Consolidated Audit Trail

Interfirm Linkage Overview

Agenda

- General Processing Overview
- Linkage Keys and Errors
- Linkage Feedback and Corrections
- Overview of releases 3.1, 3.2 and 3.3

2a/2b Timelines

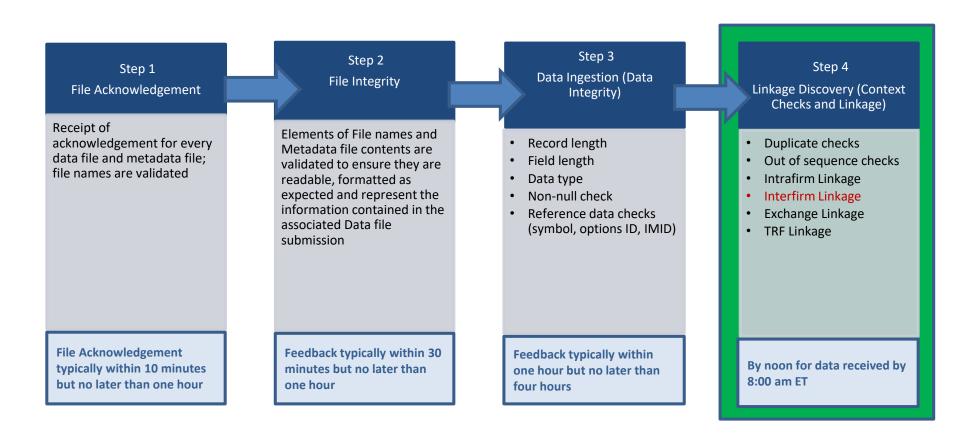
The CAT Industry Member Test and Production Environments for Phases 2a and 2b are being rolled out in a series of releases which implement different validation types at different times. These releases include:

Release	Test Environment Deployment Date	Production Environment Deployment Date	Compliance Go-Live Date	
1- File Submission and Data	December 16, 2019	April 13, 2020	June 22, 2020 (Phase 2a)	
Integrity	(multiple releases)	(multiple releases)	July 20, 2020 (Phase 2b)	
	April 20, 2020	May 4, 2020	July 27, 2020 (Phase 2a)	
2- Intrafirm Linkage	(multiple releases)	(multiple releases)	August 24, 2020 (Phase 2b)	
2 Interfirm Linkage	July 27, 2020	August 10, 2020	October 26, 2020 (Phase 2a)	
3- Interfirm Linkage	July 27, 2020	August 10, 2020	January 4, 2021 (Phase 2b)	
4 Evehanga / TDF Linkaga	Contombor 0, 2020	Contombor 20, 2020	October 26, 2020 (Phase 2a)	
4- Exchange/ TRF Linkage	September 9, 2020	September 28, 2020	January 4, 2021 (Phase 2b)	

Refer to CAT Alert 2020-01 for additional information.

General Processing Overview

CAT Processing



Linkage Discovery Steps

Interfirm Exchange/TRF Intrafirm 4. Route Key Duplicate 6. Exchange Linkage 1. Full Duplicate Checks Checks 7. TRF Linkage 2. Key Duplicate Checks ✓ When a linkage Key is 3. Intrafirm Linkage and duplicated, all events having the same linkage Out of Sequence key will be considered unlinked. ✓ Unlinked feedback with an associated Duplicate Route Linkage Key Error Code will be provided. 5. Interfirm Linkage ✓ Events routed/received between firms that do not link result in an unlinked event

Linkage Keys and Errors

Interfirm Route Linkage Key

Sender (MEOR)	Receiver (MEOA/MEOM)
senderIMID	senderIMID
destination (IMID)	receiverIMID
Event Date portion of eventTimestamp	Event Date portion of eventTimestamp
symbol (or optionID)	symbol (or optionID)
routedOrderID	routedOrderID

- Route Linkage Key must be equal between the sender and the receiver.
- Route Linkage key must be unique within the combination of the above noted fields. Uniqueness requirements apply to both the sender and the receiver.
- Session does not participate in Route Linkage key for routes between IMs.

Refer to **Section 2.6.3** of the IM Tech Spec for additional information/examples.

