

# IX

## PAYMENT AND SETTLEMENT SYSTEMS AND INFORMATION TECHNOLOGY

*The Reserve Bank extended its efforts towards enhancing the efficiency of the payments ecosystem along with targeted initiatives focused on customer centricity, cyber security and digital deepening. The Payments Vision 2025 document was released during the year with the aim of strengthening payment systems by leveraging on the initiatives undertaken during the last vision period (2019-21). The Reserve Bank also stayed focused on its endeavour to ensure round the clock availability of Information and Communication Technology (ICT) infrastructure for the smooth functioning of its IT systems and applications.*

IX.1 Efficient payment and settlement systems foster economic development, promote financial stability and support financial inclusion. Ensuring safe, secure, reliable, accessible, affordable and efficient payment systems has been one of the important strategic goals of the Reserve Bank. Towards the pursuit of these objectives, the role of the Reserve Bank has transformed from being a regulator, operator and facilitator to that of a creator of congenial environment for the structured development of the payments ecosystem in India. Payments Vision documents released by the Reserve Bank have provided strategic direction and implementation plans to drive this transformation since 2001. The Payments Vision 2025 released during the year builds on the Payments Vision 2019-21 and outlines the thought process for the period up to December 2025. Moreover, the evolving situation may warrant launch of new initiatives in addition to those specified in the Payments Vision 2025 document. The focus of the Department of Information Technology (DIT) during the year remained on cyber resilience through the implementation of a new advanced firewall solution across the Reserve Bank, initiative for upgradation to next generation Integrated Security Operation Centre (iSOC) for further strengthening cyber security infrastructure

and also launch of the 'National Cyber Security Awareness' campaign in October 2022.

IX.2 Against this backdrop, the following section covers developments in the area of payment and settlement systems during the year and also takes stock of the implementation status of the agenda for 2022-23. Section 3 provides various measures undertaken by the DIT during the year *vis-à-vis* the agenda set for 2022-23. These departments have also set out an agenda for 2023-24. Section 4 presents a summary of the chapter.

### **2. DEPARTMENT OF PAYMENT AND SETTLEMENT SYSTEMS (DPSS)**

IX.3 During the year, the Department of Payment and Settlement Systems (DPSS) continued its endeavour towards enhancing the payments ecosystem and released the Payments Vision 2025 document to consolidate the initiatives undertaken during the last vision period (2019-21). Payments Vision 2025 is built upon the five pillars of integrity, inclusion, innovation, institutionalisation and internationalisation (Box IX.1). These measures are expected to further strengthen the payments ecosystem and also create a regulatory environment to facilitate payment systems to excel at the national and international levels.

### Box IX.1 Payments Vision 2025

Payments Vision 2025 was released with the core theme of e-Payments for Everyone, Everywhere and Everytime. The Vision aims to provide every user with safe, secure, fast, convenient, accessible, and affordable

e-payment options. A snapshot of the specific initiatives, including discussions on different dimensions that are planned as part of Payments Vision 2025 is presented below:

Integrity	Inclusion	Innovation	Institutionalisation	Internationalisation
1	2	3	4	5
<ul style="list-style-type: none"> <li>• Weave in alternate authentication mechanism(s) for digital payment transactions.</li> <li>• Broaden scope, usage and relevance of Legal Entity Identifier (LEI) in all payment activities.</li> <li>• Expand interoperability to contactless transit card payments in offline mode.</li> <li>• Enhance scalability and resilience of payment systems.</li> <li>• Leverage Online Dispute Resolution (ODR) system for fraud monitoring and reporting.</li> <li>• Provide enhancements to Central Payments Fraud Information Registry (CPFIR).</li> <li>• Provide payee name look-up for fund transfers.</li> <li>• Increase proportionate oversight of Payment System Operators (PSOs).</li> <li>• Include assessment of RTGS and NEFT under Principles for Financial Market Infrastructures (PFMIs).</li> <li>• Explore local processing of payment transactions.</li> <li>• Study creation of Digital Payments Protection Fund (DPPF).</li> </ul>	<ul style="list-style-type: none"> <li>• Enable geotagging of digital payment infrastructure and transactions.</li> <li>• Revisit guidelines for Prepaid Payment Instruments (PPIs) including closed system PPIs.</li> <li>• Consider framework for regulation of all significant intermediaries in payments ecosystem.</li> <li>• Bring in enhancements to Cheque Truncation System (CTS), including One Nation One Grid clearing and settlement perspective.</li> <li>• Extend Internal Ombudsman Scheme to all PSOs.</li> <li>• Support increase in market trading and settlement hours.</li> <li>• Upscale customer outreach and awareness activities.</li> <li>• Revisit scope and usefulness of Payments Infrastructure Development Fund (PIDF) scheme.</li> <li>• Attempt regulation of BigTechs and FinTechs in payments space.</li> <li>• Continue endeavour to collect and publish granular, disaggregated payment systems data.</li> <li>• Make payment systems more inclusive.</li> <li>• Undertake evaluation of charges for all payment systems.</li> <li>• Coordinate migration of government receipts and payments to digital mode.</li> </ul>	<ul style="list-style-type: none"> <li>• Facilitate framework for Internet of Things (IoT) and context based payments.</li> <li>• Migrate all RBI operated payment system messages to ISO 20022 standard.</li> <li>• Link credit cards and credit components of banking products to UPI.</li> <li>• Create payment system for processing online merchant payments using internet / mobile banking.</li> <li>• Organise payment innovation contests &amp; hackathons.</li> <li>• Review need for multiple payment identifiers.</li> <li>• Explore guidelines on payments involving Buy Now Pay Later (BNPL) services.</li> </ul>	<ul style="list-style-type: none"> <li>• Comprehensive review of legislative aspects of the provisions and regulations of Payment and Settlement Systems (PSS) Act.</li> <li>• Constitute a Payments Advisory Council (PAC) to assist Board for Regulation and Supervision of Payment and Settlement Systems (BPSS).</li> <li>• Operationalise National Card Switch for card transactions at Point of Sale (PoS) and resultant settlements.</li> <li>• Active engagement and involvement in international fora (discussions of standard setting bodies).</li> </ul>	<ul style="list-style-type: none"> <li>• Global outreach of RTGS, NEFT, UPI and RuPay cards.</li> <li>• Expand Structured Financial Messaging System (SFMS), Indian Financial Network (InFiNet) frameworks across jurisdictions.</li> <li>• Two Factor Authentication (2FA) for cross-border card transactions.</li> <li>• Seek inclusion of INR in Continuous Linked Settlement (CLS).</li> <li>• Bring further efficiencies in payment processing and settlements on introduction of Central Bank Digital Currencies (CBDCs) - Domestic and Cross-Border.</li> </ul>

Source. RBI.

