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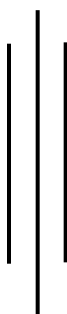
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यस बैंकबाट तयार गरिएको “National Payment Switch (NPS) and the National Payment Ecosystem- Master Reference Document” प्रतिवेदन बैंकको वेबसाइट www.nrb.org.np मा राखिएको व्यहोरा अनुरोध गर्दछु । उक्त प्रतिवेदन उपर कुनै राय/सुझाव भएमा २०८२ मंसिर १० भित्र यस विभागको ईमेल psdnic@nrb.org.np मा उपलब्ध गराई दिनुहुन अनुरोध छ ।

कार्यकारी निर्देशक

National Payment Switch (NPS) and the National Payment Ecosystem

Master Reference Document



October 2025

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Abbreviations

APIs	Application Programming Interfaces.
BFI	Banks and Financial Institutions.
DFS	Discover Financial Services.
DvP	Delivery-versus-Payments.
FPSL	Fonepay Payment Service Limited.
IPP	International Payment Partner.
NCHL	Nepal Clearing House Ltd.
NCS	National Card Switch.
NPI	National Payments Interface.
NPS	National Payment Switch.
NRB	Nepal Rastra Bank, the Central Bank of Nepal.
P2P	Person to Person.
P2M	Person to Merchant.
PSP	Payment Service Providers.
PSO	Payment System Operators.
RPS	real-time Retail Payment Switch as part of the NPS.
RTGS	Real Time Gross Settlement.
SCTL	SmartChoice Technologies Limited.
SGF	Settlement Guarantee Fund.
SIPS	Systemically Important Payment Systems.
TPA	Third-party Payment Aggregators.
VPA	Virtual Payment Address.

General Definitions

Bank refers to the Nepal Rastra Bank (NRB)

Application Programming Interfaces (APIs) refer to sets of codes and protocols that decide how different software components should interact, allowing different workflows, applications, processes, and systems, among others to communicate with one another.

Network, often referred to as Open-loop network, refers to the infrastructure, technology, and operational framework that enables the electronic initiation, authorization, clearing and settlement, and transfer of financial transactions. It connects a range of participants- including financial institutions, non-bank financial institutions, merchants, consumers, and payment processors- to facilitate seamless transfer of funds. Payment networks can take various forms, including card networks, real-time payment systems, etc., and are fundamental to the operation of modern payment systems.

Payment Infrastructure refers to the technical systems that facilitate the clearing and settlement of payments. An infrastructure is made up of hardware (for instance, servers, VPN connections, and computer terminals) and software (transaction routing and fraud and risk management); the infrastructure is managed by a payment system operator who ensures that the technical operations of the system are in line with the scheme rules for that payment type.

Scheme refers to a set of formal rules, procedures and technical standards that enable the transfer of funds between participants, typically involving multiple financial institutions and payment service providers. This includes operational specifications for the clearing of payment messages, rules for settling transactions, access requirements for participants, dispute resolution procedures, maintenance procedures, liability and indemnity procedures, and messaging standards, among others.

Payment System, as defined in Section 2(j) of the Payment and Settlement Act, 2019, refers to any system that facilitates payment of claims or liability of any kind between customer, institution or bank using payment instruments. A payment system constitutes a set of instruments, procedures,

and rules for the transfer of funds between or among participants; the system includes the participants and the entity operating the arrangement.

Scheme Operator refers to a licensed Payment System Operator (PSO) with a defined network/scheme for members onboarded in its network.

Payment System Operator (PSO) refers to an institution, as defined in Section 2(k) of the Payment and Settlement Act, 2019, that performs operations, management, and clearing of payment-related activities. It also refers to the institution that operates clearing house, electronic cards, and other electronic (online) payment networks.

Payment Service Provider (PSP) refers to an institution, as defined in Section 2(l) of the Payment and Settlement Act, 2019, providing payment-related services to the beneficiaries. It also refers to the institution that facilitates payments for goods, services, assets, or other liabilities between the institution and customers; transfers money within the country and abroad; or conducts payment transactions electronically.

National Payment Switch (NPS) refers to the interoperable payment switch implemented as per the provision in Section 21 of the Payment and Settlement Act, 2019, to facilitate seamless routing and settlement of all retail transactions in Nepal.

Retail Payment Switch (RPS) refers to a component of the NPS, implemented for processing, routing/switching, and clearing and settlement of retail non-card transactions.

National Payments Interface (NPI) is a set of standard APIs for connecting multiple underlying core systems and services for routing of financial and non-financial messages.

NPIx refers to the cross-border engine within the NPI for handling, validating, routing and processing cross-border transactions.

NPS-National Card Switch (NPS-NCS) is an interoperable card switch, operating as a component of the NPS, for local routing and settlement of cards operating in Nepal, including that of the domestic card scheme.

Interoperability refers to a mechanism in which payment instruments belonging to a particular network/scheme may be used in systems installed in other networks/schemes or in networks/schemes used in other countries.

Automated Clearing House (ACH) system refers to a deferred net settlement (DNS) system, that usually enables bulk credit and bulk debit payments, often used for recurring payments, such as salary payments, utility payments, tax payments, direct deposits, etc., settled in batches within banking hours.

Closed-loop system refers to a type of payment network developed by a single PSP, connecting both parties to a transaction on an internal network. It is also known as an in-house or intra-group network.

Fintech refers to the advances in technology that have the potential to transform the provision of financial services spurring the development of new business models, applications, processes, and products. The Fintech enablers shall be known as Fintech Firms.

RTGS refers to the large and critical value payments operated by the NRB, allowing gross settlement of transactions without netting debits with credits. It is defined in Section 2(b) of the Payment and Settlement Act, 2019

Centralized Securities Depository (CSD) refers to an entity that provides securities accounts, central safekeeping services and asset services, which may include the administration of corporate actions and redemptions, and plays an important role in helping to ensure the integrity of securities issues (that is, ensure that securities are not accidentally or fraudulently created or destroyed or their details changed).

Security Settlement System (SSS) refers to a system that enables securities to be transferred and settled by book entry according to a set of predetermined multilateral rules. Such system allows transfer of securities either free of payment or against payment.

