Cards 101

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Macha EVERYTHING PAYMENTS - EVERYWHERE

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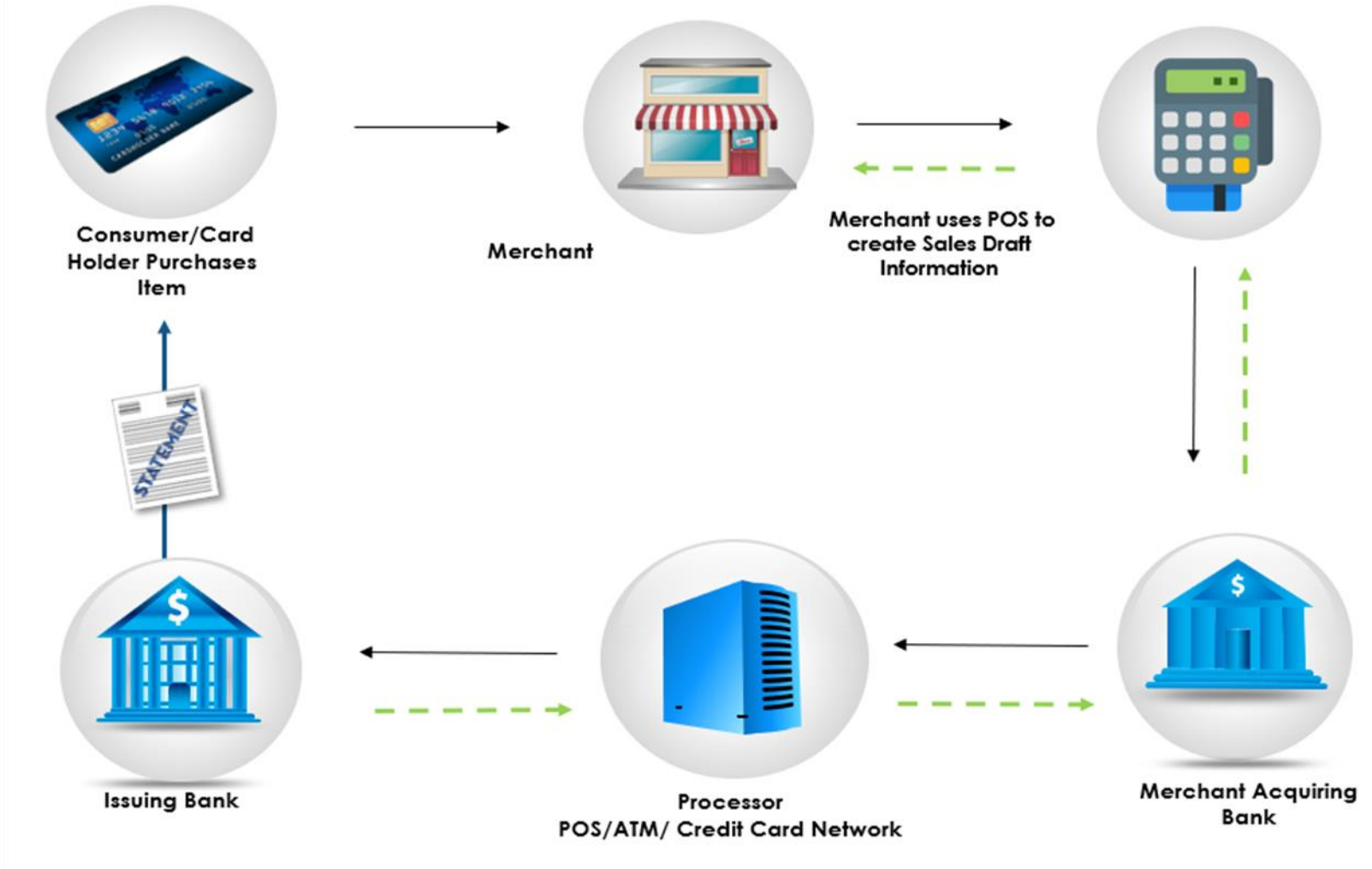
Card Payment Participants

- **Card Holder:** Individual who has been issued or authorized to use credit or debit card; must pay issuing bank under terms of card agreement
- **Card Issuer:** Entity that issues credit, debit or prepaid card to card holder; pay acquiring banks for purchases cardholders make
- **POS/ATM/Credit Card Network:** Network that provides switching facilities for the routing of credit and debit card transactions between Acquirers and Issuers; Enforce compliance among participants; Settlement between Issuer and Acquirer accounts; Settle fees between Issuer and Acquirer
- **Acquirer:** Merchant's bank; Registered member of card associations
- **Merchant:** Entity that has agreed to accept credit or debit card for purchase of goods or services at its retail locations