## Payment Systems

IX.4 The payment and settlement systems<sup>1</sup> recorded a robust growth of 57.8 per cent in terms of transaction volume during 2022-23 on top of the expansion of 63.8 per cent recorded in the previous year. In value terms, the growth was 19.2 per cent

in 2022-23 as against 23.1 per cent in the previous year, mainly due to growth in the large value payment system, viz., Real Time Gross Settlement (RTGS). The share of digital transactions in the total volume of non-cash retail payments increased to 99.6 per cent during 2022-23, up from 99.3 per cent in the previous year (Table IX.1).

**Table IX.1: Payment System Indicators - Annual Turnover (April-March)**

Item	Volume (lakh)			Value (₹ lakh crore)		
	2020-21	2021-22	2022-23	2020-21	2021-22	2022-23
1	2	3	4	5	6	7
<b>A. Settlement Systems</b>						
CCIL Operated Systems	28	33	41	1,619.43	2,068.73	2,587.97
<b>B. Payment Systems</b>						
<b>1. Large Value Credit Transfers – RTGS</b>	<b>1,592</b>	<b>2,078</b>	<b>2,426</b>	<b>1,056.00</b>	<b>1,286.58</b>	<b>1,499.46</b>
Retail Segment						
<b>2. Credit Transfers</b>	<b>3,17,868</b>	<b>5,77,935</b>	<b>9,83,695</b>	<b>335.04</b>	<b>427.28</b>	<b>550.12</b>
2.1 AePS (Fund Transfers)	11	10	6	0.01	0.01	0.00
2.2 APBS	14,373	12,573	17,898	1.11	1.33	2.48
2.3 ECS Cr	0	0	0	0.00	0.00	0.00
2.4 IMPS	32,783	46,625	56,533	29.41	41.71	55.85
2.5 NACH Cr	16,465	18,758	19,267	12.17	12.82	15.44
2.6 NEFT	30,928	40,407	52,847	251.31	287.25	337.20
2.7 UPI	2,23,307	4,59,561	8,37,144	41.04	84.16	139.15
<b>3. Debit Transfers and Direct Debits</b>	<b>10,457</b>	<b>12,189</b>	<b>15,343</b>	<b>8.66</b>	<b>10.34</b>	<b>12.90</b>
3.1 BHIM Aadhaar Pay	161	228	214	0.03	0.06	0.07
3.2 ECS Dr	0	0	0	0.00	0.00	0.00
3.3 NACH Dr	9,646	10,755	13,503	8.62	10.27	12.80
3.4 NETC (Linked to Bank Account)	650	1,207	1,626	0.01	0.02	0.03
<b>4. Card Payments</b>	<b>57,787</b>	<b>61,783</b>	<b>63,345</b>	<b>12.92</b>	<b>17.02</b>	<b>21.52</b>
4.1 Credit Cards	17,641	22,399	29,145	6.30	9.72	14.32
4.2 Debit Cards	40,146	39,384	34,199	6.61	7.30	7.20
<b>5. Prepaid Payment Instruments</b>	<b>49,366</b>	<b>65,783</b>	<b>74,667</b>	<b>1.97</b>	<b>2.79</b>	<b>2.87</b>
<b>6. Paper-based Instruments</b>	<b>6,704</b>	<b>6,999</b>	<b>7,088</b>	<b>56.27</b>	<b>66.50</b>	<b>71.63</b>
Total - Retail Payments (2+3+4+5+6)	4,42,180	7,24,689	11,44,138	414.86	523.94	659.04
Total Payments (1+2+3+4+5+6)	4,43,772	7,26,767	11,46,563	1,470.86	1,810.52	2,158.50
<b>Total Digital Payments (1+2+3+4+5)</b>	<b>4,37,068</b>	<b>7,19,768</b>	<b>11,39,476</b>	<b>1,414.58</b>	<b>1,744.01</b>	<b>2,086.87</b>

APBS: Aadhar Payment Bridge System. ECS: Electronic Clearing Service. NEFT: National Electronic Funds Transfer.

**Note:** 1. RTGS system includes customer and inter-bank transactions only.

2. Settlements of government securities and forex transactions are through the Clearing Corporation of India Ltd. (CCIL). Government Securities include outright trades and both legs of repo transactions and triparty repo transactions.

3. The figures for cards are for payment transactions at Point of Sale (POS) terminals and online.

4. Figures in the columns might not add up to the total due to rounding off of numbers.

**Source:** RBI.

<sup>1</sup> The data are for total payments, including digital payments and paper-based instruments.

### Digital Payments

IX.5 Among the digital modes of payments, the number of transactions using RTGS system increased by 16.7 per cent during 2022-23 (Table IX.1). In terms of value, RTGS transactions registered an increase of 16.5 per cent; transactions through the National Electronic Funds Transfer (NEFT) system also witnessed an increase of 30.8 per cent and 17.4 per cent in volume and value, respectively, reflective of the increase in large value corporate transactions, in line with rising economic activity. As at end-March 2023, RTGS services were available through 1,65,390 IFSCs<sup>2</sup> of 243 members, while NEFT services were available through 1,66,544 IFSCs of 230 member banks.

