Consolidated Audit Trail

Interfirm Linkage Overview 8/19/20

Agenda

- Week 1 Results Analysis
  - Statistics
  - Observations
- Tools Available for Unlinked Analysis and Use Cases
- Named Errors
- Industry Feedback
- Q & A

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 – 8/10/2020

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

Phase 2a Interfirm/Exchange/TRF Compliance Date – 10/26/2020
Phase 2b Interfirm/Exchange/TRF Compliance Date – 1/4/2021

Week 1 Results

Initial Interfirm Results

Process Date	EQUITIES		OPTIONS	
	Interfirm Sent Unlinked %	Interfirm Received Unlinked %	Interfirm Sent Unlinked %	Interfirm Received Unlinked %
8/10/2020	43.7462%	40.3759%	22.6576%	13.7142%
8/11/2020	38.4810%	37.7079%	33.3989%	13.0157%
8/12/2020	36.8713%	37.8149%	34.4612%	11.9777%
8/13/2020	32.8649%	35.2101%	25.4872%	13.7887%
8/14/2020	33.4004%	37.2112%	15.9704%	10.7118%

First Week of Interfirm Results

- Breakdown of Overall Error Rate

	Percentage of Overall Error Rate	
REASONS:	**Sender (Routes)**	**Receiver (Accept/Modify)**
Routed Order ID mismatch (8003/9003)	77%	76%
SenderIMID mismatch (8005/9005)	13%	15%
ReceiverIMID mismatch (8007/9007)	6%	6%
Symbol mismatch (8009/9009)	0%	0%
Multiple mismatches (8011/9011)	3%	3%
Route key duplicate (8013/9013)	<2%	<1%

General Observations with Differences in Linkage Key

The following scenarios are generating unlinked events and have been observed across many firms:

1. Firms populating the *orderID* as the *routedOrderID;* Counterparty reporting another value
2. Firms populating prefix in *routedOrderID*
   - Firms populating prefix: FIRMA *routedOrderID = 00123ABCD; FIRMB routedOrderID = 123ABCD*
   - *Note: leading zeroes are not removed by FINRA CAT from ROID*
3. Firms populating suffix in *routedOrderID*
   - Firms populating suffix: FIRMA *routedOrderID = 1111ABCD; FIRMB routedOrderID = 1111*
4. Firms submitting MENOs instead of MEOAs
5. Sender and Receiver populating different IMIDs
6. Firms improperly marking an Exchange Route as an Interfirm Route

Observations with Unlinked Order Modifies

- May be related to Firm Initiated Modifications to a previously routed order where no Route is required in 2a
- May be related to partial cancellations where one party reports an Order Cancel Event and the other party reports an Order Modify Event
- Overall, unlinked order modification represent 9.81% of 9003 errors. FINRA CAT cannot determine for sure what portion of this is attributed to firm-initiated modifications
- Impacts to 115 firms with 99% of impact across 15 firms
- FINRA CAT is analyzing how to eliminate such unlinked modifications from Compliance Error Rates by October 26, 2020 until the routes are required to be reported in 2d

Other Observations

1. Firms duplicating Linkage Keys (duplicate Routed Order ID)
   - Represents < 2% of all interfirm errors;
   - Impacts ~ 100 firms with 99% of impact across 5 firms
2. Named Errors due to rejected routes that are voluntarily reported by sender
   - Routes that were rejected by the destination must be marked with Route Rejected Flag = true

