) with Snapshot SubscriptionRequestType (263=0).

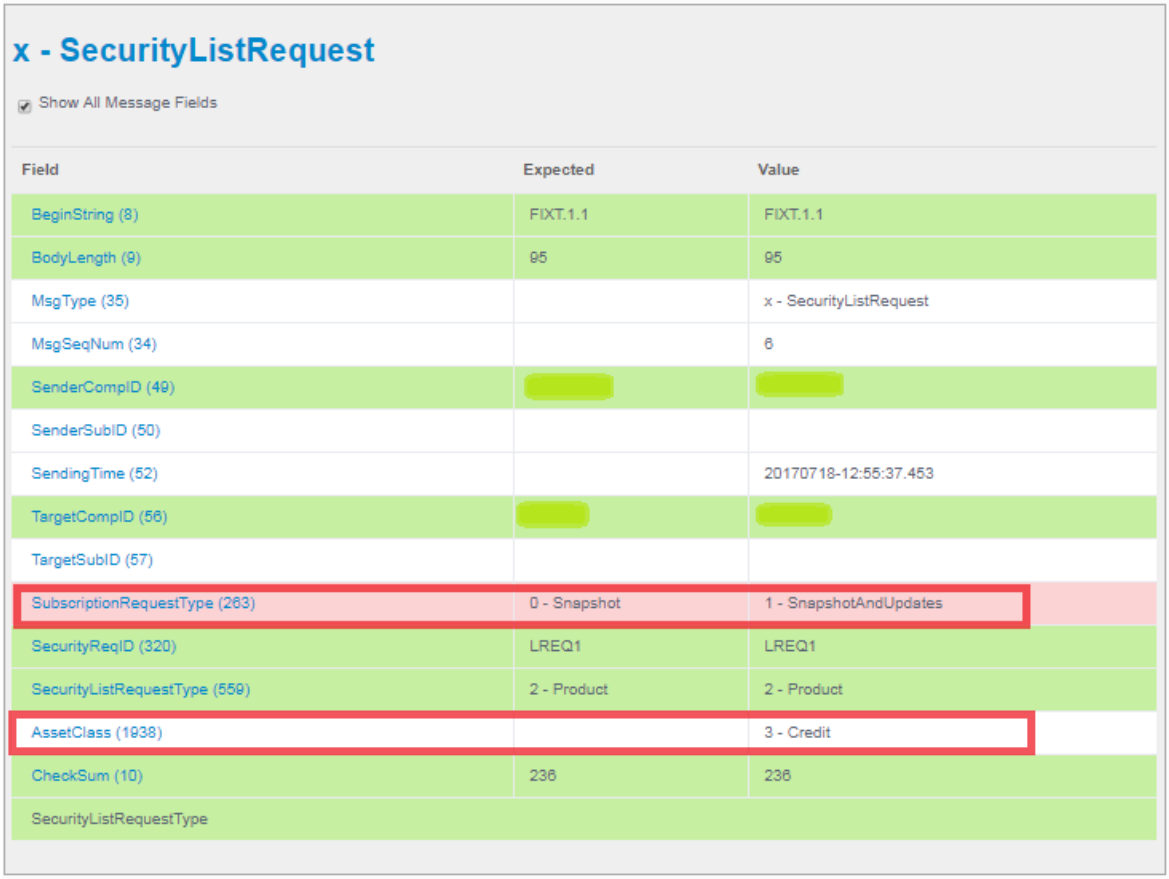


The following is a sample of a SecurityListRequest message (35=x) with tag 1938=3 (Credit) and 263=1 (Snapshot+Updates).

```
8=FIXT.1.1^A9=98^A35=x^A34=405^A49=SenderCompID^A50=SenderSubID^A52=20170718-
11:22:51.363^A56=TargetCompID^A57=TargetSubID^A263=1^A320=LREQ21^A559=2^A1938=3^A10
=121^A
```

The Test Console shows that the test failed due to SubscriptionRequestType and AssetClass mismatch.





x - SecurityListRequest

Show All Message Fields

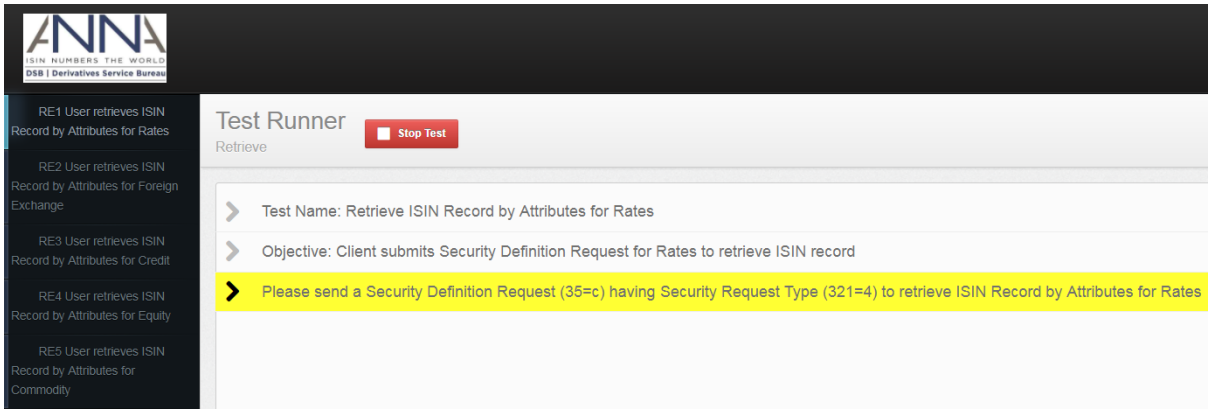
Field	Expected	Value
BeginString (8)	FIXT.1.1	FIXT.1.1
BodyLength (9)	95	95
MsgType (35)		x - SecurityListRequest
MsgSeqNum (34)		6
SenderCompID (49)	[redacted]	[redacted]
SenderSubID (50)		
SendingTime (52)		20170718-12:55:37.453
TargetCompID (56)	[redacted]	[redacted]
TargetSubID (57)		
SubscriptionRequestType (263)	0 - Snapshot	1 - SnapshotAndUpdates
SecurityReqID (320)	LREQ1	LREQ1
SecurityListRequestType (559)	2 - Product	2 - Product
AssetClass (1938)		3 - Credit
CheckSum (10)	236	236
SecurityListRequestType		

3.3.5 Retrieve

The client can retrieve ISIN record by attributes to return the existing record if the ISIN record already exists.

CASE 1: Test Passed

The FIX Conductor will request client to send Security Definition Request (35=c) having Security Request Type (321=4) for the specific asset class.

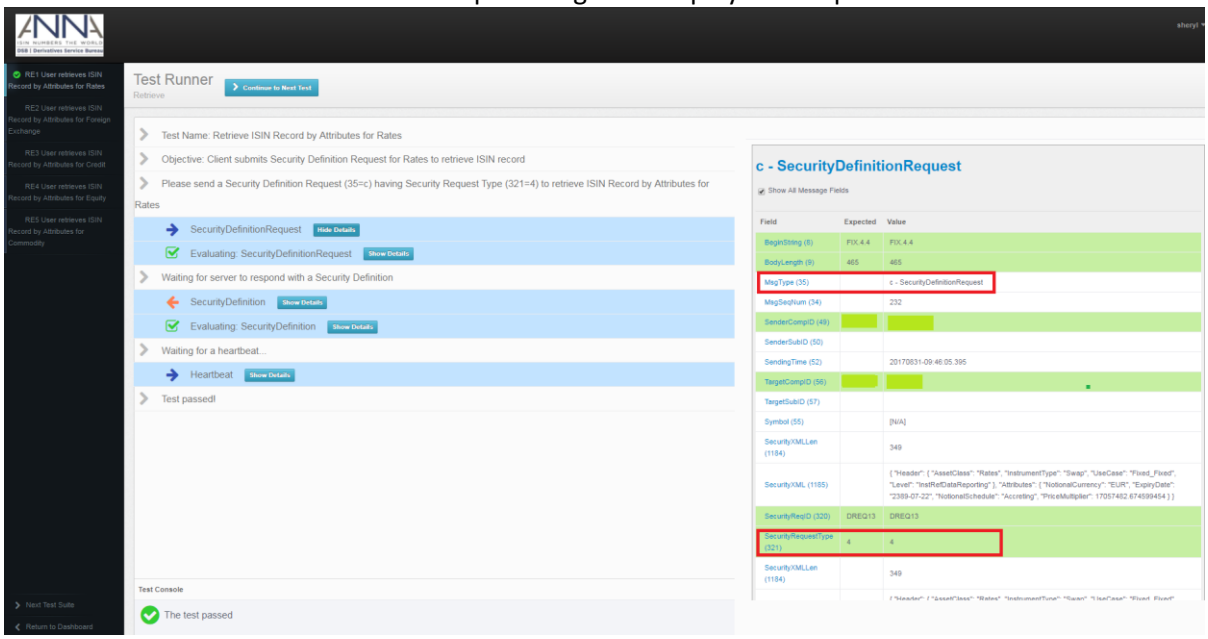


The following is a snapshot of the SecurityDefinitionRequest message (35=c) having SecurityRequestType (321=4) in the FIX log.

```
8=FIX.4.4^A9=465^A35=c^A34=232^A49=SenderCompID^A50=SenderSubID^A52=20170831-
09:46:05.395^A56=TargetCompID^A57=TargetSubID^A55=[N/A]^A320=DREQ13^A321=4^A1184=34
9^A1185={
```

```
    "Header": {
        "AssetClass": "Rates",
        "InstrumentType": "Swap",
        "UseCase": "Fixed_Fixed",
        "Level": "InstRefDataReporting"
    },
    "Attributes": {
        "NotionalCurrency": "EUR",
        "ExpiryDate": "2389-07-22",
        "NotionalSchedule": "Accreting",
        "PriceMultiplier": 17057482.674599454
    }
}^A10=238^A
```


The FIX Conductor will check for the required tags and display the output of the test case.



