

# E-Payment Systems and Cryptocurrency Technologies Spring Semester, 2020

<https://course.ie.cuhk.edu.hk/~ftec4004>

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# Acknowledgements

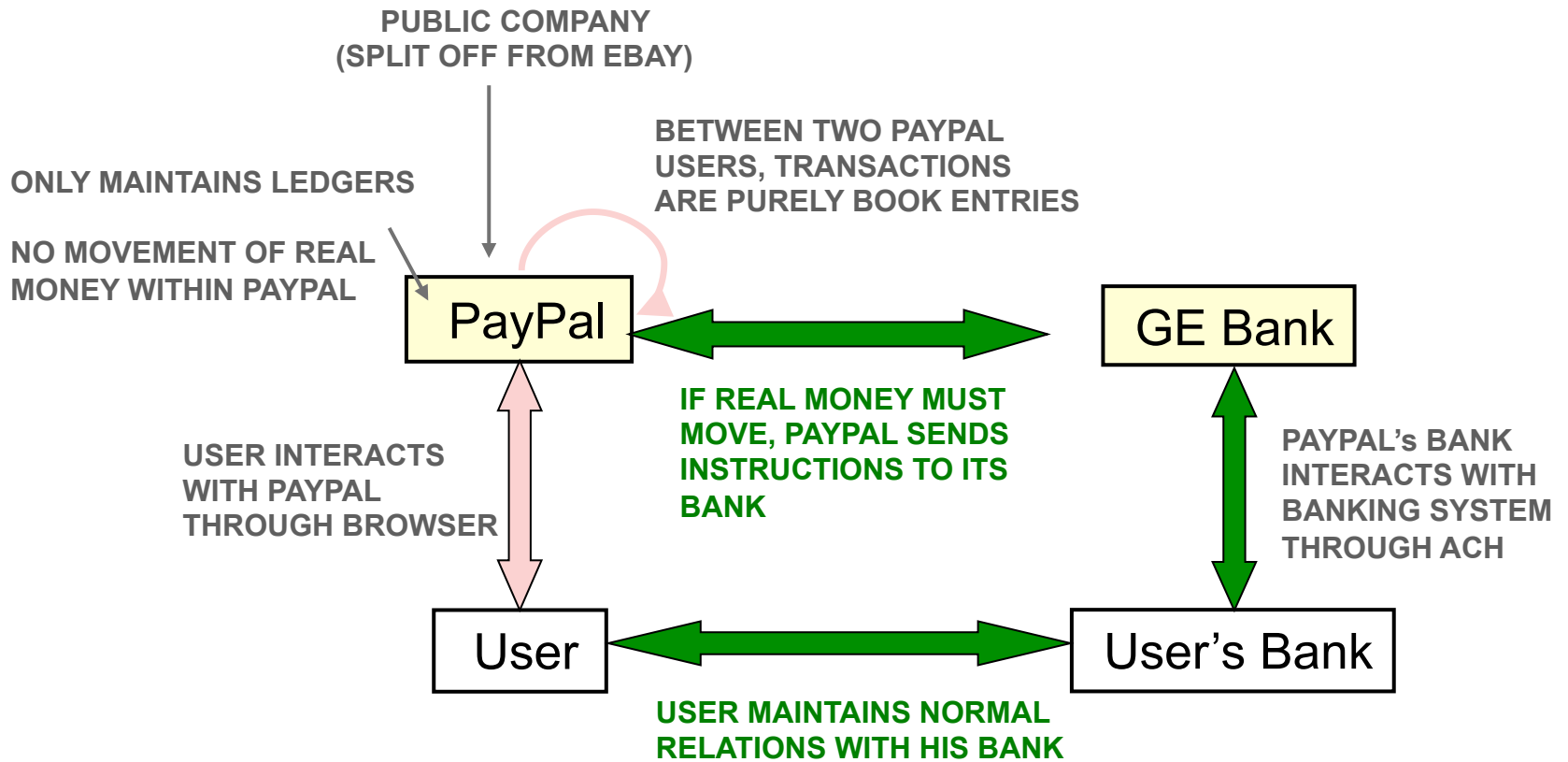
■ The slides used in this lecture are mostly adapted from the following sources. The copyrights and contribution of the original authors are hereby acknowledged and recognized:

- ◆ **The Electronic Payment Systems course by Prof. Michael Shamos, CMU**
- ◆ Chapter 12 of “Protocols for Secure Electronic Commerce”, 3<sup>rd</sup> Edition, Sherif Mostafa.
- ◆ “Technical Overview of PayPal as an Additional Payment Option,” PayPal Inc.
- ◆ “Introduction to PayPal Payment Solutions,” PayPal Inc.
- ◆ “PayPal Officially Enters China: Challenges vs. Opportunities,” Forbes, Jan 2020.
- ◆ <https://spendmenot.com/paypal-statistics/>

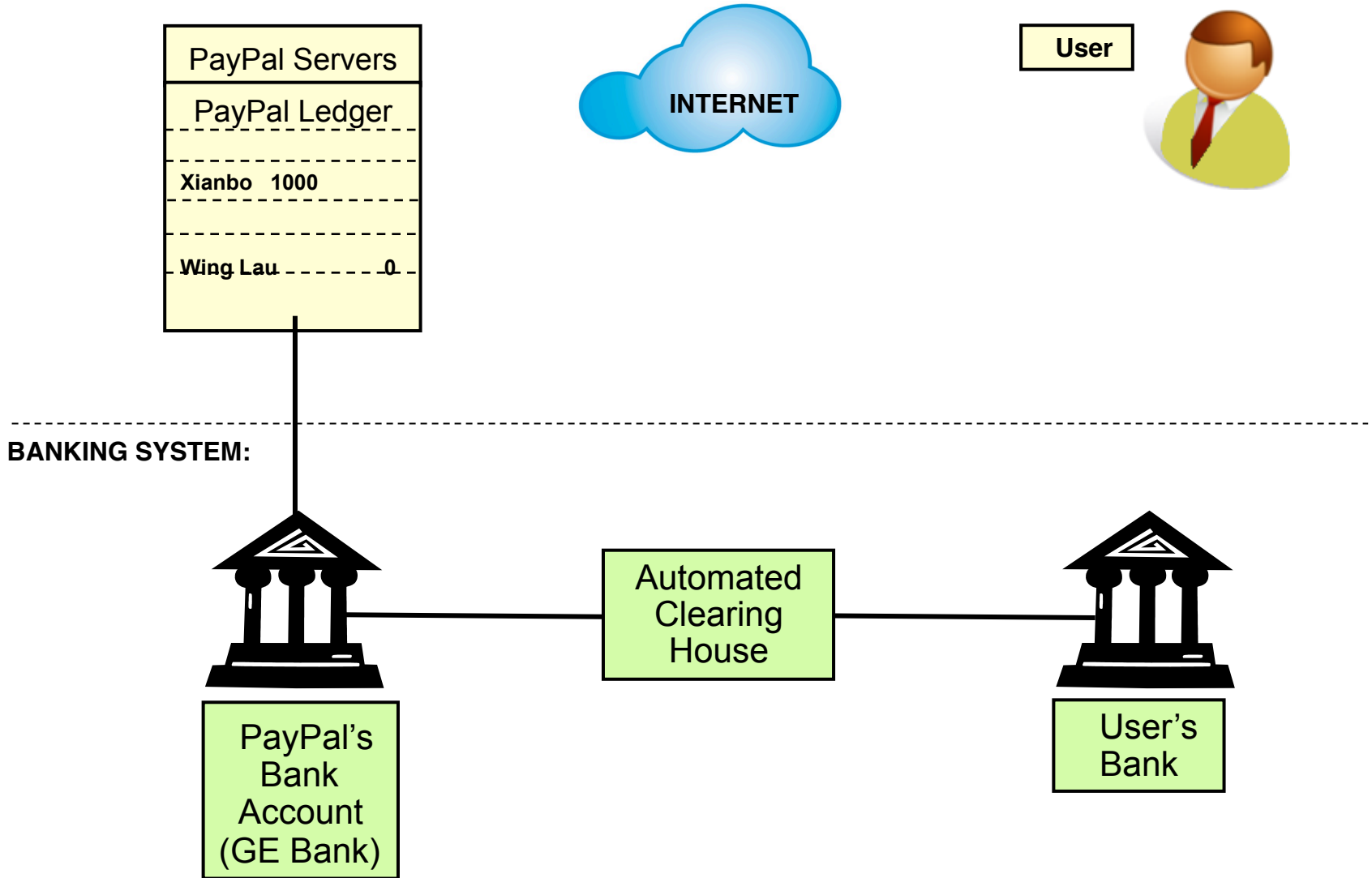
# PayPal Concepts

- Initial Mission/ Vision was to “create a global currency that was independent of interference of banks and government !!  
The mission has failed and mission has changed
- Pay anyone, anywhere via email address
- Withdraw funds anytime, or send to someone else
- Mass (bulk) payments possible
- Merchants pay low fees; individuals pay nothing
- Initially, Paypal mainly draw funds from **user's bank account (e.g. via Automated Clearing House in US)** while placing credit hold on credit card for guarantee ; Interest paid on deposits ;
- Subsequently, Paypal (consumer) accounts can be funded directly via Credit cards, i.e. no need to bind with the user (buyer) account,
  - ◆ Merchants still prefer to use ACH to receive money from Paypal to lower overhead charges