IX.6 During 2022-23, payment transactions carried out through credit cards increased by 30.1 per cent and 47.3 per cent in terms of volume and value, respectively (Table IX.1). Transactions through debit cards decreased by 13.2 per cent in terms of volume, and 1.4 per cent in terms of value. Prepaid Payment Instruments (PPIs) recorded an increase in volume and value by 13.5 per cent and 2.9 per cent, respectively. The growth in digital payments can be attributed to increased availability of acceptance infrastructure, which witnessed substantial growth during the year benefitting from the Payments Infrastructure Development Fund (PIDF) scheme, operationalised in January 2021. The number of Points of Sale (PoS) terminals increased by 28.3 per cent to 77.9 lakh at end-March 2023, while the number of Bharat Quick Response (BQR) codes deployed increased by 6.7 per cent to 53.8 lakh during the same period. Further, UPI QR increased by 48.4 per cent to 25.64 crore at end-March 2023. The number of Automated Teller Machines (ATMs) also increased

**Table IX.2: Authorisation of Payment System Operators (end-March)**

Entities	(Number)	
	2022	2023
1	2	3
<b>A. Non-Banks – Authorised</b>		
PPI Issuers	37	36
WLA Operators	4	4
Instant Money Transfer Service Providers	1	1
BBPOUs	9	10
TReDS Platform Operators	3	3
MTSS Operators	9	8
Card Networks	5	5
ATM Networks	2	2
<b>B. Banks – Approved</b>		
PPI Issuers	57	58
BBPOUs	43	44
Mobile Banking Providers	648	725
ATM Networks	3	3

**Source:** RBI.

to 2.59 lakh at end-March 2023 from 2.52 lakh at end-March 2022.

### Authorisation of Payment Systems

IX.7 Payment System Operators (PSOs) comprise PPI issuers, cross-border Money Transfer Service Schemes (MTSS), White Label ATM (WLA) operators, Trade Receivables Discounting System (TReDS) platforms, ATM networks, Instant Money Transfer Service provider, card networks and Bharat Bill Payment Operating Units (BBPOUs), besides the Clearing Corporation of India Ltd. (CCIL) and the National Payments Corporation of India (NPCI) [Table IX.2]. Further, during the year, AMC Repo Clearing Limited was granted Certificate of Authorisation to act as a Central Counter Party (CCP) for repo transactions in corporate debt securities. The Reserve Bank has prescribed guidelines to include Payment Aggregators (PAs) under its regulatory purview

<sup>2</sup> Indian Financial System Code.

and some PAs have subsequently been provided in-principle authorisation.

### **Agenda for 2022-23**

IX.8 The Department had set out the following goals for 2022-23:

- *Formulation and Release of Payments Vision Document 2025:* With the achievement of the intended outcomes and completion of identified actions in Vision 2021, the Reserve Bank shall come out with its Vision for the payments ecosystem in the coming years to ensure continuous development of the payments landscape (Paragraph IX.9);
- *Publication of Payment Dashboard:* To enhance consumer experience and provide greater insights into payment trends, the Reserve Bank shall publish a payments dashboard with pictorial representation of trends in payment systems (Paragraph IX.10); and
- *Formulation and Implementation of Framework of Geo-tagging of Payment Acceptance Infrastructure:* As announced in the Statement on Developmental and Regulatory Policies of October 8, 2021, the Reserve Bank is in the process of implementing the framework of geo-tagging payment acceptance infrastructure (Paragraph IX.11).

### **Implementation Status**

IX.9 The Reserve Bank released the Payments Vision 2025 in June 2022 laying the roadmap for payments ecosystem in the country up to December 2025. The Payments Vision 2025 builds on the earlier Payments Vision 2019-21 and envisages to further consolidate the steps initiated towards enhanced outreach, customer

centricity, cyber security and digital deepening and build on the same through five pillars of integrity, inclusion, innovation, institutionalisation and internationalisation.

IX.10 The Reserve Bank commenced publication of pictorial representation of trends in payment systems. The publication covers trends in payment systems, acceptance infrastructure, payment system operators and ticket size of payment transactions over the past two years. Dissemination of such information has benefited stakeholders and facilitated analysis in payment systems leading to further innovations.

IX.11 The Reserve Bank had issued a framework for geo-tagging payment acceptance infrastructure in March 2022 and is in the process of putting in place the required infrastructure to commence collection of details of payment touch points deployed across the country by acquiring merchants.

### **Major Developments**

#### ***Integrity***

*Restriction on Storage of Actual Card Data [i.e., Card-on-File (CoF)]*

IX.12 The Reserve Bank mandated that, after September 30, 2022, entities other than card networks and card issuers cannot store customer card data. The initiative was undertaken to prevent misuse of card data for unauthorised transactions and subsequent monetary loss to card holders due to stolen / misused card details on account of its availability with many entities.

*Prior Approval in Case of Takeover / Acquisition of Control of Non-Bank PSOs and Sale / Transfer of Payment System Activity of Non-Bank PSO*

IX.13 The Reserve Bank mandated prior approval in case of takeover / acquisition of control



of non-bank PSOs and sale / transfer of payment system activity of non-bank PSO taking into account the risks the unregulated transferability of PSO authorisation can pose to the payments ecosystem.

*Regulation of Payment Aggregators – Timeline for Submission of Applications for Authorisation – A Review*

IX.14 In terms of instructions issued by the Reserve Bank in March 2020, existing online non-bank PAs (existing as on March 17, 2020) had to seek authorisation under the Payment and Settlement Systems Act, 2007 (PSS Act). PAs had time till September 30, 2021 for submitting the application. In order to ensure smooth transition, it was decided to permit another window (up to September 30, 2022) to such PAs to apply to the Reserve Bank for seeking authorisation.

*Cyber Resilience and Payment Security Controls of PSOs*

IX.15 As announced in the Statement on Developmental and Regulatory Policies issued along with the Monetary Policy dated April 8, 2022, the Reserve Bank is in the process of issuing the Master Direction on Cyber Resilience and Payment Security Controls of PSOs, covering robust governance mechanisms for identification, analysis, monitoring and management of information security, including cyber security risks and vulnerabilities, and baseline security measures for ensuring safe and secure digital payment transactions.

