



Nasdaq Calypso

Refinitiv EMA Integration Guide

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Approved

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Document History

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3.0	July 2024	Added log category
4.0	August 2024	Added ST to copy Feed addresses from Source feed to Target feed

NOTE: The Calypso License to use this Calypso Integration Module does not include a license for any third-party data services to which this module can interface. Clients are responsible for contracting with the appropriate third-party data service(s) prior to using this Calypso Integration Module

Table of Contents

Introduction	4
Refinitiv Components Setup	5
2.1 Refinitiv Real Time Optimized (RTO)	5
2.2 Refinitiv Real-Time Distribution System (RTDS).....	5
2.3 DACS Server	5
2.4 EMA Configuration	5
Calypso Setup	6
3.1 Installing Calypso Reuters RFA Module and Refinitiv Libraries	6
3.2 Modes of Usage	6
3.3 Direct Client Access.....	6
3.3.1 Domain Value (Feed Type).....	6
3.3.2 Feed Configuration	6
3.3.3 Feed Addresses.....	8
3.3.4 Define Calypso User Attributes for Open DACS.....	10
3.3.5 Debug Logging	12
3.4 Access through Calypso Market Data Server.....	15
3.4.1 Engine Configuration for Open DACS	15
Subscribing to Quotes.....	16
4.1 Direct Client Access.....	16
4.2 Access through Calypso Market Data Server.....	17

Introduction

The Calypso Reuters RFA Module serves as a connector component which integrates Calypso with Refinitiv Real-Time-Optimized (RTO), so that Calypso can capture market data sending from RTO cloud.

The module also supports entitlement check by EMA Open DACS Entitlement when user subscribes market data from RTDS (Refinitiv Real-Time Distribution System) (formerly TREP (Thomson Reuters Enterprise Platform)).

This user guide covers the installation and configuration of the Calypso Reuters RFA Module.

Refinitiv Components Setup

2.1 Refinitiv Real Time Optimized (RTO)

Please ensure that access to RTO cloud instance is available for connectivity.

Calypso will connect to RTO and CIAM enabled RTO using EMA library.

2.2 Refinitiv Real-Time Distribution System (RTDS)

Please ensure that the RTDS is installed and configured properly.

Calypso can also connect to the Advanced Distribution Server (ADS) in the RTDS, using EMA library.

2.3 DACS Server

For users who require Open DACS Entitlement, please ensure that the DACS Server is installed and configured properly. Refer to the corresponding document for Reuters installation details.

Calypso will connect to the DACS Server at dacs_lib port.

2.4 EMA Configuration

You can configure EMA properties in calypso_ema_config.xml

For more details on the EMA Configuration, please refer to the Refinitiv documentation (EMAJ_ConfigGuide).

Calypso Setup

3.1 Installing Calypso Reuters RFA Module and Refinitiv Libraries

Please install the Calypso Reuters RFA interface.

Update the Calypso database by running Execute SQL. When you run Execute SQL as part of your installation, the Reuters RFA schema file (ReutersRFASchemaData.xml) is already loaded.

3.2 Modes of Usage

Calypso provides two modes of accessing market data from an external source, which are direct client access and access through Calypso Market Data Server.

For direct client access, Calypso client applications (e.g. Feed Quotes Window in Navigator) connect directly to RTDS/RTO and handle incoming market data items.

For access through Calypso Market Data Server, Calypso client applications (e.g. Trade Window in Navigator) connect to the Calypso Market Data Server for market data. In this mode, the Calypso Market Data Server connects to the RTDS/RTO and handles incoming market data items.

Configurations for the two modes will be introduced in the next sections.

3.3 Direct Client Access

3.3.1 Domain Value (Feed Type)

Ensure that EMA and EMAOpenDACS exist in the “feedType” domain.

3.3.2 Feed Configuration

From the Calypso Navigator, navigate to Configuration > Market Data > Feed Configuration. You can click Load to load existing feed configurations. The image below displays a sample configuration for EMA.

