ISO 20022 FOR ACH PROOF OF CONCEPT

Can the modern ACH Network support end-to-end ISO 20022 payment messaging?

2022 White Paper Prepared and Presented by:

Nacha®

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EXECUTIVE SUMMARY

In response to industry interest in the feasibility of using ISO[1] 20022 within the ACH[2] Network, Nacha partnered with the Federal Reserve Financial Services (FRFS) on a proof-of-concept (PoC) to illustrate the capability of today's modern ACH Network to simultaneously support payment instructions in an ISO 20022 Payments Clearing and Settlement (pacs) format and a Nacha record specification, including the conversion of each to the other.

The purpose of this PoC was not to establish a model for using ISO 20022 payment clearing and settlement messages for ACH nor to signal any intention by Nacha or FRFS to move to ISO 20022. The industry can leverage the findings from this project for reference in future conversations regarding the ISO 20022 standard and the ACH Network.

The PoC was conducted with a representative set of key ACH operator functions being applied to payments received in both formats. These included reading, validating, parsing, and storing payments received in input files; rejecting payments that were deemed invalid; assigning settlement dates to payments; and routing, packaging, and creating output files of payments for delivery to recipients.

The PoC was a reference implementation to determine if payments could be processed in an ISO 20022 and an ACH format using the Nacha Operating Rules and Guidelines specific to an ACH operator. A secondary objective was to help identify any transformation issues between payment message standards. This work required no changes to the existing Nacha record specifications.

Key findings from the PoC include:

1. **ISO 20022:** The PoC demonstrated the ability of an ACH operator to process ISO 20022 files, which from a structure and content perspective were well aligned with the current Nacha file standard; each file containing both credits and debits and logical collections of payments within multiple groups of work. However, ISO 20022 files in this form are, by design, not compliant with the existing ISO 20022 schemas. To facilitate the use of ISO 20022 message files within the ACH network additional work would be needed to determine how best to align an ISO 20022 schema with ACH use cases in a manner similar to the current ACH file standards.

2. **Data Transformation:** The PoC demonstrated the successful processing of both ISO 20022 messages and Nacha formatted entries through an ACH application, and payment messages were able to be transformed from one message standard to another. However, the ISO messages used for this effort included limited optional fields, and if more complex

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[1] International Organization for Standardization
[2] Automated Clearing House

ISO 20022 messages were used, the message could still be processed, but there would be some degree of data loss in the transformation to the Nacha formats.

3. **Remittance:** The PoC data sets included limited use of remittance information carried in XML format (for ISO 20022 messages) and Electronic Data Interchange (EDI) format (for Nacha formatted entries). Although remittance information can be carried through the ACH Network in either form, some complexities can arise with message transformation. This PoC did not attempt to transform the information between XML and EDI. This transformation would involve agreement between parties as to the format to be used for remittance data, and the Receiving Depository Financial Institution (RDFI) would likely need to provide the necessary schema for its corporate customers.

BACKGROUND

Nacha's ISO 20022 efforts leading up to this project began with industry interest in utilizing ISO20022 to standardize the use of an XML schema, which resulted in a Nacha opt-in program for facilitating XML in ACH payments.

Interest and adoption of ISO 20022 messaging by businesses have continued to grow, and the focus has expanded from remittance information to originators using ISO 20022 messaging for ACH payment instructions. Through industry collaboration, Nacha released the ISO 20022 Mapping Guide in 2016, which provided standardized guidance to facilitate the translation of ISO 20022 messages into ACH transactions. This tool has been downloaded more than 3,000 times, and it is currently leveraged by financial institutions, service providers, and originators.

Nacha has experienced success in modernizing the ACH Network and Rules, including the implementation of Same Day ACH payments. FRFS has also completed its project to implement a modernized ACH operator system, which has the capability to support ISO 20022 among other enhanced capabilities.

This PoC further advances Nacha's efforts to support innovation in the industry by allowing ACH users to translate and integrate the ISO 20022 standard for both electronic payments initiation and receipt, as well as payments remittance.

PRODUCT/SERVICE/METHODOLOGY

The PoC demonstrated several commonly used consumer and business ACH use cases, select ACH operator functions and potential future features of the ACH Network. The PoC used clearing

and settlement messages from the ISO 20022 catalog and Nacha file specification records to exercise the various use cases. This effort took a payments standard agnostic approach to prove the ACH operator processing requirements in accordance with the current Nacha Operating Rules could be met regardless of the message format.

