Ministry of Housing and Urban Affairs
Government of India

NPCI
भारतीय राष्ट्रीय भुगतान निगम
NATIONAL PAYMENTS CORPORATION OF INDIA

NCMC - Tap & Transit, Pan India with RuPay

NATIONAL COMMON MOBILITY CARD

BUS

METRO

AUTO

TAXI

TAXI

PARKING

RETAIL

INSTITUTE OF URBAN TRANSPORT (INDIA)

ITDP INDIA

NCMC - Tap & Transit, Pan India with RuPay

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Foreword

The Digital India programme, launched in 2015, takes forward the pioneering vision of the Hon'ble Prime Minister Shri Narendra Modi, for ensuring digital access, digital inclusion, bridging the digital divide and digital empowerment, leading to India's transformation into a knowledge-based economy and digitally empowered society. It weaves together a large number of ideas and thoughts into a single comprehensive vision to ensure that benefits of development reach each and every citizen of the country, along with timely delivery of services.

Keeping the vision of Digital India, National Common Mobility Card (NCMC) was launched in 2019 as part of the "Make in India" initiative by the Ministry of Housing & Urban Affairs (MoHUA) to overcome the issues with cash payments in the transportation sector and to establish a cheap and dependable system that functions across all modes of transportation. The project's goal is to make "One Nation One Card" available for all transit transactions. NCMC can also be used to perform low-value offline retail transaction which will further the cause of Digital India.

The working paper drives deep into National Common Mobility Card, providing valuable information into its implementation, and expected benefits. It underscores the government's dedication to building an inclusive and sustainable transportation ecosystem that caters to the needs of all stakeholders. With the present NCMC card base, commuters can travel across India with single card irrespective of their mode of travel.

At present, NCMC is being implemented in Metros and State Bus Transport across the nation. The implementation of NCMC will be extended to all other modes of public transport like e-buses, trains, auto-rickshaws, ferries, taxis/cabs, and monorails. The aim is to make it easier for commuters to use NCMC from the first mile to the last mile of the route, making the journey seamless. This will also bring standardization across public transit ecosystem in terms of issuance, acceptance, networking interfaces, clearing, settlement, and dispute management systems.

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International case studies from cities like London, Singapore, Japan, and Hong Kong provide valuable insights into the adoption of digital-based ticketing systems. Initially most of them adopted stored-value cards for transit payment. Few of these countries also adopted a contactless debit/credit card account-based ticketing mechanism, the same could not be replicated in India as it poses a challenge because of the inherent design flaw of the fare getting paid despite the amount not being available in customer's account. This means either the issuer, transit operator or the card network takes the liability. The account-based ticketing system also allows the fare to get directly debited from the customer's bank/credit card balance; this again is a security risk and can expose idle balances of the users to phishers and hackers in case of any security lapse.

The current public transport ticketing system in India is fragmented and prone to revenue leakage. There are different ticketing systems in place, each with its own set of rules and regulations. NCMC addresses these challenges and provides a unified payment solution which is ubiquitous and seamless. This is a pan-India initiative to introduce a unified ticketing system for public transport across cities and different modes of transport.

NCMC presents a paradigm shift in the way transit payment is handled bringing in the convenience of use of bank issued debit/credit/prepaid cards without the risk associated with account-based ticketing. NCMC card has a stored value component that works seamlessly for transit ticketing and other low-value retail transactions. This fosters convenience and efficiency, reducing queues and promoting a hassle-free travel experience. Stored value based ticketing further simplifies access, allowing users to load monetary value onto the card and use it across different modes of transportation. NCMC specifications also provide for service area where transit operators can easily configure and run their business rules like monthly/weekly/season passes.

Currently there are 48 issuers who are issuing NCMC cards. Together they have issued more than 164 million cards which can be readily used in NCMC compliant transit systems. This not only takes away the effort of issuance of new NCMC cards to the commuters but also removes the dependency of commuters queuing up to buy tickets. With the present NCMC card base and the new interoperable transit projects going live, India is in an advanced stage to bring transformation in the transit ecosystem. Scaling up the NCMC implementation will lead to improvements in fare collection efficiency, reduce operational costs, and increase ridership.

NCMC is a promising initiative that has the potential to improve the efficiency and convenience of public transport in India. However, the road to successful NCMC implementation is not without challenges. Slow adoption of NCMC by public transport operators, widespread use of exisiting NCMC cards by commuters requires collaborative efforts among government bodies, transport agencies, and technology providers.

CHAPTER 1:
INTRODUCTION

NCMC
TAP AND TRANSIT,
PAN INDIA
WITH RUPAY

CHAPTER 1: INTRODUCTION

In urban India, almost 47% of people walk and cycle to work[1], followed by public transport, two-wheelers, cars, and autos. Just five per cent take cars.[2] Public transport in Indian cities varies across geographies. While metropolitan cities such as Delhi, Mumbai, Chennai, Bangalore, Hyderabad, etc. have multiple modes like city buses, commuter rail, and metro rail, smaller towns such as Ranchi, Gwalior, etc. rely mainly on intermediate public transport modes like autos, shared autos etc. rather than buses. In large cities like Hyderabad, Bengaluru, Chennai, etc., buses cater to more than 70% of public transport trips[3]. Bus services in Bengaluru and Chennai recorded close to 35 lakh and 36 lakh passengers per day, respectively, in 2018-19[4].

Urban transport plays an important role for people moving around in cities for work, leisure, and other activities. It helps to boost the city's economy by providing affordable and easy transport for people to travel from one place to another.

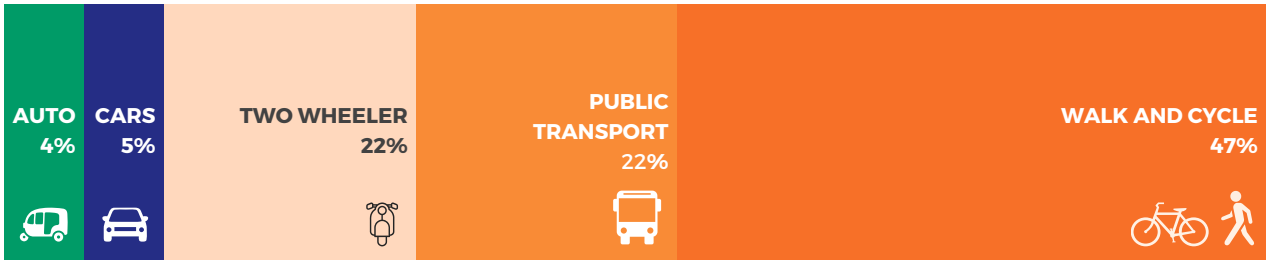

Figure 1: Mode Share in Urban India (Source: Census, 2011)

At first glance, the public transport ridership data of some cities might seem good, but a year-to-year comparison lays bare the problem that's brewing beneath the surface. In the past few years, declining ridership has been a cause for great concern for city bus operators. This decline is mainly due to decline in the number of buses and service quality, resulting in overcrowding, delays in services, long queues to buy tickets, lack of coverage, etc. To make the situation worse, COVID-19 pandemic led to a further decline in bus transport ridership across all the cities. COVID has made people feel concerned about overcrowding, the use of physical cash and paper-based age-old ticketing systems in Indian public transportation, limelighting the need to move towards a seamless contactless system to build resilience.

