

Abstract

This document is aimed at looking for a basic the Overview of Credit Card Industry, Payments, Processing Steps, Merchandising, Authorization, Posted transactions including the key trends, market shares and issues that should keep in the mind while developing the payments strategy which is otherwise known as Payment Card Industry.

Basics of Credit Card Industry



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Version: 0.5

Last Modified Date: **06-Sep-18**

Révision History

Date	Version	Author	Reviewer	Change Description
09-Apr-18	0.1	Debi Mishra		Prepared the draft version
30-Apr-18	0.2	Debi Mishra		Updated major industry trends statistics numbers
28-Jul-18	0.3	Debi Mishra		Added the payment channel type descriptions into the text
20-Aug-18	0.4	Debi Mishra		Added some text regarding First Data mechanism
18-Sep-18	0.5	Debi Mishra		Updated data flow diagram for batching and clearing section

Glossary of Terms

Terms/ Acronym	Definition
BIN	Bank Identification Number
APR	Annual Percentage Rate
PCI	Payment Card Industry
CB	Credit Bureaus
EFT	Electronic Funds Transfer
PCI DSS	Payment Card Industry Data Security Standards - This is a set of security standards designed to ensure that ALL companies that accept, process, store or transmit credit card information maintain a secure environment.
AVS	Address Verification System
FD	First Data – a Credit Card Servicing System
POS	Point of Sale
EFT	Electronic Fund Transfer
ACH	Automated Clearing House
PIN	Personal Identification Number
SIC	Merchant Standard Industrial Classification Code
MCG	Merchant Category Group
PI	Plastic Instrument – otherwise known as Credit Card
IF	Interchange Fee
CHIPS	Clearing House Interbank Payment Systems
MICR	Magnetic Ink Character Recognition
OCR	Optical Character
RTGS	Real Time Gross Settlement
ACH	Automated Clearing House
Fed wire	US Federal Reserve Bank network
NYCE	New York Cash Exchange, a subsidiary of FIS
CHIPS	Clearing House Interbank Payment Systems

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Introduction

This paper is aimed at software professional looking for a basic overview of the credit card markets, landscape, overall strategy, the key trends associated, payment processing system, and the ongoing issues such as frauds and compliances. Every year, consumers use hundreds of millions of credit cards to spend trillions of dollars and revolve hundreds of billions of dollars of debt. Credit card issuers, payment card networks, and other market players spend billions of dollars annually to promote their brands and attract new customers. A credit card is a payment card issued to users (cardholders) to enable the cardholder to pay a merchant for goods and services based on the cardholder's promise to the card issuer to pay them for the amounts so paid plus the other agreed charges. The card issuer (usually a bank) creates a revolving account and grants a line of credit to the cardholder, from which the cardholder can borrow money for payment to a merchant or as a cash advance. In other words, credit cards combine payment services with extensions of credit.

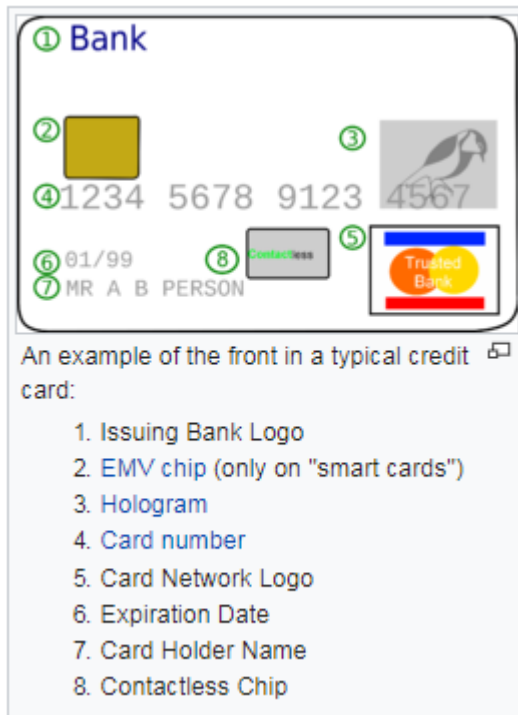
Card History and Its Overview

The use of credit cards originated in the United States during the 1920s, when individual firms, such as oil companies and hotel chains, began issuing them to customers for purchases made at company outlets. The first universal credit card, which could be used at a variety of establishments, was introduced by the **Diners' Club, Inc.**, in 1950. Another major card of this type, known as a travel and entertainment card, was established by the **American Express** Company in 1958. A later innovation was the bank credit card system, in which the bank credits the account of the merchant as sales slips are received and assembles the charges to be billed at the end of the period to the cardholder, who pays the bank either in toto or in monthly installments with interest or "carrying charges" added. The first national plan was **Bank Americard**, begun on a statewide basis by the Bank of America in California in 1958, licensed in other states beginning in 1966, and renamed **VISA** in 1976–77. Many banks that began credit card plans on a citywide or regional basis eventually affiliated with major national bank plans as the range of included services (meals and lodging as well as store purchases) expanded. This development changed the nature of personal credit, which was no longer limited by location. Other major bank cards include **MasterCard** (formerly known as Master Charge in the United States), JCB (in Japan), Discover (formerly partnering with Novus and primarily issued in the United States), and Barclaycard (in the United Kingdom, Europe, and the Caribbean). Western Union has provided the metal cards giving fee deferred payment privileges to preferred customers known as "**Metal Cards**".

Technical Specifications

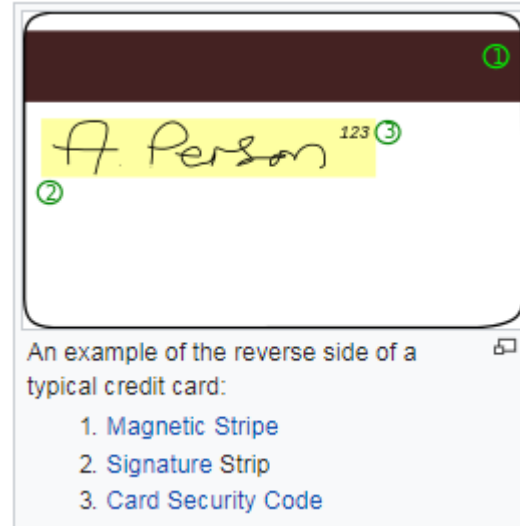
The size of most credit cards is **85.60 mm × 53.98 mm** (3.375 in × 2.125 in) and rounded corners with a radius of **2.88–3.48 mm**, conforming to the ISO/IEC 7810 ID-1 standard, the same size as ATM cards and other payment cards, such as debit cards. Credit cards have a printed or embossed bank card number complying with the ISO/IEC 7812 numbering standard. The card number's prefix, called the Bank Identification Number (BIN), is the sequence of digits at the beginning of the number that determine the bank to which a credit card number belongs. This is the first six digits for Master card and Visa cards. The next nine digits are the individual account number, and the final digit is a validity check code. Credit cards have a magnetic stripe

conforming to the ISO/IEC 7813. Many modern credit cards have a computer chip embedded in them as a security feature. In addition to the main credit card number, credit cards also carry issue and expiration dates (given to the nearest month), as well as extra codes such as issue numbers and security codes. Not all credit cards have the same sets of extra codes nor do they use the same number of digits.