In-scope use cases and message types
- Payroll (Nacha PPD credit & ISO 20022 pacs.008)
- Bill payments (Nacha PPD debit & ISO 20022 pacs.003)
- Business-to-business (B2B) payments (Nacha CTX credit & ISO 20022 pacs.008)
- Same Day ACH transactions for Payroll, including stale date
- Operator rejects (created for Nacha PPD and ISO 20022 pacs.008)
- DFI returns (Nacha PPD to ISO 20022 pacs.004)

Project data and processing

For the purpose of this project, synthetic test data for the Nacha and ISO 20022 formatted files was consistent with the individual messaging schemas. Collectively, the Nacha and ISO20022 formatted files included the exact same test data. Nacha created the Nacha format test files and partnered with a third party to create equivalent ISO 20022 standard test files. All project test files supported batch processing, complex payments remittance data for B2B payments, ACH rejects and returns and sufficient transactions to represent the various ACH use cases.

FRFS collaborated with a third party to stand up an instance of an ACH application that emulated the processing of ACH files from an ACH operator perspective. The results obtained in the PoC were achieved by processing the test files through this emulation. Transactions included both end-to-end ISO 20022 payment messages and conversion support when the RDFI or the RDFI's corporate customer required a different format. An example of this would be the Originating Depository Financial Institution (ODFI) submission of an ISO 20022 pacs.008 credit file when the RDFI required an ACH file of entries in the Nacha standard PPD format for receipt.

The third-party ACH application used for this proof of concept:
- received files containing payment messages in various formats;
- validated the contents of the file;
- generated a file receipt acknowledgment;
- assigned a settlement date;
- routed payments to the appropriate destination; and
- bundled the payments for delivery to the recipient based on the message standard required.

One test transaction purposely used a non-existent routing and transit number, and it was rejected per the operating rules during testing as an R13 (Invalid ACH Routing Number). For returns, a single ISO pacs.003 bill pay debit entry that had been transformed to an ACH PPD

entry was returned as R01 (Insufficient Funds), with the ODFI receiving the return as an ISO pacs.004 entry.

Transaction bundling and routing

The PoC included one ODFI (Test Bank 1) sending to two RDFIs (RDFI A and RDFI B) that chose to receive their files in different formats, regardless of input format. RDFI A receives consumer debits and credits in ISO 20022 format and corporate credits (CTX) in Nacha format. RDFI B receives consumer debits and credits (PPD) in Nacha format and corporate credits (CTX) as a mix of Nacha and ISO, depending on the corporate receiver's choice of format.

TESTING APPLICATIONS

Consumer application for Payroll and Bill Pay (PPD)

Use Case	Origination Test Data	RDFI A	RDFI B
Only the RDFI has influence over what is transformed. A single RDFI may choose to accept only some work in ISO format. Routing is determined by a combination of standard entry class (SEC) and RDFI. PPD Payroll and Bill Pay were selected as the work type being transformed.	Nacha PPD Payroll batch with 2-day settlement	Receive Nacha in ISO for PPD	Receive Nacha in Nacha for PPD
	Nacha PPD Payroll batch with Same Day settlement		
	Nacha PPD Payroll batch with stale-dated entries, resulting in Same Day settlement		
	Nacha PPD Bill Pay batch with recurring and single entry Next Day settlement		
	ISO pacs.008 files with mixed 2-day and Same Day settlement dates for payroll credits; credits separate from debits	Receive ISO in ISO for PPD	Receive ISO in Nacha for PPD
	ISO pacs.003 files for bill pay debits		

Corporate application for Remittance to Corporate Customers (CTX)

Use Case	Test Bank 1 Origination Data	RDFI A	RDFI B
Only the RDFI's Corporate customer has influence over what is transformed. A single RDFI may choose to accept only some work for some customer accounts in ISO format. Routing is based on SEC, RDFI, and Account. CTX with unstructured addenda was selected as the work type being transformed.	Nacha CTX Credit batch with unstructured addenda and 2-day settlement.	Receive Nacha in Nacha for all CTX	Receive Nacha in Nacha for Customer A CTX
			Receive Nacha in ISO for Customer B CTX
	ISO pacs.008 file for invoices with unstructured remittance	Receive ISO in Nacha for all CTX	Receive ISO in Nacha for Customer A CTX
			Receive ISO in ISO for Customer B CTX

Return of Consumer debit to ODFI in Original ISO Format (R01)

Use Case	RDFI B Initiates Return	Test Bank 1 Receives Return
The ODFI must receive returns in the same format as the original entry. Transformed ISO to PPD Bill Pay was selected as the work type being returned for insufficient funds.	Receive ISO in ACH for PPD; Returned ACH format (R01)	Original entry sent as ISO pacs.003; Returns must be received as ISO pacs.004 (addenda will go out as unstructured remittance on 004)

RESULTS

Provided below are screenshots that capture the processing that occurred during the PoC. The screenshots included are representative of the processing that occurred during the PoC and are intended to be supportive of the PoC key findings and conclusion.

