ETNA CLEARING

System Requirements Specification

10th March 2024

OVERVIEW

This document describes the required functionality, architecture and business cases for the post trading solution.

Requirements

This is a high level overview of the functionality required for the platform

- Stock Trading - the platform supports only stocks and ETFs
- Positions:
    - Tracking of individual position lots
    - Tracking of broker-level position across all securities
- Audit - Tracking of all operations happening in Finesse
- Transactions:
    - Management of transactions
- Account opening
    - Individual account
    - Joint account - Tenants with Right of Survivorship - JTWROS,
    - Foreign account,
    - Foreign Joint account
    - Custodian
    - Account verification - Ability to perform KYC via LexisNexis
    - Ability to open accounts in ETNA Trader and send the application to Finesse
    - Ability to approve/reject accounts in Finesse
    - Auto-generation of Clearing Account Number and FDID
    - Cash account only
- Account Funding
    - Wire Transfers
    - Deposits via Fedwire
    - Processing of daily BMO reports
- Core DTCC Integration(Specify the cycle)
    - Storage of CAS MQ messages
    - Storage of UTC MQ messages
    - Storage of ICM MQ messages
    - Storage of OW MQ messages
    - Tracking and management of OW obligations based on OW MQ messages
    - Processing of DTC's EOD report
    - Scheduled import of DTC's Security Master
    - Processing of CNS's Balance Order (if it doesn' come through MQ)
- OMS integration - SOD and EOD generations
- Back Office - UI for the trade desc team

- Account management
    - View accounts
    - View account details and information
  - Position lots management
  - Transactions
  - User and permission management
  - Security Master
    - Ability to manage securities
    - Ability to create custom security(UIT, Warrants, bonds)
    - Disable securities
    - Mark securities for fractional trading
  - DTCC messages
  - Ability to create a position on account
  - Risk Management
    - Tracking of settled/unsettled funds
    - Cash Call
  - Accounting
- ACAT transfers - ability to transfer accounts from other clearings.
- Service accounts
  - Error Account
  - Fees Account
  - Inventory Account
  - Sec fee accounts (would that be part of fees above)
  - Commissions
- Regulations and Compliance
  - Electronic Blue Sheet(EBS)
  - Rule 15c3-3
  - Aged CNS Fails
  - Aged balance order fails or ex-clearing fails (DTC fails)
  - Segregations
    - By Security
    - By Account
    - ...
- Fractional Trading(OMS + Clearing) - see details in pdf
  - Ability to open fractional accounts and non fractional accounts
  - Ability to filter accounts by fractional ability in Back Office.

- Ability to filter by security/cusip
- Account Documents:
  - Tax Lots - 1099s
  - Account Statements
  - Trade Confirmations
- Tax Loss harvesting
- Corporate actions(OMS + Clearing):
  - Automatic application of corporate actions
  - Corporate Action Previews
  - Dividends (cash/stock)
  - Splits (forward/reverse)
  - Reorgs (mandatory/voluntary
  - Announcements - ASB positions only
    - Dividends (cash/stops)
    - Stock Splits (forward/reverse)
    - Mandatory Reorgs
    - Voluntary Reorgs
- Reports:
  - P&S
    - Trade Blotter (t/d & s/d)
    - Trade Break Report
    - ASB/CNS Reconciliation (stock and money)
    - CNS Projection Report
    - CNS Trade Summary Report
  - Cashiering (settlements)
    - DTC Fail Reports (aged)
    - DTC Activity Report
    - DTC Balance Order report
    - DTC EX-Clearing report
    - DTC/ASB stock reconciliation
    - DTC/ASB Seg reconciliation
    - ASB Fail Activity (clean ups – Set-up)
    - OW – Status Report
    - OW – Activity
    - Firm Stock Record Reports (Customer & Firm)
  - Finance

- Daily Money Line (Customer & Firm)
- 15c3 – Reserve Computation Report

Resources

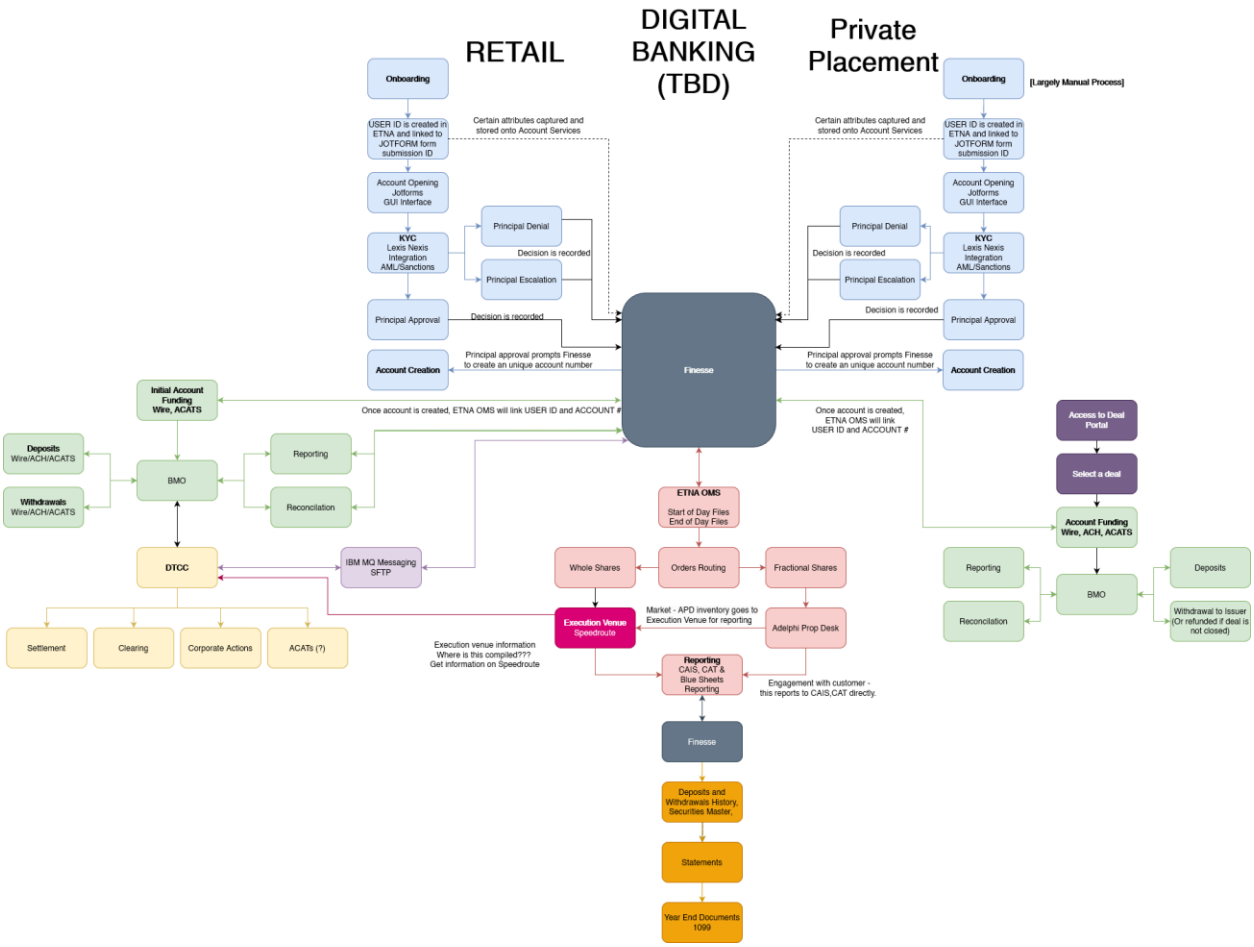
Configuration

- Initial Clearing Setup

DTCC

- Equities Clearing
- Shortening the Settlement Cycle to T+1

Business Processes Diagram



Clearing Architecture

Diagram

- Internal - Architecture diagram
- C4 Architecture diagram - https://app.diagrams.net/#G1rDGSelf-Clearing.drawiodkzA0zndrUe2WNuKgjZ7K9uW-Vd3A%23%7B%22pageId%22%3A%22yESLFXCAFKOYwSgbs1Uw%22%7D

Tech Stack

Backend:

- Language: C# 10
- Framework: .NET Core 8
- DB: PostgreSQL + Entity Framework Core
- Testing frameworks: Moq, nUnit

UI:

- Language: TypeScript 4.9.5
- UI library: React 18
- Testing frameworks: Jest, @testing-library/react

The clearing architecture will partially involve ETNA Trader's existing infrastructure (e.g. OMS) while also adding several new microservices and user interfaces that facilitate the clearing and settlement processes.