Sponsor Bank refers to the (settlement) bank nominated by the indirect participants of PSOs for the purpose of final settlement of all transactions processed by indirect participants. The eligibility

criteria for the Sponsor bank should be as prescribed through Directive No. 4 of Payment Systems related Unified Directives.

Nepal Clearing House Limited (NCHL) refers to a licensed PSO, authorized to develop, implement, and operationalize the NPS, per the approval from the Board of the NRB, dated 2077/03/01, as the core and interoperable switch for the country.

Settlement Guarantee Fund (SGF) refers to a fund created by contribution of participant member BFIs and the network through its own source or alternative funding arrangements to mitigate the default risk and settlement risk. SGF shall be created, managed and operated as per the procedures and directives/guidelines issued by the NRB.

Licensed Institutions refer to the PSOs and PSPs (both non-bank and banks) licensed by the NRB.

P2P refers to peer-to-peer fund transfer or payments.

P2M refers to peer-to-merchant payments, made by the customers to merchants for the goods and services purchased from their stores (physical and online).

Issuer refers to the participant who receives and authenticates the payment message.

Acquirer refers to the participant of a trusted source that originates the payment message.

On-us refers to a case where the issuer and acquirer are the same bank.

Direct Members refer to the banks and financial institutions licensed by the NRB and operating within Nepal and having direct membership of the underlying core system of any PSO and NPS. Such banks hold settlement/reserve account at NRB's GL system. They shall have a direct communication link and shall be fully integrated with NPS, enabling the member to exchange financial and non-financial messages with other members. For the case of NPS-NCS, the BFIs having their own host switch integrated with NPS-NCS shall be referred as "Principle Members" and those not having their own switch shall be referred as "Associate Members".

Indirect Members refer to the non-bank financial institutions that have a direct communication link and are fully integrated with NPS enabling the member to exchange financial and non-

financial messages with other members but do not have settlement account at NRB to settle their financial obligations. Therefore, they need to settle their net clearing position (NCP) positions through a Direct Member as settlement bank that has an account at NRB¹.

Net Clearing Position (NCP), also termed as Net Settlement Instruction (NSI), refers to the financial position for each member at the closure of each clearing session. The NCP might be a net debit or a net credit position, and it is calculated on a multilateral basis, encompassing multiple systems integrated within NPS.

Technical Members refer to the licensed institutions that are allowed to process transactions of their own or on the behalf of their customers. Technical members shall also include entities of the Government of Nepal (GON), large institutions or corporations or any other entity prescribed by the NRB. Licensed PSOs and PSPs may also be onboarded as technical members in the NPS. Technical Members shall have direct communication link and fully integrated with NPS but do not have settlement account at NRB to settle the financial obligations. Therefore, they need to settle their positions through a Direct Member as a settlement bank that has an account at NRB. For the case of NPS-NCS, it will be referred as Technical Payment Processor (TPP)².

Cross-border refers to any digital payments-related initiatives beyond the territorial boundary of Nepal.

¹ The general definition has been established following the definition laid-down in Section 3.1.2 of the Operating Rules for Retail Payment Switch

² The general definition has been established following the definition laid-down in Section 3.1.3 of the Operating Rules for Retail Payment Switch

1. Background

Nepal Rasta Bank (NRB) is responsible for ensuring the stability, safety, and efficiency of the country's payment systems. As empowered by the NRB Act, 2002 and guided by the Payment and Settlement Act, 2019, NRB has established the Payment Systems Department (PSD) to oversee, regulate and promote secure and inclusive payment systems across the nation. The Payment and Settlement Act, 2019 guides the development, expansion, promotion, monitoring and regulation of overall payments, clearing, and settlement system of the nation.

To carry out payment-related activities in Nepal, individuals or institutions must be licensed by NRB³. These licensed institutions fall under two broad categories:

- a. Payment System Operators (PSOs)- entities that manage the infrastructure for clearing and settlement
- b. Payment Service Providers (PSPs)- institutions that offer payment instruments and services to end users, including mobile wallets, QR payments, and domestic fund transfers.

Table 1 outlines the roles of PSOs and PSPs as per point 2(4) and 2(5) of the Licensing Policy for Payment-related institutions, 2023.

Table 1: Types of Licensed Institutions

PSO	PSP
Operate Automated Clearing House (ACH)	Operate card and non-card instruments for payment of goods, services, property, or any other obligations
Ensure interoperability of payment systems	Facilitate domestic fund transfers
Operate electronic card network	Operate payment instruments by participating in PSO's network
Operate payment switch	Carry out other tasks as specified by NRB
Carry out other tasks as specified by NRB	

³ As per the Section 5 of Payment and Settlement Act, 2019, no one is allow to carry out activities as a PSO or a PSP without obtaining licensed from the Bank

While Nepal’s digital payments ecosystem has grown rapidly, it still faces challenges of fragmentation due to closed-loop systems, lack of full interoperability, and duplicative infrastructure. To address these gaps and consolidate payment systems, the National Payment Switch (NPS) can play a crucial role.

The NPS serves as the central switching infrastructure for retail payments in Nepal. It is designed to enable interoperability among various closed-loop systems, networks/schemes, and payment infrastructures. Based on open application programming interfaces (APIs), NPS is accessible to all ecosystem participants on a non-discriminatory and low-cost basis.

By fostering interoperability, the NPS aims to create a unified, faster, and more efficient payment experience for all users- whether they are sending money, paying bills, or accepting digital payments. It is a foundational element in the development of the broader national payment ecosystem envisioned by NRB.

This document serves as a master reference document to explain:

- a. Integrated national payment ecosystem envisaged by the NRB and the role of NPS in such ecosystem
- b. The architecture and components of NPS
- c. The role of NPS in ensuring interoperability of retail payments (both card and non-card) systems.

2. Legal Basis

The implementation of the NPS is backed by both a legal mandate and strategic policy decisions of the NRB. As per clause 21 of the Payment and Settlement Act, 2019, all institutions and their payment instruments must be integrated with the NPS, following the procedures prescribed by the Bank. This legal requirement supports the development of a unified, secure, and interoperable payment ecosystem across the country.

