Dvara Research | Policy Brief | May 2020

Transaction failure rates in the Aadhaar enabled Payment System

Urgent issues for consideration and proposed solutions

Author: Malavika Raghavan[1]

Executive Summary

The Aadhaar enabled Payment System (AePS) has witnessed a surge in transactions during India's Covid-19-induced lockdown. Many providers have pivoted to use of this system as bank branches experienced service disruptions in the early weeks of the lockdown, limiting the cash-out points in India. This coincided with a huge demand for cash withdrawals by vulnerable citizens in response to announcement of cash transfer schemes by Central and State governments. Many migrants who are part of the mass exodus away from affected cities have heightened reliance on wayside shops and MicroATMs to access cash.

Worryingly, the rise in AePS transactions has been accompanied by reports of a spike in transaction failure rates. This has serious consequences for consumers who desperately need to access and remit cash to stay afloat in the crisis. Unfortunately, limited published evidence and analysis of the nature of these transaction failures exists.

This policy brief identifies the most serious categories of AePS transaction failures based on data and conversations with four financial institutions with a combined presence across the country. To understand the levels at which these failures occur, the AePS process flow is described in Section 2. Section 3 describes our understanding of the main reasons for AePS transaction failures, especially in April 2020, and highlights the impact on consumers. Section 4 of this brief proposes some immediate and medium-term solutions for urgent discussion, given the enormous costs these failures externalise to the most vulnerable users of India's financial services infrastructure.

[1] The author is Head of the Future of Finance Initiative at Dvara Research. Special thanks to the financial service providers who provided data and insights for this policy brief. The author is grateful for the engagement from Mr. Samir Shah, Ms Bindu Ananth, Dr. Indradeep Ghosh, Mr. Deepak Singhal, Mr. Abhinav Pandey, Ms. Sheekha Verma, Mr. Alok Pati, Mr. Murty L and members of Future of Finance Initiative team. Errors and omissions are the authors own. Feedback is welcomed at: malavika [dot] raghavan [at] dvara [dot] com.

1. Introduction: AePS transactions in India's Covid19-related lockdown

Cash withdrawal from bank accounts is an essential financial service in a crisis, especially for low-income informal sector workers whose lives have been thrown into uncertainty in the Covid19 pandemic. In this context, the Aadhaar enabled Payment System (AePS) has emerged as a key cash-out infrastructure for providers and consumers. This is reflected in the dramatic increase in AePS transactions volumes in April 2020 (see Table 1).

Table 1: AePS Statistics from NPCI

Month	Approved Transactions (In Mn)	Approved ONUS (i.e. Intra-bank) Transaction (In Mn)	Approved OFFUS (i.e. Inter-bank) Transaction (In Mn)
Apr 2020	403.33	212.08	191.26
Mar 2020	172.84	110.97	61.87
Feb 2020	205.51	135.62	69.89

Source: AePS Product Statistics [1]

Several factors have necessitated a pivot to reliance on AePS infrastructure, especially for financial institutions serving low income consumers. Following the announcement of the nationwide lockdown on 24 March 2020:

- banking services were immediately affected with several branches closing and working hours shortened due to various operational difficulties [2][3];
- an estimated 400m workers in the informal economy, many of whom are daily wagers who suffered severe setbacks to their livelihoods and needed access to their cash [4];
- Central and State Governments announced cash transfer schemes to support the most vulnerable individuals, creating huge demand for withdrawals by those trying to access cash transfers [5];
- migrant workers have suffered gravely, with many joining the mass exodus on foot from affected cities back to their home towns on foot. For many who may have their banking and ID documentation in their home towns, the reliance on the AePS has been heightened.

Unfortunately, the rise in AePS transactions has been accompanied by reports of a serious spike in failure rates. This has serious consequences especially for low-income consumers without access to alternative cash-out points or the ability & access to digital services.

This policy brief identifies the most serious categories of AePS transaction failures based on conversations and data from four financial institutions with a combined presence across most states in India[2]. Section 2 provides an overview of the AePS transaction flow. Section 3 identifies key categories of transaction failures, especially in April 2020 and fleshes out the impact on consumers. Proposed measures to address these concerns are set out in Section 4.

[2] The institutions whose data and comments were used for of this study include Dvara KGFS, Eko India Financial Services Pvt. Ltd and another financial service provider. Additionally, we have data on success & failure rates from one other financial service provider.

2. Overview of the AePS transaction flow

The AePS system allows consumers with Aadhaar numbers to carry out financial transactions at Micro-ATMs through the Banking Correspondent (BC) of a bank.[6] Using AePS, BC agents can enter the consumer's Aadhaar number in a Micro-ATM and authenticate the transaction using the consumer's biometric data. AePS is designed for consumers who do not possess smartphones or require assisted access to services. Debit/ATM cards can be swiped to populate details on Micro-ATMs, but details can be inputted manually. This means even customers who do not physically possess their debit cards can in theory undertake a transaction, as long as they have an Aadhaar-seeded bank account. Annex A shows a simplified AePS process flow.