Overview of Error Analysis Tools

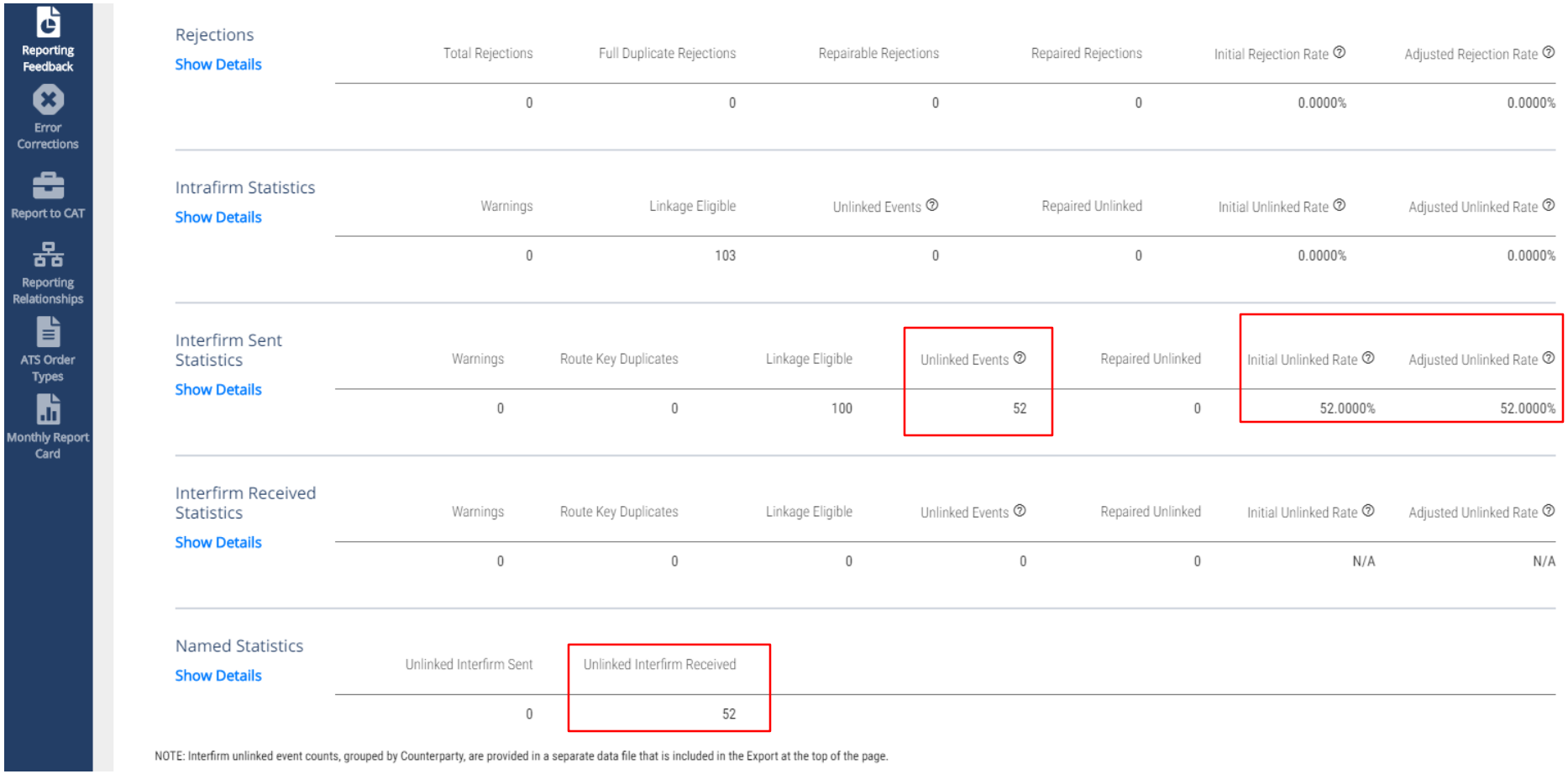
Error Code Cheat Sheet

Scenario	Error	If your firm is the Sender	If your firm is the Receiver
		Your feedback will contain	
Duplicated Linkage Key	Route Key Duplicate	8013	9013
Both Firms Reported - Event Date and Routed Order IDs are equal	SenderIMID Mismatch	8005 & 9006	9005 & 8006
	ReceiverIMID Mismatch	8007 & 9008	9007 & 8008
	Symbol Mismatch	8009 & 9010	9009 & 8010
	Multiple Mismatches	8011 & 9012	9011 & 8012
Both Firms Reported - Routed Order ID Mismatch	Routed Order ID Mismatch	8003 & 9004	9003 & 8004
Both Firms Reported - Your Event Rejected	Routed Order ID Mismatch	2XXX, 9004	2XXX, 8004
Both Firms Reported - Counterparty Event Rejected	Routed Order ID Mismatch	8003	9003
Missing Route or Accept - Your Firm	Routed Order ID Mismatch	9004	8004
Missing Route or Accept - Counterparty	Routed Order ID Mismatch	8003	9003

Error Corrections Workflow

Step 1	• Review Reporting Summary Interfirm Unlinked Rate
Step 2	• Export Counterparty Report from Reporting Summary
Step 3	• Review Error Code Counts Statistics
Step 4	• Analyze Samples from Error Search
Step 5	• Contact Counterparty & Resolve Errors
Step 6	• Evaluate Adjusted Error Rates on Reporting Summary