An example of the front in a typical credit card:

1. Issuing Bank Logo
2. EMV chip (only on "smart cards")
3. Hologram
4. Card number
5. Card Network Logo
6. Expiration Date
7. Card Holder Name
8. Contactless Chip



An example of the reverse side of a typical credit card:

1. Magnetic Stripe
2. Signature Strip
3. Card Security Code

Market Share Statistics

Below statistics are based on **Major Card Issuers** as no of account holders opened. Citibank holds the largest share of America's credit card debt. The size of an issuer's card loan portfolio is one of the best measures for determining market share since it's a function of both how many credit cards are issued., The largest 10 credit card issuers Citi, Chase, Capital One, Bank of America, Discover, Synchrony Financial and American Express etc. together holding roughly 89% of total revolving credit card debt in the United States.

Bank	Card Active Users	% Total Market Share
Citigroup Inc.	95.4 M	17.09%
JPMorgan Chase & Co.	82.8 M	14.84%
American Express Co.	62.7 M	11.23%
Capital One Financial Corp.	62.1 M	11.13%
Bank of America Corp.	58.2 M	10.43%
Discover Financial Services	38.7 M	6.94%
Synchrony Bank (GE Capital)	36.7 M	6.57%
Wells Fargo & Co.	23.2 M	4.15%
Barclays Bank Delaware	16.3 M	2.93%
U.S. Bancorp	13.7 M	2.46%

The four **Major Card Networks** in the United States are Visa, Master card, Amex and Discover. Visa is by far the largest credit card network around the world. In the United States, the volume of purchases processed

on the network is over twice what it is for American Express and Master card credit cards. Discover is in a far fourth place, with \$0.121 trillion in purchases processed in 2016.

Year	VISA	MasterCard	Amex	Discover
2010	42.00%	26.00%	23.12%	4.5%
2011	44.78%	25.10%	24.00%	4.80%
2012	45.60%	24.00%	25.76%	4.94%
2013	45.89%	23.78%	27.45%	5.08%
2014	47.92%	22.90%	27.23%	5.50%
2015	48.00%	22.45%	26.12%	5.90%
2016	52.00%	21.95%	25.67%	5.45%

Key Reasons to use Credit Card

- ✚ **Grace Period** – When we make a purchase through a debit card the cash available in our account is debited immediately. Whereas when we purchase through credit card, your money remains with you till the time you have to make the credit card bill payment. It gives us extra time to earn interest on our money in your bank.
- ✚ **Don't have to carry Cash** – We can make purchase online and offline through credit card. It sets us free from the burden of carrying cash in our wallet.
- ✚ **Universal Acceptance** – Majority of merchants accept credit card now a days worldwide.
- ✚ **Build Credit History** – If we have no credit or are trying to improve our credit score, using credit card responsibly will help our credit score because credit card companies will report our payment activities to credit bureaus institutions.
- ✚ **Loyalty Benefits** – There are various benefits issuing bank pass it on to credit card customers such as bonuses, cash back, frequently and flyer miles, insurance to attract and retain value credit card customers.
- ✚ **Safety Usage** – Paying with a credit card makes it easier to avoid losses from fraud. When our debit card is used fraudulently, the money goes missing from our account instantly. It can take a while for the fraudulent transactions to reserve and the money is restored to our account after investigation. Whereas when credit card is used fraudulently, the credit card user is not out of the money immediately. User need to notify to the bank about the fraud and do not have to make any payments. Bank will investigate and resolve the matter.

Classification of Cards

There are a number of types of payment cards, the most common ones being credit cards and debit cards. Most commonly, a payment card is electronically linked to an account or accounts belonging to the cardholder. These accounts may be deposit accounts or loan or credit accounts, and the card is a means of authenticating the cardholder. However, stored-value cards store money on the card itself and are not necessarily linked to an account at a financial institution.

- ✚ **Consumer Card** – These cards are coming under Standard Cards. It may have additional card holder information like Secondary, Authorized card holder and all the transactions are posted into a single account which in Primary Account Holder's. Annual fees are calculated yearly and earned promotional bonus through transactions. The balances shown on the statement each month must be paid in full by the due date. Late fees are usually added to the account if the balance is not paid in full. These accounts typically have No Preset Spending Limit (NPSL). Ex – Charge cards, Revolving cards are coming under this category.
- ✚ **CO Branded Card** – Company joins forces with a credit card issues to lunch a card product benefits are – increased number of card issued. Greater market share for the issues bank. New revenue stream for the co-brand partner. Usually uses a rewards program to achieve strategic objectives co brand options i.e. Reward program through Issuing Bank and in partnership which is Loyalty options.
- ✚ **Commercial Card** – A product of companies. Cardholder's account linked to the company. Mainly used for company expenses. The company name is embossed on the plastic. Additional card holder is not allowed. Three types i.e. – **Corporate Cards** – Designed for large organizations for company executives are used for travel, and entertainment purpose. **Purchasing Cards** – Designed for larger organization and used by the purchasing officers for general purposes, are aimed at reducing account, payable expenditure by replacing paper based order processing. **Business Cards** – Are designed for smaller business with in 1 and 50 employees.
- ✚ **Private Level/ Retail Card** – Issued by large organizations who provide credit for their Customers only. Example – Mobile card or Dulux Trade card. Smart Card
- ✚ **Smart Card** – Contains a computer chip with memory and interactive capability which may be used at a POS terminal, ATM, or designated smart card reader. Designed for small values of transactions.
- ✚ **ATM Card** – Commercial card used for withdraw funds, make deposits, transfer funds, enquiry account details etc.
- ✚ **Debit Card** – Similar to ATM cards. Also accepted through merchants. Funds are immediately transferred from the card holder's designated savings account/ cheque.
- ✚ **Prepaid Card** – Works on the theme of pay now and use at your convenience, very similar to prepaid mobile phone cards. Buy a card, load the desired amount and use. It is otherwise known as reloadable cards. No bank account is required. Ex – Gift, travel cards.

Credit Card Landscape

Understanding the credit card climate is important for two reasons. First, credit card offers change regularly, based on the health of the economy and issuers' business objectives. So being able to see the bigger picture – averages, trends, etc. – gives you a baseline against which to compare offers. And that will help you find the best credit card deals as well as ultimately save more money. Monitoring the credit card landscape can also tell you a lot about the health of the U.S. consumer. For example, 0% introductory APRs and initial rewards

bonuses dried up during the Great Recession. And the decline in consumer credit quality during that period was a big reason why.

Major Industry Trends

- Interest Rates** - The average credit card APR rose 10 basis points during Q1 2018. Average APRs for several credit card segments are at the highest point since WalletHub began tracking this data in 2010, including credit cards for people with good credit (19.51%), people with excellent credit (13.98%) and students (17.81%).

	Q3 2017	Q4 2017	Q1 2018	Q1 2018 vs Q4 2017
Excellent Credit	13.76%	13.89%	13.98%	0.65%
Good Credit	18.93%	19.14%	19.51%	1.93%
Fair Credit	22.19%	22.28%	22.34%	0.27%

- 0% APRs & Rewards Bonuses** - The rate at which credit card users earn rewards on purchases is trending upward. Credit card companies are emphasizing balance transfers over new-purchase financing, offering 0% intro rates for 12% longer and charging slightly lower regular APRs. Balance transfer fees have also gotten 2.08% cheaper in the last 12 months. Initial rewards bonuses made big moves in the past 12 months, increasing in value by 24.54%.