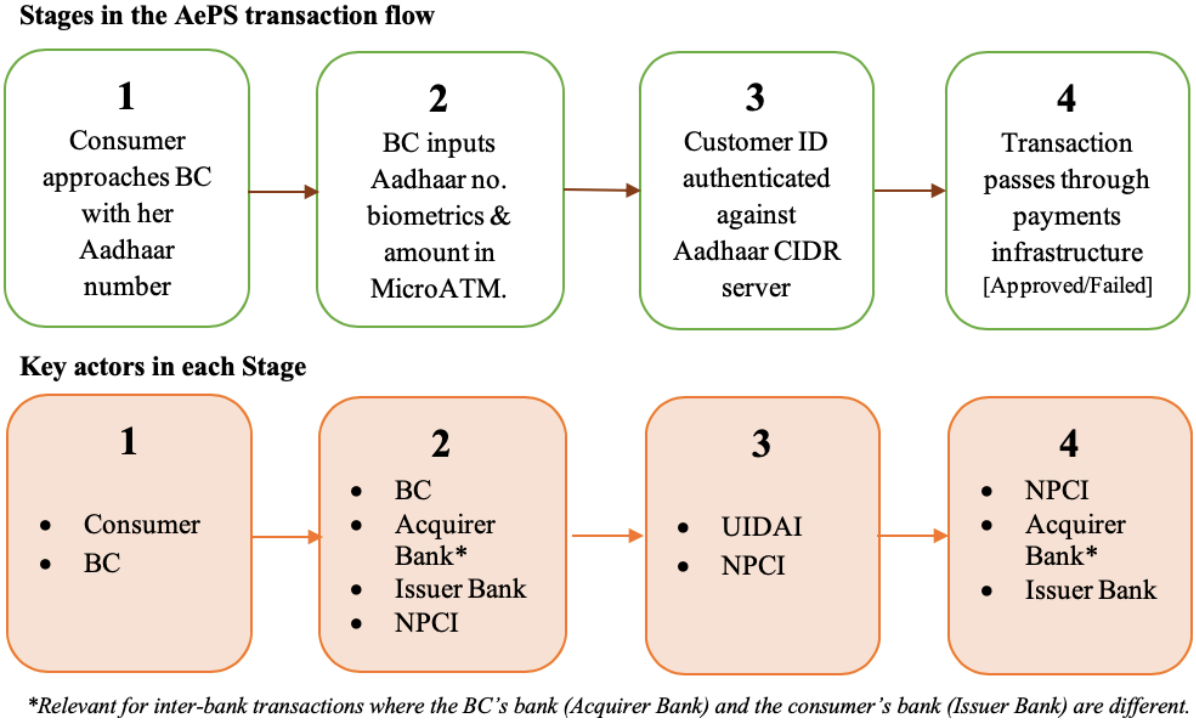
AePS currently enables 6 types of transactions: (i) balance enquiry (ii) cash withdrawal (iii) cash deposit (iv) fund transfer (v) generating mini statement and (vi) purchases (i.e. payments to Merchant).[7]

2.1. Process flow for AePS transactions

For a consumer seeking to withdraw cash through AePS, the main interaction is with the BC agent who handles the MicroATM. After the BC inputs the required information and initiates the transaction, the back-end AePS process begins which requires coordination between the National Payments Corporation of India (NPCI) as the body operating the AePS, the Unique Identification Authority of India (UIDAI) which oversees authentication against the Central Identities Data Repository (CIDR), and banks who enable cash withdrawal from bank accounts.

Figure 1 below maps the four broad stages of the journey in the AePS process flow, mapping them against the key actors involved at each stage of the process. This mapping is helpful to identify the stage at which transaction failures are being most encountered, and the relevant actors who can help overcome or reduce these transaction failures.

Figure 1: Stages of the AePS transaction flow



**Relevant for inter-bank transactions where the BC's bank (Acquirer Bank) and the consumer's bank (Issuer Bank) are different.*

Currently, only banks[3] are authorised to undertake AePS transactions (so any non-bank entities seeking to offer AePS services must enrol as the BC of an authorised Bank). [8] The consumer is involved only in Stage 1 of the AePS process flow to request initiation of the transaction. The BC is involved until stage 2 when she operates the MicroATM. Stage 3 and 4 involve technical processes in the banking, payments and biometric authentication systems. In Stage 4 of the process in Figure 1 (above), cash can be withdrawn, deposited or transferred as part of:

- an **intra-bank** transaction i.e. where the consumer's bank account is held with the BC's banking partner, so the bank approves the withdrawal (as both the Acquiring Bank and Issuer Bank for the transaction); or
- an **inter-bank** transaction i.e. from a bank account that is not held at the BC's banking partner, then the BC's bank (as the Acquirer Bank) must coordinate with the bank where the consumer's bank account is located (the Issuer Bank) to enable the withdrawal.

In the latter scenario, the Acquirer Bank will route the transaction through the NPCI switch to the Issuer Bank. The Issuer Bank then interacts with its Core Banking System to process the payment request. It will send a transaction approval to the Acquirer Bank to complete the transaction and release cash requested by the consumer. Annex B of this note includes diagrams representing these processes.

All AePS transactions generate a printed or electronic transaction receipt for the consumer, with details of the transaction, the status of the transaction and other details specified in the AePS Interface Specification.[7] A response code is also received by the BC and their financial institution for declined or failed transactions. This response code's description is indicative of the reason for the decline.[9]

From this process-flow, it becomes clear that transaction failures can occur at three levels AePS process flow:

A. **Consumer/ BC level** i.e. in Stages 1 and 2 when the consumer and BC initiate the transaction;

B. **Infrastructure level** i.e. in Stages 2, 3 and 4 within the Authentication and Payments Systems;

C. **Bank level** i.e. in Stage 4 due to hand-offs or rejections from the Banking system.

As noted above, the response codes generated for each transaction can give an indication of the level at which the failures are occurring. Given the spike in the failure rates of AePS transactions, one way to arrive at a broad picture of **which level the majority of transaction failures are occurring**, is by examining the response codes received by financial institutions for declined or failed AePS transactions.