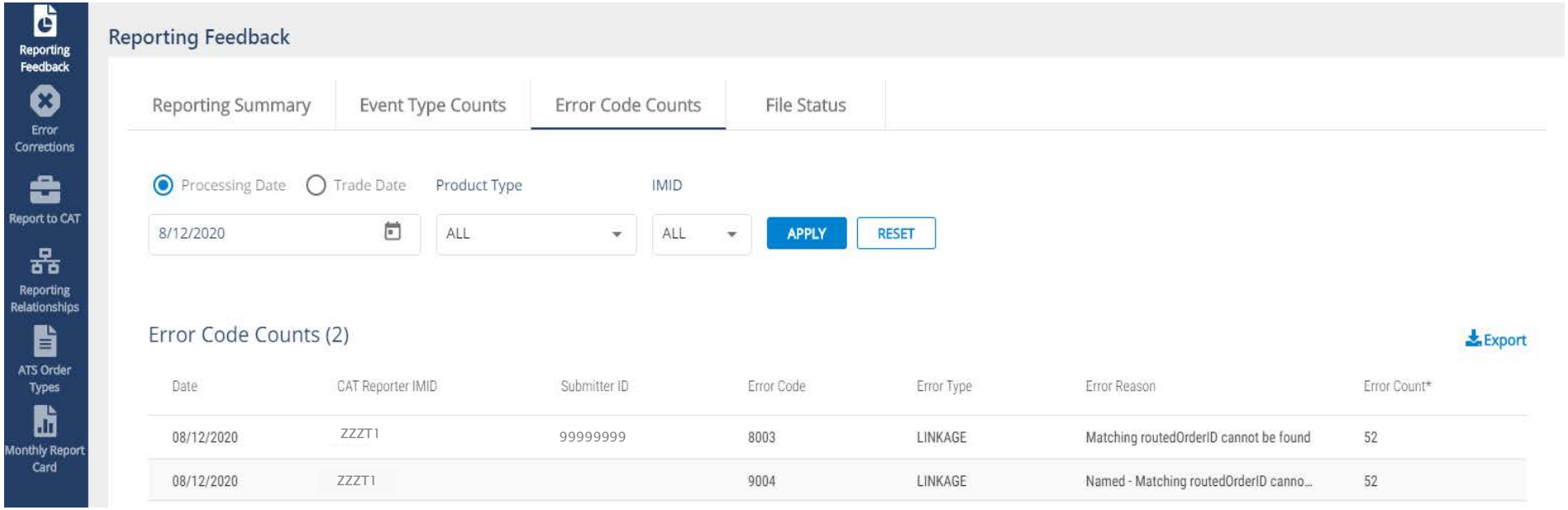
Step 1: Review Reporting Summary Interfirm Unlinked Rate



Step 2: Export Counterparty Report from Reporting Summary

Created By: catnsharma													
Created On: 08/17/2020 20:23:00													
Date: 08/12/2020													
Date Type: ProcessingDate													
Product Type: ALL													
Perspective: REPORTER													
Linkage Processing Date	Trade Date	Product Type	CRD ID	IMID	Submitter	Third Party ID	Counterpa	Counterpa	Linkage Type	Linkage Sub Type	Record Count Category	Record Count Sub Category	Records Count
8/12/2020	8/12/2020	EQUITIES	99999999	ZZZT1	99999999		88888888	ABCD1	INTERFIRM	INTERFIRM SENT	ERROR	UNLINKED	52
8/12/2020	8/12/2020	EQUITIES	99999999	ZZZT1			88888888	ABCD1	INTERFIRM	INTERFIRM RECEIVED	ERROR	UNLINKED NAMED	52

Step 3: Review Error Code Counts Statistics



Step 4: Analyze Samples using Export from Error Search

Created By: catnsharma						
Created On: 08/17/2020 22:53:21						
Date Type: Processing Date						
Date: 08/12/2020						
Product Type: ALL						
Perspective: REPORTER						
IMID: ALL						
Error ROE ID	Error Code	Order Key Date	Sender IMID	Receiver I	Destination	Routed Order ID
12374985458678	8003	20200812T000000.000000000	99999999:ZZZT1		88888888:ABCD1	XX113854
12374985458409	8003	20200812T000000.000000000	99999999:ZZZT1		88888888:ABCD1	XX113855
12374985458413	8003	20200812T000000.000000000	99999999:ZZZT1		88888888:ABCD1	XX113856
12374985458419	8003	20200812T000000.000000000	99999999:ZZZT1		88888888:ABCD1	XX113857
12374985458421	8003	20200812T000000.000000000	99999999:ZZZT1		88888888:ABCD1	XX113858
12374985458423	8003	20200812T000000.000000000	99999999:ZZZT1		88888888:ABCD1	XX113859
12374985458428	8003	20200812T000000.000000000	99999999:ZZZT1		88888888:ABCD1	XX113860
36674985458430	8003	20200812T000000.000000000	99999999:ZZZT1		88888888:ABCD1	XX113861

- Linkage feedback error files are also available under 'Report to CAT' Download feedback that could be used to further analyze Unlinked as well as Unlinked Named Errors
- With the 9/28 Production release, Named Errors will be included in Error Search results