Component Overview

ETNA Clearing Service

The clearing service will be the core component of clearing; responsible for the following functionality:

- Generation and processing of SOD (Start-of-Day) files
- Processing of incoming EOD (End-of-Day files
- Account Funding via BMO Harris Bank
- Calculation of net debit/credit for ticker symbols traded during today's trading session
- Calculation of net debit/credit for funds
- Parsing and storage messages from DTC
- Application of corporate actions
- ACAT
- Report generation

Clearing Management UI

The clearing management UI will house the back office functionality that the broker's personnel can use to perform various clearing-related procedures. The functionality in the UI will include:

- Ability to view, modify, and add positions (both position lots and security-level positions)
- Ability to view, modify, and add accounts
- Ability to view, modify, and add transactions
- Ability to view, modify, and add securities
- Audit of all operations occurring as part of the clearing process
- Manual verification of clearing operations
- Ability to manually deposit and withdraw funds from trading accounts
- Ability to view DTC messages stored in the database (for at least the last 7 years)
- Tracking and monitoring of historical clearing sessions
- Audit of all operations occurring in Finesse

The clearing management UI will be available only to personnel who have been granted permission to access the portal. For this purpose, ETNA will create a new permission role dedicated to the clearing functionality.

Account Management Service

The Account Management Service (AMS) is an existing service in ETNA Trader responsible for opening, modification, and removal of investors' accounts. As part of clearing, AMS will contain the following functionality:

- Account opening via JotForm
- Account modification via JotForm
- Account closing via JotForm
- Submission of new accounts to the Clearing service

- Processing of account updates retrieved from SOD files (deposits, withdrawals, dividends payments, etc.)
- Automatic generation of FDID and Clearing Account Number for new accounts

OMS

ETNA Trader's Order Management System (OMS) will be the primary component interacting with the Clearing service. Bi-directional data flow between OMS and Clearing will be facilitated by:

- End-of-Day (EOD) files sent by OMS to Clearing
- Start-of-Day (SOD) files sent by Clearing to OMS

The transference of both EOD and SOD files will be facilitated by a dedicated AWS S3 bucket that will be created specifically for this purpose.

The OMS will also be refactored to enable fractionalized trading, taking into account the changes that must be made on the UI, in the reporting, and in the application of corporate actions.

Clearing Database

The clearing database will be the primary storage for all clearing-related data. The database engine of choice will be Postgres, as it suits the storage and scalability requirements and will enable us to leverage cloud-native databases like AWS Aurora that facilitate tremendous scalability. The clearing database will store the following data:

- Accounts
- Position Lots
- Transactions (funds transfers, account opening requests, etc.)
- Securities
- DTC messages
- Comprehensive logs for auditing purposes
- Corporate actions
- Reports provided by BMO Harris Bank via SFTP

Funding Service

The purpose of the Funding service is to track all outstanding and historical deposit and withdrawal requests as well as interacting with the clearing bank – BMO – by means of PAIN messages (ISO 20022).

Funding Database

The Funding database will serve as the storage for all deposit and withdrawal requests as well as the corresponding PAIN 001, 002, and 008 messages. All sensitive information stored in Finesse will be encrypted.

It must also be noted that even though customer's banking information is technically related to funding, it will actually be stored in the Clearing databasfileDTC Message Processor Service Finesse will interact with DTC through a group of IBM MQ channels that will be connected to a NodeSJ service called DTC Message Processor Service. The purpose of the service will be to monitor messages from the MQ and save them to the Clearing database.

IBM MQ Connection

Clearing service will interact with DTC through an IBM MQ channel configured in the production environment. The channel must be online 24/7 to ensure that all messages passed by DTC are successfully received, decrypted, parsed, and saved to the Clearing database.

SFTP Location

To facilitate the ingestion and processing of reports from BMO Harris Bank, an SFTP location will be configured in the broker's production environment (with access credentials to be generated by ETNA and provided to BMO's support team).

Action Scheduler

Overview

In the Clearing service, every trading session will automatically generate a clearing procedure consisting of multiple steps that must be performed in order to complete the clearing process.

1. Maintenance
2. Retrieving and processing the EOD file
3. Transaction Reconciliation
4. Account Opening
5. Account Funding
6. Net debit/credit for ticker symbols and funds
7. Application of corporate actions
8. Processing of reports from DTC
9. Submission of reports to DTC
10. Generation of SOD files

The multi-step procedure will commence with the generation and processing of the Start-of-Day file and end with the generation of the End-of-Day file once all of the necessary overnight operations like funding and corporate actions have been performed.

The state history updates will be logged in the Clearing service to ensure that the compliance team may review the step-by-step progression of the clearing flow.

The Maintenance Step

Overview

The first step of the clearing flow will be maintenance and its purpose is to generate snapshots of various data like positions, cash balances, and other entities before the session begins and irreversibly modifies the data. This is critical for report generation and application of dividends (after being credited said dividends by DTC, Finesse must be able to look up who were the owners of the security on the ex-div date and disburse the appropriate amounts to each account.

Furthemore, the maintenance step will also create daily snapshots of accounts' cash positions which will be critical for report generation.

Schedule

The maintenance step is scheduled to start at 8:30 PM ET.

The Generation and Processing of EOD files step

Overview

The Clearing service will retrieve information about the executed orders from ETNA OMS via transactions – an existing entity in the OMS. Transactions will be compiled in the OMS into a so-called End-of-Day (EOD) file and subsequently sent to an AWS S3 bucket which ETNA will provision specifically for EOD and SOD files. The Clearing service will then retrieve the file from the bucket according to a pre-configured schedule, process it, and ingest its contents into the service's database.

The Clearing service will then use the retrieved transactions to update the positions in the PositionLot table.

Note that accounts and securities will not be contained in the EOD file, as accounts will be provided to Clearing by AMS while the securities will be collected by Clearing directly from QuoteMedia.

Schedule

The EOD file generation will start at 8 PM ET and upon completion it will be exported by the OMS to an AWS S3 bucket. It is reasonable to assume that 30 minutes will be sufficient for the file to be placed in the bucket, and consequently the processing of the EOD file by the Clearing service will commence at 8:30 PM ET. Both time parameters may at any point be modified by ETNA's support team.

End-of-Day File Format

An End-of-Day file will contain the following fields:

OMS DB field	File field	Clearing Service DB field	Type	Details
Transaction.Id	N/A	transaction_lot.id		Primary key. Not mapped. Not equal in OMS and Clearing
Transaction.Acc	N/A	transaction_lot.a		Key, mapped via

ountId		ccount_id		`account` entity on both sides using Clearing Account Number or FDID
Transaction.Date	TransactionDate	transaction_lot.date		
Transaction.Value	Price	transaction_lot.price		
Transaction.Description	Description	transaction_lot.description		
Transaction.SecurityId	N/A	transaction_lot.security_id		key, mapped via `security` entity on both sides
Transaction.Quantity	Quantity	transaction_lot.quantity		
Transaction.Type	Type	transaction_lot.type		
Transaction.IsDayTrade	IsDayTrade	transaction_lot.is_day_trade		

EOD File Example

The following is a sample End-of-Day file that will be generated daily in the OMS:

AccountNumber,TransactionDate,Price,Description,Symbol,Quantity,Type,IsDayTrade
8887776,2024-01-23 17:33:52.7905020,-4.75000000,,AAPL,0.00000000,1,False
8887776,2024-01-23 17:33:52.7905020,-19462.00000000,,AAPL,100.00000000,2,False
8887776,2024-01-23 17:35:57.8633086,-4.75000000,,AAPL,0.00000000,1,True
8887776,2024-01-23 17:35:57.8633086,19462.00000000,,AAPL,-100.00000000,2,True
8887776,2024-01-23 17:35:57.8633086,-9.00000000,,AAPL,0.00000000,7,True
9995554,2024-01-23 17:36:26.1309878,-4.75000000,,F,0.00000000,1,False
9995554,2024-01-23 17:36:26.1309878,-1128.00000000,,F,100.00000000,2,False
9995554,2024-01-23 17:36:38.4294692,-4.75000000,,F,0.00000000,1,True
9995554,2024-01-23 17:36:38.4294692,1128.00000000,,F,-100.00000000,2,True
9995554,2024-01-23 17:36:38.4294692,-1.00000000,,F,0.00000000,7,True

The Transaction Reconciliation Step

The second step of the clearing flow will be reconciliation of transactions that Clearing receives from three sources:

- OMS's End-of-Day file
- Execution venue's End-of-Day report

Clearing will iterate through each transaction and match them across all three reports. If there is a discrepancy between quantity or price of two transactions with the same execution ID, Clearing will generate a trade break to be resolved by a member of the operations team. The UI for trade breaks will look as follows:



In the initial version of Clearing, trade breaks will have to be resolved manually by contacting the party at fault and cooperating with them on identifying the root cause and fixing the issue.

Step 3. Account Opening

The account opening process in Clearing will comprise the existing account onboarding functionality available in the AMS with KYC and generation of FDID and Clearing Account Number being added to the Clearing service. The following use cases outline all potential account opening and management scenarios.

Use Case: A User Opens an Account

If a user would like to open a new retail account, they following flow will be executed:

1. The user opens the web or mobile UI and clicks Open New Account. The JotForm is pulled up.
2. The user fills out the retail JotForm and clicks Submit.
3. The new account is registered in the AMS with status Awaiting Approval.
4. AMS sends information about the new account to Clearing.
5. Clearing registers the new account and sets its status to Awaiting Approval.
6. A clearing operations employee performs KYC via LexisNexis for the account from the Clearing UI.
7. The clearing employee either rejects the account (in which case the user will receive a corresponding notification) or approves it. Once the account is approved, the Clearing service will generate an FDID and a clearing account number in which case the

account's status will be set to Approved and it will be sent to the AMS/OMS as part of the SOD file, and the user will be able to use it).