*Payment Fraud Reporting – Migration to DAKSH (Utkarsh)*

IX.16 The Reserve Bank migrated the payment fraud reporting to *DAKSH* – the Reserve Bank's Advanced Supervisory Monitoring System on

January 1, 2023. In addition to the existing bulk upload facility to report payment frauds, *DAKSH* platform provides additional functionalities, viz., maker-checker facility, online screen-based reporting, option for requesting additional information, facility to issue alerts / advisories and generation of dashboards and reports.

**Financial Inclusion**

*Bharat Bill Payment System (BBPS) – Amendment to Guidelines*

IX.17 The Reserve Bank reduced the net worth requirement for non-bank BBPOUs from ₹100 crore to ₹25 crore to facilitate greater participation in the ecosystem. The revised net worth was on the lines of other non-bank payment system participants who handle customer funds (such as PAs) and have similar risk profile.

*Processing of e-Mandates for Recurring Transactions*

IX.18 The Reserve Bank enhanced the per transaction limit for subsequent transactions (without Additional Factor of Authentication) undertaken under the e-mandate framework for processing of recurring transactions done using cards, PPIs and UPI from ₹ 5,000/- to ₹ 15,000/- per transaction.

*One Nation One Grid*

IX.19 Reserve Bank has migrated the Cheque Truncation System (CTS) to facilitate single settlement for banks' position across grids. This is expected to benefit banks with regards to liquidity requirements for CTS. The initiative is being undertaken to promote efficient cheque processing and is in line with the vision of migrating from the current architecture of CTS from three regional grids to 'One Nation, One Grid'.

*Payments Infrastructure Development Fund (PIDF) [Utkarsh]*

IX.20 The Payments Infrastructure Development Fund (PIDF) continued capacity building across the country in terms of deployment of new payment acceptance infrastructure. Till March 31, 2023, 219.3 lakh payment touchpoints (213.7 lakh digital and 5.6 lakh physical) were created across the country under the PIDF through the subsidy payment of ₹ 347.65 crore.

*e-BAAT Programmes*

IX.21 The Reserve Bank has been conducting electronic banking awareness and training (*e-BAAT*) programmes regularly for the benefit of a cross-section of customers / bankers / students / public. During the year, 322 *e-BAAT* programmes were conducted by the regional offices of the Reserve Bank, in which safe usage of electronic payment systems, their benefits and grievance redressal mechanisms were explained to the participants.

*Publication of Granular Data on Payment Systems and Payment Frauds*

IX.22 The Reserve Bank has taken various initiatives to enhance the coverage of payment systems data published. In this connection, the Reserve Bank commenced publication of entity-wise data on PPI issuers and TReDS platforms. Further, the ATM deployment data was enhanced to disseminate information on district-wise distribution of ATMs across the country. The Reserve Bank also commenced publication of data on domestic payment frauds and cross-border payment transactions undertaken using cards issued in India.

*Digital Payments Awareness Week 2023 – Launch of Mission “Har Payment Digital”*

IX.23 The Reserve Bank launched the Mission ‘Har Payment Digital’ on the occasion of the Digital Payments Awareness Week (DPAW)

2023 observed from March 6 to 12, 2023 with campaign theme “*Digital Payment Apnao, Auron ko bhi Sikhao*”. As part of the initiative, PSOs have pledged to adopt 75 villages across the country under the ‘75 Digital Villages’ programme with a vision to convert them into digital payment enabled villages.

**Innovation**

*Interoperable Card-less Cash Withdrawal (ICCW) at ATMs*

IX.24 The Reserve Bank permitted banks, ATM networks and White Label ATM Operators (WLAOs) to provide an option of ICCW at their ATMs. Under this facility, UPI is used for customer authentication during ATM transactions with the settlement facilitated through the National Financial Switch (NFS) / ATM networks. The absence of need for a card to initiate cash withdrawal transactions would help contain frauds like skimming, card cloning and device tampering.

*Enhancements to Unified Payments Interface (UPI)*

IX.25 UPI is the single largest retail payment system in India in terms of volume of transactions and has become one of the most inclusive modes of payment in India. The Reserve Bank further expanded the scope of UPI by the introduction of various features:

- *UPI Lite On-device Wallet* : The Reserve Bank permitted small value transactions in UPI through an on-device wallet in UPI App to facilitate safe and secure payments where users can transfer a maximum of ₹2,000 to UPI Lite with the wallet subsequently debited for transaction of up to ₹200, provided sufficient balance is available. UPI Lite provides superior user experience using near real-time small value payments without the necessity of entering UPI PIN.

- *Linking of Rupay Credit Cards to UPI:* To further deepen the usage of UPI, the Reserve Bank broadened financial products / instruments that can be linked to UPI for payment processing and permitted linking of RuPay credit cards to UPI. This arrangement is expected to provide more avenues and convenience to customers while making payments through the UPI platform.
- *Processing Mandates with Single-Block-and-Multiple-Debits:* UPI has the feature for processing mandated recurring transactions and single-block-and-single-debit which is used in initial public offer (IPO) subscriptions and is observed to be utilised in over 50 per cent of the IPO applications in the last two years. The Reserve Bank permitted the introduction of single-block-and-multiple debits functionality in UPI to further enhance the capabilities in UPI by enabling a customer to create a payment mandate against a merchant by blocking funds in his / her bank account for specific purposes which can be debited, whenever needed. This feature is expected to be helpful for hotel room bookings, purchase of securities in the secondary capital market as also purchase of government securities using the Reserve Bank's Retail Direct scheme and e-commerce transactions, as it will build a higher degree of trust in transactions assuring merchants of timely payments, while ensuring funds remain in the customer's account till actual delivery of goods or services.