	Q3 2017	Q4 2017	Q1 2018	Q1 2018 vs Q4 2017
Balance Transfer Avg. 0 % Intro Peri.	11.14%	11.19%	11.29%	
New Purchase Avg. 0 % Intro Period	9.77%	9.91%	10.05%	

- Fees** - The average annual fee (\$15.55) is down 5.30% year over year. The average foreign-transaction fee (1.60%) has fallen 31% since Q4 2014 and more than 15% in the past year alone. The average cash advance fee is now the greater of \$12.65 or 3.27% of the amount withdrawn, which marks a 43% increase in five years.

	Q3 2017	Q4 2017	Q1 2018	Q1 2018 vs Q4 2017
Average Annual Fee	15.82%	15.75%	15.55%	-1.27%
Average Maximum Late Fee	32.36%	32.42%	32.44%	0.06%
Average Foreign Transaction Fee	1.64%	1.61%	1.60%	-0.62%

- Complaints & Satisfaction** - The volume of credit card complaints filled with the CFPB in Q1 2018 increased by more than 10% in the last year. Complaints related to “Collection” (+17.7%) and “Delinquent account” (+23.7%) increased the most during Q1. Complaints related to “Customer service / Customer relations” (-16.7%) and “Rewards” (-19.5%) fell the most.

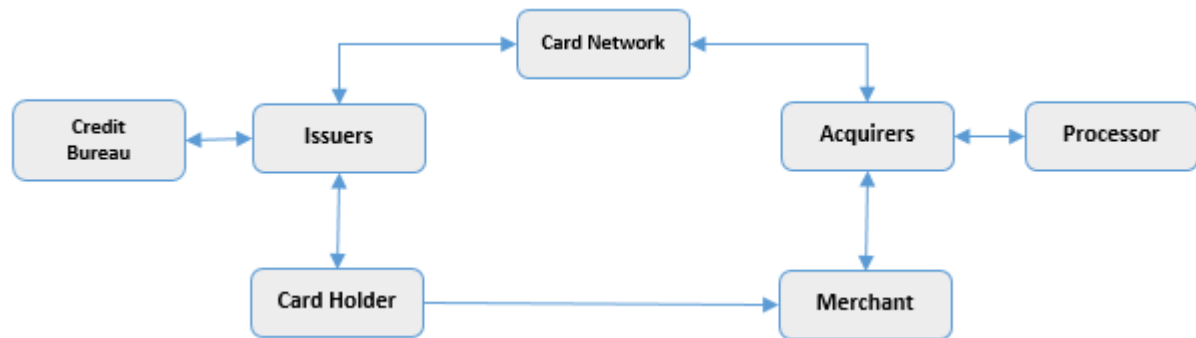
	Q3 2017	Q4 2017	Q1 2018	Q1 2018 vs Q4 2017
Collection	28.64%	27.29%	32.11%	17.70%
Billing	18.56%	19.17%	17.47%	-8.84%
APR to Interest Rate	3.90%	3.91%	3.59%	-8.27%
Closing Account	5.89%	6.23%	5.87%	-5.83%
Payoff Process	5.08%	5.30%	4.62%	-12.87%
Delinquent account	1.55%	1.89%	2.34%	23.68%

Key Concepts

Major Stake Holders

- Customer/ Cardholder** – Known as consumer also who is carrying a Credit Card issued by any Bank which is used for purchase of goods or services, transfer money, cash withdrawals and other purposes.
- Merchant Information** – Retailer or service provider that accepts a card as payment for a purchase that sells goods or services. Ex – a restaurant, shopping malls, theaters, shops etc.
- Card Association** – It is otherwise known as Card Networks. Ex – VISA, MASTERCARD, AMEX etc. Visa and MasterCard aren't banks and they don't issue credit cards or merchant accounts. Instead, they act as a custodian and clearing house for their respective card brands. They also function as the governing body of a community of financial institutions, ISOs and MSPs that work together in association to support credit card processing and electronic payments. The primary responsibilities are to govern the members of their associations, including **interchange fees** and qualification guidelines, act as the arbiter between issuing and acquiring banks. That last one has become even more important now that Visa and MasterCard are public companies. Visa uses their Visa Net network to transmit data between association members, and MasterCard uses their Bank net network.
- Issuing Bank (Customer's only)** – The bank issues cards to consumers and has the liability for the Line of Credit provided. The issuing bank is also a member of the card associations (Visa and MasterCard). Issuing banks pay acquiring banks for purchases that their cardholders make. It is then the cardholder's responsibility to repay their issuing bank as per the terms and agreement.
- Acquiring Bank (Merchant's only)** – An acquiring bank is a registered member of the card associations (Visa and MasterCard). An acquiring bank is often referred to as a merchant bank because they contract with merchants to create and maintain accounts (called merchant accounts) that allow the business to accept credit and debit cards. Acquiring banks provide merchants with equipment and software to accept cards and handle customer service and other necessary aspects involved in card acceptance. The acquiring bank also deposits funds from credit card sales into a merchant's account.
- Credit Bureaus** – To act as an agency to maintain credit history information on consumers. Contacted by the issuing bank for the reference before a card application is approved. Notified by the issuing bank if card holder has failed to settle total outstanding and is considered a bad debt customer.

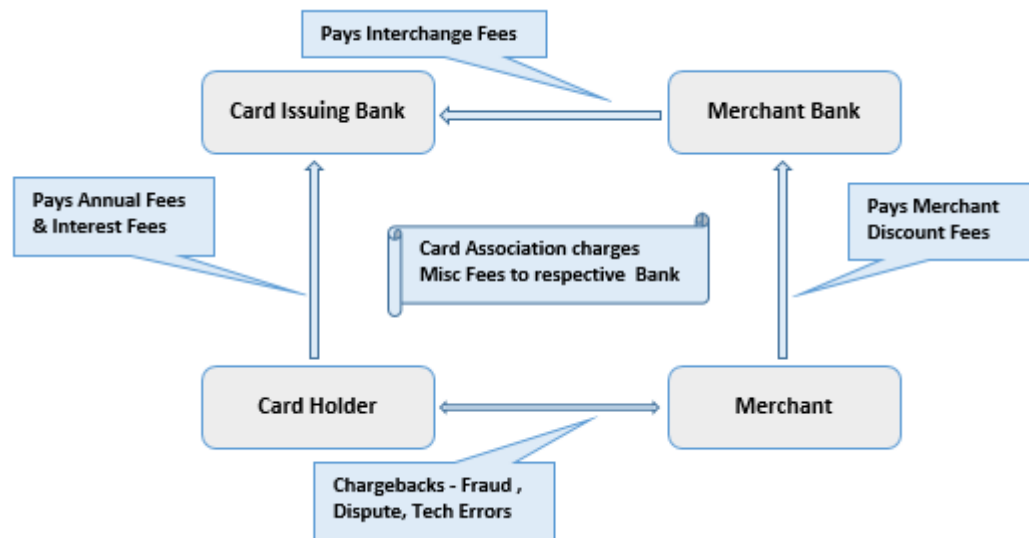
- ✚ **Processor** –Credit card processors are mostly responsible for data transmission and security when you use your card at a store or online to make a purchase. There are two types of processors in the payment-card system. Front-end processors route transactions from merchants to the cardholder's bank to gain authorization; that is, they make sure a customer has enough available credit or funds to make a purchase. Back-end processors are responsible for a fund's settlement, which ends with the merchant receiving a deposit for transactions.



