Introduction to Payments

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Payments Innovation and FinTech



Review: Banks are a Bundle of Financial Services

- What a Bank Does
 - Makes Loans
 - Takes Deposits
 - Initiate & Receives Payments
 - Facilitates Investments
 - Ancillary Services



What's Old:

The Existing Structures for Payments in the US

US Payment Systems



• What is a Payments System?: A system that facilitates the transfer of funds between or among participants



Payment System

A Method to Amend and Record Entries on Ledgers for Money Authorizing, Clearing and Recording Final Settlement

Office of Discount & Deposit, Mashington, Feb. 13- 1809 SO. DOLLS.

Personal Check Thomas Jefferson 1809

WESTERN UNION TEL. CO. TELEGRAPH TRANSFER. No. antoine RECEIVED of TOTAL, \$ 00 No Premium will be less than 25 Cent

7

Western Union

Telegram

1873



Image by ajmexico on flickr. CC BY

Telex 1950s – 1970s

7

Financial Ledgers

Record Economic Activity and Financial Relationships

Record Transactions and Accounts







Proto Cuneiform Uruk, ca 3000 B.C

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Personal Ledger George Washington 1747

8

IBM 360 1961

Credit Cards



Image is in the public domain.

Term 'Credit Card' Edward Bellamy's Science Fiction 'Looking Backward' 1887



Charge Plates & Credit Coins Late 1880s – 1960s



Merchant Credit Cards Late 1920s – 2000s ⁹



First Bank Card Charge-It First National Bank Brooklyn, 1946

Credit Cards







First General Merchant Card Diners' Club 1949 American Express First Plastic Card 1959 Bank of America First General Purpose Credit Card 1966

Credit Card Processing







| Slide Card Imprinter | |
|----------------------|--|
| 1950s | |

Visa Imprinter 1979

10

Payment Terminal 2018

Modern Payment Systems



11

US Payment Systems

- Two Types of US Payments Systems:
 - "Large-value payment systems" (LVPS)
 - Funds transfer system that typically handle large-value payments and time-critical payments
 - In the U.S., LVPS's are operated by both private sector and public sector entities

• Retail Payment Systems

Our Focus

Today

 Funds transfer system that typically handles a high volume of relatively low-value payments

US Payments Governance

OTC Interest Rate Swaps Default Swape OTC Credit Default Swape Cheargeort OTC Natural Gas and Instructory products CE US physical gas products Apricultural, Energy. OTC-BEFs **FX** and Metal products North American Natural Gas The Trend Eachange **Chicago Mercantile Exchange** ICE Clear **Derivatives Exchange** schange (NGX Credit LLC. **Clearing House Clearing House** Minneapolis Grain Exchange Clearing House - MGER IDEX Swap International Derivatives Clearing Hoes Futures LCH, Clearmet OTC Interest rate swaps, Commodities FRB NYSBD SEC CFTC OFC Energy and CDS products ICE Clear Europe **ICE Futures Europe** New York Portfolio Foliaite Becurilles DTC Clearing (NYPC) Cantor Clearing **Cantor Futures** House Exchange NYSE LINE Kansas City Board of Trade Clearing Corp. -XCBT OTC Wheat calendar swaps Fixed Income Options Clearing Corp. . . . ICE Clear U.S. Clearing Corp. National Securities Clearing Corp. Clearing Corp. (000) (NBCC) (660) OTC products ICE Futures U.S. Mortgage Backed U.S. Government, Securities Agency Securities Chicago Clauste Eures National Stock stores Escharge Agency Securities Exchange EATS. CROE BOX Nicago Stock Exchange NASOAD OMX BE **CROE Block Eachs** CIDOE Futures NYSE AMEX **Direct Edge EDGATOGS** WINE Excenses MASDING OWN PHE. ELX Futures | NYSE Arcs Automated Equity NASOAQ OMX Futures **Nernative Trading Systems (87**) **SDAQ Stock Mark** Finance Markets In Current as of April 08, 2012 Exchanges or Selected OTC **Central Securities Diede** Products Central arities Sections sistory Agency bergardies (1 TY ICES In case of the local division of the local d other trading venues Products Source: Federal Reserve Bank of Chicago Financial Markets Group ----- Clearing Agreement Cross Margining Anangement. ----- Regulatory Authority Proposed Supervision Supervised by other agencies (not shown) * Daniel from publicly available information ---+ Information Sharing

U.S. Regulatory Authority over Payment, Clearing and Settlement Systems

For Context: US Large Value Payment Systems – FedWire

- Fedwire Funds and Fedwire Securities
 - Real-time gross settlement (RTGS) system operated by the Federal Reserve
 - Participants: Federal Reserve Bank account holders
 - A depository institution that maintains an account at a Federal Reserve Bank is allowed to be a Fedwire Funds participant
 - Institutions send funds, in central bank money, for their own accounts and on behalf of customers

For Context: US Large Value Payment systems – NSS, CHIPS and CLS

- Fed National Settlement Service (NSS)
 - Multilateral settlement service operated by the Federal Reserve
 - Agent submits an electronic file of **net posi**tions. Debit positions deducted from participant account. Then, credits are processed
 - Agents: CCPs, SSSs, and LVPS
 - Participants: Federal Reserve account holders
- Clearing House Interbank Payment Systems (CHIPS)
 - U.S. dollar funds transfer system operated by The Clearing House
 - Participants: Must reside in the US and be subject to supervision by US state or federal banking supervisors.
- Continuous Linked Settlement Bank (CLS)
 - Bilateral FX settlement system for 17 currencies
 - Payment-versus-payment (PvP)
 - Participants: Large financial institutions

