

# Essentials of Payment Systems



MVL Consulting Private Limited

[www.mvlco.com](http://www.mvlco.com)

# Program process

- Inter-active sessions
- Post program support
- Reviews/questions during the sessions
- If you do not understand, ask immediately
- Speed of delivery
- Mobile phones
- Session breaks
- Evaluation process



# Essentials of Payment Systems

## Module 1 Basics of Payment Systems

MVL Consulting Private Limited

[www.mvlco.com](http://www.mvlco.com)

# Module Objective

**At the end of this module, you will understand:**

- 1. Why does a bank make and receive payments ?*
- 2. What is payment and settlement ?*
- 3. Basic types of payments*
- 4. Key elements of payment systems*

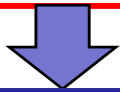


# Let's visit a bank .....

- What products and services does a customer get at a bank ?

- **Loans**

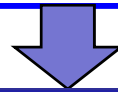
- Term Loans
- Working Capital
- Bridge loans
- Overdrafts
- Mortgages
- Auto loans
- Many more.....



Disbursal/Interest/Recovery

- **Deposits**

- Time Deposits
  - Term deposit
  - Recurring
- Demand Deposits
  - Savings
  - Current
  - Checking



Receipt/Interest/Repayment

- **Services**

- Cash management
- Receipt/payments
- Remittances
- Documentary credits
- Guarantees
- Many more ...



Fund Transfers/Charges

Transaction Banking



# Why does a bank make or receive payments ?

- **Own account transactions**
  - loan/investments
  - liquidity management
  - cover operations/position maintenance
- **On Customer account**



# What types of transactions does a customer do?



- **Payments/deposits**

- Within a bank (book transfer) Customer to customer/account to account
- Local (within a city)
- Domestic (within a country) in local currency – Exceptions : Hong Kong and UK
- Cross border (across countries) in foreign exchange - Exceptions : EUR/XCD

- **Which other entities provide payment services ?**

- Post offices
- Mobile payment services, Google Wallet/IMPSI/MNO – M-Pesa Model
- Parabanking/legal services like Western Union, Money Gram
- Bitcoin – electronic currency
- Illegal services like hawala



- **Why does a customer route these transactions through a bank ?**

- Convenience/ease
- Safety
- Regulation

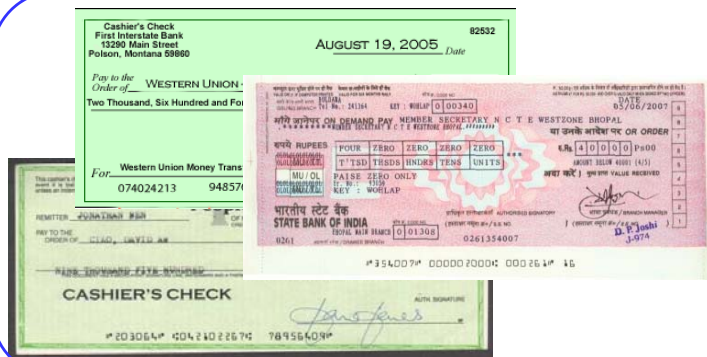
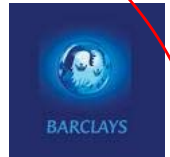


# What is a payment and settlement system ?



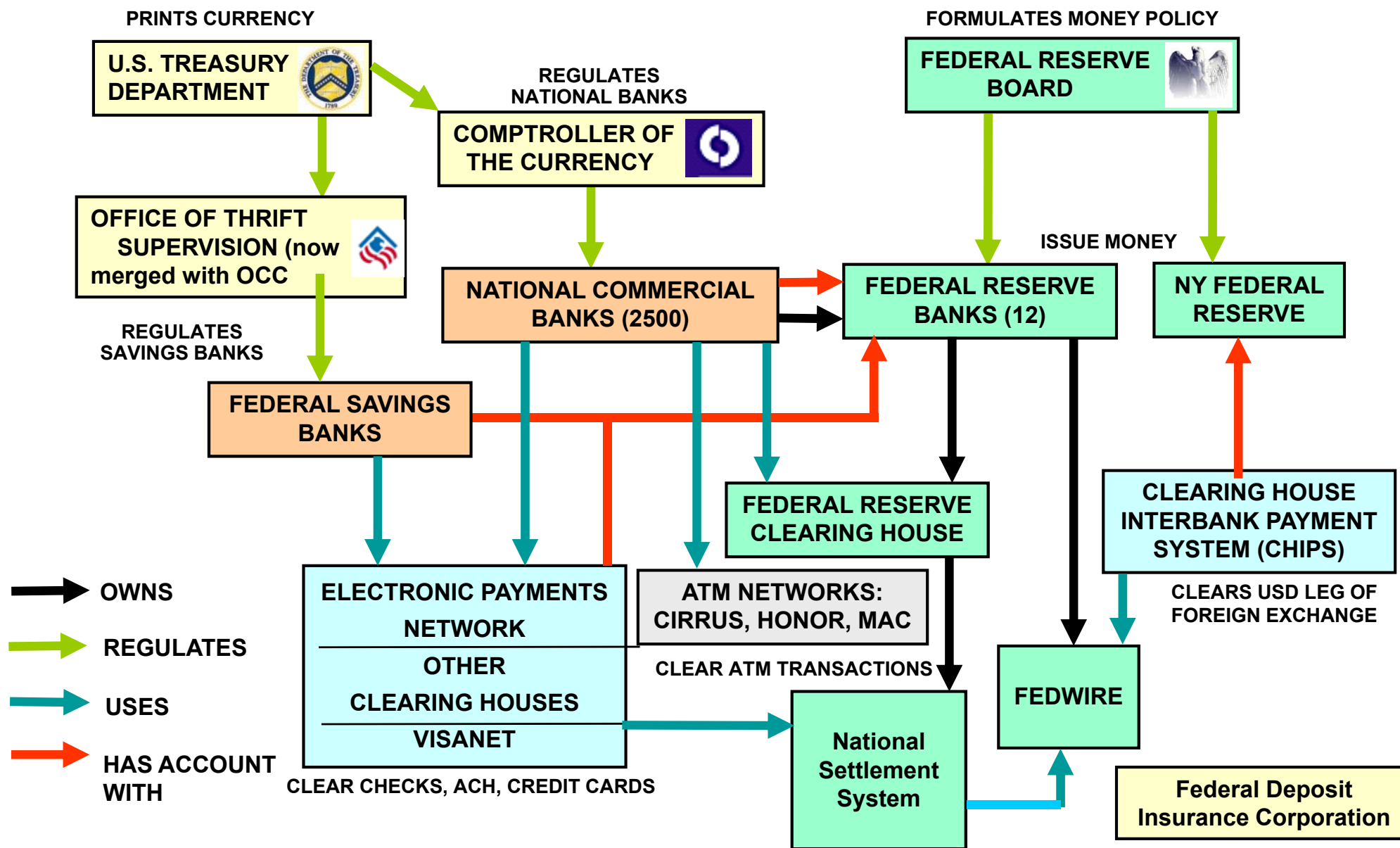


# Actors in payment and settlement system

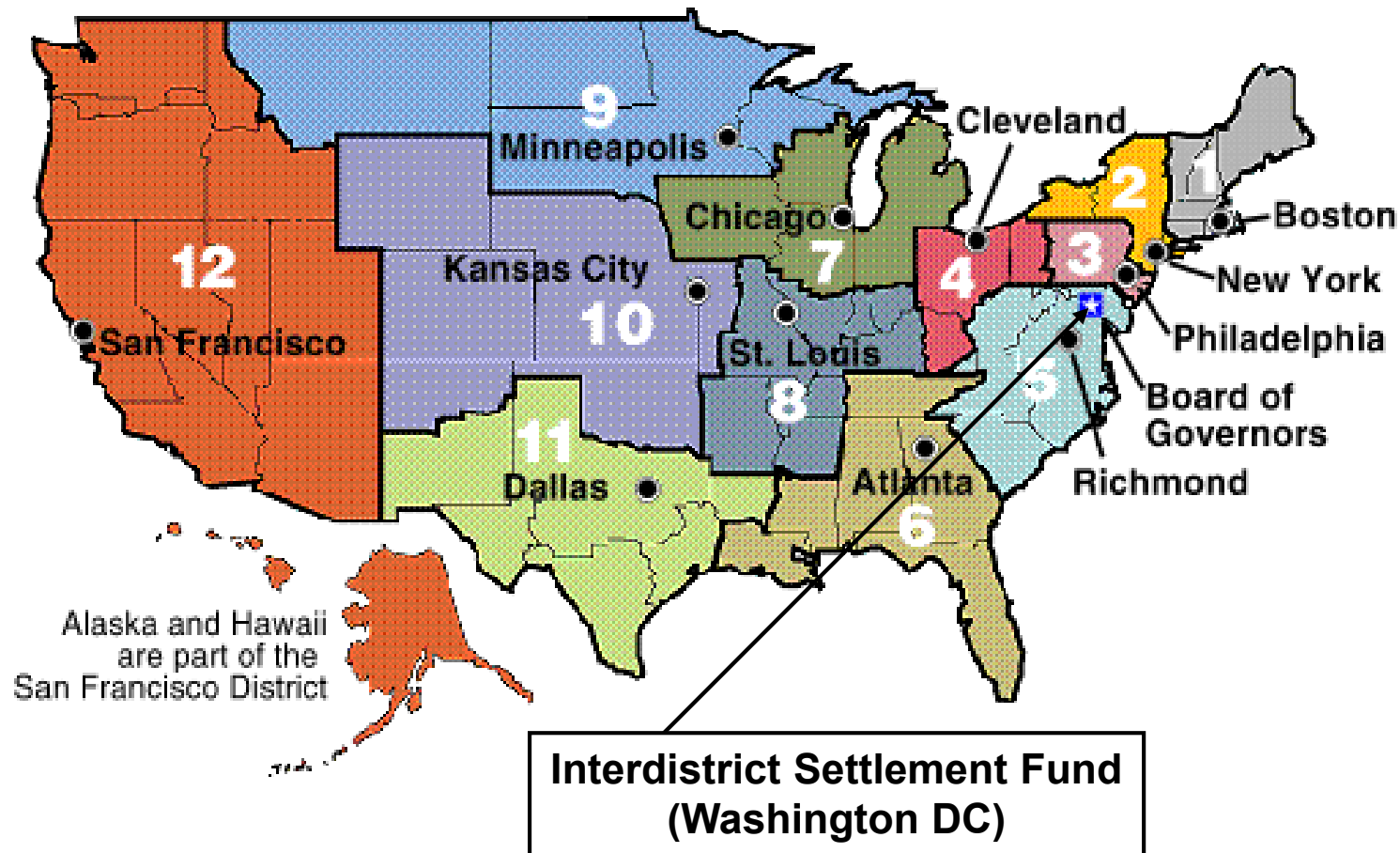


A payment system is the collection of procedures, rules, standards, instruments, institutions and technical means used to exchange financial value between two parties discharging an obligation.

# Banking and payment systems in USA



# Federal Reserve System

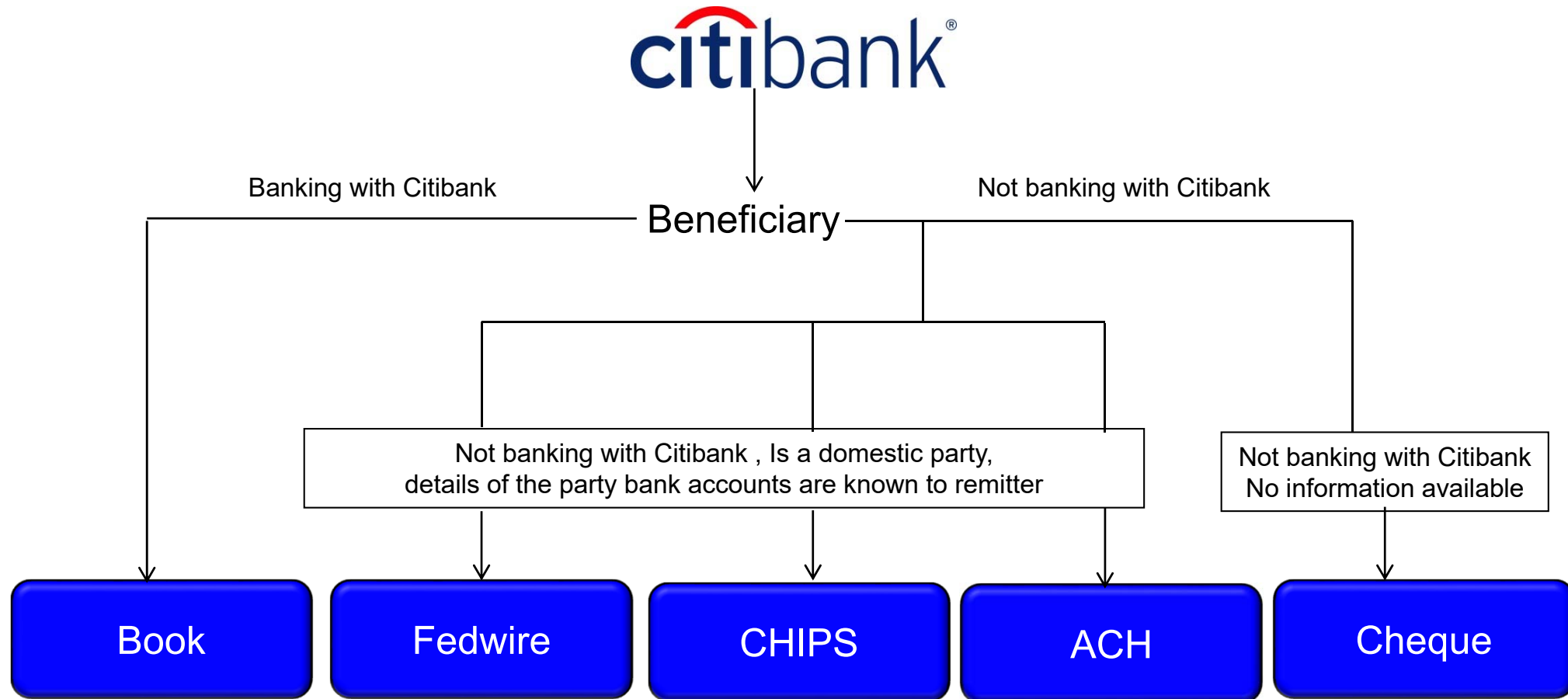


## INFO

+ branches (Cleveland Fed has a branch in Pittsburgh)