[1] *Census of India, 2011*
[2] *Census of India, 2011*
[3] *Census of India, 2011*
[4] *CIRT (2021). State Road Transport Undertakings Profile and Performance 2018-19*

Amidst shifting urban mobility trends in India, characterized by dwindling bus ridership and pandemic-induced challenges, public transport authorities in India needed solutions to bring people back to public transport. There is a critical need to increase the bus fleet as per the specifications of Ministry of Housing and Urban Affairs (MoHUA) based on the buses per lakh population and improve the services to make public transport efficient, reliable, comfortable, and convenient. The national government has taken initiatives like the Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME) scheme to increase the number of public electric buses in the country. MoHUA, recently launched the PM-eBus Sewa scheme to boost India's electric mobility infrastructure with the deployment of 10,000 electric buses through a central outlay of ₹20,000 crores[5]. However, there is also a need for Mobility as a Service (MaaS) solutions that can make public transport hassle-free, similar to using a private vehicle. MaaS offers an integrated, user-centric approach to transportation, amalgamating various modes into a seamless journey, thus offering public transport riders an interoperable door-to-door journey experience.

The National Common Mobility Card (NCMC) complements this by providing a unified payment system, simplifying access across diverse modes of transportation, and reducing the need to stand in long queues for tickets. Even in the recently launched PM eBus Sewa scheme, support will be provided for implementing NCMC-based Automatic Fare Collection (AFC) systems. These initiatives are critical in the face of evolving urban dynamics, which aims to reinvigorate public transport, enhance convenience, and invigorate sustainable travel habits, fostering a more efficient and interconnected urban mobility landscape.

1.1 GLOBAL OUTLOOK ABOUT MaaS AND COMMON CARD-BASED TRANSIT TICKETING

Ticketing and payment systems in public transport have rapidly evolved in recent decades globally. Paper tickets, sold at ticket vending machines and counters, were increasingly replaced with AFC systems, including closed-loop smart cards, such as the Octopus Cards in Hong Kong and Singapore's Ez-Link card.

The aim of these new AFC systems was to speed up passenger flows, reduce the cost of fare collection, and eliminate the need for manual ticket issuers and checkers, thus saving on cost and providing a better service to passengers. These systems have been very successful, with millions of cards issued and generally high passenger satisfaction. However, they have come at a cost, with the responsibility for the maintenance of a large ticket retailing estate and the costs of issuing cards all falling on the operator itself. The following three global case studies layout how the digital ticketing system has evolved over the years and its impact on the implementation approaches.

[5] *https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1949430*

CASE 1: SINGAPORE'S SIMPLYGO INITIATIVE

In 1990, Singapore introduced a magnetic fare card to implement the digital fare system in buses and railways. The government replaced the magnetic cards, which were launched in 1990, with the Ez-link prepaid contactless cards in 2002.

With a population of 5.8 million, the efficient running of Singapore's Mass Rapid Transit (MRT) system and a fleet of buses are key to keeping the city moving. With Smart Mobility as a key pillar of Singapore's Smart Nation vision and an existing costly closed-loop system in place, the Singapore Land Transport Authority (LTA) was keen to deliver excellence to its riders by removing the burden of topping up transit cards while setting a new ticketing standard in Asia.

Singapore's transportation authority in 2016 introduced Account-Based Ticketing (ABT)[6] as "SimplyGo" to make it easier for commuters to use their contactless credit or debit cards for the fares that they are already using for other purposes. Introducing ABT solutions under Singapore's Smart Nation Vision eliminated the need to stand in long queues to buy transit-only cards or recharge the prepaid transit card, making it Asia's first ABT deployment.

Fare charges are accumulated on a daily basis or up to 5 days or after a total of $15 is spent on transit fares, whichever is earlier, based on the card issuing authority. The accumulated amount is posted to the user's banks after 3 days. Postings will be reflected in the user's credit, debit or prepaid card account based on the processing time of the Issuing Bank.

A pre-authorization fee is initiated after payment is posted to the card used at the point of boarding. The pre-authorized amount is reflected on the card account bank statement as the earmarked amount on the card and is released based on the respective issuing bank policies. The liability for unauthorized fraud via contactless card is borne by the issuing bank or payment service provider, not the PTO.

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[6] It is a fare collection system which uses the back office system to keep track of who travels and how much they should pay their fare.

CASE 2: SEOUL'S T-MONEY CARD

Seoul, Korea in 1995[7] first implemented a closed loop-based smart card with a prepaid travel set-up called "Upass". Initially, this card was only available for use in the Seoul Bus Transportation. The main aim of Korea's Integrated smart card tickets was to have transparency in the management system of bus operators, to reduce the delays caused by the long queues of fare payments and to make it convenient for the users to pay using a card instead of paying the fares in cash.

In 2004, T-money, a closed loop-based smart card ticketing system, was launched in Seoul to expand the ticket operating system in various regions. The card has now become compatible in 60 cities throughout the country. The prepaid smart card uses an integrated fare system based on distance, i.e., passengers are charged based on the combined distance travelled on any mode of public transport.

T-money also calculates the discount or reduced fares for eligible passengers such as students, children, and senior citizens. T-money could be used for the subway, bus, taxi, and distribution payment services.

T-money was implemented through a Public Private Partnership (PPP) model in which the private partnership provided all the funding during the initial stage. The PPP model helped Seoul's government reduce the financial burden and boost technological development in the project. According to a survey conducted in 2005, it was found that Seoul had the highest percentage (81%) of ticketing among the cities using smart cards in the country.

CASE 3: HONG KONG'S OCTOPUS CARD

The contactless prepaid smart card ticketing system for major transport operators in Hong Kong was introduced by Octopus Cards Limited (OCL) in 1997. Introducing Octopus cards eliminated cash counting and saved time for the operators. A single card can be used for different things like traveling on public transport, parking, shopping, leisure activities, and several other places. The Octopus card transaction can be completed in 0.3 seconds, providing convenient and quick service to the users.