[3] As per NPCI's website, 44 Mainline Commercial Banks, 47 Regional Rural Banks, 16 Co-operative Banks and 12 Payment Banks & Small Finance Banks can currently offer AePS services–a total of 119 institutions.[12]

3. Identifying the main reasons for AePS transaction failures

High failure rates in the AePS system have been recognised in the past, both in official documents and independent academic studies. For instance in December 2016, the final report of the Ministry of Finance's Committee on Digital Payments headed by Ratan P. Watal noted that over 60% of inter-bank AePS transaction were failing [10, p. 128]. In May 2019, the Report of the RBI's Committee on Deepening of Digital Payments chaired by Nandan Nilekani also acknowledged high AePS transaction failure rates.[11, p. 47]

In terms of academic studies, a paper released in 2019 by researchers at the Digital Identity Research Initiative at the Indian School of Business (ISB) provides important insights from a dataset of 9 million+ transactions (of which 7 million+ were AePS transactions) taking place between December 2014 and December 2018 from a BC aggregator operating pan-India. [12]

The study found that on an average, **one-third of AePS transactions fail** (34.03%) with:

- 17.03% of failures as a result of biometric mismatch;
- 3.71% of failures due to other technical reasons (e.g. bank system failures, internet connectivity), and
- 13.3% are because of non-technical reasons (e.g. lack of sufficient balance, invalid amount entered).[4]

These results indicate that **Infrastructure-level** issues i.e. biometric mismatches are were major contributors to AePS transaction failures in the study period (until December 2018). Biometric mismatches can be the result of a variety of issues that (a) pre-date the authentication attempt, for e.g. improper collection of biometrics at Aadhaar enrolment, (b) occur at the time of authentication, for e.g. poor quality of scanner, foreign material on the scanner, low fingerprint image quality of the scanned finger etc, or (c) occur due to problems of the authentication system such as false non match rates/ false match rates, or other security vulnerabilities [13]. Unfortunately, the error codes for biometric mismatch is a broad one that does not provide further detail regarding the underlying reasons for mismatches.

Issues at the **Consumer/BC level,** such as incorrect execution of the transaction or insufficient balance, appear to be the next major contributer to AePS transaction failures

Overall, high failure rates in the AePS system have been acknowledged in the past with some level of understanding of the main contributors to such failures. This provides some context with which to assess the experience of providers and consumers using AePS in April 2020.

[4] Note that the study found that failure rates declined as the experience of users grew. However, it is not clear how the increase in the user experience can improve failure rates for technical reasons in the banking or authentication system.

3.1. AePS failure rates in April 2020

In the period since India's Covid19-related lockdown was announced, AePS transaction volumes have risen dramatically. Simultaneously, the experience of a rise in failures of financial transactions executed through the AePS also began to become more widespread. Providers in India's financial service industry using the AePS systems began to notice this issue. Journalistic reports have also surfaced the experience of consumers who have faced the consequences of these failures.[14] This is especially a worry given cash withdrawals are an urgent need for migrants and informal sector workers in the present crisis.

Failure rates received from four financial institutions with a pan-India presence reveal an average percentage of AePS failed transactions of **39% across providers in April 2020**. This ranges between providers from **10%** to **62%** of all AePS transactions failing. Several factors could explain this variation. For instance, providers with higher failure rates are more geographically dispersed with exposure to geographies known to have higher failure rates such as Haryana, Bihar and Uttar Pradesh. [15]

Even setting aside the variation, this has serious consequences for consumers in a crisis. Consider applying a 39% failure rate to the total number of AePS transactions in April 2020. Going by the reported number of 403.33 million approved AePS transactions [1], if we assume 39% of all transactions failed, then roughly 661 million AePS transactions would have occurred in April 2020 in total of which 257 million transactions failed.

Overall, all providers consistently have confirmed **a sharp rise in the number of failed AePS transactions in April 2020**. For one provider, the percentage of failed transactions rose from 49% in the first three weeks of March 2020, to 53% in the last week of March after the lockdown was declared, to 62% in April 2020. This figure resonates with observations from the head of a BC firm carried in a report published on 6 May 2020, who noted that their AePS authentication failures had risen from 20 to 30% to over 45 to 50%. [14]

Such indications of the increase in transaction failure rate combined with the overall rise in AePS transaction volumes is a serious concern. This could mean that as AePS usage goes up, failed transactions as a proportion of transactions could become much higher in this system.

Across providers, the **major reasons identified as contributing to failed AePS transactions** are:

i. Biometric data mismatch;
ii. Issuer Bank or Switch not operative (Timeout);
iii. Invalid account /No account (Aadhaar not linked);
iv. Insufficient funds;
v. Transaction not permitted for card / blocked or frozen account; and
vi. Reached maximum number of transaction allowed for the day.