Determining Which IMID to Populate (Section 2.4.1 of the Spec)

- If an Industry Member has more than one IMID, the following criteria should be used to determine how to populate the senderIMID, receiverIMID, and destination fields:
 - For orders received from or routed to an alternative trading system (ATS), the FINRA ATS MPID must be used.
 - FINRA members must use the same MPID for CAT reporting that it uses for related trade reporting facility (TRF) trade reporting, or, for quoting on an IDQS.
 - If there is no ATS, TRF or quoting MPID requirement, firms may agree to use any valid FINRA MPID when routing to or receiving from another FINRA member, as long as both CAT Reporters use the same MPID as the IMID.
 - For orders received from or routed to a non-FINRA member firm, firms must agree to use the same IMID when reporting events to CAT. Non-FINRA members may use any effective identifier of the firm.
- The senderIMID, receiverIMID, and destination fields can be different than the CAT Reporter IMID.

Populating IMID Fields on Interfirm Routes (Section 2.4.1 and 2.6.3.1 of the spec)

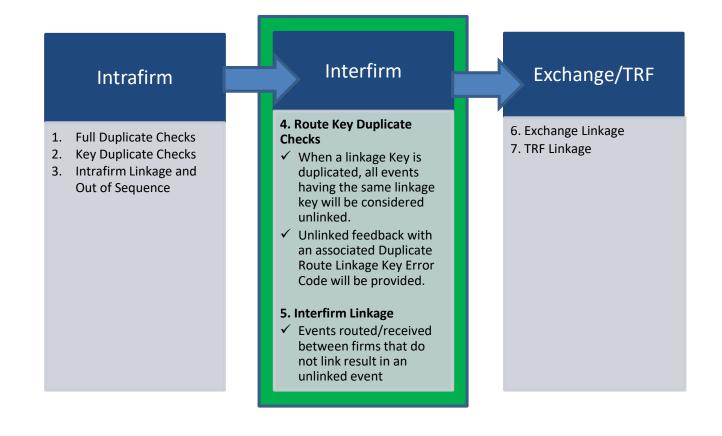
CAT reporters must populate the senderIMID, receiverIMID and destination fields with both the CRD and IMID, formatted as <CRD>:<IMID>.

Example:

Sen	der - MEOR	Receiver - MEOA			
CATRep	orterIMID ABCD	CATReporterIMID DEFG			
senderIMID	123:ABC	senderIMID	123:ABC		
destination	456:DEFG	receiverIMID	456:DEFG		
Event Date (portion of eventTimestamp)	05012018	Event Date (portion of eventTimestamp)	05012018		
symbol	XYZ	symbol	XYZ		
routedOrderID	ROID1234	routedOrderID	ROID1234		

This requirement will become effective on July 27, 2020.

Linkage Discovery Steps



Error Codes

- Error Codes identify the reason a File or Record did not pass a validation
- Codes may be deemed an Error or a Warning:
 - All Errors must be corrected
 - Warnings are not repairable
- Error codes are organized by processing stages:

Error Type	Assigned Series
Warnings	< 1000 (change to IM Specs to allow for filtering)
File Integrity Errors	1000
Ingestion Errors	2000
Intrafirm Linkage Errors	3000
Trade Linkage Errors	4000 and 5000
Exchange Linkage Errors	6000 and 7000
Inter-firm Linkage Errors	8000 and 9000