US Retail Payment Ecosystem

- Retail payment systems
 - Funds transfer system that typically handles a high volume of relatively low-value payments
 - <u>Retail payments are mainly made by consumers and between businesses to</u> <u>purchase goods and services</u>
- In U.S., retail payment systems are operated by **both** the private sector and public sector:
 - Cash
 - ACH (eg. FedACH and EPN)
 - Check Clearing (eg. Fed, SVPCo, Viewpoint)

Credit (e.g., VISA/MC/AMEX/DSC)

Debit Card Systems (Pulse, NYCE, MAC, Tyme, SHAZAM, STAR)

• Prepaid Cards (on debit rails)

How Do US Consumers Pay for Things?

Consumer Spend by Method



- Cash Losing Ground
- Credit/Debit Majority
- COVID Impact

The Retail Payments Ecosystem: Cash

- Less than 8% of payments volume and falling
- Dominant still for lowest value payments
- Heavy use by low-income and unbanked
- Anonymous
- Great for illegal activities
- Immediate-no latency
- Holder holds risk of loss, theft or counterfeit
- No way to stop payment

The Retail Payments Ecosystem: Checks

- Around 10% of payments volume and falling
- Dominant still for oldest population
- Risks include
 - Insufficient funds (NSF/OD)
 - Forgery
 - Unauthorized Issuance
- Latency in "clearing and settlement process" sill survives despite legislative efforts
 - Move funds from payor's account at bank to payee's account at bank by debiting and crediting banks' accounts at Federal Reserve
 - ? Day delay
 - Hurts low-income consumers the most
- Payor has risk of loss from alterations and fraud
- Payment can be stopped prior to settlement
- Negotiable instruments under UCC Article 4



The Retail Payments Ecosystem: Check 21 Truncation through ACH

Questions?

The Retail Payments Ecosystem: Cards



Credit Card Transaction Participants

- Cardholder: While this is pretty self-explanatory, there are two types of cardholders: a "transactor" who
 repays the credit card balance in full and a "revolver" who repays only a portion of the balance while the
 rest accrues interest.
- Merchant: This is the store or vendor who sells goods or services to the cardholder. The merchant
 accepts credit card payments. It also sends card information to and requests payment authorization from
 the cardholder's issuing bank.
- Acquiring Bank/Merchant's Bank: The acquiring bank is responsible for receiving payment authorization requests from the merchant and sending them to the issuing bank through the appropriate channels. It then relays the issuing bank's response to the merchant.
- Acquiring Processor/Service Provider: This third-party entity is sometimes an arm of the acquiring bank. A processor provides a service or device that allows merchants to accept credit cards as well as send credit card payment details to the credit card network. It then forwards the payment authorization back to the acquiring bank.
- Credit Card Network/Association Member: These entities operate the networks that process credit card
 payments worldwide and govern interchange fees. Examples of credit card networks are Visa,
 MasterCard, Discover and American Express. In the transaction process, a credit card network receives
 the credit card payment details from the acquiring processor. It forwards the payment authorization
 request to the issuing bank and sends the issuing bank's response to the acquiring processor.
- Issuing Bank/Credit Card Issuer: This is the financial institution that issued the credit card involved in the transaction. It receives the payment authorization request from the credit card network and either approves or declines the transaction.





| WELLS |
|-------|
| FARGO |
| |







Magnetic-Stripe and Chip Card—Credit or Debit Authorization

Merchant or cardholder swipes the card through a magnetic-card reader, dips the card into a chip-reading device,** or waves the card in front of a Visa payWave reader.

Cardholder presents a Visa card to pay for purchases. For card-absent transactions, the cardholder provides the merchant with the account number, expiration date, billing address, and Card Verification Value 2 (CW2).*

if necessary, transmits an authorization request to the acquirer.*** For card-absent transactions, the account number and other information may be digitally or key-entered.

Merchant enters the transaction amount, and,



If the transaction requires a PIN-verification, the cardholder follows POS prompts and enters the PIN.



Card issuer provides an online response.

Acquirer electronically sends the authorization

VisaNet

passes on

the request

to the card

issuer.

request to VisaNet.

5

VISANE

Merchant receives the authorization response, and completes the transaction accordingly.

Acquirer forwards the response to the

merchant.

* In certain markets, CVV2 is required to be present for all card-absent transactions.

VisaNet forwards the card issuer's



Before approving a transaction, the issuer may check to make sure the cardholder has available funds for credit, then:

- Checks the exception file for all "statused" accounts such as lost, stolen, counterfeit, and credit problems.
- Applies risk-based rules or parameters, such as velocity checks, or a neural network to minimize fraudulent transactions.

If a match is made, the transaction is declined and a response is given to the merchant

Deep Dive: Credit Card Authorization

Deep Dive: Credit Card Settlement

Magnetic-Stripe and Chip Card—Clearing and Settlement

Acquirer credits the merchant's account and electronically submits the transaction to Visa for settlement. ACQUIRER 10 VisaNet: IT of IT of MERCHANT Card issuer: Facilitates ٠ settlement. Posts the Pays the acquirer ٠ transaction to and obtains the cardholder settlement from account. the card issuer Sends the . Cardholder then sends the monthly receives the transaction to the statement to the statement.

card issuer.

cardholder.

