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Setting Interoperability in Motion

Reimagining Transit Payments

WHITE PAPER
JUNE 2026



Setting Interoperability in Motion

Reimagining Transit Payments

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Suggested Citation

Jagtap, S. (June, 2026) White Paper: Setting Interoperability in Motion: Reimagining Transit Payments . The Dialogue.®

Catalogue No.

TD/DE/WP/0626/08

Publication Date

June 30, 2026

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List of Abbreviations

Abbreviation	Full Form
AFC	Automatic Fare Collection
AFCS	Automatic Fare Collection System
BEL	Bharat Electronics Limited
BIS	Bureau of Indian Standards
BMRCL	Bengaluru Metro Rail Corporation Limited
BMTC	Bengaluru Metropolitan Transport Corporation
BRTS	Bus Rapid Transit System
C-DAC	Centre for Development of Advanced Computing
DFS	Department of Financial Services
DMRC	Delhi Metro Rail Corporation
DTC	Delhi Transport Corporation
EMV	Europay, Mastercard, Visa
ETM	Electronic Ticketing Machine
JAM	Jan Dhan-Aadhaar-Mobile
KSRTC	Kerala State Road Transport Corporation
KYC	Know Your Customer
MeitY	Ministry of Electronics and Information Technology
MoHUA	Ministry of Housing and Urban Affairs
NCMC	National Common Mobility Card
NFC	Near-Field Communication
NIC	National Informatics Centre
NPCI	National Payments Corporation of India
NUTP	National Urban Transport Policy
PPI	Prepaid Payment Instruments
PPI-MTS	Prepaid Payment Instruments for Mass Transit Systems
PoS	Point-of-Sale
qSPARC	Quick Specification for Payment Acceptance Device over RuPay Chip
RBI	Reserve Bank of India
RFP	Request for Proposal
SBI	State Bank of India
ST	State Transport
STU	State Transport Undertaking
TfL	Transport for London
TVM	Ticket Vending Machine
UPI	Unified Payments Interface

Executive Summary

The National Common Mobility Card (NCMC) was envisioned as the foundation of India's interoperable transit payments ecosystem under the "One Nation, One Card" initiative. Designed to integrate public transport with retail payments through a single EMV-compliant payment instrument, the programme sought to eliminate fragmented city-specific fare systems while supporting India's broader digital public infrastructure. Since its launch in 2019, nearly 200 million NCMC-enabled cards have been issued and several metro transit systems have adopted NCMC-compliant fare collection infrastructure. Despite these achievements, the programme has yet to realise its core objective of enabling seamless, nationwide interoperability across transit systems.

This paper identifies five key challenges. First, commuters experience significant onboarding friction, including offline wallet activation requirements and limited incremental value over existing transit cards, reducing incentives to adopt NCMC as their primary mobility instrument. Second, although NCMC is built on open technical standards, many deployments continue to operate through exclusive issuer arrangements, limiting effective interoperability and broader participation. Third, implementation remains uneven across transport modes, with metro systems progressing faster than city bus networks because of the high cost of upgrading legacy fare collection infrastructure. Fourth, fragmented governance across central ministries, regulators, payment system operators, and state transport agencies has slowed implementation and resulted in inconsistent adoption across cities. Finally, low commuter awareness and limited use beyond transit have prevented the card from delivering the broader digital payments ecosystem envisaged at its inception.

Taken together, these findings suggest that expanding NCMC issuance alone will not create a truly interoperable mobility ecosystem. The paper recommends a phased approach centred on strengthening interoperability and improving ecosystem participation. This includes reducing user activation frictions, discouraging exclusive acceptance arrangements, supporting migration from legacy fare collection infrastructure, strengthening institutional coordination, and providing a roadmap for broader participation by payment networks. Over the longer term, it also examines the transition towards a genuinely open-loop transit payments architecture capable of accepting any compliant contactless payment instrument.

India has demonstrated through its digital payments ecosystem that interoperability can drive innovation, competition, and widespread adoption. Applying these principles to urban mobility presents an opportunity to transform transit payments from fragmented local systems into a seamless national public infrastructure. The NCMC has established the technological foundation for this transition; the next phase must focus on creating the policy, institutional, and market conditions necessary to realise its full potential.

1. Introduction

India's urban transition is reshaping the country's mobility needs. Urbanisation in India has increased from 18% in 1960 to 37.6% in 2026,¹ with the urban population projected to reach 675 million by 2035. This rapid concentration of people in cities has placed sustained pressure on urban infrastructure, particularly transport systems, intensifying the demand for fare collection mechanisms that are seamless, interoperable, and capable of accommodating high transaction volumes. As per the most recent Census, around 22% of working Indians commute using public transport, placing transit at the centre of urban economic productivity.²

Running parallel to this urban transition has been the digital transformation of India's payments architecture under the Digital India mission. The India Stack, anchored in the Jan Dhan-Aadhaar-Mobile (JAM) trinity,³⁴ has built the foundational rails for interoperable digital payments at population scale, with the Unified Payments Interface (UPI) emerging as the dominant retail payments instrument. Yet despite this transformation in retail and person-to-person payments, fare collection in urban transit has remained outside the digital mainstream, continuing to rely on cash and proprietary closed-loop systems.

A third structural shift is the rapid expansion of India's tourism economy. In 2024, India recorded 9.95 million foreign tourist arrivals and 20.57 million international tourist arrivals when non-resident Indian arrivals are included, marking a 14.85% increase over 2019 figures and elevating the country to twentieth place globally in terms of international arrivals.⁵ Domestic tourist visits crossed 2.95 billion in the same year, an all-time high, while domestic visitor spending exceeded ₹15.5 trillion.⁶ According to the World Travel and Tourism Council, the travel and tourism sector contributed approximately ₹21 trillion to India's GDP and supported 46.5 million jobs in 2024, equivalent to 9.1% of national employment, with international visitor spending reaching a record ₹3.1 trillion.⁷ The Government's Viksit Bharat 2047 framework targets 100 million inbound tourists annually,⁸ placing urban transit squarely within the tourism infrastructure stack. International visitors arriving from London, Singapore, New York, or Sydney are accustomed to tapping any contactless bank card or device wallet at a fare gate, a convenience first deployed at scale by Transport for London (TfL) in 2014 when the Oyster ecosystem was extended to globally issued contactless cards.⁹ In this context, an interoperable and intermodal transit fare instrument was considered an infrastructural priority for Indian cities seeking to compete with comparable destinations on the same experiential terms as global tourism economies.

¹ Department of Economic and Social Affairs, Population Division. (2025). *World urbanization prospects: The 2025 revision*. United Nations. <https://population.un.org/wup/>

² Government of India. (2011). Census of India 2011. Office of the Registrar General and Census Commissioner. <https://censusindia.gov.in>

³ Ministry of Finance, Department of Financial Services. (2025, August 28). *Pradhan Mantri Jan Dhan Yojana: National Mission for Financial Inclusion completes 11 years of transformative impact* [Press release]. Press Information Bureau, Government of India. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2161401>

⁴ Ministry of Road Transport and Highways, 2024. *JAM (Jan Dhan, Aadhaar, Mobile) Trinity and digital revolution: A decade of financial inclusion, transparency and corruption-free India*. Press Information Bureau, Government of India. PRID 2086611. Available at: <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2086611>

⁵ Press Information Bureau. (2025, January 29). Arrivals of foreign tourists [Press release]. Ministry of Tourism, Government of India. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2220107>

⁶ Ministry of Tourism. (2025). India Tourism Data Compendium 2025. Government of India. <https://tourism.gov.in/sites/default/files/2025-09/India%20Tourism%20Data%20Compendium%202025.pdf>

⁷ World Travel and Tourism Council. (2025, June 5). India's international visitor spend soars to record highs, WTTC reports. <https://wtcc.org/news/india-international-visitor-spend-soars-to-record-highs>

⁸ Press Information Bureau. (2024, December 16). Tourism expansion in India [Factsheet]. Ministry of Tourism, Government of India. <https://www.pib.gov.in/FactsheetDetails.aspx?Id=149085>

⁹ Mastercard. (2017). Contactless payments travel well in London: Architecting new global ticketing standards with TfL. <https://www.mastercard.us/content/dam/mccom/en-us/documents/transport-for-london-case-study-april-2017.pdf>

It is at the intersection of these three transformations, an urbanising India, a digitising payments ecosystem, and an expanding tourism economy, that the NCMC was conceptualised. First articulated in 2006 as part of the National Urban Transport Policy (NUTP) and subsequently developed under the Make in India initiative, the NCMC builds on earlier indigenous efforts such as the More Card and is envisioned as an interoperable instrument capable of integrating retail and transit payments on a single card.