Of these reasons, biometric mismatches and transaction timeouts were the larger proportion of errors in this period noted across three of the providers contacted for this study. These are Infrastructure-level and Bank-level issues outside the control of the BC agent and consumer undertaking the transaction. The remaining reasons noted the list above can occur due to problems at the Bank-level (due to improper seeding or caps of transactions) or errors taking place at the Consumer/BC level.

The change in the nature of failures during April 2020 is seen from the top three contributors to transaction declines for one provider, which were (i) biometric mismatch, (ii) transactions timeouts and (iii) insufficient funds in the account of the consumer. The percentage of transaction failures due to biometric mismatch and insufficient funds in accounts were comparable before and after the commencement of the lockdown (even though transaction volumes increased). However, a stark rise was seen in transaction failures from Timeouts due to the Issuer Bank being inoperative. These spiked from 3% in March 2020 to 12% in April 2020. In this case, it means technical failures and timeouts from banks grew from being the reason for failure in three transactions per hundred, to being the cause for twelve failures in every hundred transactions.

Another provider also indicated that many of the major reasons for transaction failure could be outside of the control of the BC agent, especially if they are operating in a remote rural with poorer connectivity or with a banking partner whose technical systems are suddenly overwhelmed by the heightened transaction volume.

3.2. Impact on Consumers already in distress

The failure of AePS transactions can have severe adverse consequences of individuals seeking to withdraw cash. Anxiety and uncertainty can result for consumers where their transactions are declined. Often the technical response codes generated may not be meaningful for the consumer or even the BC agent, creating fear and a lack of clarity.

Even more of a concern are situations where transactions are initiated, amounts are debited from the consumer's account but the cash withdrawal fails. This can occur due to issues in banking infrastructure, technical infrastructure or connectivity issues. These has knock-on consequences detailed below, which consumers and BC agents are battling on the ground.

Inability to confirm if account is debited despite failed transaction

In many cases the response code for a failed transaction does not enable the BC agent to determine whether the amount has been debited from the consumer's bank account or not. Providers mention that error codes can be opaque, making it hard for the BCs to tell the consumer what went wrong when a transaction was declined.

For e.g. when a response code indicates that the "*Issuer Bank is inoperative*", although the transaction is disrupted there is a possibility that once the Issuer Bank's server is operational again, the cash withdrawal request may be cleared. At the point of the transaction being declined, the BC may not even able to confirm the status of a transaction and whether the consumer's account may be debited after sometime.

Where a delayed debit takes place, the consumer has no option but to wait for a reversal.

Extended period without reversal of debits

According the RBI Notification on Turn Around Time (TAT) and compensation for failed transactions[16], where a person's account is debited during an AePS transaction but confirmation is not received at the merchant location, then the Acquirer Bank (whose BC initiated the transaction) must make a credit adjustment within 5 days of the transaction. Further, they need to pay the consumer Rs. 100 per day for delays beyond 5 days.

The worrying reality described by providers is that consumers are having to wait 14-15 days for such adjustments, and in certain cases the adjustment never takes place.

Loss of money for consumers due to failed AePS transactions

Cash withdrawal in the AePS system happens after successful Aadhaar authentication, following which the consumer's bank (the Issuer Bank) debits her account and sends a message to the MicroATM that the transaction is approved. The BC can then hand over the equivalent amount of cash.

For an inter-bank transfer, the Acquirer Bank (which disburses cash through its BC agent and MicroATM) will hand over the cash and settlement will take place between the Acquirer Bank and the consumer's Issuer Bank separately.

Interbank settlement takes place twice a day on AePS on a netted basis.[17] Accordingly, banks bulk settle their exposures as Acquirer Banks or Issuer Banks in multiple AePS transactions, twice a day directly in their RTGS settlement accounts held with the RBI[5].[7] The Procedural Guidelines for the AePS system issued by NPCI to all participants (the NPCI Procedural Guidelines) places responsibility on the Acquirer and Issuer Banks to perform a daily reconciliation.

This means all Bank participants need to keep their settlement accounts reconciled on a daily basis. These reconciliations become critical when transactions fail.

[5] Each bank using AePS has a daily "Net Debit Cap" (NDC) for AePS transactions which is separate from caps for other NPCI services the bank may use (such as IMPS, UPI or RuPAy). [7] The NDC is refreshed and re-set with every successful settlement. Outgoing transactions for an NPCI Member bank are stopped if their net exposure exceeds the NDC. This could also result in declines perhaps, if the NDCs are not appropriately set or monitored.

For instance imagine that the consumer's account is debited, but the Issuer Bank's systems fail thereby disrupting the transaction. In this situation, money may not have left the Issuer Bank's systems but the debit is reflected on the consumer's account. In this case it is a bank's internal matter, as action will need to be taken by the consumer's own bank (the Issuer Bank) to accurately return money to her account and ensure it is not trapped in any suspense account of the Issuer Bank. In some cases, it is understood that such actions may not be completed in a timely manner.

Alternatively, if the timeout occurs due to a failure of the Acquirer Bank's systems, then although the consumer's account has been debited and reconciled with the Acquirer Bank's settlement account the cash withdrawal may not be completed to the consumer. In this case, the Acquirer Bank will need to reverse the transaction after proper reconciliation back to the Issuer Bank's settlement account, after which the Issuer Bank will need to credit the amount back into the consumer's account.