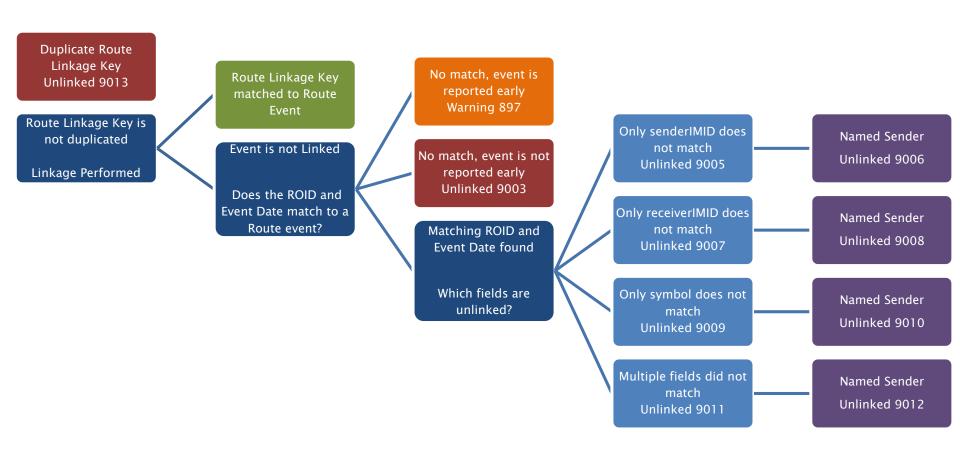
Interfirm Route Key Linkage Errors

Error Type	Description
Route Key Duplicates	Error codes assigned when a CAT reporter submits a route, accepted, or modified event with a duplicate Route Linkage key. Duplication of Route Linkage Keys will result in unlinked errors for all records having the same key.
Unlinked Routes	Route event that is unlinked
Unlinked Order Accepted / Modified	Accepted and/or the modified event that is unlinked.
Named Errors	Error codes assigned when the CAT Reporter was named in a record submitted by another CAT Reporter (Industry Member, Exchange or TRF/ADF/ORF) that is unlinked.
Early Reported Warning	Warning error code assigned to the CAT Reporter who submitted the record on the CAT Reporting Day prior to the due date (e.g., event occurring at 5:15 reported the next day by 8 am when it was not due until 8:00 am the next Trading Day). Warning because the contra was not required to report yet.

Order Route event – Linkage Order of Operations (8000 Errors)

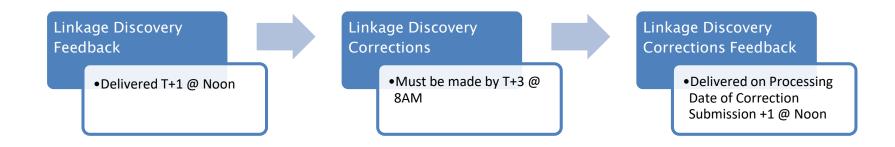


Order Accepted/Order Modified events – Linkage Order of Operations (9000 Errors)



Linkage Feedback and Corrections

Linkage Discovery Feedback and Corrections



Linkage Feedback Delivered via SFTP

- Feedback files will be accessible in the Submitter's feedback directories.
- Feedback for data submitted by a CAT Reporting Agent on behalf of a CAT Reporter will be accessible under the CAT Reporter's feedback directories if the CAT Reporter has an SFTP account.
- Named Errors will be accessible <u>only</u> in the CAT Reporter's feedback directory.
 - The feedback format will match the format of the original submission unless the CAT Reporter specifies a preference for Named Unlinked Errors that is different than the Unlinked Errors.
- Feedback will remain available for 10 calendar days.

Linkage Feedback Available on the Reporter Portal

- Machine formatted feedback files for all submission types will be accessible for download by the CAT Reporter, Submitter and Third-Party Reporting agent (if applicable).
- Machine formatted feedback files for Named errors will be accessible for download <u>only</u> by the CAT Reporter.
- Machine formatted feedback files will remain available for 10 days.

Correcting Interfirm Unlinked Errors

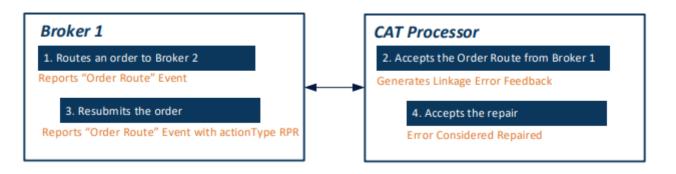
Error Feedback

- Error feedback returned to CAT Reporters will include the associated Error Code(s) and the Error Record Identifier (errorROEID).
- Assigned an initial repair status of Unrepaired ('U').

Reporting Corrections

- Distinguished using the Action Type Code.
 - 'RPR' must include errorROEID of the CAT identified error being corrected.
 - 'COR' must include firmROEID of the CAT identified error or CAT Reporter reporting error being corrected.
 - 'DEL' may include the errorROEID or the firmROEID.
- The use of a 'DEL' event can be used to remove an erroneous event which resulted in an error.
- Corrections made by an Industry Member to correct a linkage error will resolve any Linkage errors given to the counterparty.