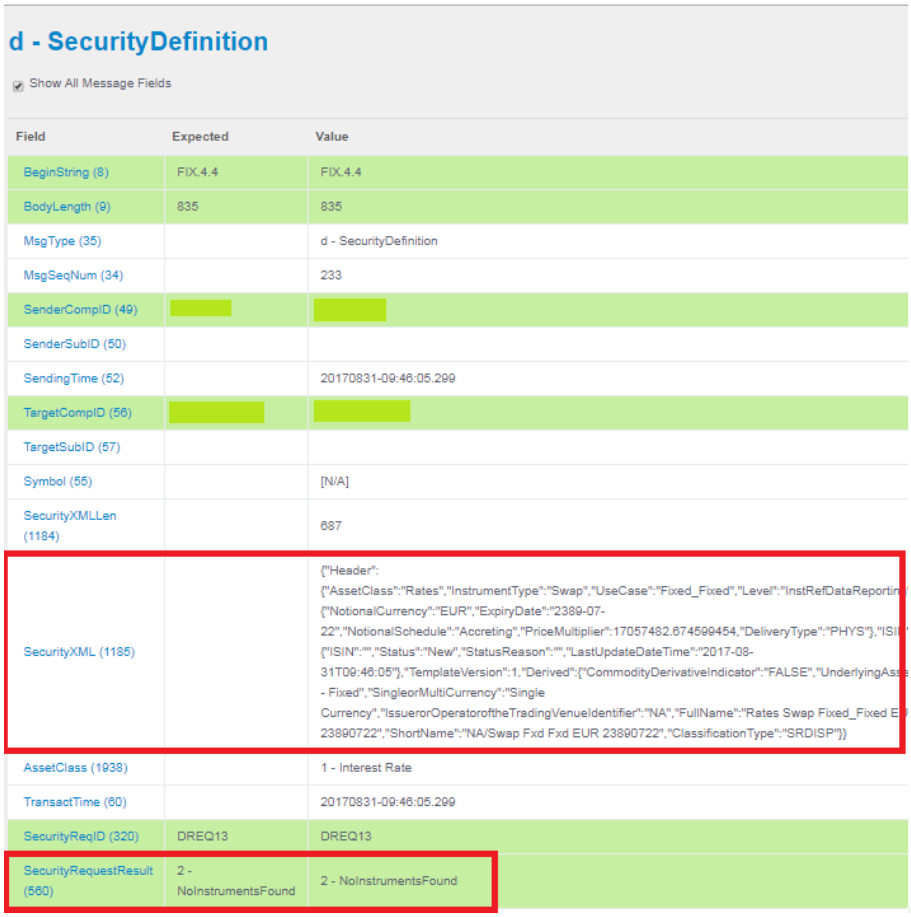
If the request is valid, Security Request Result will display 560=0 and the JSON payload is available in SecurityXML (1185) and it contains a valid ISIN identifier.


```
8=FIX.4.4^A9=868^A35=d^A34=269^A49=TargetCompID^A50=TargetSubID^A52=20170831-
10:04:02.855^A56=SenderCompID^A57=SenderSubID^A22=4^A48=EZB0BLWWZN02^A55=[N/A]^A60=
20170831-
10:04:02.855^A320=DREQ14^A560=0^A1184=699^A1185={"Header":{"AssetClass":"Rates","In
strumentType":"Swap","UseCase":"Fixed_Fixed","Level":"InstRefDataReporting"},"Attri
butes":{"NotionalCurrency":"EUR","ExpiryDate":"2389-07-
22","NotionalSchedule":"Accreting","PriceMultiplier":17057482.674599454,"DeliveryTy
pe":"PHYS"},"ISIN":{"ISIN":"EZB0BLWWZN02","Status":"New","StatusReason":"","LastUpd
ateDateTime":"2017-08-
31T10:04:02"},"TemplateVersion":1,"Derived":{"CommodityDerivativeIndicator":"FALSE"
,"UnderlyingAssetType":"Fixed - Fixed","SingleorMultiCurrency":"Single
Currency","IssuerorOperatoroftheTradingVenueIdentifier":"NA","FullName":"Rates Swap
Fixed_Fixed EUR 23890722","ShortName":"NA/Swap Fxd Fxd EUR
23890722","ClassificationType":"SRDISP"}}^A1938=1^A10=023^A
```


In case JSON payload is available in SecurityXML (1185) yet the ISIN identifier is empty, the Security Request Result will display 560=2 which is no instruments found that match the selection criteria. Other attributes like the CFI and FISN are populated.

8=FIX.4.4^A9=835^A35=d^A34=233^A49=TargetCompID^A50=TargetSubID^A52=20170831-09:46:05.299^A56=SenderCompID^A57=SenderSubID^A55=[N/A]^A60=20170831-09:46:05.299^A320=DREQ13^A560=2^A1184=687^A1185={"Header":{"AssetClass":"Rates","InstrumentType":"Swap","UseCase":"Fixed_Fixed","Level":"InstRefDataReporting"},"Attributes":{"NotionalCurrency":"EUR","ExpiryDate":"2389-07-22","NotionalSchedule":"Accreting","PriceMultiplier":17057482.674599454,"DeliveryType":"PHYS"},"ISIN":{"ISIN":"","Status":"New","StatusReason":"","LastUpdateDateTime":"2017-08-31T09:46:05"},"TemplateVersion":1,"Derived":{"CommodityDerivativeIndicator":"FALSE","UnderlyingAssetType":"Fixed - Fixed","SingleorMultiCurrency":"Single Currency","IssuerorOperatoroftheTradingVenueIdentifier":"NA","FullName":"Rates Swap Fixed_Fixed EUR 23890722","ShortName":"NA/Swap Fxd Fxd EUR 23890722","ClassificationType":"SRDISP"}}^A1938=1^A10=015^A

The FIX Conductor will display the details of the Security Definition (35=d) message.



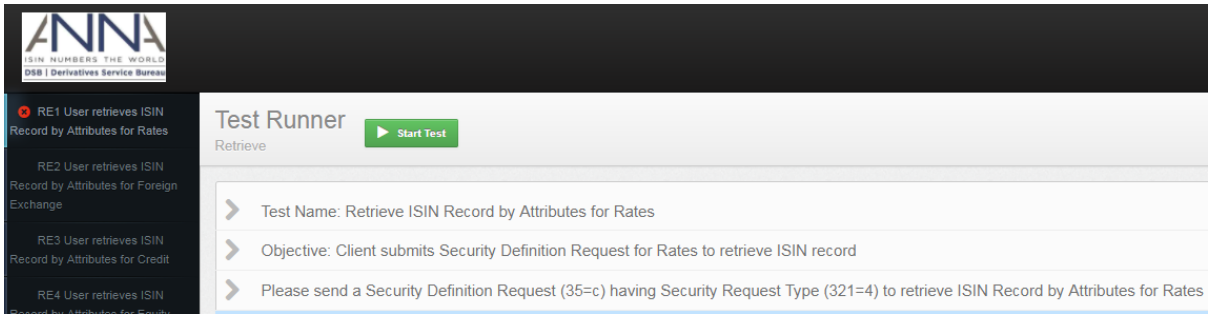
d - SecurityDefinition

Show All Message Fields

Field	Expected	Value
BeginString (8)	FIX.4.4	FIX.4.4
BodyLength (9)	835	835
MsgType (35)		d - SecurityDefinition
MsgSeqNum (34)		233
SenderCompID (49)		
SenderSubID (50)		
SendingTime (52)		20170831-09:46:05.299
TargetCompID (56)		
TargetSubID (57)		
Symbol (55)		[N/A]
SecurityXMLLen (1184)		687
SecurityXML (1185)		{"Header": {"AssetClass":"Rates","InstrumentType":"Swap","UseCase":"Fixed_Fixed","Level":"InstRefDataReporting"},"Attributes":{"NotionalCurrency":"EUR","ExpiryDate":"2389-07-22","NotionalSchedule":"Accreting","PriceMultiplier":17057482.674599454,"DeliveryType":"PHYS"},"ISIN":{"ISIN":"","Status":"New","StatusReason":"","LastUpdateDateTime":"2017-08-31T09:46:05"},"TemplateVersion":1,"Derived":{"CommodityDerivativeIndicator":"FALSE","UnderlyingAssetType":"Fixed - Fixed","SingleorMultiCurrency":"Single Currency","IssuerorOperatoroftheTradingVenueIdentifier":"NA","FullName":"Rates Swap Fixed_Fixed EUR 23890722","ShortName":"NA/Swap Fxd Fxd EUR 23890722","ClassificationType":"SRDISP"}}
AssetClass (1938)		1 - Interest Rate
TransactTime (60)		20170831-09:46:05.299
SecurityReqID (320)	DREQ13	DREQ13
SecurityRequestResult (560)	2 - NoInstrumentsFound	2 - NoInstrumentsFound

CASE 2: Test Failed

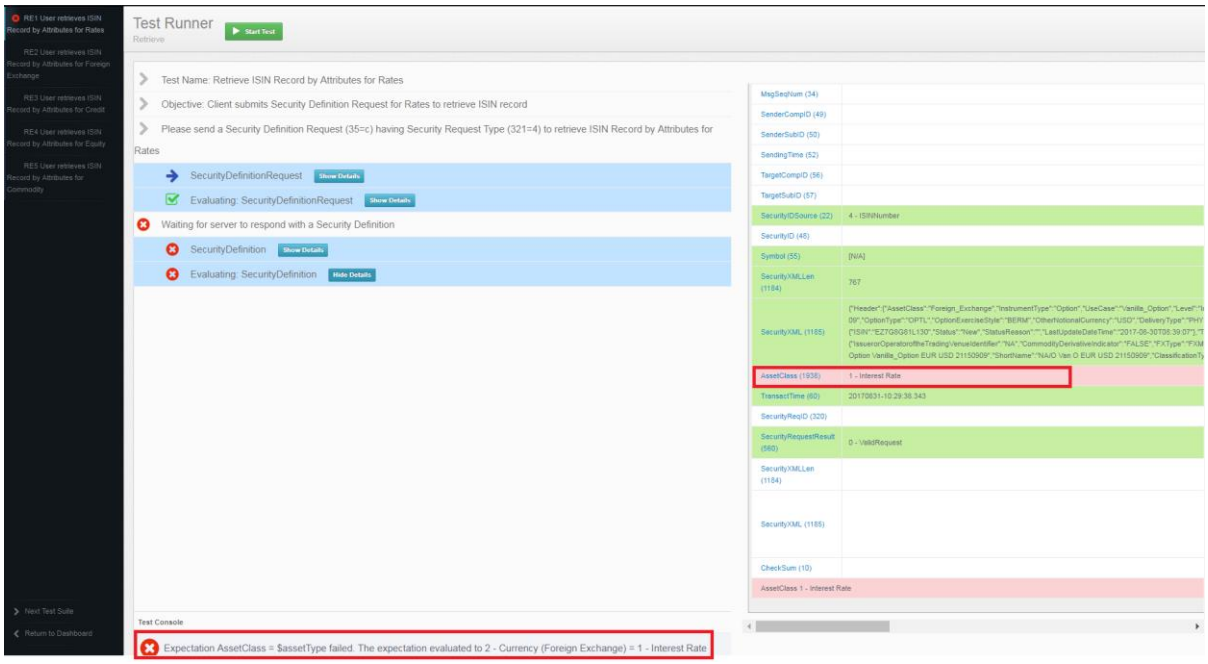
The test will fail if the client sends a Security Definition Request for a different asset class that the FIX Conductor is expecting or if there are missing tags.