Merchant deposits the transaction receipt with acquirer.*



Deep Dive: Credit Card Tokenization Enables Mobile Payments



Credit Card Processing Fees for Merchants are High in the US but not in EU



Deep Dive: Credit Card Processing Fees & Costs 1/2

- Depending on the type of merchant and through which platform a good or service is delivered (e.g., at the retail store, through e-commerce or by phone), credit card processing rates will vary. They usually are charged as flat fees, per-transaction fees or volume-based fees.
- Merchant Discount Rate: Merchants pay this fee for accepting credit card payments and receiving service from acquiring processors. It's usually between 2% and 3% (online merchants pay the higher end) — to as much as 5% — of the total purchase price after sales tax is added. Also known as a discount fee, this rate comprises several components:
- Interchange Fee: The acquiring bank and acquiring processor pay this fee to the issuing bank. It is market-based and set by each credit card network (except American Express). Visa and MasterCard, for instance, update their interchange rates twice per year. Most interchange fees are assessed in two parts: a percentage to the issuing bank and a fixed transaction fee to the credit card network. For instance, the per-swipe fee might be 2.35% plus \$0.15.
- Interchange fees vary and are categorized through a process called "interchange qualification," which determines the rate based on several criteria:
 - Physical presence or absence of the card during the transaction
 - Processing method used (e.g., swiped, manually entered or e-commerce)
 - Credit card company
 - Card type (e.g., regular, premium, commercial, rewards or government-issued)
 - Merchant's business type (as determined by merchant category code)

Deep Dive: Credit Card Processing Fees & Costs 2/2

- Assessments: Credit card networks (except American Express) charge this fee for transactions that are made with their branded cards. It usually is based on a percentage of the total transaction volume for the month. The fee usually is fixed, and the merchant's acquiring bank may not charge a lower rate or negotiate a better deal with the merchant. Assessments generally are charged per transaction but can vary depending on the pricing model the merchant follows. For instance, Visa might charge a 0.11% assessment plus \$0.0195 processing or usage fee for each card swipe. Assessment amounts may change periodically
- ✓ Markups: Acquiring banks and acquiring processors usually will include a markup over interchange fees and assessments partly as profit and partly to cover the cost of facilitating credit card transactions. It constitutes between 20% and 25% of total card-processing costs. Merchants generally can negotiate the markup with the entities that charge them. Markups vary by processor and pricing model. They may also include other types of fees.
- ✓ Chargebacks: Customers reserve the right to dispute a charge on their credit card billing statement within 60 days of the statement date. When the issuing bank receives a complaint from a customer, it charges the merchant between \$10 and \$50 as a penalty and for issuing a "retrieval request." If the merchant doesn't respond to the retrieval request within a certain timeframe, it could incur additional fees. The merchant may appeal, but the process is long and likely to favor the customer. If the merchant loses, the issuing bank will recover, or charge back, the customer's payment.

Deep Dive: Credit Card Fees Support Rewards



Deep Dive: Credit Card Risk & Regulation

• TILA—Truth in Lending Act

- Withhold payment and challenge charges
- Dispute resolution for billing errors
- Liability for unauthorized transactions capped at \$50

• CARD Act

- Imposes substantive limits on card product terms
- Losses for Card-Present transactions fall on issuing bank
- Losses from Card Not-Present (e.g., online) transactions fall on Merchants
- Card Association Rules Govern More than Statutes and Regulations

Credit Cards Also Drive Some FinTech Models



Rewards Card for HENRYs ٠

Corporate Cards for Startups •

Cards for Credit Invisibles

Get credit, without a

credit score.

Questions?

Deep Dive: Debit Point of Sale (POS) Cards

- The same interbank networks that operate the ATM network also operate the PIN Debit POS network.
- Most interbank PIN networks, such as Pulse, NYCE, MAC, Tyme, SHAZAM, STAR, and so on, are regional and do not overlap, however, most ATM/POS networks have agreements to accept each other's cards.
- Debit cards in the United States are usually issued with a Visa, MasterCard, Discover or American Express logo allowing use of their signaturebased debit networks.
- Much lower interchange revenue/cost (less than 30 bps for PIN debit) than credit cards

Deep Dive: Impact of "Durbin Amendment" Limits on Bank Partner Interchange

Durbin Amendment

The Durbin Amendment, named after the Illinois Democratic Senator Dick Durbin, was an extension within the Dodd-Frank Act that passed in 2011 which capped the interchange fees that banks could charge merchants on debit card transactions.

Before the Durbin Amendment, *banks made approximately 44 cents per debit card transaction in interchange fees*. Many businesses believed that this was an egregiously high number, especially given that in a debit card the risks of non-payment are lower.

The Durbin Amendment sought to reduce these fees and changed the structure such that banks could only charge interchange fees of a cap of 21 cents plus 0.05% of the transaction (and an additional 1 cent to account for fraud protection costs).

However, there was an important exception: this cap only applied on debit cards issued by *banks with over \$10B in assets*. This exclusion of smaller banks was meant to protect the regional and community banks and allow them to continue to have that revenue stream.