Types of Fees Involved

- ✚ **Annual Fee** – This is the fee the card holder pays to the issues for the right to carry and use the bank credit card application system.
- ✚ **Interest Fee** – This is the charge that the issues levies on the Cardholder on the unpaid monthly balances. This is approximately 20-36% per annum and is known as Annual Percentage Rate.
- ✚ **Service/ Misc. Fee** - This is the fee that the VISA and MasterCard associations charge the member banks for providing the clearing and the settlement networks and undertaking other services like arbitration, stand in authorization including miscellaneous activities.
- ✚ **Interchange Fee** – The acquiring bank and acquiring processor pay this fee to the issuing bank a small percentage (1-1.6%) of the transaction amount. It contributes approximately 20% of the bank's credit card revenue. The acquirer/ processors pays the interchange fee to the issuer through the Settlement system. It is market-based and set by each credit card network (except American Express) or defined by National Associations.
- ✚ **Merchant Discount Fee** – This is the fee the acquirer charges the merchant in return for the processing the transaction i.e. handling card holder purchases and the interchange fee cost. The merchant fee is generally about 1.7 – 4 % of the transaction amount and depends the nature of card, merchant sales and the charges slips activity. Interchange fee charged by issuing bank and acquiring bank fees combined together are referred as Merchant Discount charged by acquiring bank to merchant. Issuing bank earns majority portion of the merchant discount and acquiring bank get a small slice of the merchant discount.
- ✚ **Chargebacks** – Chargebacks result when an issuer charges back the purchase amount to the merchant. This is generally the result of a customer complaint to the issuer. Chargebacks protect

consumers in the event of a fraudulent transaction, customer dispute, or a technical error such as being charged twice for a transaction.



Authentication Based on Verification

- Offline Debit** - Debit cards, which are linked to customers' checking accounts at banks, come in two forms. Both capabilities typically reside on the same card. Signature-based debit transactions (known as "offline debit") tend to be routed through either MasterCard or Visa, much like a credit card transaction. These transactions are debited from a customer's account about two days after the purchase – similar to credit transactions. The process uses two separate messages for authorization, clearing and settlement. Consumers typically do not pay a fee for signature-based transactions, and the logo for the association is on the front of the card.
- Online Debit** - PIN-based debit (known as "online debit") requires the consumer to enter a personal identification number – four to 12 digits long – at the point of sale (POS); the transaction is then routed through electronic-funds-transfer (EFT) networks such as STAR®, Pulse®, NYCE®, MAC®, and SHAZAM®. These all require users to enter a PIN for both ATM and POS transactions. PIN transactions also can be run through EFT networks at MasterCard and Visa. The PIN-based format uses a single message for authorization, clearing and settlement. Unlike signature debit, the customer's checking account is debited immediately, much like an ATM withdrawal. And also similar to an ATM withdrawal, the issuing bank may charge the customer a fee to make a POS purchase. Yet for merchants, fees for accepting PIN-based debit transactions have historically been lower than those for the signature-based option – the need for a valid PIN combined with the immediate debiting of funds makes them less risky, thereby translating to a lower cost. Signature-based debit cards, on the other hand, come with higher fees to account for their greater risk, in part due to the chance that the user might be forging a signature.
- PIN, CVV, iCVV** - A card security code (card verification data [CVD], card verification number, card verification value [CVV], card verification value code, card verification code [CVC], verification

code [V-code or V code], or signature panel code [SPC]) is a security feature for "card not present" payment card transactions instituted to reduce the incidence of credit card fraud. The CSC is in addition to the bank card number which is embossed or printed on the card. The CSC is used as a security feature, in situations where a PIN cannot be used. The PIN is not printed or embedded on the card but is manually entered by the cardholder during point-of-sale transactions. Contactless card and chip cards may electronically generate their own code, such as iCVV or a dynamic CVV.

Different Payment Channels

A payment system is a set of processes and technologies that transfer monetary value from one entity or person to another. Payments are typically made in exchange for the provision of goods, services or to satisfy a legal obligation. They can be made in a variety of currencies using several methods such as cash, checks, electronic payments and cards. The essence of a payment system is that it uses cash-substitutes, such as checks or electronic messages, to create the debits and credits that transfer value. The value that is being transferred is typically stored in depository accounts at banks or other types of financial institutions. The banks, in turn, are connected to a set of payment systems that they use to process payments on behalf of their customers or depositors. Most US banks are members of a number of different payment systems such as Fedwire (US Federal Reserve Bank network), Point of Sale (POS) and card networks such as NYCE (New York Cash Exchange, a subsidiary of FIS) and CHIPS (Clearing House Interbank Payment Systems). Banks operating in multiple countries connect to payment systems in each of the countries where they operate either directly or through a correspondent bank. In the simplest case involving the traditional banking system, payments involve below four participants:

- ✚ The **payer** makes the payment and has its bank account debited for the value of the transaction.
- ✚ The **payer's financial institution** processes the transaction on the payer's behalf.
- ✚ The **payee's financial institution** processes the transaction on behalf of the payee and generally holds the value in an account.
- ✚ The **payee** receives value of the payment by credit to its account.

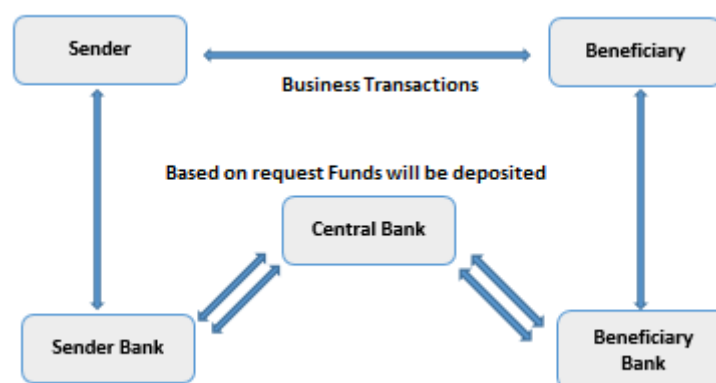
The operation of the model is often referred to as the payment process and it involves four basic steps:

- ✚ Payment instructions are the information contained in a wire transfer or check. These instructions are from the payer and tell the paying bank to transfer value to the beneficiary through the network and receiving bank.
- ✚ Payment generation is when the instructions are entered into the system—e.g. printed on a check or transmitted via ACH or wire.
- ✚ Clearing is the process where the banks use the payment information to transfer money between themselves on behalf of the payer and the beneficiary (payee).
- ✚ Settlement is the final step in the basic process and occurs when the beneficiary's (payee's) bank account is credited and the payer's bank account is debited. Final settlement occurs when the banks irrevocably pass value among themselves, a distinction that has important treasury implications.