The following is a snapshot of the SecurityDefinitionRequest message (35=c) in the FIX log.

```
8=FIX.4.4^A9=502^A35=c^A34=320^A49=SenderCompID^A50=SenderSubID^A52=20170831-
10:29:38.357^A56=TargetCompID^A57=TargetSubID^A55=[N/A]^A320=DREQ16^A321=4^A1184=38
6^A1185={
    "Header": {
        "AssetClass": "Foreign_Exchange",
        "InstrumentType": "Option",
        "UseCase": "Vanilla_Option",
        "Level": "InstRefDataReporting"
    },
    "Attributes": {
        "NotionalCurrency": "EUR",
        "ExpiryDate": "2115-09-09",
        "OptionType": "OPTL",
        "OptionExerciseStyle": "BERM",
        "OtherNotionalCurrency": "USD"
    }
}^A10=181^A
```

Asset Type failed due to asset class mismatch. The FIX Conductor was expecting for Rates but SecurityDefinitionRequest (35=c) for Foreign Exchange was sent.

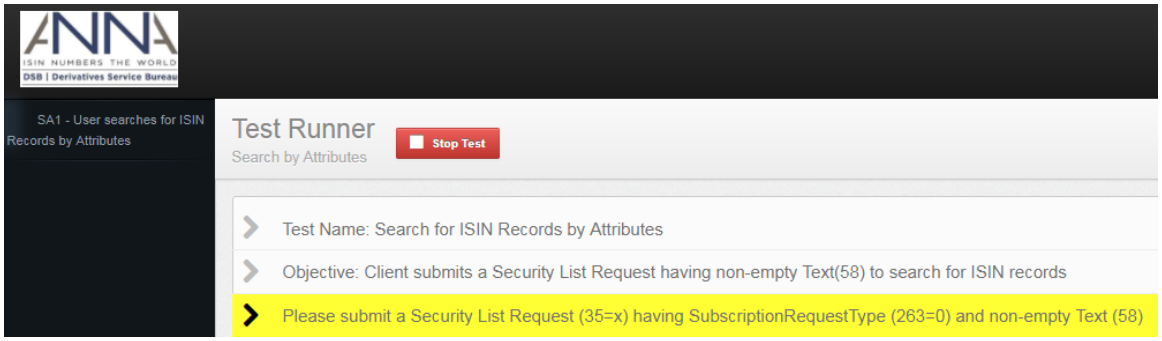


3.3.6 Search by Attributes

The client can search ISIN records by attributes that match the supplied criteria that is provided in the Text(58) tag.

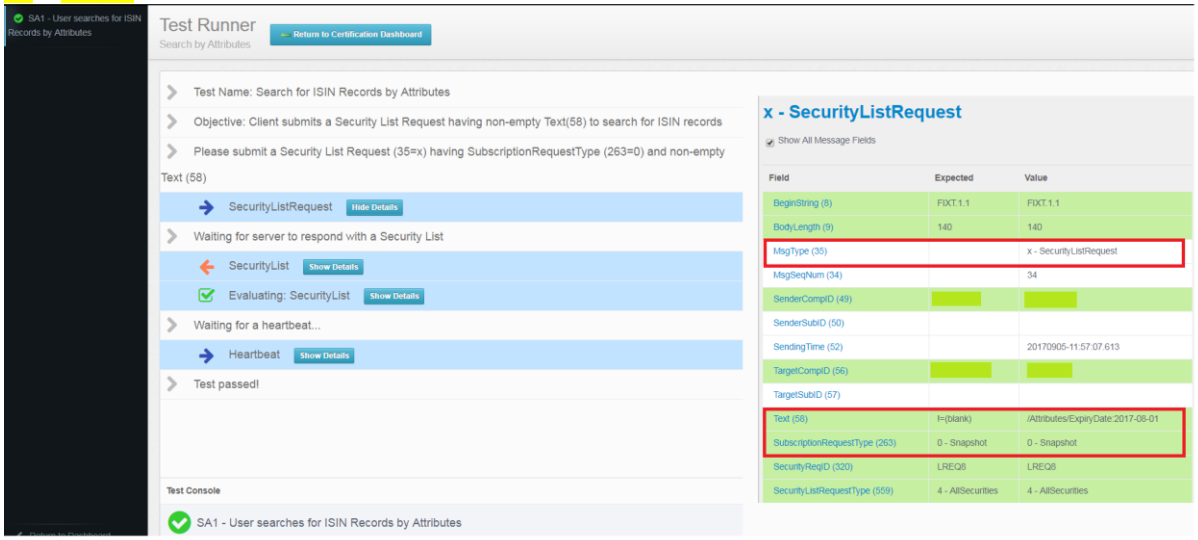
CASE 1: Test Passed

The FIX Conductor will request client to submit a Security List Request (35=x) having Subscription Request Type (263=0) and non-empty Text (58).



The following is a sample of a SecurityListRequest message (35=x) having SubscriptionRequestType (263=0) and non-empty Text (58).

```
8=FIXT.1.1^A9=140^A35=x^A34=23^A49=SenderCompID^A50=SenderSubID^A52=20170905-
11:52:05.415^A56=TargetCompID^A57=TargetSubID^A58=/Attributes/ExpiryDate:2017-08-
01^A263=0^A320=LREQ7^A559=4^A1181=0^A10=024^A
```



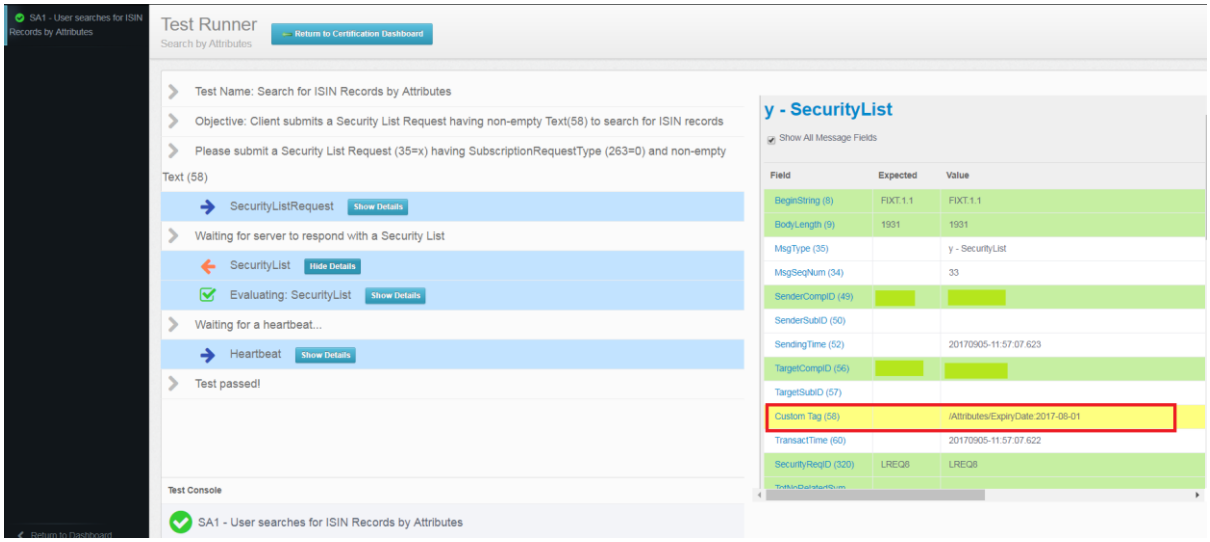
The following is a sample of a SecurityList message (35=y). A valid response contains

- SecurityRequestResults(560)=Valid Request(0)
- TotNoRelatedSym(393): The total number of ISIN records that matches the search criteria
- NoRelatedSym(146): The number of ISIN records in this message
- ApplSeqNum(1181): as supplied by the user

```
8=FIXT.1.1^A9=1931^A35=y^A34=22^A49=TargetCompID^A50=TargetSubID^A52=20170905-
11:52:05.397^A56=SenderCompID^A57=SenderSubID^A58=/Attributes/ExpiryDate:2017-08-
01^A60=20170905-11:52:05.396^A320=LREQ7^A393=2^A560=0
```

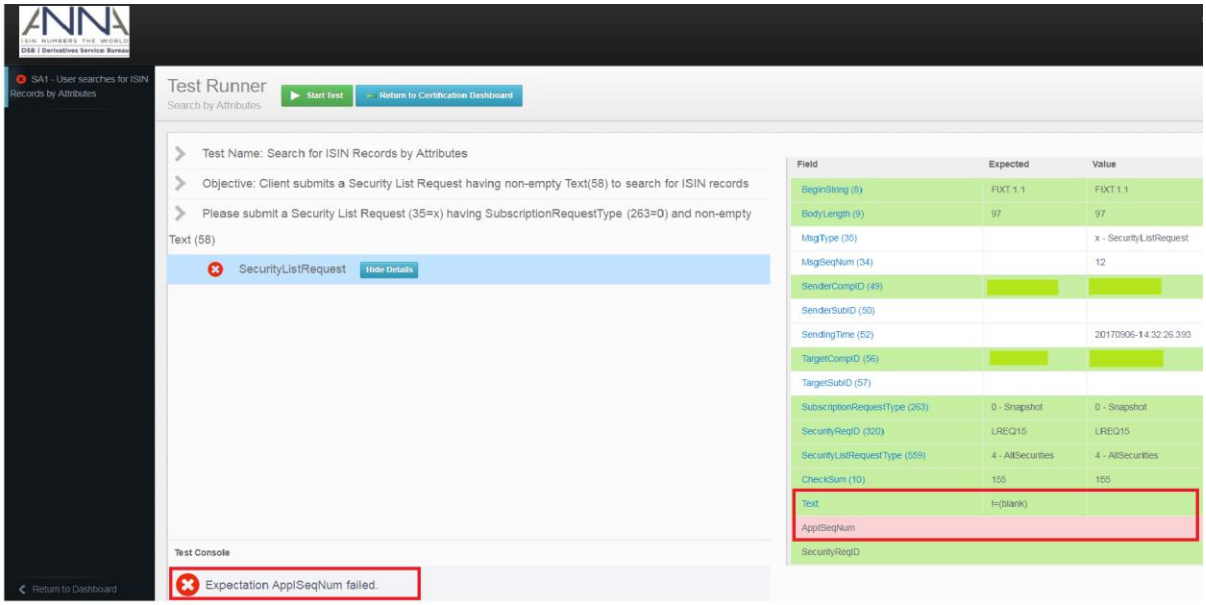
^A1181=0^A146=2^A55=[N/A]^A48=EZ84H1HTRFT4^A22=4^A1938=5^A1184=892^A1185={"Header":{"AssetClass":"Commodities","InstrumentType":"Forward","UseCase":"Forward","Level":"InstRefDataReporting"},"Attributes":{"NotionalCurrency":"EUR","ExpiryDate":"2017-08-01","ReturnorPayoutTrigger":"Contract for Difference (CFD)","DeliveryType":"CASH","BaseProduct":"AGRI","TransactionType":"FUTR","FinalPriceType":"ARGM","ReferenceRate":"A Fuel oil 0.1%S -waterborne spot Tokyo bay rim intelligence products","PriceMultiplier":1,"SubProduct":"GROS","AdditionalSubProduct":"FWHT"},"ISIN":{"ISIN":"EZ84H1HTRFT4","Status":"Expired","StatusReason":"","LastUpdateDateTime":"2017-09-05T11:51:28"},"TemplateVersion":1,"Derived":{"CommodityDerivativeIndicator":"TRUE","UnderlyingAssetType":"Agriculture","IssuerorOperatoroftheTradingVenueIdentifier":"NA","FullName":"Commodities Forward AGRI GROS FWHT EUR 20170801","ShortName":"NA/Fwd AGRI FWHT EUR 20170801","ClassificationType":"JTAXCC"}}^A55=[N/A]^A48=EZ3B46BRHK59^A22=4^A1938=3^A1184=764^A1185={"Header":{"AssetClass":"Credit","InstrumentType":"Option","UseCase":"Index_Swaption","Level":"InstRefDataReporting"},"Attributes":{"NotionalCurrency":"EUR","ExpiryDate":"2017-08-01","UnderlyingInstrumentISIN":"EZB495ZWSFD3","OptionType":"CALL","OptionExerciseStyle":"AMER","ValuationMethodorTrigger":"Vanilla","UnderlyingAssetType":"CDS on Index","DeliveryType":"CASH","PriceMultiplier":1},"ISIN":{"ISIN":"EZ3B46BRHK59","Status":"Expired","StatusReason":"","LastUpdateDateTime":"2017-09-05T11:52:00"},"TemplateVersion":1,"Derived":{"CommodityDerivativeIndicator":"FALSE","IssuerorOperatoroftheTradingVenueIdentifier":"NA","FullName":"Credit Option Index_Swaption EZB495ZWSFD3 EUR 20170801","ShortName":"NA/CDS Idx Swt EUR 20170801","ClassificationType":"HCIBVC"}}^A10=253^A