FeedConfig Window

Name: Type: Is Default

Name	Value
ConfigFileName	calypso_ema_config.xml
ConsumerName	Consumer_RTO
UserName	GE-A-00495411
Password	●●●●●●●●●●●●●●●●
ClientId	d06234d2a74b42f79516b3a28
ClientSecret	●●●●●●●●●●●●●●●●

FeedConfig Window

Name: Type: Is Default

Name	Value
ConfigFileName	calypso_ema_config.xml
ConsumerName	Consumer_TREP
UserName	calbode
Password	●●●●●●●●●●●●●●●●
ClientId	
ClientSecret	●●●●●●●●●●●●●●●●
QUOTE_AGE_OUT_DAYS (Default 0)	

Enter a feed name in the Name field, and select EMA from the Type field (or EMAOpenDACS if you would like to use Open DACS for entitlement check).

The Name is a way to refer to the feed within Calypso and Calypso configuration files.

Tip: If you already had a Reuters Feed configured to use the earlier Calypso Reuters feed type, load it and select EMA from the Type field to replace the Reuters type to avoid re-configuring the feed addresses.

Set the parameters as applicable.

- ConfigFileName: The location of the EMA configuration file previously created. This location is with respect to the CLASSPATH as it will be retrieved using the Java ClassLoader. For example, if the EMA configuration file path is <calypso_dir>/client/resources/ema_config.xml, fill ema_config.xml in the field.
- ConsumerName: The name of one of the Consumers defined in the EMA configuration file. This is used by EMA to determine the connectivity details to use for this particular client. Please refer to the sample EMA configuration file for consumer names defined in the configuration file.
- UserName: Machine account username required across RTO enabled with Version 1 Authentication (also known as "oAuthPasswordGrant" or "V1 Password Credentials").
- Password: Machine account password required across RTO enabled with Version 1 Authentication.
- ClientId: Service Account client ID required across RTO enabled with Version 2 Authentication (also known as "oAuthClientCredentials" or "V2 Client Credentials").
- ClientSecret: Service Account client Secret required across RTO enabled with Version 2 Authentication.
- QUOTE_AGE_OUT_DAYS: The number of days for a particular quote stored in Calypso to be "aged out" (the default value is 0). If the stored quote has lasted longer than the number specified in this field, the

entitlement check will be bypassed and it will be available to every Calypso user (applicable to EMASOpenDACS feed only).

You can check the “Is Default” checkbox to make this feed your default feed source. Click Save to save the changes.

To enable Open DACS Entitlement for the feed, please also add the feed name to the domain “EntitlementCheckFeed”.

[NOTE: This only applies to feeds of type EMASOpenDACS]

3.3.3 Feed Addresses

The Feed Address Window allows mapping Calypso quote names to ELEKTRON quote names.

From the Calypso Navigator, navigate to Configuration > Market Data > Feed Address Mapping to bring up the Feed Address window.

The following images show examples for feed address mapping (applicable to both feed type EMA and EMASOpenDACS):

The screenshot shows the 'Feed Address Window' with the following configuration:

- Feed: EMA_RTO_FEED
- Quote Address: FX.EUR.GBP
- Quote Type: Price
- Feed Address: ELEKTRON_DD|EURGBP=R * 1 + 0
- Names Like: (empty)
- Bid: BID, Ask: ASK, High: BID_HIGH_1, Last: (empty)
- Open: OPEN_BID, Close: (empty), Low: BID_LOW_1, Date: ACTIV_DATE