Industry Participants

- Cardholder makes a purchase at a terminal
- Acquiring entity acquires the transaction from the merchant and sends to the network
- The network routes transaction to Issuer
- Issuing entity will approve or decline the transaction

Card Payment Flow



Definitions

- Interchange: a sharing of a portion of payments system costs among the issuers and acquirer's participating in the card system. Generally, interchange fees are collected from acquirers and paid to issuer's (or netted by issuers against amounts paid to acquirers) to reimburse the issuers for a portion of the costs incurred by them in providing services (income for institution)
- Switch fees: Per transaction fee payable by the Issuer when transactions pass through the switch (cost for institution)

Net Interchange

- Gross interchange minus processing fees charged to the issuer by the network
- Issuer switch fees vary significantly from network to network
- Gross interchange: $0.15 + 1.05% of $50 purchase = $0.675

  Minus network issuer switch fees ($0.06)

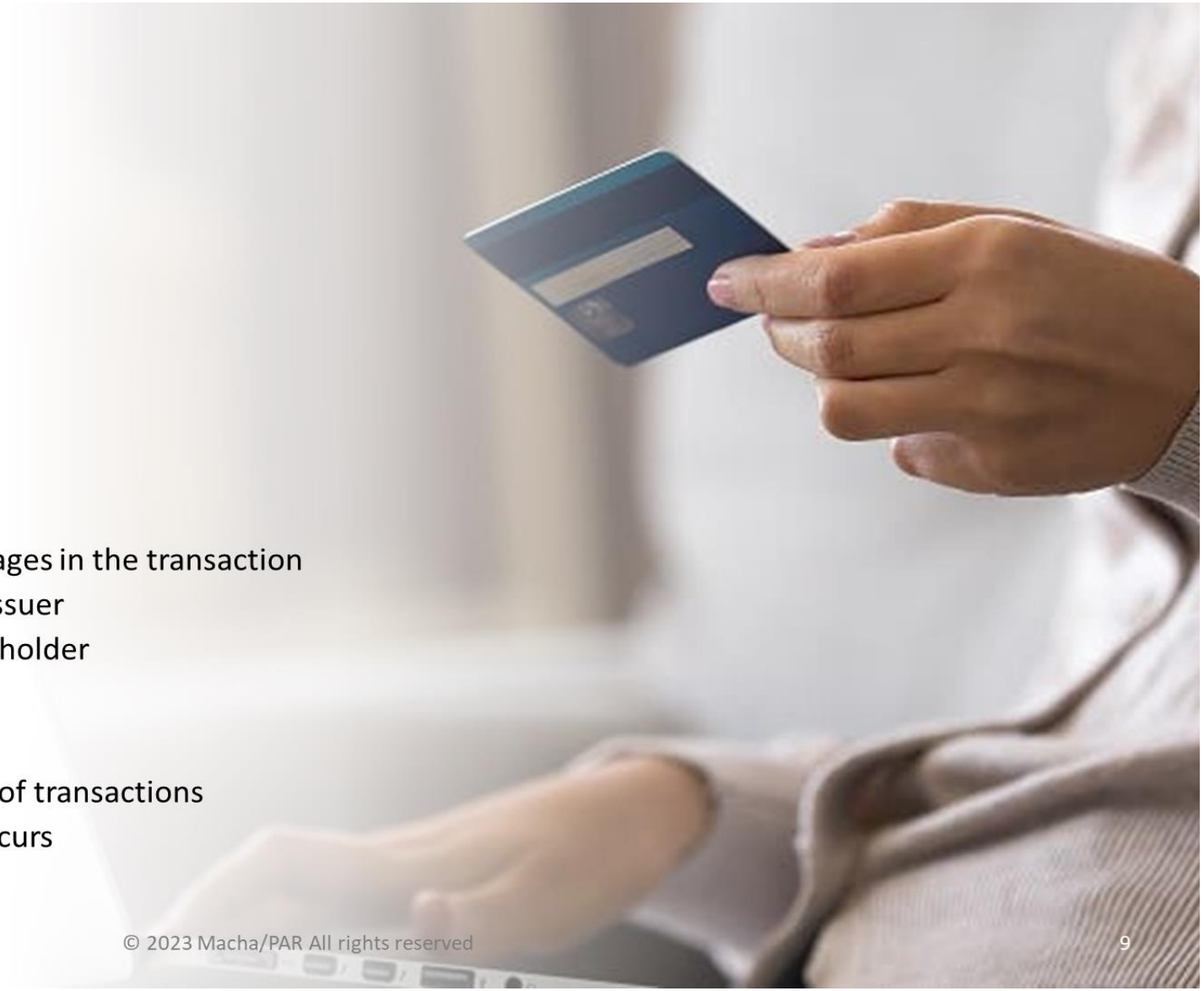
  Net Interchange = $0.615

Authentication

- Single Message
  - Formerly known as PIN-based, PIN debit, or simply “debit”
- Authorization and posting data included in one transaction message
  - At the time cardholder engages in the transaction
  - Transaction date known to the cardholder
  - Controls account posting date
  - May contain a PIN