The FIX Conductor will check for the required tags and will display the result of the test case.



CASE 2: Test Failed

If the Client sends SecurityListRequest message (35=x) having SubscriptionRequestType (263=0) but there are missing tags, then the test will fail.



The following is a sample of a SecurityListRequest message (35=x) having SubscriptionRequestType (263=0) with incomplete tags.

```
8=FIXT.1.1^A9=97^A35=x^A34=12^A49=SenderCompID^A50=SenderSubID^A52=20170906-
14:32:26.393^A56=TargetCompID^A57=TargetSubID^A263=0^A320=LREQ15^A559=4^A10=155^A
```

The FIX Conductor is expecting for non-empty Text(58) and ApplSeqNum(1181).

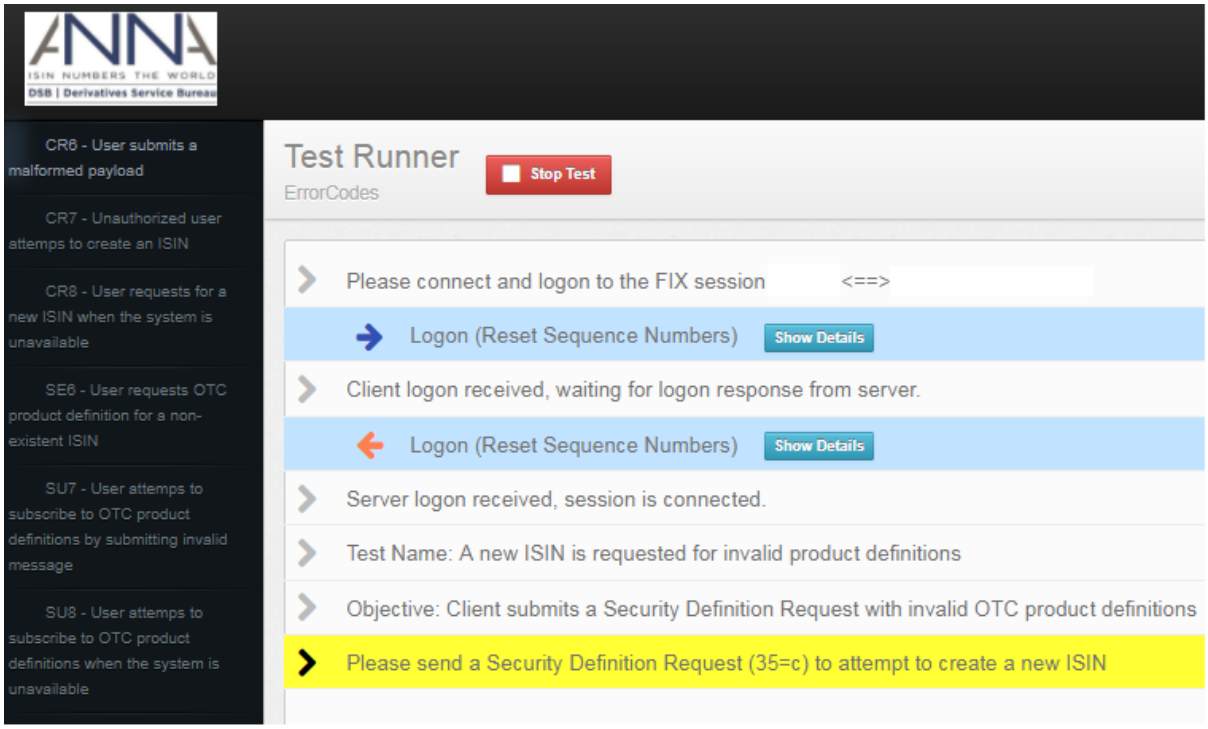
3.3.7 Error Codes

Client needs to connect on Simulated mode to test the output of the error codes.

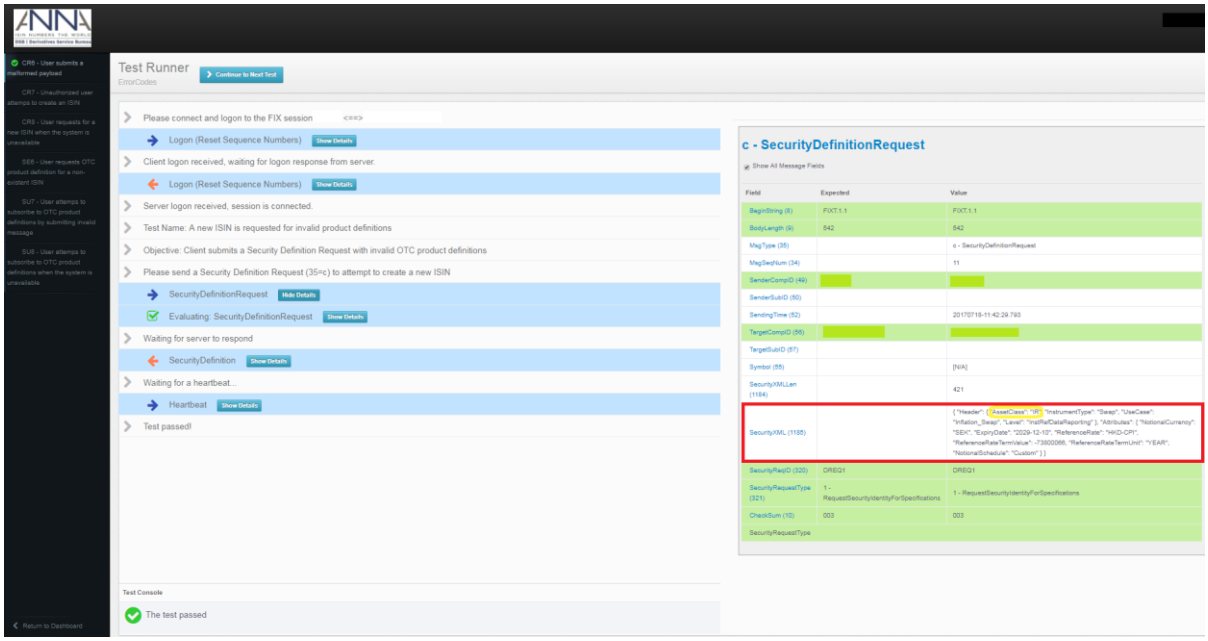
CR6 - User submits a malformed payload

Objective: Client submits a Security Definition Request with invalid OTC product definitions

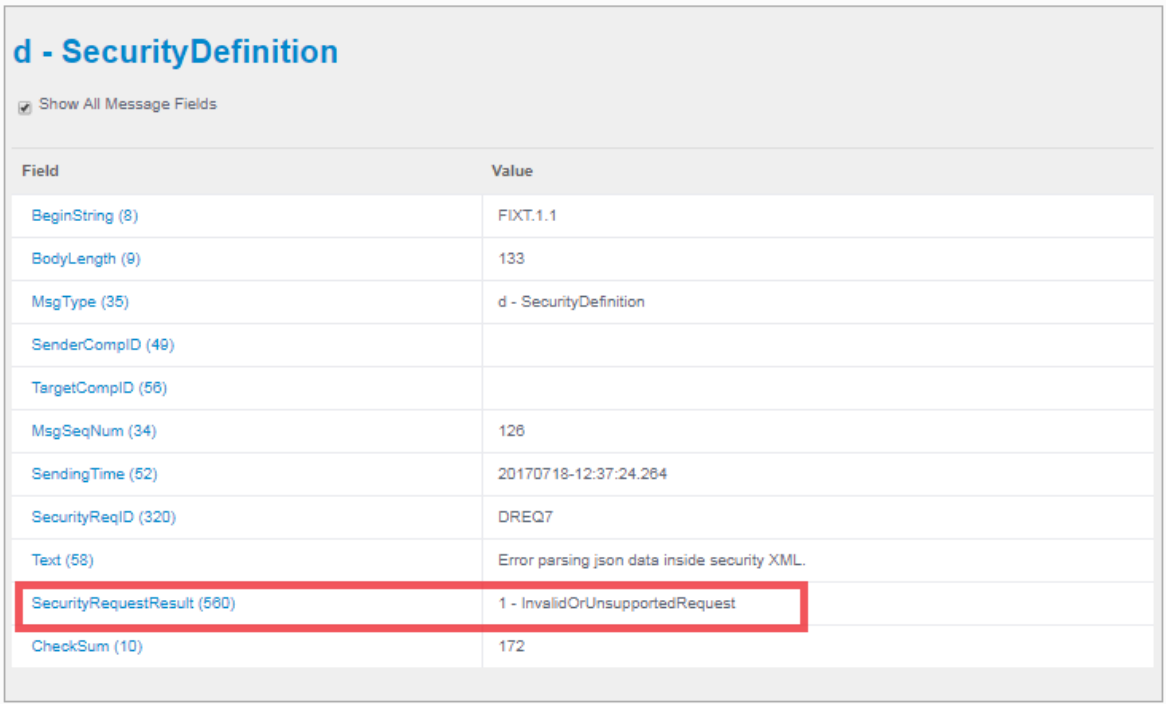
In this case, client needs to submit an invalid OTC product definition.



The following is a snapshot of Security Definition Request with invalid asset class.