*Expanding the Scope of BBPS to Include all Payments and Collections*

IX.26 The scope and coverage of BBPS includes all categories of billers who raise

recurring bills. The Reserve Bank expanded the scope of BBPS to include all categories of payments and collections, both recurring and non-recurring in nature. This enabled the BBPS platform to become accessible to a wider set of individuals and businesses who can benefit from the transparent and uniform payments experience, faster access to funds at a lower cost and improved efficiency.

*Issuance of PPIs to Foreign Nationals / Non-Resident Indians (NRIs) visiting India*

IX.27 Reserve Bank allowed foreign nationals and Non-Resident Indians (NRIs) access to UPI while visiting India. The facility was initially extended to travellers from G-20 countries at select international airports for merchant payments (P2M) in India. Going forward, this facility shall be enabled across all entry points in the country.

**Internationalisation**

*Enabling BBPS to Process Cross-border Inbound Bill Payments*

IX.28 The Reserve Bank extended the scope of BBPS to permit cross-border inward payments by providing NRIs additional options to undertake utility, education, and other bill payments on behalf of their families in India. NRIs can now benefit from the standardised bill payment experience, centralised customer grievance redressal mechanism and prescribed customer convenience fee offered by the BBPS.

*Global Outreach of Payment Systems (Utkarsh)*

IX.29 The Payments Vision Document 2025 has outlined expanding the global outreach of UPI and RuPay cards as one of the key objectives under the internationalisation pillar. The Reserve Bank has been working towards this vision through collaboration with various countries. Efforts are being undertaken for inter-linking UPI with



Fast Payment Systems (FPS) of other countries to enable both foreign inward and outward remittances using the UPI platform.

IX.30 The Reserve Bank and the Monetary Authority of Singapore (MAS) operationalised linkage of their respective FPS, UPI and PayNow on February 21, 2023, enabling users of the two systems to make instant and low-cost cross-border peer-to-peer (P2P) payments on a reciprocal basis. The UPI-PayNow linkage is expected to further anchor trade, travel and remittance flows between the two countries. Further, acceptance of UPI through QR codes has been enabled in Bhutan, Singapore, and the UAE. Indian tourists travelling to these countries can use their UPI Apps to make payment at merchant sites. For the global outreach of RuPay cards, arrangements have been made with Bhutan, Singapore, Nepal, and the UAE to accept RuPay cards without co-branding with other international card schemes. Issuance of RuPay cards in other countries is also being examined. Going forward, the Reserve Bank, along with the NPCI International Payments Limited (NIPL) will continue to effect partnerships for cross-border payments and enhance the global outreach of UPI and RuPay cards.

### **Other Initiatives**

#### *Digital Payments Index (DPI)*

IX.31 The Reserve Bank had constructed a composite Digital Payments Index (DPI) in 2021 to capture the extent of digitisation of payments across the country. The RBI-DPI index is computed semi-annually and has demonstrated significant growth representing the rapid adoption and deepening of digital payments across the country in recent years. The index constructed with March 2018 as base (score 100), measured 377.46 in September 2022.

#### *Inspection of PSOs*

IX.32 Under Section 16 of the PSS Act, offsite inspections of 44 retail entities, viz., 26 non-bank PPI issuers, two WLA operators (WLAOs), nine BBPOUs, three card networks, three TReDS platform providers and one ATM Network were carried out by the Reserve Bank during 2022-23.

#### *CCIL Inspection*

IX.33 The Reserve Bank conducted the onsite inspection of CCIL under Section 16 of the PSS Act. CCIL was assessed against the 24 Principles for Financial Market Infrastructures (PFMIs) formulated by the Committee on Payments and Market Infrastructures-International Organisation of Securities Commissions (CPMI-IOSCO). As a CCP, CCIL was rated 'Observed' for 19 principles and 'Broadly Observed' for one, while four were 'Not Applicable' to it. As a Trade Repository (TR), CCIL was rated 'Observed' for 10 principles, 'Broadly Observed' for 1, while 13 were 'Not Applicable'.

#### *Developments in CCIL*

IX.34 During the year, CCIL exhibited resilience in its functioning, particularly in view of the past COVID experiences. The issuances of legal entity identifiers (LEI) by CCIL's subsidiary Legal Entity Identifier India Ltd., crossed 56,000 during the year. Major developments pertaining to CCIL during the year are:

- CCIL extended the facility of settling cross-currency transactions through Continuous Linked Settlement (CLS) to overseas branches of Indian banks with effect from October 10, 2022. This initiative is on the similar lines of CCIL-CLS services of IFSC Banking Units (IBU) entities in Gujarat International Finance Tech-City (GIFT City);

- In view of the impending London Interbank Offered Rate (LIBOR) cessation, CCIL conducted three cycles of portfolio compression exercise of Interest Rate Swap (IRS) trades on the Mumbai Interbank Forward Offer Rate (MIFOR) benchmark; and
- The Reserve Bank accorded approval to CCIL for extending intra-day security shortage replenishment to allocatee members in securities segment and introduction of prefunding of securities (outright and market repo) and funds (outright, repo and triparty repo) in securities segment which is under implementation.

#### *Benchmarking India's Payment Systems – Follow-on Exercise*

IX.35 The Reserve Bank undertook a follow-on benchmarking exercise for the year 2020 with progress measured since the last benchmarking exercise undertaken for the year 2017, covering the same countries and parameters. The exercise sought to (a) arrive at an understanding of the preferences Indians have for making and receiving payments and how these preferences compare with other countries; (b) measure the efficiency of India's payment systems; (c) measure India's progress in the parameters since the last exercise; and (d) list the areas where there is scope for further improvement. The exercise validated India's progress in payments ecosystem with India categorised as a 'leader' or 'strong' in respect of 25 out of 40 indicators (21 indicators in the previous exercise).