Inbound Files

The screenshot below represents a view of the various Nacha format and ISO 20022 test files that were processed as part of the PoC. It provides an example of how information from various payment standards can be normalized for the purposes of processing different types of work through a common set of operating rules.

	Transmission Id ▲	Received	Sender	Message Standard	Inbound Batches / ICLs	Condition	Rejects and Warnings	Original Name	Control Credit Amount	Control Credit Count	Control Debit Amount	Control Debit Count
☐ ⓘ	43	Apr 21, 2022, 9:06:52 AM	Test Bank 1	ISO 20022	1	Accepted	1	FTM_GeneratedName_Id_34012	$19,083.67	12	$0.00	0
☐ ⓘ	44	Apr 21, 2022, 9:09:03 AM	Test Bank 1	ISO 20022	1	Accepted	0	FTM_GeneratedName_Id_34026	$5,009.02	7	$0.00	0
☐ ⓘ	45	Apr 21, 2022, 9:10:34 AM	Test Bank 1	ISO 20022	1	Accepted	0	FTM_GeneratedName_Id_34035	$301.00	3	$0.00	0
☐ ⓘ	46	Apr 21, 2022, 9:11:51 AM	Test Bank 1	ISO 20022	1	Accepted	0	FTM_GeneratedName_Id_34040	$1,675.46	3	$0.00	0
☐ ⓘ	47	Apr 21, 2022, 9:14:02 AM	Test Bank 1	ISO 20022	1	Accepted	0	FTM_GeneratedName_Id_34045	$0.00	0	$1,345.00	10
☐ ⓘ	48	Apr 21, 2022, 9:17:37 AM	Test Bank 1	NACHA	5	Accepted	1	03.31.Nacha.Fwd.TestDeck	$26,069.15	25	$1,345.00	10
☐ ⓘ	49	Apr 21, 2022, 9:19:56 AM	RDFI B	NACHA	1	Accepted	0	04.01.Nacha.Rtn.TestDeck	$0.00	0	$130.00	1

Units of Work

Files processed were parsed into distinct units of work for processing: batches for Nacha files and groups for ISO 20022 files. Both sets of work contained a payment that would reject due to a payment being non-compliant with an ACH operator edit.

FTM Nacha and ISO 20022 Integration

Home | Processing Batches / ICLs

Processing Batches / ICLs

No filter applied

	Batch / ICL Id	Business Date	Sender Id	Company	Company Id	Message Type	Status	Transactions	Rejects and Warnings	Forward Return	Calculated Credit Amount	Calculated Credit Count	Calculated Debit Amount	Calculated Debit Count	Exposure Limit Checked	Exposure Limit Reviewed
	189	Apr 21, 2022	021000005	AFTERLIFERECORDS	9123456789	pacs.008	Complete	12	1	Forward	$19,083.67	12	$0.00	0		
	191	Apr 21, 2022	021000005	SUPER TEMPS	1123456789	pacs.008	Complete	7	0	Forward	$5,009.02	7	$0.00	0		
	193	Apr 21, 2022	021000005	PRAIRIE SUPPLY	8823456789	pacs.008	Complete	3	0	Forward	$301.00	3	$0.00	0		
	195	Apr 21, 2022	021000005	Acme Supply Corporat	9079369642	pacs.008	Complete	3	0	Forward	$1,675.46	3	$0.00	0		
	197	Apr 21, 2022	021000005	NY ELEC CO	2223456789	pacs.003	Complete	10	0	Forward	$0.00	0	$1,345.00	10		
	199	Apr 21, 2022	021000005	AFTERLIFERECORDS	9123456789	PPD	Complete	12	1	Forward	$19,083.67	12	$0.00	0		
	201	Apr 21, 2022	021000005	SUPER TEMPS	1123456789	PPD	Complete	7	0	Forward	$5,009.02	7	$0.00	0		
	203	Apr 21, 2022	021000005	NY ELEC CO	2223456789	PPD	Complete	10	0	Forward	$0.00	0	$1,345.00	10		
	205	Apr 21, 2022	021000005	PRAIRIE SUPPLY	8823456789	PPD	Complete	3	0	Forward	$301.00	3	$0.00	0		
	207	Apr 21, 2022	021000005	ACME SUPPLY CORP	9523456789	CTX	Complete	3	0	Forward	$1,675.46	3	$0.00	0		
	209	Apr 21, 2022	307074506	NY ELEC CO	2223456789	PPD	Complete	1	0	Return	$0.00	0	$130.00	1		