The Octopus Card is the world's pioneering and most extensive electronic payment system and was the first in the world to use contactless prepaid smart card technology for public transportation. The card can be recharged at transit stations or convenience stores that accept the card.

[7] *Korea's Integrated fare and Smart Card Ticket System, The Korea Transport Institute, 2013*
https://centers.ibs.re.kr/html/living_en/transport/KSP%205%20Lessons%20from%20Korea%E2%80%99s%20Integrated%20Fare%20and%20Smart%20Card%20Ticket%20System.pdf

The Octopus Card implementation project adopted the BOO (Build Own Operate) approach in which private companies made capital investments. However, the public sector has become excessively dominant over the private sector, affecting the private sector's efforts on technological and operational innovation.

Conclusion

As explained in the three cases, Singapore, Seoul, and Hong Kong were the first to implement the smart card ticketing system and integrated fare system globally with different approaches in their implementation mode. In the case of Hong Kong's and Seoul's approach, it has been observed that the strategy of partnering with private companies has reduced the burden of huge investment for the government to implement digital ticketing systems. However, this kind of approach can only be pursued when these private companies have sufficient resources and are committed to introducing new technologies into the system, depending on the needs of the users. In both cases, the collaboration between the public and private sectors enabled the government to implement the project effectively as the roles were distributed among the public and private sectors.

Outside of the transport payment networks, how people choose to pay globally has continued to evolve. Since 2010 onwards, contactless payment cards have become increasingly popular – a trend which the Covid-19 pandemic has accelerated. Combining the merits of both smart card tickets and payment cards into one system where the public transport operator no longer needs to provide and manage dedicated closed-loop smart cards is the underlying idea of open-loop payment in public transport.

1.2 INITIATION OF CARD-BASED TRANSIT TICKETING IN INDIA

During the last 3-4 decades, the banking sector has experienced a gradual transformation by introducing various digitized payment methods for retail and transport sectors. Traditionally, the usage of cards has been the most preferred payment method because of user convenience, awareness, and consumer behavior. Since the advent of UPI, mobile payments have made advancements in e-commerce and QR Payments.

However, most of the fare collection across different transport modes like parking, bus, metro, etc., was majorly done by using cash, which caused many problems associated with cash collection, i.e., handling cash, time consumed in giving change, revenue leakages, etc. COVID-19 worsened the situation, and people started moving away from cash-based payments towards cashless payment systems, supported by the Government's Digital India initiative.

Due to challenges faced while handling the cash and tracking down the users' mobility patterns, many transport operators have implemented closed-loop/semi-closed loop card-based digital payments. The operators themselves did the maintenance and operation of these systems.

Closed-loop card based digital payments were well adopted by urban population. However, they were challenges posed by the interoperability of closed-loop or semi-closed-loop card systems such as:

- Smart cards with a closed loop or semi-closed loop have limited usage or can be used only by specific operators with the same system installed. As a result, customers have to carry multiple cards for different transit operators and any other kind of transaction.
- In the closed-loop system, the cards are issued by the operators. Hence, they incur extra expenditure for maintaining these cards throughout their lifecycle.
- With low access to smartphones and mobile network connectivity in certain geographies, any digital payment that is mobile based will face challenges in achieving complete acceptance. In addition, many people are not aware of using smartphones for digital ticketing purposes.

Given these challenges in the existing payment method and the aim to promote digital payment methods across all sectors with high and low-value transactions, there is a need for a unified card system. This system will allow a single card to be used for all payments, including transport, e-commerce, and retail transactions.

To address these challenges associated with cash payments and to create an affordable and reliable system that works across all types of transport, the Ministry of Housing & Urban Affairs (MoHUA) introduced the National Common Mobility Card (NCMC) under the "Make in India" initiative in 2019. The objective of the project is to enable"One Nation One Card" for all digital transactions related to transport.

To ensure the implementation of the project, MoHUA formed a committee under the chairmanship of the Additional Secretary in the Ministry. The committee included representatives from organizations like the National Informatics Centre (NIC), Centre for Development of Advanced Computing (C-DAC), Bureau of Indian Standards (BIS), National Payment Corporation of India (NPCI), and the Ministry of Finance.

The purpose of the committee was to study and recommend ways to create a compatible system that can work with different vendors and operating systems and to define the standards for cards and devices. Based on the suggestions, MoHUA assigned the task of standardizing the NCMC Ecosystem to C-DAC and NPCI. While NPCI has developed the card and terminal standards (L2 and L3), C-DAC has created the AFC standards(L4 to L7).

CHAPTER 2:
CONTACTLESS TICKETING SYSTEMS

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2.1 CARD-BASED TICKETING (STORED VALUE)

Card-based ticketing systems are those in which the ticketing data is principally and continuously stored mostly or exclusively on the fare media, be it a magnetic stripe card or a Near-Field Communication (NFC) card. The terminals used may, depending on the technology, temporarily or permanently store some data or even transfer it to a central server. The central server data is not used for operational purposes; for example, the validity of the ticket is not checked immediately against the central server data. Instead, the validation logic built in the terminal determines whether the ticketing token (card) is authentic, and the data is valid for travel.

Card based ticketing systems in public transport became popular around the year 2000s, like Oyster in London, Octopus in Hong Kong, Stockholm's Access card, and Navigo in Paris. These card-based ticketing systems were initially designed to work within the closed-loop transit system; thereby limiting its utility.

2.2 ACCOUNT-BASED TICKETING

In the ABT system, travelers can use their existing bank cards, which is linked to their account. As a result, passengers do not have to carry physical paper tickets or a reloadable card to show they have the right to travel, and the back-office ticketing system will automatically calculate the fare, which is debited from their bank account.

ABT system have the advantage of reducing the issuance cost for the operators. It allows the transport operators to move to an open loop system, which allows the users to pay with cards for public transport and makes it cost-effective and efficient for the operators.

However, this system is prone to financial losses in case of non-payment by the customer. Depending on the fare rules configured by the PTO, taps may be aggregated over a given period- a few hours, a day, etc. and fare caps applied. This system is vulnerable to first rider risk, where the user gets to travel without having sufficient balance in his account. This can be only stopped by putting up a blacklisting process which is not a viable option in the transit ecosystem. This risk is mitigated in NCMC cards by creating a stored value in the existing bank cards (debit/credit/prepaid) that works seamlessly for transit ticketing and other low-value transactions.

2.3 CLOSED-LOOP SYSTEM

In a closed-loop systems, the ticketing fare media specifications, applications and interfaces are proprietary to the AFC system provider. In such cases the fare media issued by the transit operator is only accepted by the respective operator or any other operator who has contracted to use the same system.