The government's vision is to create digitally enabled, inclusive, and sustainable smart cities that are seamlessly traversable through an interoperable and unified EMV-compliant (Europay, Mastercard, Visa) card, that can be used across public transit systems in multiple cities. This aligns with the Smart Cities Mission's goal of integrating digital infrastructure across 100 cities, with the NCMC serving as a cornerstone of multimodal transport integration. The card is designed to support offline transactions for low-value retail payments and online transactions for high-value payments. By consolidating high-volume, low-value transactions, it seeks to reduce the burden on payment network infrastructure while improving interoperability, accessibility, and ease of mobility through a single instrument for both retail and transit payments. The NCMC, launched under the 'One Nation One Card' tagline, aims to automate fare collection, promote digital payments, and eliminate the need for multiple cards or cash across transport modes. In its debit card variants, it also supports retail purchases, toll payments, parking fees, and ATM withdrawals, extending its utility beyond urban mobility.

Fare collection models across various modes of public transport, including metro rail, buses, suburban trains, tolls and parking, continues to be dominated by cash. This creates several challenges associated with paper currency, including operational inefficiencies in cash handling, revenue leakages, and reconciliation burdens.¹⁰ To address these challenges, regional transport operators have launched multiple initiatives to digitise and automate fare collection through Automatic Fare Collection (AFC) systems. However, the proprietary nature of these AFC systems creates vendor lock-in for maintenance and supplies. These closed-loop systems also discourage interoperability, requiring customers to maintain multiple cards to access transport networks across different cities. Moreover, these cards generally do not support retail transactions. The NCMC seeks to address these limitations by promoting standardisation, reducing costs for operators, and improving customer experience through interoperability across cities such as Delhi, Bengaluru, Kochi, and Mumbai.

To build an indigenous, affordable, interoperable system that avoids vendor lock-in, the Ministry of Housing and Urban Affairs (MoHUA) conceptualised the NCMC programme under the Government's "One Nation One Card" vision. The programme envisaged a standardised, indigenous, and interoperable ecosystem covering AFC systems, parking gates, toll booths, and retail Point of Sale (PoS) terminals across Indian cities. Chaired by the Additional Secretary of MoHUA, a committee was constituted to study and recommend the development of the NCMC ecosystem. The committee included representatives from the National Informatics Centre (NIC), Centre for Development of Advanced Computing (C-DAC), Bureau of Indian Standards (BIS), National Payments Corporation of India (NPCI), and the Ministry of Finance. Following an extensive study of international models, the committee released its report in July 2015 and recommended the EMV open-loop model with stored-value functionality.¹¹ Based on these recommendations, MoHUA tasked C-DAC and NPCI, with facilitation from the Delhi Metro Rail Corporation (DMRC) and State Bank of India (SBI), to standardise and indigenise the NCMC ecosystem using EMV card-based specifications and interoperability based on open standards.¹² NPCI defined the card as the RuPay Quick Specification for Payment Acceptance Device over RuPay Chip (qSPARC) dual-interface (contact and contactless) EMV card, enabling both transit and retail payments, with NPCI responsible for clearing and settlement. The committee decided against a pure

¹⁰ Khaneja, V. (n.d.). *National common mobility card - a single card for a gamut of digital transactions*. C-DAC.

https://www.cdac.in/index.aspx?id=print_page&print=blog_ni_onoc

¹¹ Ministry of Urban Development. (2015). *Standards & Specifications of National Common Mobility Card (NCMC)*.

<https://mohua.gov.in/upload/uploadfiles/files/CommitteeReportofNCMC03.pdf>

¹² Khaneja, V. *National common mobility card - a single card for a gamut of digital transactions*. C-DAC.

https://www.cdac.in/index.aspx?id=print_page&print=blog_ni_onoc

open-loop EMV payment model, as used in many Western countries, because Reserve Bank of India (RBI) regulations require compliance with Know Your Customer (KYC) norms, necessitating the use of prepaid cards. Further, RBI regulations waive two-factor authentication only for low-value transactions, making the stored-value approach necessary to ensure compliance with prevailing digital payments regulations.¹³

Under the committee's open loop, stored-value model, the NCMC card hosts two separate instruments: a primary bank account for online EMV payments and a separate prepaid offline wallet (the “stored value”) embedded on the chip itself. This hybrid architecture enables offline transit transactions, which are typically high-volume and low-value, thereby reducing the burden on payment and network infrastructure. It also addresses compatibility concerns by supporting retail payments for everyday purchases such as groceries and fuel. The NCMC kernel, embedded in terminals, manages both online and offline transactions using encrypted Near-Field Communication (NFC) technology and supports real-time balance updates.

Despite this detailed design, the NCMC programme has not fully achieved its intended functionality since its launch in Ahmedabad in 2019.¹⁴ While card issuance reached 200 million by 2024, the programme has yet to realise its core objective of unifying fare collection across public transit systems nationwide through a single card that also functions as a standard debit card. Key shortcomings include user friction and continued reliance on legacy systems, technological incompatibilities with existing infrastructure, the exclusion of global card networks, and a weak user experience arising from KYC-related friction and limited intermodality across transport modes. The following section explores these challenges in greater detail.

¹³ Asariparambil, N. S. (2025, September 26). *New RBI rules for digital payments, OTP from 2026: All you need to know*. The Week. <https://www.theweek.in/news/biz-tech/2025/09/26/new-rbi-rules-for-digital-payments-from-april-2026-full-details-and-link-to-reserve-bank-circular.html>

¹⁴ Kaushik, H. (2019, March 4). PM Modi launches "one nation, one card" for transport mobility in Ahmedabad. *The Times of India*. <https://timesofindia.indiatimes.com/india/pm-modi-launches-one-nation-one-card-for-transport-mobility-in-ahmedabad/articleshow/68260283.cms>

2. Urban Mobility and Commuter Experience: A 5-Year Deployment Review

As per data from 2019, 34 banks were certified by NPCI on the NCMC platform for the issuance of RuPay contactless debit and prepaid cards. Six banks issued over 2.4 million cards that year.¹⁵ Adoption of NCMC-compliant architecture remained steady, with early adopters such as Ahmedabad Metro (2019) and Delhi Metro (which achieved full compliance achieved by June 2023)¹⁶ demonstrating proof of concept. Delhi Metro achieved 100% NCMC-enabled gates across all its lines.

More recent implementers, such as Nagpur Metro (which floated a transition tender in July 2025)¹⁷ Delhi Transport Corporation (DTC) buses in Delhi, and State Transport (ST) buses in Mumbai, highlight the slower pace of adoption in legacy systems. Adoption rates vary from around 10% in retrofitted systems, such as Mumbai Metro Line 1, to significantly higher levels in newly built networks. By mid-2026, the issuance of NCMC-compliant cards had grown substantially, driven by government directives, infrastructure upgrades, and new NCMC offerings.¹⁸

According to 2021 data, NCMC card issuance scaled rapidly, with 49.26 million cards issued by 25 banks and 26 prepaid payment instrument (PPI) issuers. Despite more than 49 million NCMC-enabled debit cards being in circulation, only 47,273 offline transactions had been recorded nationwide by October 2021.¹⁹ To put this into perspective, approximately 1.7 million passengers travelled on the Delhi Metro every day in 2021. In contrast, online transactions conducted using NCMC-enabled debit cards reached 7,10,000 in November 2021, indicating considerably stronger adoption of the online payment functionality.

Usage figures improved significantly by 2023. Data from December 2023 showed that around 4.7 million commuters had used NCMC-enabled cards to travel on the Delhi metro over the preceding six months. This shift occurred after the Delhi Metro achieved network-wide NCMC compliance in June 2023.²⁰ The expansion marked a significant upgrade from the initial limited rollout on the Airport Express Line. In

¹⁵ Ministry of Housing and Urban Affairs. (2019, July 10). National Common Mobility Card (NCMC) [Answer to Unstarred Question No. 2002 raised by Shri Prabhakar Reddy Vemireddy]. In *Parliamentary Debates: Rajya Sabha, Two Hundred and Forty-Ninth Session* (pp. 224–225). Government of India.

https://rsdebate.nic.in/bitstream/123456789/700015/1/IQ_249_10072019_U2002_p224_p225.pdf

¹⁶ Press Trust of India. (2022, February 25). *Delhi Metro network to be fully NCMC-compliant by Jun 2023: DMRC*.