Total: 11 Selected: 0 | ‹ 1 ›

Payments

The Inbound Transmissions screenshot shows some of the payments that were processed as part of the PoC. It depicts payments being processed in each of the two standards and translation from one format to the other.

FTM Nacha and ISO 20022 Integration

Home | Processing Batches / ICLs | **Inbound Transactions**

Inbound Transactions

No filter applied

	Transaction Id	Business Date	Forward / Return	ODFI	Company	Company Id	Message Type	System Amount	Receiver	Recipient	Destination Account Number	Outbound Message Type
	760	Apr 21, 2022	Forward	02100000	ACME SUPPLY CORP	9523456789	CTX	$1,235.45	RDFI B	RR SIGNS AND MOR	096326014	pacs.008
	743	Apr 21, 2022	Forward	02100000	SUPER TEMPS	1123456789	PPD	$1,100.67	RDFI B	TONY STARK	5550505777	PPD
	708	Apr 21, 2022	Forward	021000005	SUPER TEMPS	1123456789	pacs.008	$1,100.67	RDFI B	Tony Stark	5550505777	PPD
	730	Apr 21, 2022	Forward	02100000	AFTERLIFERECORDS	9123456789	PPD	$1,000.01	RDFI B	KURT COBAIN	5550505666	PPD
	695	Apr 21, 2022	Forward	021000005	AFTERLIFERECORDS	9123456789	pacs.008	$1,000.01	RDFI B	Kurt Cobain	5550505666	PPD
	728	Apr 21, 2022	Forward	02100000	AFTERLIFERECORDS	9123456789	PPD	$1,000.00	RDFI A	JANIS JOPLIN	12121798	pacs.008
	693	Apr 21, 2022	Forward	021000005	AFTERLIFERECORDS	9123456789	pacs.008	$1,000.00	RDFI A	Janis Joplin	12121798	pacs.008
	727	Apr 21, 2022	Forward	02100000	AFTERLIFERECORDS	9123456789	PPD	$900.95	RDFI A	KAREN CARPENTER	12121212	pacs.008
	692	Apr 21, 2022	Forward	021000005	AFTERLIFERECORDS	9123456789	pacs.008	$900.95	RDFI A	Karen Carpenter	12121212	pacs.008
	739	Apr 21, 2022	Forward	02100000	SUPER TEMPS	1123456789	PPD	$850.50	RDFI A	LOIS LANE	12121285	pacs.008
	744	Apr 21, 2022	Forward	02100000	SUPER TEMPS	1123456789	PPD	$850.50	RDFI A	BRUCE BANNER	12123247	pacs.008
	704	Apr 21, 2022	Forward	021000005	SUPER TEMPS	1123456789	pacs.008	$850.50	RDFI A	Lois Lane	12121285	pacs.008
	709	Apr 21, 2022	Forward	021000005	SUPER TEMPS	1123456789	pacs.008	$850.50	RDFI A	Bruce Banner	12123247	pacs.008
	734	Apr 21, 2022	Forward	02100000	AFTERLIFERECORDS	9123456789	PPD	$750.95	RDFI B	ELVIS PRESLEY	5550504999	PPD
	699	Apr 21, 2022	Forward	021000005	AFTERLIFERECORDS	9123456789	pacs.008	$750.95	RDFI B	Elvis Presley	5550504999	PPD
	740	Apr 21, 2022	Forward	02100000	SUPER TEMPS	1123456789	PPD	$700.00	RDFI B	JIMMY OLSON	5550503123	PPD
	741	Apr 21, 2022	Forward	02100000	SUPER TEMPS	1123456789	PPD	$700.00	RDFI B	BRUCE WAYNE	5550505321	PPD
	706	Apr 21, 2022	Forward	021000005	SUPER TEMPS	1123456789	pacs.008	$700.00	RDFI B	Bruce Wayne	5550505321	PPD

Outbound Files

The Outbound Transmissions screenshot shows the output files to each RDFI in either the Nacha or ISO 20022 message standards. Outbound files were created based on the RDFI's chosen payment standard by SEC or by SEC and corporate receiver.

