



Unified Payments Interface (UPI)

A payment solution designed to transform economies of the 21st century

“*RuPay and UPI are not just a low cost and highly secure technology, but it is our identity in the world.*”

- Hon'ble Prime Minister of India, Shri Narendra

Modi Source: [ANI](#), Mar 07, 2023





Table of Contents

<u>Executive Summary</u>	<u>03</u>
---------------------------------	------------------

<u>The Evolution of UPI</u>	<u>06</u>
------------------------------------	------------------

- Key issues of payments ecosystem (Pre-UPI)
 - *Macro-economic* **07**
 - *Demand-side*
 - *Supply-side*
- Evolution of Indian Payments Industry **08**

<u>An Overview of UPI</u>	<u>10</u>
----------------------------------	------------------

- Product Overview **11**
- Tech Architecture **13**

<u>The Impact of UPI</u>	<u>14</u>
---------------------------------	------------------

- Rise in Digital Payments **15**
- Benefits
 - *Macro-economic*
 - *Demand-side* **16**
 - *Supply-side*

<u>Way Forward</u>	<u>24</u>
---------------------------	------------------

- Global Expansion **25**
- NIPL Initiatives **28**
- Pain Points and Ways UPI May Assist **29**

<u>Conclusion</u>	<u>30</u>
--------------------------	------------------

<u>Acronyms</u>	<u>32</u>
------------------------	------------------

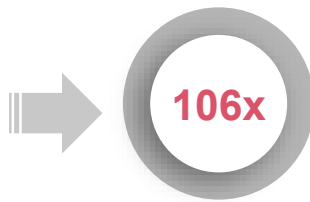
<u>Appendix</u>	<u>33</u>
------------------------	------------------

UPI is one of the most important open infrastructure solutions that promotes digital payment, addressed ecosystem challenges and increases level of financial inclusion

*Prior to 2016,
Ecosystem Challenges*

*2023:
UPI has addressed most of the challenges*

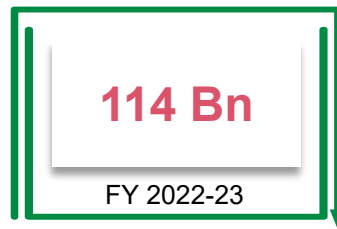
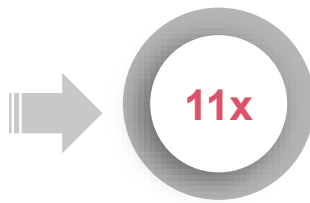
Merchant Acquisition (Acceptance Touchpoints)



Growth in P2M transactions due to No/Low MDR and lite acceptance infrastructure

Source: RBI Website

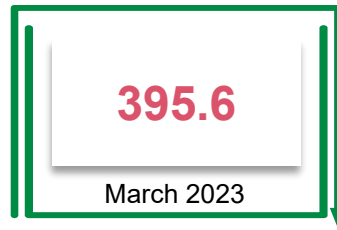
Growth in Digital Payment Transactions



Expanded the pie of digital payment transactions instead of cannibalizing

Source: RBI Website

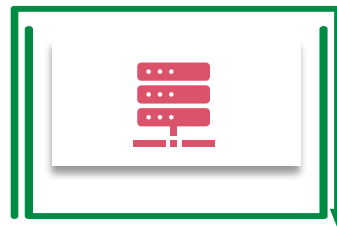
Digital Payment Maturity



Significant growth in the RBI-DPI Index since 2018

Source: RBI Website

Fear of Fraud & Theft



Layered security framework of UPI provides the require comfort to the end-users

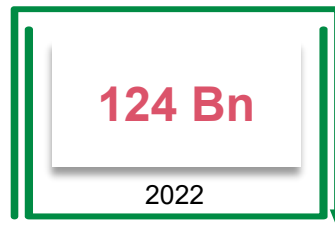
Source: PwC Analysis

UPI's transaction growth and its impact on the annual spending of stakeholders has shown the ability of a payment scheme for an economy without a domestic card scheme

Prior to 2016, Ecosystem Challenges

2023: UPI has addressed most of the challenges

Reduction in currency coins circulation



The growth in currency coins in circulation has witnessed a dip after UPI from 8.2% (2012-16) to 1.4% (2017-22)

Source: RBI Website

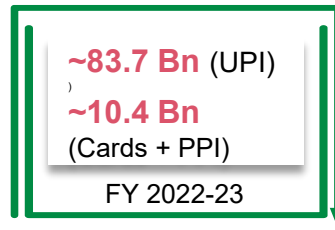
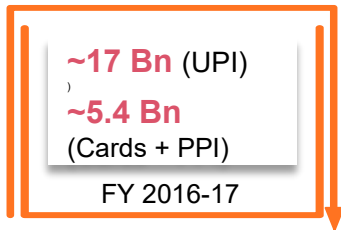
Reduction in investment towards ATMs



Cost saving for banks due to reduction in number of ATM installations- 0.6% (2017-22).

Source: RBI Website

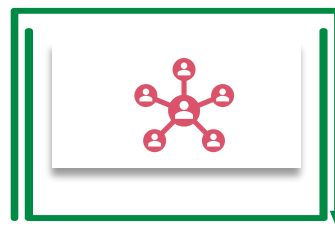
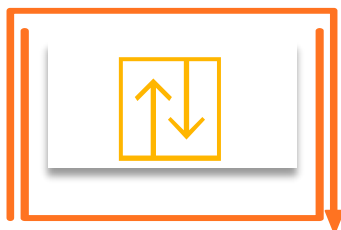
Digital payments can grow without the presence of domestic card scheme



UPI has achieved this traction with only 280-300 active users

Source: RBI Website

Ease of Interoperability



QR based infrastructure, open architecture and active involvement of banks and non-banks has resolved the issue of interoperability

Source: PwC Analysis

Global economies can learn from UPI and enhance their real time payment ecosystem

Global real time payment systems face challenges across business, technology and ecosystem participation



Broader Stakeholder Collaboration & Participation

- Non-banking participants need to be included in industry consultations from the time of inception
- Clear regulatory frameworks would be required for collaboration between stakeholders and for innovation to thrive in the market



High Payment Acceptance Cost

- Non-standard and physical POS acceptance technologies results in increasing the cost of acceptance that deters adoption



Legacy Frameworks

- Banks may run on legacy frameworks and integration to real time payment infrastructure remains a pain point
- Features like 24x7 availability and shorter settlement window may be some of the issues with existing legacy frameworks



Business Revenues

- Fear of cannibalization of card-based revenues due to real time payment adoption as card payment share in the digital payment market is increasing globally



Fees & Charges

- High fees and charges of financial institutions impacts the overall adoption of real time payments. Also, the losses arising due to fraud discourages the end-users to use digital payments.



Interoperability

- Most of the real time payments across the globe are focused on domestic transactions
- High cost and continued infrastructural issues has restricted the adoption of cross-border payment solutions.

Hence, there is a need for an out of the box solution like UPI, which can provide flexibility, varied product and customized services catering to global needs

Efficiency and Effectiveness

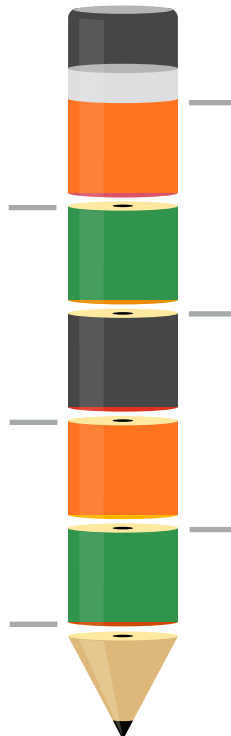
Utilising UPI's technology stack based on open-source; real time payment frameworks globally can achieve faster GTM's at a much lower cost

Easy Integration

Existing systems (legacy & new) can be easily integrated to UPI payment rails supporting both real time and batch settlement functionality

Interoperability

Ability to offer interoperability across multiple schemes in a region will be able to attract higher adoption



Risk Management

UPI's central anti fraud solution caters to detecting fraud in real time using AI/ML solutions for scoring and risk assessment

Payment as a Service

Integrating participants to the real time payment infrastructure using open APIs wherein service can be availed from a single platform

Common Platform

It is very essential to provide access to all payment use cases on a single payment rail to ensure ease of use



Unified Payments Interface

A payment solution designed to transform economies of the 21st century

Chapter 1:

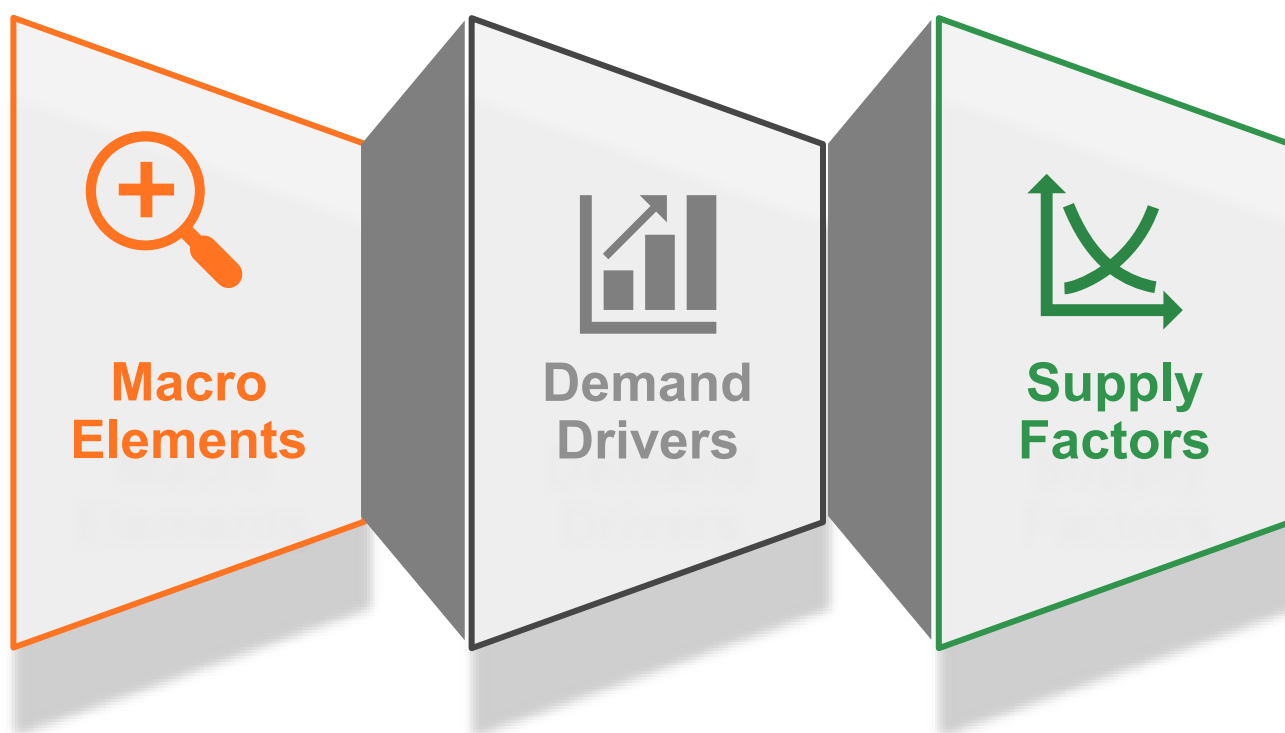
The Evolution of UPI













Key issues of the payments ecosystem (Pre-UPI)

Evolution of Indian Payments Industry

Prior to 2016, the adoption of digital payments in India was underpenetrated due to some ecosystem-level challenges