Interfirm Linkage Correction



Error Feedback - Unlinked Interfirm Event	Corrected Submission
errorCode: 8003 actionType: RPR errorROEID: 923451234	actionType: RPR errorROEID: 923451234 type: MEOR CATReporterIMID:BRK1
<pre>type: MEOR CATReporterIMID:BRK1 eventTimestamp: 20180417T101010.101 routedOrderID: Z23456 symbol: XYZ</pre>	eventTimestamp: 20180417T101010.101 routedOrderID: X55894 symbol: XYZ destination: BRK2 senderIMID: BRK1
destination: BRK2 senderIMID: BRK1	Both the CAT Reporter's Unlinked error and the counterparty's Unlinked Named error will reconcile after correction

Release 3.1

Industry Test - 7/27/2020 Production - 8/10/2020

Industry Member 2a/2b - Release 3 Interfirm Release Rollout

Interfirm Release 3.1 Industry Test – 7/27/2020 Production – 8/10/2020

 Machine-to-Machine Interfirm Validations & Feedback including Named Errors

CAT Reporter Portal

- Download Interfirm Feedback including Named Errors
- Set preference for Named Feedback (JSON vs CSV)

Interfirm Release 3.2
Industry Test – 8/10/2020
Production – 8/17/2020

CAT Reporter Portal

- Reporting Summary (Interfirm Link Eligible, Errors, Warnings and Adjusted Error Rate)
- Counterparty statistics downloadable for Interfirm Unlinked and Unlinked Named Errors
- Error Code Count screen to include Interfirm Errors and Warning including Named Errors
- Error Search screen ability to view and correct Interfirm Linkage Errors (No Named Errors)

Interfirm Release 3.3
Industry Test – 9/21/2020
Production – 9/28/2020

CAT Reporter Portal

- Error Search screen ability to view Named Interfirm Errors (Not repairable via the Portal)
- New Screen for Interfirm statistics by counterparty

Additional planned features still being evaluated for release time frame:

- Enable Bulk Repair for linkage errors
- Summary of counterparty errors by error code
- SFTP Reconciliation and Repair Status

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(not intended for production use)



on behalf of (99999999)
Nello DeBlasio (catndeblasio)