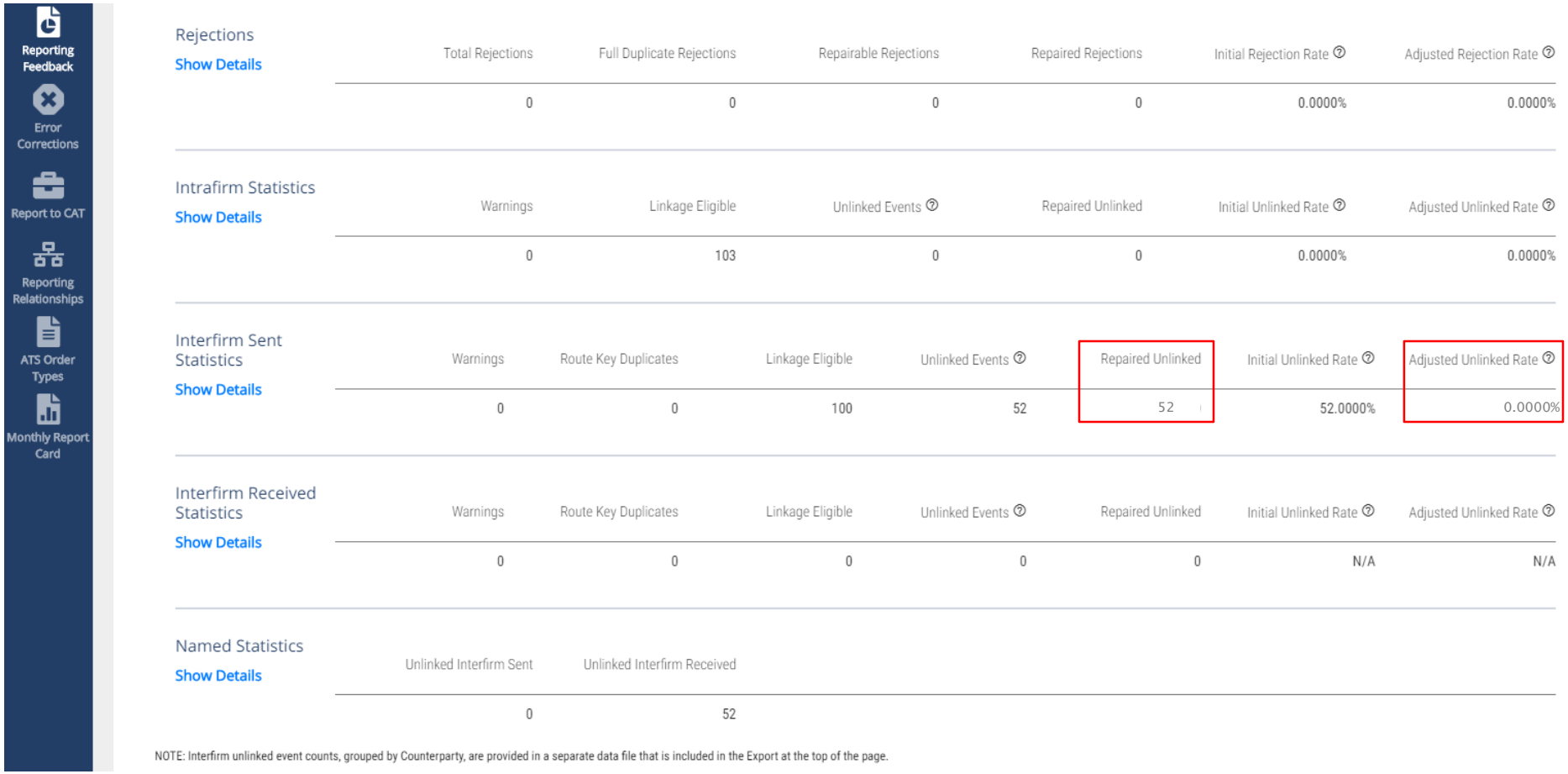
Step 5: Contact Counterparty & Resolve Errors

Contact counterparty to confirm who must correct error → Submit a Repair

For Example: Counterparty ABCD1 Submits a Repair with a matching *routedOrderID*

Record Type	actionTypeCode	errorROEID	FirmROEID	Type	eventTimestamp	receiverIMID	senderIMID	symbol	routedOrderID
Original Submission	NEW		20200812_R98	MEOA	20200812T000000.000	88888888:ABCD1	99999999:ZZZT1	GOOG	AAXX113854
Repair	RPR	56478654323412	20200812_R98	MEOA	20200812T000000.000	88888888:ABCD1	99999999:ZZZT1	GOOG	XX113854