The actual payment process will depend on the type of payment instrument that the payer and payee choose to use—or have chosen for them by their financial institutions.

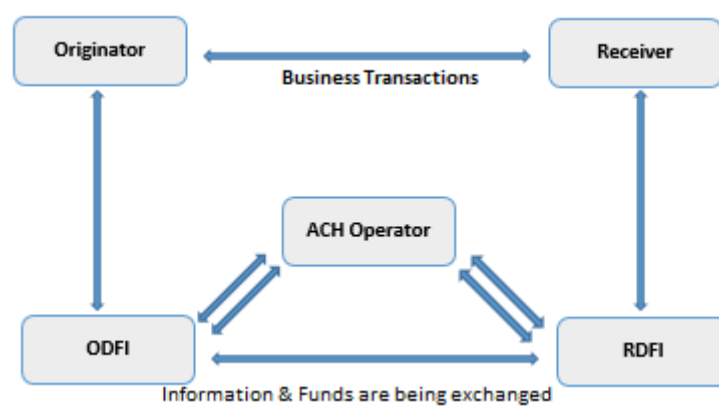
✚ **Paper Based Payments** – Checks/ drafts are still a popular way of making payments in the US and some other parts of the world, but they are not the only paper-based payment system. The process of exchanging value through checks is generally called check clearing. A check contains the names of the payer and the payee, the payer's account number, amount of the check, the date the check was issued and the name and routing number of the maker's bank. There is generally a coding strip at the bottom of the checks that enables high-speed reader/sorter equipment to process them quickly. In the US and Canada the coding strip uses magnetic ink character recognition (MICR); other countries use an optical character (OCR) system. Before the banks can process the check they must add the amount of the payment to the coding strip at the bottom of the item, a manual step that adds cost and the possibility of error to the check clearing process.

✚ **High Value Transfer** - High-value transfers also referred to as real time gross settlement (RTGS) transfers are generally used between businesses when there is the requirement for fast, secure and final transfer of value. Frequently referred to as wires, they typically provide good value at the time of receipt and are considerably more costly than other electronic systems. The sender (payer) instructs its bank in a mutually acceptable way to wire money to the beneficiary (payee). Included in the sender's instruction are the name of the beneficiary, the beneficiary's bank and other address details specific to the particular high-value system. In the case of Fedwire this would include the ABA number (American Bankers Association) of the banks being used along with the beneficiary's account number. The sender's bank would then use its direct access to the high-value system to instruct the beneficiary's bank to debit its account with the central bank and credit the beneficiary. Because the instruction is final and irrevocable and because the beneficiary's bank is receiving immediate value from the central bank it provides the funds to the beneficiary virtually on an immediate basis.

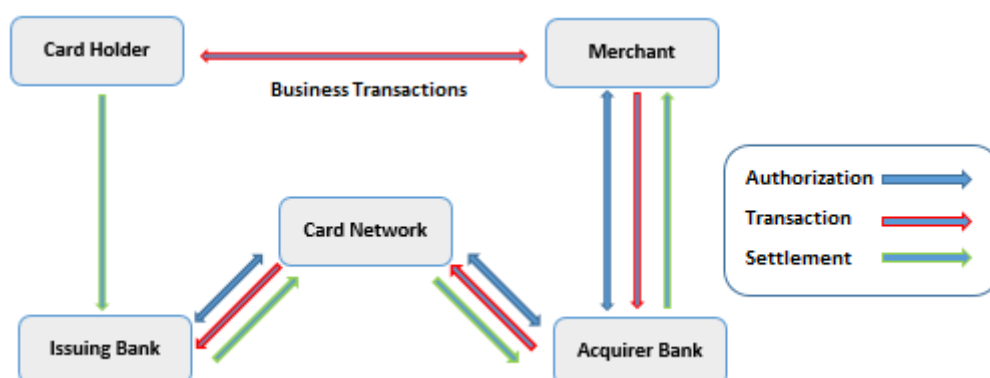


✚ **Batch EFT Systems** - Batch EFT systems, such as the ACH (Automated Clearing House) in the US and BACS in the UK were created to handle large volumes of relatively low value transfers. Because these transfers did not have the requirements of immediacy and finality that are common to high-value

systems, participants would exchange batches of transfers on a daily basis settling the transfers the following day. Like high-value systems, senders (payers), called originators in the ACH world, provide their banks—ODFIs (originating depository financial institutions) with payment instructions. Unlike high-value systems, there are usually multiple payments in each batch of instructions sent to the ODFI. The ODFI processes the instructions and sends a file of all customer instructions to its ACH Operator. The ACH Operator then distributes all of the payments in all of the batches to the appropriate RDFIs (receiving depository financial institutions) which then credit the individual receivers (payees). It is also possible within the ACH—and many other batch systems—to send instructions to debit the receiver’s account. It is for this reason that the terms originator and receiver are used rather than sender and beneficiary.



- Card Based Payments** - Card based systems, which include both debit and credit cards, are a fast growing form of payment and becoming the predominant channel for retail consumer payments. Although a third-party vendor may issue credit or debit cards, bank-issued cards are the most widely used. A credit card is issued against a line of credit that the institution or merchant has extended, whereas a debit card is issued against a deposit account held by a business or consumer. Stored value cards, such as gift and payroll cards, are a special type of debit card that do not access a specific bank account but are prefunded at the time of issuance. Some stored value cards can be “reloaded”, where funds can be added to the available balance extending their usability.



Terminal and POS – Hardware

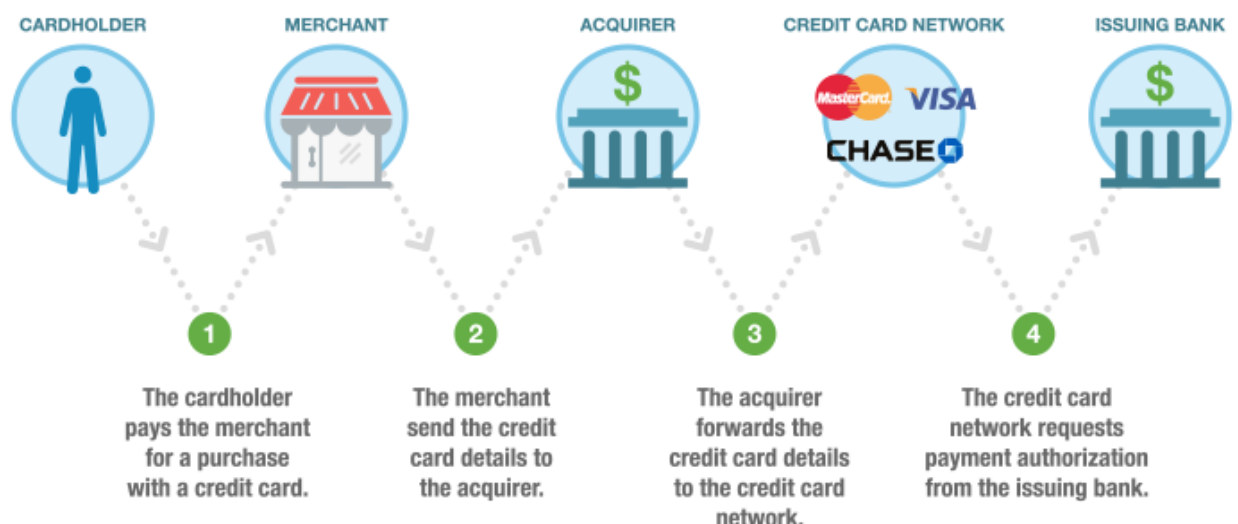
Businesses require terminals to process electronic payments at the POS. A terminal is a mechanism for merchants to be able to accept electronic payments—a device that will capture and transmit card information for processing via card payment brands. There are many standalone terminal providers, including VeriFone, Hypercom, and Ingenico. Merchants want to find a reliable terminal with ultra-fast processors and communications hardware to make sure transactions are handled quickly and accurately. Peripherals are add-on devices that provide a merchant with additional transaction functionality at the POS. For example, a merchant with a cash register might want to integrate a PIN pad that allows for debit transactions. The addition of a PIN pad would allow consumers to swipe their card and enter their PIN number at the POS.