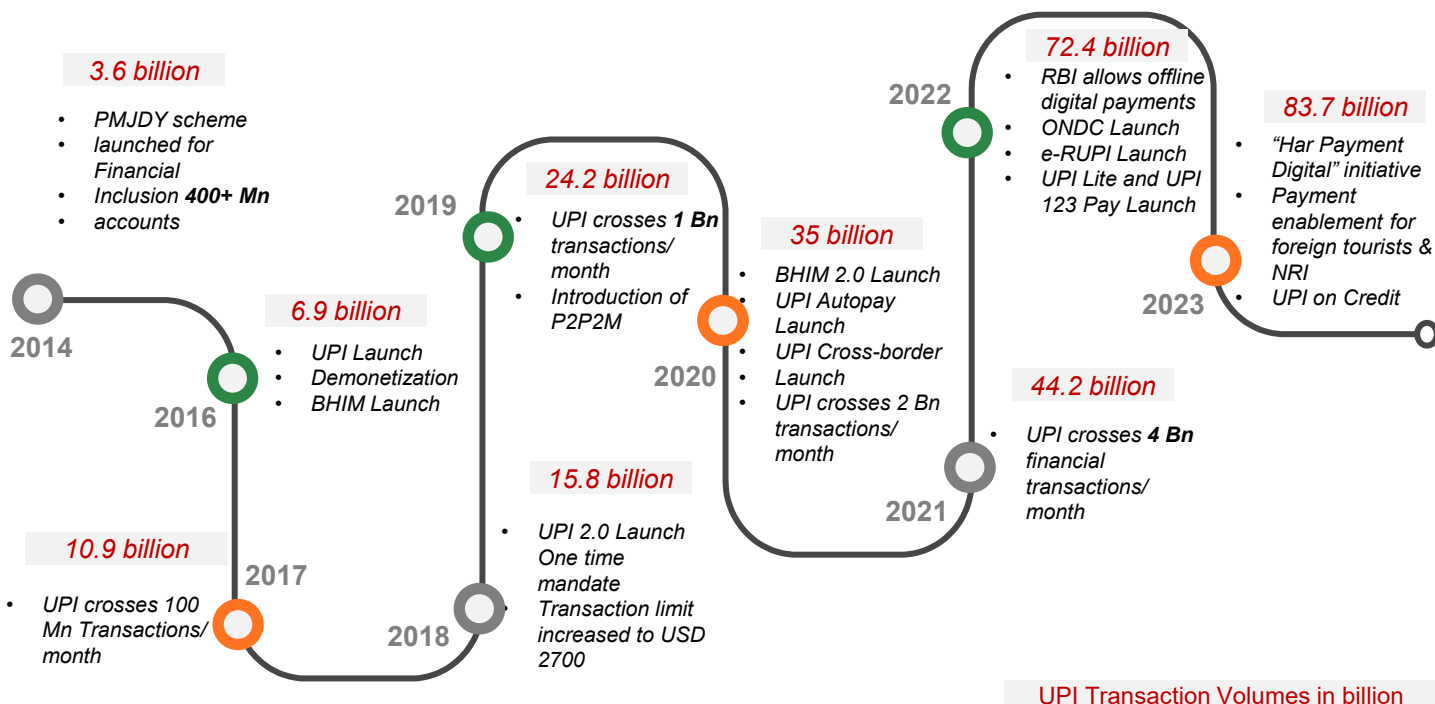


- | | | |
|---|---|--|
|  <p>Low contribution of digital payments to overall GDP</p> |  <p>Reluctance of merchants to accept credit card payments due to MDR charges</p> |  <p>Lack of banking infrastructure in tier-2 cities and below</p> |
|  <p>Low rate of overall financial inclusion</p> |  <p>Fear of theft and fraudulent activities among end consumers</p> |  <p>Low rate of financial inclusion (FI Index at 43.4 in March 2017) and formalization (Source: RBI Website)</p> |
|  <p>High dependence on cash for daily transactions (~88% in FY 2016) (Source: SBI Research)</p> |  <p>Lack of interoperability across digital payment tools</p>  <p>Inability of micro-merchants to access credit from formal financial services.</p> |  <p>Lack of financial literacy around digital payments</p> |

Key issues of payments ecosystem (Pre-UPI)

Evolution of Indian Payments Industry

Introduction of UPI has helped the digital payments landscape to evolve promoting growth and innovation in the industry



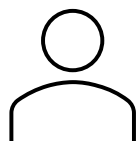
Regulatory support along with acceptance from industry participants, rise in investments and entry of innovative fintechs led to the growth of the digital payments industry

Robust Regulations



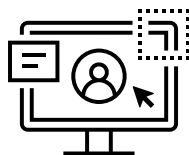
RBI regulations and government initiatives have boosted the adoption of digital payments.

Consumer Adoption



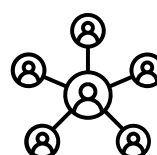
From cash to NEFT, to mobile wallets, to 390+ Mn UPI users, Indian consumers have been open to exploring and accepting new payment systems.

Active Fintech



Rise in adoption of digital payments and encouraged **PSOs (~67 authorized by RBI)** to explore new use cases.

New Entities



The rise in the number of Innovative Fintechs and the emergence of new players are providing accessibility and ease of usage.

Investments & Fund Inflow

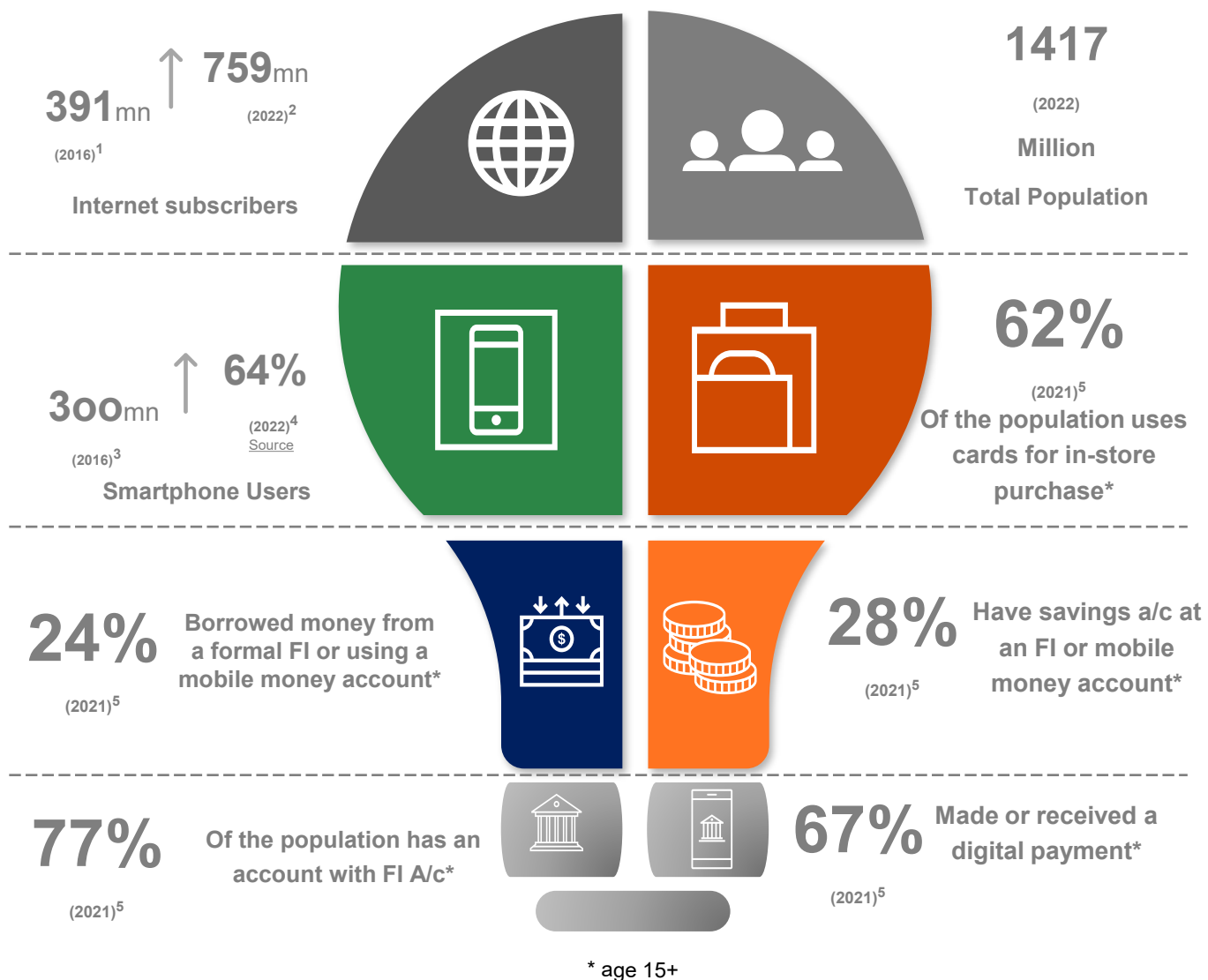


Fintech sector received funding worth ~\$9.8 Bn in 2021, led by the **PayTech** segment with **53% share** of fintech funding across all fintech verticals in India

Key issues of payments ecosystem (Pre-UPI)

Evolution of Indian Payments Industry

Also, positive change in consumer behavior towards adoption of **digital financial services**, has supported the growth of UPI in India



Sources: ¹News Article: [Moneycontrol.com](#), ²News Article: [The Hindu](#), ³News Article: [Economic Times](#), ⁴News Article: [Live Mint](#)

⁵Global Findex Database

“UPI is not competing against other payment systems. While that is the way it gets portrayed, UPI is clearly becoming the most preferred way to replace cash-dominated transactions”

- Deepak Sharma – President and CDO Kotak Mahindra Bank

(Source: [Business Today](#) | Sept 15, 2022)



Unified Payments Interface









A payment solution designed to transform economies of the 21st century

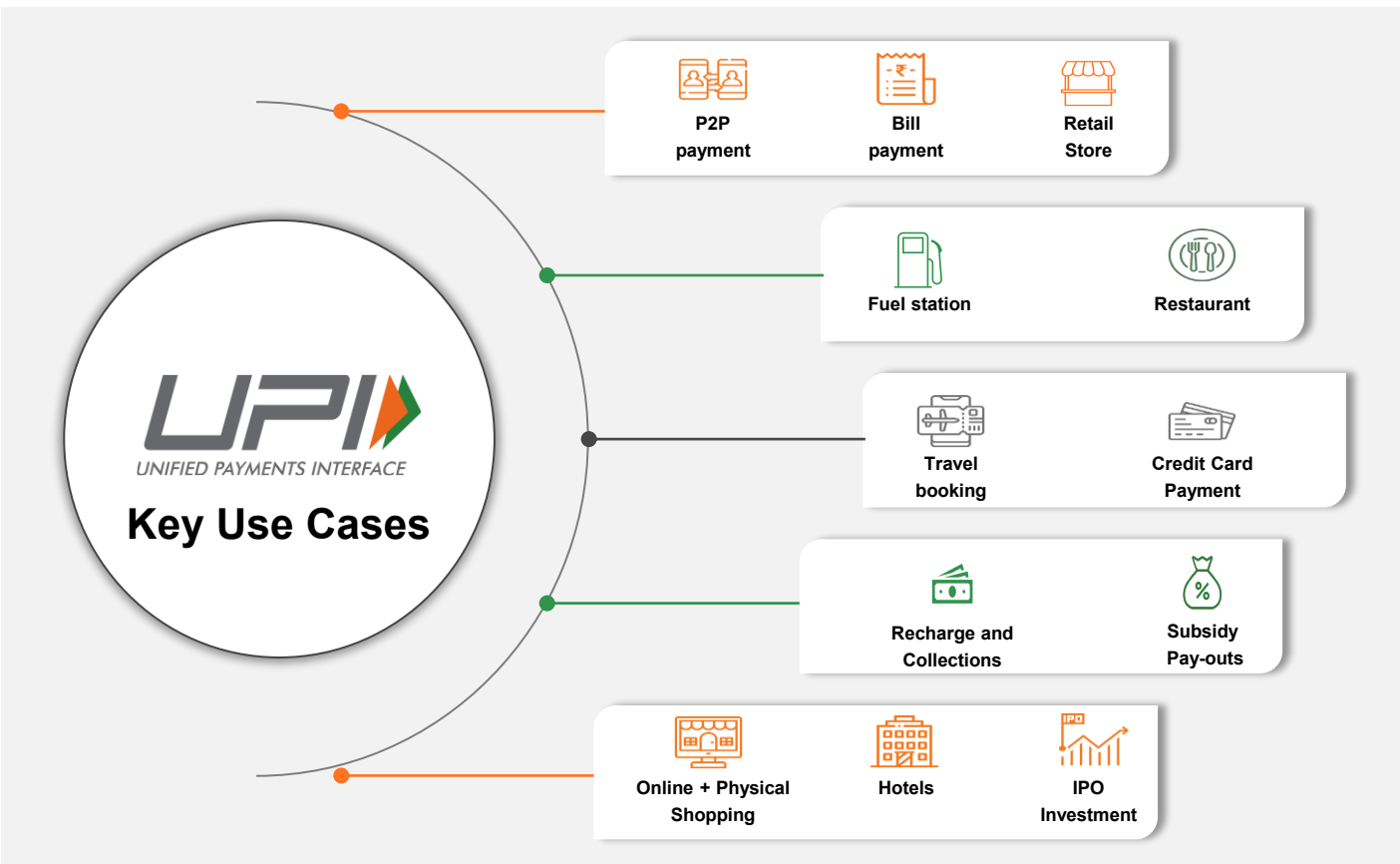
Chapter 2:

An Overview of UPI



UPI is a **multi-channel platform** that caters to the varied needs related to digital payment of end-users

Channel	Products
 Online (by using QR and/or mobile apps)  Online + Offline (by using QR and / or on-device wallet)  Offline (by using IVR on feature phones)	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Payments Types Multi-type payments:- P2P, P2M, P2P2M, P2G, G2P, B2B</p> </div> <div style="width: 45%; text-align: center;">  Recurring e-mandate based payments </div> </div>
	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>UPI Collect Pull funds from the intended remitter</p> </div> <div style="width: 45%; text-align: center;">  Instant payment system for feature phone users </div> </div>
	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>IPO on UPI Subscribe for IPO on NSE and BSE</p> </div> <div style="width: 45%; text-align: center;">  Application to process low value transactions </div> </div>
	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Credit on UPI Payments by using RuPay credit card</p> </div> <div style="width: 45%; text-align: center;">  Wallet to enable merchant transactions for foreign travelers </div> </div>
	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>NRE accounts NRI & NRE from 10 countries can make payments without Indian mobile number</p> </div> <div style="width: 45%; text-align: center;">  Access of Overdraft accounts on UPI </div> </div>



The key characteristics of UPI has added value for the end-users in terms of access to financial services, and standardization



Multiple Features

Rich features embedded into payments like RTP, mandates etc., to enable streamlined low-value payment acceptance and settlement flow



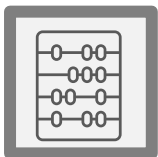
Open Banking

Adaptive framework can be provided to MNOs and FinTechs



Runs on Proxies

Trust and Security: Overlay Account details



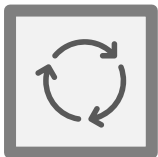
Integrated with various payment channels

Seamless integration with multiple channels of payment ecosystem



Instant Payment

Instant fund transfer: 24X7, 365 days. Also, real-time payments using Feature phones



Interoperable platform

Displace cash by enabling easy access to funds in any account across the country



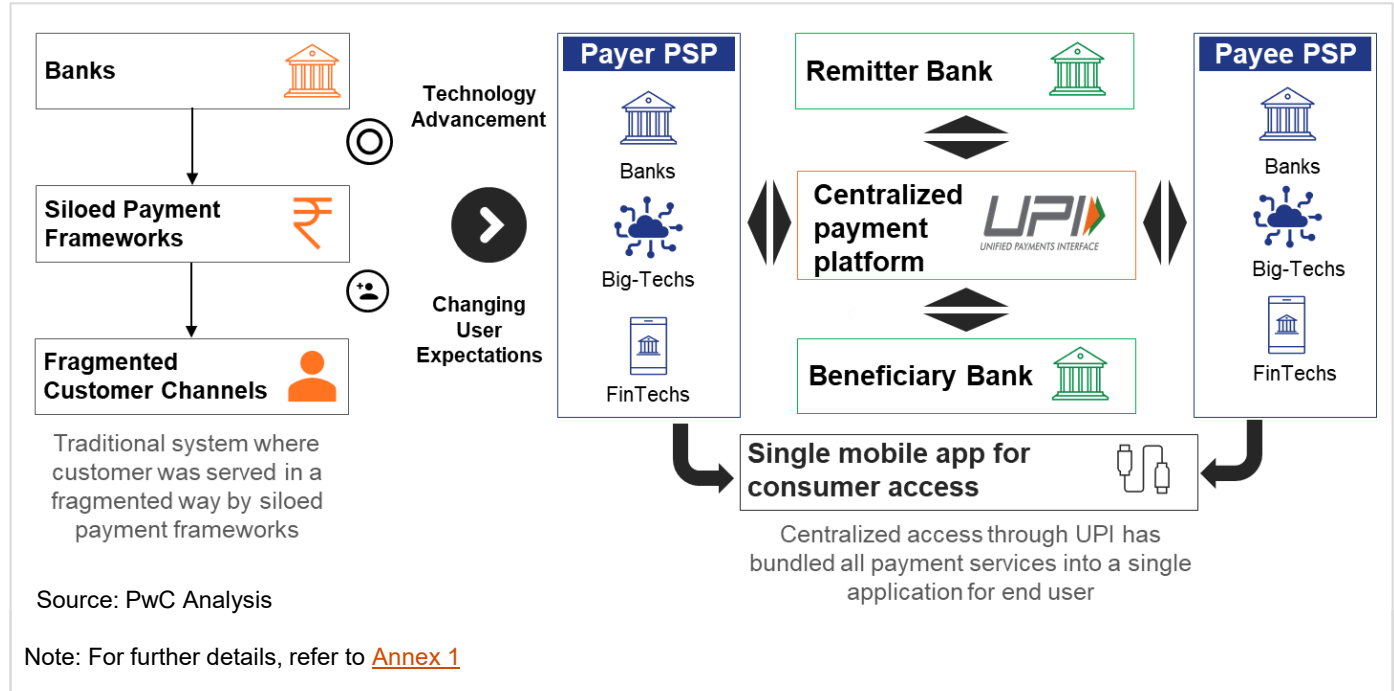
API Driven

Multiple use cases can be integrated seamlessly using APIs

India has built an ambitious platform for digital payments, including a system for sending rupees between any bank or smartphone app – Bill Gates

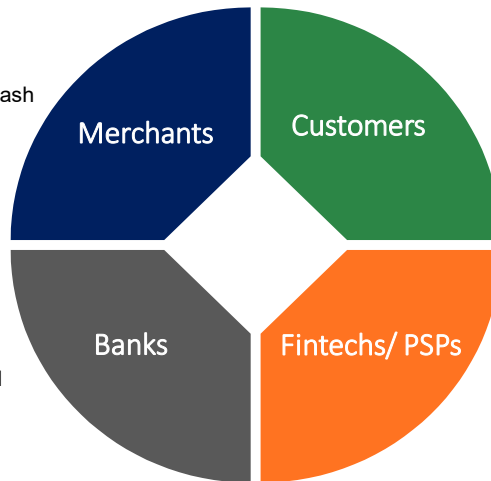
(Source: [Business Today | Dec 08, 2020](#))

The **tech architecture** of UPI has simplified the traditional payment systems, unbundled new services, and benefited the stakeholders across the ecosystem



Benefits to key stakeholders

- Low cost of acceptance
 - Accept payments without credit/debit cards
 - Eliminates need to return or handle cash change
 - Suitable for both physical and online merchants
 - Facilitates access to credit
- Low investments towards branch and PoS
 - Low cost of merchant onboarding
 - Transaction data for better understanding of customers to uplift cross-selling / upselling



- Round-the-clock availability
 - Single app for accessing different bank accounts
 - Multiple use cases for various kinds of payments
 - Ability to raise complaints from mobile apps directly
 - Convenience and ease to use
- Open architecture to promote innovative products
 - Collaborations with FIs for customer-centric solutions
 - Possibility to market innovative credit products

Source: PwC Analysis

UPI is built over the *IMPS infrastructure* and allows for *instant transfer of money* between any two parties' bank accounts



Unified Payments Interface

A payment solution designed to transform economies of the 21st century

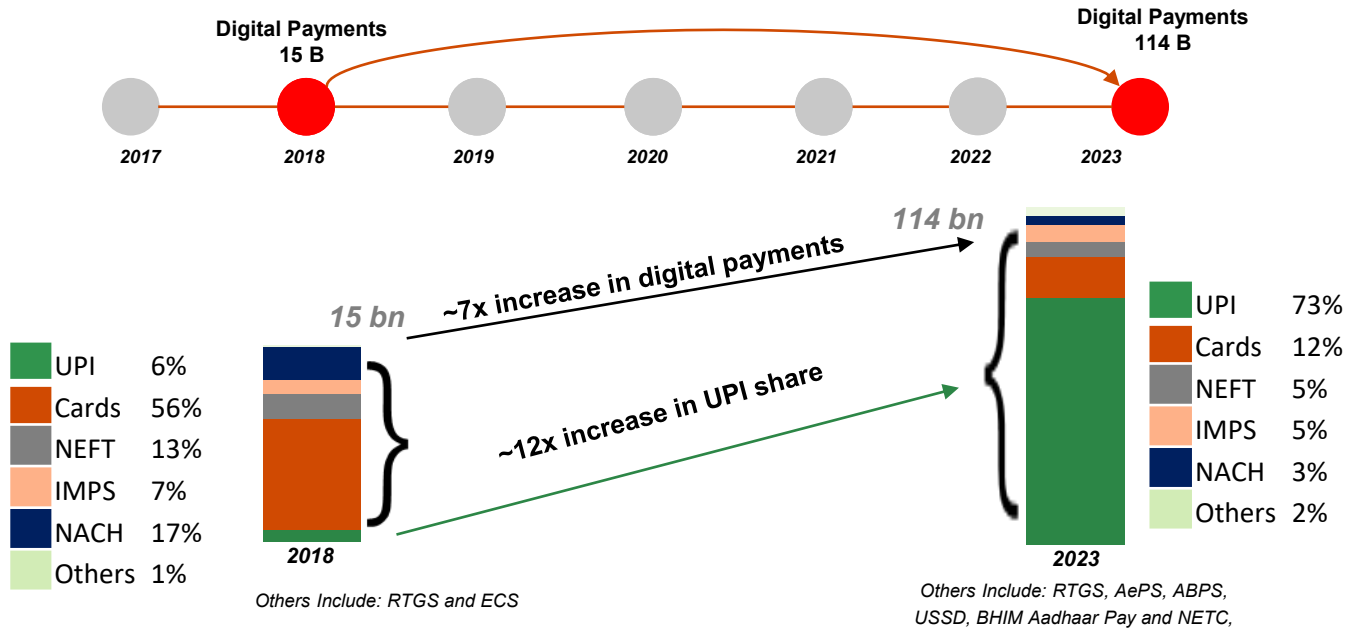
Chapter 3:

The Impact of UPI



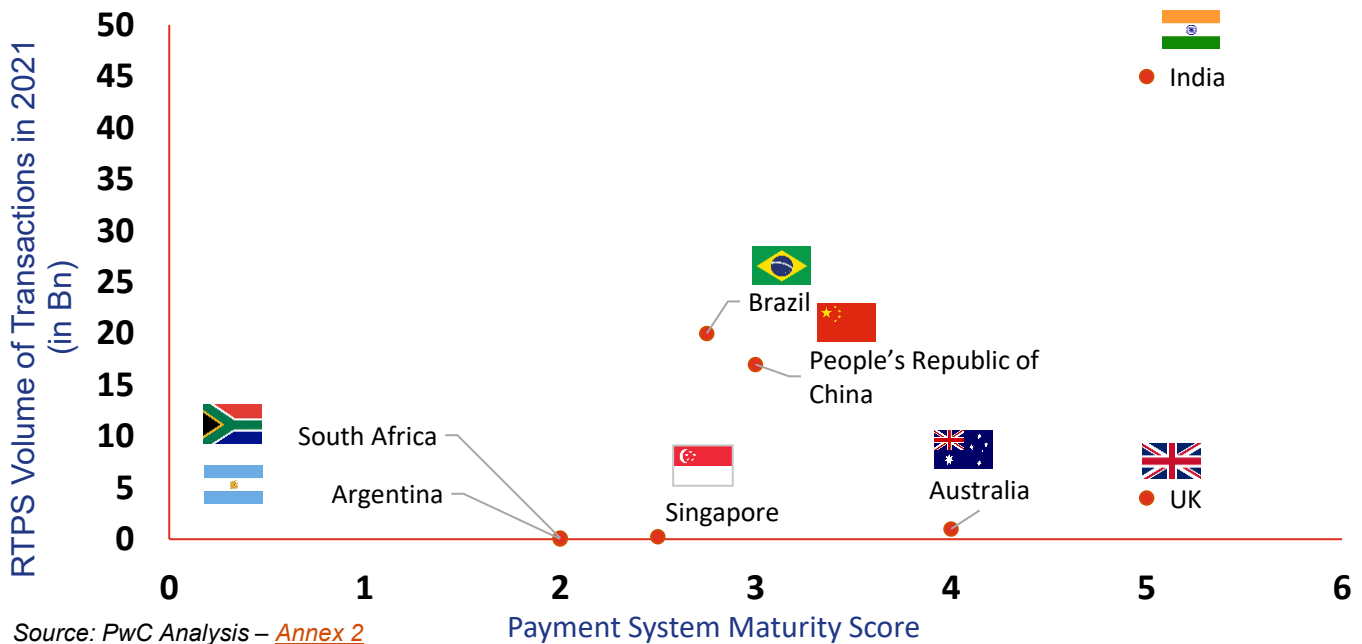
Since its launch, UPI has expanded the digital payment pie by more than seven times, achieving cash displacement while the traditional payment channels continued to grow

Digital Retail Payment Transactions



Source: RBI Website – Annual Report and Data Releases

This has resulting in positioning UPI as a gold standard that can meet the dynamic market needs of the real time payment space globally.