In essence, the Durbin Amendment led to a two-tiered interchange fee model on debit card transactions:

- For banks with >=\$10B in assets: there is a cap of 21 cents plus 0.05% of the transaction
- For banks with <\$10B in assets: can charge pre-Durbin rates of up to 0.80%-1.05% plus a \$0.15-\$0.20 transaction fee.

| | | | | | Cost if Transaction Value is: | | | | |
|------------|---------------------|----------------------|--------|-------|-------------------------------|---------|---------|---------|---------|
| Network | Transaction Type | Description | СРТ | % | \$10 | \$20 | \$40 | \$60 | \$100 |
| Visa | Regulated | CPS/Retail, Debit | \$0.22 | 0.05% | \$0.225 | \$0.230 | \$0.240 | \$0.250 | \$0.270 |
| Visa | Unregulated | CPS/Retail, Debit | \$0.15 | 0.80% | \$0.230 | \$0.310 | \$0.470 | \$0.630 | \$0.950 |
| Mastercard | Regulated | Merit III Base | \$0.22 | 0.05% | \$0.225 | \$0.230 | \$0.240 | \$0.250 | \$0.270 |
| Mastercard | Unregulated | Merit III Base | \$0.15 | 1.05% | \$0.255 | \$0.360 | \$0.570 | \$0.780 | \$1.200 |

Source: CMSPI

The immediate impact of this was that it led to a reduction in debit card interchange revenue and profit for big banks, even as they tried to pass on some of the costs to the consumer and removed debit card reward programs. Deep Dive: Impact of "Durbin Amendment" Limits on Bank Partner Interchange Created Enormous "Regulatory Arbitrage"
<\$10 Billion Banks are Exempt from

Durbin

- Can charge "old," higher interchange rate
- That's why all FinTech Synthetic Banks use *small banks* as debit providers

| Company / Product | Bank Partner | | |
|---|----------------|--|--|
| Apple Card | Green Dot Bank | | |
| Paypal (Paypal Cash + Venmo Debit Card) | Bancorp Bank | | |
| Chime | Bancorp Bank | | |
| Marqeta (used by Square, Ramp, etc) | Sutton Bank | | |
| Robinhood | Sutton Bank | | |
| Brex | Emigrant Bank | | |
Deep Dive: Impact of "Durbin Amendment" Limits on Bank Partner Interchange

The higher economics that some of these firms make on a customer relative to what big banks might make on the same customer has a few major effects:

- 1. These startups can **spend more on acquiring the same customer** because the customer is more valuable to them than to big banks.
- 2. These startups can **profitably serve some customer niches** which may be unprofitable for big banks to go after given the difference in revenue opportunity alone.
- 3. These startups can **make their product more compelling to customers** by leveraging the higher interchange and passing it back to customers in the form of reward programs, early pay-outs, and other features.
- 4. These startups can **spend more on R&D**, **customer service on a per-customer basis** relative to big banks, since they can spend more to serve these customers.

Deep Dive: Debit (POS) Cards



Deep Dive: Debit Card Risk and Reg E

Consumer Liability for Unauthorized Transfers

| Event | Timing of Consumer Notice to Financial Institution | Maximum Liability | |
|--|--|---|--|
| Loss or theft of access device1 | Within two business days after learning of loss or theft | Lesser of \$50 or total amount of unauthorized transfers | |
| Loss or theft of access device | More than two business days after learning of loss or theft up to 60 calendar days after transmittal of statement showing first unauthorized transfer made with access device | Lesser of \$500 or the sum of: (a) \$50 or the total amount of unauthorized transfers occurring in the first two business days, whichever is less, and (b) The amount of unauthorized transfers occurring after two business days and before notice to the financial institution.² | |
| Loss or theft of access device | More than 60 calendar days after transmittal of statement showing first unauthorized transfer made with access device | For transfers occurring within the 60-day period, the lesser of \$500 or the sum of (a) Lesser of \$50 or the amount of unauthorized transfers in first two business days, and (b) The amount of unauthorized transfers occurring after two business days. For transfers occurring after the 60-day period, unlimited liability (until the financial institution is notified).³ | |
| Unauthorized transfer(s) not involving loss or theft of an access device | Within 60 calendar days after transmittal of the periodic statement on which the unauthorized transfer first appears | No liability. | |
| Unauthorized transfer(s) not involving loss or theft of an access device | More than 60 calendar days after transmittal of the periodic statement on which the unauthorized transfer first appears | Unlimited liability for unauthorized transfers occurring 60 calendar days after the periodic statement and before notice to the financial institution. | |

 Includes a personal identification number (PIN) if used without a card in a telephone transaction, for example. Provided the financial institution demonstrates that these transfers would not have occurred had notice been given within the 60-day period.

Provided the financial institution demonstrates that these transfers would not have occurred had notice been given within the two-business-day period.

Debit Cards Power Each of the Three Basic Synthetic Bank Methods

- - Use a Partner Bank or Banks
 - Provide Banking Functions Through a Brokerage CMA
 - Hang Debit Card/Payment Functions on a Nondeposit "account"





Debit Cards Power FinTech Synthetic Banks



Debit Cards Power FinTech Synthetic Banks





Debit Cards Power FinTech Synthetic Banks

Deep Dive: Prepaid Debit Cards

• The same networks that operate the credit/debit card networks also operate reloadable prepaid debit cards.