The development of the NPS was also prioritized in NRB’s Strategic Plan 2017-2021 under Pillar 4, Objective 1, Strategy 1.1, Action 3, which explicitly states, “Establish National Payment Switch/Gateway (NPS/NPG)”. This strategic action underscores NRB’s long-term vision to

modernize Nepal’s payment infrastructure and promote interoperability, efficiency and financial inclusion.

To implement this legal and strategic mandate, the Board of Directors of the NRB resolved to establish and operationalize the NPS through Nepal Clearing House Limited (NCHL). Through this initiative, the NRB aims to foster interoperability across retail payment systems while reducing systemic risk and operational costs for ecosystem participants.

3. Objectives of NPS

Following are the major objectives of the NPS.

1. Consolidate and utilize existing payment infrastructures established/implemented by different scheme operators/ network.
2. Implement interoperable retail payments ecosystem (including both card and non-card payments) in Nepal.
3. Promote interoperability and inter-connection with international network providers, ensuring seamless and efficient cross-border payments.
4. Facilitate settlement of all domestic transactions (card and non-card) within the nation in the central bank money, utilizing the RTGS System.

4. Current Landscape of Nepal’s Payments System

PSD started issuing licenses to PSOs and PSPs from 2016. At present, there are 9 PSOs and 23 PSPs in operations. Of 9 PSOs, 3 PSOs are international scheme operators/networks (Visa, Mastercard, and Unionpay). Of remaining 6 PSOs, 4 PSOs have established and implemented their own payment infrastructure and payment scheme. NCHL operates NEPALPAY scheme⁴, Fonepay Payment Service Limited (FPSL) operates Fonepay scheme, Nepal Payment Solution Limited operates Instapay scheme, and SmartChoice Technologies Limited (SCTL) operates Smartpay scheme. NCHL and SCTL are interoperable through the NPS, while other networks are yet to be interoperable.

⁴ The NEPALPAY scheme is a part of the NPS, currently operated by NCHL as per the mandate given by the NRB. The payment platforms/ channels implemented by NCHL as the PSO (connectIPS, IPS, corporatePAY, etc.) are based on NEPALPAY scheme. Like NCHL, other PSOs can avail the NEPALPAY scheme through their membership in the NPS.

Licensed PSPs are operating closed-loop systems, of which only a few are interoperable⁵. Thus, unlike many countries with a unified payment scheme, under which participants issue payment instruments using a common/single payment infrastructure, Nepal's payment ecosystem is housed with multiple schemes and payment infrastructures.

PSOs, using their payment infrastructure, allow banks and financial institutions (BFIs) and PSPs to participate (directly or indirectly) in their network and offer their scheme services to member BFIs and PSPs. The BFIs and PSPs within a network are interoperable through the common payment infrastructure. However, if a BFI or a PSP is a member of a network but not of the other, such BFI or PSP is unable to route payments to a BFI or a PSP unless both networks harmonize their systems for interoperability. Thus, to offer payment services under different schemes, BFIs and PSPs need to acquire membership of each scheme, which further entails the following challenges:

- a. Many BFIs and PSPs have raised concerns regarding non-uniform network/scheme access criteria (high cost, delayed implementation, etc.) set forth by PSOs/scheme operators.
- b. Participating in different network entails annual membership costs at each network, raising the cost of services for BFIs/ PSPs, which ultimately gets passed on to customers.
- c. Sometimes, BFIs and PSPs may need to make significant changes in their system architecture to ensure interoperability with different payment infrastructures having different architecture.

Similarly, the closed-loop schemes operated by PSPs have been interoperable/ integrated with BFIs through bilateral/multilateral agreements; however, such agreements create yet another closed network with BFIs in bilateral/multilateral agreements. Closed-loop systems, within the same network/scheme can ensure interoperability riding on the payment infrastructure of the network, but the limitations of inter-network interoperability still remain in this architecture.

Thus, considering the current landscape where multiple schemes and payment infrastructures exist, allowing them to co-exist and operate independently is the topmost priority. To ensure this, NPS has been envisaged as the interoperable switch that facilitates network-to-network inter-

⁵ Moru and NamastePay wallets have ensured interoperability of their closed-loop system through the NPS, while eSewa and Khalti are exploring interoperability through FPSL's switch.

connectivity between different schemes, eliminating the need for BFIs and PSPs to be members of each scheme to offer holistic payment services⁶ to their customers.

5. National Payment System: Planned Ecosystem

The national payment system shall consist of large and critical value payment as well as retail payment systems. For large and time-critical payments, the Real Time Gross Settlement (RTGS) system shall be used for gross and real time settlement of payments. Such an arrangement is currently operational in the Nepalese payment system. At present, 20 commercial banks, 11 development banks, 12 finance companies, and 1 Infrastructure development bank have been onboarded as direct participants. As per Section 13 of NRB Act, 2002, only banks and financial institutions are allowed to open accounts at the NRB. RTGS utilizes the reserve accounts of BFIs to process and settle large and critical value payments and to provide settlement finality for retail payment systems in the central bank money.