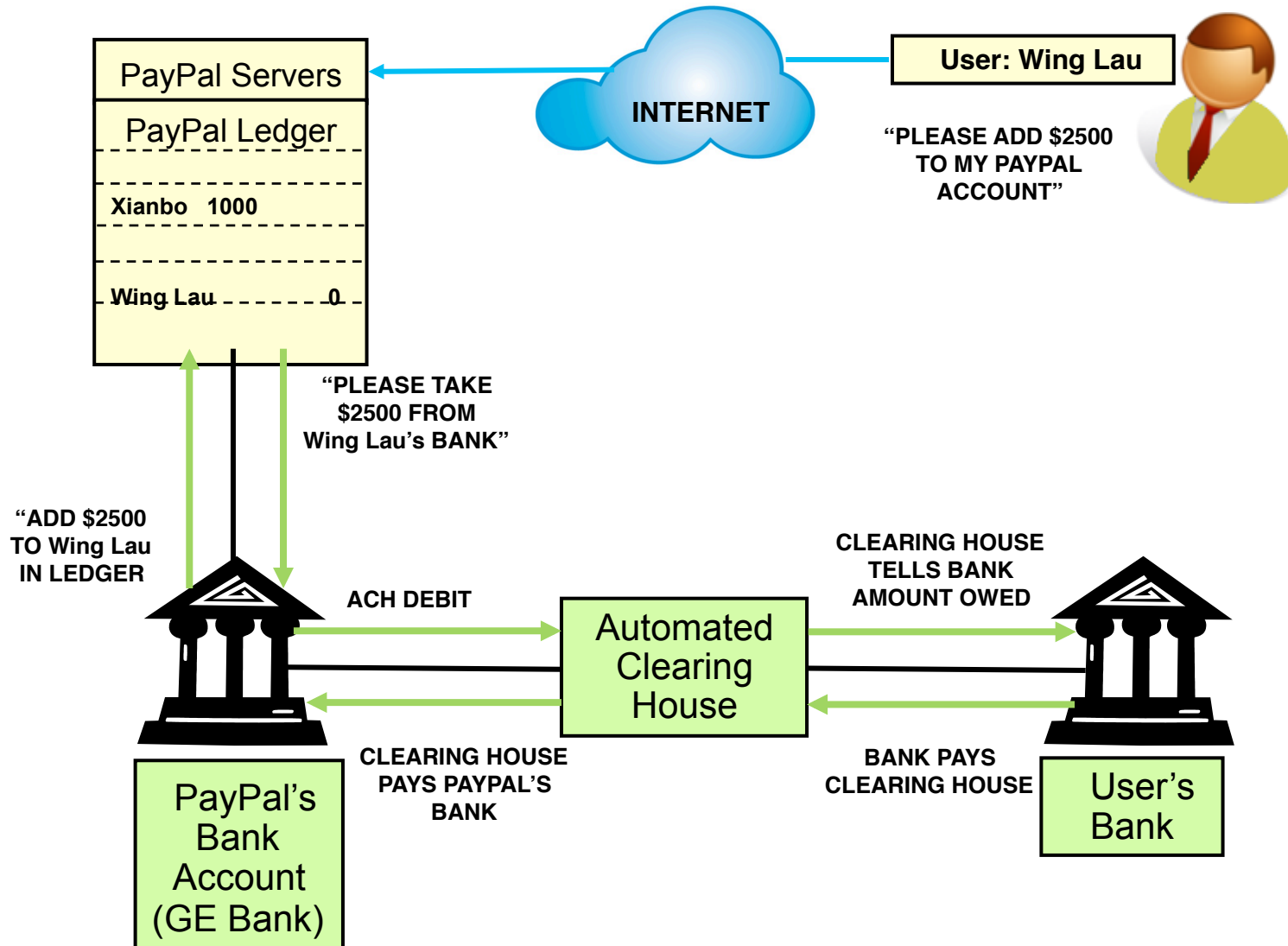
# PayPal Structure



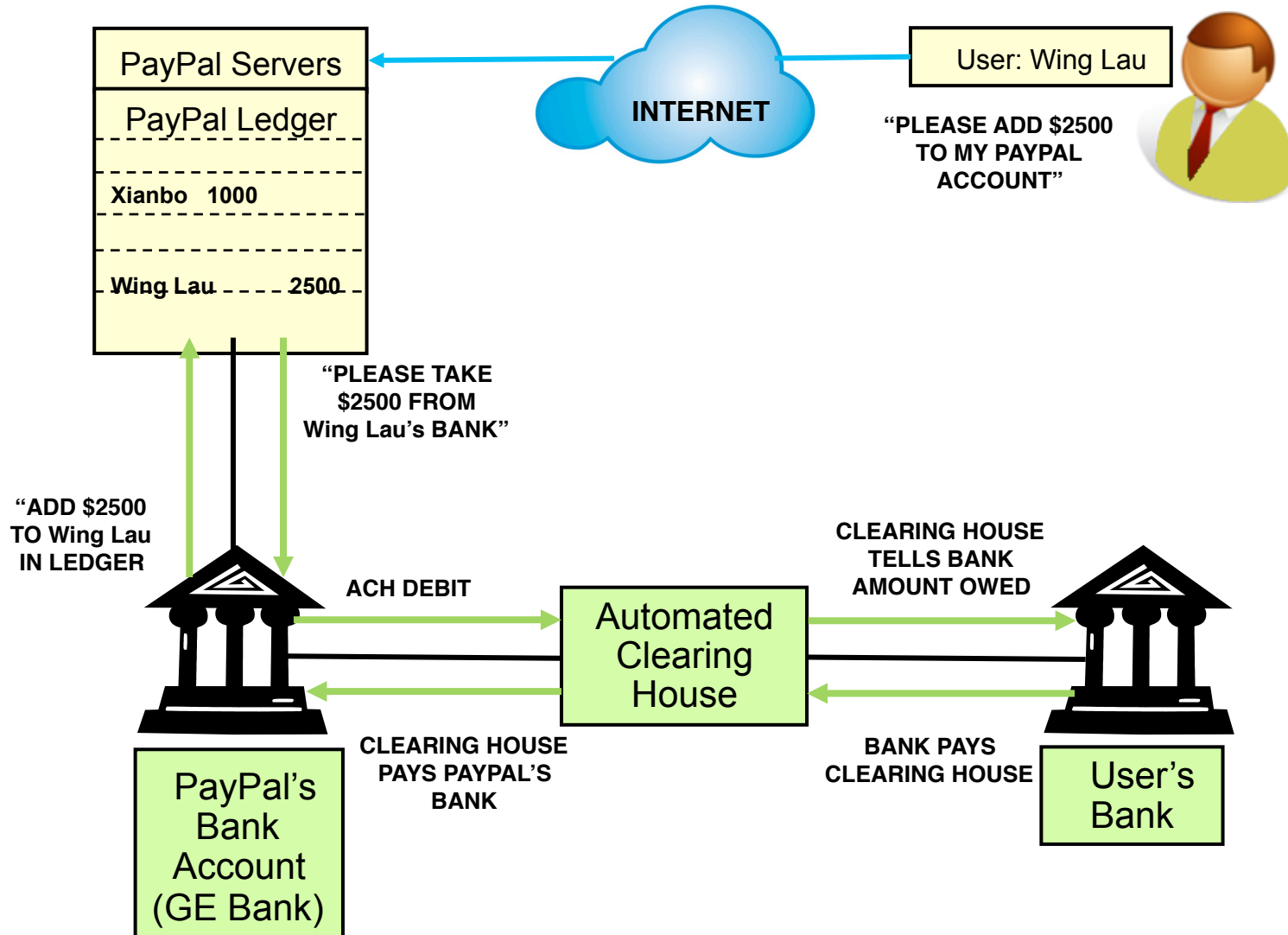
# PayPal Structure



# Putting Money Into PayPal

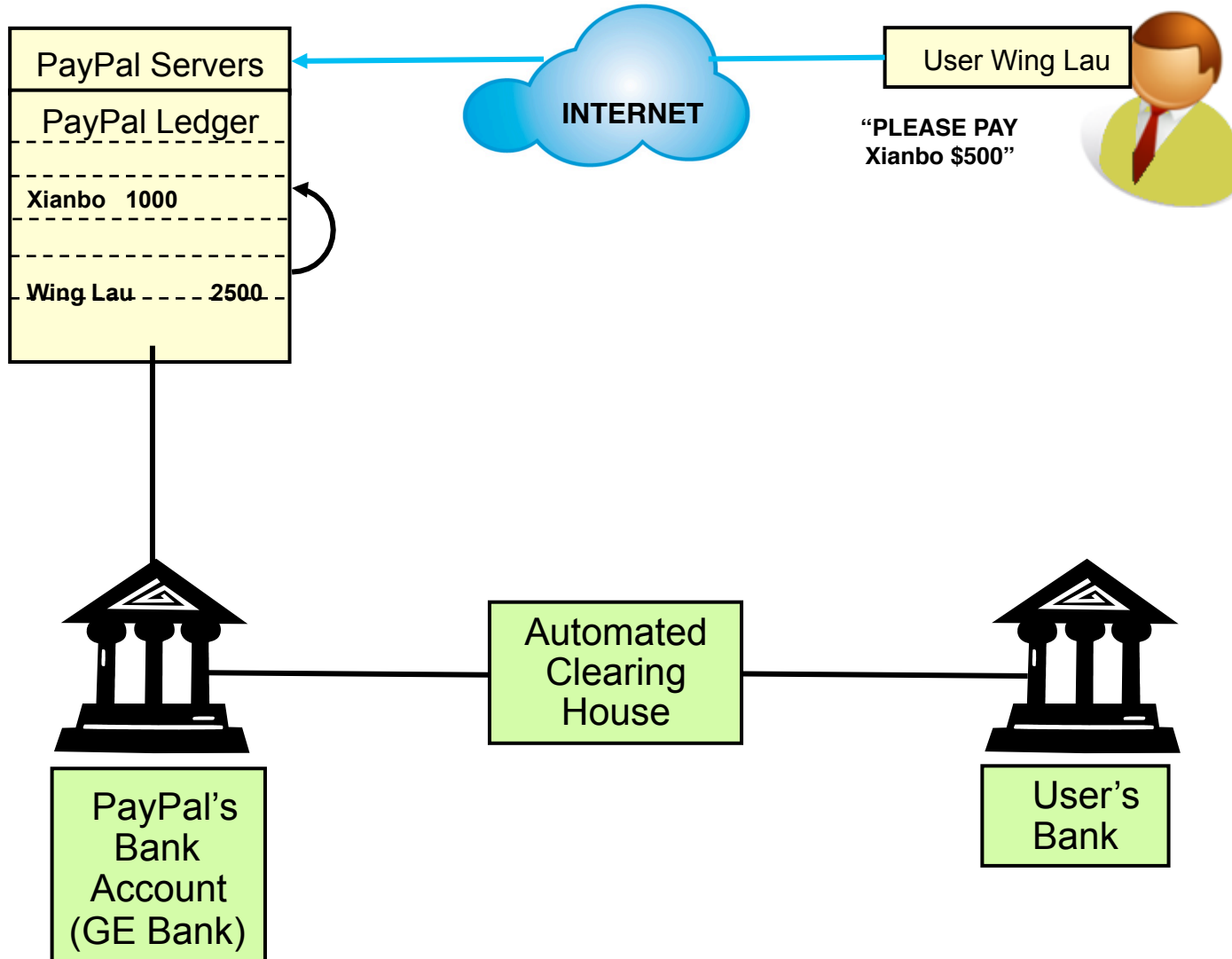


# Putting Money Into PayPal

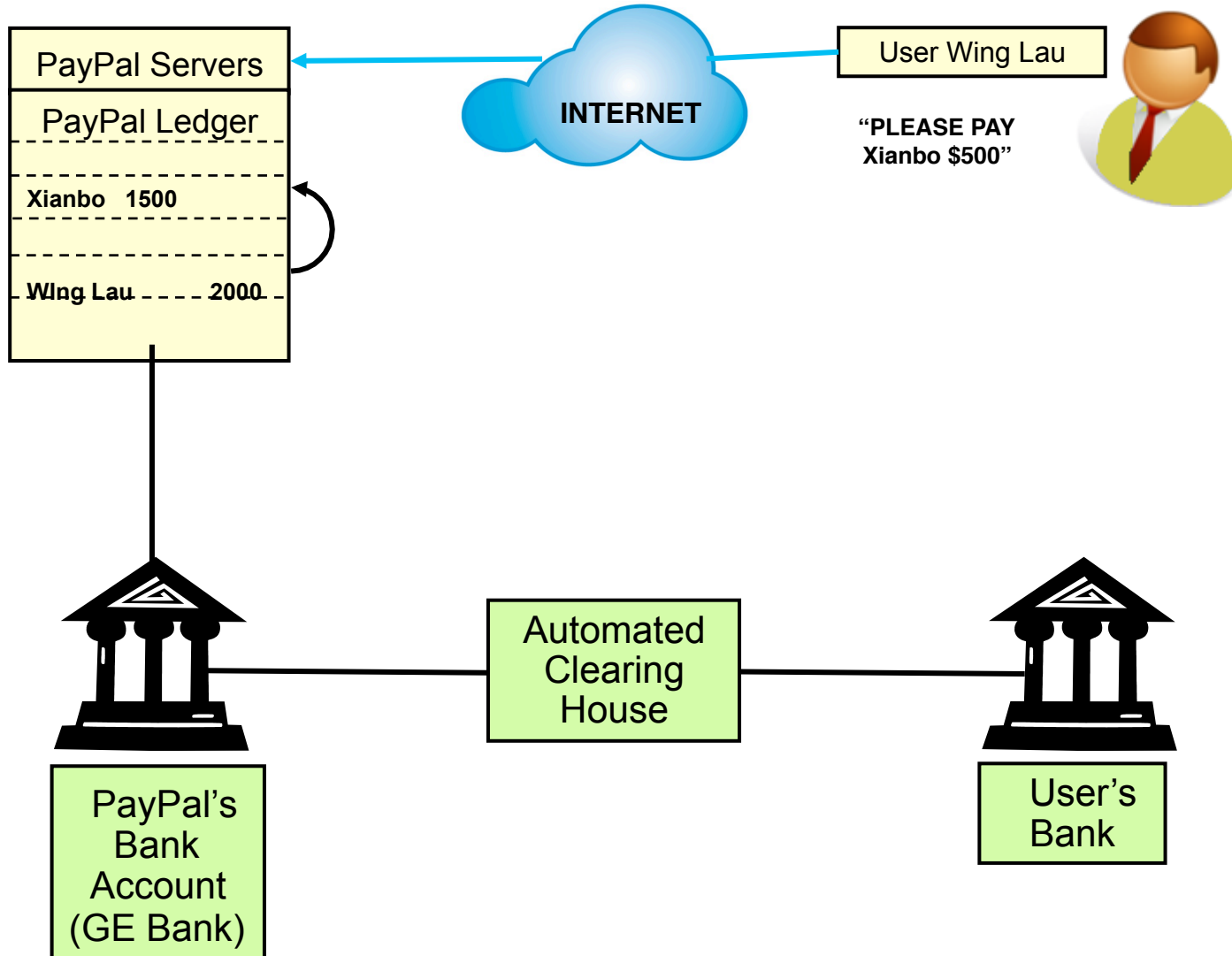




# Paying A PayPal User

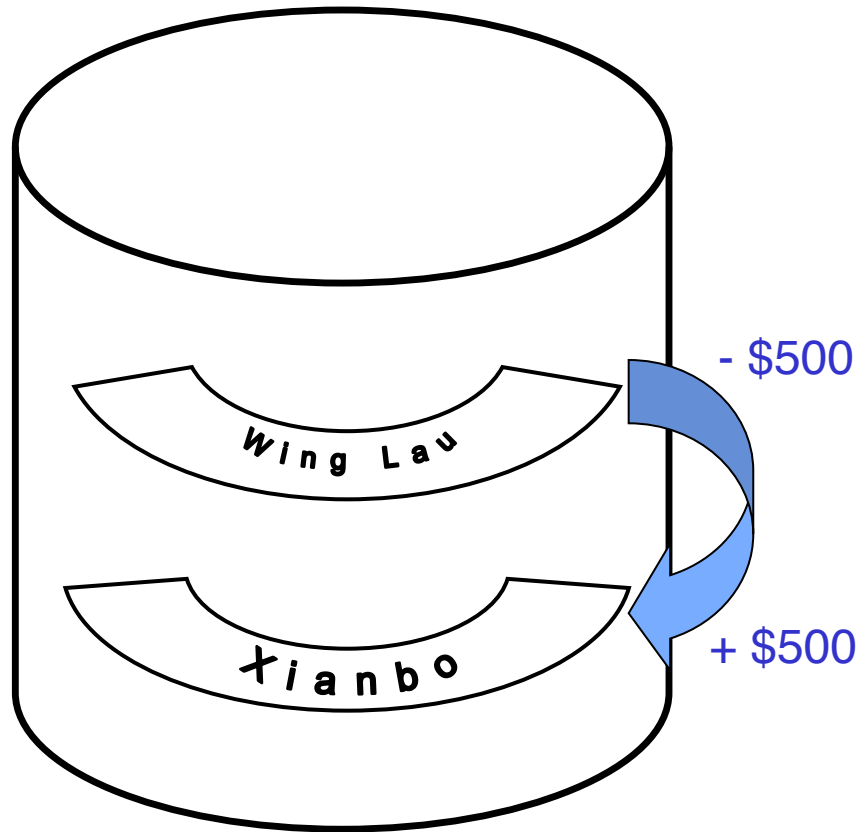


# Paying A PayPal User



# PayPal

- It's just a big disk drive!



# PayPal Fees

|                                | <b>Personal Account</b>   | <b>Premier/Business Account</b>                                     |
|--------------------------------|---|---|
| Open an Account                | Free  | Free  |
| Send Money                     | Free  | Free  |
| Withdraw Funds                 | Free for US bank accounts<br><a href="#">Fees for other banks</a> | Free for US bank accounts<br><a href="#">Fees for other banks</a>   |
| Add Funds                      | Free  | Free  |
| Receive Funds                  | Free  | <a href="#">2.2% + \$0.30 USD to 2.9% + \$0.30 USD</a> <sup>†</sup> |
| Multiple Currency Transactions | Exchange rate includes a 2.5% fee*                                | Exchange rate includes a 2.5% fee*                                  |

SOURCE: [PAYPAL](#)

# Business Model(s) of PayPal

- **Initial** Business model :
  - ◆ Enabled online P2P payments ;
  - ◆ Revenues: Fees + Float by building large user base
- **Current** Business model:
  - ◆ Payment Processing/ Management for online & offline Merchants, e.g., Fraud Management
  - ◆ Enable Global, Cross-border online purchases (e.g. acquired banking license in different countries)
    - ✦ Paypal mobile App/ web-based payments supported for “remote (Internet) shopping”
      - ~300K websites in US uses PayPal for payments
      - UK: 63.5K websites ; Germany: 54.5K ; France 38.9K ; Italy 35.4K
  - ◆ Big Data Analytics, Know-Your-Customers (KYC) :
    - ✦ Paypal shares its data with 600+ other companies

# Some Recent Developments

- In 2013, Paypal acquired Venmo, a mobile/social P2P payment startup, via its purchase of BrainTree
  - ◆ Since then, has integrated Venmo as a money transfer service under Paypal (for U.S. based customers so far)
  - ◆ Venmo accounts are funded via ACH

=> avoid/ circumvent the costs of funding Paypal account by Credit-card".