Card Processing Life Cycle

Authorization

The authorization process confirms that the buyer has more than enough funds on hand, or enough breathing room before hitting their credit limit, to complete a transaction.

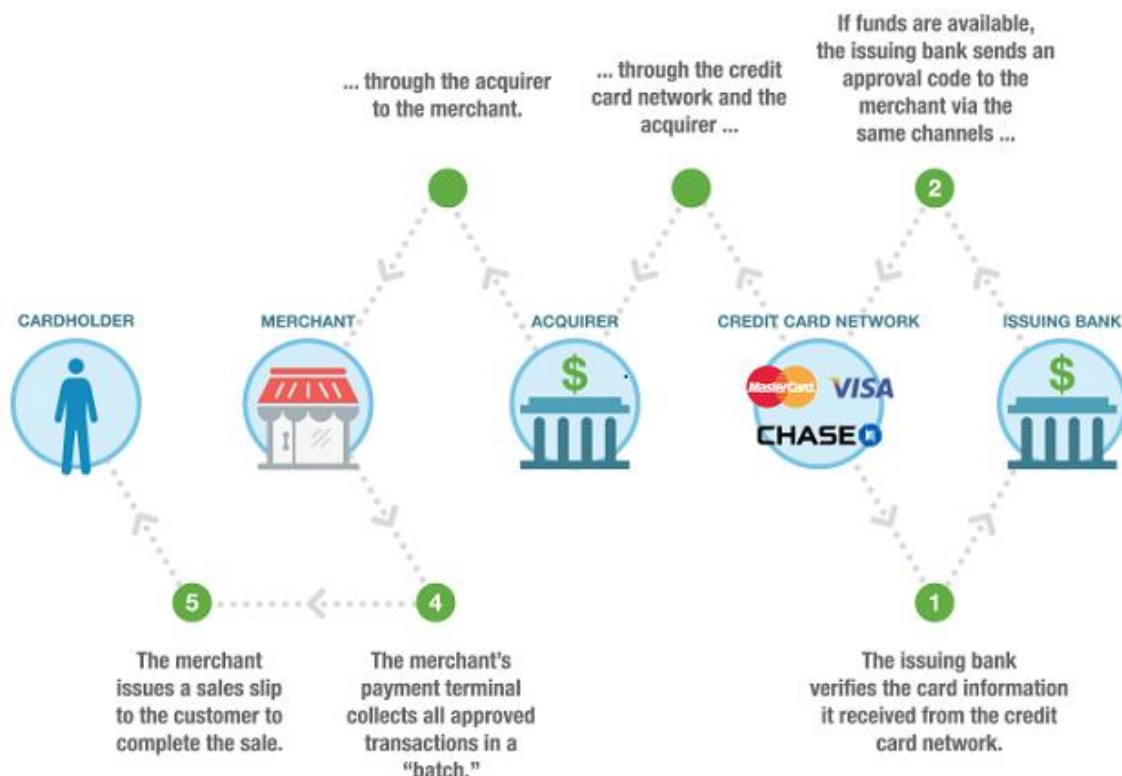
- ✚ The cardholder presents their credit card for payment to the merchant at the point of sale.
- ✚ After swiping their credit card, the customer's credit card details are sent to the acquiring bank (or its acquiring processor) via an Internet connection or a phone line.
- ✚ The acquiring bank or processor forwards the credit card details via the credit card network to Issuer requesting the payment authorization. The authorization request includes: card number, expiration date, Billing address for Address Verification System (AVS) validation, card security code , for instance and Payment amount
- ✚ An authorization code is sent to the acquirer if there is valid credit available from Issuer. Then the acquirer authorizes the transaction.



Authentication

In the authentication stage, the issuing bank verifies the validity of the customer's credit card using fraud protection tools such as the Address Verification Service (AVS) and card security codes such as CVV, CVV2 and CID. The issuing bank received the payment authorization request from the credit card network.

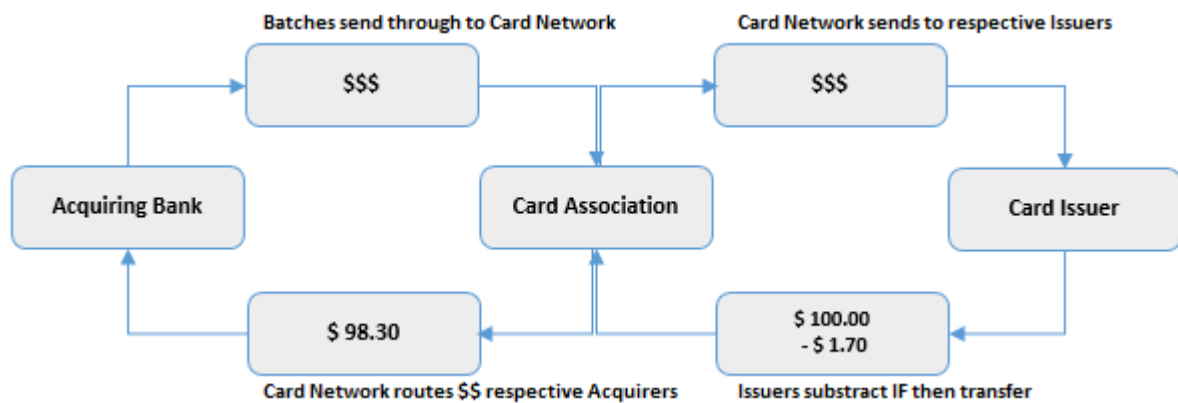
- ✚ The issuing bank validates the credit card number, checks the amount of available funds, matches the billing address to the one on file and validates the CVV number.
- ✚ The issuing bank approves, or declines, the transaction and sends back the appropriate response to the merchant through the same channels: credit card network and acquiring bank or processor.
- ✚ Once the merchant receives the authorization, the issuer place a hold on the cardholder's account.