Addresses	Quote Address	Type	Feed	Feed Address	Mult	Add	Bid Name	Ask Name	Open Nam
BRL/BM&F Corn/C	FX.EUR.GBP	Price	EMA_RTO_FEED	ELEKTRON_DD EURGBP...	1	0	BID	ASK	OPEN_BID
BRL/BM&F Feeder	FX.EUR.INR	Price	EMA_RTO_FEED	ELEKTRON_DD EURINR...	1	0	BID	ASK	OPEN_BID
BRL/BM&F Live Ca	FX.EUR.USD	Price	EMA_RTO_FEED	ELEKTRON_DD EUR=	1	0	BID	ASK	OPEN_BID
BRL/Brazilian Yellc	FX.USD.INR	Price	EMA_RTO_FEED	ELEKTRON_DD INR=	1	0	BID	ASK	OPEN_BID
BRL/Hydrous Etha	FX.USD.JPY	Price	EMA_RTO_FEED	ELEKTRON_DD JPY=	1	0	BID	ASK	OPEN_BID
BasisFactor.LIBOR									

Buttons at the bottom: Refresh, Load for Filter, Load All, Add, Modify Feed Address, Delete, Close

Select the Feed Configuration that you have defined for EMA or EMA Open DACS from the Feed field.

Click Load All to display existing mappings (if you are using an existing Refinitiv feed source).

Click Refresh to load the list of Calypso quote names.

You can filter the list by selecting a quote type from the Quote Type field and entering a search string in the Names Like field (MM.USD.LIBOR for example).

To add a new mapping:

Select a Calypso quote name from the Addresses list.

Enter the corresponding EMA quote name in the Feed Address field. Enter a multiplier value and spread value as applicable.

The quote name can be in the format of [Service Name][Item Name] (e.g. ELEKTRON_DD|EUR=).

Enter EMA instance names as applicable.

NOTE: The date that the system saves with the quote defaults to today's date. However, you may want to save a different date with the quote, such as yesterday's date. You can map the date to a DATE field used by the Refinitiv Market Data Feed. For example, ACTIVE_DATE, VALUE_DT1, VALUE_DT2, etc.

For field details on Reuters Market Data Feed, please refer to FID lookup in Reuters website.

NOTE: Map Calypso price fields (Bid, Ask, Low, High, Open, Close, Last) to PRICE field used by the Refinitiv Market Data Feed.

Click Add.

Repeat for other quote names.

Here is a field mapping example:

Calypso Field	Reuters Field	Description
Bid	BID	Latest bid price
Ask	ASK	Latest ask price
Low	LOW_1	Today's lowest trade price
High	HIGH_1	Today's highest trade price
Open	OPEN_PRC	Today's opening price
Close	HST_CLOS	Most recent non-zero closing price
Last	PRV_LAST	The previous trading day's or session's last value.
Date	ACTIV_DATE	The date when the time in TIMACT was updated.

Copy Feed Addresses from Source feed to Target feed

Users can run the MIGRATE_FEED_ADDRESS_MAPPING Scheduled Task, which is available in 18 Aug24MR to copy the feed address mappings from a source feed to a target feed.

Example ST configuration shown below will copy the Feed Address Mappings from ReutersRFA feed to RTO Feed. ST parameters are explained below.

Task Description	
Task Type:	MIGRATE_FEED_ADDRESS_MAPPING
External Reference:	Testing
Comments:	
Description:	Testing
Execution Parameters	
Attempts:	1
Retry After:	0 minutes
Expected Execution Time (SLA):	1 minutes
JVM Settings:	-Xms512m -Xmx1024m
Log Settings:	
Task Notification Options	
<input type="checkbox"/> Send Emails	<input type="checkbox"/> Publish Business Events
To User:	
Common Attributes	
Task ID	14120
Processing Org	PO
Trade Filter	
Filter Set	
Pricing Environment	default
Timezone	America/New_York
Valuation Time Hour	
Valuation Time Minute	
Undo Time Hour	0
Undo Time Minute	0
Valuation Date Offset	
From Days	0
To Days	0
Pricer Measures	
Business Holidays	
Task Attributes	
Source Feed	ReutersRFA
Target Feed	RTO
Include Feed Like	FX.EUR.USD*
Exclude Feed Like	-
Service Name to Replace	IDN_RDF
Service Name Replacement	ELEKTRON_DD

- Source Feed - Name of the Feed to copy the feed address mapping from.
- Target Feed - Name of the Feed to save/update the feed address mappings.
- Include Feed Like - Pattern to select the feed address mappings to copy. It is a mandatory parameter.
- Exclude Feed Like - Pattern to exclude the feed address mappings from copy.
- Service Name to Replace - Service name in the source feed to be replaced when copied to the destination feed. It is an optional parameter, If blank, the feed address mapping will be copied as it is from source to destination feed.
- Service Name Replacement - New Service name to use when saving the feed addresses to the destination feed.