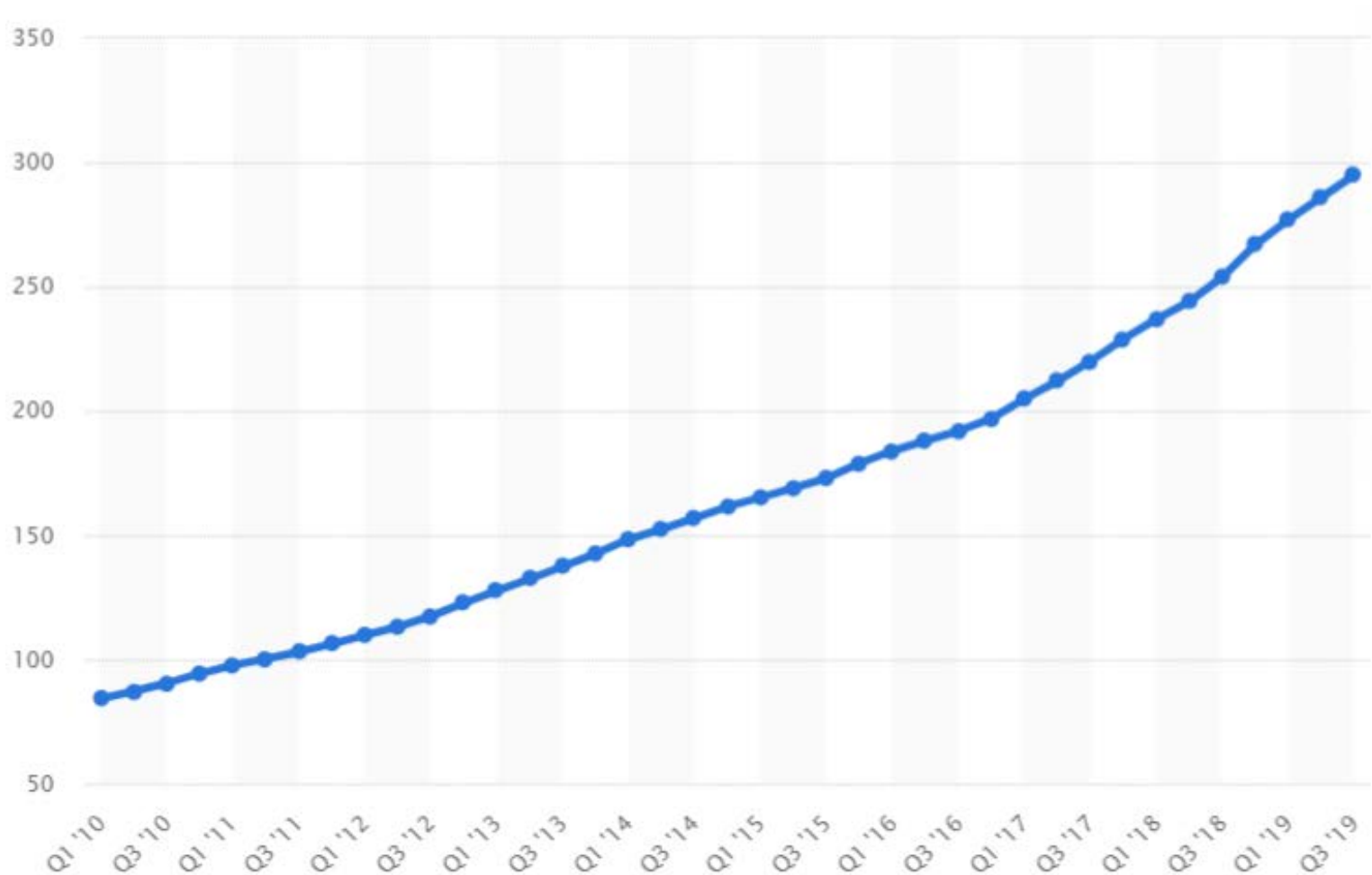
  - ✦ In 2020, Venmo has 40 million users in total with ~10 million monthly active users in US ;
  - ✦ Handled US\$ 12 billion of transactions in 2018Q1 ;
  - ✦ US\$300 million in revenue in 2019
- US-based Paypal customer can enroll (Beta) features of FDIC pass-through insurance
  - ◆ Against bankruptcy of PayPal ; Accounts insured up to \$250K
  - ◆ Different protection for fraud

# Some statistics of Paypal

- As of Jan 2020, Paypal had 286 million active users plus 20+ million merchant accounts ;  $\approx$  21<sup>st</sup> largest bank in US
  - ◆ Ave. Paypal user conducts 36.9 transactions per year
  - ◆ 87.5% online buyers use Paypal
  - ◆ 3.1 billion payment transactions in 2019Q3
  - ◆ Mobile payment volume grew by 52% in 2019Q1
  - ◆ 2019 revenue expected to exceed US\$17.70 Billion
  - ◆ % of Paypal users from different countries:
    - ◆ U.S.: 43.86% ; Germany: 17.61% ; UK: 14.39%
  - ◆ Supports 200 countries/regions ; 25 currencies
  - ◆ **Officially entered the China market in Dec 2019**
- Most Popular Digital Wallet among users in the US in 2016:
  - ◆ Paypal 76% ; Amazon Payment 24% ; Visa Checkout 15% ; Google Wallet/ Android Pay (23%) ; Apple Pay 12%

# Growth of Number of Active Paypal Users

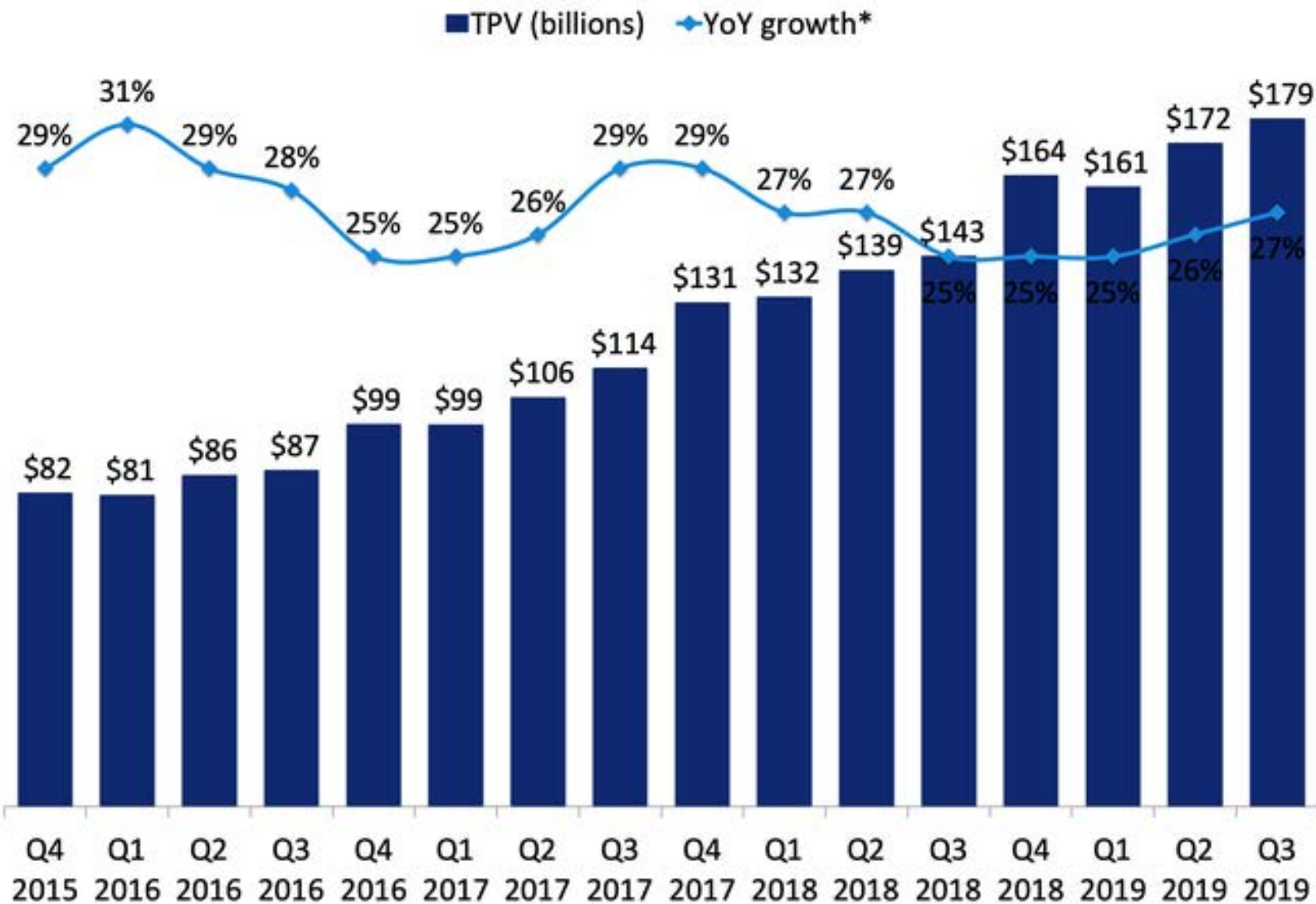
(in Millions)