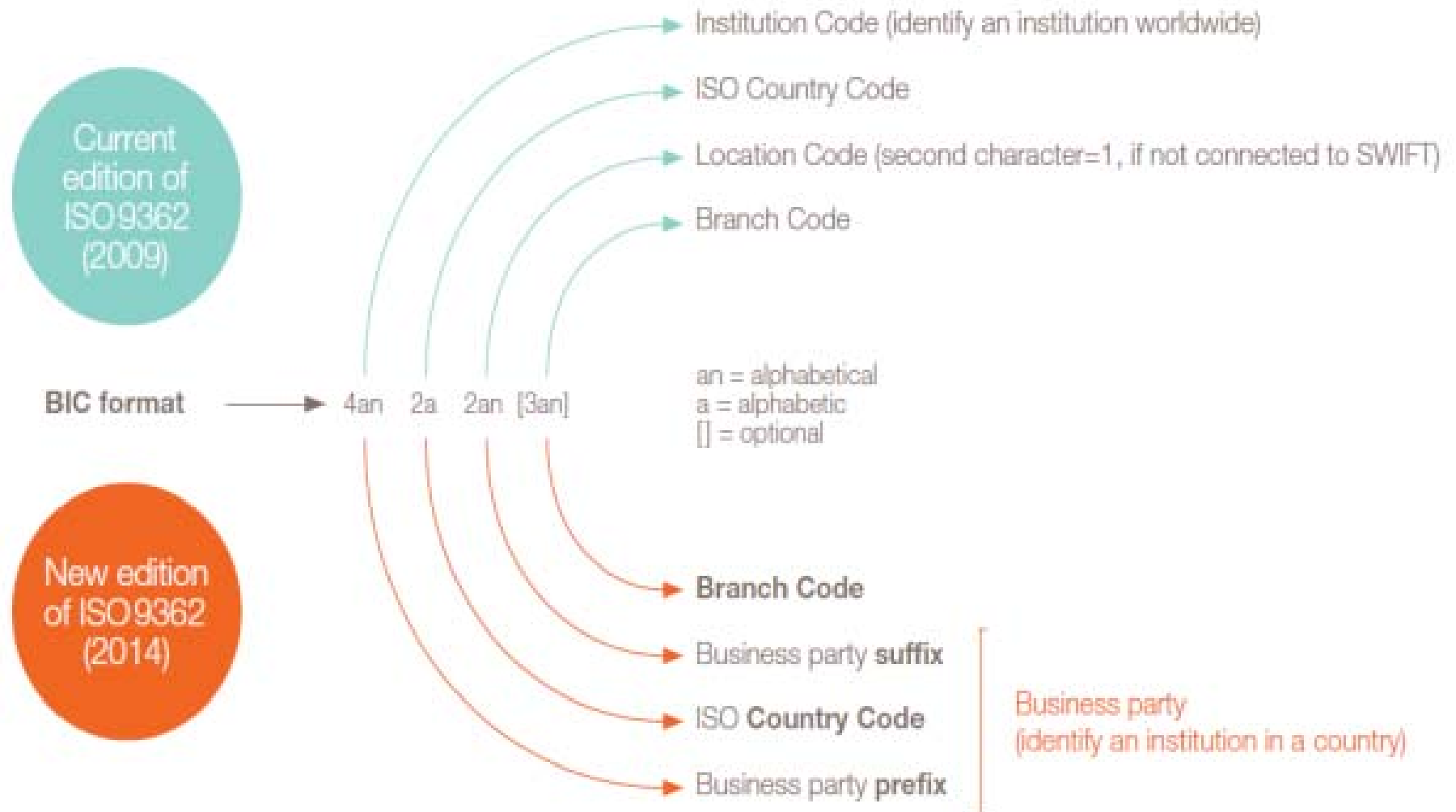
SOURCE: [FED](#)

# Determining the payment method



# CODES IN PAYMENT SYSTEMS

# Codes used in Payment Systems : BIC



# Other codes used in Payment Systems

- CHIPS Bank Number : 0772 = NATAUS33
- CHIPS Universal Identifier 6 characters (only non-household)
- ABA Codes : Routing Code – 9 characters
- UPIC – 8 character code
- IBAN (ISO 13616)
  - Upto 34 alphanumeric characters
  - GB82HSBC12345698765432
- IFSC Codes (Indian Financial System Code-11 characters)
- Currency Codes (ISO 4217)

Required in  
USA



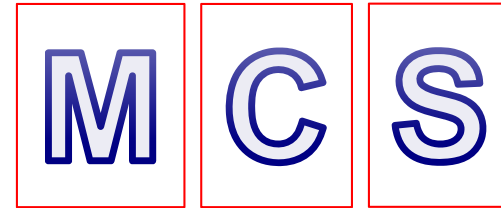
The  
Clearing House

UPIC®  
UNIVERSAL PAYMENT IDENTIFICATION CODE

# Key elements of payment systems

- **Message**

- Paper message - (examples)
  - Cheque
  - Draft
  - Travellers Cheque
- Electronic message (examples)
  - RTGS/EFT
  - ACH



- **Clearing/Message processing**

- [Message processing and computing obligations](#)
  - Physical paper messages
  - ACH files
  - Cheque truncation images
  - Cheque conversion files
  - Fully electronic messages
- Netting Process
  - Bi-lateral netting
  - Multilateral netting

- **Settlement**

- Unconditional
- Final and irrevocable





# Messages and transactions

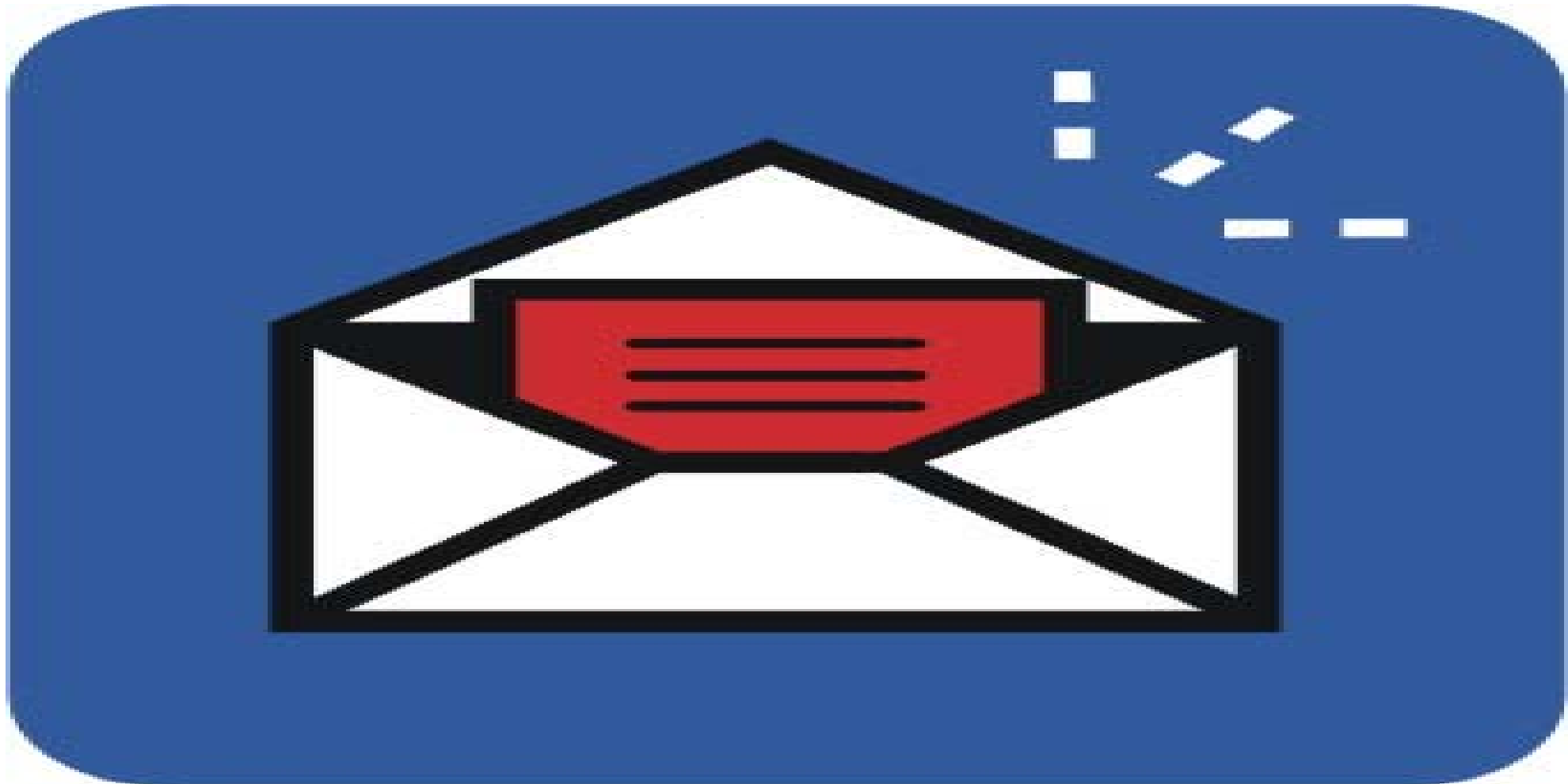
- Push
    - Example: Credit transfer
  - Pull
    - Example: Direct debits / Request for Debits
- Instruction
    - Instruction is given by account owner
  - Request
    - Request is given by other than account owner
- Value message
    - E.g. Moving money from remitter to beneficiary
  - Non-value message
    - E. g. Moving information from message sender to message receiver

- **What should be the contents of the message ?**

1. Sender's details
2. Sender's bank details
3. Beneficiary details
4. Beneficiary's bank details
5. Amount
6. Currency
7. Value date