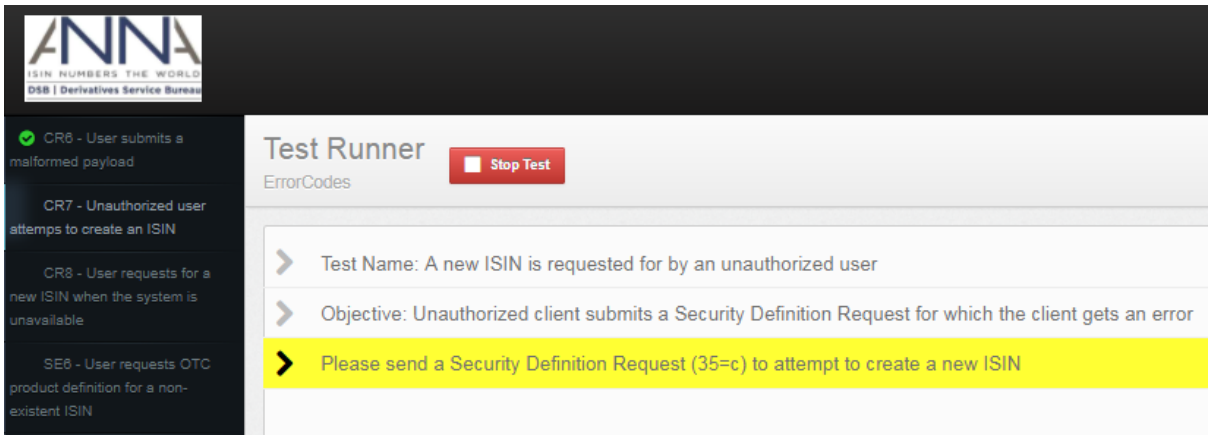
Security Request Result (560) shows Invalid or Unsupported Request due to invalid asset class “IR”.



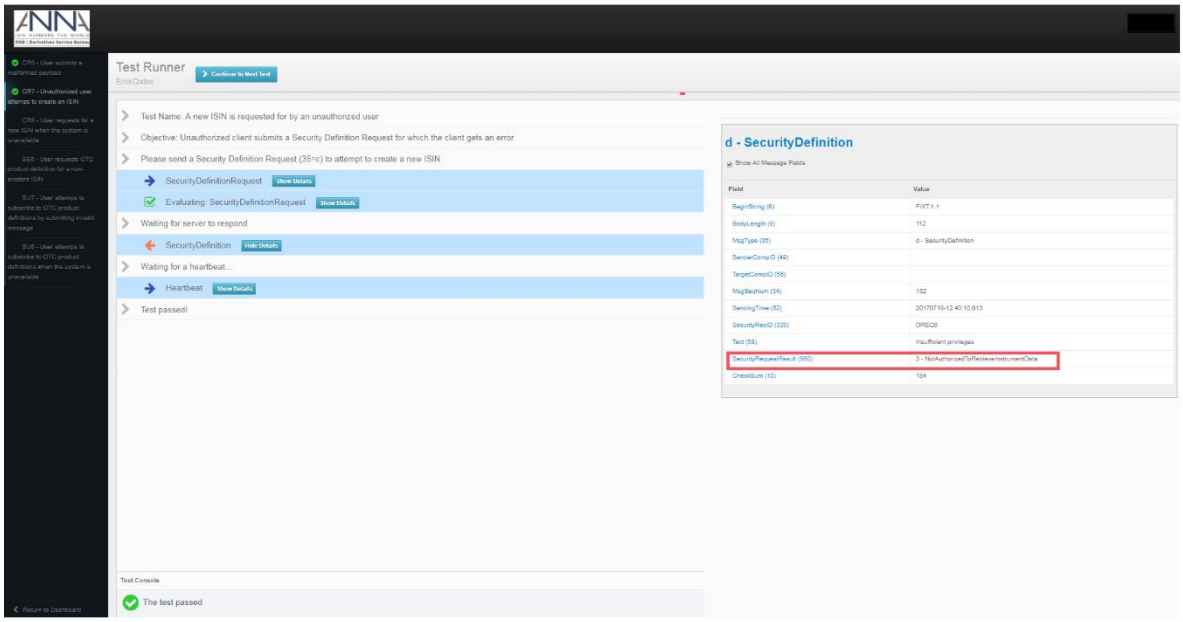
CR7 - Unauthorized user attempts to create an ISIN

Objective: Unauthorized client submits a Security Definition Request for which the client gets an error

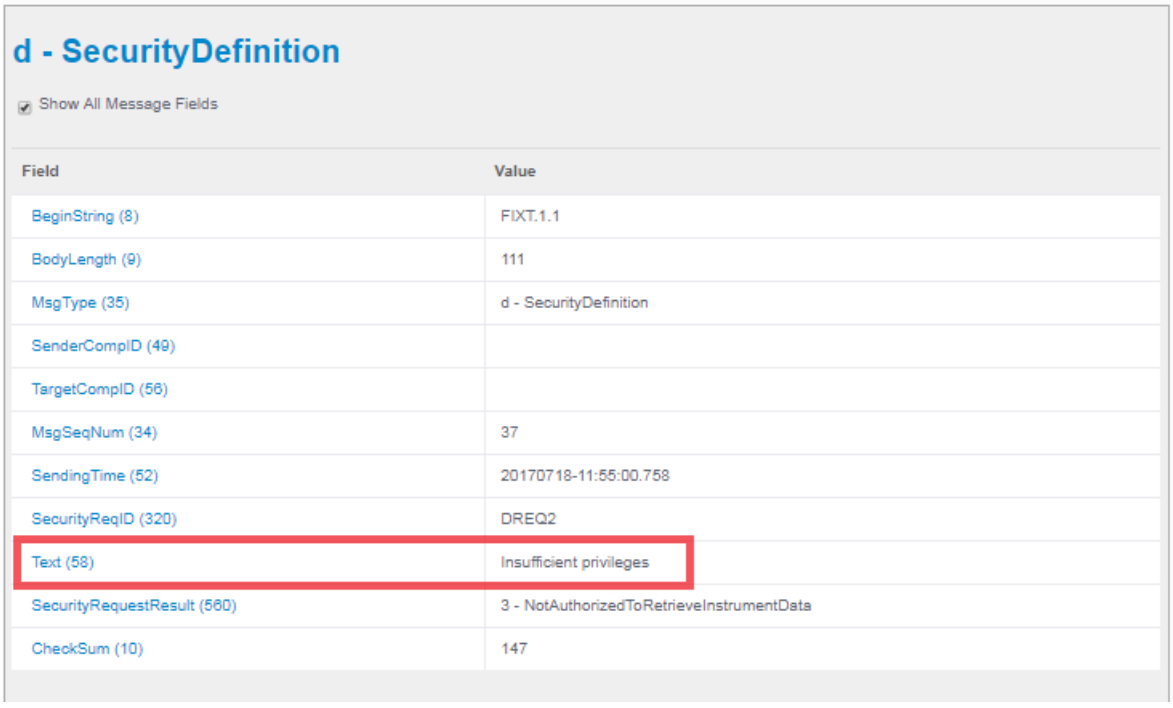
Client creates a new ISIN but is not authorized to submit a Security Definition Request.



Security Request Result (560) shows that the client is not authorized to retrieve Instrument Data.



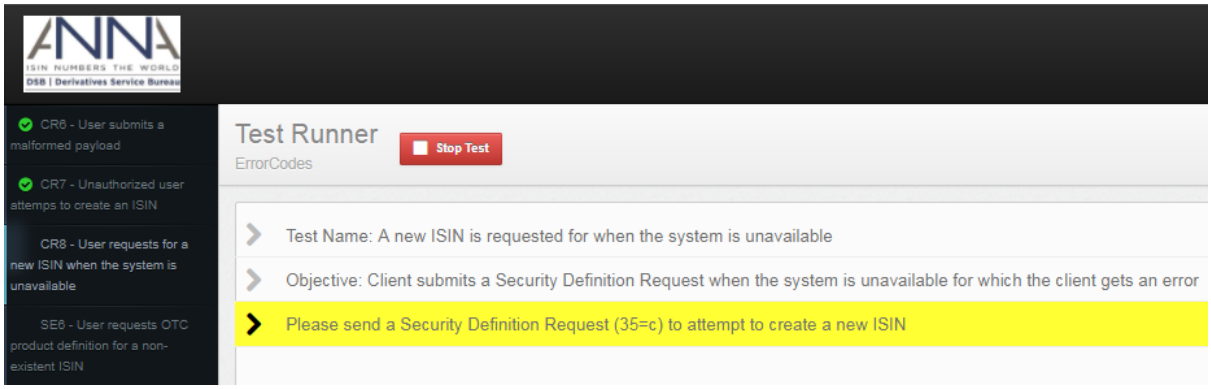
Information of the Security Request Result(560) is available in Text(58) attribute.



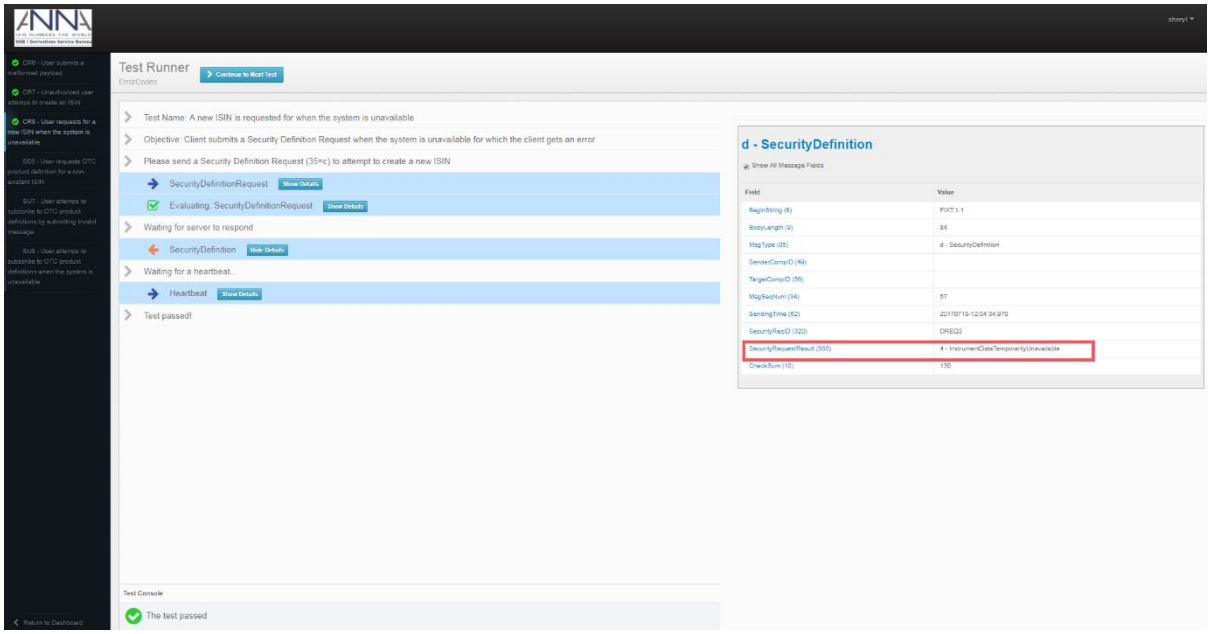
CR8 - User requests for a new ISIN when the system is unavailable

Objective: Client submits a Security Definition Request when the system is unavailable for which the client gets an error

Client sends a request for an ISIN assuming the system is unavailable.