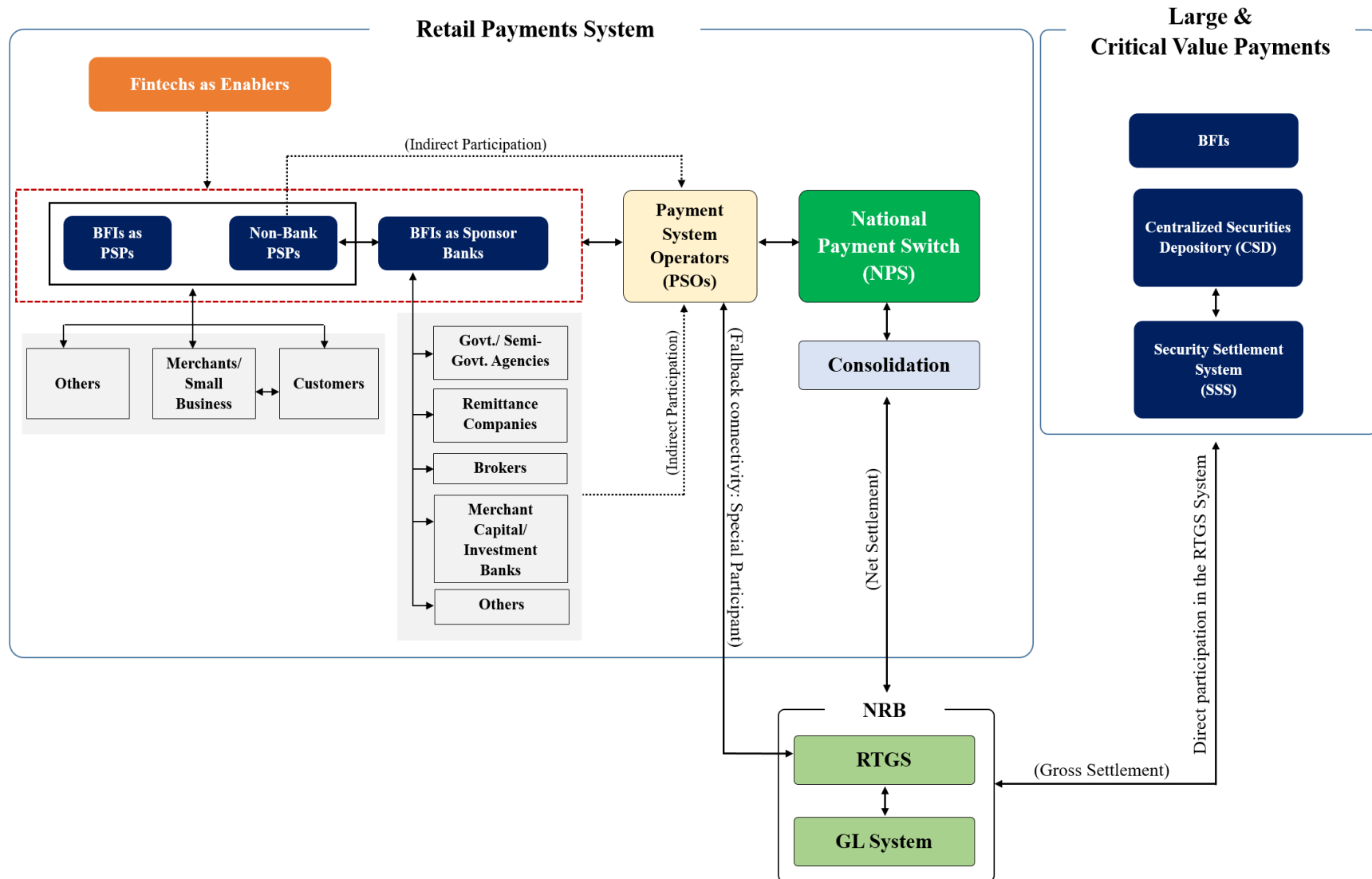
The RTGS system shall also be used to process transactions from **Centralized Security Depository (CSD)** and **Security Settlement System (SSS)**. The SSS may primarily be interconnected to RTGS, coordinating with the CSD, to maintain security books against settlement of payment leg for a Delivery-versus-Payments (DvP) security transactions. Nonetheless, the RTGS system can be integrated with the CSD if it also undertakes security settlement functions.

Non-bank PSPs may operate closed-loop systems/schemes as well as merchant payment services (such as merchant QR codes) offered by different networks/scheme operators. They may develop the payment gateway (the overlay service) that can be used by the customers and merchants to make and receive merchant payments.

BFIs as PSPs may participate in different networks to avail payment services offered by such networks. For instance, BFIs may avail Automated Clearing House (ACH), merchant QR, interbank fund transfer services, among others, offered by the PSOs/scheme operators.

⁶ In this section, holistic payment services means the capability of BFIs and PSPs to offer all available payment alternatives, offered under different schemes by different networks, to their customers.

Figure 1: Planned (Integrated) National Payment System



Non-bank PSPs and BFIs as PSPs shall offer payment related services to their customers and offer merchants/small businesses capabilities to receive payments from customers. Merchants/small businesses may directly be onboarded by non-bank PSPs and BFIs as PSPs. NRB may make necessary regulatory provisions to allow other players, such as Third-party aggregators (TPAs)⁷, depending upon the need of the ecosystem.

Non-bank PSPs shall select BFIs as sponsor (settlement) banks⁸ to participate in PSO's network/scheme. While the sponsor BFIs are the direct members in PSOs' payment infrastructure, non-bank PSPs shall be onboarded as indirect members to facilitate the settlement of indirect participants' settlement obligations in the central bank money through their own reserve accounts maintained at the NRB.

PSOs, operating their own payment schemes and payment infrastructure, play a crucial role in the interoperable retail payments ecosystem of Nepal. Their primary functions are as follows:

- a. Facilitate switching and clearing of transactions of their direct and indirect members.
- b. Processing net settlements of all direct and indirect participants through the NPS in the RTGS system.

The NPS shall enable PSOs to carry switching and clearing of transactions between networks and ensure settlement of their network services in the central bank money. As a fallback arrangement PSOs shall be onboarded as special participants in the RTGS system to ensure settlement finality of their transactions when NPS is unavailable.

⁷ TPAs are payment related institutions that participate in different networks and aggregate their payment services to allow small businesses/merchants to accept online payments from multiple payment instruments. TPAs aggregate all of their clients' transactions into a single merchant account, giving small businesses/merchants access to the functionality of a merchant account without having to go through the time-consuming process of opening merchant account themselves.

⁸ The qualification for a sponsor or a settlement bank has been specified in Directive No. 4 of the Payment System-related Unified Directives, 2081.

The NPS, as the interoperable switch, shall undertake the following functions:

- a. Consolidate positions from all inter-connected payment systems (net settlement position from all payment schemes, including paper-based electronic cheque clearing system) and create a net settlement position for each member BFI⁹.
- b. Facilitate network-to-network connectivity between different scheme operators/PSOs, switching/routing transactions from member BFIs of one PSO to member BFIs of another PSO, thereby reducing the need for BFIs to gain membership of each PSO to avail their scheme services.
- c. Facilitate interoperability between closed loop systems.
- d. Forward the net settlement position of each BFI to the RTGS system to ensure final settlement in the central bank money.