# Message and Message processing

- **How a message is processed?**

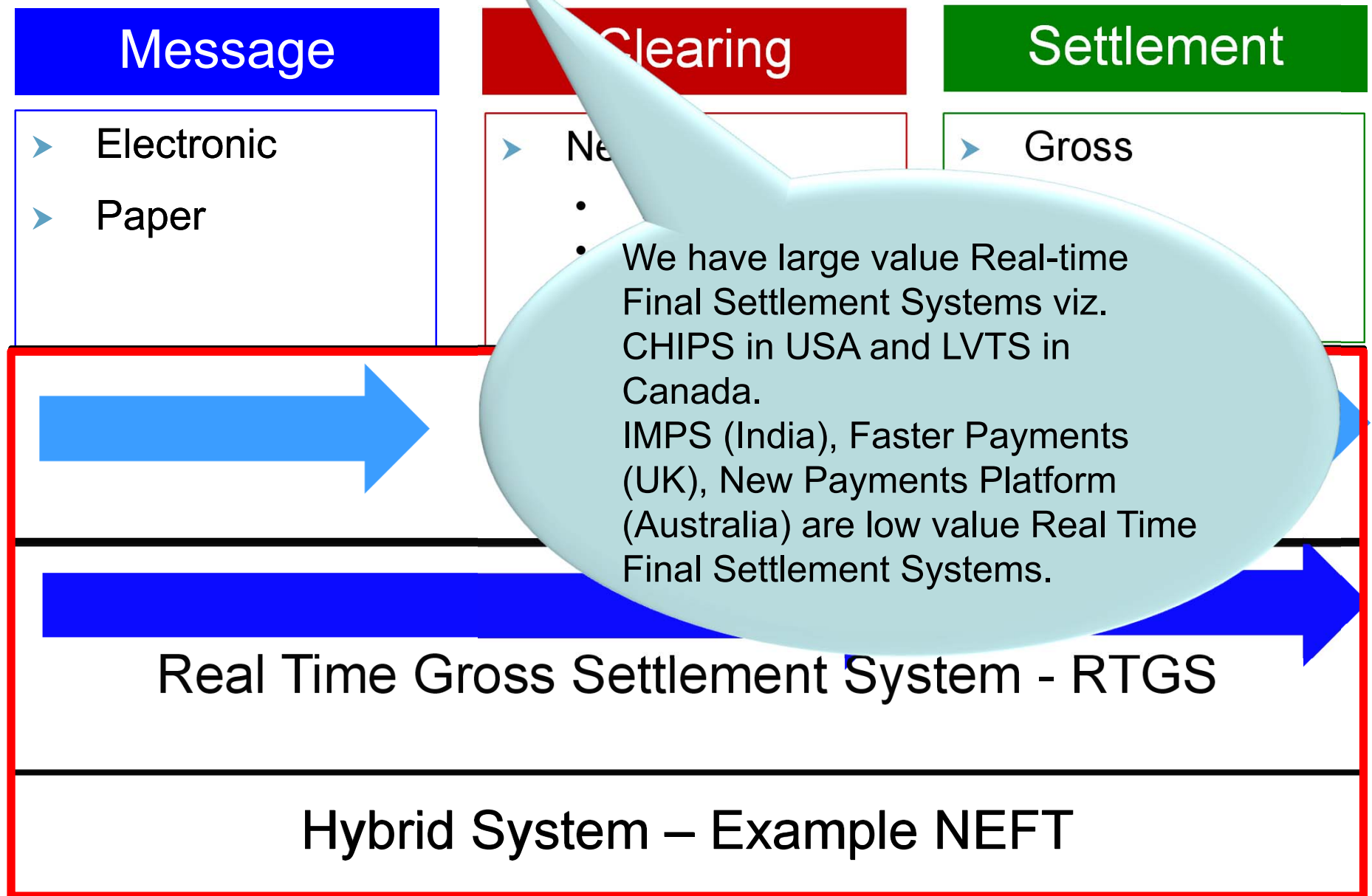


# Payment systems

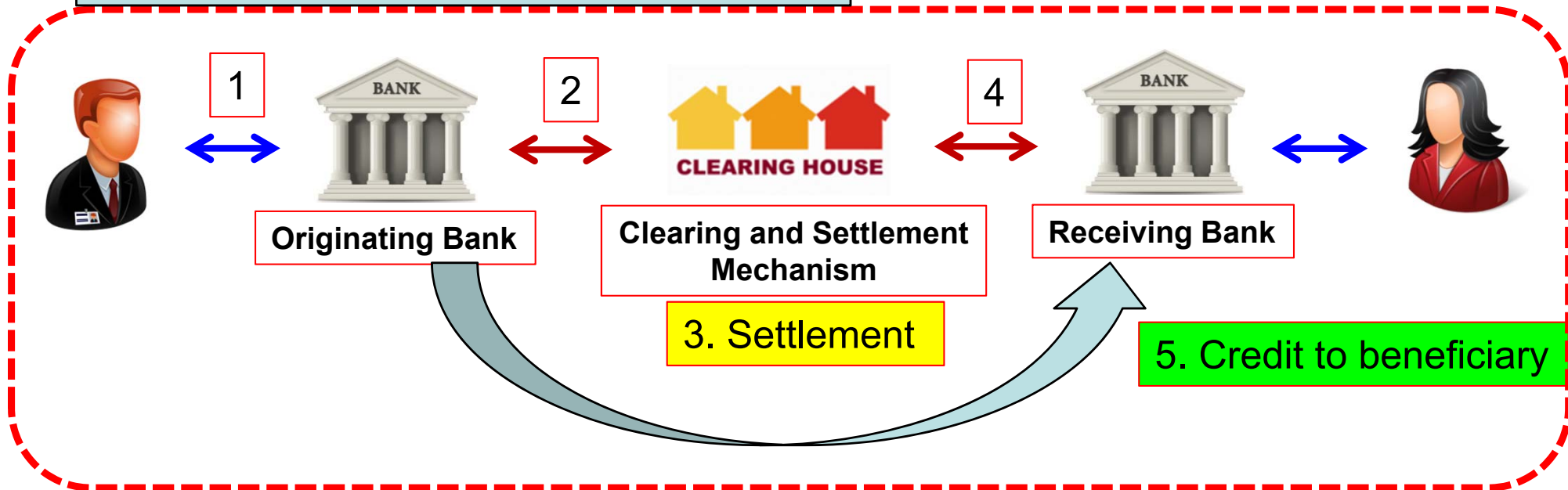
- Paper based payments
  - Cheque
  - Demand draft
  - Pay-order/banker's cheque
- Partially paper/partially electronic
  - Cheque truncation
  - Cheque conversion
- Electronic payments
  - RTGS (Examples Fedwire, TARGET2, RBI RTGS, LankaSettle)
  - Hybrid payment systems (Examples NEFT/STEP2)
  - ACH
  - ECS
  - Cards