Security Request Result (560) shows that the Instrument data temporarily unavailable (4).



d - SecurityDefinition

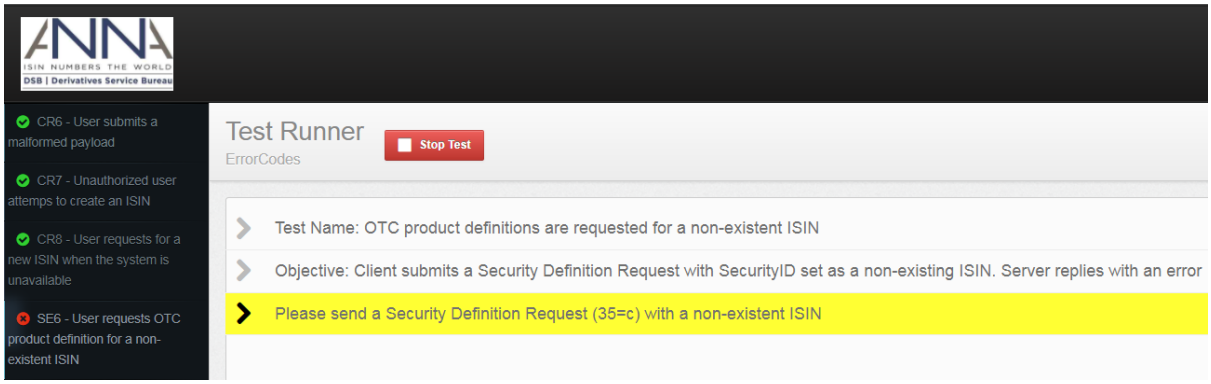
Show All Message Fields

Field	Value
BeginString (8)	FIXT.1.1
BodyLength (9)	85
MsgType (35)	d - SecurityDefinition
SenderCompID (49)	
TargetCompID (56)	
MsgSeqNum (34)	143
SendingTime (52)	20170718-12:45:24.439
SecurityReqID (320)	DREQ9
SecurityRequestResult (560)	4 - InstrumentDataTemporarilyUnavailable
CheckSum (10)	185

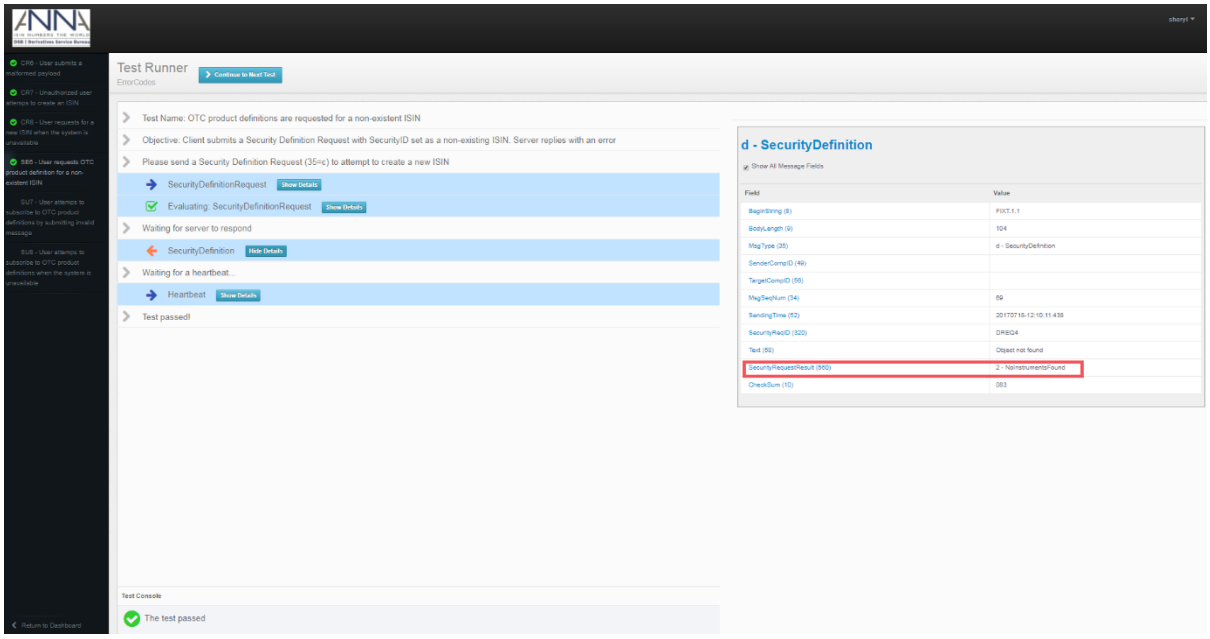
SE6 - User requests OTC product definition for a non-existent ISIN

Objective: Client submits a Security Definition Request with SecurityID set as a non-existing ISIN.

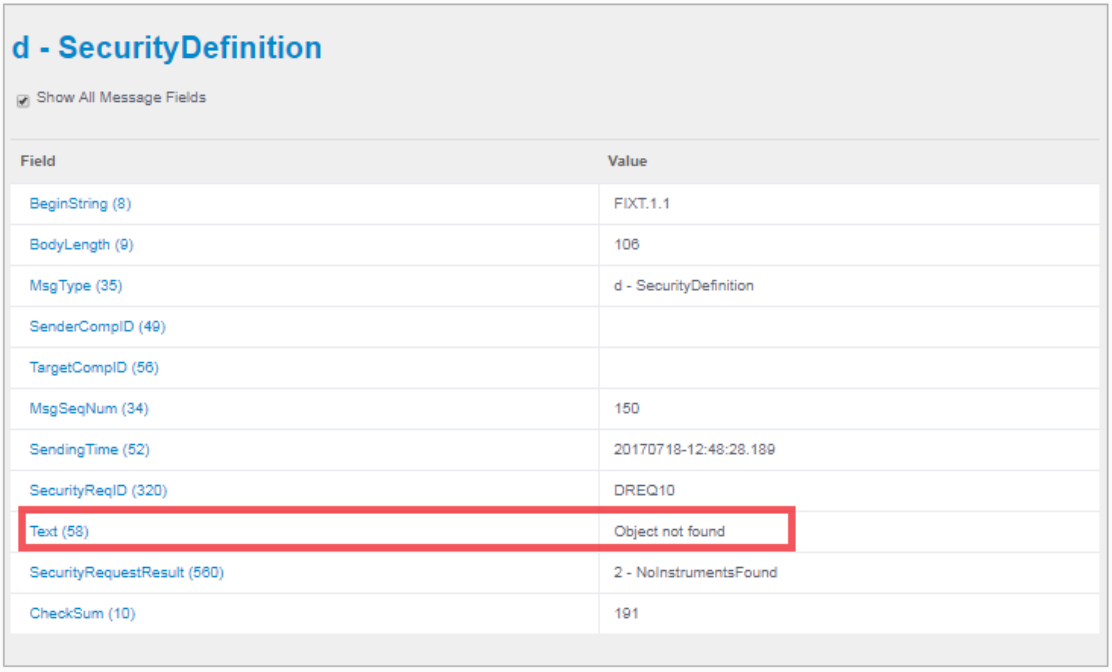
Client sends an invalid (non-existing) ISIN.



Security Request Result (560) shows No Instrument Found (2) due to non-existing ISIN.



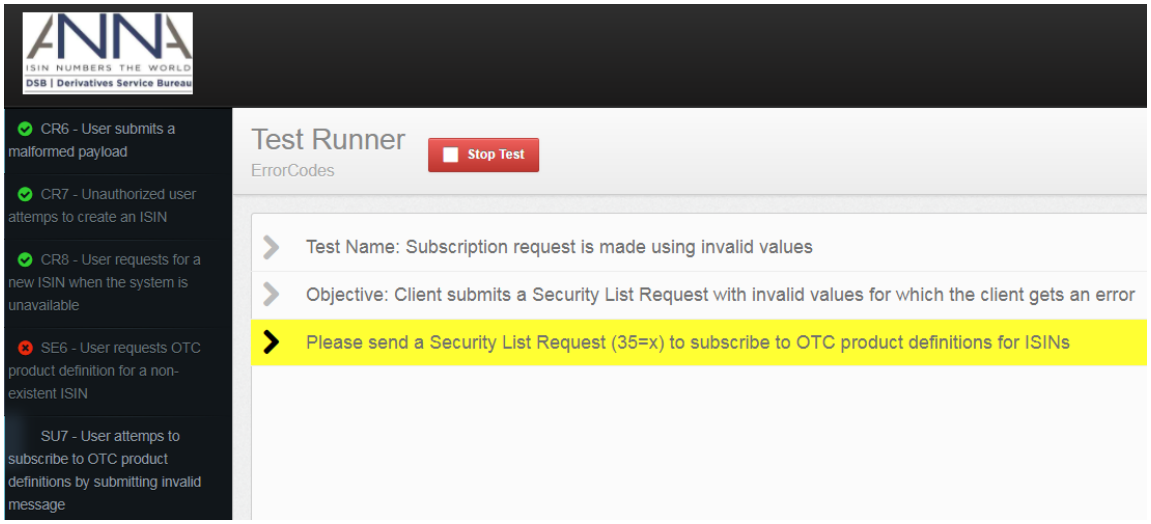
Information of the Security Request Result(560) is available in Text(58) attribute.