Step 6: Evaluate Adjusted Error Rates on Reporting Summary



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

Named Errors: Examples

Example 1 – Routed Order ID is not equal, Routing Firm corrects

	Error Code	actionType	CATReporterIMID	Type	destination/ receiverIMID	senderIMID	routedOrderID
Unlinked and Unlinked Named	8003, 9004	NEW	ABCD	MEOR	88888888:ABCD1	99999999:ZZZT1	XX113854ZZZ
Unlinked and Unlinked Named	**8004, 9003**	**NEW**	**ZZZT1**	**MEOA**	**88888888:ABCD1**	**99999999:ZZZT1**	**XX113854**
Resolves all 4 errors		RPR	ABCD	MEOR	88888888:ABCD1	99999999:ZZZT1	XX113854

Example 2 – Routed Order ID is not equal, Receiving Firm corrects

	Error Code	actionType	CATReporterIMID	Type	destination/ receiverIMID	senderIMID	routedOrderID
Unlinked and Unlinked Named	8003, 9004	NEW	ABCD	MEOR	88888888:ABCD1	99999999:ZZZT1	XX113854ZZZ
Unlinked and Unlinked Named	**8004, 9003**	**NEW**	**ZZZT1**	**MEOA**	**88888888:ABCD1**	**99999999:ZZZT1**	**XX113854**
Resolves all 4 errors		RPR	ZZZT1	MEOA	88888888:ABCD1	99999999:ZZZT1	XX113854ZZZ

Named Errors: Examples (cont.)

Example 3: Missing Event submitted late

	Error Code	actionType	CATReporterIMID	Type	eventTimestamp	destination/ receiverIMID	senderIMID	routedOrderID	Report date
Unlinked	8003	NEW	ABCD	MEOR	20200812T000000.000	88888888:ABCD1	99999999:ZZZT1	XX113854ZZZ	2020-08-13
Unlinked Named	**9004**	**NEW**	**ZZZT1**		**20200812T000000.000**	**88888888:ABCD1**	**99999999:ZZZT1**	**XX113854ZZZ**	
Resolves both errors		NEW	ZZZT1	MEOA	20200812T000000.000	88888888:ABCD1	99999999:ZZZT1	XX113854ZZZ	2020-08-15

Example 4: Rejected Event is corrected

	Error Code	actionType	CATReporterIMID	type	Quantity	destination/ receiverIMID	senderIMID	routedOrderID
Unlinked	8003	NEW	ABCD	MEOR	100	88888888:ABCD1	99999999:ZZZT1	XX113854ZZZ
Missing Quantity	**2076**	**NEW**	**ZZZT1**	**MEOA**		**88888888:ABCD1**	**99999999:ZZZT1**	**XX113854ZZZ**
Unlinked Named	**9004**	**NEW**	**ZZZT1**			**88888888:ABCD1**	**99999999:ZZZT1**	**XX113854ZZZ**
Resolves all 3 errors		RPR	ZZZT1	MEOA	100	88888888:ABCD1	99999999:ZZZT1	XX113854ZZZ

Named Errors

- The Named Firm cannot correct a named error by submitting a RPR, COR or DEL using the Firm ROE ID provided with the named feedback.
- The Firm ROE ID provided with named feedback will be removed from the feedback in a future release to avoid confusion.

Industry Feedback

- Counterparty Statistics Screen
  - Including the ability to see statistics for resolved Named Errors *(included in September release)*

- Provide enhanced Corrections Feedback via SFTP for Errors including:
  - Errors that remains Outstanding (*targeted for October 2020*)
  - Errors that have been repaired (*under consideration*)

- Deliver Named Errors to CAT Reporting Agents designated by the firms (*under consideration*)