Thus, NPS shall ensure interoperability of the retail payments in Nepal and support overall cost rationalization by:

- a. Consolidating the infrastructures of retail payments that are already established by various stakeholders.
- b. Enhancing existing retail payment systems by fostering interoperability.
- c. Ensuring the implementation of the NepalQR Standardization Framework and Guidelines for interoperability of multiple QR schemes, operational in Nepal.
- d. Ensuring interoperability of domestic card transactions processed through various switches (operated by the banks and/or third-party processors), routing domestic transactions within Nepal and partly reducing cost for the banks and end customers/ merchants.
- e. Introducing Nepal's own national multi-interfaces and multi-purpose card scheme to provide substantial growth in the issuance of the cards and acceptance infrastructure across the country.
- f. Rationalizing interchange and other association fees/charges.
- g. Functioning as the central infrastructure for routing and settlement of cross-border transactions to ensure interconnection and interoperability with international network

⁹ The net settlement position should include the net transactions of the BFI as well as the transactions of non-Bank PSPs for which the BFI is acting as the sponsor bank, netted together to determine a net settlement position.

providers in a seamless, cost-effective, and equitable manner for all institutions and instruments.

6. Components of NPS

The NPS is composed of three components- National Card Switch and Domestic Card Scheme, Retail Payment Switch (RPS) for interoperability of retail payments, and NPIx for cross-border payment integrations. The **Retail Payment Switch (RPS)** for interoperability of retail payments is operational since November 2021. The cross-border switch, **NPIx**, is operational, with cross-border person-to-merchant (P2M) acquiring services currently functional and person-to-person (P2P) payments functionality under closed user group testing phase. The **National Card Switch (NPS-NCS)**, along with NEPALPAY domestic card scheme, is operational since 2081/12/18.

6.1 Retail Payment Switch (RPS)

RPS is the core retail switch for processing non-card-based retail transactions initiated from any of the channels and any acquiring instruments integrated through National Payments Interface (NPI). All the services and instruments of RPS are available to the members and/or related stakeholders through NPI. The transactions through RPS are processed on real-time such that the finality of the payment is on instant basis with debtor and creditor accounts reflected on real-time. However, the Nostro banks are settled on deferred basis, corresponding to which the settlement risk should be backed by Settlement Guarantee Fund (SGF). Final settlement of RPS is executed on a deferred basis in the RTGS system.

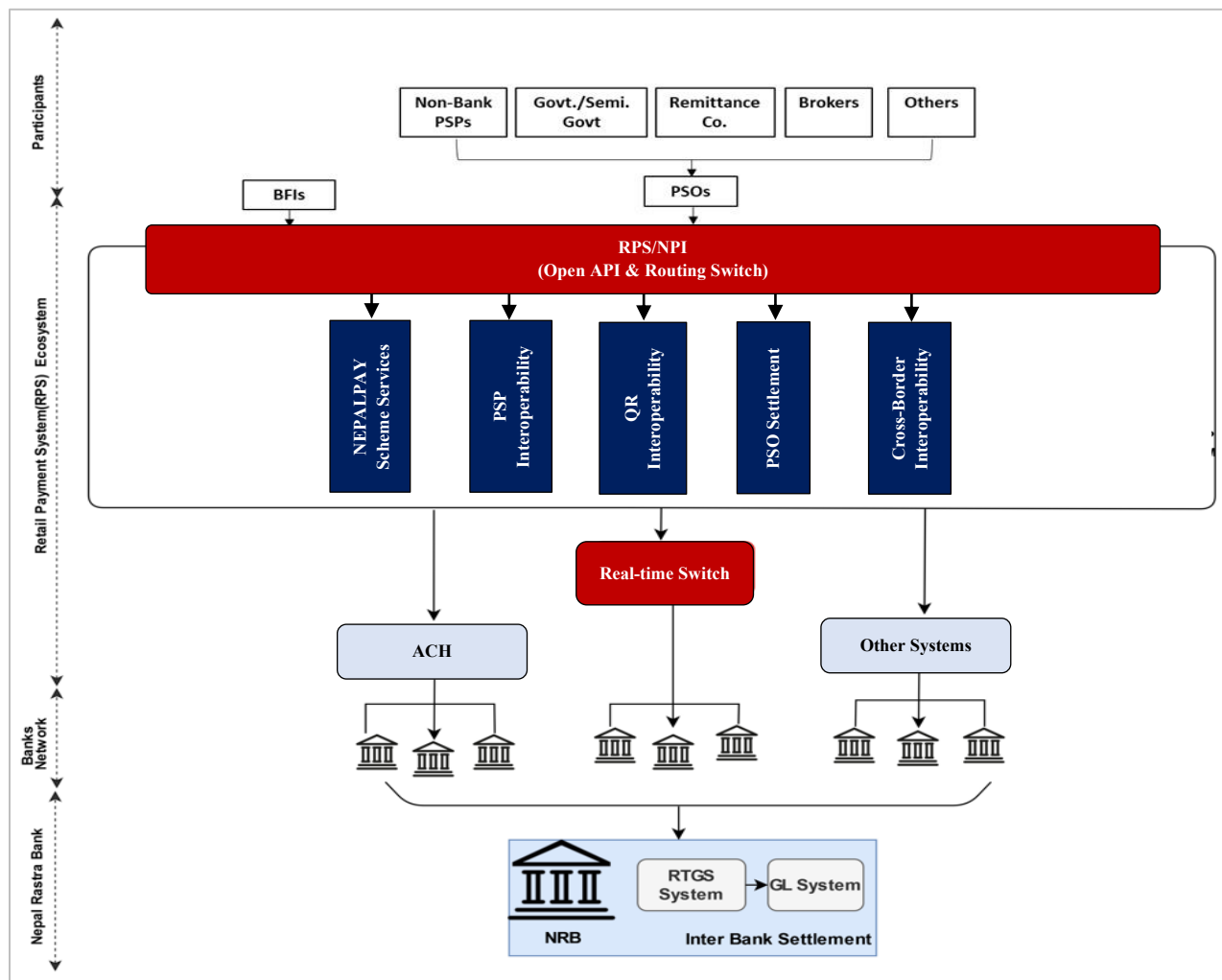
Open payments APIs are consolidated as National Payments Interface (NPI) for inter-connection and interoperability for the participating members, systems and integration with real-time payments processed through RPS and deferred credit payments processed through ACH systems. Standardized integration for overlaying services from any of channels/system of BFIs (mobile, internet, corporate, remittance), internal systems of non-bank institutions, PSPs/PSOs, government/semi-government institutions, large corporates, and others are available through NPI.