Business Day	Receiver	Message Standard	Batch Count	Control Credit Amount	Control Debit Amount	Credits	Debits	Status	Transmission Name
			23	$49,224.72	$2,820.00	48	21		
0, 2022-04-21, NACHA (Active)	RDFI B	NACHA	Batches (1)	$9,052.16	$0.00	5	0	Transmitted	NACHA.FWD.T.R3070.N7...
0, 2022-04-21, NACHA (Active)	RDFI A	ISO 20022	Batches (1)	$8,574.72	$0.00	6	0	Transmitted	ISO.CREDITS.T.R3070....
0, 2022-04-21, NACHA (Active)	RDFI B	NACHA	Batches (1)	$2,751.22	$0.00	4	0	Transmitted	NACHA.FWD.T.R3070.N7...
0, 2022-04-21, NACHA (Active)	RDFI A	ISO 20022	Batches (1)	$2,257.80	$0.00	3	0	Transmitted	ISO.CREDITS.T.R3070....
0, 2022-04-21, NACHA (Active)	RDFI A	ISO 20022	Batches (1)	$100.50	$0.00	1	0	Transmitted	ISO.CREDITS.T.R3070...
0, 2022-04-21, NACHA (Active)	RDFI B	NACHA	Batches (1)	$200.50	$0.00	2	0	Transmitted	NACHA.FWD.T.R3070.N7...
0, 2022-04-21, NACHA (Active)	RDFI B	ISO 20022	Batches (1)	$1,235.45	$0.00	1	0	Transmitted	ISO.CREDITS.T.R3070....
0, 2022-04-21, NACHA (Active)	RDFI B	NACHA	Batches (1)	$300.01	$0.00	1	0	Transmitted	NACHA.FWD.T.R3070.N7...
0, 2022-04-21, NACHA (Active)	RDFI A	NACHA	Batches (1)	$140.00	$0.00	1	0	Transmitted	NACHA.FWD.T.R3070.N7...
0, 2022-04-21, NACHA (Active)	RDFI A	ISO 20022	Batches (1)	$0.00	$645.69	0	5	Transmitted	ISO.DEBITS.T.R3070.N...
0, 2022-04-21, NACHA (Active)	RDFI B	NACHA	Batches (1)	$0.00	$699.31	0	5	Transmitted	NACHA.FWD.T.R3070.N7...
0, 2022-04-21, NACHA (Active)	RDFI A	ISO 20022	Batches (3)	$10,933.02	$0.00	10	0	Transmitted	ISO.CREDITS.T.R3070...
0, 2022-04-21, NACHA (Active)	RDFI B	NACHA	Batches (5)	$12,303.89	$699.31	12	5	Transmitted	NACHA.FWD.T.R3070.N7...
0, 2022-04-21, NACHA (Active)	RDFI A	ISO 20022	Batches (1)	$0.00	$645.69	0	5	Transmitted	ISO.DEBITS.T.R3070.N...
0, 2022-04-21, NACHA (Active)	RDFI B	ISO 20022	Batches (1)	$1,235.45	$0.00	1	0	Transmitted	ISO.CREDITS.T.R3070....
0, 2022-04-21, NACHA (Active)	RDFI A	NACHA	Batches (1)	$140.00	$0.00	1	0	Transmitted	NACHA.FWD.T.R3070.N7...
0, 2022-04-21, NACHA (Active)	Test Bank 1	ISO 20022	Batches (1)	$0.00	$130.00	0	1	Transmitted	ISO.RTNS.T.R0210.N00...

KEY FINDINGS

This section outlines the principal outcomes of the PoC without attempting to define the conclusions or recommendations drawn from them.

Key Finding No. 1

ISO 20022: The PoC was conducted using ISO 20022 messages that were neither an adoption of nor a modification to the ISO 20022 published message definitions. The PoC demonstrated the ability of an ACH operator to process ISO 20022 files which from a structure and content perspective were well aligned with the current Nacha file standard; each file containing both credits and debits and logical collections of payments within multiple groups of work. However, ISO 20022 files in this form containing multiple logical groupings (batches) of ACH entries are, by design, not compliant with the existing ISO 20022 schemas.