Source: PwC Analysis – Annex 2

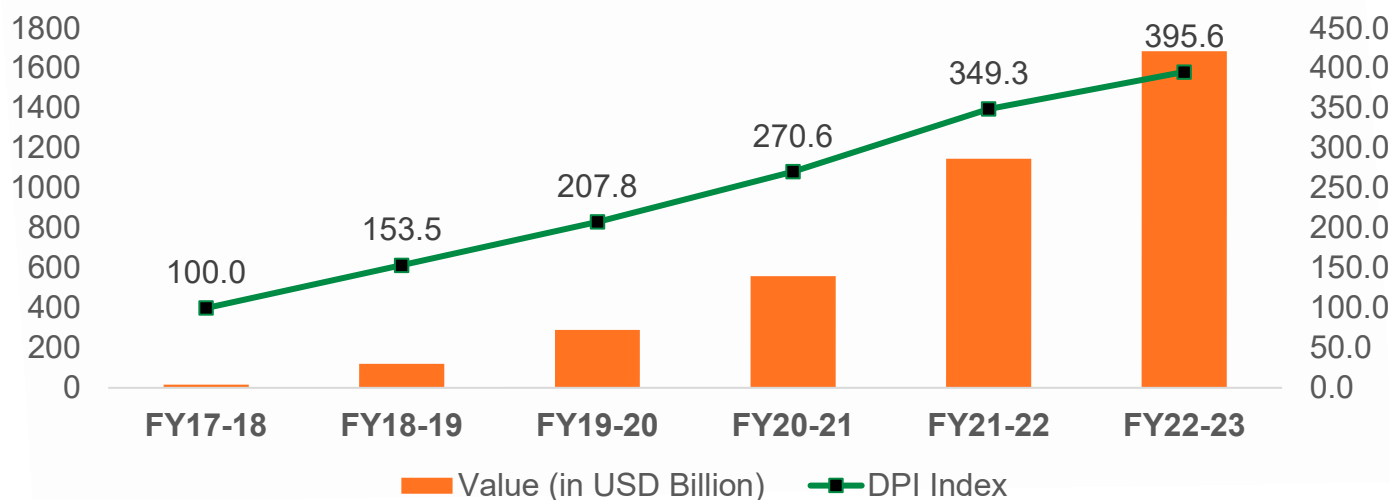
Payment System Maturity Score

The near-term goal is to get a billion transactions via UPI, from the current 30 million transactions per day, with the true potential of India being three billion UPI transactions per day. - Dilip Asbe, MD & CEO, NPCI (Source: CNBC TV 18 | Mar 29, 2023)



The growth of the digital payments index can be attributed to the increased acceptance of digital infrastructure and use of instruments such as QR

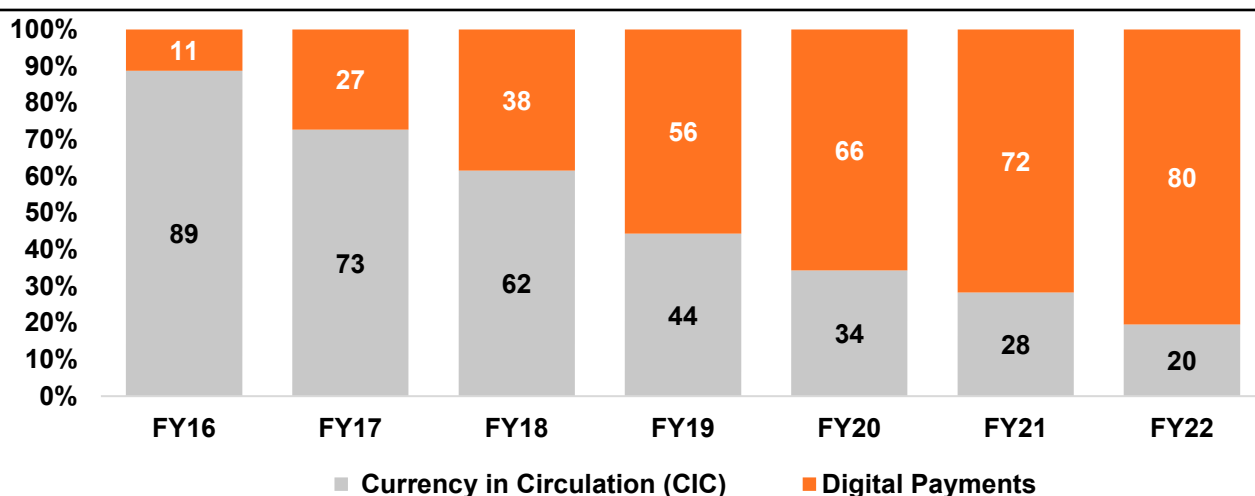
RBI Digital Payment Index and UPI Value of Transaction



RBI had created a composite **Digital Payments Index (RBI-DPI)** with **March 2018** as base to measure the **degree of payment digitisation** across the nation. The index rose to 377.46 in September 2022 from 349.30 in March 2022.

Source: [RBI Website](#)

UPI has also come a long way in making digital payments a habit, firmly placing India on track to become a **'less-cash' society**



Source: [SBI Research](#)

RBI incurred a cost of around **~\$600 Mn** to print currency in FY 2021-22 which could have been saved by moving to UPI. (Source: [Live Mint | Oct 12, 2022](#) | USD /INR FX Rate: 82.3)

Even small street vendors today tell customer not to transact in cash but via UPI instead. This shows when a facility is available, thinking also gets emboldened.

- **Hon'ble Prime Minister of India, Shri Narendra Modi**

(Source: [Press Information Bureau, Government of India | Oct 01, 2022](#))

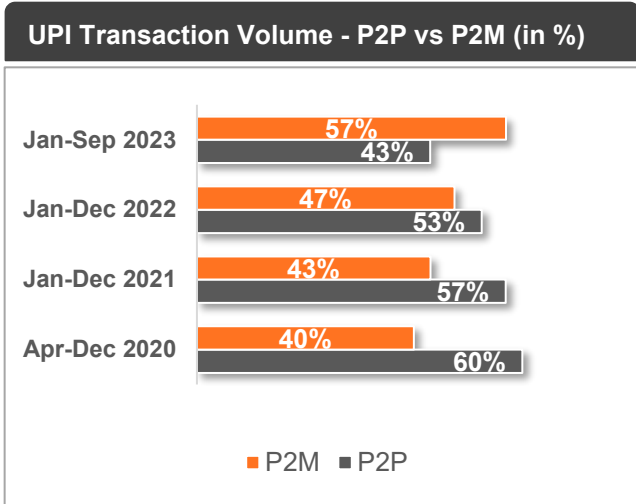
Rise in Digital Payments

Benefits: Demand Drivers

Key issues

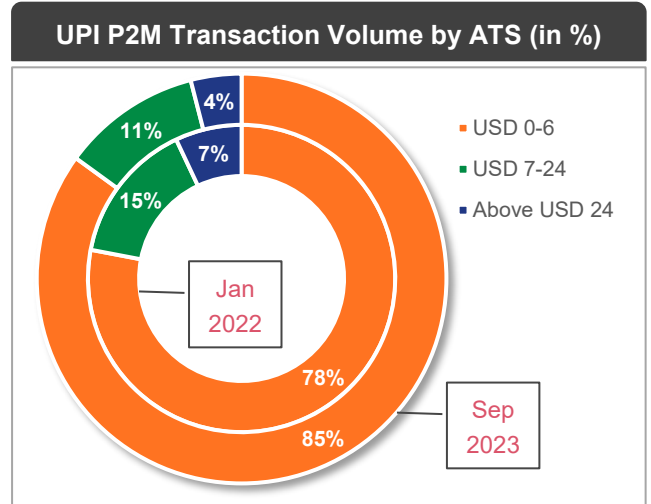


The low adoption among merchants towards accepting card-based payments due to **transaction costs** was addressed by the **low-cost model** of the UPI



Source: NPCI Website

The UPI P2M transaction volume has grown **5x** in last 3 years

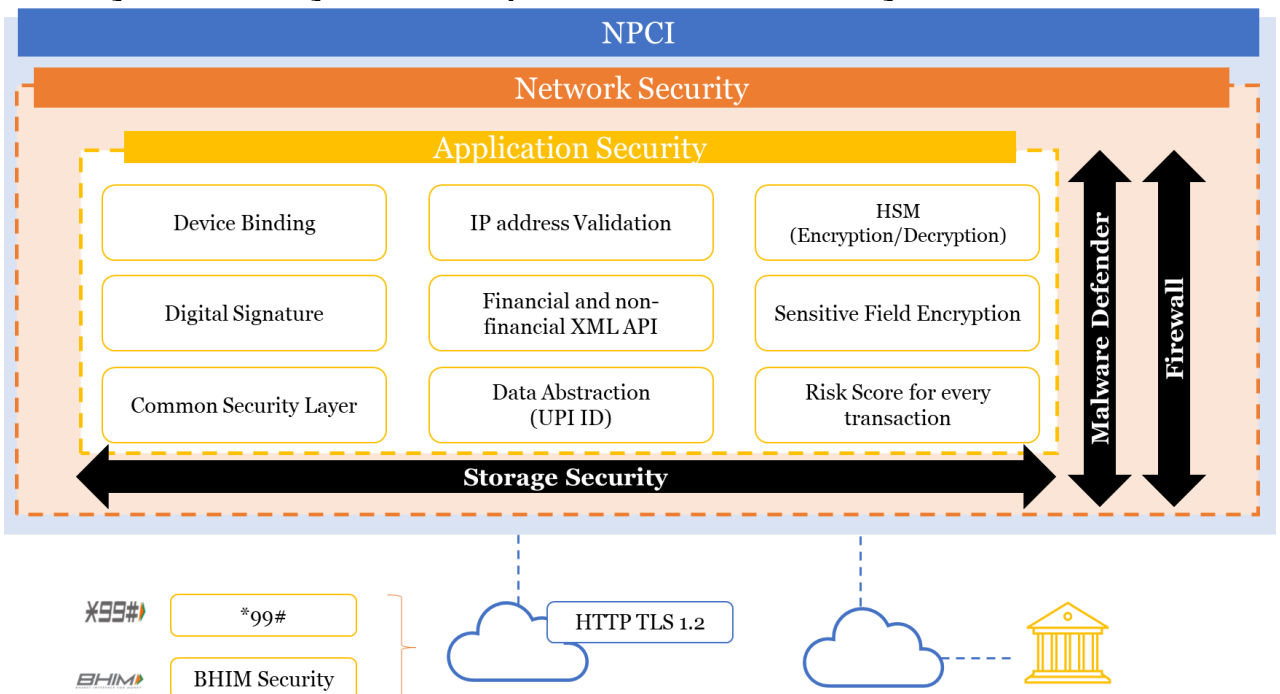


Source: NPCI Website

Low ticket size up to **\$6** continues to grow and garner a major share of the P2M market