6.1.1 High-level Architecture of RPS

The high-level architecture of the RPS is presented in Figure 2. All instruments and use cases of RPS are extended through NPI, which integrates with the system and /or channels of member BFIs

and PSPs. Specific engines for new instruments and use cases are added within NPI as open financial services for financial and non-financial services with provision to scale-up. Under NEPALPAY scheme services, participants of the RPS can avail fund transfer, NEPALPAY QR, Billers gateway, NEPALPAY Instant, NEPALPAY Request, and other services, accessible through standard APIs. The final settlement of RPS transactions is executed in the RTGS system.

Figure 2: High-level Architecture of Retail Payment Switch



6.1.2 Major Use Cases of RPS

1. The RPS has been designed to ensure interoperability of closed-loop systems (PSP interoperability), QR-based systems¹⁰ (between different schemes), and cross-border payments.
2. Under **NEPALPAY scheme services**, RPS offers the following services to participating members:
 - i. **NEPALPAY fund transfer services** (both real and non-real time), which can be integrated into payments channels/platforms of different PSPs and Banks as PSPs.
 - ii. The **interoperable NEPALPAY QR scheme**, facilitating inter-network connectivity for the participating members. It enables interoperable QR transaction routing and settlement between other QR scheme operators in Nepal.
 - iii. **NEPALPAY Instant** to initiate fund transfer based on proxy address (Virtual Payment Address- VPA)
 - iv. **Service Interoperability (Billers gateway)**, allowing API or GUI based access to participating members to service payments (such as utility bill payments, tax payments, etc.)
 - v. **NEPALPAY Request**, a direct debit instrument to pull transactions based on individual P2P requests or event-based requests or e-mandate auto-debit or as a tokenized account.
3. To facilitate settlement in the central bank money, the PSO Net Settlement module of the RPS can be used. This module allows PSOs or other institutions to process multi-lateral net settlements of their member BFIs for the transactions processed in their system.

6.1.3 Membership of RPS

The existing members of NPI can have access to the RPS and all associated instruments and use cases. Direct membership is open to all BFIs operating in Nepal or any other entity at the discretion of NRB. The participating members (direct, indirect or technical) shall be provided access to RPS through NPI and as per the standard technical specifications as follows.

¹⁰ Currently different networks have their own QR schemes, allowing QR-based payments to their participating members. NEPALPAY QR, as per the NepalQR Standardization framework and Guidelines, 2021, is intended to facilitate interoperability of QR transactions at merchant or issuer level, and for inter-network transactions and settlement between other QR scheme operators in Nepal. With interoperability fostered through the NPS, the need for multiple QR standee will be eliminated. Further, NRB may suggest a common QR standee design, which all networks must comply with.

- 1) RPS/NPI Technical Specifications Guideliness
- 2) NepalQR Standardization Framework, 2021 and any sub-documents/guidelines issued in accordance to the guidelines.

6.2 Cross-Border Payments

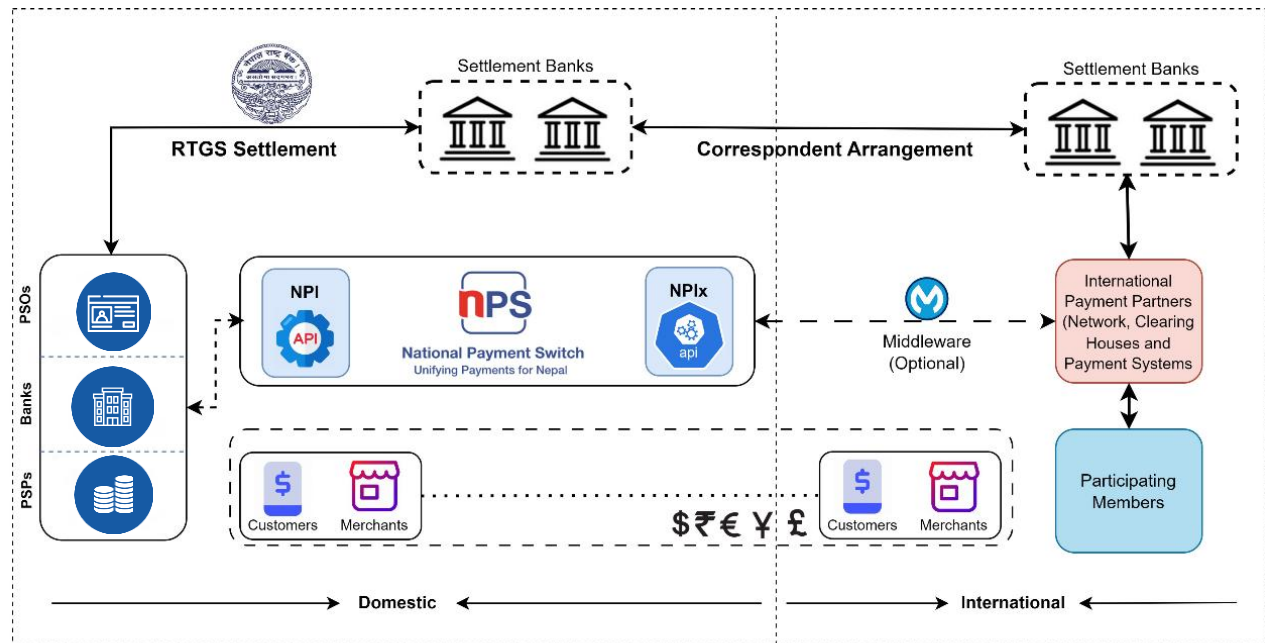
Cross border payment shall be achieved through collaboration with international payment partners (IPPs) like international networks, regional clearing house or networks and others foreign providers. NPI for cross-border payments (NPIx) shall be extended as core engine for cross border business validations, transaction routing and processing, and format conversions.