# PayPal Total Payment Volume (TPV)

Global

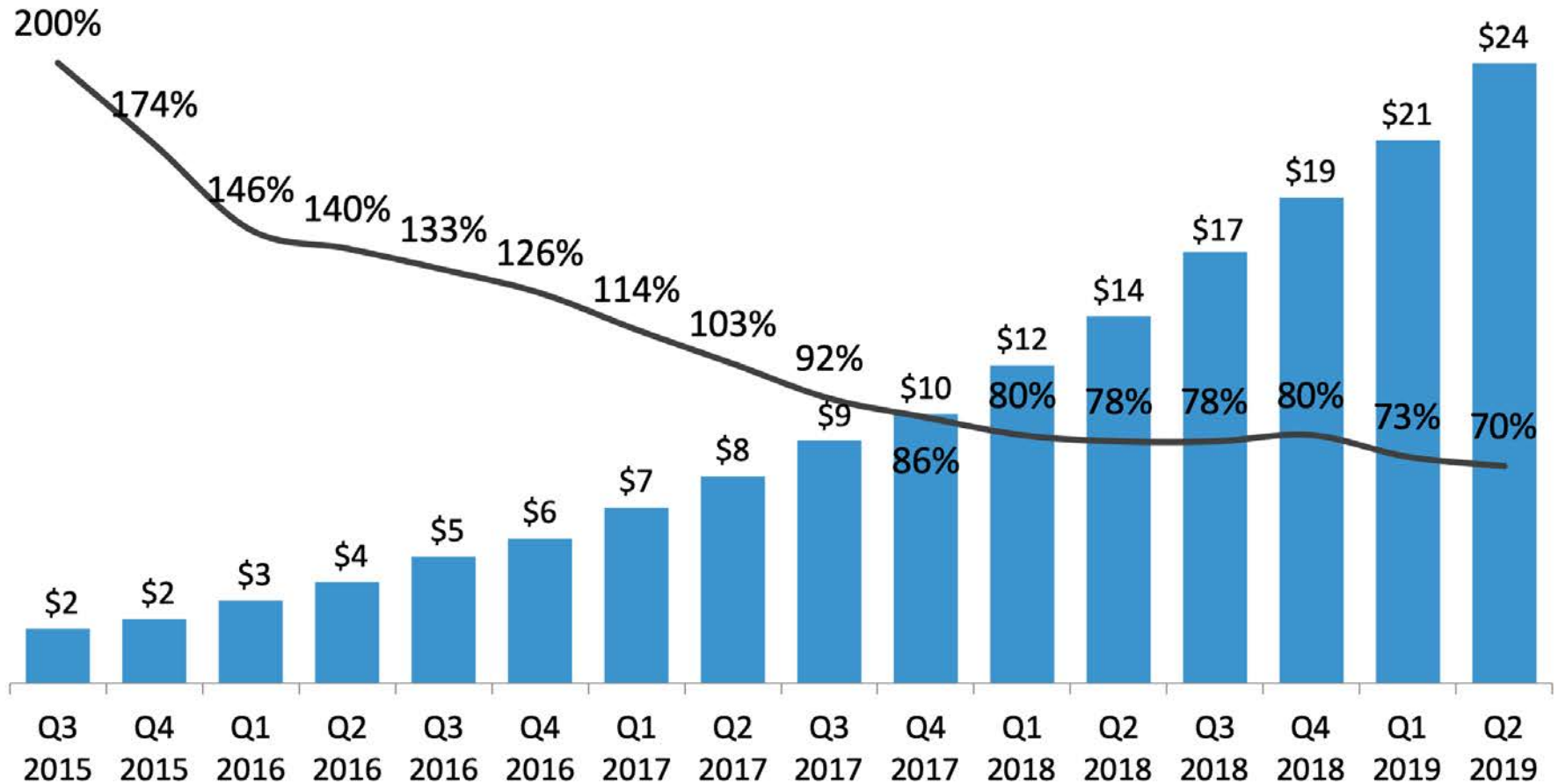


\*On a constant currency (FX-neutral) basis  
Source: Company filings

# Venmo Total Payments Volume



■ Total payments volume (billions) — YoY growth

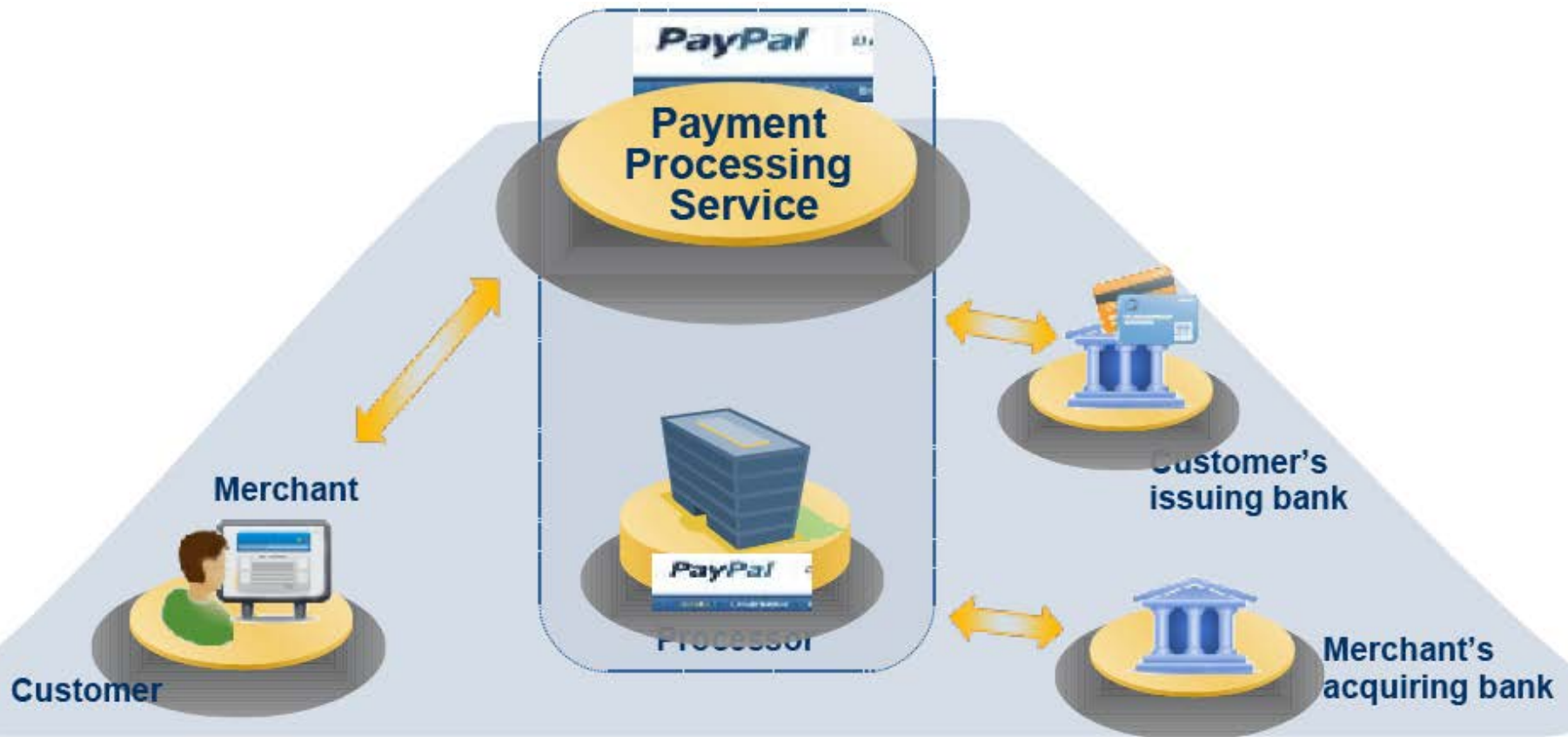


BUSINESS  
INSIDER  
INTELLIGENCE

# Business Evolution of PayPal

- Phase 1 (1998-2003):
  - ◆ Enabled P2P online, (micro) payments for its users ;
  - ◆ Closely tied to Online-Auction support (eBay)
  - ◆ Target small home-business/ online merchants which are not qualified for credit-card payment processing services.
- Phase 2 (2004-2007):
  - ◆ Expanded beyond eBay auctions to offer Payment solutions to online merchants, e.g. Payment gateways, processing, security/fraud prevention, seller-protection, financial reporting
- Phase 3 (2008–July 2015)
  - ◆ Started operating in European Union and other currencies ;
  - ◆ Expanded its focus on large businesses and mobile networks
- Phase 4 (since July 2015 after divested from eBay )
  - ◆ Cross-border money transfer remittances from/to US
  - ◆ Cloud-based mobile commerce
  - ◆ Integrate Venmo's mobile/social payment service into Paypal's ecosystem
  - ◆ Became the 1<sup>st</sup> foreign payment platform in China by acquiring 70% equity stake in GoPay (Guofubao Information Tech. Co.) in Dec 2019.