The central **anti-fraud framework** of UPI, which uses real-time and dynamic security protocols, has been able to address end-user **fear related to fraudulent activities**

A layered security framework provides added resiliency to the UPI framework



Source: PwC Analysis

Note: Refer to [Annex 3](#) for comparison between India vs other key countries

Rise in Digital Payments

Benefits:
Demand Drivers

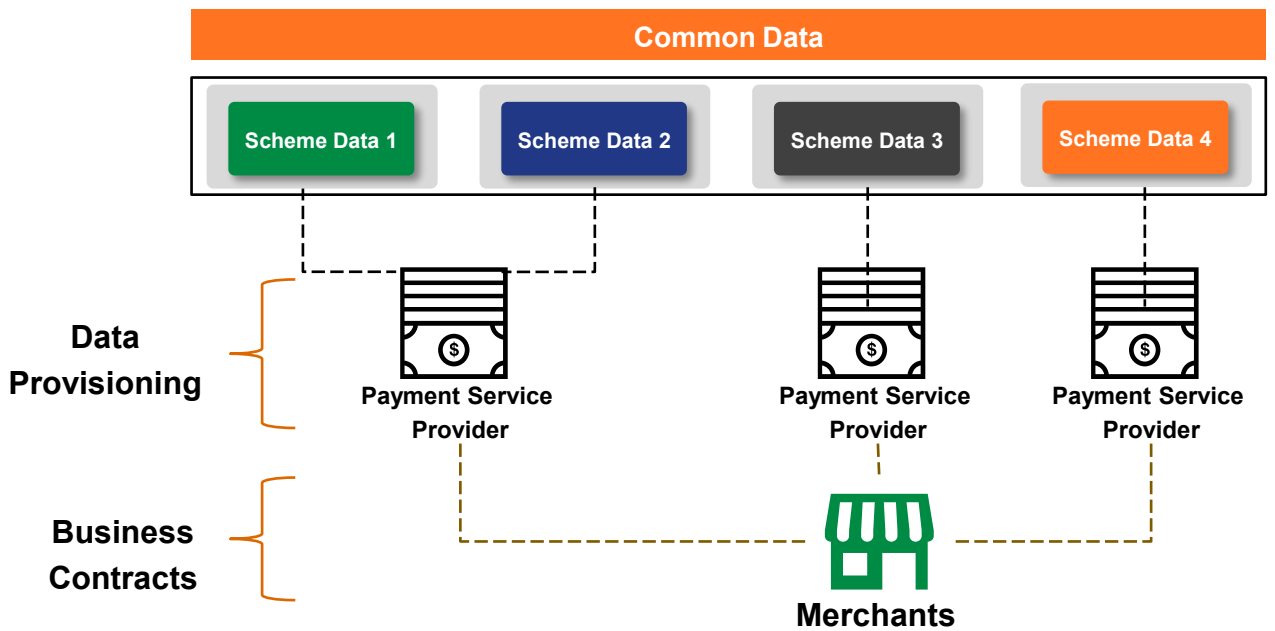
Key issues



QR interoperability feature of UPI has aided the creation of **data trail** and **formalization** of micro-merchants.



QR Based Interoperability



Source: PwC Analysis

Shared QR Infrastructure

Shared QR framework that enables stack of merchant addresses, one from each QR system stored on the QR code

Common Communication Standard

Through standard APIs, entities in the UPI framework can seamlessly communicate with each other through a standard API based protocol

Low-Cost Payment Acceptance

Through QR codes, UPI enables a low-cost payment acceptance infrastructure that is interoperable and affordable across all merchants

Considering the scale of the country, multiple interoperable QR codes should drive the acceptance infrastructure in coming years. - RBI Committee, QR code infrastructure, 2020

(Source: [Economic Times | Jul 22, 2020](#))



This in turn has enabled access to **low-cost formal credit** for MSMEs, that have been traditionally burdened by **high-cost informal credit**.

What are MSMEs doing?

With the advent of UPI, MSMEs are adopting digital payments for their day-to-day transactions which creates a valuable transaction trail.

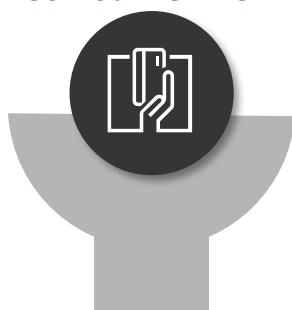
72% MSMEs transact digitally

(Source: Bluehost)

Outcome

MSMEs transacting digitally has enabled NBFCs and new-age fintechs to identify, assess and create customized credit profile of MSMEs, and provide solutions such as 'Invoice-based overdraft facility' and 'Small ticket personal loans'

Fintechs tapped on this opportunity and designed **innovative credit products** to cater the unserved MSMEs



What FinTechs are doing?

- Leverage verifiable digital transaction trail
- Categorically target thin-file or new to credit MSMEs
- Use of transaction data as a alternative for traditional cash flow statements
- Utilize regular online transactions to assess credit worthiness



How has it benefited the economy?

- Strengthen the state of India's financial inclusion
- Provide opportunity for unserved MSMEs to enter formal credit system
- Provide impetus to informal entities to register and operate as an MSME
- There was a reduction in shadow economic transactions facilitated by loan

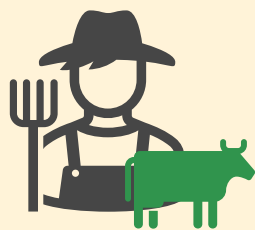
UPI is opening a world of opportunities for micro & small businesses that are the backbone of the Indian economy - Mark Zuckerberg, Facebook Co-founder and CEO

(Source: [Live Mint | Nov.06, 2020](#))



Illustrative Scenario:

Micro-SME



SURESH RAO
Rural Entrepreneur
(involved in dairy products)

PROFILE

Distributor of milk & dairy products

60-80 orders per month

Annual turnover of USD 5K-7K

Customer segments: Local customers and community centers give orders for sweets and dairy products during festive or wedding seasons. He also sells milk to local customers daily.

Transaction mode: As the payments received are instantly and in cash, the inclination to receive digital payments was low. Also, he was unaware about digital payments and its benefits.

Key Pain Points

- Unable to borrow funds to scale business (Small value transactions).
- Having to travel up to 5-7 km to visit bank branch and deposit cash.
- Risk of theft while traveling to and from home and bank branch.
- Impulse purchasing as cash is in hand and not stored in a bank account.

65%

of the income was now received directly into digital bank account

Key Initiatives

- Created UPI ID 6 months ago, by participating in the financial inclusion camp organized by a bank.
- Faced challenges initially due to limited understanding of technology and end-of-day sales reconciliation.
- Attended financial literacy trainings to understand the process and his business activity.

30%

rise in income due to digitisation of earnings

Impact

- Increased sales and productivity due to less travel time to the bank
- Better control over household finances
- Access to additional financial services such as insurance for business, and Government savings schemes
- Access to finance from formal channels due to digital transaction trail

30%

increase in small savings as earnings are directly deposited in his bank account

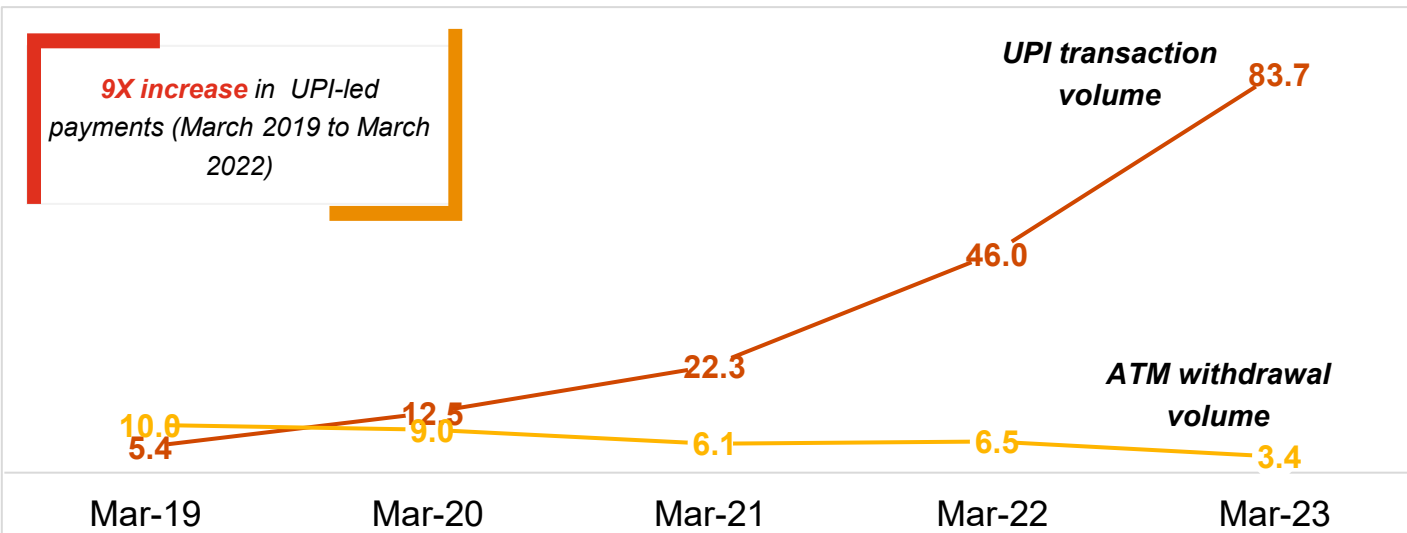
I am very happy with the UPI service and with the power to carry out digital transactions. I will continue to learn more and invest in other Digital Financial Services.

- Suresh Rao, Rural Entrepreneur (Source: PwC Analysis)



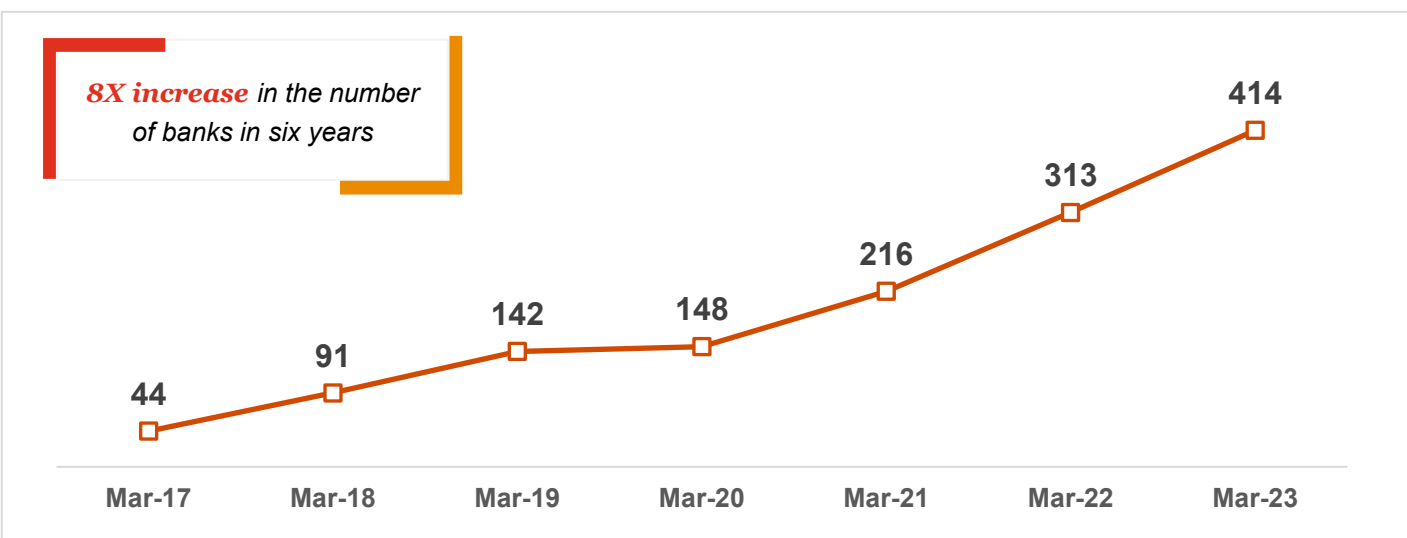
Banks were quick to adopt UPI and reduce their spending on **payment infrastructure** due to lower usage of ATMs

ATM withdrawal vs UPI transaction volume (in billion)



Source: RBI and NPCI Websites

No. of banks that have adopted UPI



Source: NPCI Website

The replacement of **ATM cash withdrawals** with **UPI-based payments** was more prevalent during COVID-19 pandemic, when users preferred contactless digital transactions for day-to-day transactions.