There are examples where closed-loop systems - card-based ticketing is pushing beyond these limitations to provide more value to customers:

MULTI-OPERATOR SMART CARDS

- These may be available where several PTOs use a common ticket system operator. An example can be found in the Netherlands, where Translink is operating the nationwide ticketing system “OV chipkaart”. Customers can use any public transport service after having purchased and pre-loaded such a card.
- Another example is the “Verbund Tickets” in Germany, where the regional transport authority is responsible for defining the tariff system for public transport in its territory. They may issue fare products valid for any operator that adheres to this joint tariff system, and customers only need one smart card to travel with any of them.

MULTI-SERVICE SMART CARDS:

- The use of closed-loop smart cards can also be extended to pay for non-transport services. Octopus, the contactless payment system launched in Hong Kong in 1997, cooperates with business partners across various sectors to facilitate the use of the Octopus card for payment in retail shops or leisure facilities. Still, the Octopus card is limited only to the shops/partners who adopt the same system as that of the closed-loop smart card, so customers can only use it within the same ecosystem.
- France has also developed a Citizen Multi-Services Application card[8] to manage third-party services beyond pure transit application. This standard is in operation in several French provinces.

[8] *ADCET- https://www.adcet.com/en/*

2.3.1 INDIAN CLOSED-LOOP PROJECTS

DELHI METRO

In 2002, the Delhi government launched prepaid smart cards for digital payments on the Delhi metro. It achieved a significant milestone by becoming the first metro rail to introduce Contactless Smart Cards (CSC) as replacements for traditional paper tickets to travel by metro.

Following that and with the vision of establishing a 100% digital payment system for all modes of public transport in Delhi, the government launched the ONE card for buses and metros in December 2018[9] with the tagline 'One Delhi One Ride'. The vision of launching this card was to make all modes of transportation convenient and seamless by using a single mobility card issued by the DTC (Delhi Transportation Corporation).

BANGALORE METRO

Since the opening of Bangalore Metro Rail Corporation Limited (BMRCL) in 2011, it used closed-loop contactless prepaid smart cards called 'Namma Metro Travel. However, BMRCL is now planning to phase out the contactless smart cards, which are based on closed-loop system cards and can be used only in the Bangalore metro. This will also help reduce the burden of carrying multiple cards for travel and retail purposes.

HYDERABAD METRO

Hyderabad metro launched their smart card in November 2017 and got a good response from the commuters wherein 7000 cards were just sold in the first two days. Initially the smart card was named Nebula and sold at Rs. 200 each with an initial top-up of Rs.100. Currently, smart cards are sold at Rs. 150 each.

While all the above metros implemented closed loop solutions, they have now shifted to NCMC solution. The implementation are at various stage and are helping the operators by bringing down the effort of new card issuance.

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[9] *Digital Ticketing As A Way Forward For Safer, Cashless Public Transport, NIUA, 2020* https://niua.in/c-cube/blog/content/digital-ticketing-way-forward-safer-cashless-public-transport

2.4 OPEN-LOOP SYSTEM

In open-loop systems, passengers can use their existing bank-issued contactless credit/ debit/prepaid card to pay for journeys. This means there are no costs associated with issuing or replacing cards for the operators, as the banks handle this.

Open-loop payment methods can be used to pay within many different systems (pretty much anywhere these days) and are funded by a centralized payment source, such as a bank or credit card account.

Passengers tap their contactless card on the transit gates for validation and access transit services. The transaction is processed by the AFC back office, which handles aggregation, fare calculation and transfers it to an acquiring bank for settlement through the banking network. Depending on the fare rules configured by the transit operator/network, transactions may be aggregated over a given period and processed in defined intervals.

The advantages and disadvantages of the open-loop system are as follows -

Advantages:

- Open-loop payment removes the dependency on regular fare media, as any bank contactless payment card becomes the ticket. Passengers can access public transport simply by tapping a valid open-loop contactless payment card on the payment terminal. The payment for the journey can either be realized during the trip, after completing the journey, or after all journeys taken that day, when the fare is calculated based on the actual use.
- It allows for interoperability with any transit system on an open-loop system. Any user with a contactless credit/debit card can use the system.
- No prior ticket purchase, app download, or manual sign-up process is needed; the customer simply uses the contactless payment card that they already use widely in their daily lives.

Disadvantages:

- As the complete issuance is managed by banks/card issuers, the transit operators don't have visibility on customer demographics. They are deprived of customer information which can be used for any future planning.
- If the customer dispute system is not properly designed and implemented, then the transit operators would be overburdened with customer complaints at their premise.

CHAPTER 3:
IMPLEMENTATION OF NCMC IN INDIA

NCMC
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3.1 OVERVIEW

The National Common Mobility Card is an initiative by the Ministry of Housing and Urban Affairs to enable seamless travel across different modes of public transportation, such as buses, metro trains, suburban trains, and more, using a single contactless smart card. Additionally, it engages an indigenous domestic payment card network, which aims at fostering self-sufficiency and eradicating the dependency on foreign companies for digital technology systems[10].

The NCMC card aims to provide a convenient and integrated way for commuters to pay for their fares across various transportation systems without the need to carry multiple cards or cash. It features a dedicated stored value component that holds a balance, usable not only for transit ticketing but also for retail low-value transactions. RuPay debit/credit/prepaid cards can serve as NCMC cards, reducing the necessity for an active internet connection for ticketing and eliminating first-rider risk. Moreover, the card is designed to be interoperable across different cities and transportation systems that are part of the NCMC program.

Currently, the transit fare payment systems are fragmented across most Indian cities and not cost effective for public transport operators (PTOs) and banks. Lately, transport authorities have realised the importance of establishing a multimodal transit system that will be interoperable across cities. Due to this RuPay NCMC cards are gaining traction and the concept of an interoperable multimodal transit ecosystem has gained popularity.

3.2 WHY NCMC

NCMC offers customers a wide range of benefits as they need only one card for different uses, people do not need to carry multiple cards for different uses, and NCMC cards make things easier for customers.

- The transactions for the NCMC cards are super quick, easy, and contactless.
- For operators, the NCMC system has common rules for payments and implementation without vendor lock-in.
- NCMC usage will also help more people to use digital payments; as a result, it will reduce operating costs and save on closed-loop card lifecycle management costs.
- It also reduces the import cost due to the local availability of manufacturing products. NCMC will further help the government digitize small-value payments and reduce costs for the entire ecosystem.
- NCMC fulfills the dream of One Nation One Card. With the NCMC card, people need only one card for their regular purchases across various cities with an additional wallet feature.
- Currently there are 48 issuers who are issuing NCMC cards. Together they have issued more than 164 million cards which can be readily used in NCMC complaint transit systems.