Key Finding No. 2

Data loss and transformation: Nacha file specifications provide a variety of SEC codes that can be used to pass credit and debit payment instructions between parties in the ACH Network. From

a content perspective, the Nacha IAT[3] SEC is more closely aligned with an ISO 20022 credit or debit instruction; however, this effort elected to focus on the PPD and CTX SEC codes that are more frequently used in the ACH Network for use cases such as payroll and bill payments.

The PoC demonstrated the successful processing of both ISO 20022 (pacs.008 and pacs.003) messages and Nacha PPD and CTX SEC entries through an ACH system. Payment messages were further transformed from one message standard to the other based on RDFI instruction by SEC and/or SEC and receiver account. Each work type was validated for compliance with the standard to which it was converted, and exceptions were noted.

The ISO 20022 messages used for this effort included fields that would be considered mandatory in Nacha record specifications, with limited optional fields (e.g., discretionary data). If a more complex ISO 20022 payment message were used with additional content (e.g., contact details and postal addresses), the message could be processed by the ACH operator, but there would be some degree of data loss in the transformation to the Nacha formats. The project did not attempt to determine whether any such data loss is material for domestic ACH payments.

Key Finding No. 3
Remittance: The PoC data sets included limited use of remittance information for both ISO 20022 messages and Nacha file specification entries. For ISO 20022 pacs.008 messages, the remittance information was included in an XML format that was compliant with the message definitions. For Nacha CTX entries, the data set included remittance information in an EDI format, which is the predominant structured form used in the ACH Network.

While remittance information can be carried through the ACH Network in either form, some complexities can arise with message transformation. This PoC did not attempt to transform remittance information between XML and EDI. When transforming ISO 20022 pacs.008 to a Nacha CTX file specification, the remittance was included as XML data within the ACH addenda; this is supported today and occurs in a very limited form within the ACH network. When transforming Nacha CTX to an ISO 20022 pacs.008 specification, the EDI remittance was included in the ISO 20022 payment message as unstructured data; this is supported by the schema but may require additional effort by the receiver to parse the data.

Transformation of corporate payments would involve some agreement or understanding between parties as to the format to be used for remittance data, and the RDFI would likely need to provide the necessary schema for its corporate customers. If a future effort were to look at like-for-like transformation of payment messages, then that scope of work would need to consider the implications of remittance information.

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[3] International ACH Transaction

CONCLUSION

The fundamental purpose of this effort was to answer the question, "Can the modern ACH Network support end-to-end ISO 20022 payment messaging?" The PoC confirmed that messages submitted in the ISO 20022 format can be processed through an ACH operator instance and meet the processing requirements. It also proved that messages can be transformed from one standard to the other with no data loss for a defined set of fields (though in some use cases/translations data could be lost unless addressed by changes to the ISO or Nacha format). Furthermore, it is possible to deliver mixed standard work to single receiving DFIs based on the preferences of the financial institution and/or its customers.

Payment Data

The PoC used synthetic test data for the Nacha and ISO 20022 formatted files, which were consistent with the individual messaging schemas. The current Nacha Operating Rules only support the Nacha ACH format for ACH transaction submission and processing; a rulemaking effort would be required to broaden support to include ISO 20022 formatted files. ACH stakeholders would need to make decisions on which ISO 20022 data fields would be mandatory, optional or unused if there was an intent to include them in ACH processing. It will be important to include businesses when making these decisions to avoid situations where data is routed end-to-end but then "dropped on the floor" by receivers who cannot process it.

Use of ISO messages

The PoC leveraged the ISO 20022 pacs.008, pacs.003, and pacs.004 for file processing and returns. The project confirmed what the industry has known, which is that ISO 20022 is not a "plug and play" implementation. It is anticipated that ACH stakeholders will have a certain amount of work to do in order to determine the mandatory ISO schema for the ACH Network. DFIs should also expect to have to perform some of their own application changes in order to support the use of ISO 20022 payment messages from their originators that wish to send and receive ISO 20022 payments initiation (pain) messages.

Additionally, it would be necessary to adopt a variation or request a change to the ISO 20022 schema in order to support traditional Nacha file concepts, such as mixing debits and credits or having multiple groups (batches) of messages in a single file. This would not be required to begin the use of ISO 20022 in an ACH environment where the originating financial institutions would control the structure of the files transmitted to the ACH Operator.