ETTravelWorld. <https://travel.economictimes.indiatimes.com/news/destination/states/delhi-metro-network-to-be-fully-ncmc-compliant-by-jun-2023-dmrc/89858333>

¹⁷ Ghulghule, V. (2025, July 16). Nagpur Metro to shift to open-loop NCMC cards for seamless travel, invest ₹154.3 CR. *The Times of India*. <https://timesofindia.indiatimes.com/city/nagpur/nagpur-metro-to-shift-to-open-loop-ncmc-cards-for-seamless-travel-invest-154-3-cr/articleshow/122528994.cms>

¹⁸ Ministry of Housing and Urban Affairs. (2023, December 4). *Introduction of smart cards by Delhi Metro* [Press release No. 1982361]. Press Information Bureau, Government of India. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1982361>

¹⁹ Ministry of Housing and Urban Affairs. (2021, December 16). *7.1 lakh online transactions made by National Common Mobility Card (NCMC) holders in November, 2021* [Press release No. 1782242]. Press Information Bureau, Government of India. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1782242>

²⁰ Zee Business. (2023, December 21). *NCMC card in Delhi Metro: Over 47 lakh commuters used it for travelling*. <https://www.zeebiz.com/india/news-ncmc-card-in-delhi-metro-dmrc-over-47-lakh-commuters-used-in-travelling-paytm-sbi-hdfc-wallet-icici-269438>

addition, open-loop NCMC cards became the default option, replacing the previously issued closed-loop DMRC cards.²¹

By 2024, approximately 200 million NCMC cards issued by 48 banks were in circulation.²² The sharp increase resulted from two major policy interventions. First, a directive issued by the MoHUA through the Department of Financial Services (DFS) in July 2023 instructed banks to issue NCMC-compliant cards by default.²³ Second, to encourage adoption, the RBI permitted the issuance of non-KYC compliant NCMC cards with a prepaid balance limit of ₹3000.²⁴

Despite offering a higher prepaid limit in Prepaid Payment Instruments for Mass Transit Systems (PPI-MTS) variants and enabling NFC functionality, NCMC cards have not added meaningful value over the transit cards previously issued by local transport corporations, such as the DMRC metro card. These cards have been in circulation for more than a decade, continue to function seamlessly across the entire Delhi metro network, and can be recharged easily through digital payment methods. According to 2022 data, before the widespread rollout of NCMC-enabled cards, around 25 million DMRC-issued cards were in circulation, and approximately 78% of commuters used them for metro travel.²⁵ For these users, there is little incentive to switch to an NCMC card that offers largely the same functionality as the DMRC-issued cards they already possess. However, following MoHUA's directive mandating the issuance of NCMC-compliant cards by banks,²⁶ the distribution of closed-loop transit cards, such as the DMRC card, has been permanently discontinued in favour of open-loop NCMC-compliant cards.²⁷ As a result, commuters can no longer obtain a closed-loop transit card, even if they prefer one.

NCMC promised a single card that could be used across public transport systems, including metros and buses, as well as for parking and both offline and online retail payments. However, a combination of limited consumer awareness and interoperability constraints across card networks has meant that many users with NCMC-enabled cards remain unaware of the card's stored-value functionality, which enables offline transit payments. Activating this functionality often requires users to manually enable it through their banking application, or visit a customer service desk at a metro station.²⁸ Furthermore, restricting NCMC functionality to select card networks has excluded many existing users of global card networks from the NCMC ecosystem.

The NCMC framework envisages a single card for multiple payment applications, including transit, retail, tolls, parking and smart city services. However, users must complete minimum KYC requirements to access certain PoS transaction capabilities, while full debit card functionality a complete KYC process similar to that for standard debit card issuance. These additional layers of friction have resulted in NCMC

²¹ Press Information Bureau. (2023, December 4). *Introduction of smart cards by Delhi Metro*. Government of India.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1982361®=3&lang=2>

²² Mishra, T., & Bhakta, P. (2024, March 18). *National Common Mobility Card to now expand as RBI allows issuance of ₹3000 value sans KYC*. The Economic Times.

<https://government.economictimes.indiatimes.com/news/digital-payments/national-common-mobility-card-to-now-expand-as-rbi-allows-issuance-of-3000-value-sans-kyc/108577327>

²³ Tiwari, D. (2023, July 19). *Government asks banks to issue mobility-enabled cards*. The Economic Times.

<https://economictimes.indiatimes.com/industry/banking/finance/banking/government-asks-banks-to-issue-mobility-enabled-cards/articleshow/101883349.cms?from=mdr>

²⁴ TOI Business Desk. (2024, March 18). *Now, National Common Mobility Card can be issued with a limit of Rs 3,000 without any KYC as RBI eases rules*. *The Times of India*. <https://timesofindia.indiatimes.com/business/india-business/now-national-common-mobility-card-can-be-issued-with-a-limit-of-rs-3000-without-any-kyc-as-rbi-eases-rules/articleshow/108581666.cms>

²⁵ Press Trust of India. (2022, May 15). *Significant rise in number of Delhi Metro smart card users: DMRC*. ET Infra.

<https://infra.economictimes.indiatimes.com/news/urban-transportation/significant-rise-in-number-of-delhi-metro-smart-card-users-dmrc/91591402>

²⁶ ET Bureau. (2023, July 18). *Government asks banks to issue mobility-enabled cards*. The Economic Times.

<https://economictimes.indiatimes.com/industry/banking/finance/banking/government-asks-banks-to-issue-mobility-enabled-cards/articleshow/101883349.cms>

²⁷ Ministry of Housing and Urban Affairs. (2023, December 4). *Introduction of smart cards by Delhi Metro* [Press release No. 1982361]. Press Information Bureau, Government of India. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1982361>

²⁸ <https://www.federal.bank.in/rupay-ncmc-debit-card>

cards being used primarily as ordinary contactless prepaid cards at transit gates.²⁹ Issuance and usage statistics for 2025 and 2026 are not publicly available. However, since NCMC cards are now issued by default in place of cards previously provided by local transit corporations, it is reasonable to assume that most new users of transit card services now possess an NCMC-enabled cards, particularly when they already possess legacy transit cards issued by local transport operators and separate debit or credit cards for PoS transactions.

The following section examines the key challenges affecting NCMC usage in greater detail:

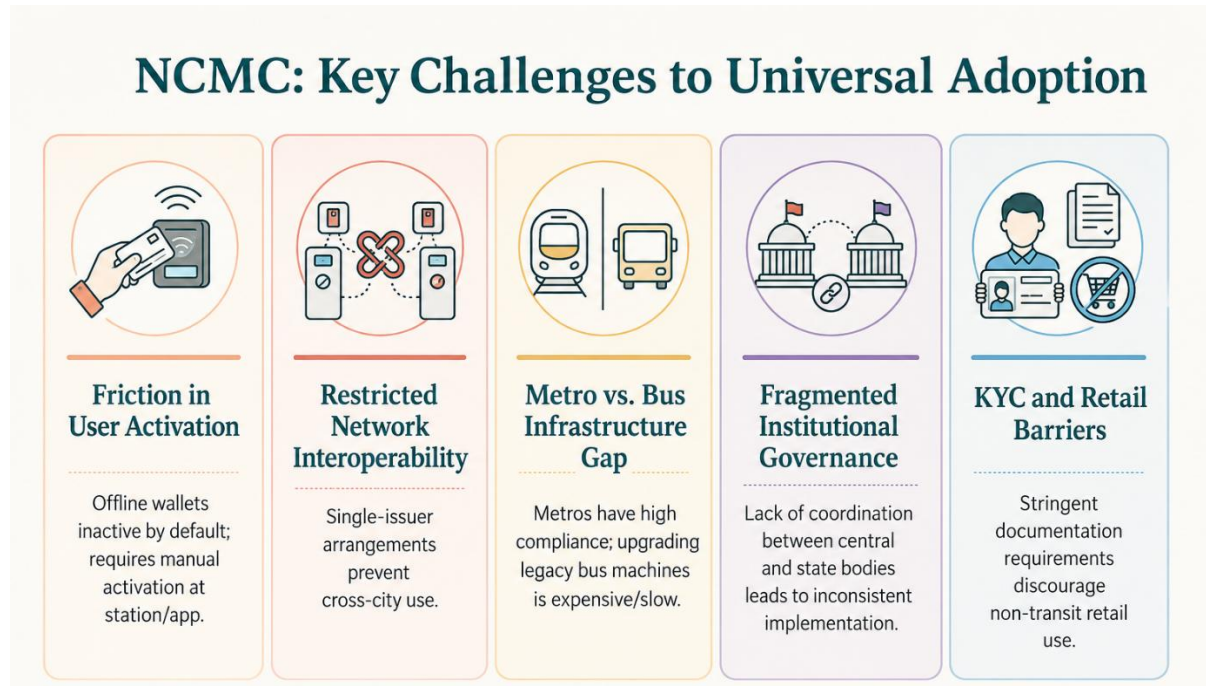


Fig 1: Key Challenges to Universal Adoption

2.1 User-Side Frictions Causing Disincentivisation

The NCMC was conceived as a hybrid EMV instrument that combines two balances on a single chip: a primary bank-linked account for online payments and an onboard stored-value transit wallet for offline tap-and-go fares. In principle, this architecture allows a single card to function simultaneously as a debit card and a transit token. In practice, however, the instrument has not displaced the legacy combination of a closed-loop transit card and a bank-issued debit card for the average urban commuter. The reasons for this lie in the issuance, network, and activation choices made by the ecosystem rather than in the underlying technology itself.