[10] Report of the Committee for Standards & Specifications of National Common Mobility Card (NCMC), 2015- https://mohua.gov.in/upload/uploadfiles/files/CommitteeReportofNCMC03.pdf

Key Features Of NCMC[11]

Figure 2: NCMC Key Features

3.3 IMPLEMENTATION MODEL

NPCI has defined the specifications for NCMC for contactless interfaces. The RuPay EMV cards are also designed to support small value payments in different areas like transport applications, smart cities, toll, parking, and daily retail payments. The specifications of the card also support monthly passes or season tickets, etc. thereby, allowing customers to use the same card for various purposes. Thus, eliminating the need to carry separate cards for banking, retail, e-commerce and transportation.

C-DAC has issued specifications for AFC systems. This was required to bring in interoperability within various components of the AFC system. Accordingly, India's first indigenously developed payment eco-system for transport consisting of NCMC Card, SWEEKAR (Swachalit Kiraya: Automatic Fare Collection System) and SWAGAT (Swachalit Gate) was launched.

The NCMC implementation model aims to make it easy for transit operators and banks to collect fares digitally where people can pay for transportation using their NCMC RuPay cards. The card can be issued by any NCMC-certified bank. It can either be a debit/credit/prepaid card. The aim of the NCMC model is to make everyone go digital for travel and low-value retail payments. Therefore, the issuance of NCMC cards by different banks will further help in making it easier for everyone to adapt to the system[12].

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[11] National Common Mobility Card - A Single Card for a Gamut of Digital Transactions, Blog, Centre for Development and Advanced Computing (C-DAC) - https://www.cdac.in/index.aspx?id=blog_ni_onoc
[12] National Common Mobility Card - A Single Card for a Gamut of Digital Transactions, Blog, Centre for Development and Advanced Computing (C-DAC) https://www.cdac.in/index.aspx?id=blog_ni_onoc

The below figure explains the working of NCMC in India. The NCMC-certified banks issue the cards to their customers upon completion of KYC/Minimum KYC. The cards are used at the terminals in metro/bus stations or on a bus which are completely offline. The terminal, during settlement, sends transactions to the concerned acquirer bank, which in turn sends the transaction file to NPCI. NPCI acts as a settlement party settling the transaction sent by the acquirer bank with the issuer bank. Thus, successfully completing one transaction.