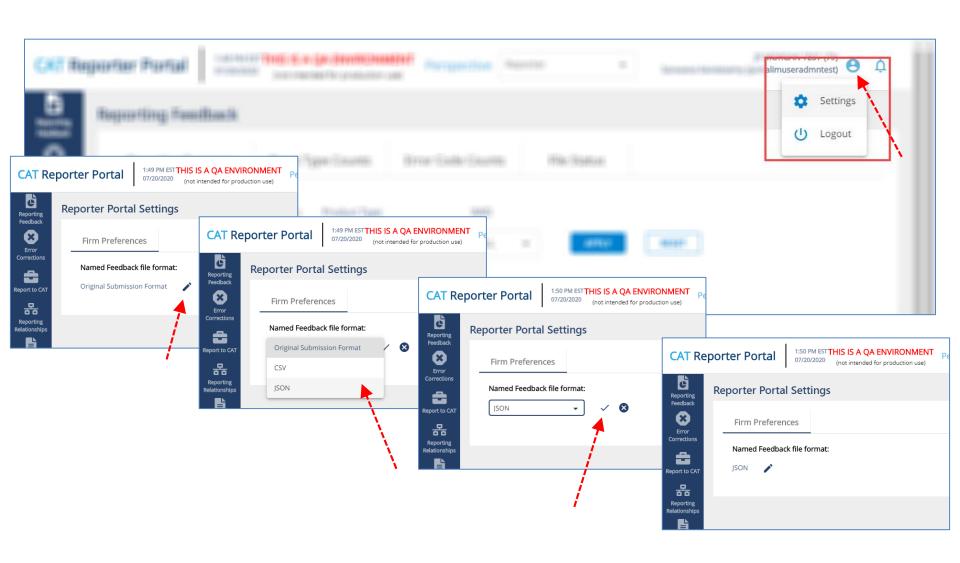




port to CAT						
Download Feedback	Create CAT Events	Pending Submissions				
i Linkage feedback files	are for both Portal and SFTP :	submissions. File Ingestion and D	ita Integrity feedback fil	les are for Portal submission	ns via direct entry/repair and "File Uploa	d" functionality only.
Feedback Time	File Name			Download		
Jul 16, 2020 11:10:52	95053_CA	T19_20200715_OrderEvents.linkage.err	or_000001.csv.bz2	<u>&</u>		<u> </u>
Jul 16, 2020 11:10:51	95053_CA	T19_20200715_OrderEvents.linkage_00	0001.csv	<u>&</u>		
Jul 16, 2020 11:10:51	95031_CA	T11_20200715_OrderEvents.linkage.err	r_000001.json.bz2	<u>&</u>		
Jul 16, 2020 11:10:51	95031_CA	T11_20200715_OrderEvents.linkage_00	0001.json	<u>&</u>		
Jul 16, 2020 11:10:51	95031_CA	T10_20200715_OrderEvents.linkage.suc	cess	<u>&</u>		
Jul 16, 2020 03:50:37	95053_CA	T19_20200716_catweb_OrderEvents_06	7227.ingestion.csv	<u>&</u>		
Jul 16, 2020 03:48:54	95053_CA	T19_20200716_catweb_OrderEvents_06	7227.integrity.csv	Ł		
Jul 15, 2020 10:29:17	95031_CA	T11_20200714_OrderEvents.linkage.err	r_000001.json.bz2	2		
Jul 15, 2020 10:29:17	95031_CA	T11_20200714_OrderEvents.linkage_00	0001.json	<u> 2</u>		
Jul 15, 2020 10:29:17	95031_CA	T10_20200714_OrderEvents.linkage.su	cess	4		
Jul 14, 2020 12:13:20	93003_CA	T15_20200706_OrderEvents_071401.m	ta.integrity.json	2		
				п		

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Release 3.2

Industry Test – 8/10/2020

Production - 8/17/2020

Industry Member 2a/2b - Release 3 Interfirm Release Rollout

Interfirm Release 3.1 Industry Test – 7/27/2020 Production – 8/10/2020

 Machine-to-Machine Interfirm Validations & Feedback including Named Errors

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- Download Interfirm Feedback including Named Errors
- Set preference for Named Feedback (JSON vs CSV)

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Industry Test – 8/10/2020
Production – 8/17/2020

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Reporting Feedback

Error Corrections



Reporting Relationships

ATS Order

Interfirm S	ent	Warnings	Linkage Eligible	Route Key Duplicates	Unlinked Events ⊙	Repaired Unlinked	Initial Unlinked Rate 🕏	Adjusted Unlinked Rate 🕏
Hide Details IMID St	ubmitter ID	0	5,456	39	13	0	0.9530%	0.9530%
CAT10	95031	0	98	9	3	0	12.2448%	12.2448%
CAT11	95031	0	5,358	30	10	0	0.7464%	0.7464%

ΙU

Interfirm Received	l Warnings	Linkage Eligible	Route Key Duplicates	Unlinked Events ூ	Repaired Unlinked	Initial Unlinked Rate 🏵	Adjusted Unlinked Rate ூ
IMID Submitter ID	0	2,728	8	5	0	0.4765%	0.4765%
CAT10 95031	0	49	0	3	0	6.1224%	6.1224%
CAT11 95031	0	2,679	8	2	0	0.3732%	0.3732%

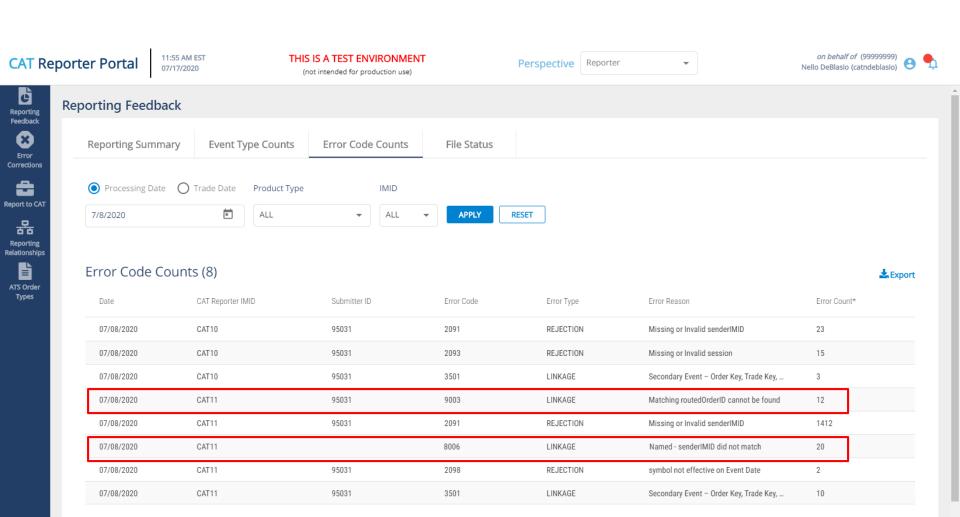
Named Statistics	Unlinked Interfirm Sent	Unlinked Interfirm Received	
Hide Details —	35	22	
CAT10	19	7	
CAT11	16	15	