Pursuant to the MoHUA-DFS directive of July 2023, banks are required to issue NCMC-compliant cards by default to new customers.³⁰ Issuance volumes have responded accordingly, with around 200 million

²⁹ Chadha, S. (2024, April 23). Airtel Payments Bank's new NCMC-enabled debit, prepaid cards: How it works. Business Standard. https://www.business-standard.com/finance/personal-finance/airtel-payments-bank-s-new-ncmc-enabled-debit-prepaid-cards-how-it-works-124042300348_1.htm.

³⁰ ET Bureau. (2023, July 18). Government asks banks to issue mobility-enabled cards. The Economic Times. <https://economictimes.indiatimes.com/industry/banking/finance/banking/government-asks-banks-to-issue-mobility-enabled-cards/articleshow/101883349.cms>

NCMC cards in circulation by March 2024.³¹ However, the directive itself is silent on card networks, and in practice, issuance has continued through restrictive rails for the structural reasons discussed in Section 2.2. As a result, existing holders of card networks that do not participate in the NCMC ecosystem, who constitute a significant share of formally banked urban consumers served by private-sector banks, cannot use their existing cards at NCMC-enabled fare gates. They are not offered a direct upgrade path from their current payment instrument to a transit-capable one. Consequently, joining the NCMC ecosystem requires users to acquire an entirely new card.

The second barrier is operational and affects even customers who hold an NCMC-enabled card issued by their primary bank. The transit functionality on these cards does not work out of the box. The offline stored-value wallet is dispatched in an inactive state, and the customer must perform a service creation transaction before the card can be tapped at a fare gate. Two activation channels exist. The first is a visit to a customer desk at a metro station, where the customer initiates service creation and a first balance load. The second is activating the ‘Contactless’ feature via the bank’s proprietary app.³² For a typical urban commuter who already holds a functional closed-loop transit card and a working debit card, the marginal benefit of consolidating two cards into one is dwarfed by the marginal cost of an additional counter visit or the friction of in-app activation. Furthermore, several customers are simply unaware this functionality exists.

The third barrier is behavioural and follows from the first two. Three sets of user behaviours have emerged with their interaction with the NCMC ecosystem. First, commuters who do want a single transit instrument tend to acquire the PPI-MTS variant of the NCMC card, a minimum-KYC prepaid product capped at Rs. 3,000 following the RBI’s March 2024 relaxation,³³ which is issued instantly at metro counters and is usable for fare payments from the moment of issuance, but offers no retail or e-commerce functionality at PoS. These users obtain a working transit card and never engage with the wider payment dimensions that the NCMC was designed to deliver. Second, commuters who already hold incumbent closed-loop cards from local transit corporations such as the DMRC or the Bengaluru Metro Rail Corporation Limited (BMRL) continue to use them, since these cards are already activated, already topped up, and already familiar. Third, holders of bank-issued NCMC debit cards typically use them only for retail and online transactions, in exactly the same manner as they would use a non-NCMC debit card, and never activate the offline transit wallet at all.

The cumulative effect is that the NCMC has become an additional layer in the urban consumer’s wallet rather than a replacement for the instruments already in it.

2.2 Interoperability Paradox

Although the NCMC vision is seen as a way to make transit and economic activity interoperable using hybrid card technology, its policy outlook has overlooked the role of global card networks in realising the full potential of ‘One Nation, One Card’ vision.

On the one hand, the NCMC is considered “open-loop,” given its EMV standard for chip cards. On the other hand, when the NCMC was conceptualised (2017-2019), the central Government and the RBI prioritised the development of a homegrown domestic network architecture for the initiative.³⁴ The RBI

³¹ Mishra, T., and Bhakta, P. (2024, March 18). National Common Mobility Card to now expand as RBI allows issuance of Rs. 3000 value sans KYC. The Economic Times. <https://government.economictimes.indiatimes.com/news/digital-payments/national-common-mobility-card-to-now-expand-as-rbi-allows-issuance-of-3000-value-sans-kyc/108577327> (Already in your document as footnote 18.)

³² Federal Bank. (n.d.). NCMC RuPay contactless debit card: Frequently asked questions. Retrieved May 2026, from <https://www.federal.bank.in/rupay-ncmc-debit-card>

³³ TOI Business Desk. (2024, March 18). Now, National Common Mobility Card can be issued with a limit of Rs. 3,000 without any KYC as RBI eases rules. The Times of India. <https://timesofindia.indiatimes.com/business/india-business/now-national-common-mobility-card-can-be-issued-with-a-limit-of-rs-3000-without-any-kyc-as-rbi-eases-rules/articleshow/108581666.cms>

³⁴ Ministry of Electronics & Information Technology. RuPay. <https://www.digitalindia.gov.in/initiative/RuPay/>

and Ministry of Electronics and Information Technology (MeitY) considered NCMC as a part of India's Digital Public Infrastructure, akin to UPI and FASTag, with a mandate to develop a robust indigenous network. Further, the NCMC kernel was jointly built by C-DAC, Bharat Electronics Limited (BEL) and NPCI, giving it a domestic technological foundation.³⁵ This is evidenced by the directive issued in July 2023 by the MoHUA, through the DFS, instructing banks to issue NCMC-compliant cards by default to new customers.³⁶ While the directive itself is network-neutral on its face, in practice it reinforces the existing domestic issuance infrastructure, since the overwhelming majority of NCMC-functional cards in circulation are aligned with this indigenous framework.. Banks complying with the directive are therefore likely to default to their existing domestic issuance pipelines rather than build out parallel NCMC product lines on global card networks. Hence, although the policy environment did not directly prohibit global networks, it provided limited immediate incentives for them to participate, naturally favouring the localised technological foundation.

Despite said policy signalling, global payment networks responded positively. On 22 May 2019, Mastercard's South Asia leadership confirmed that around 15 of its partner banks in India were at various stages of signing up to the NCMC programme.³⁷ This commitment was driven by the principle that an NCMC-capable card could sit on any account, debit or credit, with the source of funds being immaterial to the card's transit functionality. Other major card networks also took similar steps, committing to work with the Government, member banks, and Public Transport Operators to utilise contactless transit as a strategic gateway for driving broader digital payment adoption in the local economy.³⁸

Even with this early engagement and the development of NCMC-compliant kernels by various global card networks, issuance of non-domestic NCMC products has not materialised at any meaningful scale in the Indian market. Every Indian bank that has launched an NCMC-compliant card to date, has issued exclusively on domestic rails. The reason for this lies not in technical readiness, which has been in place on the global network side since 2019, but in a layered set of commercial and institutional incentives.

Three factors anchor this equilibrium. First, the bulk of NCMC-compliant card issuance in India flows through public sector banks, whose domestic-issuance pipelines are well-established and operationally mature, anchored in part by financial inclusion programmes such as the Pradhan Mantri Jan Dhan Yojana, which requires RuPay debit card issuance as a feature of the scheme.³⁹ The MoHUA directive of July 2023 asked banks to issue NCMC-compliant cards by default for new customers, but did not prescribe a network. The cheapest way for public sector banks to comply was to add NCMC functionality to their existing domestic debit card pipeline, which they were already issuing in volume. Building a parallel NCMC product line would have required separate product agreements, re-certification of card management and personalisation systems, parallel settlement flows, and customer service training, all for marginal commercial return.