UPI was thoughtfully planned, and critical aspects of its design led to its success - Google's letter to Federal Reserve imploring to build a RTPS on the lines of UPI.

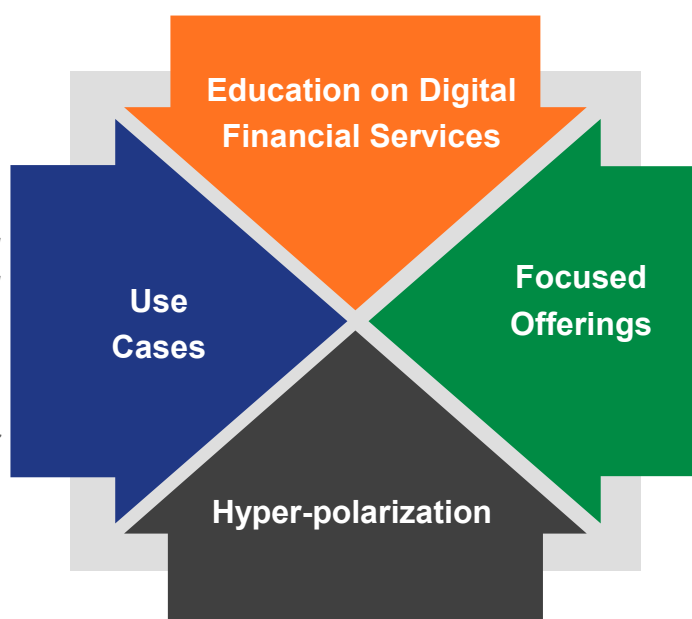
(Source: [Federalreserve.gov](https://www.federalreserve.gov) | Nov 07, 2019)



Education, awareness and implementation support by private and public sector played a critical role in the overall adoption of UPI among the end users

Multiple initiatives and approached have been used to promote digital payments

- Awareness about customer rights & payment process for effective adoption
- New players are driving financial literacy through merchants and digital promotion



- New use cases (like request to pay, QR and BBPS) have been used in extending the value proposition to provide relevant rural payments products with higher adoption.

- Integration of specific digital payment methods on mobilephones by organisations to drive digital payment adoption.
- For example, offline payments using IVR in areas with low internet connectivity

- Hyper-polarization of payments applications to drive end-user adoption and make payments applications relevant for the underserved

Key examples of financial literacy



Central Bank of India

Financial Literacy Week

Source: [Press Information Bureau, Government of India](#) | Feb 14, 2023



Leading Rural Fintech company

Community based ecosystem to promote digital payment literacy



A FinTech Player

Initiative to educate One million rural women



Digital awareness campaign launched by the NPCI

Financial inclusion is a major step towards growth which ensures the overall economic development of the marginalized sections. – Hon. Finance Minister, Nirmala Sitharaman

(Source: [Press Information Bureau, Government of India](#) | Aug 28, 2022)

Rise in Digital Payments

Benefits: Supply Factors

Key issues



The impact of UPI adoption becomes more evident when low-income states also cross the national average of digital transactions per capita

‘UPI Sabka Hai’ a digital solution that is not only for affluent, but for the masses

	States and Union Territory	MPI Score (2019-21)	Digital Payments Per Capita
STATES	Andhra Pradesh	0.025	17.68
	Arunachal Pradesh	0.059	1.04
	Assam	0.086	1.76
	Bihar	0.160	1.36
	Chhattisgarh	0.070	0.42
	Goa	0.003	5.89
	Gujarat	0.050	2.39
	Haryana	0.031	12.42
	Himachal Pradesh	0.020	2.83
	Jharkhand	0.131	1.81
	Karnataka	0.031	6.54
	Kerala	0.002	2.91
	Madhya Pradesh	0.090	2.18
	Maharashtra	0.033	6.95
	Manipur	0.034	0.80
	Meghalaya	0.133	0.77
	Mizoram	0.024	0.55
	Nagaland	0.066	0.58
	Odisha	0.070	5.28
	Punjab	0.020	2.04
Rajasthan	0.065	2.38	
Sikkim	0.011	2.14	
Tamil Nadu	0.009	3.44	
Telangana	0.024	2.57	
Tripura	0.056	1.11	
Uttar Pradesh	0.103	7.73	
Uttarakhand	0.041	3.91	
West Bengal	0.050	3.16	
UNION TERRITORIES	Andaman & Nicobar Islands	0.009	2.35
	Chandigarh	0.017	38.48
	Dadra & Nagar Haveli	0.039	8.78
	Delhi	0.014	9.31
	Jammu & Kashmir	0.020	0.80
	Lakshadweep	0.015	1.27
	Puducherry	0.004	4.91

Low-income states – Uttar Pradesh and Odisha – have average digital payments transactions higher than the national average (i.e. 3.85).

3.85

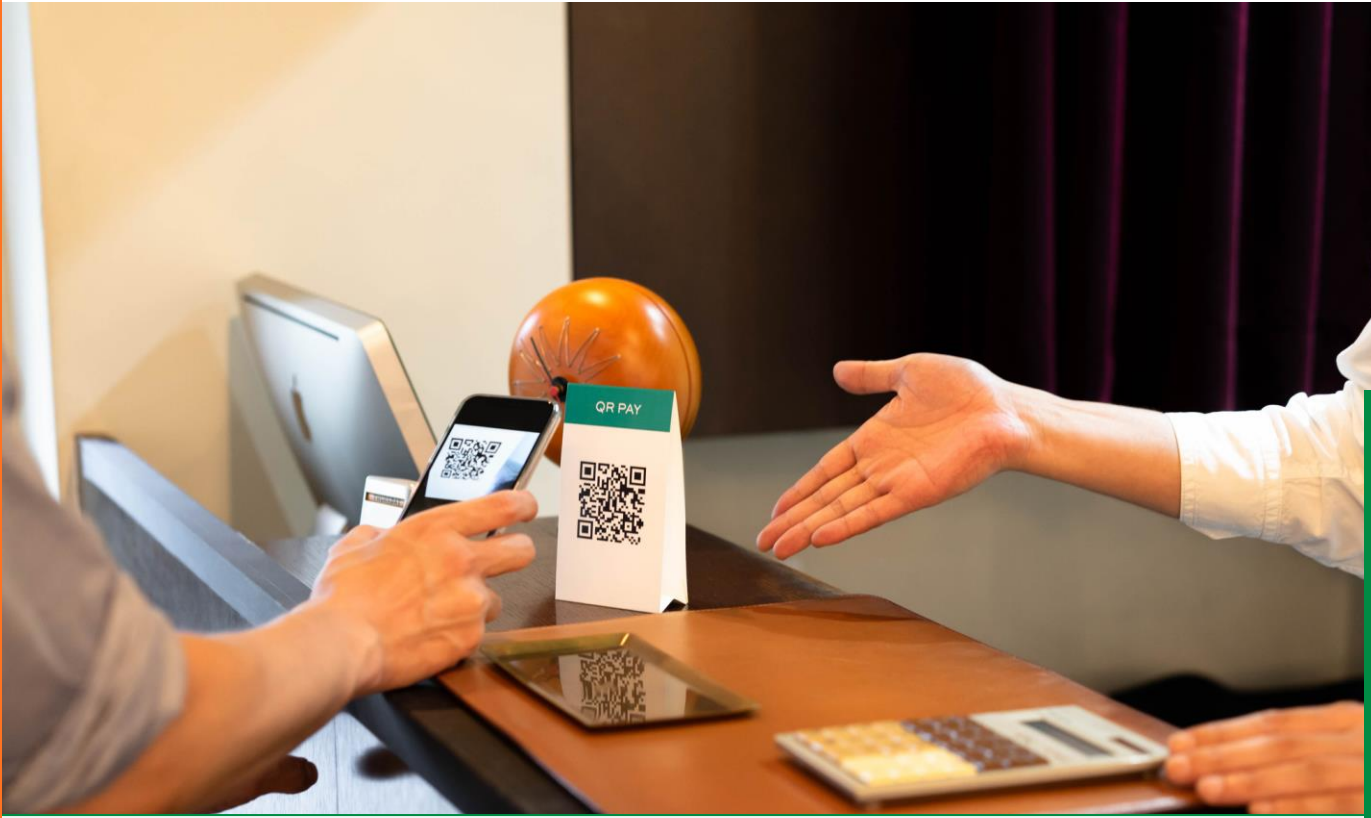
Average digital payment transactions per capita
(Data upto 31 Oct 2023)

Note: The MPI score ranges from 0.002 to 0.160, where 0.002 is the lowest MPI score. Also, higher values imply higher multidimensional poverty.

Sources:

Multidimensional Poverty Index (MPI score): [Niti Aayog](#), 2021

Digital Payment Transactions (Per Capita Basis): [DigiDhan](#)



Unified Payments Interface

A payment solution designed to transform economies of the 21st century

Chapter 4:

Way Forward

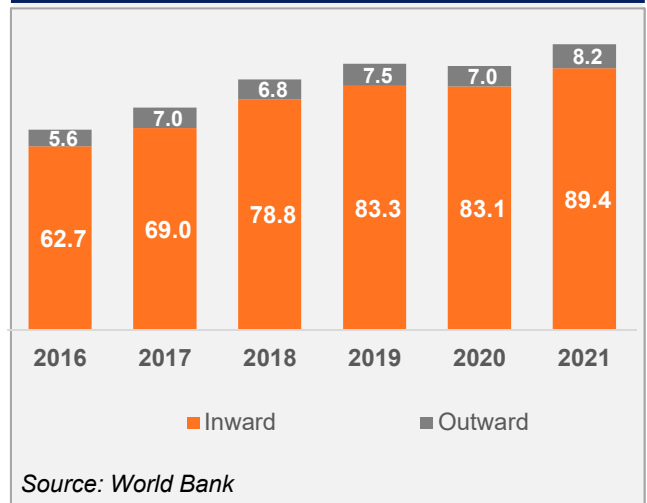


NPCI has initiated expansion of UPI to international markets, which can in turn help to lower the cross-border remittance fees and enable seamless merchant payments.

India remains the leader in the global remittance inflows

- India is the largest global market for inward remittance flow, followed by People's Republic of China and Mexico.
- India's inward remittances primarily come from the Middle East and the USA, with most outward remittances sent to Nepal and Bangladesh.
- Since 2016, India's cross-border remittances have been growing steadily, driven by the increase in global mobility of goods and services, international travel and international workforce.
- Despite the availability of conventional modes, the transaction fees and excessive regulatory and documentation requirements make small-ticket transactions unattractive.

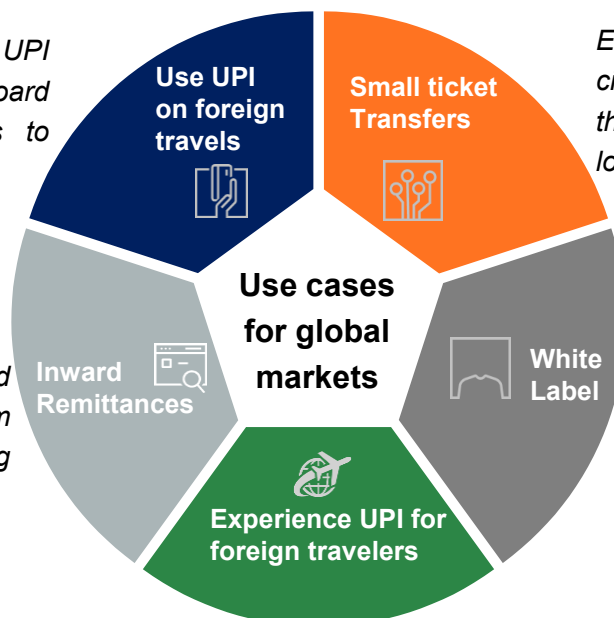
India's Remittance Flows (US\$ Bn)



Internationalising the UPI framework to onboard international merchants to the UPI framework

Enabling NRIs and Indian citizens to receive money through UPI but also targets low-value B2B payments

Utilising UPI to affect inward remittance transfers from foreign countries, replacing legacy players



Helping foreign economies to deploy UPI in their countries to replicate UPI's success in India

Enabling NRI and NRE account holders to make payments without an Indian mobile number and facilitating a wallet feature for P2M transactions for foreign travelers.