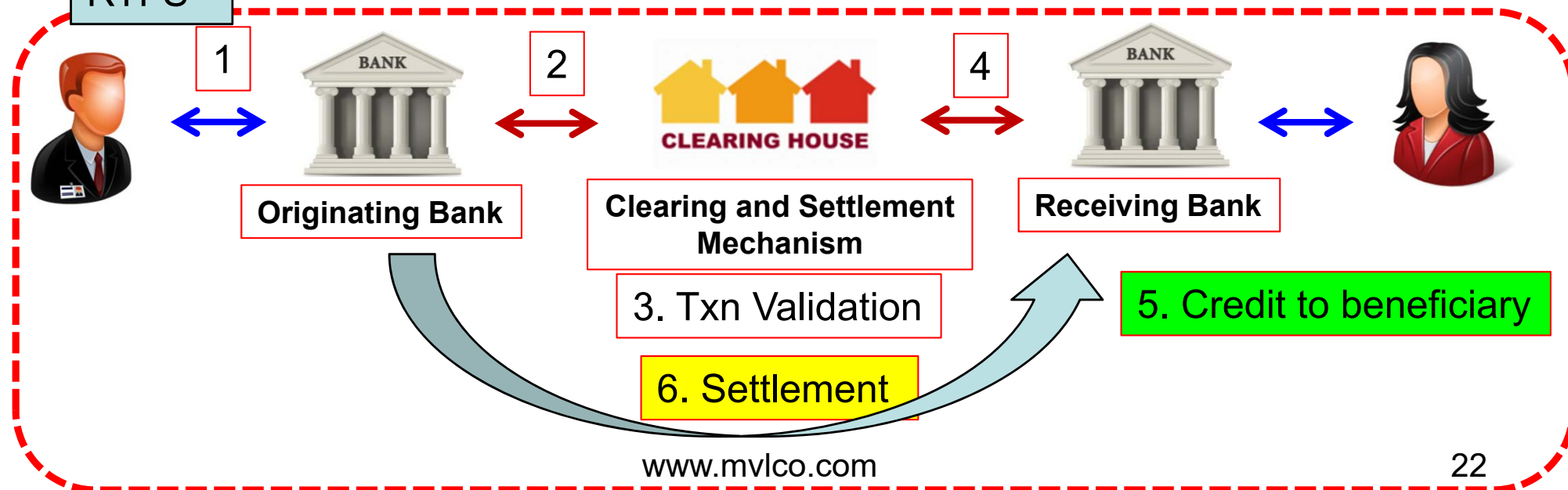
# Key elements of payment systems



## DNS, RTGS and Hybrid. Other than RTFS



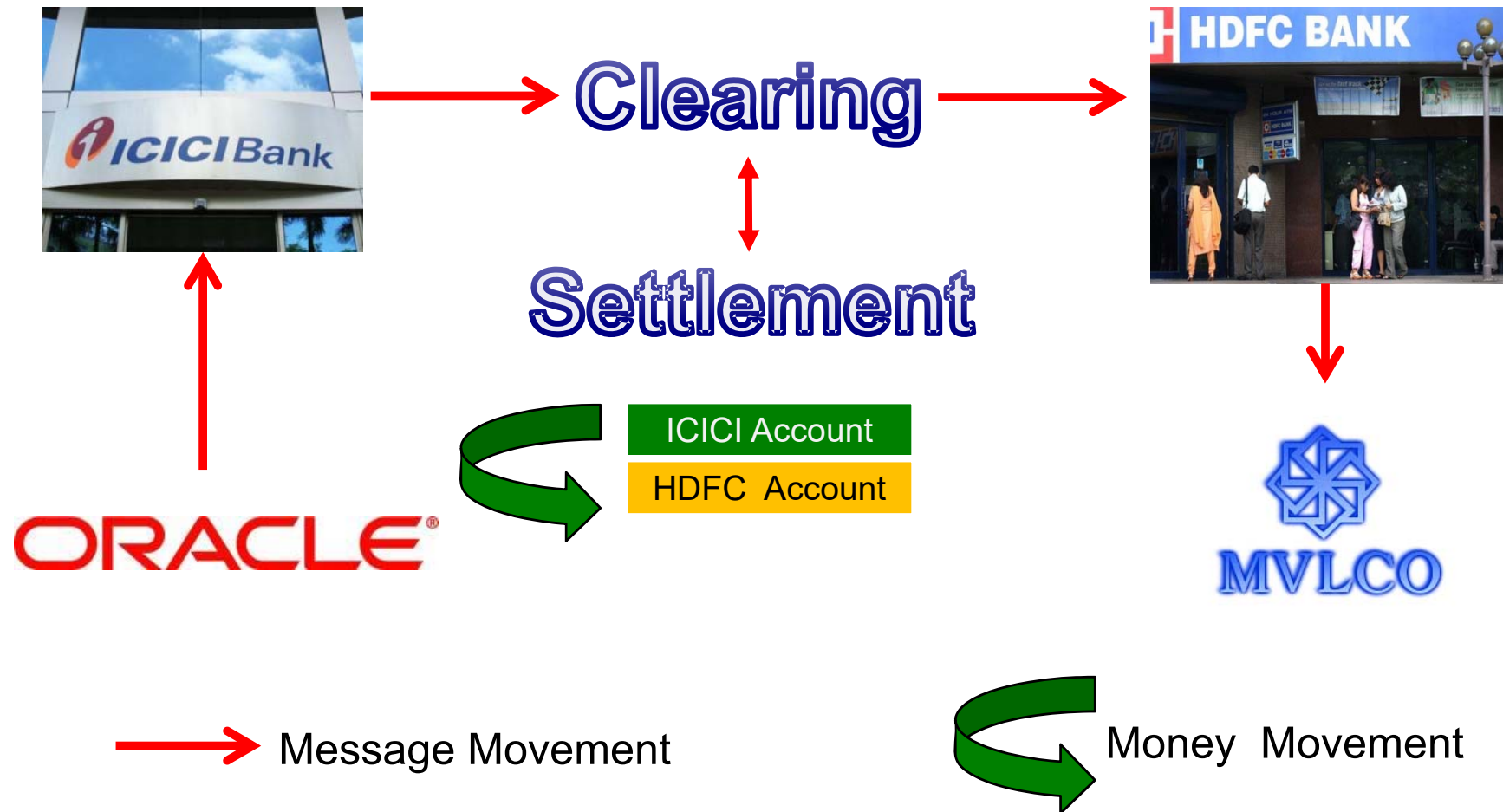
## RTFS



# Comparative table

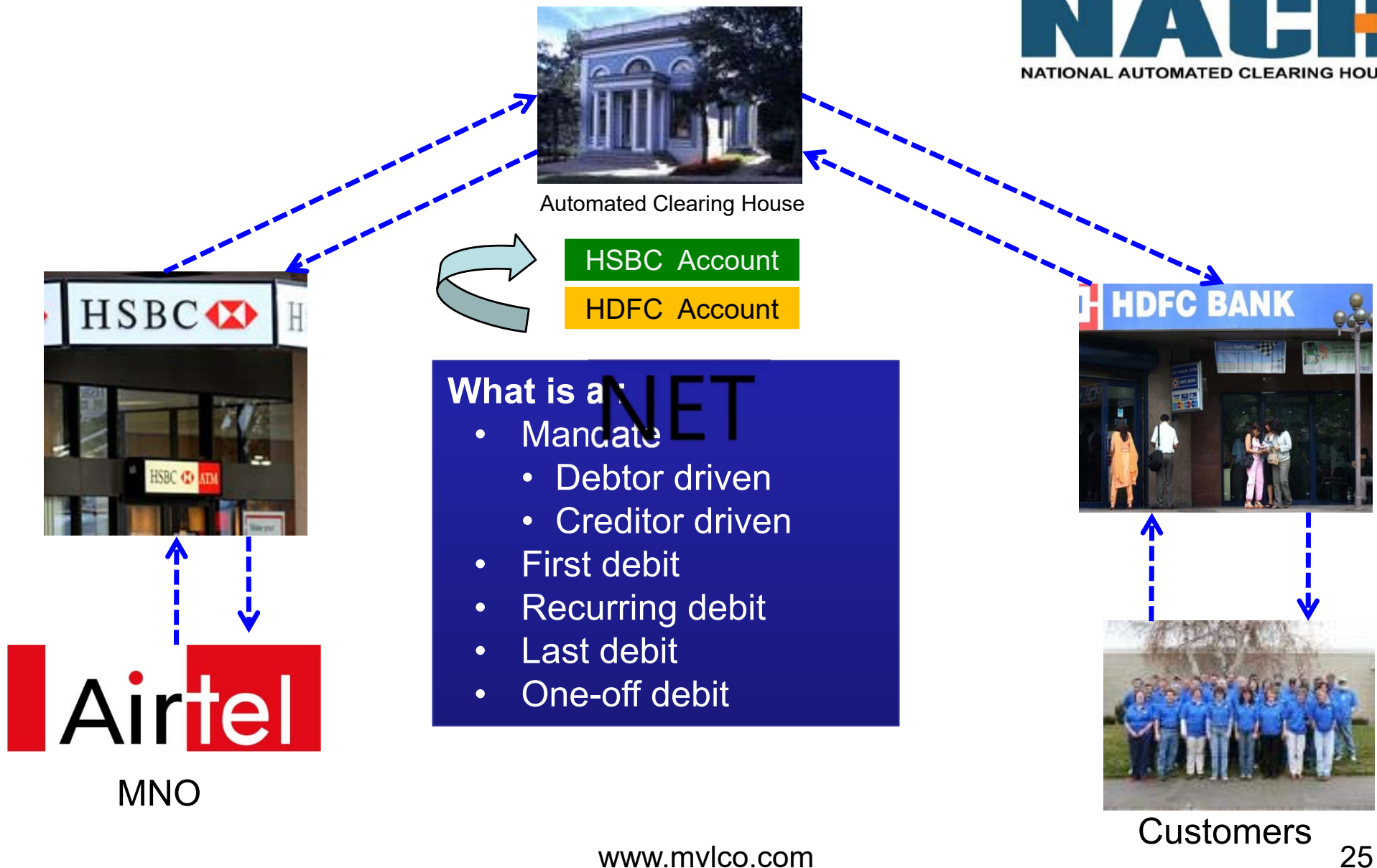
Region	RTGS	Hybrid	RTFS	Netted
USA >>>	Fedwire, USA	ACH/NSS	CHIPS, USA	Cheque
SEPA >>>	TARGET2	STEP1/2, EURO 1		Cheque
UK >>>	CHAPS UK	BACS	FP (low value)	Cheque
HK >>>	CHATS HK	HKCL Clg		Cheque
India >>>	RTGS India	NEFT	IMPS (low value)	Cheque
Others >>>			LVTS Canada	

# Domestic payment : Credit transfer / Push



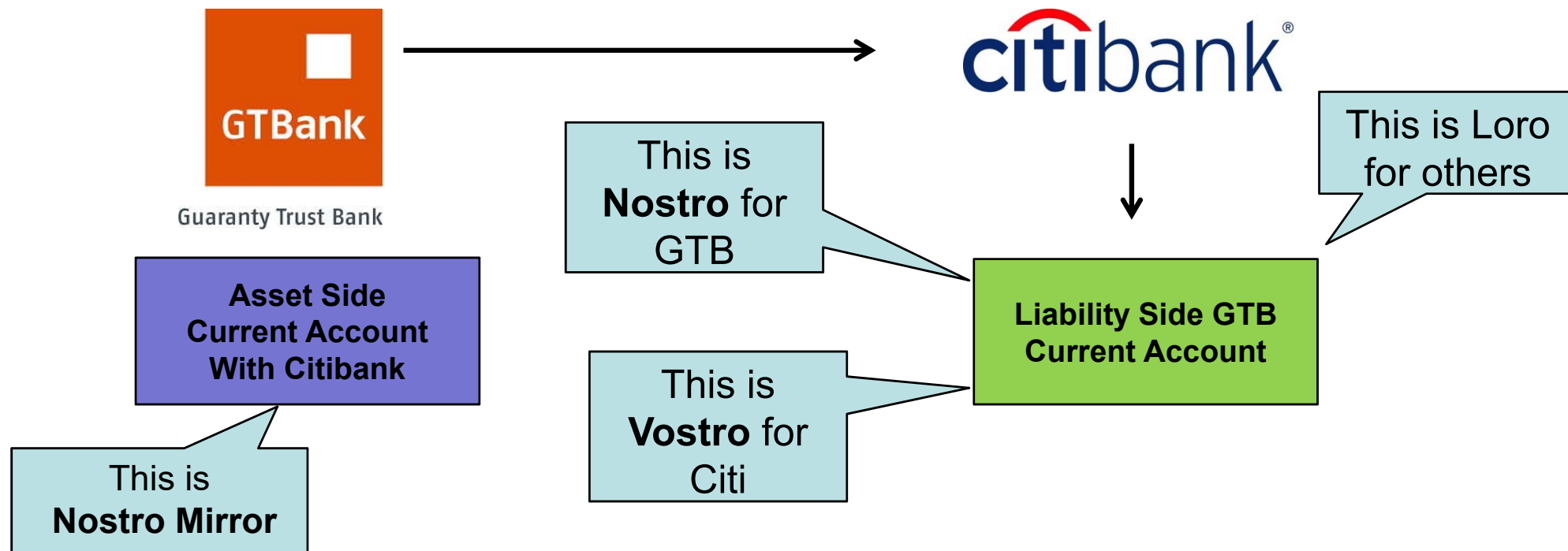


## Story Example #4 – Direct Debits



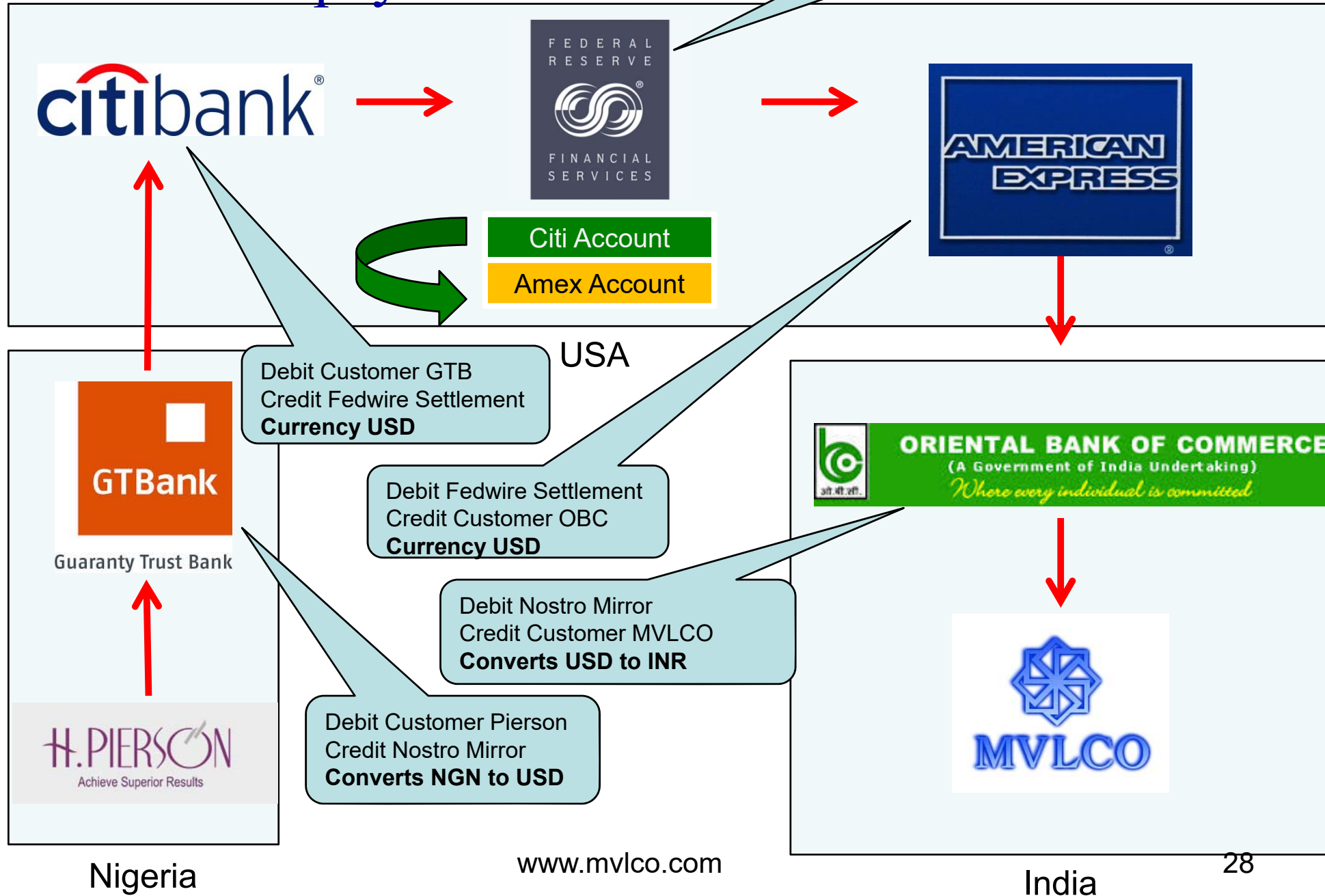
# CROSS BORDER PAYMENTS

# Correspondent banking



1. GTB opens an account in Citibank.
2. Let's presume Citibank uses Flexcube. The account is opened in the books of Citibank in Flexcube. Citibank calls it "Vostro" (yours)
3. GTB calls it "Nostro" (mine).
4. Let's presume GTB uses Finacle. To account for the transactions in its own books, GTB opens a "Nostro Mirror Account" in Finacle.

# Cross border payment



# Essentials of Payment Systems

## Module 2 Paper Based Payment Systems

MVL Consulting Private Limited

[www.mvlco.com](http://www.mvlco.com)

## Story Example <sup>#</sup>1 – You are MSD

You are **MS Dhoni**. You are selected as a Captain of Indian Cricket Team and you want to buy a new cricket kit. “**Sports Shop**” is the **most popular sports goods store in Delhi**.



You purchase a brand new kit for INR 25,000 .




## Story Example <sup>#</sup>1 – You are MSD (continued)

Let's understand how a payment is processed by using the actual paper cheque/instrument **throughout** the process.

An instrument can be a **bearer** instrument or a **crossed** instrument



<b>A/c PAYEE ONLY</b>		<b>MULTI - CITY CHEQUE</b>		EA
Txn. No. <input type="text"/>		दिनांक / Date : 11.7.08		
Pay <u>Veeranki Girija Shankar</u>				
को या उनके आदेश पर <i>On Order</i>				
रुपए <u>Twenty thousand only</u>				
अदा करें <u>₹/Rs. 20000/-</u>				
 <b>सिंडिकेट बैंक</b> <b>Syndicate Bank</b> <small>Head Office: Mumbai - 400 001</small> <small>Your faithful &amp; friendly financial partner</small>		खाता सं. A/c No. <b>90293050000021</b>	USER ID <input type="text"/>	
पुरा कैंपस, नई दिल्ली - 110 012 PUSA CAMPUS, NEW DELHI - 110 012 सिंडिकेट बैंक के सभी सी.बी.एस. शाखाओं में सममूल्य पर प्रदेय Payable at par at all CBS Branches of Syndicate Bank		For ICAR Unit- PIU- NAIP (N) Kumar AUTHORIZED SIGNATORY AUTHORIZED SIGNATORY		
505 1 24 11 100 250 4 11		29		

**ANYCOMPANY**  
1430 ANY STREET  
ANYTOWN, CA 90000

101

DATE \_\_\_\_\_

PAY TO THE ORDER OF: \_\_\_\_\_

\$

**ANYTOWN BANK**  
1000 BANKING WAY  
ANYTOWN, CA 90000

DOLLARS

MEMO \_\_\_\_\_

⑈00000101⑈ 8 ⑈000024578⑈ 12457802⑈ ⑈0000000000⑈

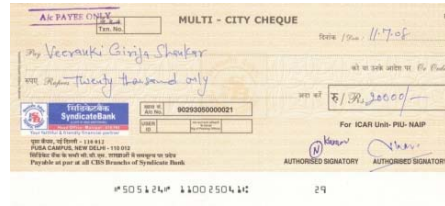


FIELDS ARE MADE UP OF POSITIONS

**LONGER THAN 6"**

(AT LEAST 6" WIDE; CANNOT BE MORE THAN 8¾")





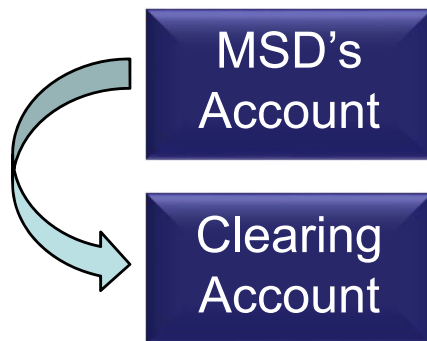
Bearer Cheque

Crossed Cheque

In India, the Clearing House and Settlement Bank are same.  
In other countries, the functions may be separated.