In both these scenarios, if the Issuer Bank does not appropriately reconcile it's consumer's account for amounts trapped within suspense accounts in its own system, or if the Acquirer Bank does not appropriately reconcile and return amounts due to the Issuer Bank from failed transactions, consumers can face distress. Although their account is debited, they would not receive any cash out. They will need to raise a complaint to the relevant Banks' complaints system to ensure the money is returned to their account.

In this situation, the NPCI Procedural Guidelines merely note that Acquiring and Issuer Banks must bilaterally deal with the consumer's complaint **within 7 days from the date of receipt** of the complaint.[7, p. 26] Compare this with the requirements for the IMPS system which requires complaints to be dealt with within **3 days of the date of the complaint**.[18]

Where transactions are disputed by a consumer, a Dispute Management System exists in the AePS system but can only be accessed by the banks themselves.[7, p. 25] In practice, this means that the consumer needs to approach the bank branch, fill out relevant forms to raise a dispute and request the Issuer Bank to take action to initiate the "charge back" process.

Providers have noted that it is virtually impossible for consumers to complete these steps in the current situation. Even where consumers have been guided to do so in the past, bank staff are often unaware or badly trained to complete this procedure.

Finally, for consumers who rely on physical pass books and branch visits (given that many lower income users may not have smart phones, or use mobile banking) filing a complaint or verifying the status of reverse requires a visit to a the bank branch. This is arduous if not impossible in the current situation.

4. Addressing key AePS failures: Solutions and Next Steps

4.1. AePS has a difficult consumer redress process that must be reconstructed

The uncertain and obscure complaints process in the AePS system is not consumer-friendly. This is especially a problem in a systems where transaction failures are high, and opacity exists as to the cause and the level at which the transaction is taking place. This results in a large burden on consumers to initiate complaints to their bank (the Issuer Bank), following which they are dependent on their Issuer Bank's initiative with in the NPCI's Dispute Management System to take steps or to resolve the issue with the Acquirer Bank.

There appears to be no real consequence for banks who do not promptly act to ensure consumers' funds are accurately credited or reversed to the accounts. Even in the normal course of affairs, this system is completely unfit for purpose for a small value consumer, who may not be adept with navigating a complex system and is suffering severe financial strain. In a crisis where movement is severely restricted and transaction failures have immediate humanitarian impacts, this complaints system is unworkable.

Solution 1 (RBI/NPCI): There is a need to imagine a simple, distinct, consumer-friendly complaints process for the AePS system. Given the large and widely recognised failure rate, the absence of such a system constitutes a disregard for consumer protection. The RBI and NPCI could seize the opportunity to re-fashion a user-friendly system.

In an ideal complaints system for AePS:

- making a complaint must be as easy as making a transaction. There should be an option for BCs to initiate or make complaints for the consumer as part of their suite of services;
- failed transaction response codes must be automated to immediately trigger reversal transactions;
- the chargeback process has failed, and must be scrapped and replaced with the limited liability system in all other electronic banking transactions[19], with the obligation on the Issuer Bank to return funds to the consumers' account immediately, and then proceed to settle any disputes on chargebacks bilaterally with the Acquirer Bank;
- the fines for banks for failure to return client monies needs to be strictly enforced by NPCI with a feedback loop to Banks, and mandated by RBI notification;
- Banks need to build capacity and train staff in complaints management, including through AePS.

Solution 2 (NPCI): As part of its AePS Product Statistics, NPCI should proactively report the number of failed transactions. These should also be reported Bank-wise to enable more accountability and transparency to develop in the market.

4.2. Tackling biometric data mismatch

Biometric mismatch emerges as the largest cause for AePS failures from the data analysed. As the 2019 study from ISB by Balasubramanian et. al. showed [12], biometric mismatches were a major contribution to AePS transaction failures even before the pandemic. As noted previously, biometric mismatch issues could be due to reasons outside the control of the Consumer /BC such as poor quality biometrics captured at enrolment and in the CIDR, or dysfunctions in the matching algorithm or other issues in the technical system. Providers have also noted that mismatches can occur due to poor quality biometric readers available with BCs. Fears of social distancing mean that BCs are unable to assist customers in placing fingers appropriately, potentially raising the error rate.

Solution 3 (UIDAI/NPCI): Error codes should be more granular at the back-end for the NPCI & UIDAI to track the underlying reason for biometric failure. There could be for reasons other than merely the consumer not using the best finger for authentication.

Solution 4 (UIDAI/NPCI): A thorough, transparent and accountable audit of failed biometrics should be conducted by the NPCI/ UIDAI, giving consumers the option of re-recording their fingerprints.

Solution 5 (Industry/UIDAI): Some providers noted that improved thermal biometric scanners are now available in the market, and could improve the error rate. The UIDAI or relevant Government body could consider how to subsidise or support access to such higher quality hardware equipment.

4.3. Tackling Bank or Switch downtimes (Timeouts)

Providers note that the digital infrastructure of banks have struggled to keep pace with the dramatic increase in AePS transactions. This has been reflected in multiple breakdowns Banks' servers and systems, resulting in timeouts and failed transactions. The NPCI has previously taken note of the need to improve bank systems due to technical declines and biometric mismatches, but the response remains slow from the banking sector.[20]

The majority of PMJDY accounts are concentrated in four Public Sector Banks (PSBs), based on data as on 6 May 2020.[21] Overall, close to 80% of PMJDY accounts are in PSBs, and about 17% are held in Regional Rural Banks with only about 3% with Private Sector Banks.[21] As cash transfers are received into these accounts, withdrawals will continue to be sought from them. The increase in the load will keep putting banks' systems—especially PSBs and RRBs—under pressure if their platforms and system capacity is not improved.