Second, on the transit operator side, there is a noticeable divergence between the theoretical interoperability mandated in AFC tenders and actual market implementation. While RFPs nominally seek "Open Loop" cards to drive broader adoption,⁴⁰ NCMC deployments have largely been structured as

³⁵ Efyian, E. (2019, June 3). *You can travel pan-India with a single mobility card: BEL*. Electronics For You.

<https://www.electronicsforu.com/news/bel-single-mobility-card>

³⁶ India Infoline. (2023, July 19). *Government requests banks to issue cards with mobility features*.

<https://www.indiainfoline.com/news/markets/government-requests-banks-to-issue-cards-with-mobility-features>

³⁷ Electronic Payments International. (2019, May 22). Mastercard to join India's National Common Mobility Card programme.

<https://www.electronicpaymentsinternational.com/news/mastercard-to-join-indias-national-common-mobility-card-programme/>

³⁸ Visa Inc. (2019, May 13). Visa launches National Common Mobility Card for multimodal transport in India [Press release].

<https://www.visa.co.in/about-visa/newsroom/press-releases/visa-launches-national-common-mobility-card-for-multimodal-transport-in-india.html>

³⁹ Department of Financial Services, *Scheme details: Pradhan Mantri Jan-Dhan Yojana*, available at

<https://www.pmfjd.gov.in/scheme>

⁴⁰ Maharashtra Metro Rail Corporation Limited. (2025). Notice inviting tender (NIT): Selection of financial institution (FI) for issuance of open loop National Common Mobility Card (NCMC) and acquiring services for Maha-Metro (Tender No. Maha-Metro-AFC-01/2025).

exclusive single-issuer-single-acquirer arrangements.⁴¹ Ecosystem documentation acknowledges that several NCMC projects, including those at Pune Metro, Kochi Metro,⁴² Nagpur Metro, Ahmedabad Janmarg,⁴³ and Surat Citilink, accept only the contracted issuer's NCMC card. In each of these cases, the contracted issuer operates on a specific domestic network rail. This structural limitation is further reinforced by recent pre-bid query responses across upcoming transit projects, where authorities have explicitly maintained existing scheme restrictions despite industry requests to accommodate alternative networks.⁴⁴ A bank evaluating whether to launch an NCMC product on global network rails therefore has to weigh the prospect that the card may not be accepted at exclusive deployments across the country, reducing its network reach relative to the preferred domestic standard. This dampens the case for parallel issuance even further.

Third, private sector banks, which issue globally accepted debit cards in much larger volumes than public sector banks, face a different but equally constraining set of incentives. Their customer base is predominantly urban, formally banked, and already holds closed-loop transit cards from local transit corporations alongside existing debit cards for retail use. The friction described in Section 2.1, namely the absence of any meaningful utility differential between an NCMC card and the combination of incumbent instruments these customers already hold, is most acute for precisely this segment. Issuing a NCMC product to a customer who already holds a Mastercard debit card and a closed-loop metro card achieves nothing for the customer, and accordingly nothing for the bank. A higher level of interoperability could be achieved if all existing card holders with NCMC functionality are provided the option to unlock its 'Stored Value' and be used for transit payments.

The NCMC framework is therefore network-agnostic in design but operates as a closed system in practice. The closure is not a function of regulatory exclusion, since requisite kernel specifications have been adopted by most major card networks for years, but of a structural equilibrium in which every commercial actor along the issuance and acceptance chain has stronger incentives to default to domestic rails. Breaking this equilibrium would require either a deliberate policy intervention to incentivise non-exclusive NCMC issuance, or a more fundamental redesign of the transit fare collection model that bypasses the NCMC offline-wallet architecture altogether.

The result is a paradoxically closed system that is antithetical to the interoperable and inclusive vision promoted by NCMC. The domestic network is, in effect, the only viable network for issuing banks and fintechs operating in the NCMC space, not because the framework prohibits alternatives but because the operating environment offers no commercial pathway for them. This forecloses competition between networks, limits innovation in product design and pricing, and constrains the broader payments ecosystem from extracting the full value of an open-loop architecture that was, on paper, designed to be network-agnostic from inception.

2.3 Infrastructural Challenges

NCMC has struggled to achieve desired penetration and adoption owing to friction caused by existing closed-loop mechanisms and institutional barriers. As of 2024-25, India's operational metro network has expanded significantly, exceeding 1013 km across 23 cities. Parallely, Bus Rapid Transit Systems (BRTS)

⁴¹ BESTpedia. (2025, February 24). NCMC: An open letter to NPCI and several transport operators. BESTpedia. <https://bestpedia.in/2025/02/ncmc-an-open-letter-to-npci-and-several-transport-operators/>

⁴² Special Correspondent. (2021, March 14). Kochi-1 card crosses one-lakh milestone. The Hindu.

<https://www.thehindu.com/news/cities/Kochi/kochi-1-card-crosses-one-lakh-milestone/article34064335.ece>

⁴³ Kagra, H., & Kohade, P. (2017). Unified ticketing system for different modes of transport in Ahmedabad city – Challenges and issues. Urban Mobility India. <https://www.urbanmobilityindia.in/Upload/Conference/1f5880d4-25d7-43ab-b6f1-a5aaf9f4bfaa.pdf>

⁴⁴ Maharashtra Metro Rail Corporation Limited. (2026). Corrigendum-V: Selection of financial institution (FI) for issuance of open loop National Common Mobility Card (NCMC) and acquiring services for Maha-Metro (Tender No. Maha-Metro-AFC-01/2025).

are active in 23 cities.⁴⁵ The Delhi Metro remains the epitome of NCMC implementation, with 100% NCMC compliance across its network. While this is a step in the right direction, with official statements from MoHUA and NPCI asserting that "most of the Metros in India have adopted NCMC",⁴⁶ NCMC compliance is at best observed only in one leg of public transit. For instance, Delhi, which boasts 100% NCMC compliance through its metro network, has struggled to make the DTC bus network NCMC compliant. As per reports in March 2025, NCMC integration for bus services in the city only began this year with the installation of Electronic Ticketing Machines (ETMs) on select depots to accept NCMC tap-and-go features.⁴⁷

Delayed implementation is a result of the various technical specifications and infrastructural upgrades that are necessary to build and install NCMC compliant ETMs across the fleet of buses in Delhi.⁴⁸ This process is expensive and time consuming, and requires complete overhaul of existing systems without any real economic/efficiency incentives over paper-based ticketing currently in play. A recent intervention by the Delhi government marks meaningful progress on bus-side NCMC integration. The Pink Saheli Smart Card, an Aadhaar-linked NCMC-enabled instrument issued for women and transgender persons, enables free travel on DTC buses and doubles as a transit card for metro travel.⁴⁹ The card represents a tangible step towards multi-modal NCMC functionality and demonstrates that bus-side compliance is operationally viable. That said, the broader rollout of NCMC acceptance across the DTC fleet has been slow, and the pace of infrastructural upgrades to ETMs across all DTC buses continues to lag the ambition of universal acceptance.

This is demonstrated by the lukewarm response received by NCMC rollout in Bengaluru. NCMC cards started being issued in Bengaluru in March, 2023. However, data from May 5, 2026 reveals that 9,88,005 commuters travelled via the Namma Metro, and only 1,28,892 of them used NCMC cards. In contrast, 3,99,937 commuters used the conventional, closed loop Namma Metro Smart Card and 2,49,387 used smart tokens.⁵⁰ Commuters have revealed that it is pointless to carry NCMC cards given its incompatibility with the bus network provided by the Bengaluru Metropolitan Transport Corporation (BMTc). The BMTc has asserted that it has been planning to upgrade legacy ETMs to support NCMC and UPI tap-to-pay functionalities, however, progress has been stifled on account of technical and financial difficulties.⁵¹

The quest for interoperable transit and mobility is hence hindered by the entrenchment of legacy fare collection systems, resulting in the delayed unification of AFCs across public transit modes within cities. Since the unification of the AFC systems of various public transit is difficult even within cities, nationwide unification seems like a far-fetched reality. Unless proper incentives to shift to an ecosystem NCMC are not given to all stakeholders, including commuters, fintech service providers, card issuers, and transport corporations, then implementation and adoption will remain staggered. The reluctance of commuters to move to an NCMC-compliant regime is perfectly encapsulated by the Mumbai Metro system's case study. On the newer Metro Lines 2A and 7, which were built to be NCMC-compliant from their inception, NCMC

⁴⁵ Government of India. (2025, August 9). *India's Metro Revolution: From Miles to Milestones*. [Press Release]

<https://www.pib.gov.in/PressNoteDetails.aspx?NoteId=155002&ModuleId=3®=3&lang=2>

⁴⁶ Ministry of Housing & Urban Affairs. (2024, October 7). *Bhubaneswar wins the 'City with the Best Public Transport System' at 17th Urban Mobility India (UMI) Conference & Exhibition 2024*. [Press Release].