THE  
**CLEARING  
HOUSE**



Rs.25,000

Settlement



Rs.25,000



# PROCESSING PAYMENT WITHOUT USING A CHEQUE THROUGHOUT THE PROCESS : CHEQUE TRUNCATION AND CHEQUE CONVERSION


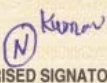
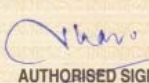
## Story Example <sup>#</sup>1 – You are MSD (continued)

Let's understand how a payment is processed by without using the actual paper cheque/instrument throughout the process.

How can this be done ?

- Cheque truncation by using a Paper Clearing House
- Cheque conversion by using an Automated Clearing House.



A/c PAYEE ONLY		MULTI - CITY CHEQUE		EA
Txn. No.		दिनांक / Date : 11.7.08		
Pay Veeranki Ginja Shankar		को या उनके आदेश पर On Order		
रुपए Rupees	Twenty thousand only	अदा करें रु/ Rs 20000/-		
 <b>सिंडिकेट बैंक</b> <b>Syndicate Bank</b> <small>(A UNIT OF INDIA DEVELOPMENT BANK)</small> <b>Head Office: Mumbai - 400 001</b> <small>Your faithful &amp; friendly financial partner</small>		खाता सं. A/c No.	90293050000021	
पूसा कैम्पस, नई दिल्ली - 110 012 PUSA CAMPUS, NEW DELHI - 110 012 सिंडिकेट बैंक के सभी सी.बी.एस. शाखाओं में सममूल्य पर प्रदेय Payable at par at all CBS Branches of Syndicate Bank		USER ID	For ICAR Unit- PIU- NAIP	
		 <b>AUTHORISED SIGNATORY</b>		 <b>AUTHORISED SIGNATORY</b>
		505124 1002504 11		

# Cheque truncation

#003456789\*  
11/02/2004  
1234567890

SEEK-2464-1  
#002/10/11 EE456789003

This is a legal copy of your check. You can use it the same way you would use the original check.

John or Jane Doe  
PO Box 123  
Home Town, MD 82881

147  
Date Oct. 11, 2004

Pay to the order of Fairtime Mortgage Co. \$ 450.34  
Four hundred, fifty DOLLARS

Home Town Bank USA

Memo Payment 36 Jane Doe

⑆00076543210 00035244 0447 ⑈000045034⑈

Substitute Check

0076543 11/03/2004  
#003456789 177947335  
1234567890

FOR DEPOSIT ONLY  
DEPOSIT BANK NATIONAL  
ACCOUNT 1234567890123  
FAIRTIME MORTGAGE CO.

DO NOT WRITE, SIGN, OR SIGN BELOW THIS LINE.  
MICROFILM FOR DEPOSIT ONLY

⑆001234567⑈  
DEPOSIT BANK NATIONAL  
PHILADELPHIA # 10282004  
6704729122

>001234567<10282004  
6704729122

009876543  
TRUNCATE BANK  
CHARLOTTE, N.C. 28026  
1799429335

Do not endorse or write below this line.

# Story Example <sup>#</sup>1 – You are MSD (continued) Cheque Truncation



**Clearing House**

Digital Image of Cheque  
and electronic data

Digital Image of Cheque  
and electronic data



Create image and  
data. Original cheque  
retained by ICICI

**Settlement Bank**

Barclays  
Account

ICICI  
Account



MSD's  
Account

Clearing  
Account

Clearing  
Account

Shop  
Account



# Story Example <sup>#</sup>1 – You are MSD (continued) Cheque Truncation/Remote Deposit Capture (RDC)



**Clearing House**

Digital Image of Cheque  
and electronic data

Digital Image of Cheque  
and electronic data

Create image and  
send the data and  
image to bank.



**Settlement Bank**

Barclays  
Account

ICICI  
Account



MSD's  
Account

ACH  
Account

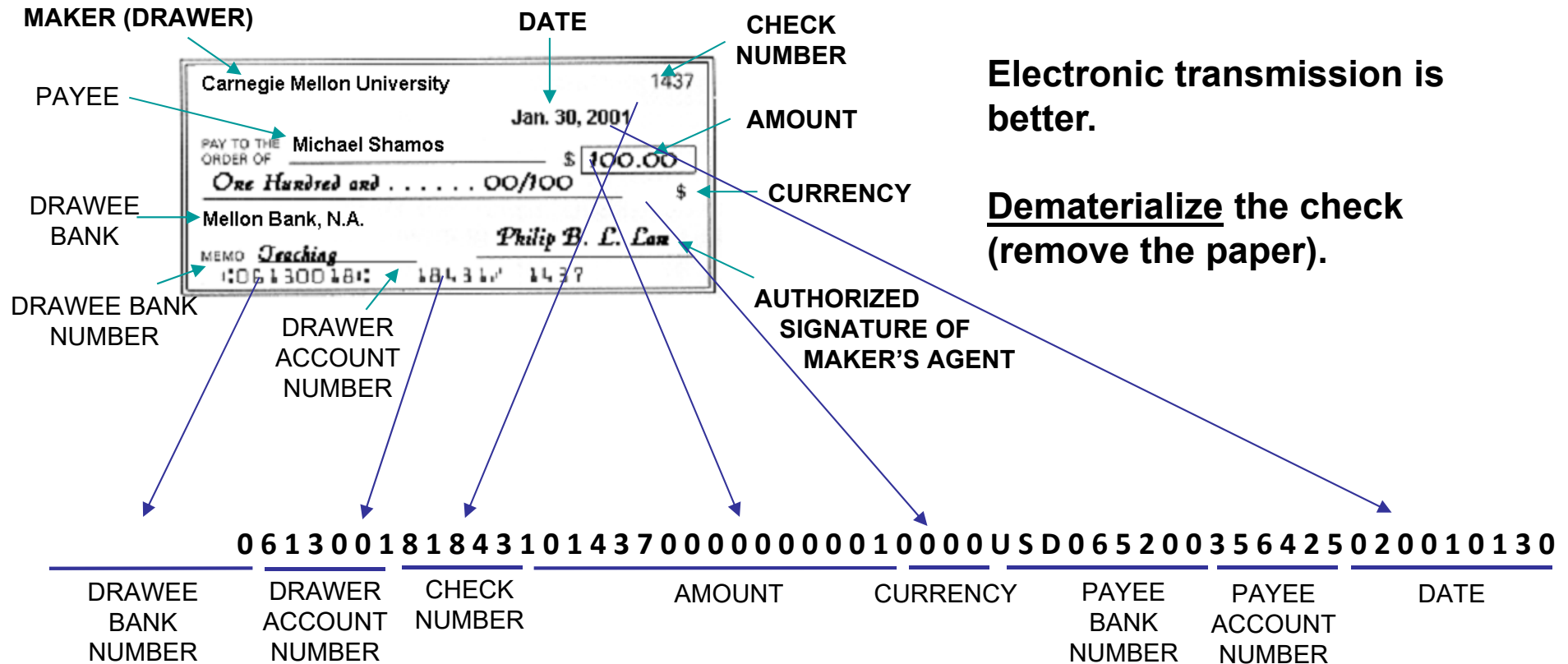
ACH  
Account

Shop  
Account

# Using mobile phone to deposit cheque



# Check Conversion



The paper check is just a carrier of information.

Electronic transmission is better.

**Dematerialize the check (remove the paper).**

Only the information is sent to the automated clearing house



# Story Example <sup>#</sup>1 – You are MSD (continued) Cheque Conversion (POP/BOC/ARC)



**ACH**

Electronic data in ACH format

Electronic data in ACH format

Extract data and send the data only.

**Settlement Bank**

Barclays  
Account

ICICI  
Account



MSD's  
Account

ACH  
Account

ACH  
Account

Shop  
Account

[www.mvlco.com](http://www.mvlco.com)

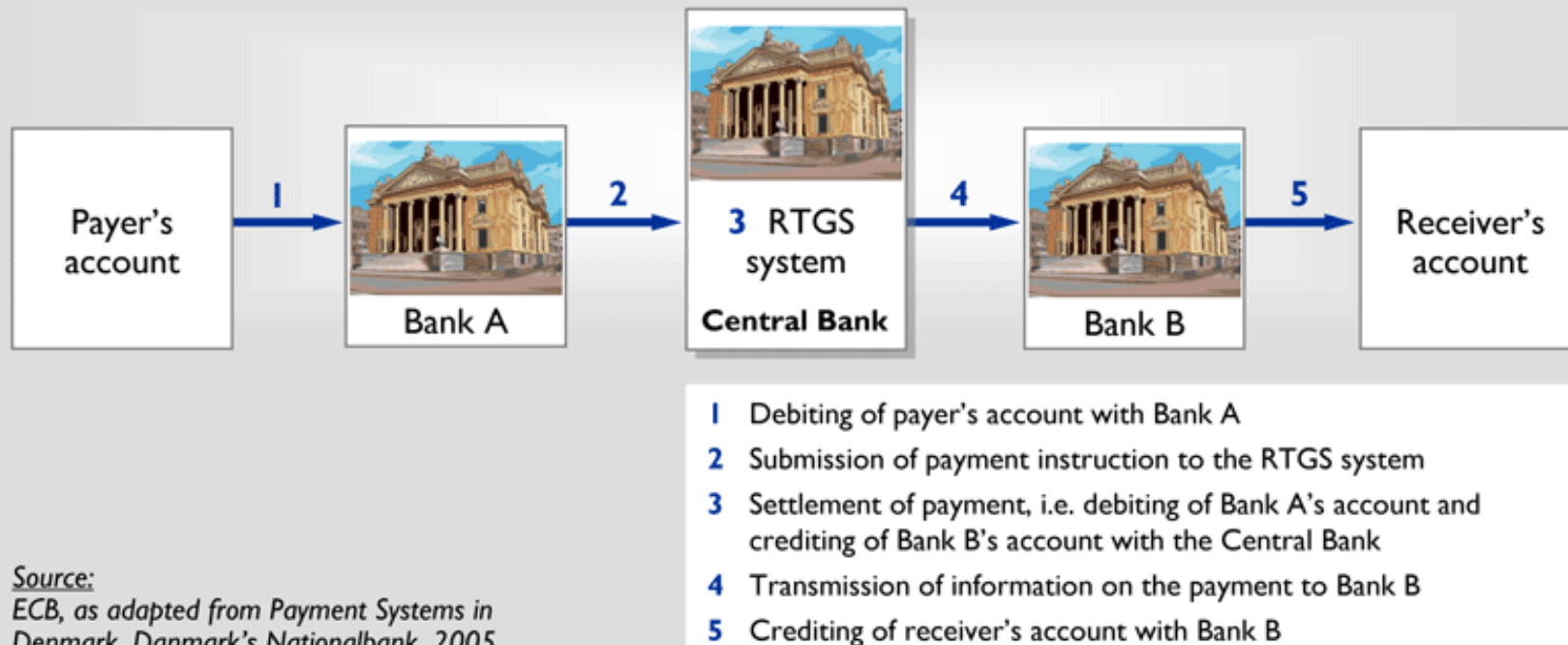
# Essentials of Payment Systems

## Module 3 Electronic Payment Systems

MVL Consulting Private Limited

[www.mvlco.com](http://www.mvlco.com)

# REAL TIME GROSS SETTLEMENT (RTGS)



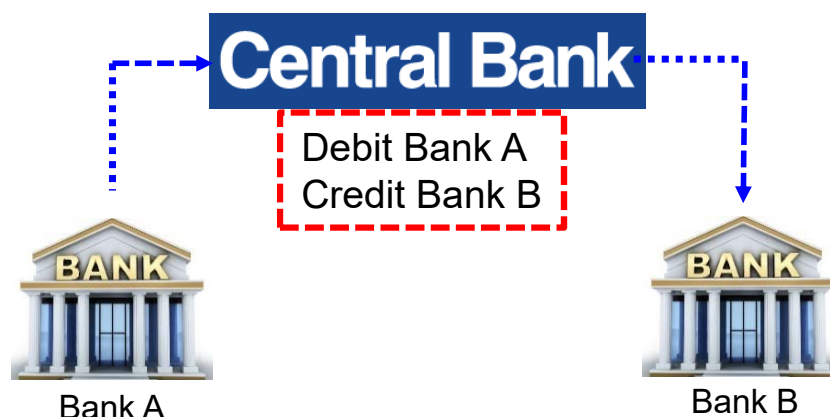
Source:  
ECB, as adapted from *Payment Systems in Denmark, Danmark's Nationalbank, 2005*

# REAL TIME GROSS SETTLEMENT SYSTEMS

# RTGS system features

- **Entities:**

- Central bank
- Sending bank
- Receiving bank



- **Used for:**

- Only for domestic funds transfers in single currency

- **Exceptions:**



- TARGET2 in SEPA (EUR) or SIRESS in SADC (ZAR)
- CHATS in Hong Kong – HKD, USD, EUR

- **Benefits:**

- Instantaneous transfer of funds, reducing the time between message and settlement and thus reducing the settlement risk.
- Improved business cycle resulting in economic growth.
- Better customer service.