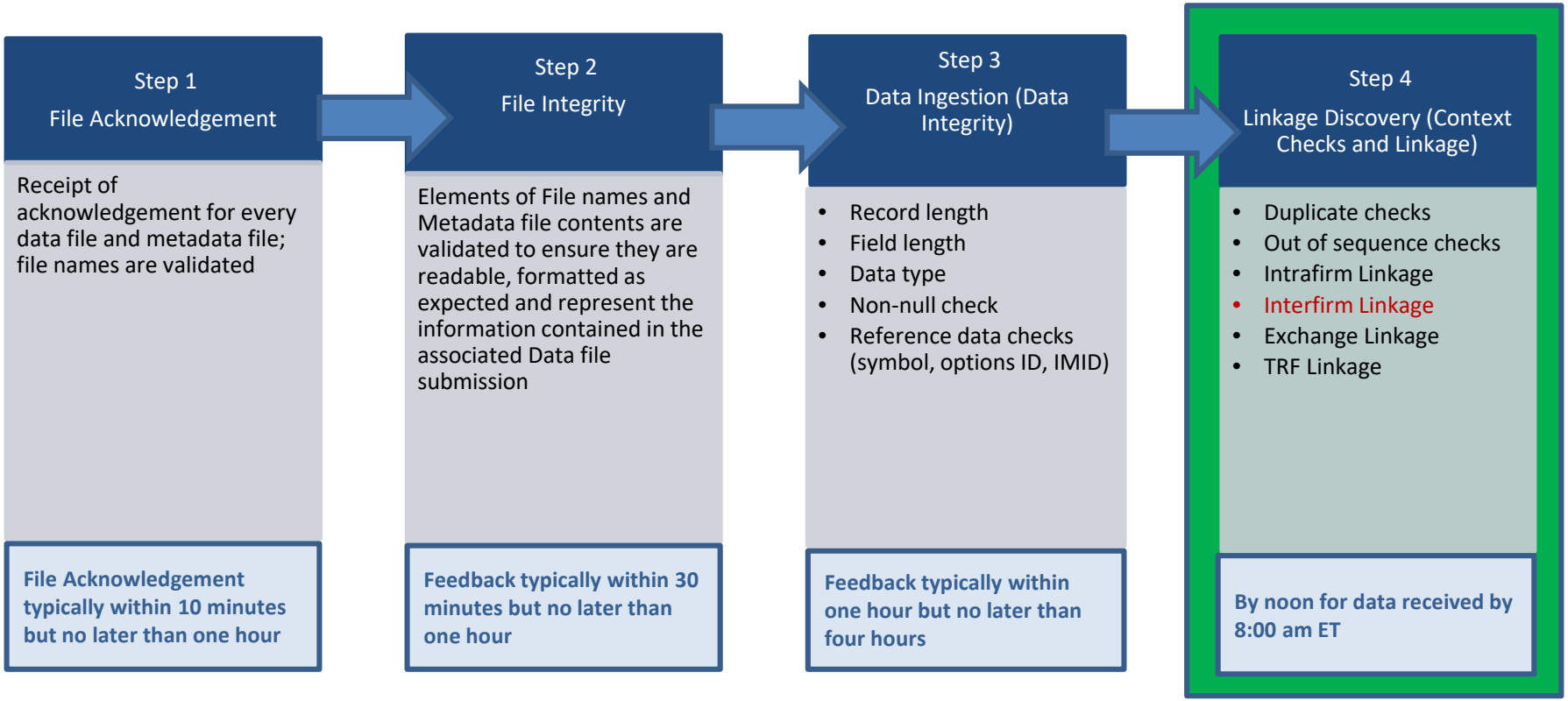
How to Ask a Question during Today's Call

- **For participants using computer audio:**
  - Click the "Raise Hand" button at the bottom of the participants window.
  - A visual prompt will indicate that your line has been unmuted.

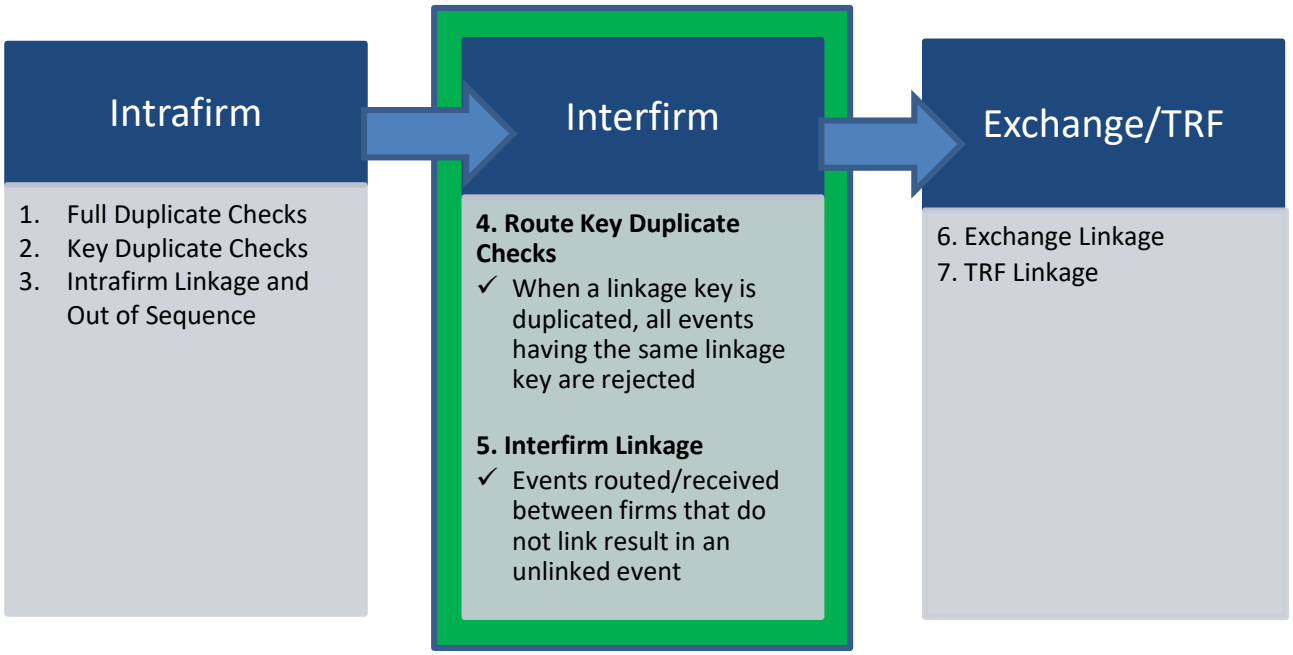
- **For participants using phone audio:**
  - Enter *9 on your phone keypad.
  - An audio prompt will indicate that your line has been unmuted.