Batching

Once authorization is complete and the merchant hands over the requested goods or service, the customer has no further role to play in the process. The merchant's POS terminal will collect all approved authorizations to be processed in a "batch" at the end of the business day. Then batching is the next step in the process:

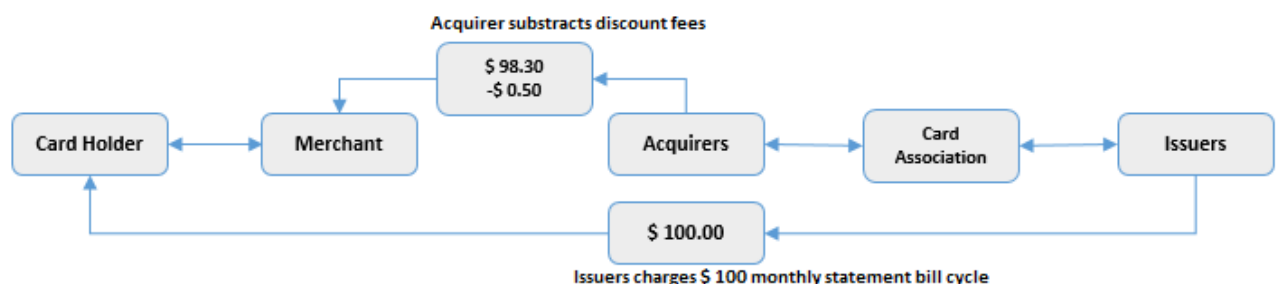
- ✚ Throughout the business day, the merchant electronically stores payment information for each authorized transaction. Each day's set of stored transactions is known as a batch.
- ✚ At the end of the business day, the merchant sends the batch to the acquirer. The acquirer temporarily holds the batch in its own secure, electronic system. Since acquirers typically have thousands of individual merchant clients, they may store multiple batches as per their own schedules.



Clearing

Once the acquirer has the merchant's batch in hand, the clearing process can begin.

- The acquirer sends the batch to the card network requesting payment from Issuers.
- The card network requests payment for the transaction and distributes to the appropriate issuer.
- The issuer deducts a transaction fee from the total transaction amount. These fees are directly tied to the interchange fees published by card networks. Interchange fees and thus transaction fees typically amount to 1% to 3% of the transaction, depending on the card network. The issuer holds the majority of the share of this fee and shares a small amount (like franchise fee) with the card network.
- The issuer routes the net amount through the card network to the acquirer.

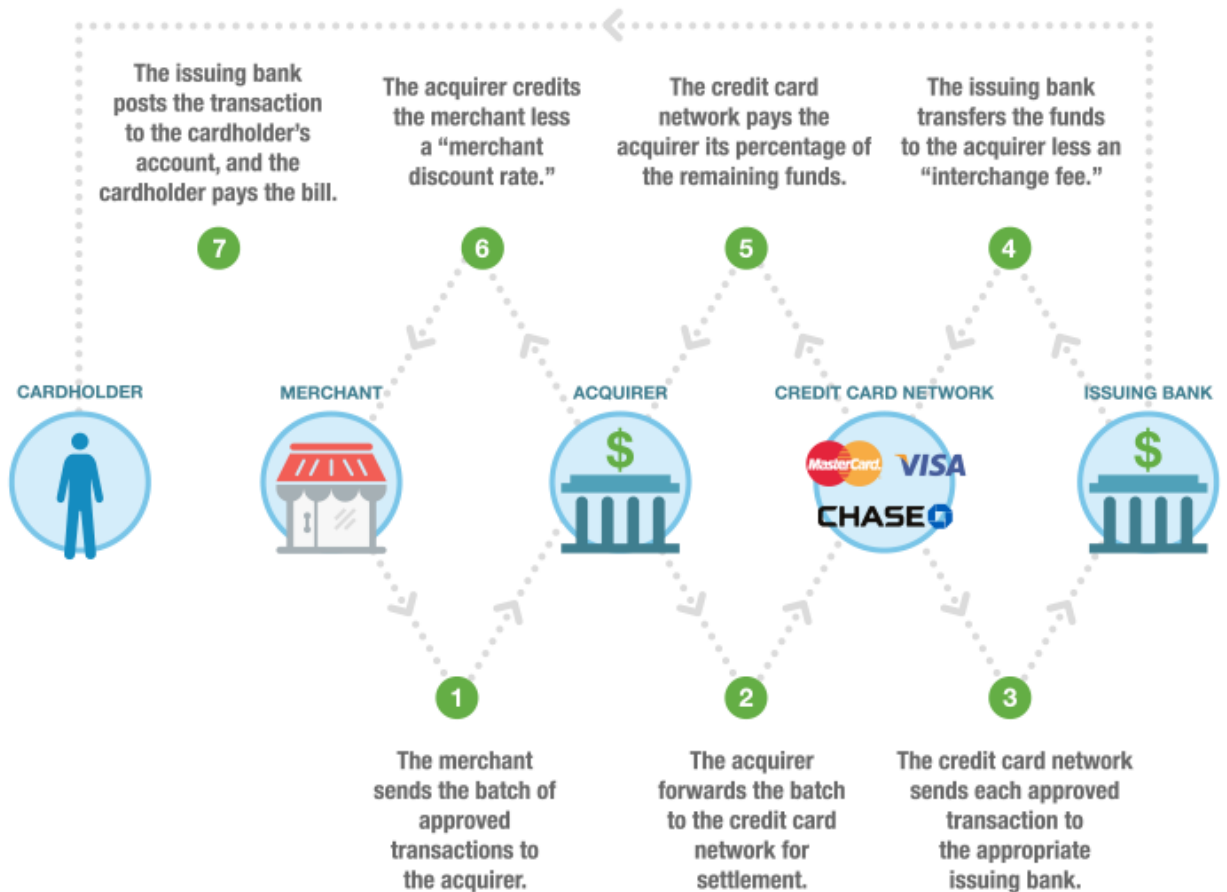


Funding/ Settlement

The final step in the transaction is funding. This is the part where the merchant receives funding for the transaction – through Card network from Issuers and Acquirers.

- The acquirer subtracts its discount rate from the transaction amount. The discount rate serves as the acquirer's payment for its part in the transaction. Like transaction fees, discount fees are directly tied to interchange fees. They account for a smaller proportion of the transaction amount less than 1%.
- The acquirer sends the remainder to the merchant's business account, and the transaction is complete from the merchant's perspective.
- The issuer sends the customer a bill for every transaction executed during the billing period, including the transaction. It's the customer's responsibility to honor the cardholder agreement and pay the bill.

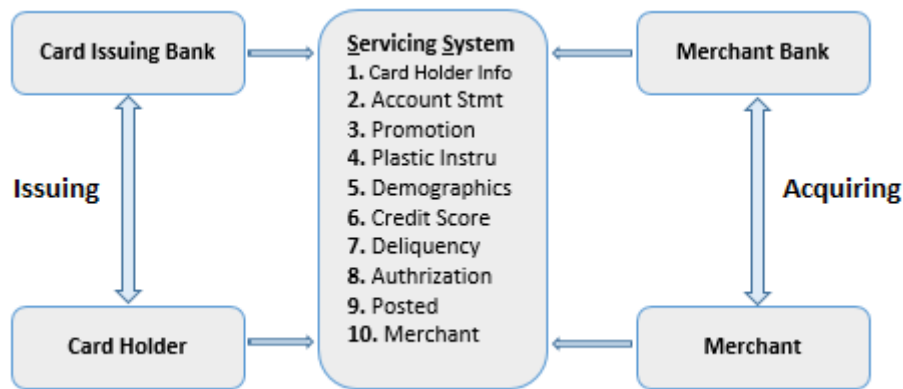
Though the typical electronic card transaction is authorized and the customer out of the picture within seconds, the entire four-step process (up to merchant funding) can take several business days to complete. Of course, it can take a month or longer for the customer to actually pay the issuing bank.