Use Case: An Entity Opens an Account

If an entity account is being opened, they will have to fill out their own JotForm that requires information pertinent to entities. Unlike retail accounts, entity applications will not be submitted to LexisNexis for KYC directly from Clearing. Instead, KYC will be performed manually by a clearing operations person.

Use Case: A Private Placement Account is Opened

If a private placement account is being opened, they will have to fill out their own JotForm that requires information pertinent to private placements. Unlike retail accounts, private placement applications will not be submitted to LexisNexis for KYC directly from Clearing. Instead, KYC will be performed manually by a clearing operations person.

Use Case: An Account is Modified

If a retail customer, entity, or a private placement user would like to modify their account, they will be able to open their previously submitted JotForm, modify its content, and resubmit it with updated information for another review by a clearing employee. Similar to the standard account opening flow, the clearing employee will be able to either reject or approve the account modification request.

Use Case: A Clearing Ops Closes an Account

A Clearing Ops will be able to close accounts at any point from the Clearing UI. Once an account is marked as closed, the SOD file will reflect this information for the OMS, and the user will no longer be able to use the freshly closed account the following trading session.

KYC via LexisNexis

One of the steps in the account opening process is account information verification via a KYC provider. ETNA Clearing will leverage a service called LexisNexis to perform KYC and ensure that the information provided by customers is accurate. LexisNexis's documentation is available here.

LexisNexis enables automated KYC verification by means of their REST API that Clearing will call to verify user-entered information. LexisNexis's API is available in two environments:

- Staging
- Production

Access to LexisNexis API is available exclusively from whitelisted IP addresses of Finesse servers.

Prior to approving a new account, a clearing employee will be able to leverage the Clearing UI to perform KYC via LexisNexis, examine the response, determine if the account holder is eligible to open a new account with the firm, and subsequently approve or reject the account.

Automatic Generation of FDID

In compliance with FINRA's requirements, ETNA Clearing will auto-generate and assign to each new account a special unique identifier called FDID before the accounts are opened and sent to the OMS via SOD files. A generated FDID will represent the first two sections of a UUID stripped of the hyphens. For instance, consider the following sample UUID:

- 59af62cc-78db-451f-b226-db57825b3d31

ETNA Clearing will extract the first two sections from it:

- 59af62cc-78db

And remove the hyphen, resulting in the following FDID:

- 59af62cc78db

Automatic Generation of Clearing Account Number

In line with the industry standard, ETNA Clearing will leverage the following formatting to generate clearing account numbers:

Retail Accounts

Prefix Ranges: 01-05 followed by R

Unique ID: 5 digits

Ex. 01R-12345

Individual - Prefix Range: 01-04

Entity

Prefix Range: 05-06

For Retail non-US accounts, Prefix Ranges: 10

Ex. 10R-12345

Private Placements

Prefix Ranges: 06-09 followed by P

Unique ID: 5-6 digits

Ex. 06P12345

- Accredited Individual - Prefix Range: 06
- Investor - Prefix Range: 01-04

- Retail Entity - Prefix Range: 05-06
- Institutional Entity - Prefix Range: 08

For Foreign Private placement accounts, prefix ranges: 10

Ex. 10P-12345

No assignments yet for 07 and 09

Account UI

All accounts present in Clearing's DB will be displayed on a separate tab called Accounts in Clearing UI. Each account will have an action bar containing actions relevant to that account. The mapping between account states and available actions is outlined in the following table:

Action / State	Approve	Reject	Perform KYC
New	✅	✅	✅
Sent to Clearing	✅	✅	✅
Approved	❌	❌	✅
Rejected	❌	❌	❌
Suspended	❌	❌	✅
Restricted	❌	❌	✅
Closed	❌	❌	❌

Step 4. Account Funding

The following functionality will be available as part of account funding:

- Deposits via wire
- Withdrawals via wire

- Deposits via ACH
- Withdrawals via ACH
- Deposit via Zelle
- Withdrawals via Zelle

Step 5. Calculation of Net Debit/Credit

Following the end of every trading session, the broker must calculate the net debit/credit for each ticker symbol to determine the net obligation owed by the broker to the counterparties, or vice versa. A similar algorithm will be used to calculate the amount of funds that DTC will either debit from or credit to the broker's account at the clearing bank.

Net Debit/Credit for Ticker Symbols

For each ticker symbol traded during the trading session, the net debit/credit will be calculated according to the following algorithm:

1. All transactions (derived from orders) will be grouped by the ticker symbol. For example, there might be a group with 5 transactions with AAPL as the underlying security and 10 transactions with T. The transaction will not be grouped by the user, as DTC is not concerned with orders and obligations of individual investors.
2. Within each transaction group, the quantity of traded securities will either be added (Buy) or subtracted from the total. For example, assuming the following orders have been placed by different investors during the trading session:
    a. Buy 5 AAPL
    b. Sell 3 AAPL
    c. Buy 10 AAPL
    d. Sell 3 SABR
    e. Sell 18 SABR

    The algorithm will first calculate the net debit/credit for AAPL: 5 + (- 3) + 10 = +12. Similarly, the net obligation for SABR will be -3 + (-18) = -21. These calculations indicate that following the day's trading session, the broker owes 21 shares of SABR to the counterparties who in turn owe the broker 12 shares of AAPL.

Note that for limit orders, if the order was partially executed – for instance, if only 7 shares have been purchased/sold out of the initially intended 10 shares of KO, only these 7 shares must be used in the calculation of net debit/credit for KO. The remaining 3 shares will be taken into account following the trading session during which they'd be purchased/sold.

Net Debit/Credit for Funds

As far as funds to be debited from or credited to the broker's clearing bank by DTC, the following algorithm will be used for calculation:

1. Add up or subtract the transaction's monetary value depending on the order type: addition for Sell orders and addition for Sell orders. For example, assuming the following orders have been placed by different investors during the trading session:

a. Buy 5 AAPL @ 101.46
b. Sell 3 AAPL @ 102.90
c. Buy 10 AAPL @ 102.50
d. Sell 4 SABR @ 3.51
e. Sell 18 SABR @ 2.9

In this case the following calculation will be performed: (-5)*101.46 + 3*102.90 + (-10)*102.50 + 4*3.51 + 18*2.9 = -1157.36. In this scenario the broker owes its counterparties $1157.36 which will be debited from the broker's account at the clearing bank by DTC.

Step 6. Application of Corporate Actions

Clearing will retrieve corporate actions from DTC through the CAS queue. One incoming message represents one corporate action that must be processed and applied. All corporate actions will be applied automatically on their due date. Corporate actions that are not supported by Clearing will be marked as not supported.

The Clearing UI will feature a separate column on the CAS page that will indicate the status of a given corporate action.

Supported Corporate Actions

The following table outlines the list of corporate actions that will be supported by Clearing:

Corporate Action	Supported	Description
Stock Split	✅	
Reverse Split	✅	
Cash Dividend	✅	
Stock Dividend	✅	
Conversion	✅	A conversion represents an exchange of securities (generally convertible bonds or preferred shares) into another form of securities (usually common shares) at a pre-stated price or ratio.
Automatic Dividend Reinvestment	✅	To do: investigate how this works at DTC
Distribution	✅	A capital distribution is an event in which shareholders

		receive an amount in cash issued from the Capital account. No reduction of the face value of a single share (or the share has no par value) takes place. The number of circulating shares remains unchanged.
Dutch Auction	✅	A dutch auction is an action by a party wishing to acquire a security. Holders of the security are invited by the acquiring party to make an offer to sell, within a specific price range. The acquiring party will buy from the holders with the lowest offers.
Exchange Offer	✅	An exchange implies the exchange of holdings for other securities and/or cash. An exchange can be either mandatory or voluntary involving the exchange of outstanding securities for different securities and/or cash. For example "exchange offer", "capital reorganization" or "funds separation".
Capital Gains Distribution	❌	A capital gain distribution is a distribution of profits resulting from the sale of company assets. Mutual funds won't be supported in the initial version of clearing.
CD Early Redemption	❌	Early redemption of a certificate deposit. Clearing will not support certificates of deposit in the initial version.
Default	❌	A bond default is a failure by the company to perform obligations defined as default events under the bond agreement and that have not been remedied.

		Bonds won't be supported in the initial version of clearing
Interest	✗	
Dividend with Option	?	?
Final Paydown	?	?
Full Call	?	?
Full Prerefunding	?	?
Liquidation		
Mandatory Exchange		
Mandatory Put		
Maturity		
Merger		
Name Change		
Odd Lot Offer		
Partial Call		
Partial Defeasance Partial		
Partial Prerefunding		
Pay in Kind		
Plan of Reorganization		
Principal		

Put		
Redemption of Warrants		
Reorganization		
Return of Capital		
Reverse Stock Split		
Rights Distribution		
Rights Subscription		
Sale Of Rights		
Security Separation		
Special Dividend		
Spin-Off		
Stock Dividend		
Stock Split		
Tender Offer		
Termination		
Warrants Exercise		
Worthless		

Step 7. Submission of Reports to DTC

As part of this step, Clearing will send all of the required EOD and intraday reports to DTC.