Appendix

CAT Processing



Linkage Discovery Steps



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

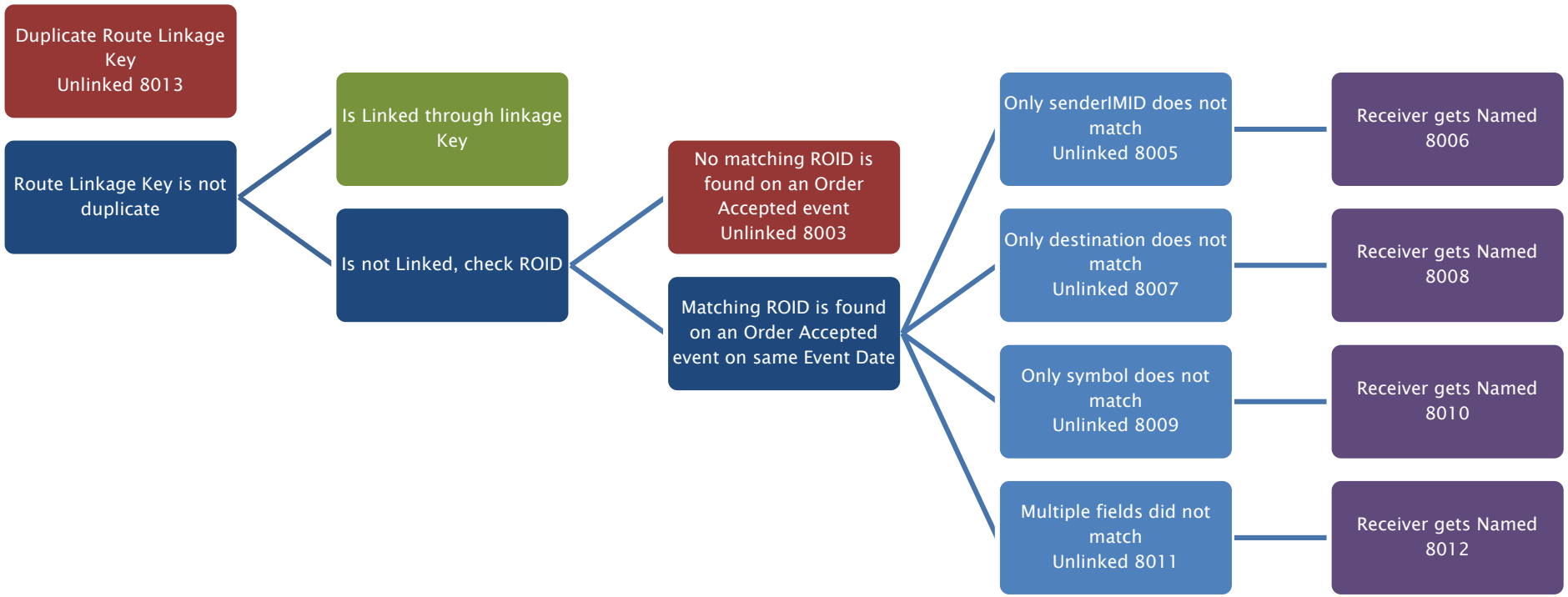
- Route Linkage Key must be equal between the sender and the receiver.
- Route Linkage key must be unique within the combination of the above noted fields. Uniqueness requirements apply to both the sender and the receiver.
- Session does not participate in Route Linkage key for routes between IMs.