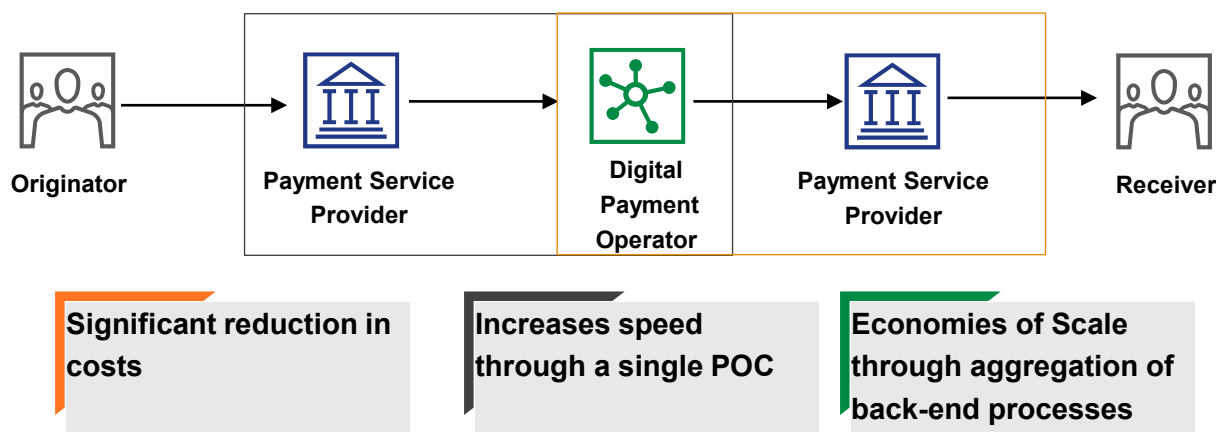
“Japan will send a team to India after April's G7 meeting to closely study the UPI platform. Japan may also consider linking systems if it adopts UPI” - Mr. Kono Taro, Digital Minister of Japan

(Source: Live Mint | Mar 12, 2023)

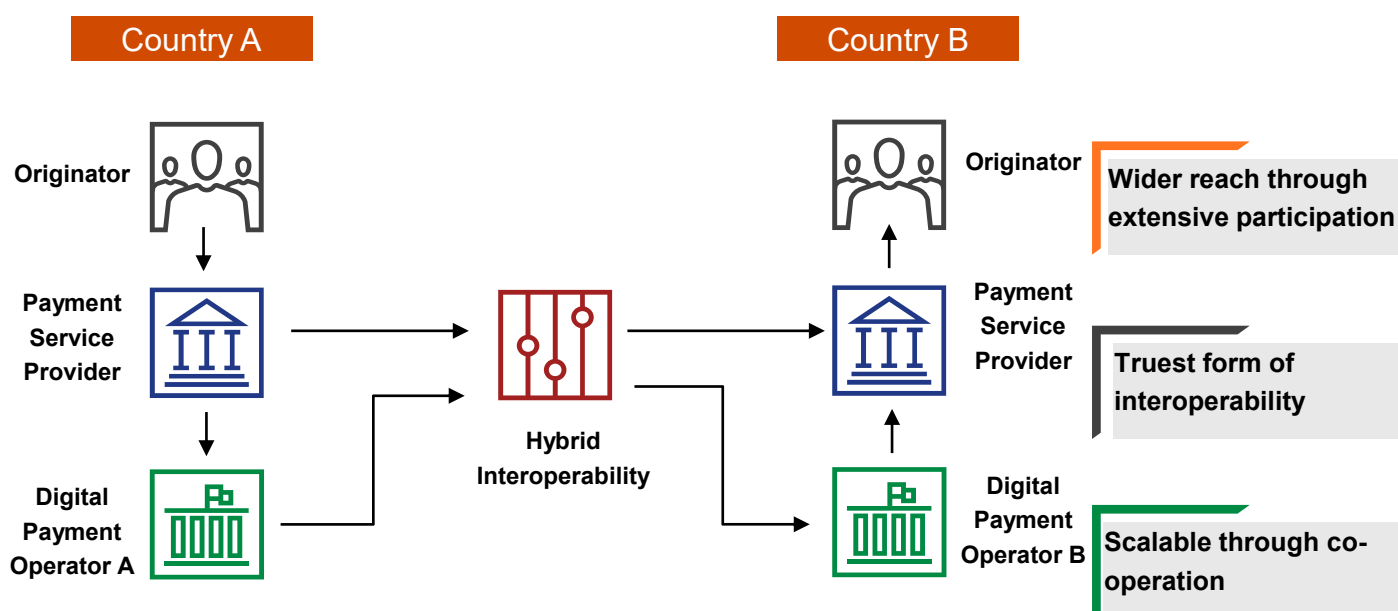
NPCI has been able to amend the legacy approach for cross-border payment by building interoperability between the real time payment systems of two countries

Interoperability is a key factor to ensure **consistent user experience across cross-border transactions**. NPCI International Payments Limited (NIPL) in this regard, through a **platform approach** ensures there is **consistency** across back-end processes translating to a unified experience. To this end, NIPL has explored/delivered **two key approaches** that ensure collaboration and simplification of cross-border transactions.

1) UPI to act as a single point of connectivity



2) UPI & international counterpart to allow connectivity between two real time payments systems



User Journey:

Singapore Real Time Payments & UPI: Real time payments in Singapore, now a reality

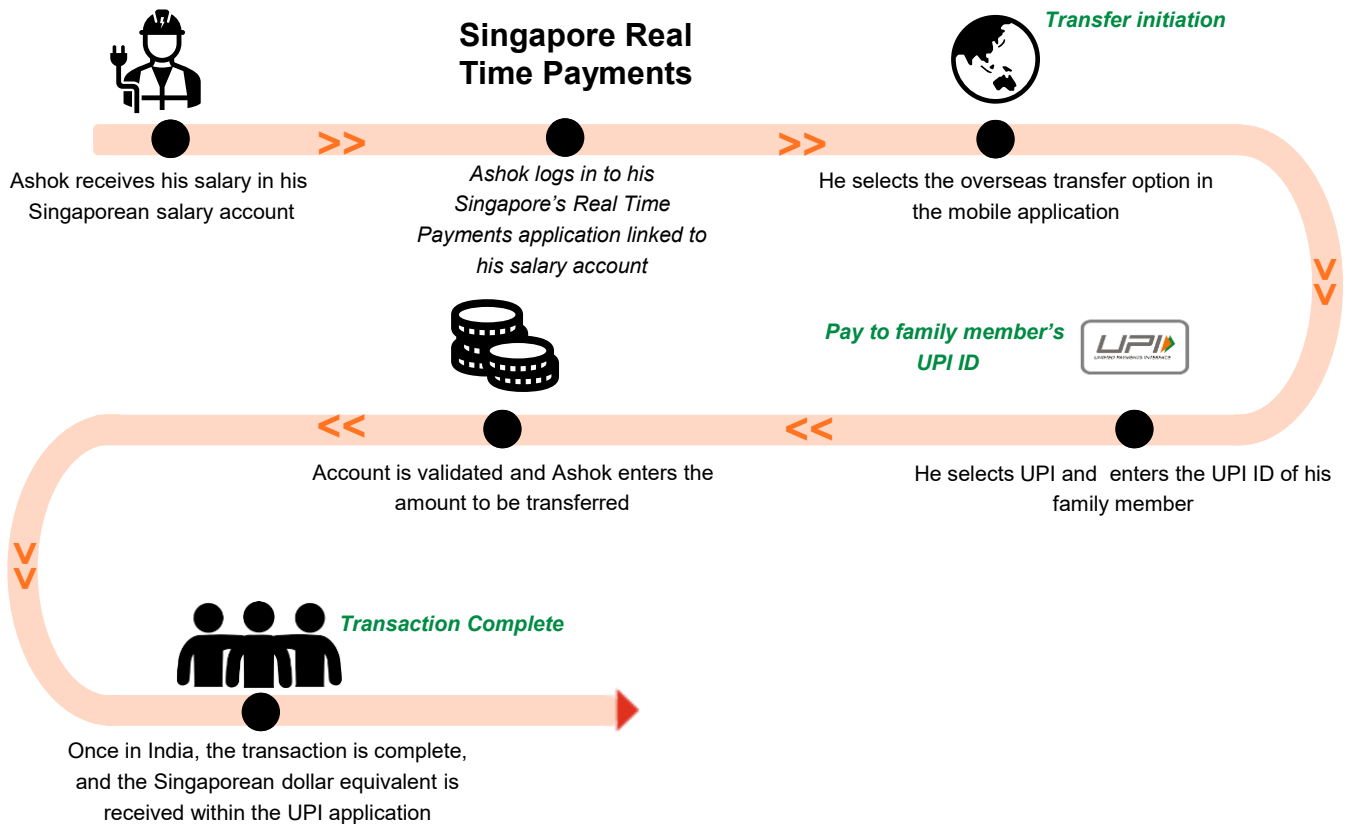


Ashok – A migrant worker in Singapore wants to send money back home to India

Ashok is a migrant worker in Singapore. Having family back in India who extensively use UPI, he is overjoyed to know that he can send money to his family because of UPI's integration with Singapore's Real Time Payments

Let's see how Ashok used digital remittance services using '*Singapore Real Time Payments-UPI*'.

Journey



Benefits of Singapore Real Time Payments - UPI

- Low Cost, Cheaper alternative for remittance-based payments
- Instant funds transfer to beneficiaries
- No need to carry Forex/incur heavy forex conversion charges
- Safe, Secure and Convenient
- Save on credit/debit card fees associated with international usage

NPCI International has been actively engaged with the counterparts to enable cross-border transaction and expand the adoption of UPI globally.

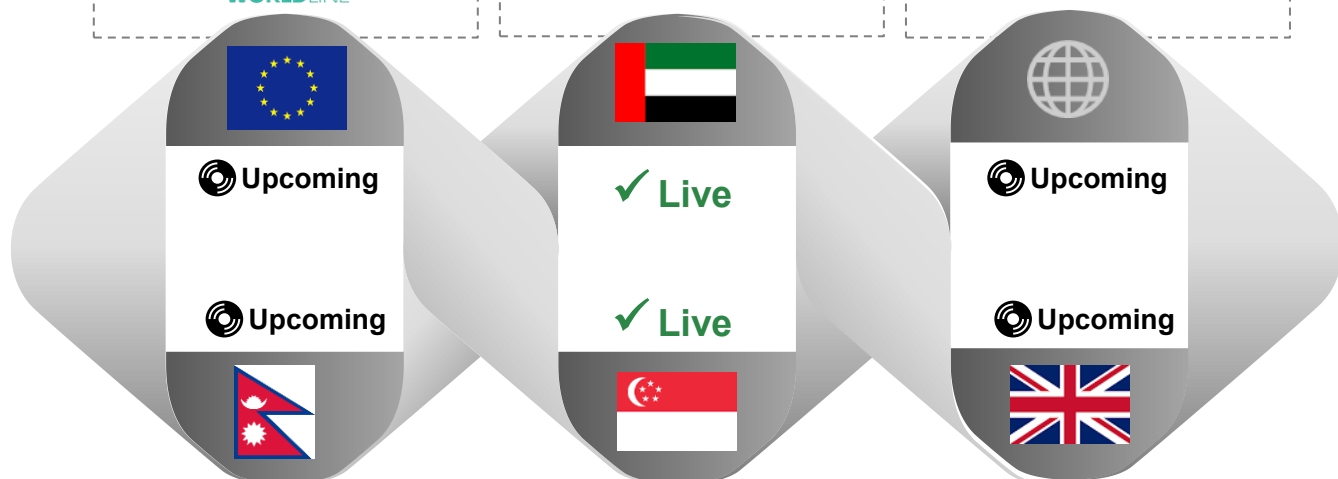
Indian tourists are empowered to make **mobile payments during their travel to Europe**. Worldline became the first European Union acquirer to offer an opportunity to European merchants to build on their Indian customer base.