# PayPal's Payment Service Model for Online Merchants



# Different types of PayPal Payment Solutions

## PayPal Products



**Website  
Payments  
Standard**

### Scenario #1

Accept online credit card payments with minimal effort



**Website  
Payments  
Pro\*\***

### Scenario #2

Build an all-in-one solution for accepting web, phone, fax and mail payments



**Express  
Checkout\*\***



### Scenario #3

Accept PayPal, keep current payment processor



**Payflow  
Gateway**

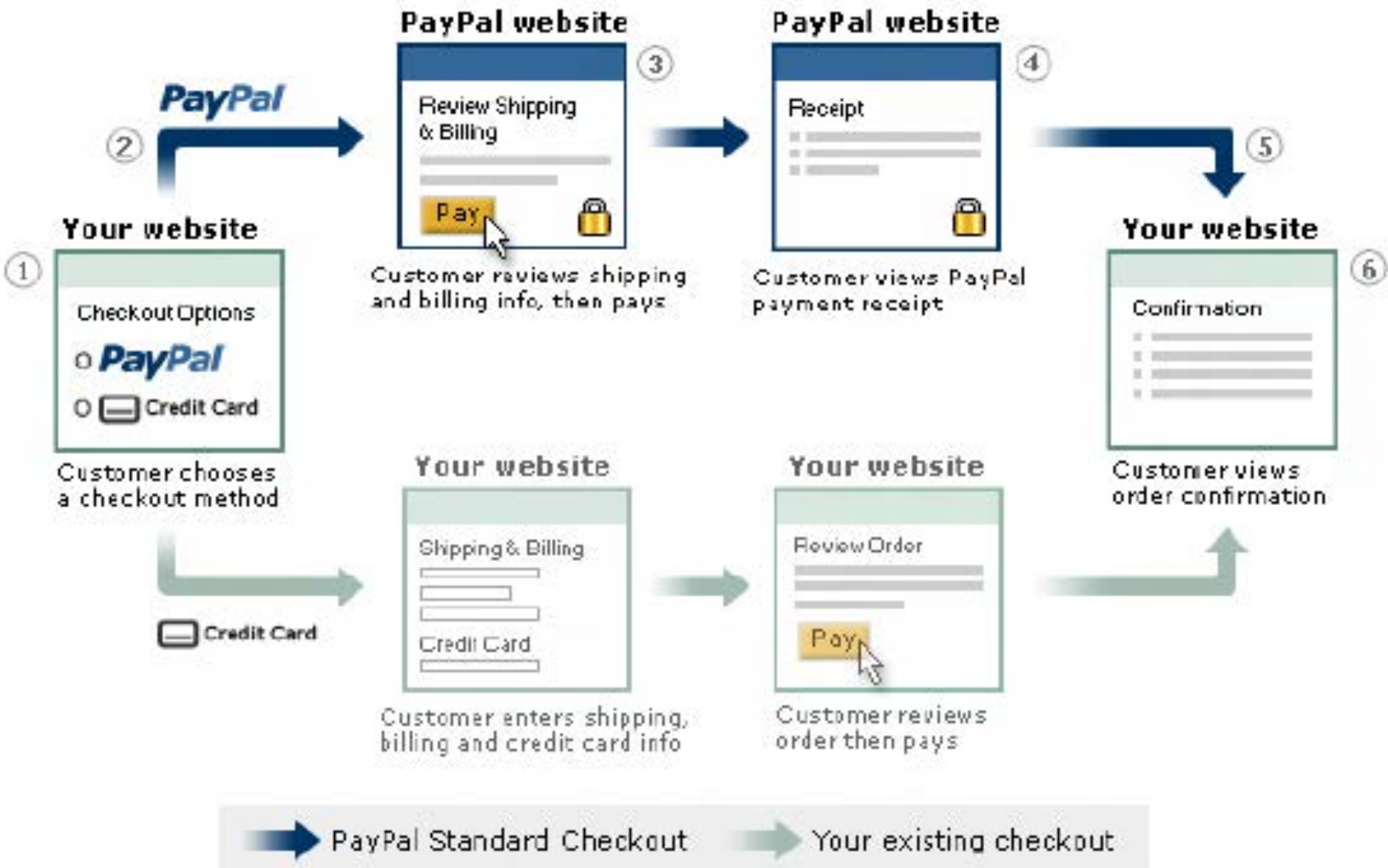
### Scenario #4

Provide a secure connection from your online store to your merchant account

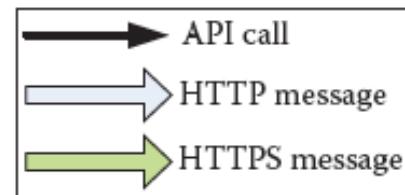
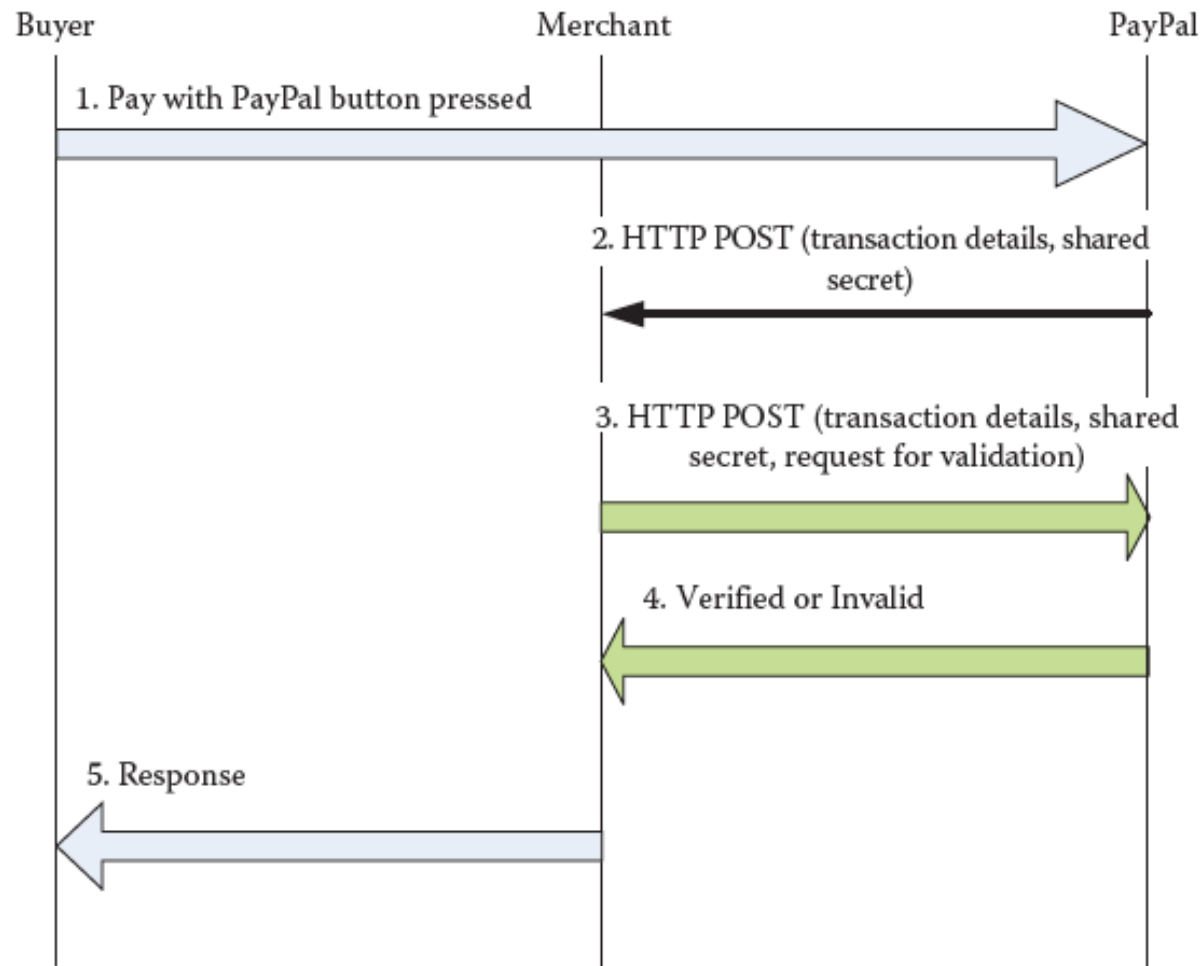
# Different types of PayPal Payment Solutions

| Product                           | Website Payments Standard                              | Website Payments Pro   | Express Checkout                             | Payflow Gateway  |
|-----------------------------------|--|--|--|--|
| Scenario                          | Accept online credit card payments with minimal effort | Build an all-in-one solution for accepting web, phone, fax and mail payments | Accept PayPal, keep current merchant account | Establish a secure connection between online store and merchant account, and keep merchant account |
| Internet merchant account needed? | <b>X</b>   | <b>X</b>   | ✓  | ✓  |
| Where customers checkout          | PayPal   | PayPal or merchant's website   | PayPal                                       | PayPal or merchant's website   |
| Virtual Terminal included?        | <b>X</b>   | ✓  | <b>X</b>                                     | ✓  |
| Business credit approval needed?  | <b>X</b>   | ✓  | <b>X</b>                                     | <b>X</b>   |