Note about IMIDs:

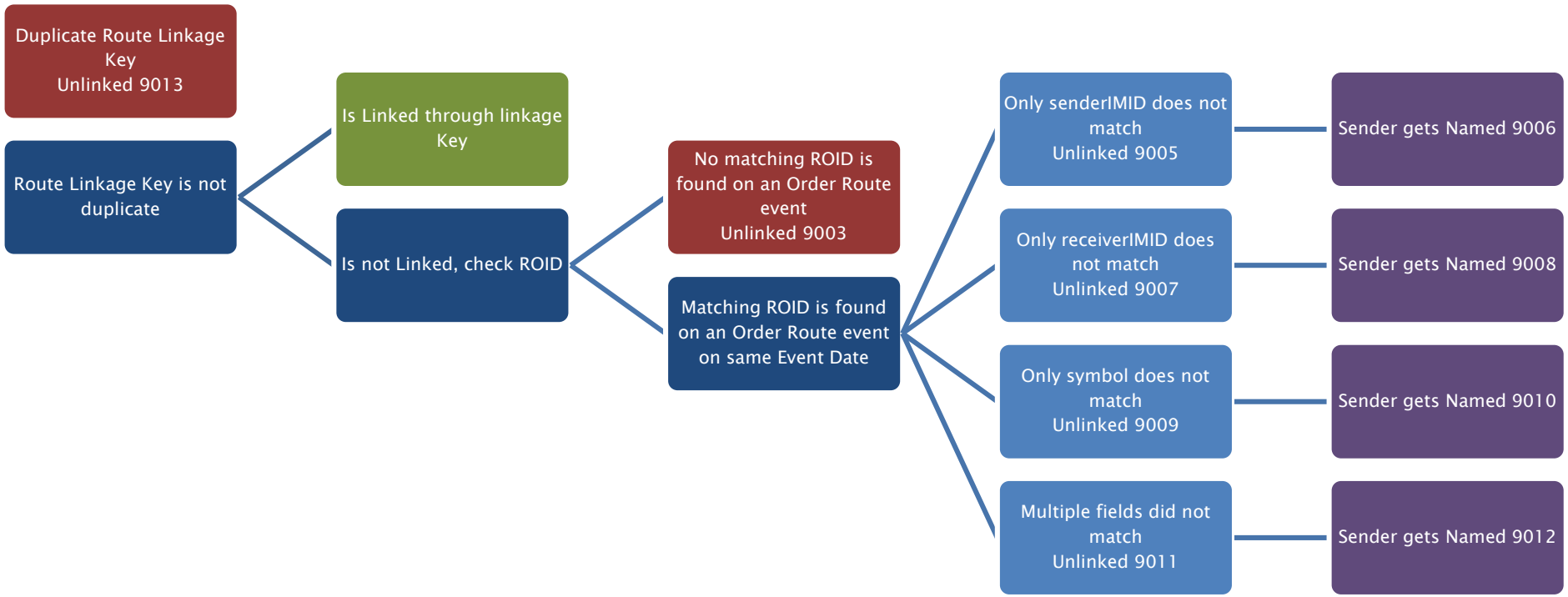
- senderIMID, destination and receiverIMID do not have to be the same as the CAT Reporter IMID which is the identifier used to report to CAT and is populated in file submissions
- CRD and IMID are both populated in the IMID fields using the format <CRD>:<IMID>
  - The CRD prefix is required to avoid managing IMID conflicts
  - The IMID portion facilitates Route Linkage Key uniqueness for firms that cannot guarantee uniqueness at the CRD level. That is, using different IMIDs within the same CRD can reduce the scope of uniqueness required for routedOrderIds

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

Order Route event – Linkage Order of Operations



Order Accepted/Order Modified events – Linkage Order of Operations



Interfirm Route Linkage Key Example

- Unlinked Errors occur when Sender and Receiver do not populate the same IMIDs in the Route Linkage Key
- When an event is unlinked, two types of feedback are provided:
  - Unlinked feedback is provided to the CAT Reporter of the Event
  - Unlinked NAMED feedback is provided to named identifier in the unlinked event
- Example: IMIDA erroneously names IMIDX instead of IMIDC in its MEOR event.

CRD	CATRptrIMID	Event	Order Key	Route Link Key	ErrorROEID
123	IMIDA	MENO	4/24/2020, IMIDA, AAPL, 12345		
123	IMIDA	MEOR	4/24/2020, IMIDA, AAPL, 12345	123:IMIDA, 456:IMIDX, 4/24/2020, AAPL, ROID1	8007
456	IMIDB	MEOA	4/24/2020, IMIDB, AAPL, 33333	123:IMIDA, 456:IMIDB, 4/24/2020, AAPL, ROID1	9007
	Named Errors				
456	**IMIDX**			123:IMIDA, **456:IMIDX**, 4/24/2020, AAPL, ROID1	8008
123	IMIDA			**123:IMIDA**, 456:IMIDB, 4/24/2020, AAPL, ROID1	9008