Step 8. Generation and Processing of SOD files

Overview

The Clearing service will generate Start-Of-Day (SOD) files and send them to OMS overnight following every trading session. The transfer of SOD files between the OMS and Clearing will be facilitated by an SFTP location where these files will be stored. A standard set of SOD file will contain the following data:

- Positions
- Account details
- Account balances
- Easy-to-borrow list (to be added in a future version)
- Security margin rates (to be added in a future version)
- Non-marginable securities (to be added in a future version)

Schedule

The Clearing service will start generating the SOD files at 3 AM ET and will subsequently place it into the SFTP location. At 4 AM ET, the OMS will import the SOD files from SFTP and start processing it.

Positions SOD

The position file will contain the following data:

Index	Name	Required	Type	Description
0	AccountNumber	Yes	String	Clearing account number

1	MarginType	Yes	Character: C – cash M – margin S – short	Position's margin type
2	CUSIP	Yes	String	Security's CUSIP
3	Symbol	Yes	String	Ticker symbol
4	Quantity	Yes	Decimal	Position's quantity
5	AverageOpenPrice	Yes	Decimal	Position's average opening price
6	CostBasis	Yes	Decimal	Position's cost basis
7	CreateDate	Yes	Date (YYYY-MM-DD)	Creation date of the position
8	ModifyDate	No	Date (YYYY-MM-DD)	Position's modification date
9	Currency	No	String	Position's underlying currency
10	Locked	No	Character (Y/N)	If set to Y, the position cannot be closed

The following is a sample positions file:
AccountNumber;MarginType;Cusip;Symbol;Quantity;AverageOpenPrice;CostBasis;CreateDate;ModifyDate;Currency;Locked
TPRO-AUTO-00000002-M;M;369604301;GE;50.00000000;94.6200;-4731.000000;2022-02-16;2022-02-16;USD;N
TPRO-AUTO-00000002-M;M;;SPY 220318C00570000;25.00000000;5.0000;-12500.000000;2022-02-16;2022-02-16;USD;N
TPRO-AUTO-00000002-M;M;;SPY 220318C00590000;-25.00000000;2.0000;4999.930000;2022-02-16;2022-02-16;USD;N
TPRO-AUTO-00000002-M;M;;F 220318C00030000;15.00000000;3.0000;-4500.000000;2022-02-16;2022-02-16;USD;N

Account Details SOD

The account details file will contain the following information:

Index	Name	Required	Type	Description
0	AccountNumber	Yes	String	Clearing account number
1	FirstName	Yes	String	Account holder's first name
2	MidName	No	String	Account holder's middle name
3	LastName	Yes	String	Account holder's last name
4	BirthDate	No	Date (YYYY-MM-DD)	Account holder's birth date
5	CompName	No	String	Company name
6	Address	No	String	Address
7	City	No	String	City
8	State	No	String	US State. Must contain two characters (e.g. FL)
9	Zip	No	String	Zip code
10	Country	No	String	Country
11	Email	No	String	Email address
12	DateOpened	Yes	Date (YYYY-MM-DD)	The date on which the account was opened
13	Closed	Yes	Character (Y/N)	Indicates if the account is closed
14	Currency	No	String	Account's underlying currency. Currently only USD is supported.

The following is a sample account balances file:

AccountNumber;FirstName;MidName;LastName;Birthdate;CompName;Address;City;State;Zip;Country;Email;DateOpened;Closed;Currency
TPRO-001-00000002-C;Beverley;;Butchard;1977-06-18;Beverley Butchard;704 Broadway Unit 1331;Kansas City;KS;64114;US;testpersonAU@gdctest.com;2021-12-27;N;USD
TPRO-001-00000003-C;Beverley;;Butchard;1977-06-18;Beverley Butchard;704 Broadway Unit 1331;Kansas City;KS;64114;US;testpersonAU@gdctest.com;2022-02-07;Y;USD
TPRO-001-00000004-C;Beverley;;Butchard;1977-06-18;Beverley Butchard;704 Broadway Unit 1331;Kansas City;KS;64114;US;testpersonAU@gdctest.com;2022-02-07;Y;USD

Account Balances SOD

The account balances file will contain the following information:

Index	Name	Required	Type	Description
0	AccountNumber	Yes	String	Clearing account number
1	TotalEquity	Yes	Decimal	Account's total equity as of the previous trading session's closing.
2	MarginEquity	Yes	Decimal	Equity of margin positions
3	Cash	Yes	Decimal	Account's cash
4	Excess	Yes	Decimal	• Funds available for trading, equal to option buying power • Funds available to withdraw
5	DayTradingBuyingPower	Yes	Decimal	Day trading buying power (relevant only for accounts of type Day Trader)

6	AllowTrade	Yes	Character (Y/N)	Allows or forbids the account to place orders
7	AllowMargin	Yes	Character (Y/N)	Allows or forbids the account to use margin
8	AllowLongStock	Yes	Character (Y/N)	Allows or forbids the account to open long stock positions
9	AllowShortStock	Yes	Character (Y/N)	Allows or forbids the account to open short stock positions
10	AllowLongOption	Yes	Character (Y/N)	Allows or forbids the account to open long option positions
11	AllowShortOption	Yes	Character (Y/N)	Allows or forbids the account to open short option positions
12	ClosePositionOnly	Yes	Character (Y/N)	Indicates if this account is only allowed to place closing orders
13	MarginCallType	No	String	Margin call type. Possible values: ● House call

				• Equity call • Initial call • Day trade call • Maintenance call
14	MarginCallValue	No	Decimal	Margin call amount. E.g. $105.19
15	MarginCallValue	No	Character C – cash M – margin D – day trader I – Margin IRA	Account's margin type
16	IsAverageAccount	Yes	Character (Y/N)	Indicates if the account is average (can be used for allocations in rebalancing)
17	RepCode	No	String	Account's rep code
18	OptionLevel	Yes	Integer (0-6)	Account's option level
19	SMA	No	Decimal	Sma balance is the amount of funds in a special memorandum account
20	FDID	No		FDID is defined in Section 1.1 of the CAT NMS Plan as "a unique identifier for each trading account designated

				by Industry Members for purposes of providing data to the Central Repository.”

The following is a sample account balances file:
AccountNumber;TotalEquity;MarginEquity;Cash;Excess;DayTradingBuyingPower;AllowTrade;AllowMargin;AllowLongStock;AllowShortStock;AllowLongOption;AllowShortOption;ClosePositionOnly;MarginCallType;MarginCallValue;MarginType;IsAverageAccount;RepCode;OptionLevel;SMA;Fdid
TPRO-AUTO-00000002-M;138351.58;138339.430000;133268.930000;135847.93;548287.20;Y;Y;Y;Y;Y;Y;Y;;;M;N;;5;135847.93;33941FE1742C46FE8F83

Account Funding

Account Funding in Clearing will be facilitated by a clearing bank – BMO Harris Bank. Whenever a user wants to deposit/withdraw funds to/from their brokerage account, Clearing will generate the corresponding ISO PAIN messages and submit them to BMO. The following table outlines the supported funding types and payment networks:

Type / Network	Customer Deposits (CustomerDirectDebitInitiation)	Customer Withdrawals (CustomerCreditTransferInitiation)
Fedwire	✅ (Pain 008)	✅ (Pain 001)
SWIFT	✅ (Pain 008)	✅ (Pain 001)
ACH	✅ (Pain 008)	✅ (Pain 001)
Zelle	❌	✅

Data Encryption and Storage

Two AES-256 encryption keys will be provisioned for storage of sensitive banking data in ClearingService and FundingService. Both keys will be stored in Finesse's S3 bucket.

Note that wire transfer details are not stored in Finesse, and users will have to re-enter their banking information each time they attempt a wire deposit or withdrawal. ACH relationship data, on the other hand, will be stored permanently in Clearing's database.

Creating an ACH Relationship:

1. The user enters their banking information in the end user UI:
    - Bank name (alias). E.g. My account at JP Morgan.
    - Account owner name
    - Routing number
    - Account number at the bank

2. The UI passes the information to the AMS which saves the following parameter into the AMS's database:

- Alias (My account at JP Morgan)

3. AMS sends the user's banking information together with the user's account ID at Finesse to ClearingService which responds with the ID of the relationship at Finesse.
4. AMS saves the ID of the banking relationship at Finesse in AMS's database.. E.g. ABCXYZ001. AMS thus stores three parameters for each ACH relationship:

- Account ID at Finesse (e.g. 01R-00001);
- Alias (e.g. JP Morgan);
- ID of the relationship at Finesse (e.g, ABCXYZ001).

5. ClearingService validates the banking information via BMO Validation API:

- If BMO comes back with a risk level of high, establishment of the new ACH relationship is terminated and the user sees an error message.
- If BMO comes back with risk levels of either low or medium, ACH relationship establishment continues.

6. ClearingService loads the AES-256 encryption key from the S3 bucket, encrypts the banking information and saves the encrypted banking information to the ClearingService DB.