Indian tourists can now make seamless payments through BHIM UPI across Neopay enabled merchants through **Neopay terminals in the UAE**



Indians with active UPI IDs can transact at QR code-enabled **merchant locations by TerraPay across the globe**.



Nepal became the first country to adopt UPI and allow P2P **cross-border remittances between Nepal and India**



Singapore Real Time Payments-UPI linkage enables users to make **instant fund transfers** directly from one bank account to another, between **Singapore & India**.

Indians can use UPI to make **in-store payments** in the UK through **PayXpert's solution**



Note: This is an indicative list of initiatives undertaken by the NPCI and is not exhaustive.

It is a far-sighted move, that would benefit the NRIs, when they visit India and pay easily at merchant locations. - Vishwas Patel, Chairman, Payments Council of India

(Source: [Indian Express | Jan 19, 2023](#))

Key Pain Points of Global Economies Related to Real-time Payments



Non-standardized QR

Some real-time payment rails do not have active interoperability and seamless fund transfer (QR codes) facility for individuals and merchants.

Key Features of UPI that may assist Global Economies

Interoperable QR code

A single interoperable QR code across banks, PPI and third-party apps to ensure that there are no platform/bank limitations during transactions.

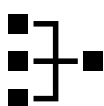


Complex & Time Intensive

Onboarding: Onboarding smaller banks and FinTechs on the new system sometimes becomes difficult due to additional cost towards migration and adoption.

Lower Cost of Onboarding

The costs incurred in UPI integration are marginal since open APIs are used and the features are modular.

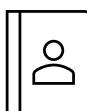


Limits of Legacy Systems

Banks may require a completely new set of integration services to comply with the requirements of new system, which makes migration complex and fraught with risks.

Modular & Open-source Tech Stack

An open stack, open-source messaging protocol (which can be customised to ISO 20022) and platform-based payment rail utilised by UPI can ease the overall migration and integration.



Ineffective Proxy Mechanism

Real-time payment system of some economies still run on account numbers and do not have alias or a proxy-based system for digital payments.

Runs on Aliases

UPI runs on alias or proxy-based payment, and can cater to any and all types of proxies (Mobile, NID, Customer Choice, etc.)



Weak Anti Fraud Capabilities

Some real-time payment system lack real-time fraud prevention engine to detect and avoid fraudulent transactions and reduce overall risk.

Real Time Anti-Fraud Engine

UPI has a real-time, centralised anti-fraud solution built on AI and NLP that may decrease the number of fraudulent transactions.



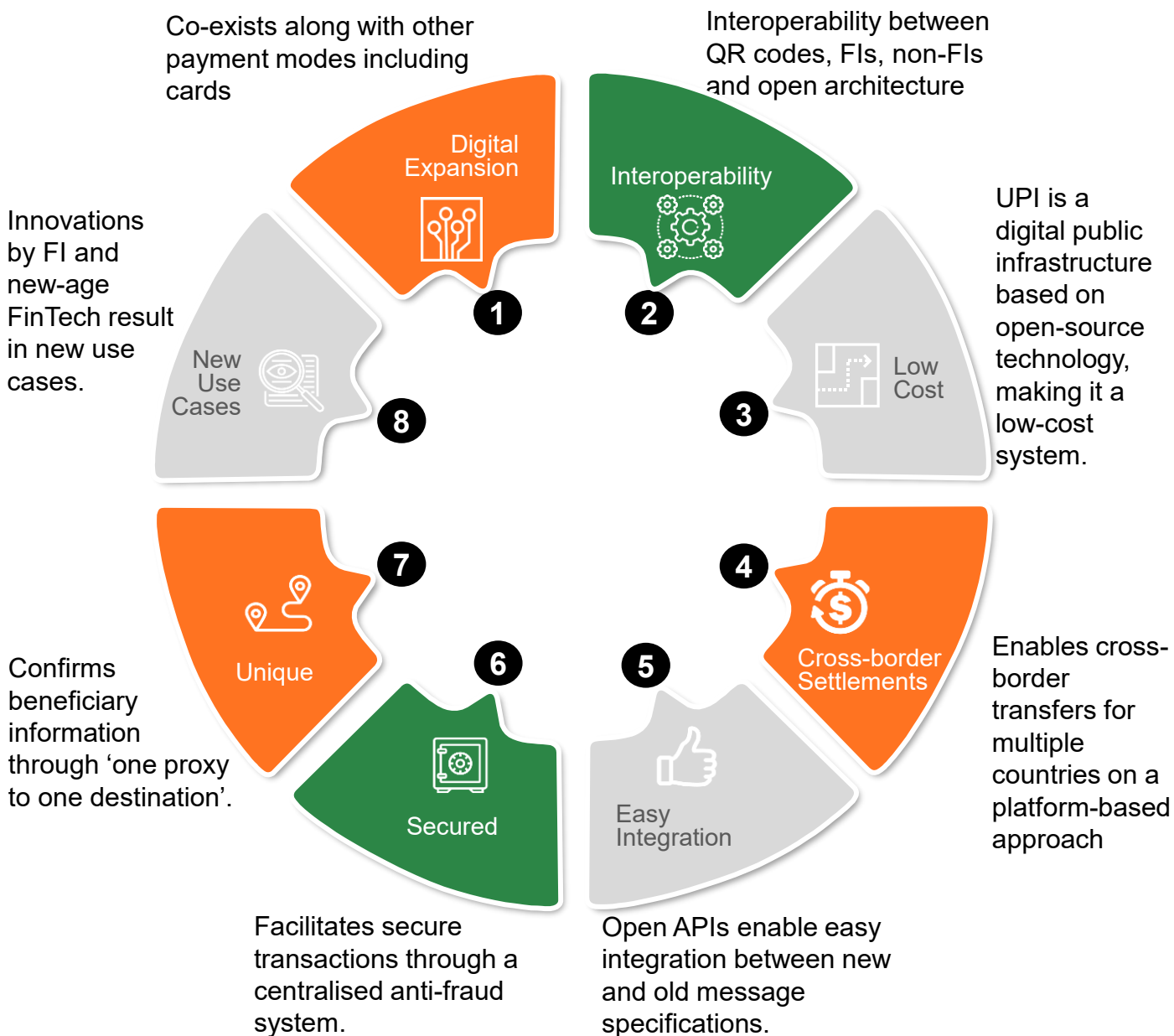
Unified Payments Interface

A payment solution designed to transform economies of the 21st century

Chapter 5: Conclusion



In all, there are **eight prominent**, non-negotiable features of UPI that make it the most accepted and desired payment solution across the globe.



AePS – Aadhaar enabled Payment System	MNO – Mobile Network Operator
AI – Artificial Intelligence	MPI – Multidimensional Poverty Index
AML - Anti Money Laundering	MSME – Micro, Small and Medium Enterprises
API – Application Programming Interface	NBFC – Non-Banking Financial Company
ASER – Annual Status of Education Report	NEFT – National Electronic Fund Transfer
ATM – Automated Teller Machine	NIBSS – Nigeria Inter-Bank Settlement System
ATS – Average Ticket Size	NIPL – NPCI International Payments Limited
B2B – Business to Business	NPCI – National Payments Corporation of India
BBPS – Bharat Bill Payment System	NRI – Non-Resident Indian
BHIM – Bharat Interface for Money	OD – Overdraft
CAGR – Compounded Annual Growth Rate	ONDC – Open Network for Digital Commerce
CIC – Cash in Circulation	P2G – Person to Government
DBT – Direct Benefit Transfer	P2M – Person to Merchant
DPI – Digital Payments Index	P2P – Person to Person
FI – Financial Inclusion	PSP – Payment Service Provider
FI – Financial Institution	QR Code – Quick Response Code
G2P – Government to Person	RBI – Reserve Bank of India
GDP – Gross Domestic Product	RTP – Real Time Payments
GST – Goods and Services Tax	SEPA - Single Euro Payments Area
HTTPS - Hypertext Transfer Protocol Secure	TCH – The Clearing House
IMPS - Immediate Payment System	TPAP – Third Party Application Provider
IPO – Initial Public Offering	TPS – Transactions Per Second
IVR – Interactive Voice Response	UPI – Unified Payments Interface
KYC – Know Your Customer	USA – United States of America
MDR – Merchant Discount Rate	XML – Extensible Markup Language
ML – Machine Learning	

UPI's Technical Scalability & Innovation

UPI works on a broker model where the platform facilitates role-based transmission between entities

Transaction per Second

10,000

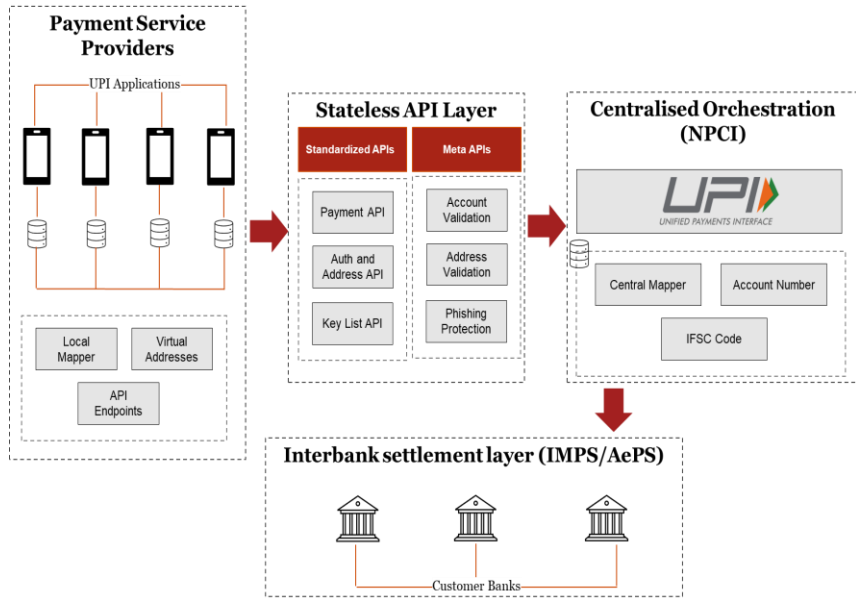
TPS

5x-10x more than legacy payment alternatives

Authentication & Auth

Separated

Authentication and authorization flows are separated through device binding



Inherent features in the UPI architecture has a positive impact on scalability and resiliency

Stateless API's



Stateless APIs exposed over HTTPS using XML input and output

Enables scaling APIs to million of users concurrently on multiple servers

Centralized Orchestration



A single access point for all PSPs via APIs

A central orchestration enables acceptance from various channels facilitating scaling at a faster pace via a single interface.

Asynchronous Processing



Request is sent, response is sent back separately via corresponding response API

Request and response are independent of each other, so the entire framework is not blocked as a result of traffic

Framework for maturity comparison of UPI vis-a-vis global RTPS framework

Scale and Maturity of Selected Payment Systems

Country	Payment System	Scale RTPS Volume in 2021 (in millions)	Maturity				
			Additional adoption*			Easy accessibility of citizen (mobile phones, smartphones)**	Overlay Services#
			Request to Pay Feature	Standardized API	Proxy identification (ID, Mobile, Etc.)		
Argentina	Immediate Transfer	25	NA	NA	✓	✓	✓
Australia	NPP	970	NA	✓	✓	✓	✓
Brazil	Pix / SPI	8,800	NA	NA	✓	✓	✓
People's Republic of China	IBPS	17,000	NA	NA	✓	✓	✓
India	IMPS, UPI	45,000	✓	✓	✓	✓	✓
South Africa	RTC	123	NA	NA	✓	✓	✓
UK	FPS	3,400	✓	✓	✓	✓	✓
Singapore	FAST	256	NA	NA	✓	✓	✓

Source: Developments in retail fast payments and implications for RTGS systems, 2021

Anti fraud framework India vs other key countries

Country	Payment Service Operator	Central transaction Monitoring	Central transaction Scoring
India	NPCI		
Nigeria	NIBSS		
SEPA	STET		
South Africa	BankservAfrica		
USA	TCH RTP		

 Mandatory Requirement

 Optional Requirement

 Not Applicable