#### *Discussion Paper on Charges in Payment Systems*

IX.36 The Reserve Bank issued a discussion paper on charges in payment systems for public

consultation in August 2022. The discussion paper covered all aspects relating to charges in payment systems [such as Immediate Payment Service (IMPS), NEFT, RTGS and UPI] and various payment instruments (such as debit cards, credit cards and PPIs). The Reserve Bank is examining the feedback received from the public, which could be used to guide policies and intervention strategies.

#### **Agenda for 2023-24**

IX.37 In 2023-24, the Department will focus on the following goals:

- *Put in Place a Resilient Framework for Structured Oversight of Centralised Payment Systems (Utkarsh 2.0)*: The Reserve Bank has completed the internal assessment of the centralised payment systems, *i.e.*, NEFT and RTGS, in compliance with the PFMI standards. Based on the learnings from the assessment, a resilient framework prescribing the standards, frequency, disclosures, *etc.* for the oversight of centralised payment systems will be formulated;
- *Review Continuation of Payments Infrastructure Development Fund (PIDF) Scheme (Utkarsh 2.0)*: The PIDF received overwhelming support from the contributors (RBI, card networks and card issuing banks) and acquirers for deployment of payment acceptance infrastructure. The scheme's initial target of creating 90 lakh payment touch points by the end of December 2023 was met by the end of the first year, *i.e.*, December 2021 itself. Implementation of the scheme resulted in various innovative ideas and field level experiences which the advisory

council members felt necessary to explore. The feasibility of continuing the scheme on these lines will be explored;

- *Implementation of Payee Name Look-up in Centralised Payment Systems:* The Reserve Bank took various proactive initiatives to ensure safety and efficiency of the payment systems, thereby ensuring public trust in the ecosystem. To enhance the payment experience further, the feasibility of real-time payee name validation before the actual fund transfer will be explored; and
- *Enhance Coverage and Granularity of Published Payment Transaction Data:* The Reserve Bank has taken initiatives to enhance the dissemination of granular data on payment systems. It envisages to continue with the initiatives on payment data dissemination to provide useful insights to stakeholders and facilitate research and further innovations in payment systems.

### 3. DEPARTMENT OF INFORMATION TECHNOLOGY (DIT)

IX.38 The Department of Information Technology continued with its endeavour to ensure availability

of ICT infrastructure for the smooth functioning of all the IT systems and applications of the Reserve Bank. During the year, the focus remained on cyber resilience as the new advanced firewall solution was implemented across the Reserve Bank. To further strengthen cyber security infrastructure, the upgradation to Next Generation Integrated Security Operation Centre (iSOC) has been initiated. Cyber Security Drills were conducted on a regular basis to test preparedness in respect of response, coordination and recovery in the event of real-life cyber-attacks. The month of October 2022 was observed as the 'National Cyber Security Awareness' month across the Reserve Bank with an overarching theme of 'See Yourself in Cyber'. Various forms of awareness initiatives were undertaken to instil cyber hygiene amongst the staff members.

IX.39 With a view to upskilling the staff with IT and analytical knowledge, the Reserve Bank initiated work on sections of an Advanced Enterprise Computing and Cyber Security Training Centre, abutting the new greenfield data centre, work on which is expected to commence shortly (Box IX.2).

IX.40 India has been the global leader in payment systems and the Reserve Bank has played a critical role in spearheading technology

#### Box IX.2 Second Greenfield Data Centre and Enterprise Computing and Cyber Security Training Institute

In the Reserve Bank, data centres have been conceived, planned and constructed based on the evolving advances in information communication technology and the vision of the Reserve Bank for a digital world, besides other factors such as seismic zone, space availability and threat perception – physical as well as virtual. Consequently, safeguarding the security and preserving the reliability of data centres to ensure smooth flow of information has been accorded

priority attention by the Reserve Bank. The Reserve Bank currently has three data centres – one greenfield data centre and two brownfield data centres, out of which one is identified as the Disaster Recovery Data Centre (DR Site).

With more and more core functions of the Reserve Bank getting IT enabled, the need for IT-related infrastructure has increased. The rapid pace of changes in IT has also

(Contd...)

rendered legacy systems uneconomical. Being a premier institution of the country, it is critical for the Reserve Bank to identify, select and implement technologies which will keep its data centres robust, reliable and in sync with the best in the world.

The Reserve Bank has thus initiated the project to construct a new state-of-the-art greenfield data centre to address the capacity expansion constraints, meet ever-increasing IT landscape needs and avoid region specific risks. This will be the fourth data centre and the second greenfield data centre of the Reserve Bank. This greenfield data centre complex will be built using the latest cutting-edge technology to provide highest level of redundancy (high availability of data/applications hosted in data centres), robustness, resilience and availability of the system. It is planned to have built-in counter measures against ever emerging physical threats. The design of the new data centre will ensure the segregation of applications based on highly critical payment systems and non-payment system applications, from a cyber-security perspective. Payment system applications will have multi-layered and relatively higher level of defense and controls *vis-à-vis* non-payment applications. The complex will also have facility to house the critical resources for managing the IT infrastructure during an emergency.

The new data centre complex will also host an advanced, new age training institute with experience centre, *i.e.*, 'Enterprise Computing and Cyber Security Institute'. The

training institute will have modern and latest technology to provide training in advanced topics like software engineering for cloud, blockchain, internet of things, artificial intelligence/machine learning, advanced cybersecurity and data centre operations.

The idea is to develop an advanced "Enterprise Computing and Cybersecurity" training centre which would, to begin with, provide IT trainings to its officers on various related topics and areas. The facility is also envisaged to provide "hands-on" trainings to the participants on all the technologies being used by the Reserve Bank. This will help to build-in the core IT professionals specialising in the areas related to their functioning, eventually minimising external dependencies, thereby reducing risks that often accompany outsourcing. The training institute will have a virtual experience centre, which will be used by participants to explore real-world situations. This training institute will be built in such a way that it provides different types of learning experience to the participants.

While the setting up of the training centre is a long process, in the meantime, the training programmes/workshops for the Reserve Bank's officials have already started with effect from October 2022. Till the new data centre gets operational and is in a position to provide hands-on training, use of software/simulation tools for providing trainings in advanced IT technologies will be explored.