AMS Database Sample

Clearing Account Number	Alias	ID of the relationship at Finesse
001R-00001	My current at JP Morgan	ABC001
001R-00002	KeyBank	ABC002

Clearing Database Sample

ID of the relationship	Clearing Account Number	Alias	Account Number	Routing Number	Account Owner Name
ABC001	001R-00001	Current account at JP Morgan	rk49r340rk4r (encrypted value of 843948230)	fcj3498j384j3jf9f (encrypted value of 123456789)	Gustavo Fring
ABC002	001R-00002	KeyBank	49g5hg5h9gw8h5g (encrypted value of 492394394)	cm9v45aj5v9av (encrypted value of 342934892	John Smith

User Initiates a Wire Transfer

1. User opens the UI and navigates to the Funding tab. They enter the banking information, select the transfer type (deposit or withdrawal), and click Submit.
2. AMS sends the payment request to Clearing who comes back with the ID of the transfer.
3. Clearing performs validation of the provided banking information via BMO validation service:
    a. If BMO comes back with a risk level of high, the wire transfer is terminated
    b. If BMO comes back with risk levels of either low or medium, the wire transfer continues.
4. Clearing will send the request's details to FundingService.
5. Based on the transfer type and the account type, FundingService will generate one of the following PAIN messages:
    a. PAIN 008 message for wire deposits for individual accounts
    b. PAIN 001 message for wire withdrawals for individual accounts
    c. PAIN 008 message for wire deposits for entities
    d. PAIN 001 message for wire withdrawals for entities
6. FundingService fetches the BMO encryption key and encrypts the original PAIN file.
7. FundingService sends the PAIN message to BMO's SFTP.
8. FundingService fetches the Funding encryption key and encrypts the original PAIN file.
9. FundingService saves the encrypted PAIN message to FundingService's database.
10. FundingService will continuously monitor BMO's SFTP for updates (PAIN 002) and update requests' states in its database.
11. The following clearing session, ClearingService will load all payment requests that meet the following criteria:
    a. Status is set to completed
    b. Flag processed is set to false

Clearing will then proceed to apply these deposit/withdrawal requests to customers' accounts.

User Initiates an ACH Transfer

1. User opens the UI and navigates to the Funding tab. They select the target ACH relationship, select the transfer type (deposit or withdrawal), specify the amount, and click Submit.
2. AMS sends the payment amount and the ID of the ACH relationship to Clearing who comes back with the ID of the transfer.
3. Clearing fetches the encryption key used to encrypt/decrypt ACH relationship information and decrypts the data.
4. Clearing sends the payment request's details to FundingService.
5. Based on the transfer type and the account type, FundingService generates one of the following PAIN messages:
    a. PAIN 008 message for ACH deposits for individual accounts (PPD)
    b. PAIN 001 message for ACH withdrawals for individual accounts (PPD)
    c. PAIN 008 message for ACH deposits for entities (CCD)
    d. PAIN 001 message for ACH withdrawals for entities (CCD)

6. FundingService fetches the BMO encryption key and encrypts the original PAIN file.
7. FundingService sends the PAIN message to BMO's SFTP.
8. FundingService fetches the Funding encryption key and encrypts the original PAIN file.
9. FundingService saves the encrypted PAIN message to FundingService's database.
10. FundingService will continuously monitor BMO's SFTP for updates (PAIN 002) and update requests' states in its database.
11. The following clearing session, ClearingService will load all payment requests that meet the following criteria:
    a. Status is set to completed
    b. Flag processed is set to false

Clearing will then proceed to apply these deposit/withdrawal requests to customers' accounts.

Distinctions Between PAIN Messages for Individual and Entity Accounts

This section describes the differences between the formatting of PAIN messages for individual and entity accounts.

Payment Type

This parameter is applicable only to ACH relationships and must be set according to the following logic:

- CCD – used for entity accounts
- PPD – used for consumer accounts

Customer Deposits (Pain 008)

Whenever a customer wants to deposit funds into their account, Clearing will generate a PAIN 008 message, with the format largely dependent on the preferred payment network (Fedwire, ACH, Swift).

US Fedwire

ACH

US SWIFT Wires

Questions:

-
-

Mixed Payables

Questions:

- Do we even need this one if we don't batch multiple payment requests into a single report?

Questions

1. Do we understand correctly that deposits are supported through both wire and ACH while withdrawals are available only via ACH (no withdrawals through wires)?
2. What's the best way for us to map payment requests between BMO and Finesse? Should we do that by entering our own internal ID in the <Strd> tag?
3. How do we handle data encryption on both sides? Do we use PGP? Which party will generate the private and public keys?
4. Enumerate all accounts that Adelphi has at BMO and which of these we need to track in Finesse – customers' funds accounts, any others?
    a. Clearing account used with DTC
    b. Customer funds account (public-facing account)
    c. 15c3 account
5. How can we distinguish DTC's debits/credits from customers' deposits and withdrawals in BMO's reports?
6. How often should/can we send payment requests and receive reports? What's the default settings for a typical clearing firm? Previous day's report + hourly.
7. As customers are continuously sending deposit/withdrawal requests throughout the day, should we batch them together and send as one payment request, or should we rather send each request individually?
8. BMO offers account validation via API, a couple of questions:
    - Do we need to perform account validation prior to payment initiation? Crystal: Yes, we would need to perform account validation.
    - If yes, should it be done for both ACH and wire transfers? Crystal: I believe so.
    - What do we do if the account owner information in our request doesn't match the national transaction and identities database? Crystal: We would likely need to raise that inquiry to principal and deny. This needs to be asked to Victor.
    - They return some sort of risk-level score – should this information somehow affect the transaction? For example, say, it's lower than 50 or some other threshold, what should we do? Crystal: This is a question that we should ask BMO about the risk level scores and Victor - what numbers we're comfortable with.
    -

Reporting

This section outlines the selection of reports that will be available in Finesse.

Finesse Reports

Trade Break Report

The trade break report will display the list of all trade breaks that have been registered in Finesse. These trade breaks will highlight the difference between Finesse's position records and CNS position records.

t/d,s/d,symbol,cusip,security description,gross money, comm,fees(sec fees)net money

Integration with DTC

Overview

Finesse will feature an integration with DTC with bi-directional data flow:

- Parsing and storing of IBM MQ messages passed by DTC to Clearing
- Submission of reports from Clearing to DTC SFTP

Resources

- Messages structure
- Messages diagram

Incoming SFTP Reports

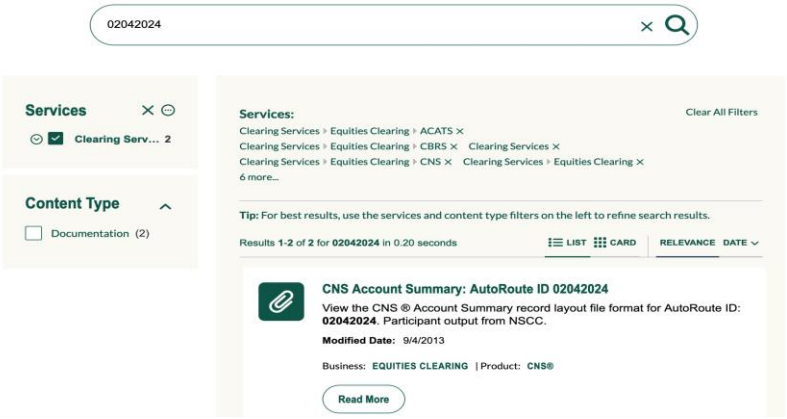
The list of reports provided by DTC is described in this spreadsheet. Note that the names of the reports in the SFTP slightly differ from their names in the spreadsheet and DTC's documentation. For instance, suppose there's a report on the SFTP titled: D240719.P2024.C00. To locate the report in the spreadsheet, extract the part following the date (P2024), remove "P", and then use the remaining digits (2024) to look up the report in the spreadsheet:

CNS BUY-IN ACTIVITY	02980891	02040891
CNS ACCOUNTING SUMMARY	02982024	02042024

Note that each report in the spreadsheet has a prefix that indicates the environment:

- 0298 – UAT
- 0204 – Production

To look up documentation on a particular report, copy the production ID of the report (e.g. 02042024) and search it at DTCC Learning:



Memo Segregation Management

Differentiation of In-House and Customer Accounts

In order to determine which positions must be memo seg'd, Finesse must be able to differentiate in-house and customer accounts. For this purpose all accounts in Finesse will feature a property called Owner Type that would indicate if the account belongs to the firm. All positions opened by accounts with the Owner Type customer would have all of their positions memo seg'd. All accounts created by end users – both individual and entity – would by default be marked as customer. In order to designate an account as in-house, an administrator who has access to Clearing UI would log into Finesse and manually create the new account, marking it as in-house..

Tracking and Management of Memo Seg'd Positions in Finesse

Memo seg'ing of all opened position lots in Finesse will be determined by the Owner Type of the account to which the position lot is bound. If the Owner Type is customer, the position lot will automatically be marked as memo seg'd. For instance, if a customer purchases 5 shares of some stock, all 5 shares will be marked as memo seg'd in Finesse. If the customer sells 2 shares, as of the settlement date only the remaining three shares will be marked as memo seg'd.

If the transaction wasn't settled on T+1, Finesse will nonetheless mark the shares as memo seg'd despite the firm not physically having the shares.

Finesse UI will feature a separate column on the security-level positions page, indicating how many shares of the positions are memo seg'd.