## RTGS

	Angola
	Botswana
	Democratic Republic of Congo
	Lesotho
	Madagascar
	Malawi
	Mauritius
	Mozambique
	Namibia
	Seychelles
	South Africa
	Swaziland
	Tanzania
	Zambia
	Zimbabwe

# Story Example <sup>#</sup>1 – Real Time Gross Settlement System



- Ford in Detroit, USA has an account with Gold Bank.
- Ford wants to immediately remit an amount of \$10,000 to Toyota, having account with Silver Bank, New York.
- It uses the Real Time Gross Settlement System to remit the funds.



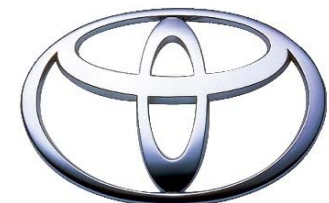
Gold Bank  
Sending Bank



Silver Bank  
Receiving Bank

**Central Bank**

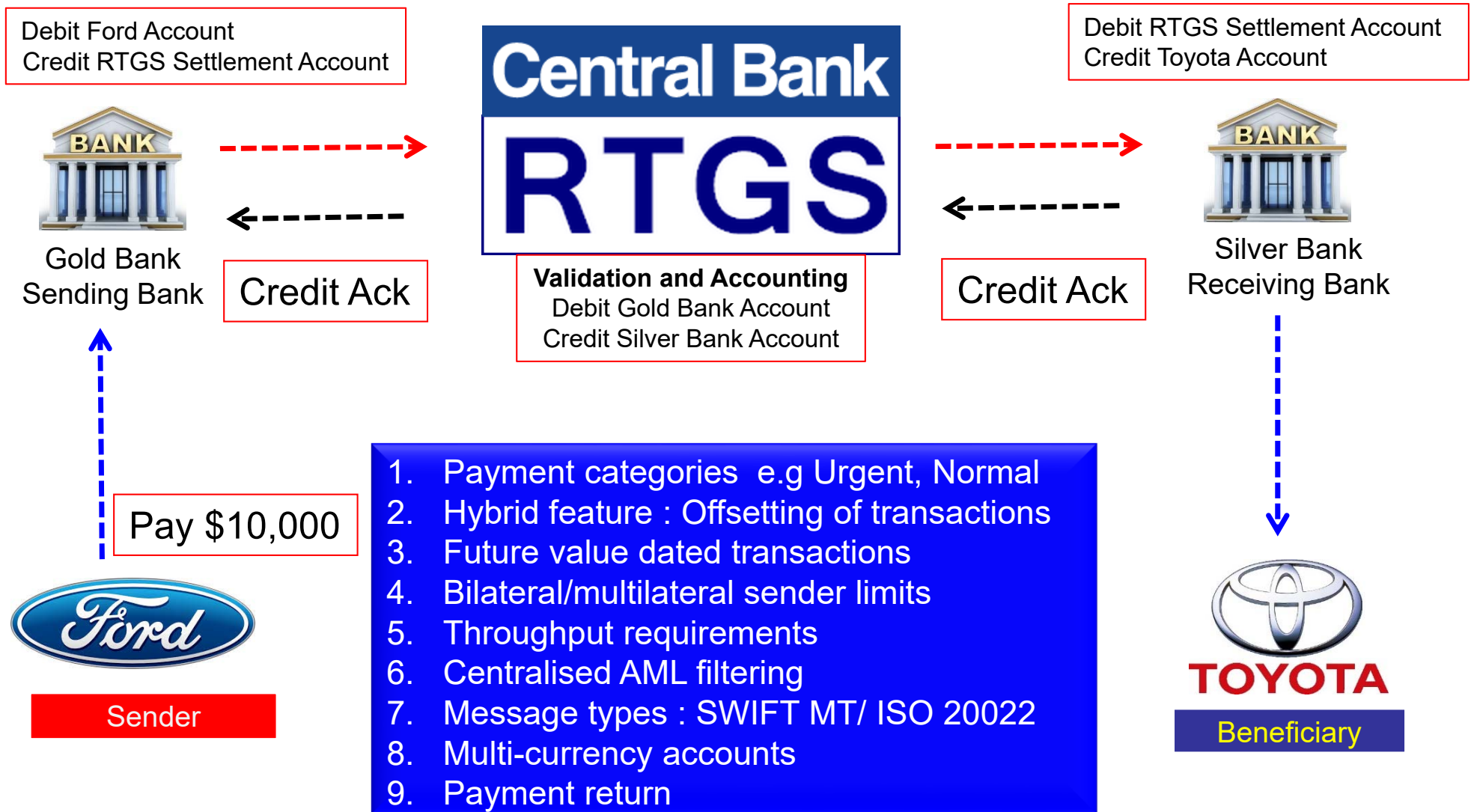
**RTGS**



**TOYOTA**



# Story Example <sup>#</sup>1 – Real Time Gross Settlement System



NEFT Administration		NEFT Administration		NEFT Administration	
Startup/Shutdown	Backup	Parameter	Update IFSC	Upload	Download
<b>Services</b>		<b>RBI</b>		<b>RBI</b>	
<b>Action</b>		<b>Download To RBI</b>		<b>UPLOAD FROM RBI</b>	
Scheduler	Start Stop	Value Date: 2005-11-02		Transaction Type: Credits	
Archive	Start Stop	Batch Time: 1200		File Name : <input type="text"/> Browse	
Send Credits	Start Stop	<input type="checkbox"/> Include Null Batchid		Upload	
Send Rejections	Start Stop	Download To File			
Send EOD/EOB	Start Stop				
Send Debits	Start Stop				
Send Returns	Start Stop				
Startup/Shutdown		Download		Upload	

# NEFT INDIA



## Story Example <sup>#</sup>2 – Hybrid Payment System : NEFT

- Ford in Mumbai has an account with Gold Bank.
- Ford wants to immediately remit an amount of INR10,000 to Toyota, having account with Silver Bank, Chennai.
- It uses the National Electronic Fund Transfer System (Hybrid) to remit the funds.

**Central Bank**

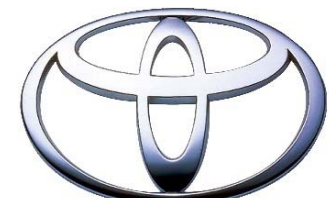
**RTGS**



Gold Bank  
Sending Bank



Silver Bank  
Receiving Bank

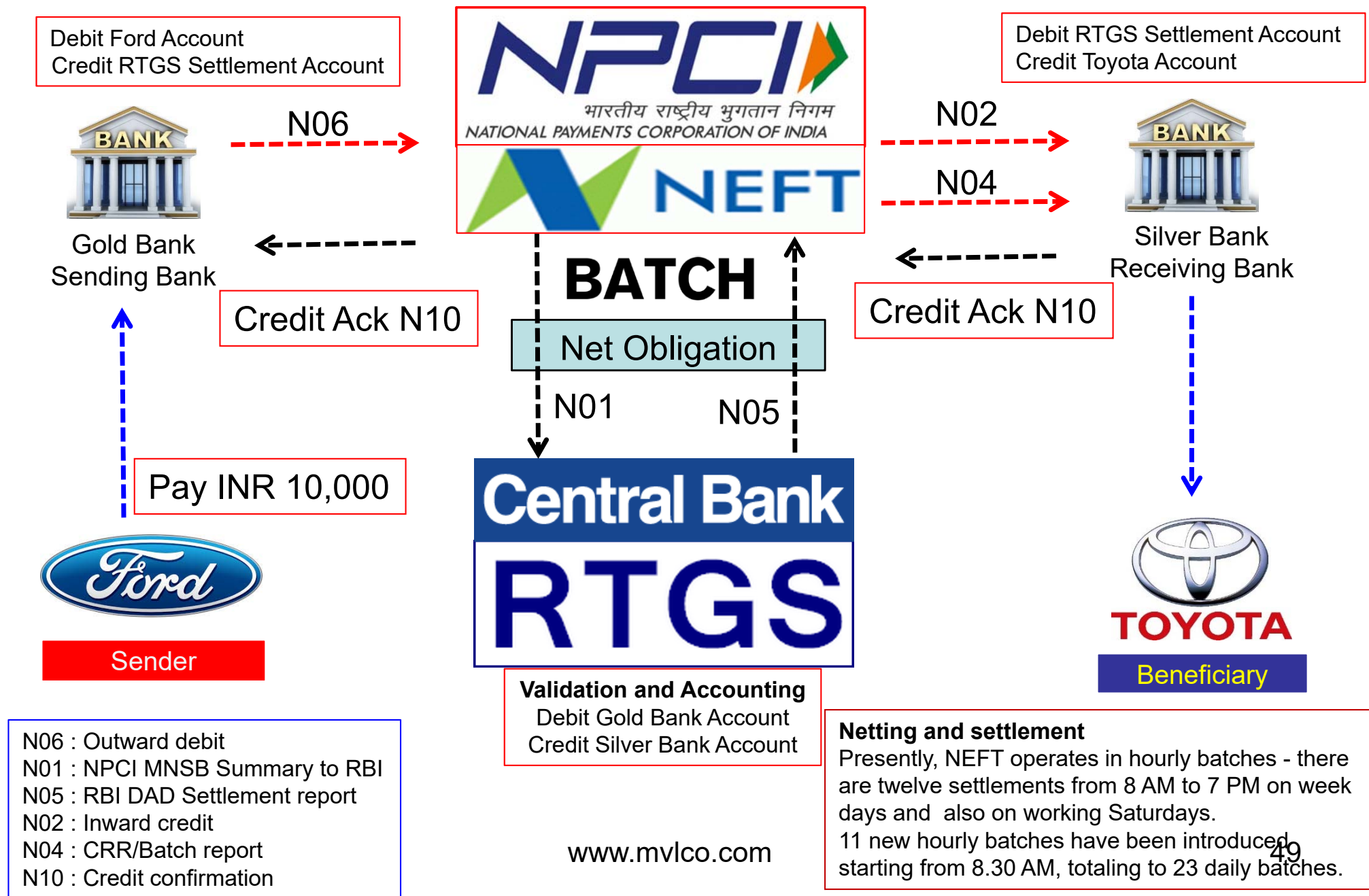


**TOYOTA**





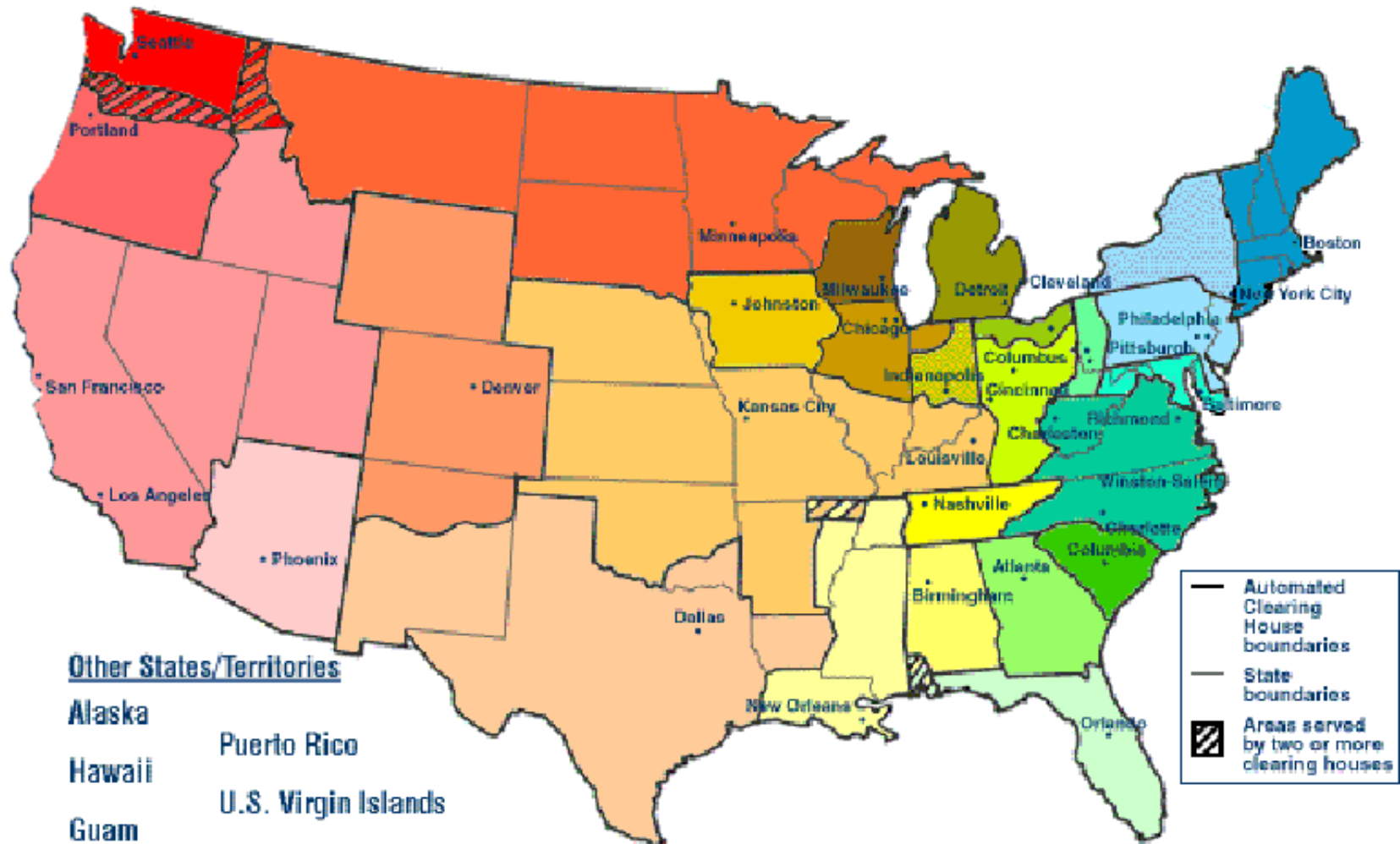
# Story Example <sup>#</sup>2 – National Electronic Fund Transfer NEFT