Deep Dive: Prepaid Debit Cards



Deep Dive: Prepaid Debit Cards



- ✓ On-demand paper checks enable payments to anyone
- ✓ Walmart Rapid Reload[™] allows cashing checks directly to card
- ✓ Mobile Remote Deposit Capture allows depositing of checks 24x7



Accelerate with Mastercard Fintech Express

Things can move rapidly in the world of FinTech. That's why we have designed Mastercard Fintech Express - a tailored service designed to help you innovate faster and grow your business quickly.

With Mastercard Fintech Express, you have a partner who can take your business to new places by helping you obtain a fast global license for issuing prepaid, debit and credit cards.



SPEED ecome a card issuer and get a BIN and License in 2 weeks.



SCALE Leverage Mastercard's global network to expand your business across markets throughout Asia Pacific and beyond.

ACCESS

Boost your business with our technology expertise, resources, tools and insights.



FLEXIBILITY

Maximize your funds with our flexible commercial arrangement with reduce fees.

Prepaid Debit Cards Enable Some FinTech Banking

Uber

Payments Solutions

How the world's largest rideshare company pays its driver-partners

DOWNLOAD CASE STUDY

CHALLENGE

Not all Uber driver-partners have bank accounts or perks tailored to driverpartners' needs. Why not offer a debit card that rewards them with perks

SOLUTION

- Instant Pay
- Branded bank account
- Tailored rewards program

Prepaid Debit Cards Enable FinTech Banking--Uber



Digital Money Movement

APIs enabling digital money movement to and from multiple accounts



Tailored Rewards Platform

Rewards platform enabling merchant partners to deliver benefits designed for their drivers to drive retention



Mobile Banking

Enable self-directed customer tools and service



Card Access in Seconds

Issue virtual cards that can be used anywhere Visa or MasterCard debit is accepted online



Back Up Balance

Drive customer lovalty by offering an overdraft like feature to eligible customers



Budget your money

Help customers plan for their personal financial goals



Cash Deposits

Enable cash deposits with more physical locations and better hours than any bank

Prepaid Debit Cards Enable FinTech Banking--Uber

Nationwide ATM Access

Offer cash access using our nationwide ATM networks and ATM locator API



Identity Verification

Comprehensive program management including identity verification, risk and customer service

Questions?

The Retail Payments Ecosystem: ACH

- Exchanges batched debit and credit payments between businesses, consumers and government accounts at banks
 - Pre-authorized recurring payments and non-recurring payments
 - Two systems: Fed ACH and private Clearing House Payments Company
 - Only banks may directly access ACH system
 - But nonbanks may use bank's routing number with bank warranting \the transactions (synthetic banks like Aspiration do this)
- EFTA and Reg E apply for consumer liability
- NACHA, Fed rules and Treasury "Green Book" govern intra bank issues
- Cheaper than Visa/MC

Which payment method has the lowest transaction fees?



Deep Dive: ACH

A taxpayer sending

funds to the IRS or local organizations online

A business paying a supplier for products

COMMON USES OF ACH Payments

A customer paying a service provider



An employer depositing money to an employee's checking account



A consumer moving funds from one bank to another

the balance

Deep Dive: ACH



Deep Dive: ACH Risk & Regulation



- EFTA and Reg E
 - Withhold payment and challenge
 - Dispute resolution for billing errors
 - Liability for unauthorized transactions capped at \$50

Same Day ACH is Available But Limited by "Bankers Hours"

| CHARACTERISTIC | SAME-DAY ACH | REAL-TIME PAYMENTS | |
|--|--|---|--|
| Speed | Intraday, batched | Within seconds | |
| Operating Hours | Banking business hours | 24/7/365 | |
| Ubiquity | All US banks | Initial participants include major US banks and smaller banks via IT partners (e.g. Jack Henry) | |
| Remittance Information | 9,999 records of 94 characters each | Unlimited (with ISO 20022) | |
| Security / Convenience | Bank routing numbers, bulk files, online payments | Proxy database, online and mobile payments | |
| Transparency of payment status | End of day | Immediate | |
| Payment Types | CT & DD | CT & request for payment | |
| igure 1 Differences between same-day ACH and real-time payment systems Source: Lipis Advis | | | |

SPEED AND OPERATING HOURS

The two biggest differentiators between real-time payments and bulk ACH systems are processing speed and system operating hours. Processing and posting of a real-time payment is completed within seconds, while bulk ACH systems post payments within hours or days of payment initiation. Sameday ACH systems represent dramatic improvements in speed over next day ACH systems, but even the fastest bulk ACH systems can be constrained by the second differentiator: system operating hours. Real-time payment systems allow users to send and receive payments 24/7/365, whereas the US ACH system is not open outside of traditional banking business hours and days.

ACH Processing Times

ACH processing times

While standard ACH payments might take up to four business days, same-day ACH payments might process within the same day.

ACH payments might take longer than a credit card or wire transfer, but these forms of payment aren't cash-in-hand. Instead, ACH payments allow for the transfer of pure-cash funds without the hassle of wire transfers or paper checks.

Standard ACH Transfer Timelines

A standard ACH debit will take about 3-4 business days in order for the transfer to be completed.