Memo Seg Reconciliation Between Finesse and DTC

To ensure up-to-date memo seg marking of all customer-owned positions both in Finesse and at DTC, a scheduled job will be configured to automatically submit an SFTP report to DTC, containing memo seg delta changes to existing positions. For instance, suppose the following net debit/credit was calculated for a given trading session that happened on Monday:

- AAPL: +5
    - Memo seg: +10 (customers collectively purchased net 10 shares)
    - House: -5 (in-house accounts collectively sold net 5 shares)
- TSLA: -12
    - Memo seg: -7
    - House: -5

Suppose the firm's memo seg position at DTC is 3 for AAPL and 20 for TSLA as of Monday. On Tuesday (the settlement date), at 6 AM ET, Finesse will submit a memo seg report to DTC via SFTP with the following values:

- AAPL: +10
- TSLA: -7

As a result of processing of this report, DTC's memo seg position records should be updated to:

- AAPL: 3 + 10 = 13
- TSLA: 20 - 7 = 13

In the morning, a member of the Ops team must check that Finesse's memo seg records match those provided by DTC to ensure there is no discrepancy between the two.

Memo Segregation for Fractional Shares

As far as fractional accounts, if an account owns 8.3 shares of some stock on Finesse's books, 8 shares will be memo seg'd while the remaining 0.3 shares will be marked as part of the whole share marked as Investment ID.

Segregation

The Sub-Accounting "Segregation" Service allows brokers to protect securities on deposit at DTC by moving them from the general free account tothe segregated account. The securities remain segregated and unavailable for any transactions until the brokers authorizes DTC to release them and return them to your general free account.

Regular segregation will not be used by Finesse;

Investment ID

Investment Identification segregates securities for the account of a firm, partner, or business into an Investment ID account, and is used for reporting information to the IRS about securities purchased for investment purposes. Investment ID transactions physically segregate securities

into your Investment ID account until instructions are received to release either all or a portion of the segregated securities. This release instruction swings back the securities indicated, making this position now available for other activities.

IBM MQ Channels

DTC provides four IBM MQ channels through which messages will be passed between Clearing and Finesse:

- CAS (Corporate Action Message)
- OWC (Obligation Warehouse Message)
- IC (Information and Communication)
- UTC (Universal Trade Capture)

Universal Trade Capture (UTC)

Raw:
NSCCGROUP1.0048=FIX.4.49=052635=AE49=NSCC56=0000147634=0000000152=20240306-09:32:57:064571=UTCW57900000001487=0570=N423=455=PIRS22=448=US7207951036460=05913=DT32=0000002500031=000100.00000030=08075=2024030660=09220000063=064=20240307552=154=1453=5448=00001476452=04448=ADSB452=01448=00004169452=18448=TEST452=37448=2452=36581=181=0575=N576=1577=615=USD381=00000002500000.00118=00000000000000.00136=4137=000000.00139=10137=0000.00139=01137=00000.00139=02137=0000000.00139=07751=0010=0008=FIX.4.49=052635=AE49=NSCC56=0000147634=0000000252=20240306-09:32:57:065571=UTCW57900000002487=0570=N423=455=ROKU22=448=US77543R1023460=05913=DT32=0000002900031=000115.00000030=08075=2024030660=09240000063=064=20240307552=154=1453=5448=00001476452=04448=ADSB452=01448=00004169452=18448=TEST452=37448=2452=36581=181=0575=N576=1577=615=USD381=00000003335000.00118=00000000000000.00136=4137=000000.00139=10137=0000.00139=01137=00000.00139=02137=0000000.00139=07751=0010=0008=FIX.4.49=052535=AE49=NSCC56=0000147634=0000000352=20240306-09:32:57:065571=UTCW57900000003487=0570=N423=455=NIO22=448=US62914V1061460=05913=DT32=0000003100031=000120.00000030=08075=2024030660=09250000063=064=20240307552=154=1453=5448=00001476452=04448=ADSB452=01448=00004169452=18448=TEST452=37448=2452=36581=181=0575=N576=1577=615=USD381=00000003720000.00118=00000000000000.00136=4137=000000.00139=10137=0000.00139=01137=00000.00139=021

37=0000000.00139=07751=0010=0008=FIX.4.49=052635=AE49=NSCC56=0000147634=0000000452=20240306-09:32:57:065571=UTCW57900000004487=0570=N423=455=ACHV22=448=US0044685008460=05913=DT32=0000002200031=000125.00000030=08075=2024030660=09270000063=064=20240307552=154=2453=5448=00001476452=04448=ADSB452=01448=00004169452=18448=TEST452=37448=1452=36581=181=0575=N576=1577=615=USD381=00000002750000.00118=00000000000000.00136=4137=000000.00139=10137=0000.00139=01137=00000.00139=02137=0000000.00139=07751=0010=000

Corporate Action Message (CAS)

The CAS queue sends messages containing corporate actions like dividends, interest payments, mergers and acquisitions, etc. The following is sample CAS message:

Raw:

<?xml version="1.0"?><env:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:env="CDTS-SUBMIT"><env:Body><cdtPrefix><cdtprVersion>01</cdtprVersion><cdtprOperation>SUBMIT</cdtprOperation><cdtprFunction>GCAMS1O</cdtprFunction><cdtprDirectionFlag>O</cdtprDirectionFlag></cdtPrefix><cdtDataDescription><cdtddVersion>01</cdtddVersion><cdtddFirmId>DTCCUS3NGCA</cdtddFirmId><cdtddBusinessDataFormat>GCAMS1O-XML</cdtddBusinessDataFormat><cdtddReferenceNum>142298905</cdtddReferenceNum><cdtddTrackingNum>ZP00203930140939</cdtddTrackingNum><cdtddDestination>ADELUS40</cdtddDestination><cdtddSeqNum>00000001</cdtddSeqNum><cdtddCycleNum>00</cdtddCycleNum><cdtddBusinessDate>00000000</cdtddBusinessDate></cdtDataDescription><cdtBusinessData><AppHdr xmlns="urn:iso:std:iso:20022:tech:xsd:head.001.001.02" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"><Fr><FIId><FinInstnId><BICFI>DTCCUS3NGCA</BICFI></FinInstnId></FIId></Fr><To><FIId><FinInstnId><BICFI>ADELUS40NYC</BICFI></FinInstnId></FIId></To><BizMsgIdr>2024022961995494</BizMsgIdr><MsgDefIdr>seev.031.002.13</MsgDefIdr><BizSvc>CSD</BizSvc><CreDt>2024-02-29T09:00:13Z</CreDt></AppHdr><Document xmlns="urn:iso:std:iso:20022:tech:xsd:seev.031.002.13" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"><CorpActnNtfctn><NtfctnGnlInf><NtfctnTp>REPL</NtfctnTp><PrcgSts><Cd><EvtCmpltnsSts>INCO</EvtCmpltnsSts><EvtConfSts>CONF</EvtConfSts></Cd></PrcgSts></NtfctnGnlInf><PrvsNtfctnId><Id>2024020250144581</Id></PrvsNtfctnId><CorpActnGnlInf><CorpActnEvtId>142298905</CorpActnEvtId><OffclCorpActnEvtId>US142298905</OffclCorpActnEvtId><EvtPrcgTp><Cd>DISN</Cd></EvtPrcgTp><EvtTp><Cd>INTR</Cd></EvtTp><MndtryVlntryEvtTp><Cd>MAND</Cd></MndtryVlntryEvtTp><UndrlygScty><FinInstrmId><OthrId><Id>83165BFM9</Id><Tp><Cd>CUSP</Cd></Tp></OthrId><Desc>3(A)2 SMALL BUSINESS ADMINISTRATION POOL 522672</Desc></FinInstrmId><PrvsFctr><Rate>.41127167</Rate></PrvsFctr></UndrlygScty></CorpActnGnlInf><AcctDtls><ForAllAccts><IdCd>GENR</IdCd></ForAllAccts></AcctDtls><CorpActnDtls><DtDtls><RcrdDt><Dt>2024-02-29</Dt></RcrdDt></DtDtls><RateAndAmtDtls><IntrstRate><Rate>0</Rate></IntrstRate></Rate

