BUSINESS PLAN FOR THE RWANDA NATIONAL DIGITAL PAYMENT SYSTEM (R-NDPS)

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DOCUMENT HISTORY

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INTRODUCTION AND BACKGROUND

CONTEXT

The Government of Rwanda's Vision 2050 sets forth an objective to achieve the status of an upper middle-income country by 2035 and a high-income country by 2050. At a high-level, the vision emphasizes improved quality of life for all Rwandans with universal access to financial services; modern infrastructure and livelihoods; increased productivity, competitiveness, and jobs; and international cooperation and positioning.[1] Achievement of these goals requires a robust and inclusive financial sector, including a safe, reliable, and efficient payment system.

The Rwandan national payments industry, including private sector players, government agencies, and regulators (as represented by the National Payments Council), plays an instrumental role in advancing these objectives through the broadening and deepening of Rwanda's financial system. Due to the commitment of the payments industry, Rwanda's financial inclusion and payments landscape has already advanced considerably over the past decade. As of 2016, 68% of the country's adult population has access to formal financial services.[2] Moreover, between 2010 and 2016, the number and value of mobile money transactions grew at a compound annual growth rate (CAGR) of 151% and 123%, respectively.[3]
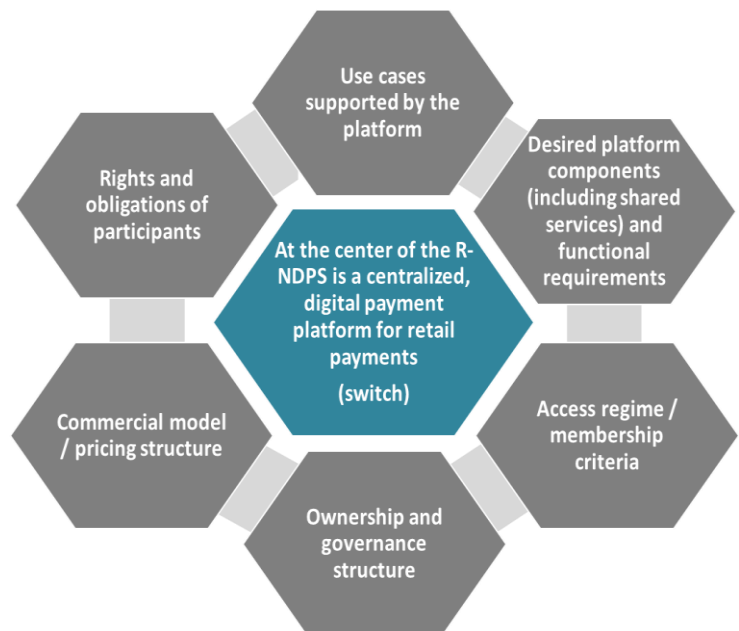
To further contribute to these objectives, the payments industry, with support of the BNR, is proactively promoting interoperability of retail payments. Interoperability would enhance the efficiency of retail payments, improve the customer experience, and create opportunities to increase transaction volumes. In this context, the BNR and Access to Finance Rwanda (AFR) have commissioned the development of a business model, case, and plan for an interoperable retail payment system.

OVERVIEW OF THE RWANDA NATIONAL DIGITAL PAYMENT SYSTEM (R-NDPS)

Developing an interoperable retail payment system requires the set-up of an interoperable scheme and switch. The distinction between a scheme and switch is as follows:

- The scheme defines the overarching standards for interoperability, which include (but are not limited to), the business rules, technical standards, revenue splits between participants, common branding, and rules around disputes and customer protection. The scheme is therefore more than just the IT platform / technology itself, as it defines the rules and standards that determine how the payment system is governed, managed, and operated.
- The switch refers more narrowly to the technology that is at the heart of the payment system. The switch implements the interoperability standards set by the scheme, facilitates

R-NDPS Schematic: *The R-NDPS comprises not only the technology / switch, but also the scheme rules, processes, and standards for implementation of the switch.*