<https://www.pib.gov.in/PressReleaseDetail.aspx?PRID=2068706®=3&lang=2>

⁴⁷ Srivastava, A. (2025, March 16). *DTC's cashless ticketing trial underway at selected depots*. The New Indian Express.

<https://www.newindianexpress.com/cities/delhi/2025/Mar/16/dtcs-cashless-ticketing-trial-underway-at-selected-depots>.

⁴⁸ Department of Delhi Transport Corporation. (2020) *Corrigendum-1: Selection of System Integrator (SI) for Implementation of Automatic Fare Collection System (AFCS) in DTC Buses* [Tender No: DTC/AFCS/589/2020/01].

https://dct.delhi.gov.in/sites/default/files/corrigendum-1_replytoqueries_0.pdf

⁴⁹ Express News Service. (2026, March 8). *Delhi CM travels in DTC bus to take stock of implementation of Saheli Pink Smart Card*. The Indian Express. <https://indianexpress.com/article/cities/delhi/delhi-cm-travels-in-dtc-bus-to-take-stock-of-implementation-of-saheli-pink-smart-card-10570465/>

⁵⁰ Bangalore Metro Rail Corporation Limited. (n.d.). *Ridership*. Retrieved May 6, 2026, from <https://english.bmtc.co.in/ridership/>

⁵¹ Special Correspondent. (2025, November 13). *Commuters urge BMTc to adopt NCMC as Bengaluru lags in unified mobility*. The Hindu. <https://www.thehindu.com/news/national/karnataka/commuters-urge-bmtc-to-adopt-ncmc-as-bengaluru-lags-on-unified-mobility/article70275761.ece>

usage stands at a respectable 35%.⁵² On the older Metro Line 1, a legacy system that was retrofitted to accept NCMC, the adoption rate is only 10%.⁵³ Maharashtra has taken a comparable step on the bus side. The state government has launched an Aadhaar-linked, NCMC-enabled smart card for students, senior citizens, persons with disabilities, women, and other concession beneficiaries, enabling them to access travel concessions on ST bus services more seamlessly. The initiative is a positive development for NCMC integration on intercity bus networks, although the broader extension of NCMC acceptance across the ST fleet and across other state transport undertakings (STUs) nationally remains a work in progress.

The disparity in adoption observed when NCMC is introduced by default in a new environment versus when it is retrofitted to a legacy system reveals how it is an uphill task to displace entrenched habits of using a familiar, and functional, closed-loop card system. This challenge is mirrored in other major cities like Bengaluru and Chennai, where adoption has been slow due to a lack of integration across different transport modes.⁵⁴

Integration problems are also exacerbated when existing, legacy systems are simply incompatible with the interoperable, open-loop envisioned by the NCMC. For instance, Kerala State Road Transport Corporation (KSRTC) has implemented its own closed-loop “Chalo” card system for collecting bus fares. Developed in partnership with the mobility platform Chalo, the card allows passengers to recharge and make digital payments for bus rides, functioning efficiently within KSRTC’s ecosystem.⁵⁵ However, industry observers and reports highlight that “closed-loop [bus] cards cannot be integrated with other transport modes,” which directly contradicts the vision of seamless, interoperable mobility that NCMC seeks to establish.⁵⁶ Transitioning such legacy systems to NCMC compliance would require a complete overhaul of backend infrastructure, replacement of existing ticket validators and ETMs, and retraining of operational personnel. This an expensive and disruptive process with limited immediate benefit to operators or commuters. Consequently, several STUs have preferred maintaining their existing closed systems, which are reliable and locally optimised, rather than investing in interoperability with national frameworks.⁵⁷ Without clear financial incentives or technical support for migration to open-loop systems, the vision of a unified, interoperable transit payment ecosystem under NCMC remains constrained.

2.4 Fragmented Governance and Institutional Coordination

Technological and commercial readiness are hurdles that can only be overcome through effective coordination among multiple institutional actors, including central ministries, ST departments, municipal corporations, metro rail companies, and payment service providers. However, the current governance structure around NCMC is fragmented. MoHUA is the nodal body overseeing the

⁵² Mehta, M. K., & Sen, S. (2025, April 12). *Mumbai’s national common mobility card set for wider rollout*. The Times of India. <https://timesofindia.indiatimes.com/city/mumbai/cm-mum-1-card-for-seamless-commute-set-for-wider-rollout/articleshow/120214577.cms>.

⁵³ Mehta, M. K., & Sen, S. (2025, April 12). *Mumbai’s national common mobility card set for wider rollout*. The Times of India. <https://timesofindia.indiatimes.com/city/mumbai/cm-mum-1-card-for-seamless-commute-set-for-wider-rollout/articleshow/120214577.cms>.

⁵⁴ Kaur, L. (2023, August 11). *DH deciphers: All you need to know about national common mobility card*. Deccan Herald. <https://www.deccanherald.com/business/dh-deciphers-all-you-need-to-know-about-national-common-mobility-card-2644187>.

⁵⁵ Kumar, K. (2025, July 6). *KSRTC travel card gains traction, demand rises for unified ticketing*. The New Indian Express. <https://www.newindianexpress.com/states/kerala/2025/Jul/06/ksrtc-travel-card-gains-traction-demand-rises-for-unified-ticketing#:~:text=While%20the%20%E2%80%98Chalo%E2%80%99%20card%20and,integration%20with%20other%20transport%20modes>.

⁵⁶ Kumar, K. (2025, July 6). *KSRTC travel card gains traction, demand rises for unified ticketing*. The New Indian Express. <https://www.newindianexpress.com/states/kerala/2025/Jul/06/ksrtc-travel-card-gains-traction-demand-rises-for-unified-ticketing#:~:text=While%20the%20%E2%80%98Chalo%E2%80%99%20card%20and,integration%20with%20other%20transport%20modes>.

⁵⁷ Dubey, N. (2023, October 4). *One nation, one card doesn’t address commuter needs of interoperable transit payment systems: Report - businesstoday*. Business Today. <https://www.businesstoday.in/amp/personal-finance/top-story/story/one-nation-one-card-doesnt-address-commuter-needs-of-interoperable-transit-payment-systems-report-400619-2023-10-04>.

implementation of NCMC, while actual deployment lies with state governments and their transport undertakings. Meanwhile, payment infrastructure and card issuance are regulated by the RBI and NPCI, each with separate compliance and certification processes. The existence of multiple authorities responsible for implementation has resulted in a lack of accountability and an operational vacuum in policy implementation.

The absence of a unified monitoring mechanism or incentive framework across agencies has led to inconsistent adoption standards and slow progress. Without institutional streamlining and clarity of roles, NCMC risks remaining a patchwork of partial implementations rather than a truly interoperable national system.

2.5 Commuter Awareness, Usage Patterns, and Inclusivity Challenges

Six years after its launch, commuter awareness remains a critical barrier to the NCMC's success. While official adoption data highlights the number of compliant cards issued, the actual understanding and intentional usage by commuters are low.

Usage patterns are heavily skewed toward transit, particularly in urban metros like Delhi, Mumbai, and Bangalore. The card functions primarily as an AFC instrument, with its utility as a general retail payments solution being minimal. Limited retail acceptance persists due to slow adoption of NFC compliant Point-of-Sale (PoS) terminals, slow merchant awareness, and KYC requirements to unlock the full functionality of NCMC-enabled cards, undermining the "beyond-transit" appeal of the 'One Nation, One Card' vision.

Persistent pain points frequently cited by users and transit operators in public forums include interoperability failure and recharge inconveniences. While cross-city metro usage is increasing, glitches often arise when using cards across different modes (e.g., metro to bus) or in newly integrated systems, leading to commuters reverting to cash or closed-loop cards. Moreover, inclusivity gaps remain stark for underserved cohorts, particularly low-income commuters. These groups are often reliant on city buses, where fare collection digitisation is slower than in metro rail systems. Furthermore, metro fares (₹20–60) often far exceed city bus fares (₹5–20), limiting the card's utility and perceived value for low-income commuters whose mobility is highly price-sensitive.⁵⁸ Beyond daily commuting, these interoperability and network barriers represent a significant missed opportunity for the broader travel economy. International tourists carrying global network cards could gain massive functionality advantages and navigate Indian cities effortlessly if permitted to use their existing, home-issued cards directly as transit media at AFC gates. Similarly, an open, network-agnostic ecosystem would inject immense convenience into domestic tourism, allowing citizens to travel seamlessly across state lines without the friction of purchasing distinct, localised fare media in every new city they visit.