# Standard Checkout Process with PayPal

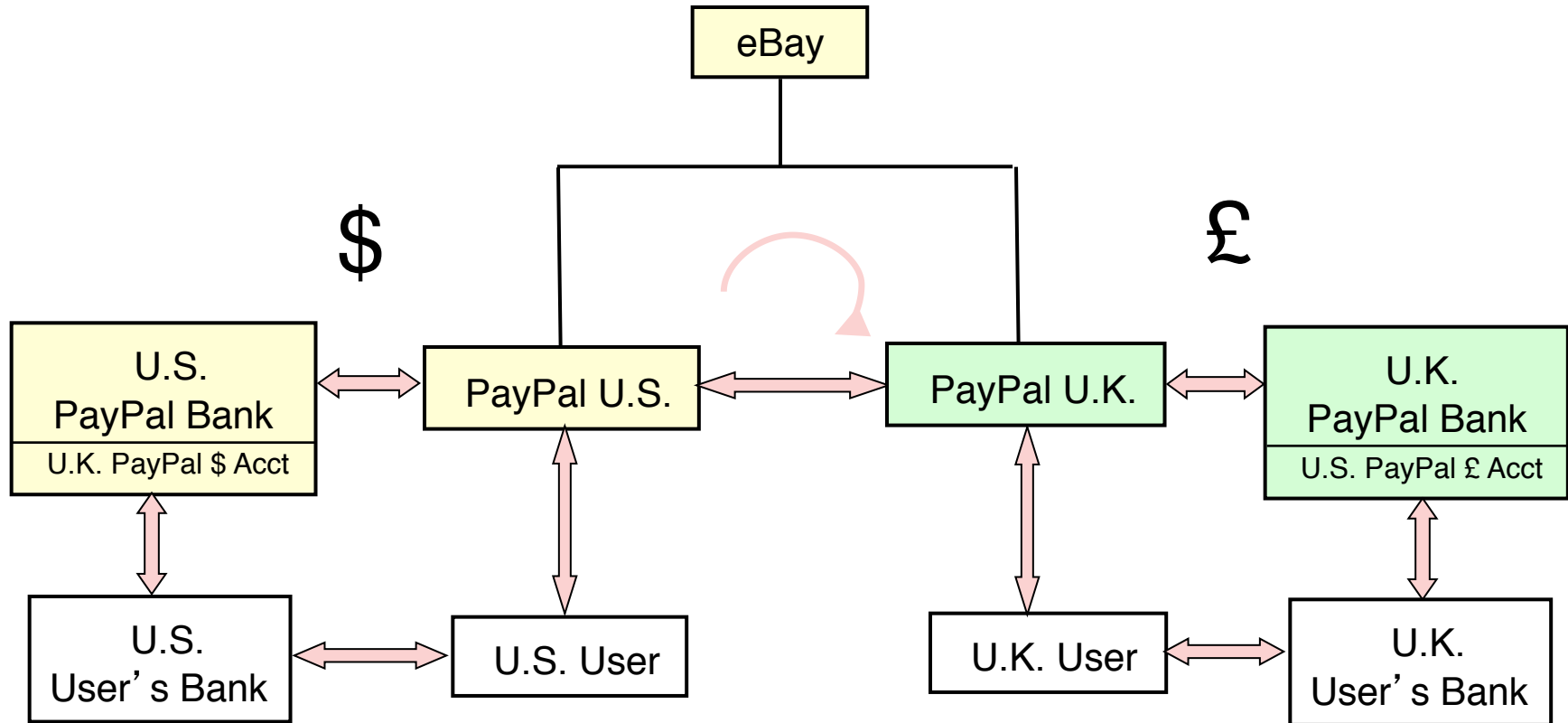


# Protocol Flow of Basic Hosted Service of PayPal for e-shopping websites



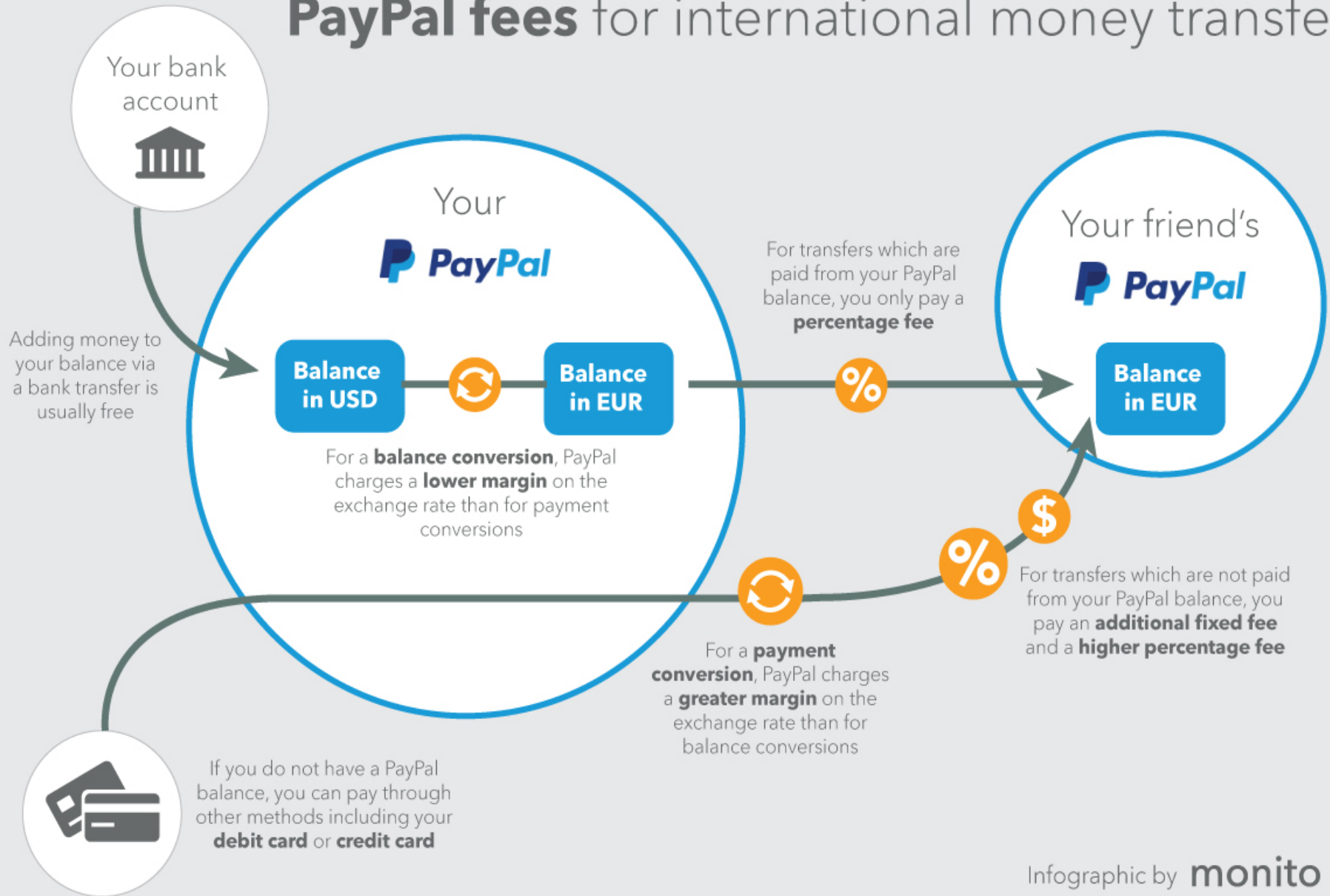



# Multi-currency support with PayPal




- While the initial Mission/ Vision of Paypal was to “**create a global currency** that was independent of interference of banks and government”, this mission **has failed and never materialized !** (mainly due to Government Regulations, e.g. Anti-Money Laundry requirements/ concerns ; see problems of Facebook’s Libra project !)
- Instead, Paypal supports cross-border/currencies transactions like how conventional Banks handle foreign exchange transactions ;
- Paypal also supports a customer to keep balance in different currency accounts

# PayPal fees for international money transfers




 Conversion fees

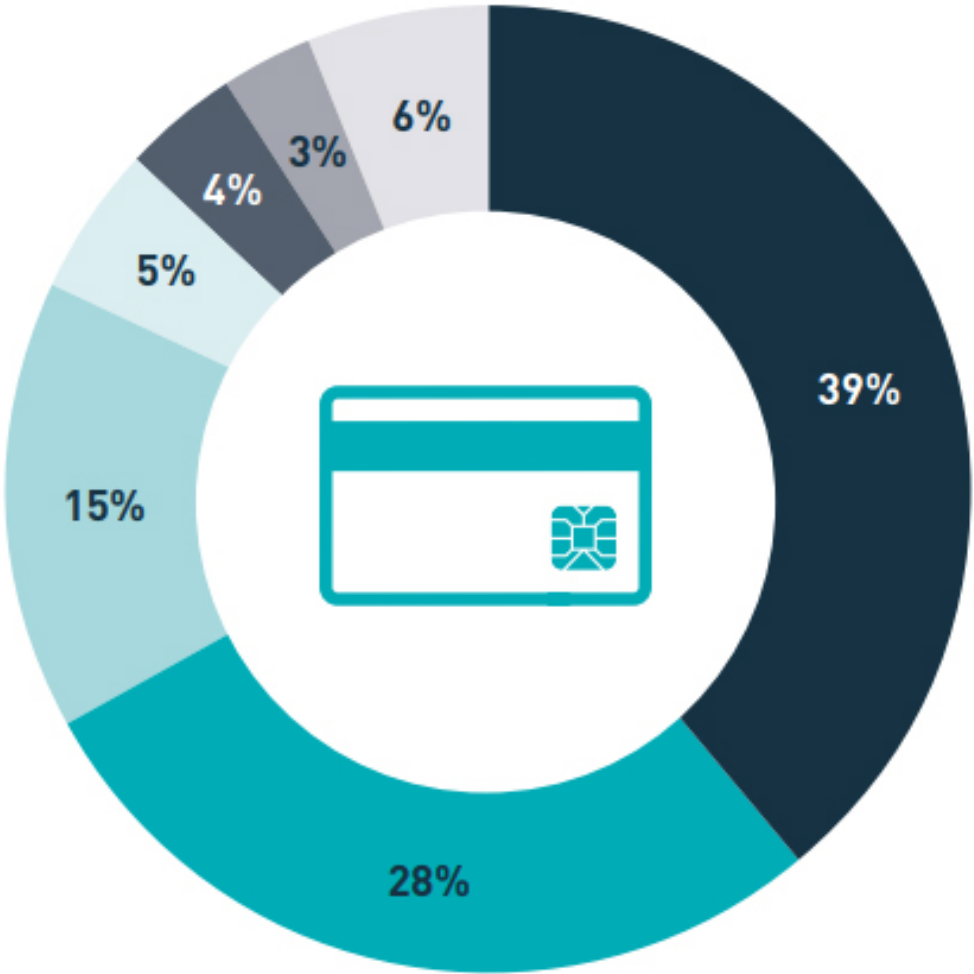
 Percentage fees

 Fixed fees

Infographic by **monito** 

Please share this illustration, but make sure to link it back to [Monito.com](https://monito.com)  