**Source:** RBI.

absorption and adoption in the payment system sphere. As such, there are multiple payment systems available in the country for use by individuals as well as institutions, each having its distinct character and application. Accordingly,

the Reserve Bank has conceptualised a light weight and portable payment system that can be operated from anywhere by a minimum number of staff, particularly in challenging times (Box IX.3).

### **Box: IX.3 Lightweight Payment and Settlement System (LPSS)**

The existing conventional payment systems like the RTGS, NEFT and UPI are designed to handle large volumes while ensuring sustained availability and hence they are dependent on complex wired networks backed by the advanced IT infrastructure. However, catastrophic events like natural calamities and war have the potential to render these payment systems temporarily unavailable by disrupting the underlying information and communication infrastructure.

Therefore, it is prudent to be prepared to face such extreme and volatile situations.

Keeping this objective in mind, the Reserve Bank has conceptualised a light weight and portable payment system that will be independent of conventional technologies and can be operated from anywhere by a bare minimum staff.

(Contd...)

It is expected to operate on minimalistic hardware and software and would be made active only on a need basis. It would process transactions that are critical to ensure stability of the economy such as government and market related transactions.

Such a light weight and portable payment system could ensure near zero downtime of payment and settlement system in the country and keep the liquidity pipeline of

the economy alive and intact by facilitating uninterrupted functioning of essential payment services like bulk payments, interbank payments and provision of cash to participant institutions. Having such a resilient system is also likely to act as a bunker equivalent in payment systems and thereby enhance public confidence in digital payments and financial market infrastructure even during extreme conditions.

**Source:** RBI.

### **Major Initiatives**

#### *Upgradation of Non-IT Physical Infrastructure at All Data Centres*

IX.41 The Reserve Bank has renewed the non-IT infrastructure of its existing data centres in the last two years. The project initiated during COVID-19 induced lockdown was successfully executed and completed with zero downtime at all data centres. The measure has enhanced the operational efficiency of data centres by optimising the energy efficiency and enabling real time monitoring of effectiveness of non-IT infrastructure through dashboards.

#### *Extension of e-Kuber for Implementation of Various Projects of the Reserve Bank and Cater to the Requirements of the Government*

IX.42 During the last year, the following major enhancements were carried out in *e-Kuber*.

- *Pilot Project of Central Bank Digital Currency (CBDC):* Enhancements in *e-Kuber* were carried out to facilitate pilot CBDC project. The pilot project was operationalised in two segments - CBDC-Wholesale and CBDC-Retail, effective November 1, 2022 and December 1, 2022, respectively;
- *Implementation of Centrally Sponsored Scheme (CSS):* The Reserve Bank is in the process to implement the pilot project of CSS, wherein *e-Kuber* platform will be

used to handle the CSS funds flow 'just in time' from the central government and state governments to state nodal agencies;

- *Implementation of PRAKALP (Pratyaksh Kar Lekhankan Pranali) under Tax Information Network (TIN 2.0):* The implementation of *PRAKALP* has gone live on July 1, 2022 with the integration of *e-Kuber* with TIN 2.0, Public Financial Management System (PFMS) and agency banks. The onboarding of 13 agency banks in the project is over and remaining agency banks are in the testing phase;
- *Implementation of Electronic Cash Ledger Indian Customs Electronic Gateway (ICEGATE):* ICEGATE was integrated with *e-Kuber* on July 1, 2019 for collection of central excise and service tax through NEFT/ RTGS mode. ICEGATE is now in the process of collection of receipts through the agency bank reporting framework. The functionality is being tested for implementation; and
- *Indo Nepal Pension Disbursement for Defence Pensioners:* The Controller General of Defence Accounts is in the process of initiating payments to defence pensioners domiciled in Nepal through NEFT. This functionality in *e-Kuber* is



in the final stages of user acceptance testing (UAT) and shall be implemented shortly.

### Agenda for 2022-23

IX.43 The Department had set out the following goals for 2022-23:

- *Continuous Upgradation of IT and Cyber Security:* The Reserve Bank strives to continuously assess and upgrade its IT security infrastructure to enhance its efficiency and effectiveness in tackling the emerging threats and protect its IT infrastructure that caters to critical payment infrastructure. In this endeavour, the Reserve Bank is upgrading Security Operation Centre (SOC) technologies with innovative capabilities and additional advancements like security orchestration, automation and response, user entity behaviour analytics, extended detection and response (Paragraph IX.44);
- *Second Greenfield Data Centre and Enterprise Computing and Cybersecurity Training Institute:* The Reserve Bank has commenced the work on a new state-of-the-art greenfield data centre during 2022-23. The data centre will cater largely to the internal needs of the Reserve Bank and its subsidiary organisations and will also host an enterprise computing and cybersecurity training institute which will cater to the IT training needs of the banking and financial sector of the country (Paragraph IX.45);
- *Next-Generation e-Kuber:* The *e-Kuber* was planned to be upgraded to the next generation based on newer technologies with wider flexibility and stability (Paragraph IX.46);
- *Better Interface for Internal Applications to Enhance User Experience and Adoption:* The Reserve Bank has been enhancing the user interface of the internal applications by adopting the latest best practices and global standards to improve the user experience and the adoption of the applications (Paragraph IX.47);
- *Making NEFT Compliant to Global Messaging Standards:* The payment industry has evolved over a period of time and various business drivers like richness of data, standardisation across payment nodes, compliance, deeper reporting, and related requirements have been constantly driving the need for change. ISO 20022 is a global and open standard for payment messaging. The RTGS system is already based on ISO 20022. The Reserve Bank is striving to make its NEFT system also compliant to this global messaging standard (Paragraph IX.48); and
- *Robotic Process Automation (RPA) Solution for Automation of Routine and Repetitive Tasks:* The Department has envisioned RPA for automation of repetitive and manual tasks such as software installation, report generation, reconciliation issues and fault remediation activities by bots without the support of IT engineers, thereby resulting in better utilisation of their services in other critical functions. This will help in reducing human errors and bring in more efficiency and productivity in day-to-day operations across the Reserve Bank (Paragraph IX.49).