Solution 6 (Industry): There is an urgent need for banks (especially PSBs and RRBs) to upgrade their server capacity and digital infrastructure to process more transactions per second, and ensure that they can serve their accountholders.

4.4. Failures due to absence of Aadhaar linkage

One of the other reasons revealed from the response codes for failed AePS transactions is the absence of a proper Account linked to the consumer's Aadhaar number. This could occur due to the absence of accurate seeding of a bank account with a consumer's Aadhaar number at the Bank, which means that consumers cannot use AePS to complete a transaction. This could happen either because the seeding was not correctly done, or consumers are not aware of the process. Accounts can also sometimes get de-seeded due to have been frozen or temporarily blocked. Clear seeding is a pre-requisite for AePS to work.

Solution 7 (Industry): There is a need to maintain clear seeding of Aadhaar-linked accounts at the Bank-level.

4.5. Failures due to insufficient funds, non-permitted transactions, blocked or frozen account

Transactions also fail because of issues with the consumer's account i.e. insufficient balance or accounts being blocked or frozen. Consumers who do not use mobile banking services may not know the status of their account, especially where passbooks have not been updated. In April 2020, they may also have expected cash transfers which may not have arrived. In such cases, consumers may initiate cash withdrawals based on their assumed account balance. In normal circumstances, this might be acceptable but given high failure rates, there could be situations where earlier failed transactions led to consumers' account being debited but cash withdrawal not taking place. If reversals are delayed or amounts are not returned, these error codes appear when consumers make repeated attempts to withdraw cash.

Solution 8 (Industry/NPCI): Some providers are proactively offering a mini statement facility that enables users to check account balance before a transaction. NPCI could consider requiring all AePS providers to display a mini-statement before cash withdrawals, deposits or transfers.

4.6. Reached Maximum Number of Transaction Allowed for the day

Several banks cap the daily number of AePS transactions that customers can undertake. Many key banks cap AePS cash withdrawals per consumer to only **one** per day. [22] [23] This is very problematic especially if a consumer's first transaction fails. These limits appear to have been imposed to combat the practice of BC agents splitting transactions to earn more commissions.[24] This in turn seems to be driven by banks' need to limit interchange fees and settlement fees on inter-bank transactions. Given the low value of AePS transactions, they can be seen to be " expensive" to serve as a result of these fees.

Solution 9 (NPCI/Industry): In the current humanitarian crises, these arbitrary caps on transactions need to be re-visited. Banks need to reconsider their strategy to limit AePS transactions, given the explosive growth despite this. NPCI should reconsider the feed levied on the AePS ecosystem for the next 3 – 6 months to reduce perverse behaviour among banks.

References

[1] NPCI, "AePS 20-21 Product Statistics," *National Payments Corporation of India*, May 01, 2020. https://www.npci.org.in/product-statistics/aeps-20-21-product-statistics (accessed May 16, 2020).

[2] M. Saha, "India coronavirus lockdown | Finance Ministry pulls up banks on shut branches," *The Hindu*, Mumbai, Mar. 27, 2020.

[3] Ministry of Home Affairs, *Annexure to Ministry of Home Affairs Order No. 40-3/2020-D - Guidelines on the measures to be taken by Ministries/ Departments of the Government of India/ State/ Union Territory Governments and State/Union Territory for containment of COVID-19 Epidemic in the Country*. 2020.

[4] ILO, "ILO Monitor: COVID-19 and the world of work. Second edition Updated estimates and analysis." International Labour Organization, Apr. 07, 2020, Accessed: May 03, 2020. [Online]. Available: https://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/documents/briefingnote/wcms_740877.pdf.

[5] The Economic Times, "Rs 36,659 crore transferred to 16 crore beneficiaries using DBT during COVID-19 lockdown," *The Economic Times*. https://m.economictimes.com/news/politics-and-nation/rs-36659-crore-transferred-to-16-crore-beneficiaries-using-dbt-during-covid-19-lockdown/articleshow/75234343.cms (accessed May 03, 2020).

[6] "AePS Product Overview," *NPCI - National Payments Corporation of India - Official Website*, Mar. 31, 2017. https://www.npci.org.in/product-overview/aeps-product-overview (accessed May 03, 2020).

[7] NPCI, "Procedural Guidelines for AePS." National Payments Corporation of India, Nov. 22, 2019, Accessed: May 03, 2020. [Online]. Available: https://www.npci.org.in/sites/default/files/Procedural_Guidelines-AePS%20_2.0.pdf.

[8] NPCI, "AePS Live Members," *National Payments Corporation of India*, Mar. 31, 2017. https://www.npci.org.in/aeps-live-members (accessed May 13, 2020).

[9] NPCI, "Circular 33 AEPS-Response Code Streamlining; NPCI/2018-19/AEPS/008." National Payments Corporation of India, Oct. 29, 2019, Accessed: May 03, 2020. [Online]. Available: https://www.npci.org.in/sites/default/files/circular/NPCI2018-19AEPS008.pdf.

[10] G. of I. Ministry of Finance, "Committee on Digital Payments - Medium Term Recommendations to Strengthen Digital Payments Ecosystem," New Delhi, Dec. 2016. Accessed: May 03, 2020. [Online]. Available: http://pibphoto.nic.in/documents/rlink/2016/dec/p2016122801.pdf.