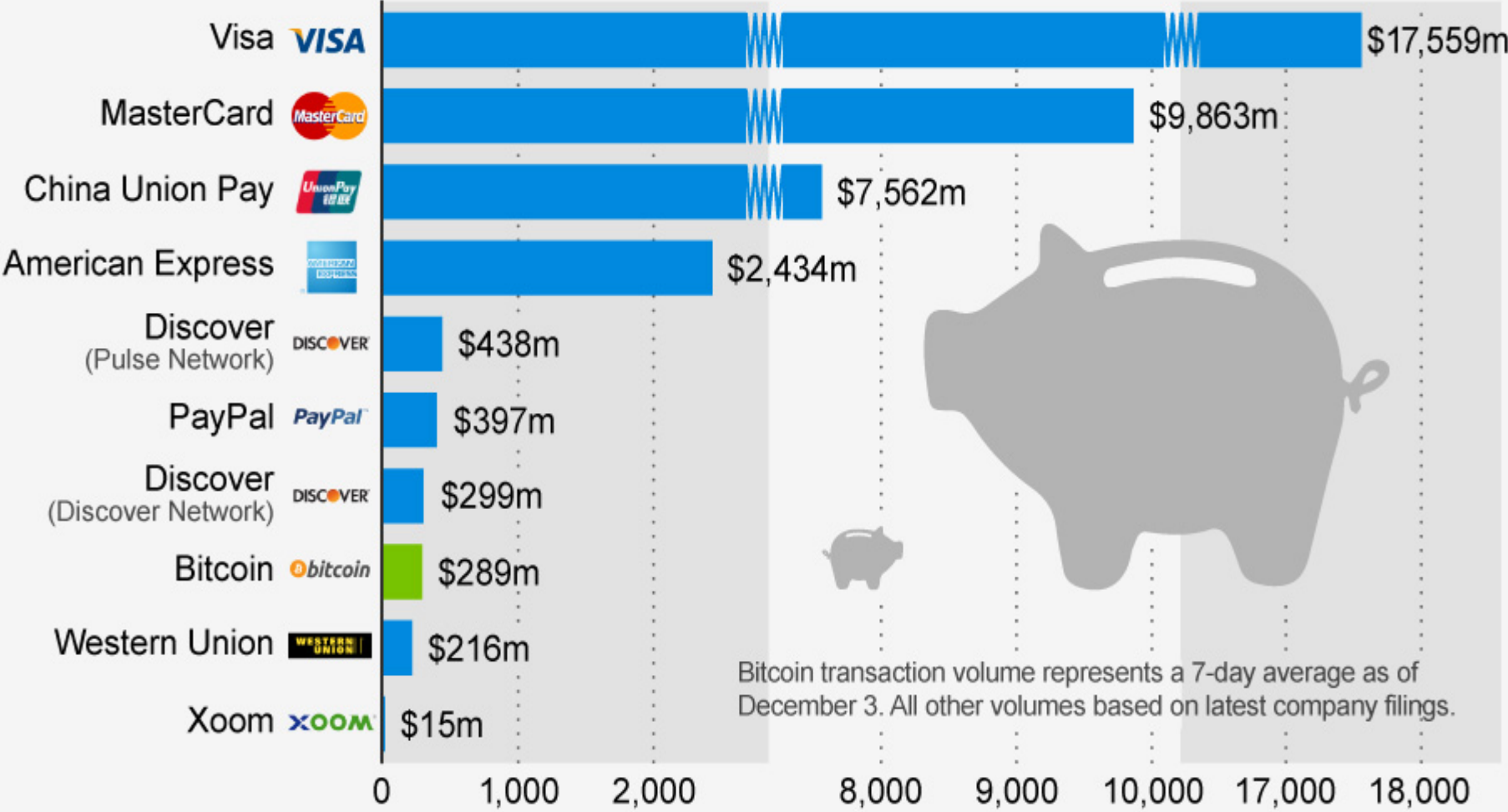
# Cross-Border Online Shopping Payment Methods



- PayPal, Alipay or equivalent
- Credit card
- Debit card
- Bank transfer
- Cash on delivery
- Prepaid card
- Other

# How Paypal Activities Stacks up against other Payment Networks

(Ave. daily transaction volume (in million US\$) (circa Dec 2013))

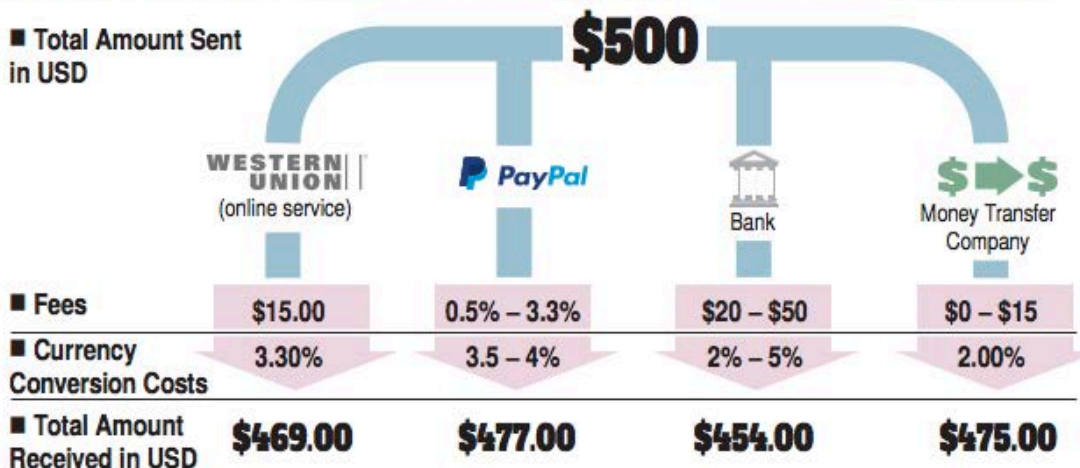


# INTERNATIONAL MONEY TRANSFERS

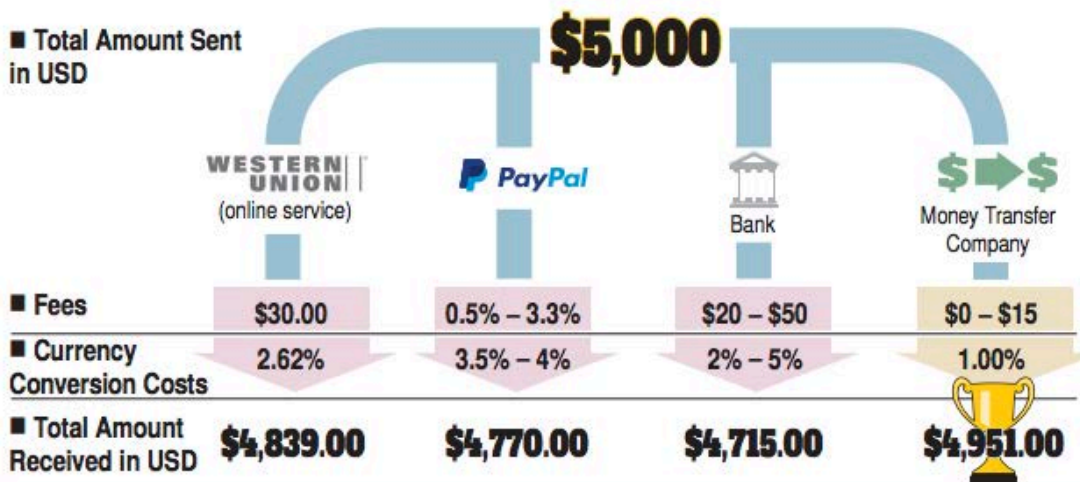
## How much actually arrives?

Banks and international money transfer companies make money from fees and converting currencies.

■ Total Amount Sent in USD



■ Total Amount Sent in USD



**Notes:**

The Western Union results are based on using their online service using a credit card with cash pickup  
 PayPal results are based on PayPal balance or linked bank account. Credit Card or Debit Card currency conversion costs are 3.9% - 7.4% plus the Fee, depending on the country  
 Bank Total Amount Received does not include fees often charged by the receiving bank  
 PayPal, Bitcoin and Western Union are registered trade marks of those respective companies  
 Currencies and Countries change the costs  
 While every care was taken at time of publishing, different results may occur due to different services, fees and currency conversion costs based on countries and changes to fee structures

Source: Transumo.com based on an USD to CAD exchange and converted back to USD using the mid-market rate.

# Major Ideas

- The Business Model and Key Revenue streams for PayPal keep evolving.
- To better align with Government Regulations on foreign exchange, anti-money-laundry requirements etc, PayPal **chose NOT to position** itself as a new online currency (i.e. unlike Bitcoin, or Libra -- Facebook's cryptocurrency) ; instead it supports multi-currency/ cross-border payment transactions like how conventional banks conduct FX transactions.