Authentication

- Dual Message
  - Signature-based or credit
- Authorization message
  - At the time the cardholder engages in the transaction
  - Requesting approval from the issuer
  - Transaction date known to cardholder
  - May contain a PIN
- Advice Message
  - When merchant submits batch of transactions
  - Settlement date and posting occurs
  - Controls account posting date



Do signatures mean anything?

- Fraud prevention?
- Chip cards
- Merchant decision
- Low dollar threshold
- No signature or PIN

Authorization

- Authorization refers to the process by which a transaction is routed to the issuer for approval and then a decision whether or not to approve the transaction is made by the issuer.
- Stand-in: During certain circumstances when the issuer's systems are unavailable or cannot be contacted, the card network or others on behalf of the issuer will make the authorization decision in accordance with either the issuer's instructions or applicable rules

Clearing vs. Settlement

Clearing refers to the exchange of financial transaction information between issuers and acquirers after a transaction has been successfully conducted at the point of interaction.

Settlement is the exchange of funds between parties. The actual exchange of funds takes place between a settlement bank, designated by the customer and approved by the card network, and a settlement bank chosen by the card network.

Credit Card Surcharges

- Optional fee added by businesses when customers pay by credit card
- Fee must be disclosed before completion of payment
- Posted notice

- Brand fees
- Product fees

Credit Card Convenience Fees

- Card issuers and payment processing networks have varying policies on credit card convenience fees
  - American Express
  - Discover
  - Mastercard
  - Visa

Network vs. Processor

- Network = Brand (MC, Visa)
- Acquiring Processor
  - Often a third party, non-bank entity
  - Service provider
  - Payment Gateway

Routing based on BIN (Bank Identification Number) tables

Regulation II – Durbin Amendment

- Debit Card Interchange Fees and Routing

"…prohibits all issuers and networks from restricting the number of networks over which debit transactions may be processed to less than two unaffiliated networks, and from inhibiting a merchant's ability to direct the routing of a debit transaction over any network that the issuer has enabled to process it."

It’s a numbers game…

- Card number on the front vs. Card number on the back
- Digits 1-6 is the BIN number – issuer identified
  - First digit signifies card network
  - 4 – Visa
  - 5 – Mastercard
  - 6 – Discover
  - 34 or 37 – American Express

  - The remaining numbers from digit 7 to the end, but not including the last digit, identifies the card holder.
  - The last digit is a check number – algorithm using the other card number digits

Luhn Algorithm – Check digit

- Checksum formula used to validate identification numbers
- From the rightmost digit, which is the check digit, moving left, double the value of every second digit.
- If the product of this doubling operation is greater than 9, sum the digits of the product
- Take the sum of all the digits
- Multiply by 9
- The last digit is the check digit