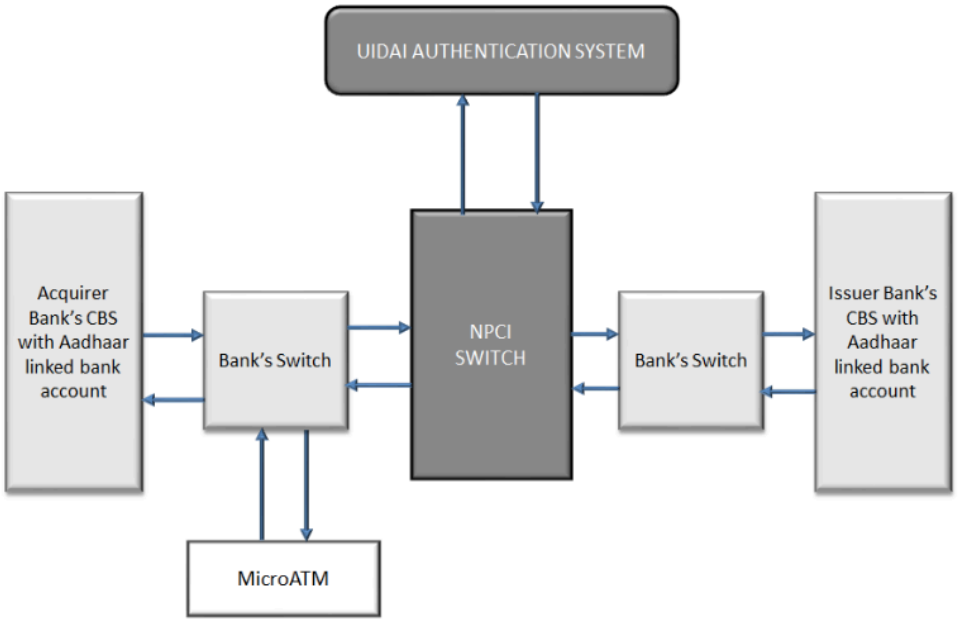
[11] Reserve Bank of India, "The Report of the High-Level Committee on Deepening of Digital Payments," Reserve Bank of India, Mumbai, May 2019. Accessed: May 03, 2020. [Online]. Available: https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/CDDP03062019634B0EEF3F7144C3B65360B280E420AC.PDF.

[12] P. Balasubramanian, S. V. R. Chandra, A. Murlidharan, and P. Tantri, "Fintech For The Poor: Do Technological Failures Deter Financial Inclusion ?," p. 80.

[13] M. Joshi, B. Mazumdar, and S. Dey, "Security Vulnerabilities Against Fingerprint Biometric System," *arXiv:1805.07116 [cs]*, May 2018, Accessed: May 13, 2020. [Online]. Available: http://arxiv.org/abs/1805.07116.

[14] A. R. Palepu, "Glitches In Aadhaar Enabled Payment System Amplified As Transactions Surge," *BloombergQuint*, May 06, 2020. https://www.bloombergquint.com/business/glitches-in-aadhaar-enabled-payment-system-amplified-as-transactions-surge (accessed May 14, 2020).
[15] A. Chhatre and D. Bhardwaj, "Analysis of failures in Aadhaar enabled Payment System," p. 6.
[16] Reserve Bank of India, "RBI Notification: Harmonisation of Turn Around Time (TAT) and customer compensation for failed transactions using authorised Payment Systems: RBI/2019-20/67 DPSS.CO.PD No.629/02.01.014/2019-20," Sep. 20, 2019. https://www.rbi.org.in/Scripts/NotificationUser.aspx?Id=11693&Mode=0 (accessed May 04, 2020).
[17] NPCI, "Circular 48 - Implementation of Two settlement in a day for AEPS transaction." National Payments Corporation of India, Jan. 02, 2020, Accessed: May 13, 2020. [Online]. Available: https://www.npci.org.in/sites/default/files/circular/Circular%2048%20-%20Implementation%20of%20Two%20settlement%20in%20a%20day%20for%20AEPS%20transaction%20-%20effective%20from%209th%20January%202020.pdf.
[18] NPCI, "IMPS Procedural Guidelines v1.9." National Payments Corporation of India, Sep. 2019, Accessed: May 13, 2020. [Online]. Available: https://www.npci.org.in/sites/default/files/IMPS%20PG-V1.9.pdf.
[19] Reserve Bank of India, "Notification: Customer Protection – Limiting Liability of Customers in Unauthorised Electronic Banking Transactions," Jul. 06, 2017. https://www.rbi.org.in/scripts/NotificationUser.aspx?Id=11040 (accessed May 04, 2020).
[20] NPC, "Circular 14 - Best Practices to reduce Technical Declines and Biometric Declines - NPCI/2018-19/AePS/014." National Payments Corporation of India, Mar. 06, 2019, Accessed: May 16, 2020. [Online]. Available: https://www.npci.org.in/sites/default/files/circular/Circular%2014__best%20pactices%20to%20reduce%20declines.pdf.
[21] Ministry of Finance, "Progress-Report of PMJDY (Bankwise) - Pradhan Mantri Jan-Dhan Yojana," *Pradhan Mantri Jan Dhan Yojana*, Jun. 05, 2020. https://pmjdy.gov.in/BankwiseLatest (accessed May 16, 2020).
[22] P. Bhakta, "SBI, Bank of Baroda squeeze micro-ATM transactions of other banks," *The Economic Times*, Oct. 03, 2019. https://economictimes.indiatimes.com/industry/banking/finance/banking/sbi-bank-of-baroda-squeeze-micro-atm-transactions-of-other-banks/articleshow/71415947.cms?from=mdr (accessed May 03, 2020).
[23] Bank of Baroda, "Bank of Baroda on Twitter: '@krishnapmp @TheOfficialSBI @RBI for AEPS Off-Us cash withdrawal by Bank of Baroda customers at BC points of few Bank's is restricted to one transaction per month. There is no restriction on balance enquiry. Thank you.(2/2)' / Twitter," *Twitter*, Apr. 19, 2020. https://twitter.com/bankofbaroda/status/1251897242597781505 (accessed May 16, 2020).
[24] P. Bhakta, "Aadhaar enabled payment system growth slows in FY20," *The Economic Times*, Mumbai, Dec. 03, 2019.
[25] NPCI, "Frequently asked questions by banks for Aadhaar Enabled Payment System," *National Payments Corporation of India*. https://docplayer.net/20526326-Banks-aadhaar-enabled-payment-system.html (accessed May 16, 2020).