Over the six years since launch, while regulatory frameworks have evolved (e.g., KYC relaxations for small-value prepaid cards), these foundational operational and design challenges related to last-mile acceptance, network restrictions, and user experience have persisted, continually constraining the NCMC's potential for mass market penetration.

⁵⁸ Mukherjee, A., Muruganantham, S., Balachandran, A., Maiti, S., & Ganesh, P. K. (2023). Improving Metro Access in India: Evidence from three cities. World Resources Institute. <https://doi.org/10.46830/wriwp.23.00009>

3. Scheme Exclusivity and the Constraint on Interoperability

This chapter conducts a focused assessment of the current limitations resulting from the NCMC's tight integration with the indigenous network. It quantifies how this arrangement constrains systemic interoperability, limits product innovation by domestic and global card issuers, and narrows user choice.

3.1 Current Model and Exclusivity Impacts

NCMC's mandate to promote domestic infrastructure has achieved significant foundational scale. By March 2024, NPCI data reported that 25 banks (along with various PPI issuers) were certified and operational for NCMC issuance, exemplified by popular products like SBI's RuPay NCMC. This dominant position was reinforced by 2023 government directives urging banks to issue NCMC-compliant cards as a default option for new customers.⁵⁹ Following this, NCMC cards in circulation skyrocketed to reach 200 million in March 2024.

However, this policy preference has implicitly restricted the active participation and scale of major global payment networks within the domestic NCMC payment channel. This strategic focus limits the integration of NCMC with existing international card products, hindering its ability to achieve universal acceptance. Initial adoption data confirms significant growth within the policy-supported ecosystem. Yet, this expansion remains largely constrained to the domestic framework, creating interoperability challenges that resemble the limitations typically associated with closed-loop payment systems.

3.2 Case for Broader Participation

Opening the NCMC ecosystem to global networks is essential to unlock its full potential for competition and systemic adoption.

The interoperable nature of India's payments infrastructure is key to mass adoption, as demonstrated by the UPI platform. Research notes from the International Monetary Fund (IMF) on digital payments and interoperability highlight that unifying fragmented networks can lead to substantial increases in digital payment usage, with some successful integration models showing a rise in usage of over 50% in the year following network unification.⁶⁰

With the RuPay network already having issued 200 million NCMC Debit cards as of 2024, diversifying the network options would ensure NCMC benefits from the scale, global acceptance, and product innovation capabilities of all card networks. This shift would align NCMC with India's rapid growth in the broader PPI market, fostering a universally acceptable and competitive payment solution. Furthermore, to achieve meaningful participation in the NCMC ecosystem would require marrying the capabilities of a standard debit card with stored value (offline) functionalities for public transit fares. Imbibing existing debit card holders, agnostic of payment networks, with NCMC functionality would help achieve meaningful scale for this vision instead of issuing fresh cards with this added functionality.

⁵⁹ Government requests banks to issue cards with mobility features. (2023, July 19). *IIFL Capital*. <https://www.indiaonline.com/news/markets/government-requests-banks-to-issue-cards-with-mobility-features>.

⁶⁰ Copestake, A., Kirti, D., Martinez Peria, M. S., & Zeng, Y. (2025). *Integrating fragmented networks: The value of interoperability in money and payments* (IMF Working Paper No. 2025/126). International Monetary Fund. <https://doi.org/10.5089/9798229013857.001>

4. Way Forward: Standards, Governance, and Open Interoperability

This chapter shall lay out specific policy interventions that would help NCMC in evening out the various challenges associated with implementation.

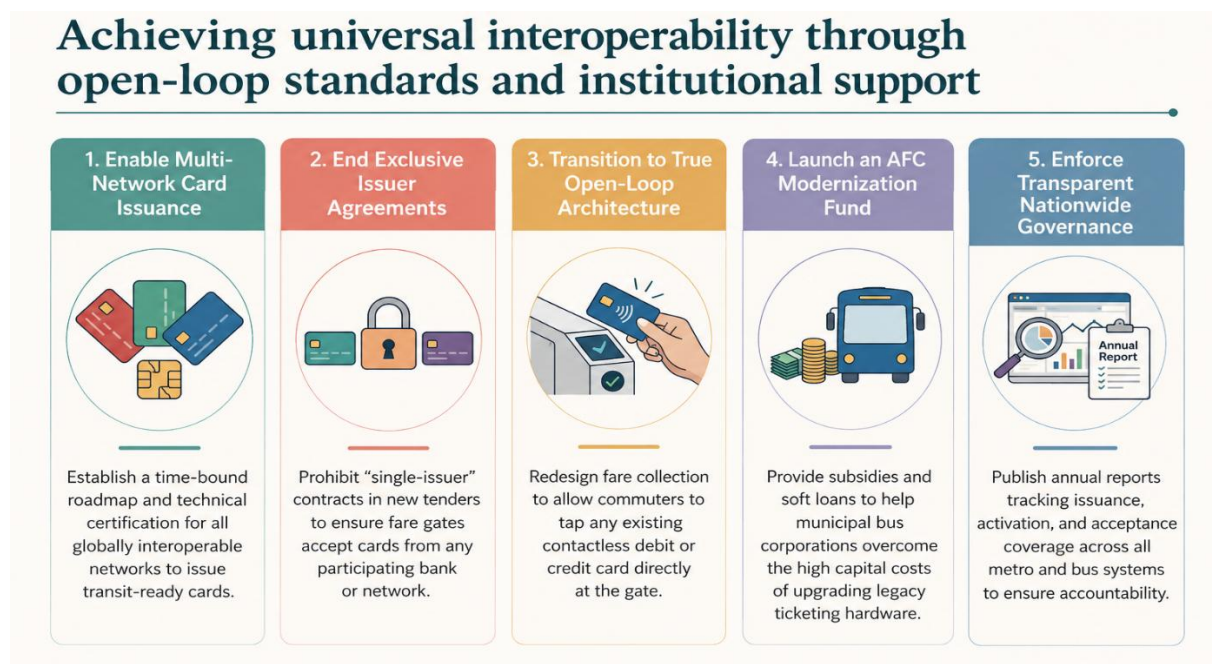


Fig 2: Recommendations towards an Interoperable Transit Ecosystem

4.1 Upholding Philosophical Consistency

As previously discussed, the NCMC was envisioned as an open-loop, interoperable mobility solution with retail functionalities. A purely closed-loop ecosystem would be fundamentally incompatible with the policy objectives behind NCMC. The hybrid open-loop system resulted in NCMC cards being used only for transit, with debit card benefits remaining locked behind KYC requirements. A truly open-loop system, which would allow multiple card issuers and the repurposing of existing cards, would encourage a truly interoperable ecosystem with healthy innovation, competition and customer satisfaction.

Although global card network operators have developed NCMC-compliant kernel specifications in May 2019, no Indian bank has issued non-RuPay NCMC cards at meaningful scale. MoHUA should set out a time-bound roadmap for multi-network NCMC issuance, with clear technical certification pathways for globally interoperable networks. This would address the network exclusivity that has rendered the NCMC framework open in design but closed in practice.

Several Tier 2 metro and BRTS systems, including Pune Metro, Kochi Metro, Ahmedabad Janmarg, and Surat Citilink, operate as exclusive single-issuer-single-acquirer arrangements, where fare gates accept only the contracted bank's NCMC card. NPCI should issue revised model concession agreements that prohibit exclusive acceptance arrangements for new tenders, with a phased migration plan for existing deployments at the point of contract renewal. The Nagpur Metro open-loop conversion of July 2025 offers a workable template.

Beyond enabling multi-network NCMC issuance, the more transformative reform would be the gradual migration of fare collection systems to a true open-loop EMV architecture, modelled on the London Oyster ecosystem,⁶¹ in which any contactless debit or credit card already in circulation can be tapped at the fare gate. This would require redesigning the AFC layer to handle online fare authorisation, daily fare capping, and post-tap reconciliation. MoHUA should commission a feasibility study on the technical, regulatory, and capital-expenditure pathway for such a migration, with a pilot deployment at one metro system to test the operating model.