3.3.4 Define Calypso User Attributes for Open DACS

For users who require Open DACS Entitlement, navigate to Configuration > User Access Control > User Defaults from the Calypso Navigator, and click on Attributes. The screenshot below shows a configuration example.

Name	Value
Default Ad-Hoc Calculation Server	▼ RISKDEV
Default Ad-Hoc Presentation Server	▼ RISKDEV
Default Dispatcher	▼ NONE
Default Pricing Grid Auto Update Dispatcher	
EMA Open DACS AppId	450
EMA Open DACS Daemon	hostname:8211
EMA Open DACS ForceUserNameLowerCase	true
EMA Open DACS Retry Rate	10
EMA Open DACS Site	SANFRANCISCO
EMA Open DACS UsageLoggingType	ALWAYS
EMA Open DACS User IP	
EMA Open DACS User Mode	N
EMA Open DACS User Name	dacsuser

Specify the following attributes.

Attribute Name	Value
EMA Open DACS AppId	Mandatory DACS Application ID
EMA Open DACS Daemon	Mandatory Host name and port of remote DACS daemon
EMA Open DACS ForceUserNameLowerCase	Flag to convert username to lower case before sending it to DACS. Default is false.
EMA Open DACS Retry Rate	Time (in seconds) at which DACS Library will attempt to reconnect to the DACS Daemon. Default value is 10.
EMA Open DACS Site	Mandatory, alphanumeric. Enter the name of DACS site used by this Calypso user.
EMA Open DACS User IP	Optional, IP address format. The IP address of the machine used by the Calypso user. If this field is left blank then local host IP address will be picked up.
EMA Open DACS User Mode	Mandatory. Accepts values of Y or N. Y: This Calypso user is using EMA in User Mode. User Mode is used when the EMA Feed Handler acts as a client and connects to the feed directly. For example, from the Feed Window in Main Entry.

Attribute Name	Value
	<p>N: This user is using the EMA in Server Mode.</p> <p>Server Mode is when the EMA Feed Handler acts as a server to provide access for multiple clients who need access to the feed. For example, the Market Data Server.</p>
EMA Open DACS Username	<p>Optional, alphanumeric.</p> <p>The DACS username of this Calypso user.</p> <p>If this field is left empty, the corresponding Calypso username will be used for DACS authentication.</p> <p>If the Calypso user is not authorized for any subscription to Reuters data items, it is suggested that a DACS user with no item permitted is created first. Then set the DACS username in this field. This setting can help avoid known performance issue.</p>

3.3.5 Debug Logging

To switch on debug logging for tracing issues, in Calypso user properties, set Yes for DEBUG, and add the following categories (separated by comma):

- EMA
- EMAOpenDACS
- EMAEventItem
- EMAEventItemDetails

To avoid flooding log files with market data logs, the module supports writing market data log to the file at a certain interval. Add REUTERS_RFA_LOG_INTERVAL to the Calypso user properties and give an integer value for the logging interval (in seconds). Zero, negative, non-integer or empty value will disable this feature and all market data logs will be written to the log file once they comes in.

● REMOVE_LINKED_MSG_ON_ACK	▶ true
● REUTERS_RFA_LOG_INTERVAL	▶ 20
● RISKSERVER_NAMING_PROVIDER_URL	▶ remote://localhost:4647

Logging and RTO Region configuration

Logging

User can enable logging for Reuters EMA module for debugging purpose. All we have to do is to add following property in calypsouser.property.<env> file: calypso.logging.ema-logging-level.