ISO does acknowledge that "If the messages exist in the ISO 20022 repository, but do not address all requirements of a new community, it can be agreed upon to update the existing models and messages and create a new version that will accommodate the needs of all." This is perhaps an activity that may need to be pursued in the future to help support a transitioning community.

Remittance

Payment remittance provided challenges for the PoC that were outlined in the key findings section. ACH stakeholders will need to continue to address these challenges for financial institutions and businesses when supporting ISO 20022 structured and unstructured remittance combined with current remittance standards such as EDI.

In summary, the purpose of this PoC was not to establish a model for using ISO 20022 payment clearing and settlement messages for ACH. If the industry chooses to move to a model which includes the use of ISO 20022 in addition to the current Nacha formatted files, it will likely be via incremental steps with optional adoption in order to provide opportunities to those who wish to utilize it.

As the financial services ecosystem and the needs of its users evolves, Nacha will continue to engage with the industry to explore the potential of the addition of ISO 20022 payment clearing and settlement. The findings from this PoC will serve as a reference and provide guidance in that work.

About Nacha

Nacha governs the thriving ACH Network, the payment system that drives safe, smart, and fast Direct Deposits and Direct Payments with the capability to reach all U.S. bank and credit union accounts. More than 29 billion ACH Network payments were made in 2021, valued at close to $73 trillion. Through problem-solving and consensus-building among diverse payment industry stakeholders, Nacha advances innovation and interoperability in the payments system. Nacha develops rules and standards, provides industry solutions, and delivers education, accreditation, and advisory services.

Resources

ISO 20022-to-ACH Mapping Guide:
https://www.nacha.org/content/iso-20022-ach-mapping-guide

Acknowledgements

As with any effort of this magnitude, many resources were involved in making this research and the resulting paper possible. Special thanks are due to key resources from Federal Reserve Financial Services, IBM, and XMLdation.

APPENDIX: PROOF OF CONCEPT DATA SETS

ACH Batch One

Test Bank 1 Originator Afterlife Rec, Company ID 9123456789, is sending payroll to twelve employees at three different RDFIs. SEC Code is PPD (credit) with an effective entry date of February 23 (2-Day). RDFI A wants to receive all PPD entries in ISO 20022 payment message format. RDFI B wants to receive all PPD entries as Nacha-formatted PPD. The ACH operator will reject a Nacha-formatted PPD entry to an Invalid routing number as a Nacha-formatted R13 entry.

Entries:

RDFI	Account No.	Amount	Ind. Name	Trace Number	Expected Result
Invalid Routing Number	11101011	1456.79	Buddy Holly	021000000000001	Rejected as Invalid ACH RTN (R13)
RDFI A	12121212	900.95	Karen Carpenter	021000000000002	Settle on 2/23-output in ISO
RDFI A	12121798	1000.00	Janis Joplin	002100000000003	Settle on 2/23-output in ISO
RDFI B	5550505555	2300.00	John Lennon	021000000000004	Settle on 2/23-output in Nacha
RDFI B	5550505666	1000.01	Kurt Cobain	021000000000005	Settle on 2/23-output in Nacha
RDFI A	12121566	2000.99	Patsy Cline	021000000000006	Settle on 2/23-output in ISO
RDFI B	5550505598	3000.21	John Denver	021000000000007	Settle on 2/23-output in Nacha
RDFI A	12121270	2022.22	Whitney Houston	021000000000008	Settle on 2/23-output in ISO
RDFI B	5550504999	750.95	Elvis Presley	021000000000009	Settle on 2/23-output in Nacha
RDFI A	12121299	2400.56	Freddie Mercury	021000000000010	Settle on 2/23-output in ISO
RDFI A	12122007	250.00	Bob Marley	021000000000011	Settle on 2/23-output in ISO
RDFI B	5550505222	2000.99	Cass Elliot	021000000000012	Settle on 2/23-output in Nacha

ACH Batch Two

Test Bank 1 Originator Super Temps, Company ID 1123456789, is sending Same Day payroll to seven employees at two different RDFIs. SEC Code is PPD (credit) with an effective entry date of February 21 (Same Day). RDFI A wants to receive all PPD entries in ISO 20022 payment message format. RDFI B wants to receive all PPD entries as Nacha-formatted PPD.