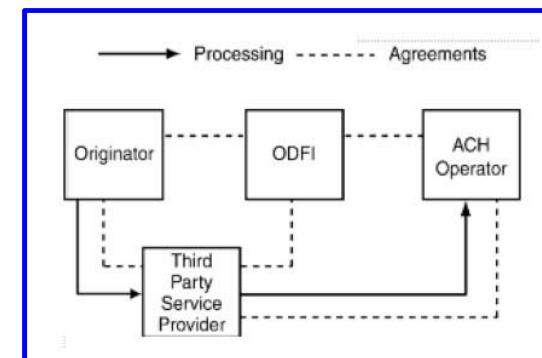
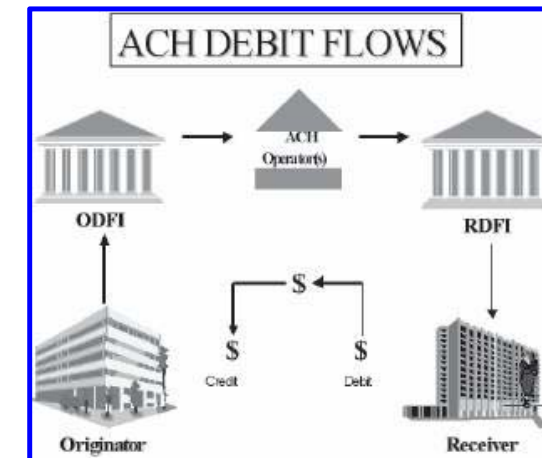
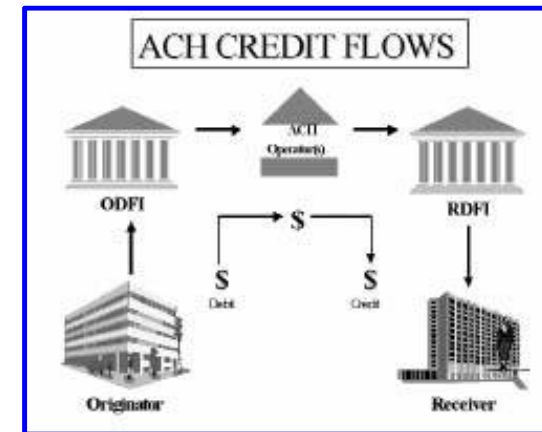
# ACH OPERATIONS

## Regional ACH



# Entities

- **Originator**
  - Consumer
  - Non-consumer
- **ODFI** (Originating Depository Financial Institution)
- **Third party sender**
  - For ODFI
  - For originator
- **Direct access**
  - Direct access debit participant
- **RDFI** (Receiving Depository Financial Institution)
- **Receiver**
- **ACH**
- **Gateway operator**



## Standard Entry Class (SEC) Codes



Code	Application Title	Application Description	Consumer / Business	Debit / Credit
ARC	Accounts Receivable Entry	Converted checks received via mail, drop box or manned bill payment location	Consumer checks or business checks without an aux-on-us field	Single debit only
BOC	Back Office Conversion Entry	Converted checks received by merchant at the point-of-purchase or manned bill payment location, and processed during back office operations	Consumer checks or business checks without an aux-on-us field	Single debit only
CCD	Corporate Credit or Debit Entry	Transfer of funds between businesses or to consolidate funds from several accounts of the same business	Non-Consumer accounts	Debit or credit
CIE	Customer Initiated Entry	Credit entry initiated by a consumer (usually through a bill payment service) used to pay an obligation	Consumer to Business account Originator: Consumer Receiver: Business	Credit only
CTX	Corporate Trade Exchange	Payment or collection of obligations between businesses. Usually carries addenda information.	Non-Consumer accounts	Debit or credit
DNE	Death Notification Entry	Notice initiated by a Federal agency to advise an RDFI of the death of an individual (includes addenda record with details)	Consumer accounts only	Non-monetary Entry
ENR	Automated Enrollment Entry	Entry submitted by financial institution to enroll accountholder in direct deposit of Federal government benefits	Consumer accounts only	Non-monetary Entry
IAT	International ACH Transaction	Transaction involving a financial agency outside of the territorial United States	Consumer or business accounts	Debit or credit
POP	Point-of-Purchase Entry	Check converted by merchant at the point-of-sale Check handed back to customer	Consumer checks or business checks without an aux-on-us field	Single debit only
POS	Point-of-Sale Entry	Entry initiated by individual at a merchant location using a merchant-issued card for payment of goods or services	Consumer accounts only	Single debit (May be credit adjustment)
PPD	Prearranged Payment and Deposit Entry	Single or recurring entry for direct deposit of payroll, pension, etc., or for direct payment of recurring bills such as utilities, loans, insurance, etc.	Consumer accounts only	Debit or credit
RCK	Represented Check Entry	Merchant or biller collection of checks which have been returned as NSF or Uncollected Funds	Consumer accounts only	Single debit only
TEL	Telephone-Initiated Entry	Single or recurring entry submitted pursuant to an oral authorization obtained solely via the telephone	Consumer accounts only	Debit only
WEB	Internet-Initiated / Mobile Entry	Single or recurring entry submitted pursuant to an oral authorization obtained via the Internet or Mobile device or (when a consumer to consumer credit) authorized using any method	Consumer accounts only	Debit or Credit
XCK	Destroyed Check Entry	Replacement entry for check that is lost or destroyed, or for check image that is unreadable or cannot be processed	Consumer or business accounts	Single debit only

# NACHA STANDARD ENTRY CLASS CODES

# NACHA Standard Entry Class (SEC) Codes (1)

- **Consumer applications / Account type**
- **CIE** : Customer initiated entries – Using home banking or bill payment service provider
- **MTE** : Machine transfer entry - ATM
- **PPD** : Prearranged payment and deposit - Direct Deposit and Direct Payment (includes IVRS and touch-tone)
- **POS** : Point of sale – Using a POS terminal
- **SHR** : Shared network transaction – Using a POS terminal
- **RCK**: represented checks
- **TEL** : telephone initiated entries – Using oral authorisation
- **WEB**: Internet/mobile initiated entries

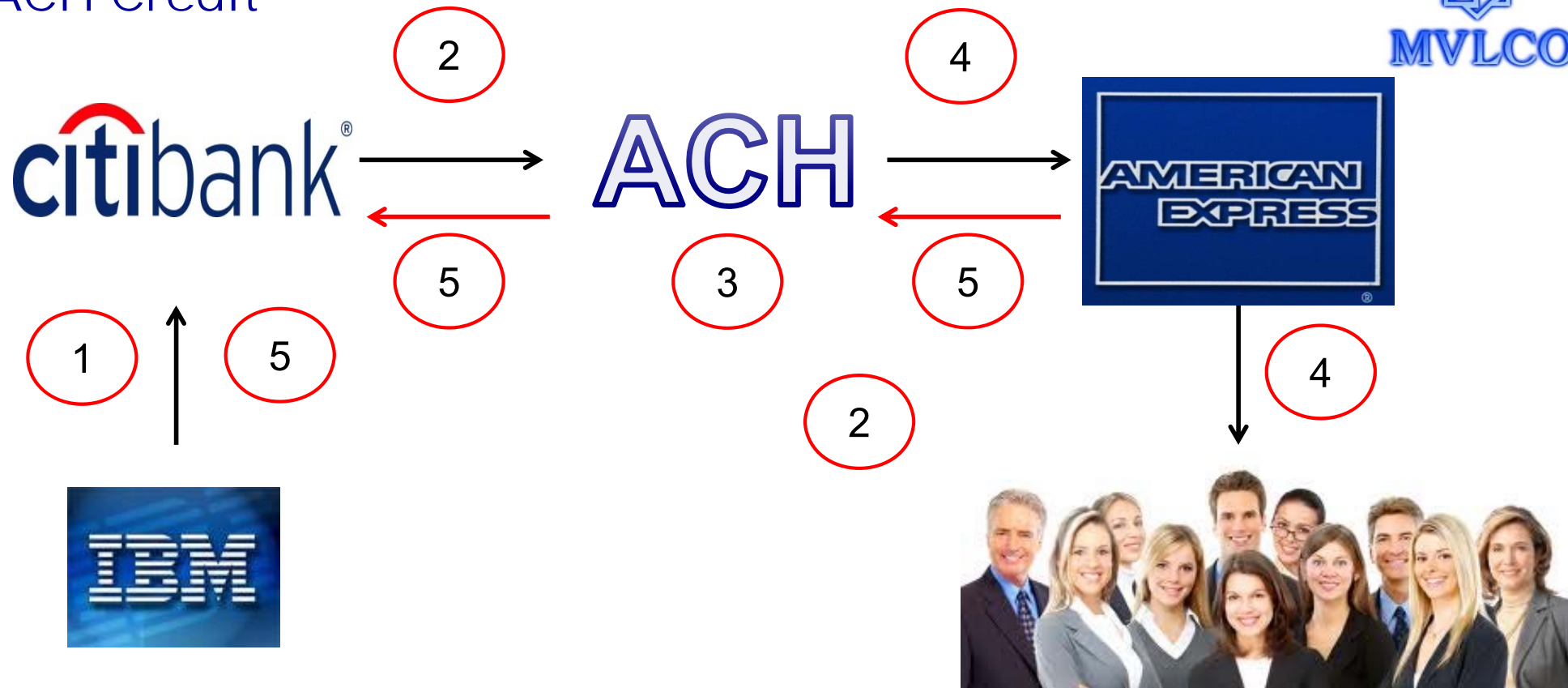


# NACHA Standard Entry Class (SEC) Codes (2)

- **Corporate applications/Account type**
- **CCD**: Corporate Credit and Debit entries
- **CTX**: Corporate trade exchange entries
- **Consumer and Corporate applications**
- **ARC** : Accounts receivable
- **BOC** : Back office conversion
- **IAT** : International ACH transaction
- **POP** : Point of Purchase/manned bill payment location
- **TRC**: Truncated entry
- **TRX** : Truncated entries exchange
- **XCK**: Destroyed check entry