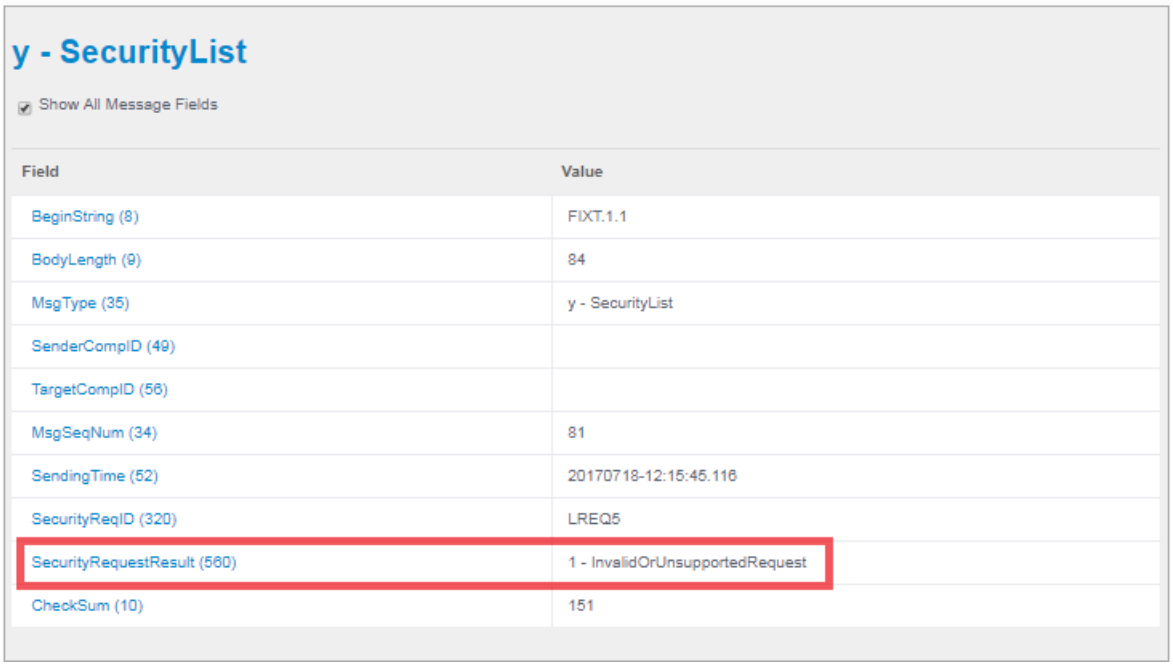
SU7 - User attempts to subscribe to OTC product definitions by submitting invalid message

Objective: Client submits a Security List Request with invalid values for which the client gets an error

Client can send any Security List Request to test this error code.



Security Request Result (560) shows Invalid or Unsupported Request (1).



y - SecurityList

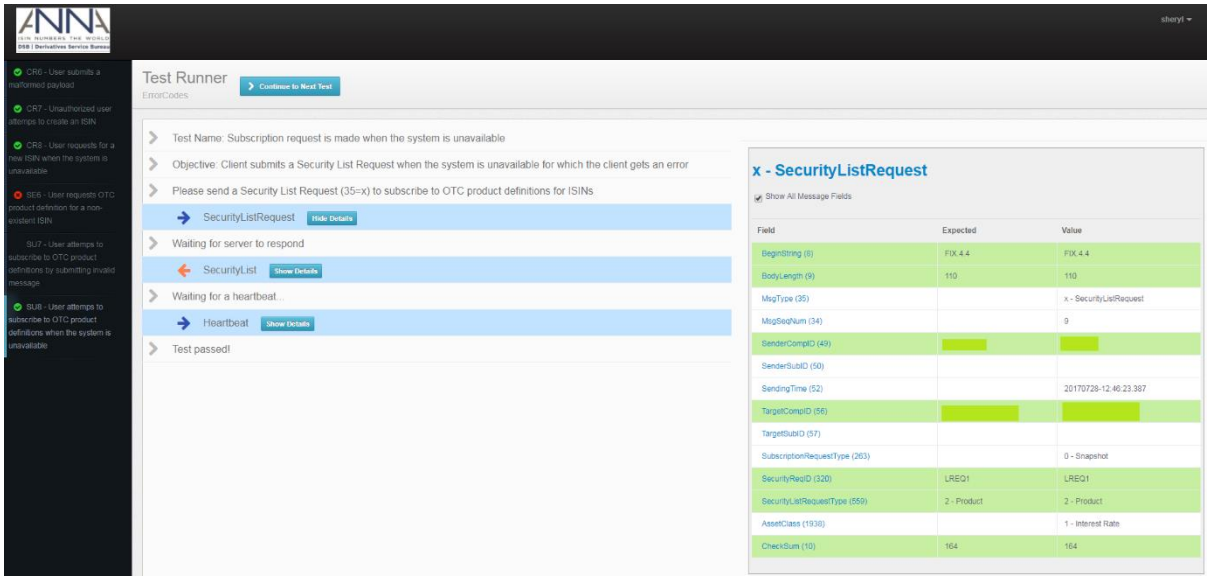
Show All Message Fields

Field	Value
BeginString (8)	FIXT.1.1
BodyLength (9)	84
MsgType (35)	y - SecurityList
SenderCompID (49)	
TargetCompID (56)	
MsgSeqNum (34)	81
SendingTime (52)	20170718-12:15:45.116
SecurityReqID (320)	LREQ5
SecurityRequestResult (560)	1 - InvalidOrUnsupportedRequest
CheckSum (10)	151

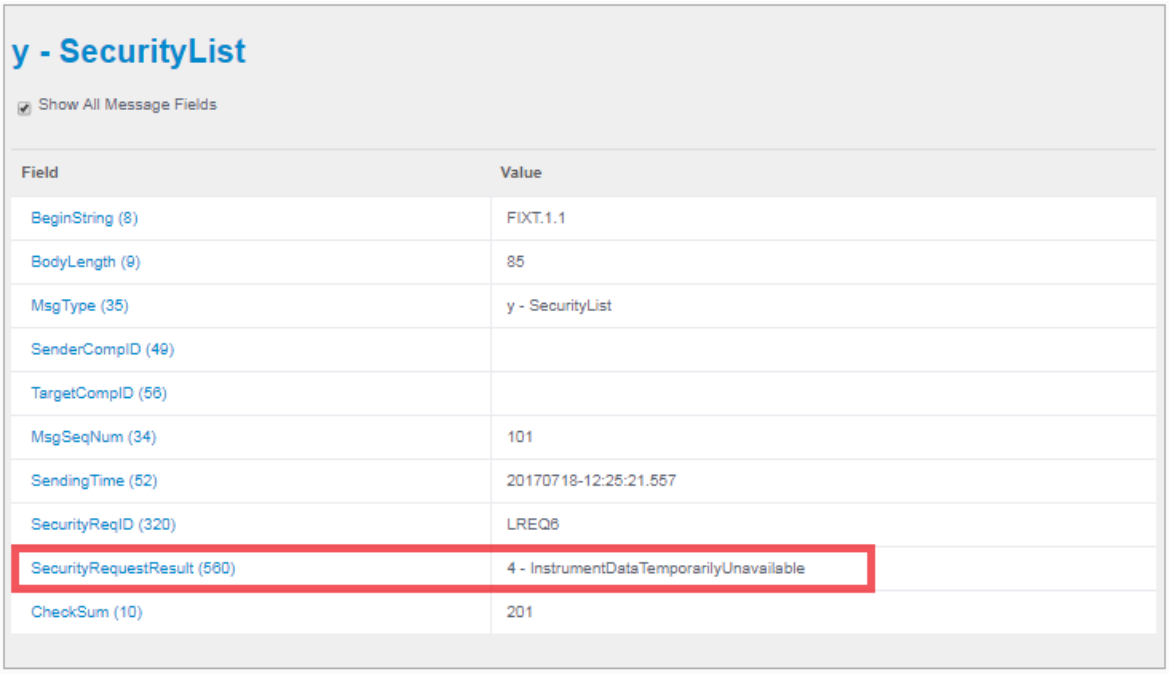
SU8 - User attempts to subscribe to OTC product definitions when the system is unavailable

Objective: Client submits a Security List Request when the system is unavailable for which the client gets an error

Client subscribes to any asset class to test this scenario.



Security Request Result (560) shows Instrument Data Temporarily Unavailable (4).



y - SecurityList

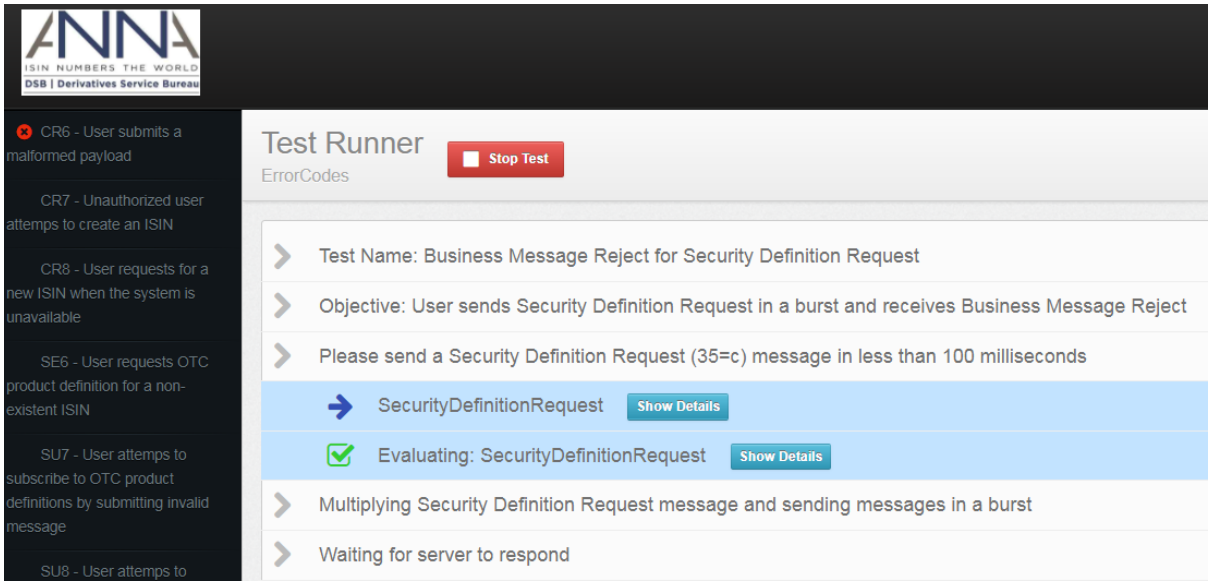
Show All Message Fields

Field	Value
BeginString (8)	FIXT.1.1
BodyLength (9)	85
MsgType (35)	y - SecurityList
SenderCompID (49)	
TargetCompID (56)	
MsgSeqNum (34)	101
SendingTime (52)	20170718-12:25:21.557
SecurityReqID (320)	LREQ6
SecurityRequestResult (560)	4 - InstrumentDataTemporarilyUnavailable
CheckSum (10)	201

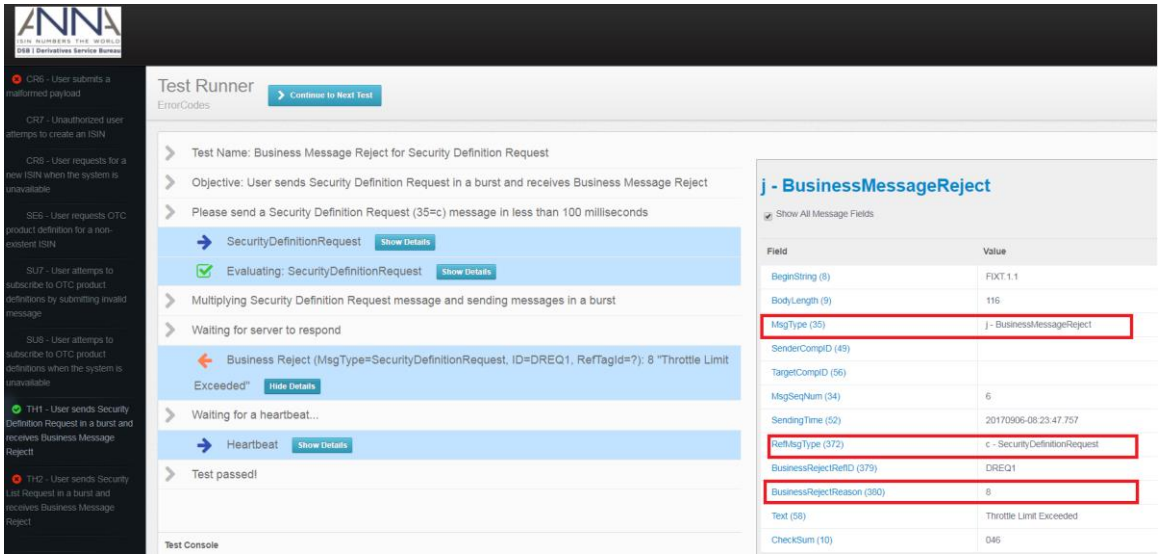
TH1 - User sends Security Definition Request in a burst and receives Business Message Reject

Objective: Client sends Security Definition Request in a burst and receives Business Message Reject

To simulate this test case, client will be requested to send a Security Definition Request message. This will be multiplied to several Security Definition Request messages and will be sent in a burst.