AndAmtDtls><IntrstAcrdNbOfDays>0</IntrstAcrdNbOfDays></CorpActnDtls><CorpActnOptnDtls><OptnNb>001</OptnNb><OptnTp><Cd>CASH</Cd></OptnTp><CcyOptn>USD</CcyOptn><DfltPrcgOrStgInstr><DfltOptnInd>true</DfltOptnInd></DfltPrcgOrStgInstr><CshMvmntDtls><CdtDbtInd>CRDT</CdtDbtInd><IncmTp><Id>0001</Id><Issr>IRSX</Issr></IncmTp><DtDtls><PmtDt><Dt>2024-04-25</Dt></PmtDt></DtDtls><RateAndAmtDtls><IntrstRateUsdForPmt><NotSpcfdRate>UKWN</NotSpcfdRate></IntrstRateUsdForPmt><WhldgTaxRate><Rate>0</Rate></WhldgTaxRate></RateAndAmtDtls></CshMvmntDtls></CorpActnOptnDtls><AddtlInf><AddtlTxt><Lang>en</Lang><UpdDt>2024-02-02</UpdDt><AddtlInf>VARIABLE RATE CMO - NORMAL PAYMENT - INTEREST IS PAID MONTHLY</AddtlInf></AddtlTxt></AddtlInf><SplmtryData><Envlp><Document xmlns="urn:iso:std:iso:20022:tech:xsd:supl.001.001.15" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"><DTCCCANOCSDDataSD1><NtfctnGnlInf><PlcAndNm>/Document/CorpActnNtfctn/NtfctnGnlInf</PlcAndNm><CretDtAndTm>2024-02-02T21:20:16</CretDtAndTm><UpdDtAndTm>2024-02-29T04:00:13</UpdDtAndTm></NtfctnGnlInf><CorpActnGnlInf><PlcAndNm>/Document/CorpActnNtfctn/CorpActnGnlInf</PlcAndNm><AsstSvcrPrcgFlg>true</AsstSvcrPrcgFlg></CorpActnGnlInf><UndrlygScty><PlcAndNm>/Document/CorpActnNtfctn/CorpActnGnlInf/UndrlygScty</PlcAndNm><DTCAsstClss>CRPB</DTCAsstClss><DTCAsstTp>S542</DTCAsstTp><DIVANNSctyDesc>SMALL BUSINESS ADMIN G D05/01/21 0.010Q 30</DIVANNSctyDesc></UndrlygScty><CorpActnDtls><PlcAndNm>/Document/CorpActnNtfctn/CorpActnDtls</PlcAndNm><CutOffDays>0</CutOffDays><RDPRefNb>D1300083165BFM902402292404250008</RDPRefNb></CorpActnDtls><CorpActnDtDtls><PlcAndNm>/Document/CorpActnNtfctn/CorpActnDtls/DtDtls</PlcAndNm><DTCPosCaptrDt>2024-02-29</DTCPosCaptrDt></CorpActnDtDtls><OptnDtls><PlcAndNm>/Document/CorpActnNtfctn/CorpActnOptnDtls[1]</PlcAndNm><DfltOptnFlg>true</DfltOptnFlg><RDPRefNb>D1300083165BFM902402292404250008</RDPRefNb></OptnDtls><CshMvmntDtls><PlcAndNm>/Document/CorpActnNtfctn/CorpActnOptnDtls[1]/CshMvmntDtls[1]</PlcAndNm><PyoutTp>INTR</PyoutTp><DTCPayMtd>1</DTCPayMtd><DTCPayOrdr>0</DTCPayOrdr><EstmtdRateFlg>false</EstmtdRateFlg><NRATaxRptblFlg>true</NRATaxRptblFlg><DTCUSTaxInstrPrd><StartDt><Dt><Dt>2024-03-01</Dt></Dt></StartDt><EndDt><Dt><Dt>2024-04-24</Dt></Dt></EndDt></DTCUSTaxInstrPrd><RDPRefNb>D1300083165BFM902402292404250008</RDPRefNb></CshMvmntDtls></DTCCCANOCSDDataSD1></Document></Envlp></SplmtryData></CorpActnNtfctn></Document></cdtBusinessData></env:Body></env:Envelope>

Parsed (JSON)

Information and Communication

In information and communication queue the message provides information about different settlements. Such as the debit, credit, settlement date, reciever and sender etc. Right now we have only preliminary settlement messages but even with other types the data will remain focused on settlement details

Raw:
A101154706000014760020232430000100000180000000172 O 0000147600-000001ESETA20230831154603000014 76DET0190000000000000000000000000000000000000000000000000000000000000000+0000000000000000+ID DELIVERID

Obligation Warehouse (OW)

For Obligation Warehouse queue the critical information it provides is the Date related details about any day order. Some of these date codes are:
/GSOD/ Obligation Warehouse Start-of-Day Notification YYMMDD
/EDCS/ Obligation Warehouse Submission Cutoff End-of-Day Message YYYYMMDD
/EODC/ Obligation Warehouse Processing End-ofDay Message YYYYMMDD
/NXTD/ Next OW ‘Trade Submission’ Day YYYYMMDD
/NXTR/ Next RECAPS Day YYYYMMDD
/CNSE/ CNS eligibility check completed YYYYMMDDHHMMSS
/POFC/ Pair off processing completed YYYYMMDD

Raw:
{1:F0100001476 0000000005}{2:O5992007240312INTDTC 00000000002403122007N}{3:{113:0701}{108:ZP00204996227920}{115:20.07.50.00}}{4: :20:SEME/24031220075 :79:GADM/PREP/20240312200750 /GSOD/20240313 /NXTR/20240327 -}

Corporate Actions

This section describes the implementation of corporate actions in Clearing.

Resources

- Service Guide – Distributions
- Calculation formulas for certain corporate actions
- Various corporate action documentation

Corporate Action Processing

Clearing supports automatic retrieval of corporate actions from DTC via the CAS queue and their subsequent saving into Clearing's database. Each message coming from the CAS queue represents a single corporate action of a specific type with various ancillary information. During each clearing session, Clearing will automatically fetch all corporate actions that must be applied on that date and apply them to the required positions and account balances.

If a corporate action fails to process, it will be marked as failed, and the clearing session will be halted until the issue is resolved. Alternatively, an employee of the Ops team can force-complete the step, leaving all failed corporate actions in the unprocessed state (with the assumption that they will somehow be handled later.) Some corporate actions are expected to fail; for instance, dividends are not meant to be paid out to customers prior to DTC's transfer of dividend funds to the clearing bank. For this reason, if a dividend's payment date is, say, May 5th, the corresponding corporate action may remain in the failed state up until the dividend funds appear in the clearing bank's report on, say, May 10th. The customers will see the dividend on their balances the following trading session (May 11th).

Stock Split

A stock split represents an increase in a corporation's number of outstanding equities without any change in the shareholder's equity or the aggregate market value at the time of the split. Equity price and nominal value are reduced accordingly. For example, if a company initiates a 2-for-1 split, it means that every shareholder who has Xs share will automatically become a holder of X*2 shares.

Stock Distribution events such as stock dividends, splits, and spinoffs are allocated on the ex-date +2 or the payable date, whichever comes later once DTC receives the securities. Your

DTC position is increased in the security for which the distribution was declared, or in securities of another issue resulting from a spinoff or rights distribution event. If a company initiates a stock split where the split ratio is fractional (e.g. 4:3 as opposed to 4:2), the resultant share count may also become fractional for certain holders. Typically, cash is paid in lieu of fractional shares.

Reverse Split

Reporting

Blue Sheet Reporting Service

FINRA may request brokers to submit the so-called Blue Sheet Reports that contain various trading and account holder information. Blue Sheet reports may be requested via email or via FINRA's Request Messenger. The Blue Sheet Reporting service will be responsible for generation and subsequent submission of Blue Sheet reports to FINRA.

crystal@adelphistockbrokers.comyou can share the document up until this point

User Management

US. A superadmin user is automatically created

A superadmin user will be automatically created during deployment of KeyCloak into the broker's AWS. This user will be used by ETNA's support team to assist with any potential issues.

US. ETNA's support team creates a Realm manager user for Broker

ETNA's support team will create a KeyCloak Realm for the broker and create an administrator for this Realm. This administrator will be a designated employee of the broker with unlimited rights in this KeyCloak realm, capable of creating users and granting them permissions to access the clearing functionality.

US. Broker creates user managers KeyCloak's Dashboard

The Realm manager will by default be the only employee capable of managing users in KeyCloak. If the Realm manager would like to enable other employees to manage users, they should create a new user and grant them the user management permission. With this permission, the employee will be able to manage other users but they won't be able to perform any other dangerous operations in the Realm.

US. Broker creates a clearing user via KeyCloak's Dashboard

To create a user, the Realm manager will perform the following operations:

1. Log into KeyCloak's administrator dashboard
2. Create the user
3. Grant the clearing permission to the user
4. The user will get an email

US. Broker modifies a user via Clearing UI

To modify user settings User manager will follow these steps:

1. Log into Keycloak User management console: http://<Keycloak host>/admin/Clearing/console/#/Clearing/users
2. Select user to be changed
3. Modify Users details: First Name, Last Name, Email, etc.
4. Press Save button

US. Broker removes a user via Clearing UI

To remove user User manager will follow these steps:

1. Log into Keycloak User management console: http://<Keycloak host>/admin/Clearing/console/#/Clearing/users
2. Select user to be changed
3. In the Actions menu choose Delete
4. Confirm Delete

US. User logs into Clearing UI

When clearing user logs into Clearing UI

1. Open Clearing UI URL https://adelphi-clearing-staging.etnasoft.us
2. User gets redirected to Keycloak log in page
3. If User successfully authenticated then he gets redirected back to Clearing UI

US. User calls the API

To call Clearing API directly User needs to:

1. Go to Swagger UI page at: http://staging.clearing.adelphi.projects.etna.etnasoft.com:8086/swagger/index.html
2. Log in using Authorize button in Swagger UI
3. In the list of available authorization options click Authorize button
4. User gets redirected to Keycloak log in page
5. If user successfully authenticated then Swagger UI display secure icon
6. User can invoke protected API methods

Account Opening

US. User opens a new trading account

When a user opens a new trading account, ETNA Trader's existing Account Management Service (AMS) will create a new trading account within the system the way it is normally done. However, with the self-clearing approach, instead of sending new account opening requests to an existing clearing firm, AMS will route the request to a new service in the self-clearing component: Account Master Service.