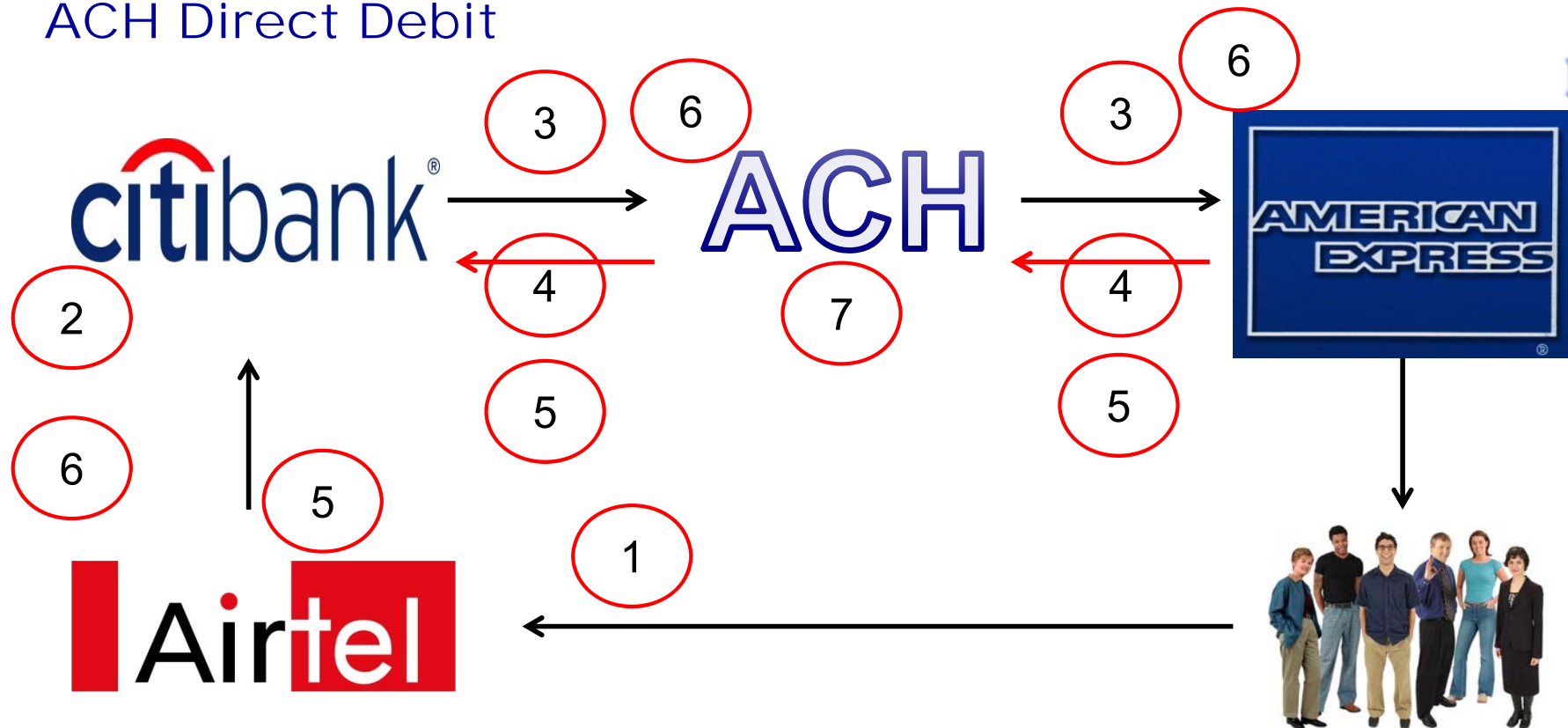


## ACH Credit



1. IBM (Originator) sends a file to Citibank (ODFI) containing credit instructions to pay vendors (receivers)
2. The file is forwarded by Citibank (ODFI) to American Express (RDFI) through ACH
3. ACH computes the net and arranges for settlement.
4. After settlement RDFI is intimated the status of settlement.. Amount is credited by RDFI to Receivers.
5. Any rejects, returns are sent to Originator by RDFI through ODFI. RDFI credits the Originator in respect of such transactions

## ACH Direct Debit



1. **Airtel (Originator)** is authorised by **customers (Receiver)** to debit their accounts : Range USD 100 (=/- 10%)
2. ACH File is sent by Airtel to **Citibank (ODFI)** to debit customers and recover dues.
3. Pre-notification (PreNote) is sent by **Airtel (Originator)** to **American Express (RDFI)** through **Citibank (ODFI)**
4. RDFI sends a return (within 6 days of PreNote) to ODFI if it is not going to accept the pre-notified entries.
5. RDFI may send a Notice of Change (NOC) to ODFI. NOC is intimated to Originator.
6. Corrected file may be sent by Originator to RDFI through ODFI.
7. File is sent to settlement agency and the payment is made on due date.

- **R-messages : RETURN, REVERSE, RECLAIM**

# RDFI PROCESSES

# RDFI processes

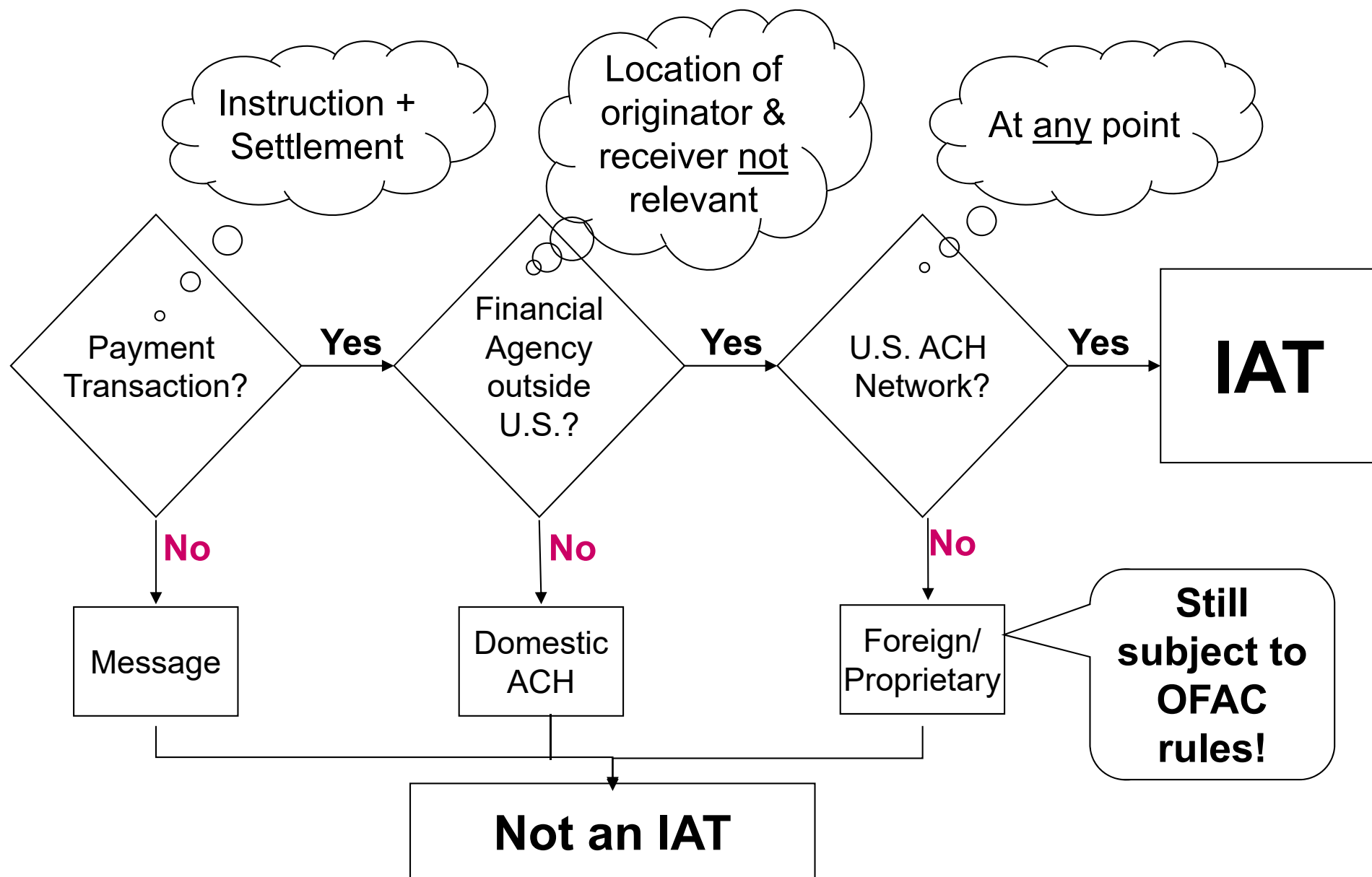
- Acceptance of complying entries from receiving ACH operator.
- Informing receivers about each debit and credit entry in their account as required by the regulation.
- Responding to pre-notifications.
- **Obligation to stop payment.**
- Transmission of return entries.
- Dealing with dishonoured returns
- Crediting receiver in respect of a debit which was not properly authorised.
- **Dealing with unauthorised debits**

# IAT ENTRIES

# What is IAT ?

- An IAT Payment Transaction is defined as an ACH entry that is part of a payment transaction involving a financial agency that is not located within the territorial jurisdiction of the United States (US).
- A payment transaction is defined to include any and all settlements, accounting entries or disbursements that are necessary or appropriate to carry out the instruction.
- If the funds move across an international border or if the instructions and the funding combined are from outside the US, even if the payments are sent from a US bank to a US bank, it would be considered an IAT.
- Penalties for noncompliance with OFAC can range from \$10,000 to \$10 million per occurrence with potential prison terms

# Identifying an IAT



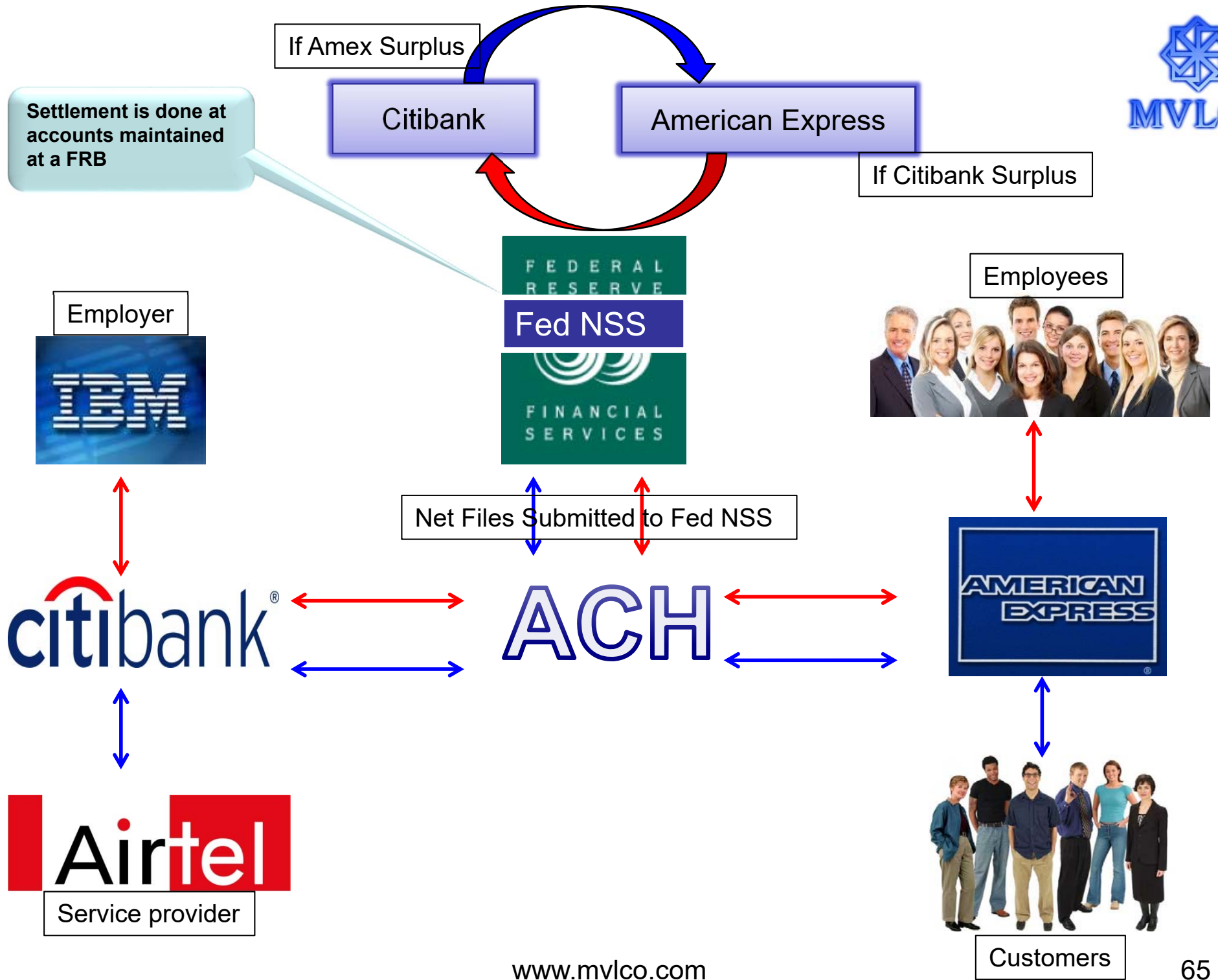


# NATIONAL SETTLEMENT SERVICE

# What does NSS do ?

- NSS is a multilateral settlement service owned and operated by the Federal Reserve Banks.
- It allows participants in private clearing arrangements to settle their **net obligations** with same-day finality using participant's reserve or clearing account balances maintained at the Federal Reserve Banks.
- NSS participants include local check clearinghouse associations, automated clearinghouse (ACH) networks, credit card processors, and automated teller machine (ATM) networks.





# Thank You !