Here is a Sila example:

- On Monday: A user requests an ACH debit.
- Tuesday: Funds leave the other bank on Tuesday morning.
- Wednesday: The RDFI has 48 hours—until Thursday morning—to report a return code. This gives Sila enough time to wait for return codes and then process the ACH payment.
- By Thursday: The funds are settled by 4 PM and Sila tokens are issued at that time.

Same Day ACH Transactions

In 2016, Nacha rolled out same day ACH processing. This not only improved the quality of the ACH Network, but it also reduced the incidence of returned entries and lowered the associated financial costs of the ACH Network.

ODFIs will be able to submit same day ACH payments through two clearing windows:

- 10:30 AM ET, with settlement occurring at 1 PM
- 2:45 PM ET, with settlement occurring at 5 PM

Virtually all ACH transactions (99% of the current ACH volume), including both ACH credit and ACH debit transactions, are eligible for this type of processing. International transactions (IATs) and transactions above \$25,000 are not eligible.

Many FinTechs Use "Same Day" ACH, But Often Charge for It

| Products Company Resources Employees | Login | Sign Up |
|--|--------|--|
| | | How are payments sent? |
| Money Transfers and Payments | | DailyPay utilizes the Visa and Mastercard networks for our instant transfers and the ACH network for next-business-day transfers |
| How much can I transfer? | | ✓ |
| How fast can I receive money? | | ^ |
| With DailyPay, you can receive a transfer from your Available Balance either instantly or on the next business | ss dav | |

ay, you can receive a transfer from your Available Balance either instantly or on the next business day

1. Instantly – transfer your earnings immediately, no matter what time of day it is. This includes weekends and holidays, 24/7/365.

2. Next Business Day – if you request a transfer before 5:30 p.m. ET, you will receive your money on the next business day. If you complete the transfer request after 5:30 p.m. ET, you will receive the transfer on the following business day.

Fees can be employee paid, employer paid, or a combination of both



For ACH (next business day) transfers



For instant transfers, 24/7/365

ACH Powers Some Non-Card FinTech

| ∞ brigit | | Submit a request Download Brigit Blog | | |
|--|--|---------------------------------------|--|--|
| Brigit Help Center > General In | fo > About Brigit | Q Search | | |
| Articles in this section Who can use Brigit? How does Brigit work? | How does Brigit work? | Follow | | |
| Does Brigit affect my credit? Referral Program | Brigit is a financial health app that links up to your checking account and runs in the background to help you budget better, keep tabs on bills, find side gigs, and get up to \$250 when you qualify for instant cash. | | | |
| Notifications | Share details about your bank | | | |
| Why did you launch Brigit? | 2. Brigit runs in the background and looks at your transactions to provide updates on upcoming bills, whether you'll have enough to cover them, and sends you money if you need it | | | |
| What makes Brigit different? | Use features like side-gigs to find ways to earn extra money on the side Upgrade to the Plus plan for access to our cash advance product and a help get your finances on track | host of other services to | | |
| | 5. Enjoy peace of mind and focus on the things you care about! | | | |

ACH Powers Some Non-Card FinTech



Other Payments Innovations

- Mobile Wallets
- SMS
- QR Codes
- SMS
- Tokenization
- Biometrics
- P2P
- Crypto
- Stablecoins



Questions?

Fast and Slow Payments

Mobile Payments Take a Click, but Processing Takes Days

Claire Tsosie December 10, 2014

The dark truth behind America's payments lag

Home to Silicon Valley giants and some of the most forward-thinking tech innovations, why does America lag so far behind in digital payments?



The U.S. still relies on antiquated payment processing technologies while other countries can process in real time. What's the holdup?

- The U.S. still relies on antiquated payment processing technologies while other countries can process in real time. What's the holdup?
- "At Bank of America, mobile payments take at least one business day to process. SnapCash, SnapChat's new payment system powered by Square, completes transactions in one or two business days; cashing out on Venmo takes the same amount of time. With Google Wallet, it takes three or four. All these transactions go through the same Automated Clearing House network, or ACH, a system that's over 40 years old.
- How it works
- Here's what happens: When you make an online or mobile payment from a checking account, your bank processes your draft request and sends it to the ACH network with a batch of others. From there, the draft goes into one of two systems one run by the Federal Reserve or the other, operated by The Clearing House (TCH), which is owned by commercial banks. The ACH network then sorts the transaction and makes the money available to the recipient, and the payment is complete.
- The process takes one or two business days. And even though the system is automated, the machines still keep a banker's schedule – no holidays, weekends or evenings. Why?
- "You've got to think about it as a system that was conceived and implemented in the '70s," Elizabeth McQuerry, a former Federal Reserve payments system manager, said last year in an interview on National Public Radio."---Nerd Wallet

Why Faster Payments?