NOTE: Interfirm unlinked event counts by Counterparty are provided in a separate data file which is included in the Export at the top of the page



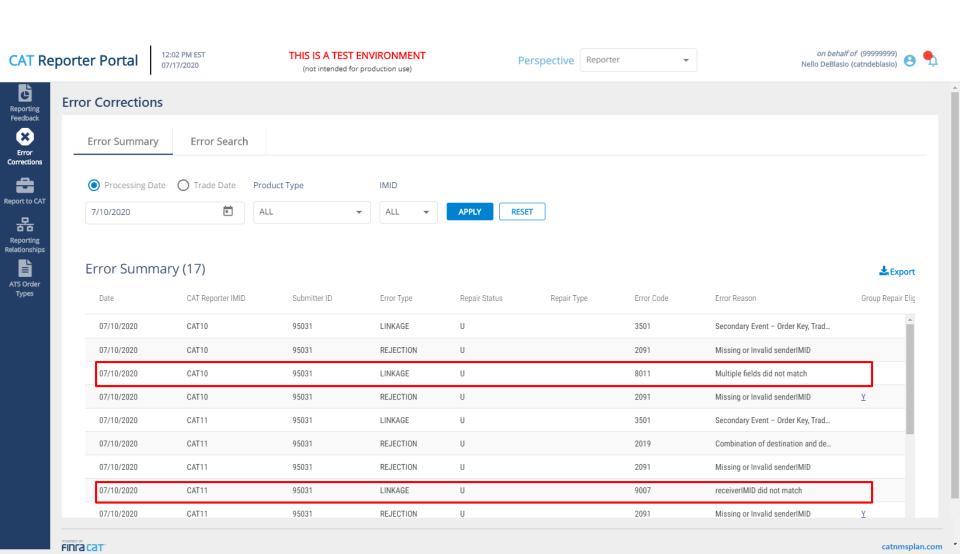
Counterparty Export - Sample for firm ZZZZ1

Linkage Processing Date	Trade Date	Product Type	CRD ID	IMID	Submitter ID	Third Party ID	Counterparty CRD ID	Counterparty IMID	Linkage Type	Linkage Sub Type	Record Count Category		Records Count
6/29/2020	6/28/2020	EQUITIES	9999	ZZZZ1	88		361	GSCO	INTERFIRM	INTERFIRM SENT	ERROR	UNLINKED	10
6/29/2020	6/28/2020	EQUITIES	9999	ZZZZ1	88		361	GSCO	INTERFIRM	INTERFIRM RECEIVED	ERROR	UNLINKED	15
6/29/2020	6/28/2020	EQUITIES	9999	ZZZZ1			123	MLCO	INTERFIRM	INTERFIRM SENT	ERROR	UNLINKED NAMED	30
6/29/2020	6/28/2020	EQUITIES	9999	ZZZZ1	88		79	JPMS	INTERFIRM	INTERFIRM SENT	ERROR	UNLINKED	30
6/29/2020	6/28/2020	EQUITIES	9999	ZZZZ1	88		79	JPMS	INTERFIRM	INTERFIRM RECEIVED	ERROR	UNLINKED	40
6/29/2020	6/28/2020	EQUITIES	9999	ZZZZ 1			361	GSCO	INTERFIRM	INTERFIRM RECEIVED	ERROR	UNLINKED NAMED	7