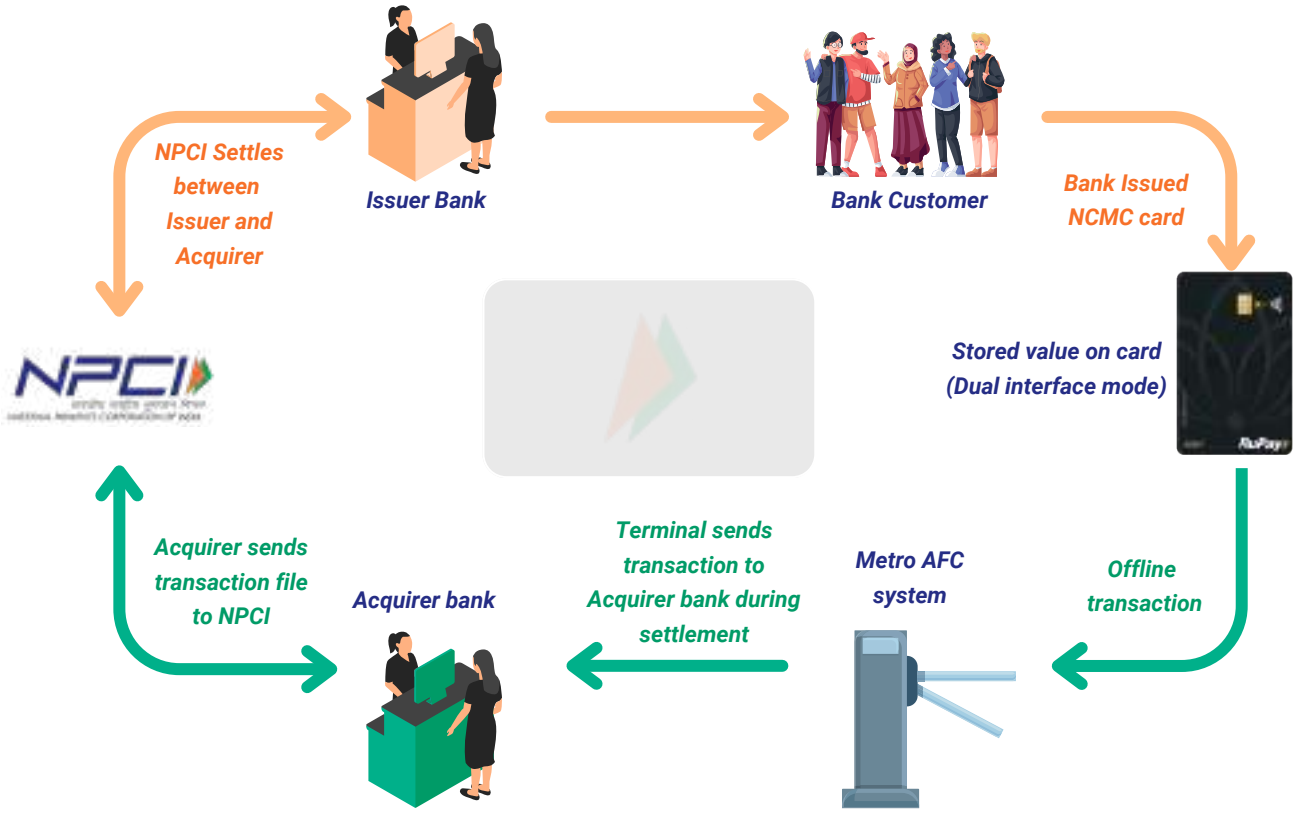

Figure 3: NCMC implementation model

Key Considerations for Implementation

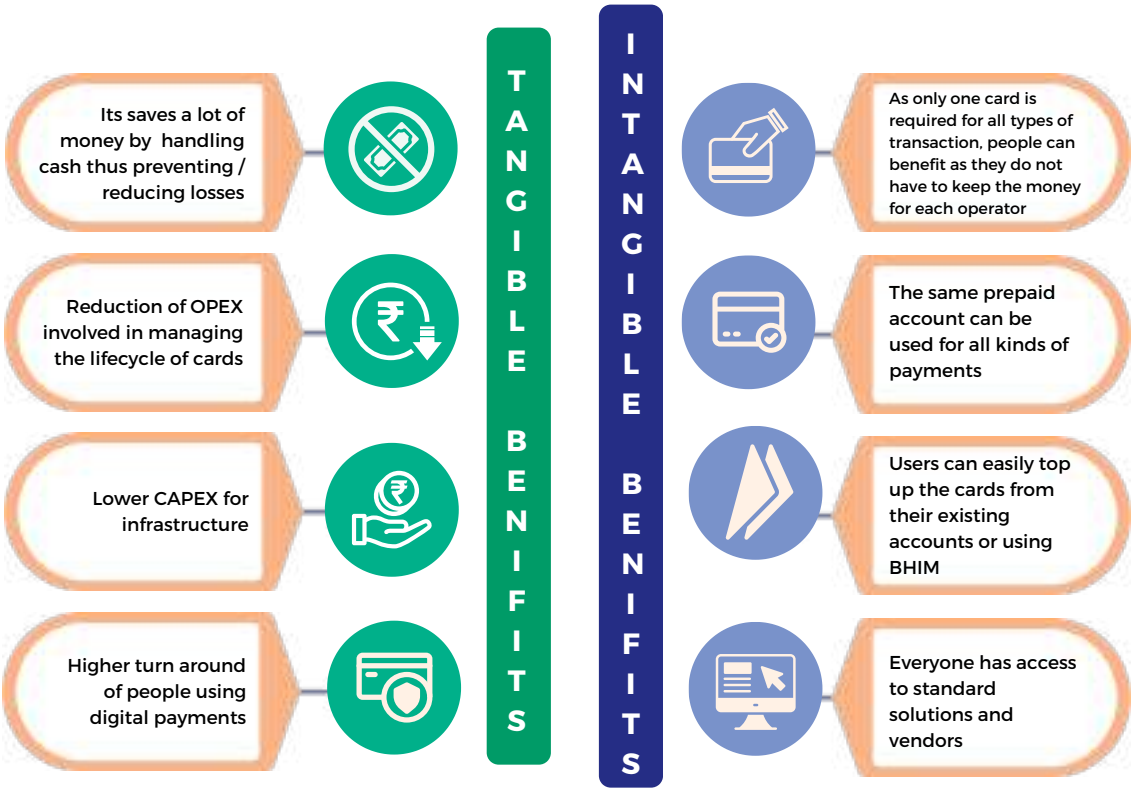

Figure 4: Consideration points for implementation mode

3.4 BUSINESS MODEL OF NCMC

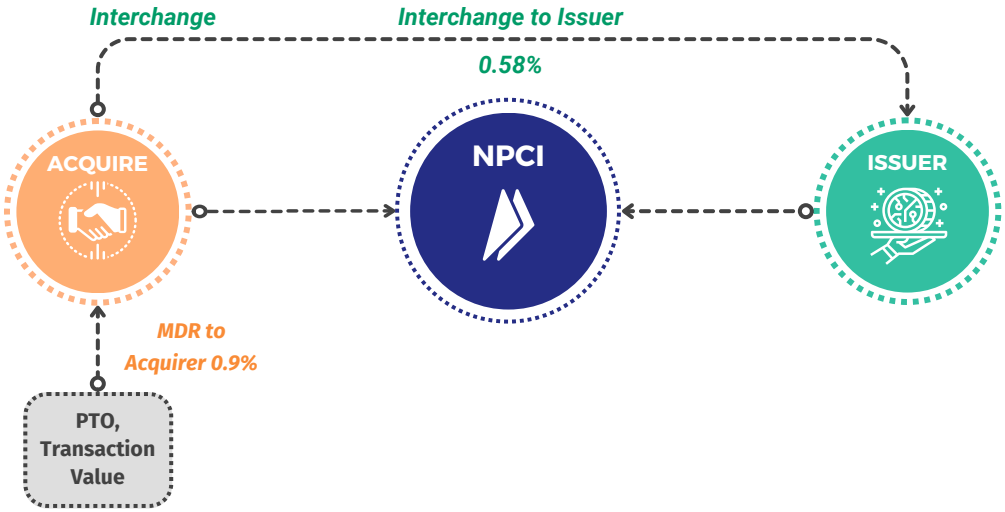

Figure 5: Business Model

For use of any NCMC, PTO pays a Merchant Discount Rate (MDR) to the acquirer bank at 0.90% of the transaction value. The acquirer pays an interchange of 0.58% of the transaction value to the issuer. A bidirectional communication exists between all the fiduciary bodies involved in the transaction. NPCI provides online transaction routing, processing, and settlement services to members participating in NCMC by charging a nominal switching fee from both parties.

3.5 EVOLUTION OF NCMC IN INDIA

In the early implementation of NCMC, transit operators started onboarding single bank as issuer and acquirer with 3–5 years of exclusivity. Transit operators also experimented by going for different tenders for AFC solution and NCMC payment solution. Subsequently, the transit operators went for consolidated tenders where the bank was also made responsible for the AFC solution. This helped to stabilize the system and further provided an opportunity to the bank to earn higher revenue during the contract period. This model turned out to be cost effective for PTOs as there was no upfront investment on AFC systems. It also opened up an avenue for additional revenue for the transit operators in the form of royalty for exclusivity.

3.5.1 EXCLUSIVE NCMC PROJECTS

During the early days of NCMC, due to very few banks being NCMC certified, projects were implemented with an exclusive arrangement in terms of issuance and acceptance. This meant that a single bank was selected by a transit operator who acted as issuer as well as acquirer.

3.5.1.1 NOIDA METRO

Noida Metro introduced a new way of ticketing for metro rides in India by implementing open-loop-based ticketing. AuroTransit successfully implemented NCMC RuPay-compliant AFC gates for Noida Metro Rail Corporation (NMRC). The project has been live since January 2019. State Bank of India was selected as issuer and acquirer for the project.

3.5.1.2 NAGPUR METRO

The Nagpur Metro Rail Corporation Limited (NMRCL) was reconstituted as Maharashtra Metro Rail Corporation Limited (MAHA Metro) to execute all metro rail projects in Maharashtra except the Mumbai Metropolitan Region. Maha Metro has taken several steps to enhance travel efficiency and convenience in Nagpur. Among multiple initiatives, adopting NCMC complaint AFC was a major move. This innovative digital payment system has been implemented across all metro stations in Nagpur. It also enables users to pay for their fares using MAHA RuPay prepaid cards in any mode of transportation. This initiative was implemented on a Public-Private Partnership basis, with the State Bank of India leading the consortium. SBI has signed the contract for the supply, installation, commissioning, and maintenance of the AFC systems for the Nagpur Metro.