Transactions initiated by a member to international entities, or vice versa, shall first be routed through NPIx for cross-border related conversions, validations, and business workflows before being processed through NPI or delivered to an international network. NPIx is an independent platform within NPS that supports cross-border use cases, irrespective of corridors.

6.2.1 High-level Architecture of NPIx

The high-level architecture of cross border payments is presented in Figure 3.

Figure 3: High Level Architecture of Cross-Border Payments



*Note : Logos are used for illustration purpose only

The NPIx cross-border engine can be accessed by the participating members through secured communication link of NPI. The NPIx engine supports all multiple payment types, including P2P, P2M, service payments and trade payments, irrespective of corridors or international networks. The cross-border transaction initiated by the participating member to IPP member or vice-versa will be routed first through NPIx for cross-border related conversions, validations and business workflow prior to being processed through NPI or prior to being delivered to IPP network.

Domestic settlement of cross-border transactions between participating members shall be processed and settled through RPS with final settlement of the member BFIs in the RTGS system. Cross-border transactions settlement shall be through an arrangement between the designated settlement bank(s) in Nepal and its correspondent bank in respective IPP country. The operations of the cross-border payments through NPIx shall be guided by the operating rules, issued from time-to-time as per NRB's directions.

6.2.2 Major Use Cases of NPIx

Following are the major use cases of cross border payments as a part of NPS:

1. Cross border Person to Person (P2P) Transfer
2. Cross border Merchant Payments (P2M)

However, this can be extended for B2B transactions also, as per the corridor or network partner. Cross border payments are enabled from the retail issuing instruments including mobile banking, wallets, and fast payment systems.

6.2.3 Interoperability of NPIx

NPIx is an extension of NPI, comprising a set of standard APIs for handling, validating, routing, and processing cross-border payments, as well as for integration with international entities/networks. NPIx provides a structured approach to enhancing cross-border payment capabilities, fostering collaboration among domestic and international entities, and promoting interoperability and efficiency within the payment's ecosystem. The mechanism followed by NPIx for achieving cross-border payment interoperability are as follows:

- a. **Cross-border network expansion:** This shall identify and expand the cross-border payment networks, with potential corridors or remittances, tourism, and business/trade related transactions. It shall focus on establishing seamless integration for cross-border

payments with clearing house, networks, aggregators or payment partners, prioritizing P2P (peer-to-peer) and P2M (peer-to-merchant) payments, along with other relevant use cases.

- b. **Standard integration specifications:** NPIx specifications are standardized, with the capability of establishing integration with international payment partners and defining business processes for specific corridors. A comprehensive guideline for integration with the NPIx is also developed to facilitate seamless connectivity and integration.
- c. **Domestic routing and interoperability:** To ensure domestic integration and interoperability, standard specification shall be provided for domestic participants or networks to connect with the NPS through NPIx. Domestic entities, willing to participate in the NPIx under NPS, shall be onboarded ensuring uniform participation and integration criteria and interoperability standards.
- d. **Settlement mechanism:** Implementation of standardized settlement mechanism for cross-border payments shall be facilitated through a corresponding banking arrangement between Nepal and respective IPP(s). Domestic settlement of cross-border transactions with the participants shall be carried out via NRB's RTGS system and RPS.

7.3 National Card Switch (NCS) and NEPALPAY Domestic Card Scheme

7.3.1 National Card Switch

NPS-National Card Switch (NPS-NCS) has been planned for local routing and settlement of cards operated in Nepal, including NEPALPAY card¹¹. It will integrate with payment switches of BFIs/PSOs for card transactions. It also has a centralized system for back-office and fraud and risk management. The final settlement of NCS is planned to be executed on deferred basis at RTGS.

7.3.1.1 High-level Architecture of NCS

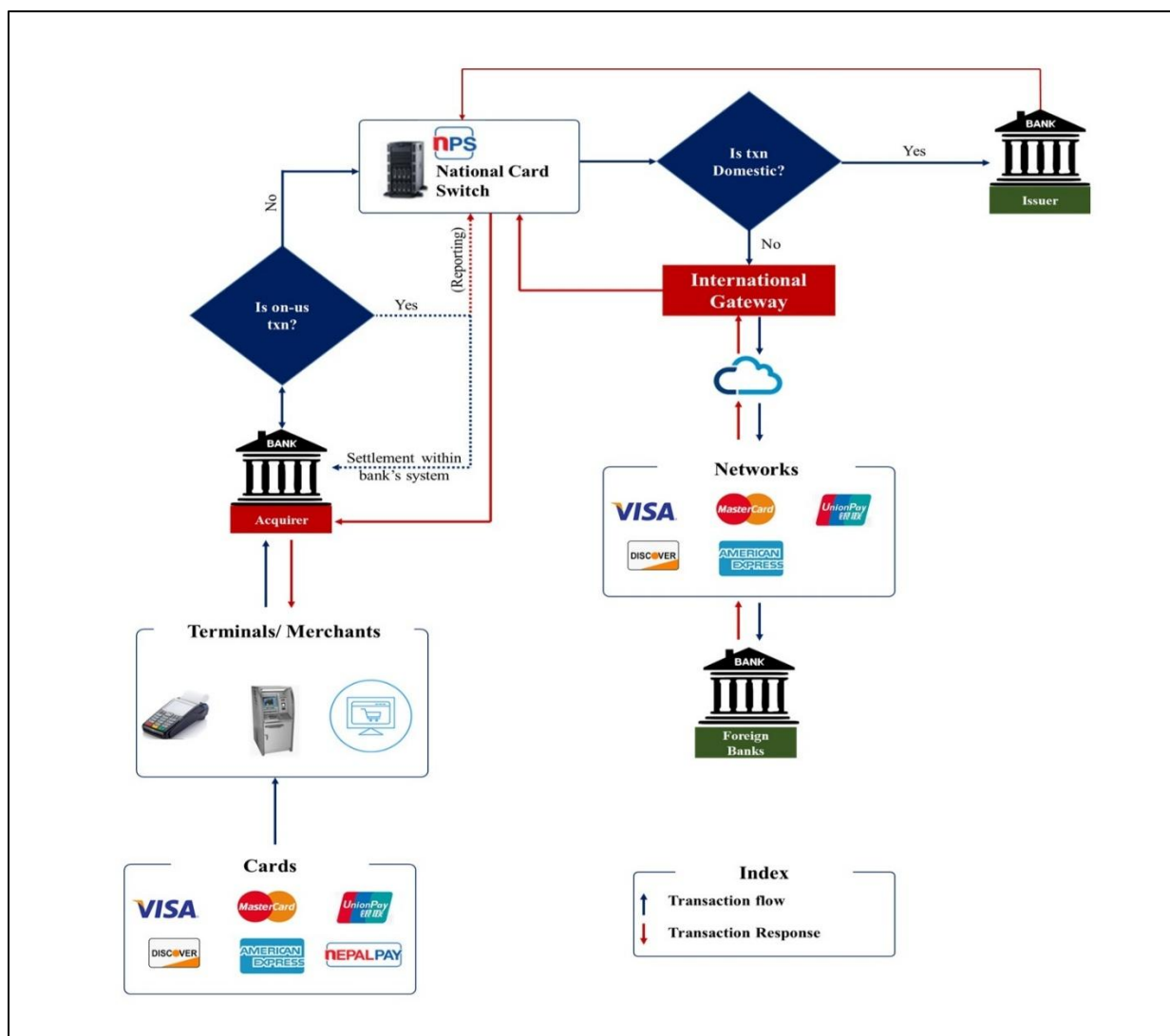
For any card transaction initiated from terminals managed by an acquirer in Nepal, the transaction will be routed through NPS-NCS for domestic transactions. The NPS-NCS shall forward the transaction details to the respective card issuer for authentication and authorization. In case of international transactions involving cards issued under national card scheme and Discover cards (including Discover, Diners, and Pulse), the transaction will be routed through NPS-NCS, which