- "The U.S. payment system is at a critical point in its evolution. Improvements in computing speed and information processing allow payments to take place faster than ever before. Although innovation is taking place, faster payments solutions are being developed in a fragmented way without collaboration across the payment industry or broad adoption across the market as a whole.
- Many countries have already upgraded their payment systems to take advantage of improvements in technology, allowing payments to be sent within seconds between payers and recipients.
- Given the breadth and complexity of the U.S. market—with over 10,000 depository institutions and hundreds of non-bank payment providers—it is more challenging to implement improvements to the payments infrastructures in a coordinated way."
- --Faster Payments Task Force

Real-Time Payments Globally

Denmark - Nets

India - IMPS

Japan - Zengin

Mexico - SPEI

Nigeria - NIP

Iceland - RTGS System



| Singapore - FAST | Eurozone |
|-----------------------------------|------------------------------------|
| South Africa - Real-Time Clearing | US |
| South Korea - HOFINET | |
| Sweden - BIR | |
| Switzerland - SIC | Key |
| Taiwan - CIFS | Live real-time payments systems |
| Turkey - TIC-RTGS | Planned real-time payments systems |
| UK - Faster Payments | |

Milestones in Fed's modernization push

The Federal Reserve has been collaborating with a diverse set of stakeholders to foster the development of a real-time payment system. Here is a look at some of the key events and goals



"Our greatest challenge is not in designing a 24/7/365 system," she said. "It's how do we migrate such critical infrastructure to that over time while [also] ensuring the safety and stability and availability that underpins all these payments systems."

Fed Faster Payments

How Fed Now Will Work

 The FedNow service will be developed as an interbank real-time gross settlement system (RTGS) with immediate access to funds once a payment message is received. The system will settle payments by debiting and crediting an institution's account(s) with the Federal Reserve Banks, similar to how Fedwire works to settle "high-value" interbank wires today.

What Do Real-Time Payments Bring?

What Are Real-Time Payments?



Real Time Payments



Real-Time Payments Are Important

BROOKINGS

CITIES & REGIONS GLOBAL DEVELOPMENT INTERNATIONAL AFFAIRS U.S. ECONOMY U.S. POLITICS & GOVERNMENT MORE

REPORT

inequality? Implement a real time payment system

Aaron Klein · Wednesday, January 2, 2019

"Failure to act on faster payments costs billions of dollars to working families. The slow payments system drives individuals to use high-cost check cashers (\$2 billion annual fees), small dollar 'pay day' lenders (\$7 billion) and experience bank overdraft fees (\$24 billion). While all payday loans and overdrafts occur among banked customers (the products require bank accounts), Federal Reserve data show that the majority of people who use check cashers have bank accounts."



Real-Time Payments Are Important *Fed Wants Workers to Get Pay Faster*



Federal Reserve Board Governor Lael Brainard said the central bank will start its own real-time payments system to close the gap between when money is deposited and when it is available. Cliff Owen/Associated Press

But Not Everyone Agrees About How



RTP[®]: The New Real-Time Payments System for All Financial Institutions

The RTP® network from The Clearing House is a real-lime payments platform that all federally insured U.S. depository institutions are eligible to use for payments innovation. With mobile technology and digital commerce driving the need for safer and faster payments in the U.S., financial institutions of all sizes are taking advantage of the RTP network's capabilities to create or enhance digital services for their corporate and retail customers.

The RTP® Network: For All Financial Institutions

The Clearing House launched the RTP network in November 2017 to bring real-time payments to the U.S. Today the RTP network reaches over 50% of U.S. transaction accounts, and is on path to reach nearly all U.S. accounts by 2020. The RTP network was built for financial institutions of all sizes and serves as a platform for innovation allowing financial institutions to deliver new products and services to their customers. Financial Institutions can integrate into the RTP network directly, through Third-Party Service Providers, Bankers' Banks and Corporate Credit Unions.

Big Banks Don't Want Fed's Real Time Payments Rails

By PYMNTS 🍯 🔤

Posted on August 4, 201


RTP Are Already Here...Push Payments Through The Clearing House

Real-Time Payments for All Financial Institutions

The RTP® network from The Clearing House is a real-time payments platform that all federally insured U.S. depository institutions are eligible t commerce driving the need for safer and faster payments in the U.S., financial institutions of all sizes are taking advantage of the RTP network' retail customers.

RTP Network Coverage by State

ENLARGE



The Clearing House

Simple, Transparent, Uniform Pricing for All Financial Institutions

The RTP® network has a single price for all participants with **no volume discounts, no volume commitments and no monthly minimums** to ensure that financial institutions of all sizes participate on the same terms. Financial institutions pay only for the transactions they originate.

| Network Fees | | |
|---|------------------|--|
| Credit Transfer Sent | \$0.045 | No network fees apply to any other message sent or received. |
| Request for Payment Sent | \$0.01 | |
| Remittance Advice Sent | \$0.01 | |
| Prefunded Balance Account Drawdown Request Executed | \$2.00 | |
| Fees owed to other participants | | |
| Request for Payment Incentive Fee Upon each successful RTP Credit Transfer sent in response to a Request for Payment message, the participant that initiated the Request for Payment will owe the incentive fee to the participant initiating the RTP credit Transfer | \$0.10* | |
| Network-at-Cost Pass-through | | |
| ConnectivityRSA Token | Pass- Through | Overall cost of connectivity associated with either the MPLS or secure VPN connections to the RTP® network will be calculated by TCH and charged on a monthly basis. Connectivity costs will apply to any participant with a direct connection. |

* TCH will facilitate the collection and disbursement of RFP Incentive Fees between participants. TCH is not obligated to distribute RFP incentive Fees that TCH is unable to collect from the owing participant.

Frequently Asked Questions

• What is the RTP® network?

The RTP network, the real-time payments system from The Clearing House, is the first new core payments infrastructure in the U.S. in more than 40 years, is currently accessible to financial institutions that hold 70% of U.S. demand deposit accounts (DDAs), and the network currently reaches 56% of U.S. DDAs. The RTP network is open to all federally insured U.S. depository institutions.