Passengers can easily tap on the AFC gates while boarding on the metros, which deducts the fare for the journey. This system has transparent revenue collection, therefore avoiding frauds and money leakages.[13]

[13] https://www.rprealtyplus.com/amp/interview-old/maha-metro-on-the-right-track-43517.html r

3.5.1.3 AHMEDABAD BRTS (BUS RAPID TRANSIT SYSTEM)

Janmitra Cards were first issued in June '17. This technology allows people to pay for bus rides using their NCMC cards. These cards work at the bus stations and inside the city buses. The digital payment system helps people to have convenient and secure access to the BRT buses.

3.5.1.4 SURAT BUS

The NCMC RuPay prepaid card was launched in February 2018 by ICICI Bank in collaboration with Surat Municipal Corporation. It facilitates convenience and flexibility for not only ticketing in public bus transport in Surat but also offers exciting features such as access to Surat municipal services such as a library, swimming pool, and parks, paying taxes and bills. It also offers a discount of 25% for women and senior citizen commuters in Surat buses and a 100% discount for differently abled, visually impaired, and freedom fighters[14].

3.5.1.5 KOCHI METRO

Kochi became a pioneering city by implementing this first-of-its-kind digital ticketing system in June '17. Kochi Metro Rail Limited (KMRL) has signed a public-private partnership with the Axis Bank for the AFC system and AGS Transact for maintaining and integrating the fare collection system. Axis Bank has partnered with NPCI to develop an open, interoperable system. The cards issued by the bank can be easily topped up through cash, debit, or credit cards.

3.5.1.6 PUNE METRO

Pune Metro went live on NCMC in August'23 with HDFC bank as the issuer and acquirer.

[14] *Surat Municipal Corporation: https://www.suratmunicipal.gov.in/Services/SuratMoneyCard*

3.5.2 OPEN LOOP INTEROPERABLE NCMC PROJECTS

As more banks started to get certified with NCMC the true essence of interoperability was achieved. With the release of clear guidelines from MoHUA transit operators started selecting banks only for acquiring. This meant any RuPay NCMC card would be accepted by the transit operator.

3.5.2.1 DELHI METRO

NCMC was introduced in the Delhi Metro Airport Express Line in 2021, with the line capable of handling NFC. By the end of June 2023, all the lines in the Delhi metro were NCMC compliant, and all the NCMC complaint cards could be used in metros. It offers a discount of 10% during peak hours and 20% during non-peak hours for using NCMC cards.

3.5.2.2 AHMEDABAD METRO

The first phase of the metro was inaugurated by the Honourable Prime Minister in September 2022. NCMC was introduced for the metro in May '23. Paytm Payments Bank is the acquiring bank.

3.5.2.3 CHENNAI METRO

NCMC was introduced in Chennai Metro in April 2023. The city is also envisioning expanding NCMC cards for the buses in the city. CMRL is also planning to implement NCMC for its parking. CMRL is also the first metro to stop the issuance of its closed loop card in order to promote NCMC.

3.5.2.4 BANGALORE METRO

The tech capital's metro system was made NCMC compliant in April '23. Users can get an NCMC card by surrendering their closed loop cards at both metro stations and RBL Bank branches. Approximately 8 Lakhs closed-loop Namma metro cards have been sold till April'23. This has slowed down the adoption of NCMC cards among commuters. Hence, to promote NCMC, BMRC plans to phase out the close-loop cards.

3.5.2.5 BEST BUS, MUMBAI

The NCMC cards issued in Mumbai can be used for contactless payments on the buses, metro, and other NCMC-compliant services.

3.5.2.6 MUMBAI METRO LINE 2A AND 7

The NCMC - 'Mumbai 1' card has been issued by SBI since January '23. The card can be used to travel on all metros in India and city buses with the NCMC ticketing system. The users of the card can get discounts on their trips, like 10% off on weekends and holidays and 5% off on weekdays. NCMC-compliant ticketing is yet to go live on line 1, however, the systems are ready to accept NCMC payments.

Multimodal Implementation in Mumbai

Mumbai metro lines 2A and 7, went live on January '23. Commuters started using NCMC cards which were issued in Mumbai 2A and 7 line not only for their metro rides but also in BEST buses and Mumbai Metro line 1 with zero marketing. Within a month the interoperable transactions of NCMC in Mumbai reached a significant level of 2 lakh transactions. And the numbers have increased incredibly high even in the following months, which shows that customers were comfortable using one card across different modes of transport.

This was the first successful interoperable multimodal implementation that India had witnessed.

3.5.2.7 KADAMBA BUS

Kadamba Buses were made NCMC compliant in December '21. Paytm Payments Bank is the acquiring bank.

3.5.2.8 KANPUR METRO

NCMC was launched in Kanpur on 4th April 2023, at IIT Kanpur Metro Station. SBI implemented this in PPP model under the 'Make in India' campaign. Using NCMC-compliant cards, Kanpur metro passengers can easily travel without needing separate ticket purchases. There is a 10% discount on every metro ride by using an NCMC card.