Best Practices

First Data – A Leading Credit Card Servicing System

First Data Corporation is a financial services company located in United States. First Data is dedicated to help local business and the world's largest companies conduct secure commerce, more than 3,000 transactions per second every day equaling \$2.4 trillion per year. First Data has six million merchants, the largest in the payments industry. The company handles 45% of all US credit and debit card transactions. In 1976, First Databecame the first processor of Visa and MasterCard bank-issued credit cards. In 1980, American Express Information Services Corporation (ISC) bought 80% of First Data. The remaining 20% was purchased in 5% increments each subsequent year until June 1983. First Data Corporation was incorporated on the 7th of April, 1989. In October 2014, First Data announced the Enhanced Trans Armor Solution for small businesses. First Data's Trans Armor Solution protects payment card data throughout the transaction process, incorporating several security and compliance products into one multi-layered solution.



Credit Processing Solutions and its Advantage

- ✚ **Acquisition & Origination** – Intuitive tools to develop marketing materials assist in acquiring new cardholders. Plus access to traditional and non-traditional data sources help determine risk on new accounts. Capture your share of the market and profitably grow your portfolio by differentiating yourself in the marketplace through customized branding and messaging.
- ✚ **Payment Instruments** – First Data's extensive experience in the card production and fulfilment process helps ensure faster delivery, better discounts and unsurpassed quality. Getting payment devices to customers is easier and more efficient with our data preparation, production, and issuance service.
- ✚ **Credit Processing** – First Data uses the latest technology for quick accurate processing. In addition, you can select from a variety of pricing solutions allowing you to differentiate pricing and fees at account and transaction levels, leading to increased revenue. Provide real-time approvals or declines to increase efficiency as well as enhance customer service. Enhance strategy development and operational efficiencies by accessing online tools to generate and view program reporting, easily retrieve archived statements, letters and other documents online.
- ✚ **Credit Risk & Delinquency** – Choose from a broad range of solutions to help lower credit risk loss and improve collections by automatically triggering your defined delinquency and collection policy options for delinquent accounts. First Data offers a one-to-one approach to payment risk management that allows you to balance risk effectively while continuing to maximize quality customer acquisition and retention.
- ✚ **Fraud & Information Services** – Innovative solutions, like Defense Edge, provide fraud detection and cardholder notification across all transaction types. Custom analytic services fulfill your data requirements across the entire customer lifecycle. Plus, integrated loyalty solutions consolidate customer rewards across products and help drive usage.

Being FD a **Credit Card Servicing System** is highly responsible to maintain below subject areas to facilitate the complete the cycle of credit card transactions.

Account/ Card Holder Elements

This subject area holds the master information which is Card Holder/ Consumer information with respect to account level details. The account number will never be changed throughout the system. The Account identifier i.e. account number is the key element to identify an account uniquely. Major attributes – account activation date, charge off date, account open date, monetary transaction last date, last payment date etc. Account Accumulator contains the aggregated information at account level like total balance amount, rolling 12 months delinquency information, last payment amount, Interest charges, available credit amount, Last credit line amount, Promotion Item fee, Late fee and Merchandise fee etc. Account Processing Parameters are the logical subset of card holder master information which is related to processing parameters for the product control and comparing the current pricing strategy, annual charge, annual charge date, bonus strategy identifier, cash annual interest rate, credit line amount, portfolio code, strategy code, strategy date etc. Card Holder Statement contains the statement information sent in the statement to the customer at the cycle. Major attributes are last statement date, balance amount, bonus amount, cash amount, cash annual interest rate, merchandise interest, item charge amount, Principal outstanding and previous statement balance etc. Mailed Statement & Promotion is a collection of logical entities has printed in mailer statement records and promotional offers. The account contains promotional Data if qualifying certain conditions. Statement has generated based on billing monthly cycle.

Plastic Instrument

A logical representation of the Instrument i.e. Plastic card. More than one plastic card is associated with one account. Each card holder has a unique Plastic ID. All the plastic IDs on an account have the same expiration date. Major attributes are card activation code, last generated date, status code, status reason code i.e. the reason code presentation instrument status was changed and Prior Expiration Date. When a card is lost, PI changes but account number remains the same. Credit Card Account is associated with multiple Plastic depending on Primary, Secondary and Authorized users roles in the system.

Customer Demographics

This area contains the customer details associated with credit card account holder. Major attributes are First Name, Last Name, Gender, Title, Suffix and Prefix etc. Customer Account is how customer related to accounts. Relation between Accounts to Customer is one to many depending on the code representing the role of an individual for the account. FD is associated with Primary, Secondary and Authorized signed user customer role types. Both primary and secondary customer further linked with address segment and stored in different table upon role type and address type (Bill, Mail, Letter, and Reference). Relationship between customers to address is one to many.

Customer Behavioral Score

This area is a small set of entity under Card holder master information which represents the relative risk presented to a grantor for extending credit to an account. Major attributes – Behaviour score number which represents a number that an account has gone three or more cycles delinquent in a given period of time.

Similarly Credit Bureau Score Number, Score one number etc. Delinquency Detail is representing the delinquent cycle, amount printed in the statement. Account identifier is the key attribute to identify the records having amount of each delinquent item, delinquency cycle code, Statement type code determining the delinquent amount is the current amount or from the statement etc.

Authorized vs Posted Transaction

This subject area contains monetary transactions associated with the card. Monetary transactions are divided into two category. First step is authorized and once the same transaction approved by Issuer Bank then it is converted to posted monetary transaction. There are few transactions at account level and few at customer plastic card level. There are several transactions like – Purchase, Sale, Balance Transfer, Cash Withdrawal, balance refund, Bill Payment and Late Fee. Major data elements are Authorization Number, Batch Transaction Type, Alpha Batch, Status Code, Merchant Account Identifier, Merchant SIC, Monetary Detail Transaction Code, Transaction Amount, Transaction Date and Transaction Post Date etc. A transaction record can take 1 business day or more from authorization to posting. The amount of an authorization may or may not match with the amount of a posted transaction record always unless there is an authorization adjustment.

Merchant Acquisition

First Data holds its merchant logical information to determine the Types/ Category of each transactions associated with different POS. Per each transactions Transaction Codes are playing a vital role along with merchant SIC code & merchant account numbers. There are several key items are being tracked in the backend when a swipe has taken place in any terminals. Major elements are – master card transaction category code, master card transaction category description, merchant category description, merchant type description, Visa merchant category group abbreviation and Visa merchant category group etc. Each elements are associated with Merchant account holders with respect to Acquiring Bank at individual level. Above information is further stored at monetary transaction level to calculate the fees associated with each transactions.

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