¹¹ NEPALPAY card scheme, the national/domestic card scheme, is a part of the NPS-NCS. Licensed institutions can seek membership of NPS-NCS to issue cards under NEPALPAY scheme.

directs to the issuer for approval. The settlement and dispute resolution processes for these transactions shall be facilitated through NPS-NCS.

In the first phase, for international transactions involving other global card networks such as VISA, MasterCard, UnionPay International, American Express (Amex), and others, transactions will be routed through the existing arrangements between the card schemes and respective BFIs in Nepal. Similarly, the settlement and dispute management for such transactions will be handled by the relevant international card networks. In the second phase, international routing of all card-related transactions shall be handled through NPS-NCS. The high level process flow for card transactions processed through the NPS-NCS is presented in Figure 4.

Figure 4: High Level Process Flow of NPS-NCS transactions



All card related transactions acquired by Nepalese merchants shall be routed through the NPS-NCS. In case of same issuing and acquiring bank, transactions shall be settled internally by the respective banks, and the report of such transaction shall be provided to the NPS-NCS for centralized reporting. In case of domestic transactions (with both card and merchant based in Nepal), the NPS-NCS shall route transactions between issuing and acquiring banks directly using the domestic rail. For international transactions (card is issued by international banks, while the merchant is based in Nepal), transactions shall be routed via international rail to respective network for transaction authorization. For such transactions, settlements shall be as per the network's international settlement system.

The detailed transaction flow for different use cases, settlement mechanism, dispute resolution mechanism, etc. shall be in accordance with specification, guidelines, operating rules and procedures, and others, issued from time-to-time.

7.3.2 NEPALPAY Card

Nepal Payment Card (NEPALPAY) is an EMV compliant domestic card scheme, with its base specifications used from Discover Financial Services (DFS). It supports contact and contactless cards including debit, credit and prepaid cards. While NPS owns the scheme ownership, specification and governance framework of NEPALPAY Card, the issuing and acquiring shall be accomplished through the participating members. The international acceptance of NEPALPAY card shall be ensured through DFS, whereas their international cards will also be acquired in Nepal through NPS.

7.3.3 Major Use Cases of NCS and NEPALPAY Card

Following are the instruments and/or major use cases that will be available through NPS-NCS:

- a. Interoperable national switch for routing and settlement of domestic card transactions by integrating switches of the BFIs and payment processors.
- b. Issuance of contact-based and contactless debit, credit and prepaid cards under NEPALPAY domestic card scheme.
- c. Availability of e-commerce transactions for NEPALPAY card scheme.
- d. International acceptance of national/domestic card scheme through Discover Financial Services (DFS) network.

- e. Domestic routing of all transactions using Nepali card (irrespective of card scheme) at Nepali merchant terminals.

7.3.4 Interoperability of NCS and NEPALPAY Card Scheme

NPS-NCS has been envisioned as the core switch for local routing and settlement of all network cards operated in Nepal including, NEPALPAY card scheme, through integration with payment switches of BFIs/ PSOs. Members will have to participate in NPS-NCS for local routing and settlement. They will also participate for issuance and acquiring of NEPALPAY card, which will be accepted internationally through DFS network. For on-us transactions conducted within the same bank acting as both issuer and acquirer, NPS-NCS shall forward such transaction reports at defined intervals for centralized reporting.

8. The Road Ahead: Towards an Inclusive National Payment Ecosystem

As Nepal continues its journey towards a digitally empowered economy, the NPS emerges as a critical infrastructure, designed to ensure interoperability among diverse retail payment systems/networks. By providing a unified and efficient switching mechanism, the NPS will serve as the foundation for a seamless, secure, and inclusive national payment ecosystem.

The NPS will facilitate money settlements in central bank money, even for non-bank participants, enhancing the safety and finality of transactions. This not only builds public trust but also aligns with international best practices in payment system operations.

The envisioned payment ecosystem is inclusive by design, enabling co-existence and interoperability of existing networks and schemes. This ensures that innovation and competition can flourish without fragmenting the user experience or diluting the efficiency of payment services. Furthermore, a direct inter-connection between large value systems such as the CSD and SSS reflects a strategic approach to building a holistic payment infrastructure that supports both retail and high-value financial markets.

In sum, the road ahead for Nepal's national payment infrastructure is driven by collaboration, resilience, and inclusivity. As the digital backbone, the NPS will play a pivotal role in building a future-ready financial ecosystem that addresses the evolving needs of citizens, businesses, and the broader economy.