Account Master Service will have the following responsibilities:

1. Storing the list of the existing trading accounts.
2. Initiating deposits and withdrawals via Plaid.
3. Interacting with the Settlement Service to perform fund transfers via the settlement bank.

After an account opening request has been created, it will be submitted to LexisNexis for identity verifications and KYC procedures; once it's approved by an administrator/supervisor on the Adelphi side, the account will be registered as new in ETNA Trader (in both Account Management Service and Account Master Service).

Account Funding

ETNA Clearing will enable account funding via an integration with BMO Harris Bank that also serves as the clearing bank. Users will be able to both deposit and withdraw funds to/from their accounts. The following payment types will be available out of the box:

- Wire transfers (whether the initiating party will be the broker or the user is TBD)
- ACH transfers

Specifications

Formatting of the payment messages that must be initiated by ETNA Clearing is outlined in these documents.

US. User Places a Successful Order

1. A user placed a new order (e.g. Buy 5 AAPL)
2. OMS verifies the order, checks its parameters against the account's balances and then sends the order to the execution venue via FIX.
3. Order is executed on the exchange (e.g. Buy 5 AAPL).
4. The execution venue notifies ENTA OMS that the order has been filled.
5. Account balances are updated in ETNA OMS.
6. At the end of the day, at the designated time (e.g. 8 PM), an EOD report is sent to the ETNA Transaction Service.
7. The Transaction Service contacts all execution venues involved in the execution of orders and matches the data from the venue with the data in the EOD file.
8. Assuming the order execution was successful, the Transaction Service reckons that the counterparty must deliver 5 shares of AAPL to Adelphi.
9. The Transaction Service consequently generates and sends a report to DTCC.

US. ETNA sends an EOD Report to DTCC

Following the end of a trading session, ETNA will submit a report to DTCC, indicating which securities must be transferred from Adelphi's account to the required counterparty and vice versa.

Trade Submissions:
Sample trade report that ETNA must submit to NSCC both manually and through their API:

PARTICIPANT	MPID	TRADE DATE	BUY/SELL	CUSIP	CNS ELIGIBLE	SHARE AMOUNT	SHARE PRICE	SETTLEMENT DATE	SPECIAL INSTRUCTIONS
#1476	ADSB	3/30/2023	B	68620P101	N	20000	329.23	4/3/2023	night cycle settlement
#1476	ADSB	3/30/2023	B	92836Y300	N	38000	329.23	4/3/2023	day cycle settlement
#1476	ADSB	3/30/2023	S	77543R102	Y	23000	329.23	4/3/2023	night cycle settlement
#1476	ADSB	3/30/2023	B	594918104	Y	19000	329.23	4/3/2023	day cycle settlement
#1476	ADSB	3/30/2023	B	62914V106	Y	25000	329.23	4/3/2023	day cycle settlement
#1476	ADSB	3/30/2023	S	674599105	Y	20000	329.23	4/3/2023	partial delivery

#1476	ADSB	3/30/2023	B	594918104	Y	19000	329.23	4/3/2023	night cycle settlement

where:

Parameter	Type	Description	Example
Participant	String	Unique identifier of the broker-dealer at DTCC	#1476
MPID	String	Unique identifier of the market participant (broker-dealer)	ADSB
Trade Date	Date (mm/dd/yyyy)	The date on which the trade occurred	4/11/2024
Buy/Sell	String	Indicates if the broker is buying (B) or selling (S) securities as part of this transaction	• B • S
CUSIP	String	Unique CUSIP of the security that was traded as part of this transaction	037833100
CNS Eligible	Boolean		True / False
Share amount	Double	Indicates the number of shares that has been traded as part of this transaction	25
Share price	Double	Indicates the price at which the shares have been traded as part of this transaction	12.78
Settlement date	Date	Indicates the date at which the transaction must be settled and the securities and funds transfer must occur between the broker and the counterparty	4/12/2024

Special instructions	String	Special instructions that have been submitted as part of the trade	day cycle settlement

US. ETNA Receives a Confirmation from DTCC

Sample confirmation output provided by DTCC:

SEQUENCENB	MKT	B/S	EXCTNBRKR	CONCLRBRKR	CONEXECBRKR	ISIN#	SHAREQTY	PRICE	CNTRCTAM	TRADEDATE	STLMTDATE	STLTYPE
1	80	B	ADSB	4169	TEST	594918104	19,000	$329.23	6255370	3/30/2023	4/3/2023	0
2	80	S	ADSB	4169	TEST	674599105	20,000	$329.23	6584600	3/30/2023	4/3/2023	0
3	80	B	ADSB	4169	TEST	62914V106	25,000	$329.23	8230750	3/30/2023	4/3/2023	0
4	80	B	ADSB	4169	TEST	594918104	19,000	$329.23	6255370	3/30/2023	4/3/2023	0
5	80	S	ADSB	4169	TEST	77543R102	23,000	$329.23	7572290	3/30/2023	4/3/2023	0
6	80	B	ADSB	4169	TEST	928336Y300	38,000	$329.23	12510740	3/30/2023	4/3/2023	0
7	80	B	ADSB	4169	TEST	686220P101	20,000	$329.23	6584600	3/30/2023	4/3/2023	0

where:

Parameter	Type	Description	Example

SEQUENCE NB	Int		

US. Funds are transferred to/from the BMO Harris Bank

DTCC posts final settlement figures at approximately 3:45 PM ET each day. The end-of-day net-net settlement balance for each Settling Bank that settles on behalf of more than one Participant is the net of the net debit and net credit balances of all Participants for which that Settling Bank settles, after cross-endorsement with the National Securities Clearing Corporation (NSCC), including the Settling Bank's own settlement obligations as a Participant if it settles for itself.

If the broker has two traders, one of whom purchased $500 worth of securities while the other sold $300 worth of securities, DTC would instruct the Federal reserve to charge the broker's settlement bank $200.

ETNA's Self-Clearing's responsibility would be to ensure that the funds inflow and outflow at BMO are consistent with the calculations of ETNA's clearing.

US. ETNA Matches Orders in EOD Against SpeedRoute

To ensure that there's no discrepancy between the transaction records in ETNA OMS and the execution venue, ETNA's Self-Clearing will fetch transactions from the execution venue (SpeedRoute) and match it against the transactions in the EOD file. If there's no discrepancy between both data sources, ETNA will proceed to generate and send the CNS report to DTCC. Should there be any conflict, ETNA's backend will generate an error message that must be handled by the Back Office personnel.

US. ETNA sends a CNS Report to DTCC

US. Stock split happens

If an investor holds a position in a company that intends to perform a stock split, ETNA's Self-Clearing will automatically retrieve a report from DTCC containing the said corporate action.

US. Dividend is paid out to a shareholder

If an investor holds a position in a company that intends to disburse dividends, ETNA Self-Clearing will automatically retrieve a report from DTCC containing the said corporate action.

US. FINRA Requests a Blue Sheet Report

FINRA may request any broker-dealer to submit the Blue Sheet Report containing various trading and account holder information. The request may be submitted either through FINRA's Request Messenger or via email. ETNA will generate and send the report to FINRA via fileX; specifically, through S3.

Electronic Blue Sheets Specs. PDF.

US. ETNA sends CAT reports to FINRA

US. ETNA sends CAIS reports to FINRA

US. Good faith violation occurs

Note: might be irrelevant if the usage of unsettled cash is disabled.

US. Freeriding violation occurs

Note: might be irrelevant if the usage of unsettled cash is disabled.

US. Cash liquidation violation

Note: might be irrelevant if the usage of unsettled cash is disabled.

CAT Reports

In addition to being sent to FINRA, CAT reports must also be stored in the Self-Clearing DB.

Account Funding

- Creating an ACH relationship
- Performing a deposit
- Performing a withdrawal

Questions

Dividends / CA

- How will Adelphi/ETNA be notified when dividends are to be disbursed? Do we get a report from DTC? Will we get a notification from BMO? Or will we have to call their API to learn about any incoming dividend distributions?
- How do we handle stock splits? Do we get a report from DTC?

Funding

- How will deposits/withdrawals be handled on the BMO Harriss's side? Will there be a subaccount for each individual investor?
- As per page 21 of DTCC's funds settling documentation, DTC will simply instruct Fed to either debit or credit the broker's settlement bank. It seems as if ETNA and Adelphi do not participate in the process. Do we need to automatically monitor the funds inflow/outflow at BMO? If so, where's the API? If there's a discrepancy between calculations (e.g. DTC says BMO must debit Adelphi's account for $500k while ETNA's calculations suggest a slightly different figure), what's the course of action in this case?

DTCC

- How does DTCC handle conflicting information submitted by two counterparties?
- Need to clarify the the fields in both reports
- Do we report partial fills separately?
- Which other files/reports are provided by DTCC?

Post-Launch

Extending the Market Hours

Adelphi will initially go with the regular market hours; however, in case the trading hours need to be extended, we need to ensure that the EOD file is not generated during the post-market hours.