Real-time payments over the RTP network provide consumers and businesses with the ability to conveniently send payments directly from their accounts at federally insured depository institutions 24/7, and to receive and access funds sent to them over the RTP network immediately. Financial institutions that use the RTP network to make faster payments on behalf of their customers benefit from the RTP network's realtime final interbank settlement. The RTP network represents a new phase of evolution within the U.S. payments industry and provides a platform for product innovation. Financial institutions can leverage a variety of features – enhanced speed, security, and messaging capabilities – to create unique offerings for their retail and corporate customers.

• What is a real-time payment on the RTP network?

The characteristics of a real-time payment on the RTP network are:

- 1. 24/7 The RTP network is live and operates 24/7, which allows financial institutions to send or receive payments at any time.
- 2. Immediate Availability Recipients receive the payment within seconds of the sending bank initiating the transaction; RTP network receiving financial institutions are required to make funds available immediately, except where necessary for risk management or legal compliance purposes.
- 3. Payment Certainty Sending financial institutions (FI) are not able to revoke or recall a payment once it has been authorized and submitted to the RTP network. However, there is a process to facilitate FI-to-F communication around return of funds sent in error.
- 4. Ubiquity All federally insured depository institutions can be RTP network participants, regardless of size.
- 5. Extensibility Rich, flexible messaging functionality is included to support value-added products. For example, the RTP network provides messaging that enables a request for payment of a bill or invoice.
- 6. Convenience Customers of RTP network financial institution participants are able to initiate payments from their existing accounts.
- 7. Cash Flow Control The ability to send and receive immediate payments gives customers more control over cash flow, which may be particularly important for cash-constrained small businesses and consumers.
- 8. Adaptability The RTP network has a flexible architecture to adapt to changing market needs.

• Now that the RTP network is live, who is using it?

The RTP network, the real-time payments system from The Clearing House, is the first new core payments infrastructure in the U.S. in more than 40 years, is currently accessible to financial institutions that hold 70% of U.S. demand deposit accounts (DDAs), and the network currently reaches 56% of U.S. DDAs. The RTP network is open to all federally insured U.S. depository institutions.

• Do I have to be a member of The Clearing House to use the RTP network?

No. Any federally insured depository institution can be an RTP network participant.

• Is the RTP network only for P2P (person-to-person) payments?

No, the RTP network is designed to address unmet customer needs across all customer segments (B2B, B2C, C2B, P2P, A2A, G2C, etc.). Consumers, businesses, and the government can use the RTP network.

RTP Through TCH



RTP is Push Only

- There are good reasons why no real-time system in the world currently
 offers genuine pull direct debits. Many scheme rules require an RDFI to
 notify the ODFI (or the originator to notify the receiver) of a direct-debit
 authorization days before the transaction is settled. Direct debits can
 often require a notification period where a bank must inform its customer
 before money is drawn from their account, which can defeat the purpose
 of real-time.
- And almost all payment systems have lengthy return periods for disputed direct-debit transactions, which can discourage one-off direct debits and would likely produce skepticism from industry stakeholders were realtime direct debits under consideration.
- It's possible that real-time direct debits could be developed for a particular use case, but given the necessity of refund rights and the complexity of the fraud prevention they require, a system should only add real-time debits when the need justifies the marked increase in risk. The first country to do this will be blazing a new trail.

Why Isn't TCH/RTP Enough?

- It's a Monopoly of the Biggest Banks
- They've Promised to Treat Small Banks the Same, but...
- The Fed Thinks This:
 - "Why does the Federal Reserve believe it is important to develop the FedNow Service?
 - In assessing its criteria for new payment services, the Federal Reserve Board (Board) considers input from the public, historical experience, and its own analysis to assess whether such services can be expected to generate public benefits that private-sector services alone may be unable to achieve. Based on its assessment, the Board concluded that private-sector real-time gross settlement services for instant payments alone were unlikely to provide an infrastructure for instant payments with reasonable effectiveness, scope, and equity.
 - In particular, private-sector services are likely to face significant challenges in extending equitable access to the more than 10,000 diverse depository institutions across the country. By contrast, the Federal Reserve is well positioned to overcome the challenge of extending nationwide access to an infrastructure for instant payments, thanks in large part to its existing nationwide payment infrastructure and established customer service relationships with more than 10,000 depository institutions (or their agents)....
 - In addition, the presence of multiple real-time gross settlement (RTGS) services for instant payments—the FedNow Service and private-sector RTGS services—can yield additional efficiency benefits by leading to lower prices "and higher service quality, which would benefit the U.S. payment system and its users.

What Will RTP Mean for FinTechs?

- Improved Service Potential for PFM Aspects of FinTech
- Creative New Ways to Do Business

BUT... Most FinTech Payments Will Still Ride the Bank Payment Rails

• Bank Control of US Payment System Limits Innovation



- How a Bank Does it
 - Charter from US or State Creates Various preferences in Law
 - Preemption/exportation
 - Setoffs etc.
 - Deposit Insurance from FDIC
 - Cheap & <u>Stable</u> Funding
 - Security for Customers
 - Direct Access to Payments System
 - Initiate and Receive Payments
 - Prevent Non-Bank Competition
 - Broker-Dealer and/or Asset Management subsidiaries

Questions?