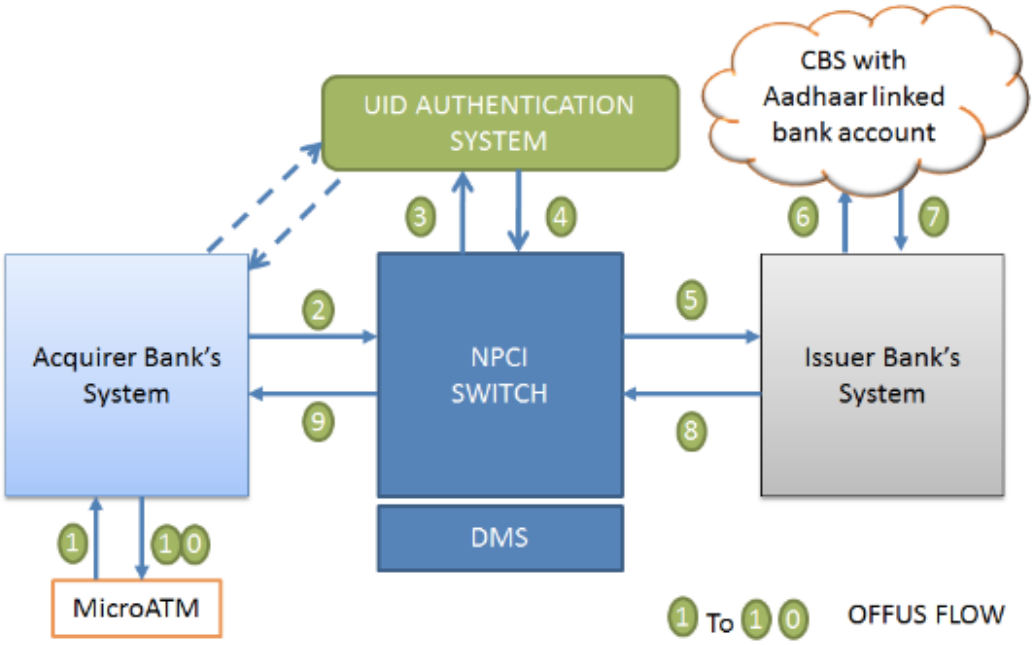
Annex A
Simplified Architecture of the AePS Architecture (as per NPCI)



Source: NPCI – Frequently asked Questions by Banks for AEPS [25, p. 4]

Annex B

Aadhaar Initiated Interbank Cash Withdrawal – Process flow



Source: NPCI – Frequently asked Questions by Banks for AEPS [25, p. 8]

In case of inter-bank cash withdrawal,

- Step 1: Consumer need to enter Aadhaar number, IIN, amount of cash to be withdrawn and fingerprint data. In this scenario the consumer is transacting through an Acquirer Bank (which means that the consumer does not have the Aadhaar-enabled account in that bank). The Acquirer Bank enables the withdrawal of cash through its infrastructure such as Point-of-Sale machine, BC services and cash.
- Step 2, 3, 4 and 5: Authentication is done by UIDAI and coordinated through NPCI switch.
- Step 6 and 7: After successful authentication, the Issuer Bank (where the consumer has her account) deducts the amount requested from the consumer's Aadhaar-enabled account.
- Step 8 and 9: The Issuer Bank send a positive response to the Acquirer Bank through NPCI Switch. Clearing and settlement is performed by NPCI through Dispute Management System (DMS).
- Step 10: The Acquirer Bank sends a transaction receipt to the MicroATM as a confirmation and then cash is dispensed.

Contact Us

Dvara Research, Chennai
10th Floor-Phase 1,
IIT-Madras Research Park,
Kanagam Village, Taramani
Chennai 600113

Dvara Research, Mumbai
The Mosaic, Raaj Chambers, 5th Floor,
New Nagardas Road,
Mogra Pada, Andheri (E)
Mumbai 400053

E-mail: ffi@dvara.com

Twitter: @_FutureFinance

@dvararesearch

Website: www.dvara.com