If above property is not passed, still we will see error logs from EMA end for navigator, ST and riskServer. Example usage of the property: calypso.logging.ema-logging-level=trace

The following are possible values for the above property:

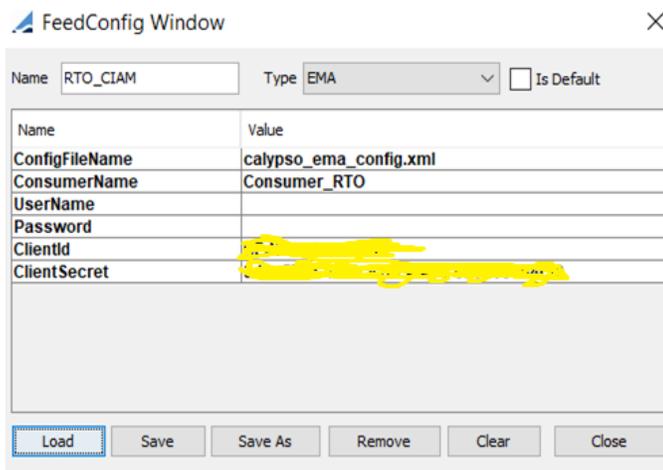
Value	Description
Trace	FINEST logs which include region, request, client, response, etc.
INFO	Shows only INFO logs
ERROR	Only Error logs

RTO Region

For cloud deployment, it is not always feasible to change calypso_ema_config.xml for RTO based EMA configuration when user wants to use different region for different configuration.

Calypso now introduced a new property that can be added in calypsouser.properties.<env> to tackle the above problem: calypso.feed.ema.configs.<feed-name>.rto-region

feed-name: It is the value that we give in Feed config window. For example, RTO_CIAM



The possible values can be as follows:

Value
ap-northeast-1

Value
ap-southeast-1
eu-central-1
eu-west-1
us-east-2
us-east-1

The usage of the property for above SS-1 screenshot Feed config can be as follows:

```
calypso.feeds.ema.configs.RTO_CIAM.rto-region=us-east-2
```

So, say if you have created feed configuration RTO_CIAM and given Consumer_RTO as the Consumer Name, it will find the associated Channel name as Channel_RTO

```
</Consumer>
<Consumer>
  <Name value="Consumer_RTO"/>
  <Channel value="Channel_RTO"/>
  <Dictionary value="Dictionary_1"/>
  <MaxDispatchCountApiThread value="6500"/>
  <MaxDispatchCountUserThread value="6500"/>
</Consumer>
<Consumer>
  <!-- Name is mandatory -->
  <Name value="Consumer_LPC"/>
  <!-- Channel is optional: defaulted to "RSSL_SOCKET + localhc
  <!-- Channel or ChannelSet may be specified -->
```

Then it will locate Channel_RTO and replace region property with the property that was defined

```
<TcpNodeDelay value="1"/>
<Host value="colocalypsotrep.calypso.com"/>
<Port value="14009"/>
</Channel>
<Channel>
  <Name value="Channel_RTO"/>
  <ChannelType value="ChannelType::RSSL_ENCRYPTED"/>
  <CompressionType value="CompressionType::None"/>
  <GuaranteedOutputBuffers value="5000"/>
  <!-- EMA discovers a host and a port from RDP service discovery for the specified location
  when both of them are not set and the session management is enable. -->
  <Location value="us-east-2"/>
  <EnableSessionManagement value="1"/>
  <ObjectName value=""/>
</Channel>
</ChannelList>
</ChannelGroup>
```

If above property is not provided in the property file , then it will default to reading the region present in calypso_ema_config.xml.