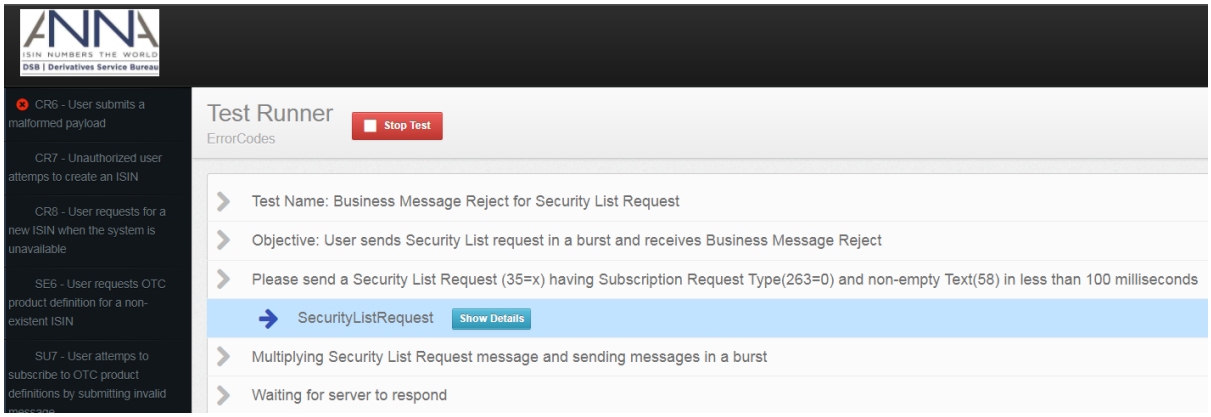
Client will receive BusinessMessageReject (35=j) having business MessageRejectReason (380) = Throttle Limit Exceeded (8) and RefMsgType (372) value = c.



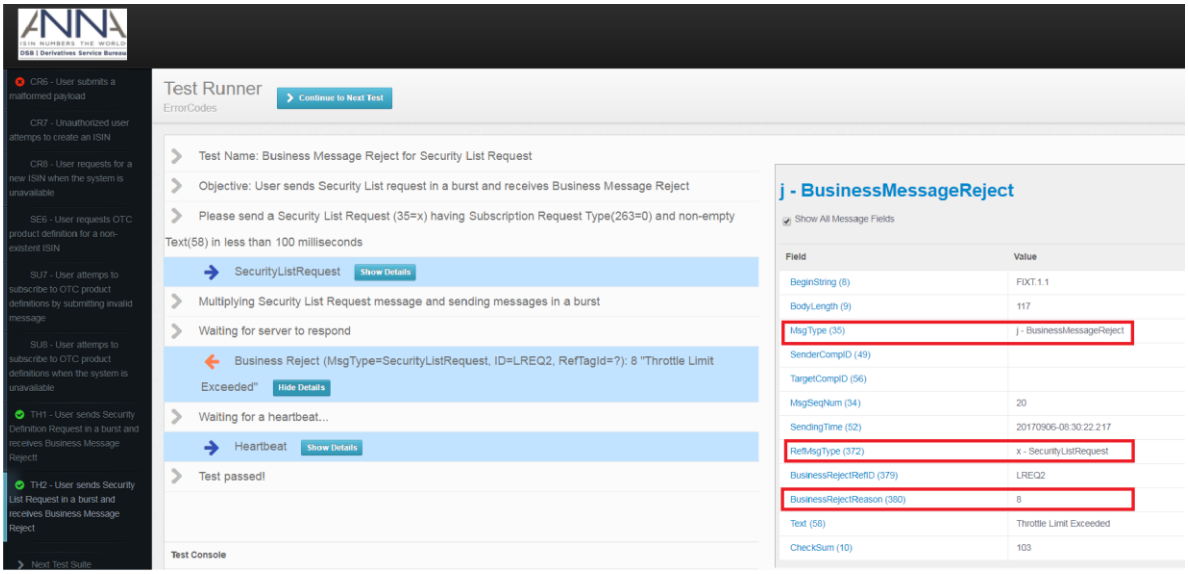
TH2 - User sends Security List Request in a burst and receives Business Message Reject

Objective: Client sends Security List Request in a burst and receives Business Message Reject

To simulate this test case, client will be requested to send a Security List Request message. This will be multiplied to several Security List Request messages and will be sent in a burst.

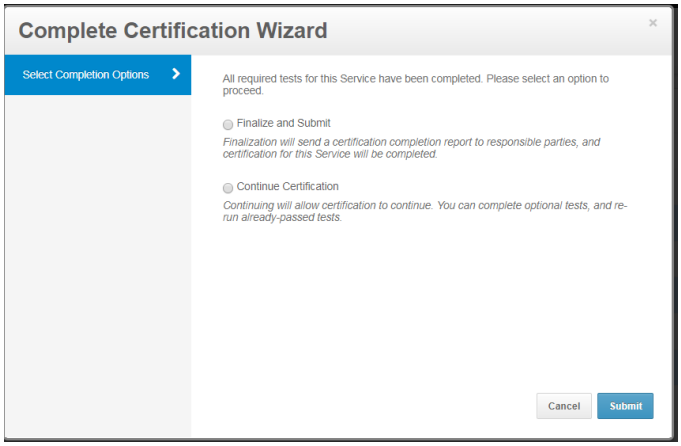


Client will receive BusinessMessageReject (35=j) having business MessageRejectReason (380) = Throttle Limit Exceeded (8) and RefMsgType (372) value = x.



3.4 Certification Report

Upon completion of the required test cases, a summary of the result of each test case will reflect on the certification report.



- Finalize and Submit – Certification for the service is completed and Certification Report is made available to the DSB Technical Support Admin and the client.
- Continue Certification – This will allow the client to continue optional test cases and rerun passed test cases.

The following is a sample of the Certification Report with the details of the Test Cases, Date Run, User and Result of the Test Cases.

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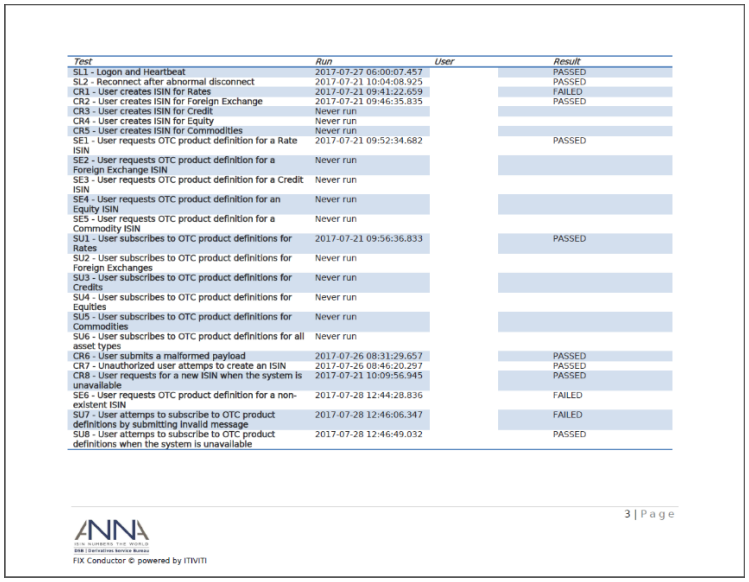
CERTIFICATION REPORT

The Derivatives Service Bureau (DSB)

DSB

July 31, 2017



Test	Run	User	Result
SL1 - Logon and Heartbeat	2017-07-27 06:00:07.457		PASSED
SL2 - Reconnect after abnormal disconnect	2017-07-21 10:04:08.925		PASSED
CR1 - User creates ISIN for Rates	2017-07-21 09:41:22.659		FAILED
CR2 - User creates ISIN for Foreign Exchange	2017-07-21 09:46:35.835		PASSED
CR3 - User creates ISIN for Credit	Never run		
CR4 - User creates ISIN for Equity	Never run		
CR5 - User creates ISIN for Commodities	Never run		
SE1 - User requests OTC product definition for a Rate ISIN	2017-07-21 09:52:34.682		PASSED
SE2 - User requests OTC product definition for a Foreign Exchange ISIN	Never run		
SE3 - User requests OTC product definition for a Credit ISIN	Never run		
SE4 - User requests OTC product definition for an Equity ISIN	Never run		
SE5 - User requests OTC product definition for a Commodity ISIN	Never run		
SU1 - User subscribes to OTC product definitions for Rates	2017-07-21 09:56:36.833		PASSED
SU2 - User subscribes to OTC product definitions for Foreign Exchanges	Never run		
SU3 - User subscribes to OTC product definitions for Credits	Never run		
SU4 - User subscribes to OTC product definitions for Equities	Never run		
SU5 - User subscribes to OTC product definitions for Commodities	Never run		
SU6 - User subscribes to OTC product definitions for all asset types	Never run		
CR6 - User submits a malformed payload	2017-07-26 08:31:29.657		PASSED
CR7 - Unauthorized user attemps to create an ISIN	2017-07-26 08:46:20.297		PASSED
CR8 - User requests for a new ISIN when the system is unavailable	2017-07-21 10:09:56.945		PASSED
SE6 - User requests OTC product definition for a non-existent ISIN	2017-07-28 12:44:28.836		FAILED
SU7 - User attemps to subscribe to OTC product definitions by submitting invalid message	2017-07-28 12:46:06.347		FAILED
SU8 - User attemps to subscribe to OTC product definitions when the system is unavailable	2017-07-28 12:46:49.032		PASSED

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