Entries:

RDFI	Account No.	Amount	Ind. Name	Trace Number	Expected Result
RDFI A	12121616	556.80	Clark Kent	021000000000013	Settle on 2/21-output in ISO
RDFI A	12121285	850.50	Lois Lane	021000000000014	Settle on 2/21-output in ISO
RDFI B	5550503123	700.00	Jimmy Olson	021000000000015	Settle on 2/21-output in Nacha
DFI B	5550505321	700.00	Bruce Wayne	021000000000016	Settle on 2/21-output in Nacha
RDFI B	5550504888	250.55	Peter Parker	021000000000017	Settle on 2/21-output in Nacha
RDFI B	5550505777	1100.67	Tony Stark	021000000000018	Settle on 2/21-output in Nacha
RDFI A	12123247	850.50	Bruce Banner	021000000000019	Settle on 2/21-output in ISO

ACH Batch Three

Test Bank 1 Originator Prairie Supply, Company ID 8823456789, is sending payroll to three employees at two different RDFIs. SEC Code is PPD (credit). Originator planned for them to settle on February 23. However, they used a stale effective entry date of January 23, which caused them to settle on February 21 (Same Day).

Entries:

RDFI	Account No.	Amount	Ind. Name	Trace Number	Expected Result
RDFI B	5550505211	100.00	Laura Ingles	021000000000030	Settle on 2/21-output in **Nacha**
RDFI A	12122121	100.50	Nellie Oleson	021000000000031	Settle on 2/21-output in ISO
RDFI B	5550505114	100.50	Almanzo Wilder	021000000000032	Settle on 2/21-output in **Nacha**

ACH Batch Four

Test Bank 1 Originator NY Elec Company, Company ID 2223456789, is sending a batch of recurring and single entry PPD debits (bill pay) with ten entries to two different RDFIs. SEC Code is PPD (debit) with an effective entry date of February 22 (Next Day).

Entries:

RDFI	Account No.	Amount	Ind. Name	Disc. Data	Trace Number	Expected Result
RDFI A	12121215	150.50	George Costanza	R	021000000000020	Settle on 2/22-output in ISO
RDFI A	12121276	100.00	Elaine Benes	R	021000000000021	Settle on 2/22-output in ISO
RDFI B	5550504654	125.75	Monica Geller	R	021000000000022	Settle on 2/22-output in **Nacha**
RDFI B	5550505300	195.00	Ross Geller	R	021000000000023	Settle on 2/22-output in **Nacha**
RDFI B	5550503602	130.00	Rachel Green	S	021000000000024	Settle on 2/22-output in **Nacha**
RDFI A	12121577	100.19	Chandler Bing	S	021000000000025	Settle on 2/22-output in ISO
RDFI B	5550504214	148.00	Joey Tribbiani	S	021000000000026	Settle on 2/22-output in **Nacha**
RDFI A	12121657	136.00	Phoebe Buffay	S	021000000000027	Settle on 2/22-output in ISO
RDFI A	12120910	159.00	Liz Lemon	R	021000000000028	Settle on 2/22-output in ISO
RDFI B	5550502122	100.56	Jack Donaghy	R	021000000000029	Settle on 2/22-output in **Nacha**

ACH Batch Five

Originator Acme Supply Corporation, Company ID 9523456789, is making trade payments to three companies at two different RDFIs. SEC Code is CTX (credit). The Originator wants the payments to settle on February 23 (2-Day). RDFI A wants to receive all CTX as Nacha-formatted CTX. RDFI B has one customer, Explosives Company, that wants to receive in Nacha-formatted CTX. Another customer, RR Signs and More Inc., wants to receive in ISO 20022 payment message format.

Entries:

RDFI	Account No.	Amount	Receiving Company	Trace Number	Expected Result
RDFI A	310433	140.00	Anvil Company	021000000000033	Settle on 2/23-output in **Nacha**
RDFI B	8880504227	300.01	Explosives Company	021000000000034	Settle on 2/23-output in **Nacha**
RDFI B	096326014	1235.45	RR Signs and More Inc.	021000000000035	Settle on 2/23-output in ISO

ACH Batch Six

RDFI B is returning a transaction to TestBank1. The return file is created on February 23, 2022, at 11:15 AM ET. The transaction is a debit for Rachel Green that was originated by NY Elec Company on February 21 with a settlement

date of February 22. It is returned as NSF. The file is created in Nacha Format because RDFI B receives its PPD entries in Nacha Format. The return file will be converted to ISO for TestBank1.

Entries:

RDFI	Account No.	Amount	Receiving Company	Trace Number	Expected Result
TestBank1	55550503602	130.00	NY Elec Co	307074500000001	Settle on 2/23-output in ISO