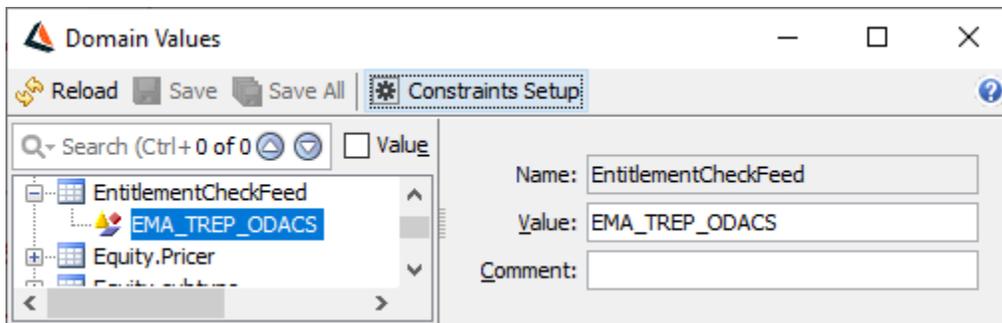
ⓘ As the property is feed-name dependent, please ensure the following tips:
 Please avoid using spaces within the feed name.
 Please take care of whitespaces in and around the feed-name
 If it is a must to use spaces between , we discourage it and we recommend changing the feed name in feed config window, but if it is not an option you can do following:
 For example, if feed name is EMA RTO CIAM then calypso.feeds.ema.configs.EMA\ RTO\ CIAM=us-east-2

3.4 Access through Calypso Market Data Server

The entitlement service in Calypso system is responsible for entitlement check in this mode of usage. Corresponding configurations will be introduced in this section.

3.4.1 Engine Configuration for Open DACS

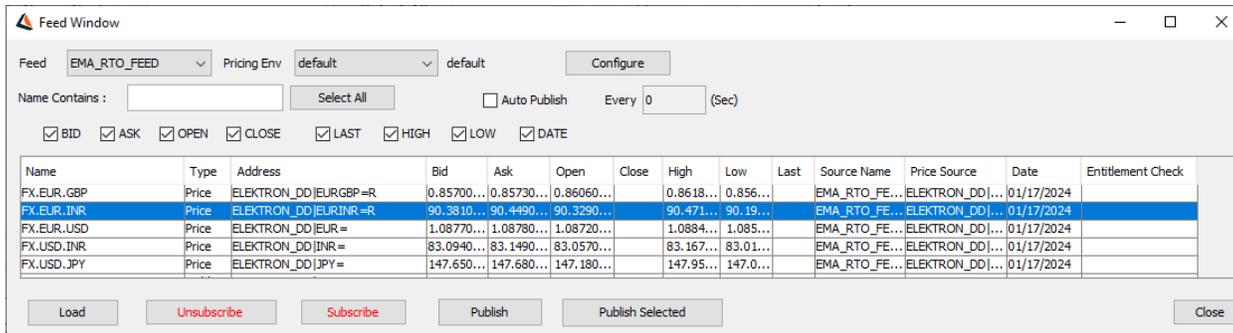
For feeds of type “EMAOpenDACs”, add the feed name to the domain “EntitlementCheckFeed”, and the entitlement service for the particular feed will be registered to the Entitlement Server.



Subscribing to Quotes

4.1 Direct Client Access

You can use the Feed Window to check that you are receiving quotes from the feed source.



From the Calypso Navigator, navigate to **Market Data > Market Quotes > Feed Quotes** to subscribe to quotes from the feed source.

Select the Feed and Pricing Environment.

Click Load to load the feed addresses previously configured.

You can filter the list by typing a search string in the Name Contains field (MM.USD.LIBOR for example).

Select quote names as applicable (click to select one quote name, Ctrl-click to select multiple quote names).

You can also click Select All to select all the quote names.

Click Subscribe to subscribe to the quotes for the selected quote names.

The quotes will be populated accordingly if the system is configured properly and if the quotes are entitled to the user.

To save quotes to the system, please use the SAVE_QUOTES scheduled task. The screenshot below shows a configuration example of SAVE_QUOTES scheduled task for EMA Feeds.