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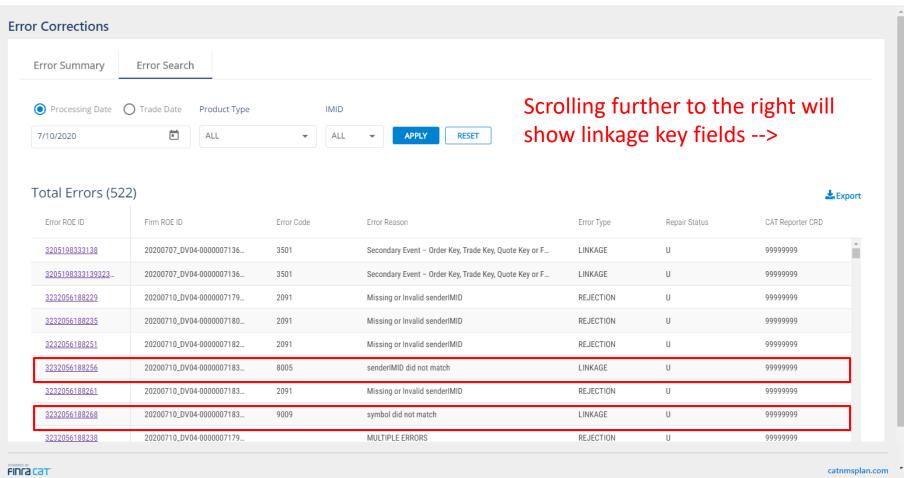
catnmsplan.com



12:08 PM EST

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Reporter

Perspective

on behalf of (9999999)

Nello DeBlasio (catndeblasio)

Comingled Feedback Example

	errorROEID	type	actionTypeCode	IMID	IMID/sendIMID/ rtngOrigin	rcvrlMID/ destination	symbol	OrderID	routedOrderID	eventTimestamp	ErrorCode	ErrorDesc	RprdStatus	Analysis	Correction Steps & Outcome
1	12345	MENO	NEW	FRMA			XYZ	ABC123		1/30/2019 9:30:02.000	2018	Missing or Invalid deptType	U	Rejection causing	Rejection repair will
	12992	MEOC	NEW	FRMA			XYZ	ABC123		1/30/2019 9:30:03.000	3501	Secondary Event - Key Not Found	U	unlinked Intrafirm	repair both errors
														Missing Origination	Late report will repair
2	13004	MEOC	NEW	FRMA			ZZY	AB9101		1/30/2019 9:42:03.000	3501	Secondary Event - Key Not Found	U	Event, no rejection	unlinked error
														Unlinked because FRMB	
														did not report or Route	FRMB's rejection repair or
														rejected; named error for	late submission will
3	13921	MEOA		FRMA	FRMB	FRMA	BBA	AZ333	VFA499	1/30/2019 9:45:03.000	9003	Matching routedOrderID not found	U	FRMB Route not present	repair unlinked error
												Named on Order Route event where			
4					FRMB	FRMA	AAA		CCD931	1/30/2019 9:58:03.000	8004	routedOrderID cannot be found	U	FRMA or FRMB - Incorrect	Additional analysis needed
4														linkage key	Additional analysis needed
	13273	MEOA		FRMA	FRMB	FRMA	BBA	AZ333	VFA499	1/30/2019 9:45:03.000	9003	Matching routedOrderID not found	U		

Release 3.3

Industry Test – 9/21/2020

Production - 9/28/2020

Industry Member 2a/2b - Release 3 Interfirm Release Rollout

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Named Received

Named Received

Reported Received

Reported Sent

WXYZ

WXYZ

AAAA

ABCD

7777777

77777777

7777777

8888888

902

739

882

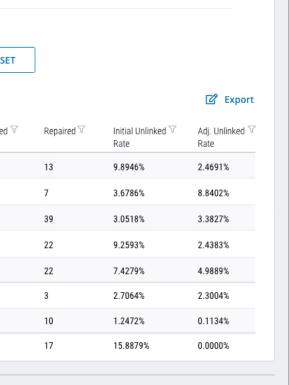
107

67

20

11

17





7/15/20

7/15/20

7/15/20

7/15/20

CAT12

CAT10

CAT19

CAT17

INTERFIRM

INTERFIRM

INTERFIRM

INTERFIRM

CAT NMS WEBSITE

User Name

How to Ask a Question during Today's Call

For participants using computer audio:

- Click the "Participants" button at the bottom of the app window, then the "Raise Hand" button at the bottom of the participants window.
- A visual prompt will indicate that your line has been unmuted.

For participants using phone audio:

- Enter *9 on your phone keypad.
- An audio prompt will indicate that your line has been unmuted.