Example

Initial PAN

PAN	3	7	1	4	4	9	6	3	5	3	9	8	4	3	X

Step 1 - double the values

Double values	3	**14**	1	**8**	4	**18**	6	**6**	5	**6**	9	**16**	4	**6**	X

Step2 - sum the digits

Sum digits	3	**5**	1	**8**	4	**9**	6	**6**	5	**6**	9	**7**	4	**6**	X

Step3 - sum all digits

3 + 5 + 1 + 8 + 4 + 9 + 6 + 6 + 5 + 6 + 9 + 7 + 4 + 6 = **79**

Step4 - multiply by 9

79 x 9 = **711**

Result

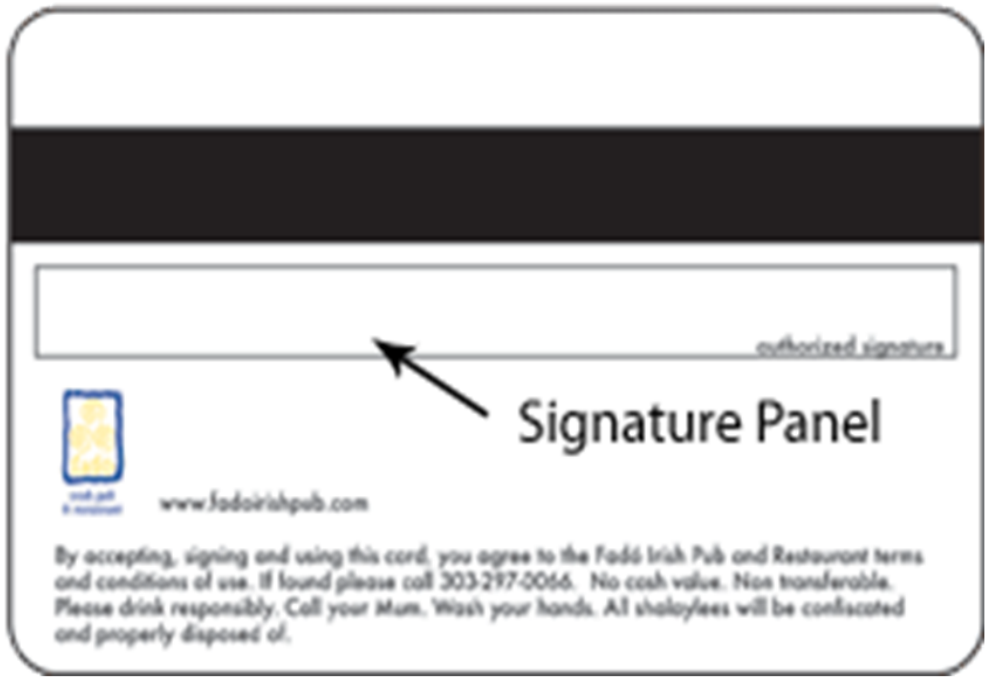
The check digit is **1**.

CVV Code

- Code Verification Value
- Three or four digit number
- Determined by the debit or credit issuer based on specific factors, such as the card number, expiration date, an issuer's unique code, or a specific service code

Signature Panel

- Intended to verify your agreement with the card company.
- “Not valid unless signed”
- “See ID”
- Not necessary and will phase out!



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Address Verification Service

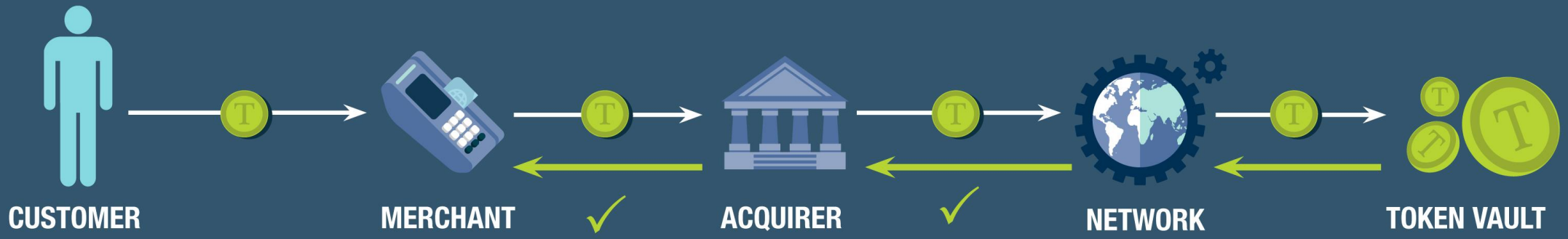
- Checks numeric portions of cardholder mailing address
  - Zip codes at gas pumps
- Does not apply to cards outside of US, Canada, and UK

Tokenization

- For most non-plastic card devices and CNP transactions, replaces the real card number (primary account number or PAN) with a different “Tokenized PAN” that cannot be used to perform a transaction by itself.
- Network Tokens
  - Not single use
  - Domain specific
  - Device specific
  - May be algorithmically or randomly generated
  - Token is detokenized to Issuer original PAN by Network Token Vault

HOW DOES A TOKENIZED TRANSACTION WORK?

1. When paying—either via online purchase or tap-to-pay—the token goes to the Merchant
2. The Merchant passes the token along to their Merchant Acquirer
3. The Merchant Acquirer passes the token to the Network
4. Once passed to the Network, the data is within the secure bank vault
5. The network consults its "Token Vault" to match the token with the customer's account number



6. The Network passes along the token and personal account number to the Bank
7. The Bank verifies funds and authorizes the transaction
8. The authorization is passed to the Network and proceeds back to the Merchant Acquirer and to the Merchant

BANK

Velocity Checking

- Computing volume transactions threshold to attempt to reduce fraud
- Dollar amount checking
- Transaction speed occurrence
- Number of transactions in a period
- Repeated card number attempts (merchant related)

Virtual Cards

- Exists as non-physical, non-plastic devices
- Used in e-wallets or for online purchases
- Instant issue
- Credit, Debit, or Prepaid Debit
- Added level of security and convenience
- May be domain specific
- Easily changed/maintained

Contactless Cards

- What is it?
- Mobile Wallets
- Embedded Contactless Technology
- Why we like it: speed, less physical contact, reduced wear, better for travel

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Questions??