Task Description	
Task Type:	SAVE_QUOTES
External Reference:	SQ1504201437
Comments:	SAVE QUOTES SCHEDULED TASK
Description:	SAVE QUOTES SCHEDULED TASK (Feed: EMA)
Execution Parameters	
Attempts:	1
Retry After:	0 minutes
Expected Execution Time (SLA):	5 minutes
JVM Settings:	-Xms512m -Xmx1024m
Log Settings:	
Task Notification Options	
<input type="checkbox"/> Send Emails	<input type="checkbox"/> Publish Business Events
To User:	
Task Attributes	
Feed	EMA_RTO_FEED
Exclude Backdated Quotes	False
Waiting Minutes	
Wait For Maximum Time	False
Include Quote Names Like	
Exclude Quote Names Like	
BID	True
ASK	True
OPEN	True
CLOSE	True
HIGH	True
LOW	True
LAST	True
DATE	True
Skip Existing Quotes	False

For details on configuring a scheduled task, please refer to the Calypso User Guide for Scheduled Tasks.

In the direct client access mode, Open DACS Entitlement Check will happen in the Calypso component subscribing to the quotes (e.g. Feed Window in Navigator, Scheduled Task).

Before making subscription, Calypso system will check whether the DACS user (defined in section 3.3.5) is entitlement to the quote, based on the subject name of the feed address (Subject Based Entitlement, SBE). Subscription will be submitted only if the user is entitled.

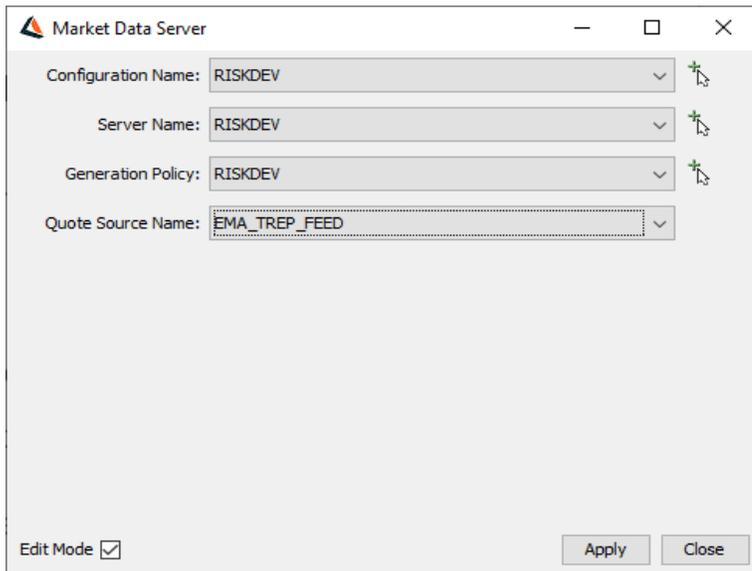
After subscription started, incoming market data items will be preceded by their corresponding entitlement information. Calypso will submit the market data items together with the entitlement information to DACS Server for checking (Content Based Entitlement, CBE). Calypso system will process the item only if the user is entitled. For some cases, in which the entitlement information is not supplied by RTDS, the system will bypass CBE and the item will be available to all users.

4.2 Access through Calypso Market Data Server

You can subscribe to real-time quotes using the Market Data Server.

You need to define a Market Data Server based on the feed that you have setup.

Sample market data server configuration:



You can then select the Market Data Server in the User Defaults attribute "Market Data Server Config" and start the corresponding Risk Server to subscribe to the quotes.

Please refer to the Calypso Installation Guide for details on defining and starting risk servers, and refer to the Market Data Server User Guide for details on using a Market Data Server.

In this mode, the entitlement service in Calypso system (section 3.4) will handle the Open DACS Entitlement Check.

When a market data item reaches the Calypso system (e.g. at Trade Window) through the Calypso Market Data Server, the Calypso component receiving the item (e.g. Trade Window) will submit the item, entitlement information and DACS user (defined in section 3.3.5) to the entitlement service for checking.

CBE, or SBE, or both will be done on the item, depending on the type of entitlement service supported by the Reuters service supplying that item. The market data item will only be available for further processing if the user is entitled.

Please refer to corresponding Reuters documentations on Open DACS.