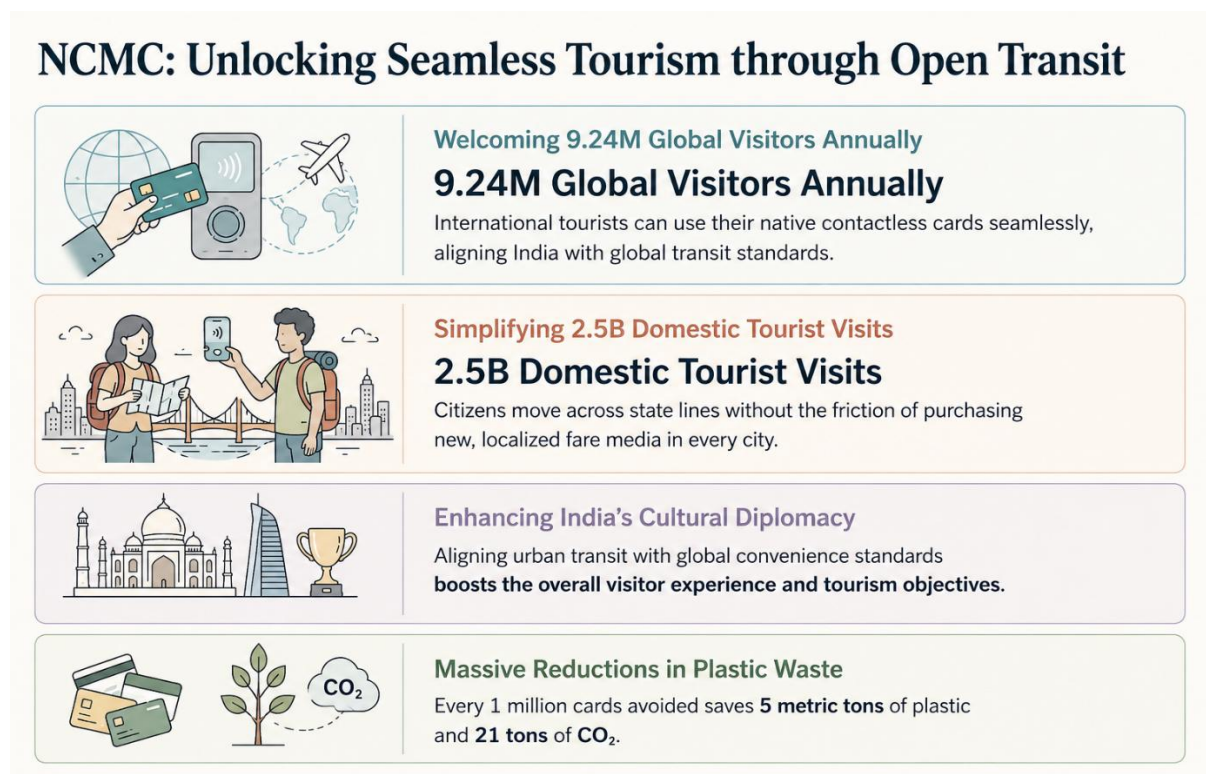


Fig 3: Unlocking Seamless Tourism Through Open Transit

A further benefit of this transition would be the immediate accessibility it offers to both domestic and international travellers. With India hosting approximately 9.95 million Foreign Tourist Arrivals in 2024⁶² visitors arriving from Europe, North America, or Southeast Asia typically carry contactless, globally operated credit and debit cards that work seamlessly at transit gates in London, New York, Singapore, and Sydney. A true open-loop EMV architecture at Indian metros and buses would extend the same convenience to inbound tourists, removing a meaningful friction point in the visitor experience and aligning urban transit with India's broader cultural diplomacy and tourism objectives. Domestically, India

⁶¹ White, A. (2023, November 1). Lessons from London: The Blueprints for Open Loop: IOT Now News & Reports. IoT Now News - How to run an IoT enabled business. <https://www.iot-now.com/2023/11/01/139515-lessons-from-london-the-blueprints-for-open-loop/>

⁶² Press Information Bureau. (2025, January 29). Arrivals of foreign tourists [Press release]. Ministry of Tourism, Government of India. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2220107>

recorded over 2.95 billion domestic tourist visits in 2024. A network-agnostic ecosystem would inject immense convenience into domestic travel, allowing citizens to move seamlessly across state lines without the friction of purchasing distinct, localised fare media in every new city they visit. Furthermore, bypassing the need for dedicated transit cards offers profound environmental benefits. The mass issuance of single-use or dedicated PVC-based transit cards generates significant plastic waste, with every one million cards consuming approximately 5 metric tons of plastic and emitting roughly 21 tons of CO₂ equivalent during production.⁶³ Enabling commuters to use their existing bank cards at transit gates can drastically reduce plastic footprint, directly supporting India's national sustainability and net-zero commitments.

4.2 Providing Institutional Incentives

A Central (MoHUA) "AFC Modernisation Fund" must be established. This fund must provide dedicated financial support (subsidies, soft loans) to help financially strained ST organisations, especially municipal bus corporations, overcome the "substantial CAPEX barrier" of upgrading legacy AFC systems to NCMC-compliant infrastructure.⁶⁴ Furthermore, a newly envisioned, sustainable revenue-sharing model must be developed to make the NCMC proposition commercially viable for all stakeholders involved. Stronger governance could enforce nationwide compliance, preventing local exclusivity, aligned with 2024-25 annual reports⁶⁵ promoting NCMC for digital inclusion.

Stronger governance is also required to enforce nationwide compliance and prevent the entrenchment of local exclusivity arrangements at the deployment level. MoHUA, as the nodal ministry, should publish an annual NCMC implementation report tracking issuance, activation, acceptance coverage, and exclusive-deployment status across all metro and bus systems, with public visibility into compliance with the model concession agreements proposed in Section 4.1. This would replace the current opacity around deployment-level adoption with a transparent, accountable framework aligned with the digital inclusion goals articulated in the DFS 2024-25 Annual Report.

⁶³ Thales Group. (2021). Eco-friendly credit cards: the definitive guide to sustainable payment cards. Thales DIS. <https://www.thalesgroup.com/en/markets/digital-identity-and-security/banking-payment/issuance/eco-friendly-credit-cards>

⁶⁴ Khaneja, V. National common mobility card - a single card for a gamut of digital transactions. C-DAC. https://www.cdac.in/index.aspx?id=print_page&print=blog_ni_onoc.

⁶⁵ Department of Financial Services. (2025, March 12). *Annual report 2024-25*. <https://financialservices.gov.in/beta/en/annual-report>.

5. Conclusion

The NCMC initiative is an ambitious step towards unifying India's fragmented transit payment landscape and redefining mobility, inclusion and accessibility through an interoperable framework. "One Nation, One Card" is a vision of a digitally inclusive India, where transit and payments converge seamlessly across modes, cities and regions. However, the journey from concept to widespread adoption has been uneven. Structural, economic and institutional challenges have slowed progress, while the lack of consistent incentives for users, issuers and operators has hindered large-scale migration to open-loop systems.

Realising the NCMC vision will require more than technical readiness; it demands a reorientation of governance, incentives and user experience. Encouraging competition among card networks, providing institutional support for AFC upgrades, and making NCMC cards frictionless for everyday use are essential steps. Beyond enhancing commuter convenience, a truly interoperable NCMC ecosystem can also serve as a catalyst for domestic and international tourism by making travel across cities simpler, faster and more reliable. Seamless digital transit payments can help visitors navigate multiple modes of public transport using a single instrument, improving accessibility to local businesses, cultural sites and regional attractions.

As India's urban infrastructure expands and its digital ecosystem matures, the NCMC can become a cornerstone of both mobility and financial inclusion. By linking everyday commuting with tourism and local economic growth, it can play a central role in strengthening India's image as a connected, inclusive and digitally advanced nation. The path forward lies in transforming NCMC from a policy aspiration into a user-centric, interoperable mobility solution that embodies India's broader digital transformation goals.

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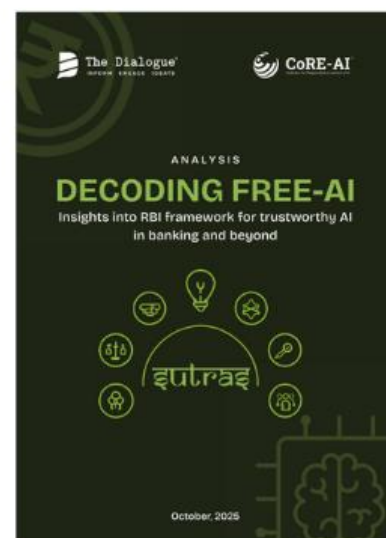
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