### **Implementation Status**

#### *Continuous Upgradation of IT and Cyber Security*

IX.44 The Reserve Bank is at an advanced stage of procurement and upgradation of SOC technologies. 'Security Automation, Threat Analysis and Response Centre (SATARC): Next Generation Security Operation Centre (NGSOC)' will enable the Reserve Bank in creating a secured environment by minimising manual effort and improving security by realising intelligent automation at granular level.

#### *Second Greenfield Data Centre and Enterprise Computing and Cybersecurity Training Institute*

IX.45 The main consultant for the data centre project has been appointed and the project work is under progress. Construction work will commence in 2023. The training centre has started functioning from a remote location and is on the path of developing into a high-class training institution by carrying out quality programmes covering relevant themes with a special focus on emerging technologies. While the process for setting up the institute's infrastructure is in progress, two trainings have been conducted till December 2022.

#### *Next-Generation e-Kuber*

IX.46 The process of upgradation of *e-Kuber* has been initiated with state-of-the-art technology using microservices with application programming interface (API) based integration. The upgraded system will have functionalities like reporting with comprehensive real time dashboards, enhanced user experience, scalability, resilience and easier process orchestration. Additionally, it will have ease of integration with external and internal systems, front-end improvements for enhancing

productivity, robust controls, and integrated security architecture platform. The implementation will be completed by March 2024.

#### *Better Interface for Internal Applications to Enhance User Experience and Adoption*

IX.47 A design review of the different internal applications was conducted during the year, based on which the improvement in interface, designs, features and product upgrades are being undertaken. Special focus has been placed on user-centric design and continuous accessibility in a safe and secure manner.

#### *Making NEFT Compliant to Global Messaging Standards*

IX.48 The project is expected to be completed in the early months of 2023. Adoption of ISO 20022 will provide structured and granular data, improved analytics, end-to-end automation, and better global harmonisation. It will also pave the way for interoperability between RTGS and NEFT. While many countries are still making their large value system compliant with ISO 20022 standard, the Reserve Bank will have its retail payment system also compliant with these standards.

#### *Robotic Process Automation (RPA) Solution for Automation of Routine and Repetitive Tasks*

IX.49 The requirement analysis of the project is underway, as part of which certain processes related to IT operations and service request management have been identified as potential use cases. Different products available in the market are being assessed for the purpose. Post assessment, the procurement and pilot, full implementation of the solution shall be done keeping in view the emerging IT and business risk scenarios.

## Agenda for 2023-24

IX.50 The Department's goals for 2023-24 are set out below:

- Upgradation of e-Kuber (Utkarsh 2.0):* The *e-Kuber* being designated as a Critical Information Infrastructure (CII) by the National Critical Information Infrastructure Protection Centre (NCIIPC), the significance of the application cannot be undermined. The *e-Kuber* application has interface with many important stakeholders including Government of India and state governments, and thus needs to be up to date with the latest technology architecture to match the evolving IT and financial landscape. The upgradation of *e-Kuber* to the next generation based on newer technologies with wider flexibility and greater stability has, therefore, been included in the Reserve Bank's *Utkarsh 2.0* milestones. The upgraded *e-Kuber* shall employ latest technologies using application programming interfaces (APIs), microservices and containers, and is expected to be completed for implementation in 2023-24;
- Next Generation Data Centre (Utkarsh 2.0):* The Reserve Bank has initiated the project to construct a new state-of-the-art greenfield next generation data centre to address the capacity expansion constraints, meet ever-increasing IT landscape needs and avoid region specific risks. Considering the criticality of the project for fulfilling the Reserve Bank's IT infrastructure requirements, the next generation data centre project has

been included in the Bank's *Utkarsh 2.0* milestones. The construction of the data centre has commenced and shall be in an advanced stage of completion in 2023-24;

- Upgradation of RTGS:* The Reserve Bank, in its continuous endeavour to update and upgrade India's national payment systems, has planned to upgrade the RTGS system. This will include improvements in existing functionalities and introducing several new functionalities supported by RTGS. The upgraded RTGS will take care of the futuristic requirements like scalability, enhanced security and performance; and
- Enhancement of Internal Applications leading to Digital Transformation of Work Culture in the Reserve Bank:* The Department will be enhancing the internal applications to facilitate a transformation towards digital modes and reducing dependence on manual and paper-based procedures in day-to-day work. Continuous improvements in *Sarathi* (Electronic Document Management System), a revamped Enterprise Knowledge Portal, improved Visitor Management System and development of a web interface for regulated entities to submit applications/requests has been planned to be undertaken by the Department, which will help bring about the digital transformation.

## 4. CONCLUSION

IX.51 The Reserve Bank continued with its endeavour towards improving the payments ecosystem along with a focus on further enhancing outreach, customer centricity, cyber security and digital deepening. The Reserve Bank published the Payments Vision 2025 and sustained its

efforts to ensure round the clock availability of ICT infrastructure for the smooth functioning of its IT systems and applications. The focus of the Reserve Bank during the year also remained on strengthening the cyber resilience with the implementation of the new advanced firewall solution across the Reserve Bank, supplemented with various forms of cyber awareness initiatives to instil cyber hygiene amongst the staff members. The Reserve Bank has also conceptualised a light weight and portable payment system that can be operated from anywhere by minimum

staff, particularly relevant in the challenging times. Further, with a view to upskilling the staff with IT and analytical knowledge, the Reserve Bank initiated work on development of an Advanced Enterprise Computing and Cyber Security Training Centre abutting the new greenfield data centre, construction of which is expected to commence shortly. Upgradation of *e-Kuber* and RTGS systems would also be undertaken during 2023-24, reflecting the Reserve Bank's continuous efforts to use the latest technologies to build a robust and sound payments ecosystem.