METRO SYSTEMS IN INDIA

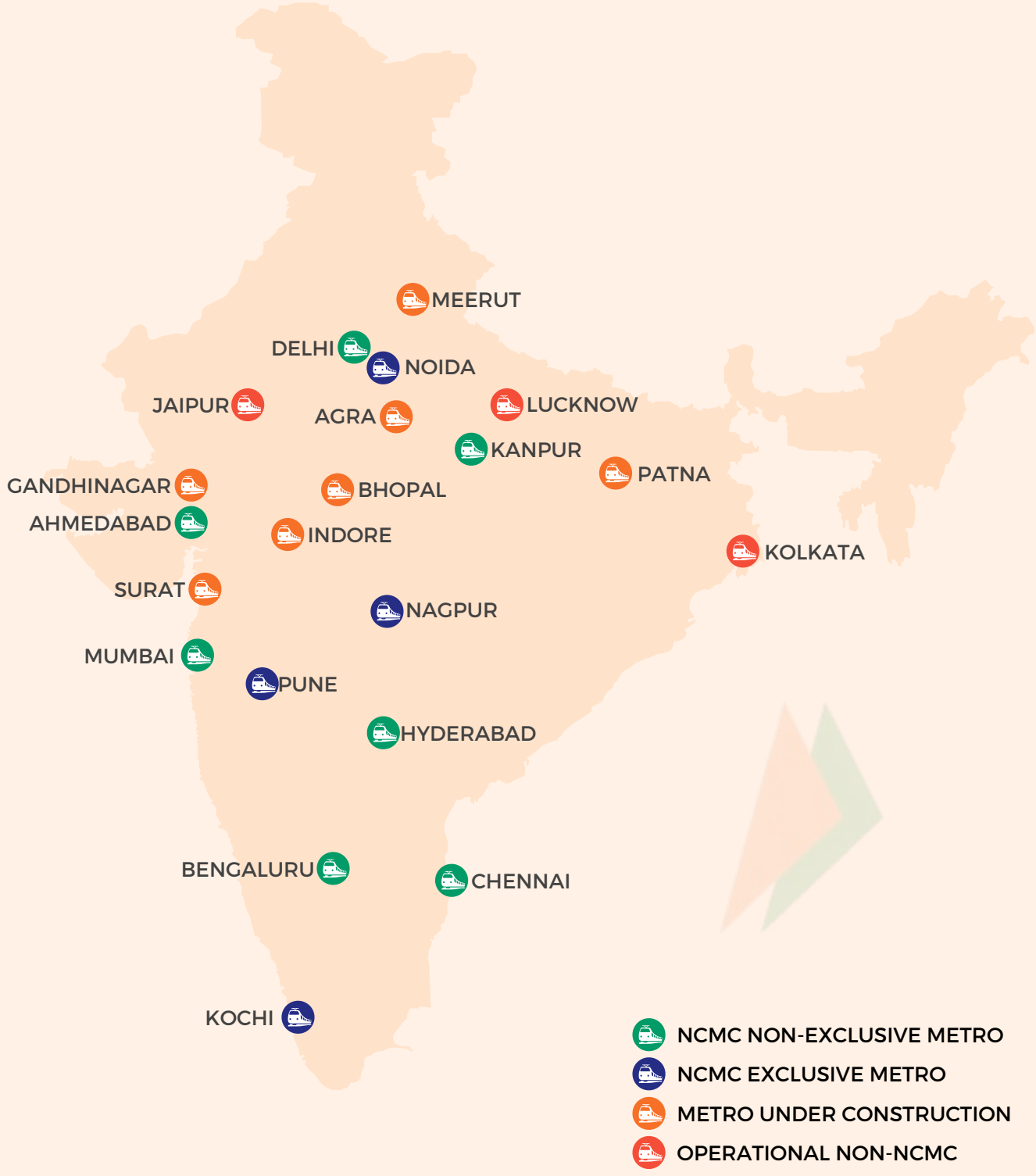

Figure 6: Operational and under construction metro systems in India

(Source: Ministry of Housing and Urban Affairs)

CHAPTER 4:
WAY FORWARD FOR NCMC IN INDIA

NCMC
TAP AND TRANSIT,
PAN INDIA
WITH RUPAY

WAY FORWARD FOR NCMC IN INDIA

Globally, traditional paper tickets have been replaced by tokens, smart cards, and mobile apps. Early adopters of digital ticketing in India were closed loop based in which users had to carry different cards, and passengers were not willing to block their funds in separate cards. Thus, India's goal was to establish a fully digital transit payment system that will work across all public transport networks and retail payments in the country. NCMC is the first huge leap towards achieving this goal. NCMC cards provide a seamless ticketing experience to its users and hence can support in improving the ridership of transit operators. Around 80% of Indians already have a bank account with 845 million[15] associated debit cards. Today RuPay has become the largest debit card issuer in the country and all NCMC-compliant RuPay cards can easily be used for transit payments.

While countries like Singapore and London have also adopted a contactless debit/credit card account-based ticketing mechanism, this system poses a challenge because of its inherent design flaw of first rider risk. The system allows the fare to get directly debited from the customer's bank/credit card balance; this again is a security risk and can expose idle balances of the users to phishers and hackers in case of any security lapse. This risk is mitigated in NCMC cards by creating a stored value component that works seamlessly for transit ticketing and other low-value retail transactions.

Interoperability of NCMC across all modes of public transport will help achieve the true essence of 'One Nation One Card'. While the prime focus was to implement NCMC in Metros and State/City Buses across the country, now is the time to extend the implementation to other modes of public transportation like e-buses, trains, auto-rickshaws, ferries, taxis/cabs and monorails as well. This will help commuters to use NCMC end to end, right from the first mile to until the last mile of the journey, thus making it a seamless experience. The data generated would allow mobility experts to analyze the mobility pattern and customize the public transport services as per the needs of the commuters. This in turn, can improve the service quality of public transportation, providing reliable and safe commutes to its riders, which will boost ridership and reduce the number of private vehicles on the road, thereby decongesting urban roads in the longer run.

This approach will also lead to huge economies of scale for the PTOs due to the removal of the duplicity of efforts as well as standardization across issuance, acceptance, networking interfaces, clearing, settlement, and dispute management systems.

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[15] The changing face of transit: Emergence of a multimodal integrated ticketing system, PWC, 2020 https://www.pwc.in/industries/financial-services/fintech/dp/the-changing-face-of-transit.html

The additional feature of the service area on the card gives a huge advantage for configuring any merchant or transit-specific application, for example, season tickets, monthly passes, membership, etc. The ultimate vision is that all public transport operators across the country adopt the NCMC specifications to achieve common technology and country-wide interoperability over a period and save the common man from carrying multiple cards/standing in queues/carrying change/risks of cash handling, etc. Several PTOs in the country, like Mumbai metro, Delhi metro, etc., have already adopted NCMC-compliant systems.

The use of NCMC is not curtailed to public transport ticketing only; it can also be used for any low-value transactions offline and for other transactions online. As per recent data, approximately 70% of UPI transaction volume was under ₹500. NCMC has the feature of stored value, which offers an 'offline transaction' proposition across all low-value segments. This can promote the use of NCMC for small-value transactions. Various Indian cities such as Ahmedabad and Surat have already integrated various government agencies and services such as municipal corporations, parking, tax payments, and public amenities compliant with NCMC payments. NCMC users can use the same card for all transport-related transactions and other access management such as smart campus, event management, and corporates.

Despite all the advantages of NCMC, there are a few improvements that can be incorporated to accelerate NCMC adoption in the country. For example, when a transport operator has already implemented non-NCMC/closed-loop ticketing systems using a public-private partnership, for them to shift NCMC requires either canceling the partnership or amending the terms and deliverables, thus making the party liable to pay back the capital invested by the private companies or incur huge loss.

From the perspective of user, the card issuance and top-up journey should be simple and seamless. Given the varied customer segment especially in the bus transport there is a need for transit only NCMC card which can be issued without any documentation. Thus, it's essential to implement NCMC in a phased manner to address the issues with the operators, coupled with communication and outreach efforts to raise awareness among the citizens for widespread adoption. MoHUA is keen on addressing all the shortcomings and is equally driving the adoption of NCMC across transit operators throughout the country.

Young demographic dominates India's urban population and thus promises deep penetration of technology-backed products such as NCMC, which makes using public transportation simpler and more accessible. By doing so, India has the potential to set an example and become the first country in the world using interoperable systems for offline payments.

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ONE NATION.
ONE CARD.