Use cases supported by the platform

Desired platform components (including shared services) and functional requirements

Rights and obligations of participants

At the center of the R-NDPS is a centralized, digital payment platform for retail payments (switch)

Access regime / membership criteria

Commercial model / pricing structure

Ownership and governance structure

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[1] http://www.minecofin.gov.rw/fileadmin/user_upload/Hon_Gatete_Umushyikirano_Presentation_2016.pdf
[2] http://www.afr.rw/IMG/pdf/finscope_digitalfinancial_services.pdf
[3] National Bank of Rwanda Payment System Statistics

the transactions, calculates revenue splits, monitors transactions, and ensures compliance and implementation of dispute management rules.

In this document, the interoperable retail payment system is referred to as the Rwanda National Digital Payment System (R-NDPS). The R-NDPS refers to the overall scheme, which comprises not only the technology / switch, but also the broader set of rules, processes, and standards for the implementation of the switch. The key elements of the R-NDPS are illustrated in the R-NDPS schematic above.
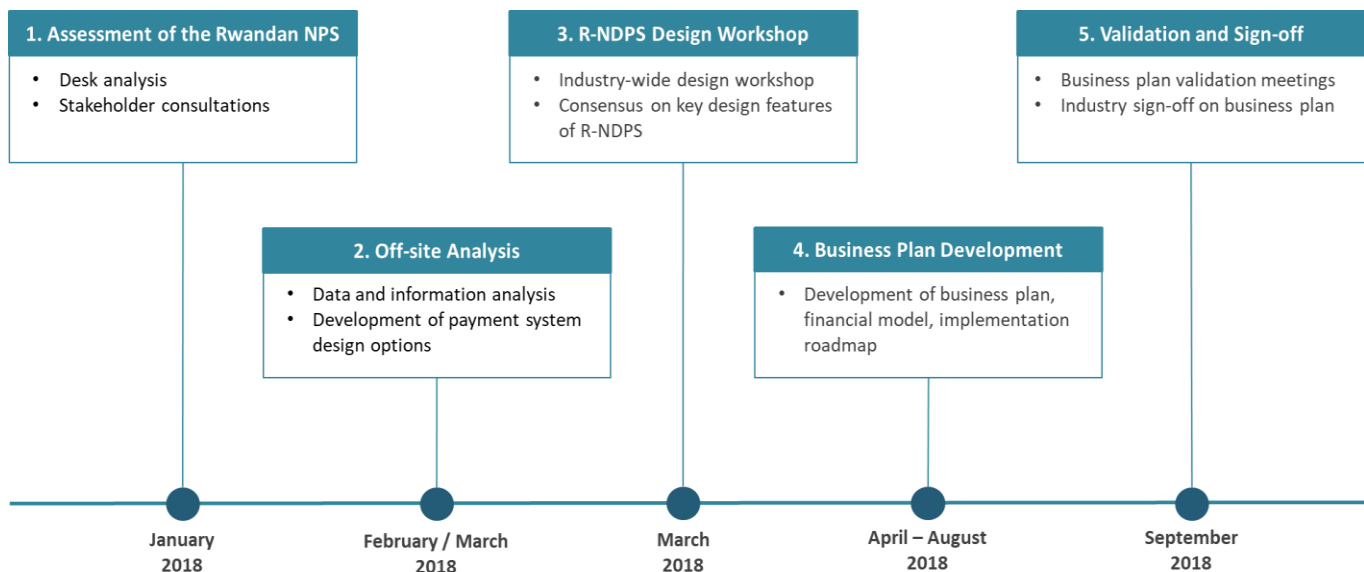
PURPOSE OF THIS DOCUMENT

The purpose of this document is to provide a business plan that details the main parameters of the R-NDPS. The contents of this document reflect the Rwandan payments industry's consensus on the key features of the R-NDPS, and serve as a guide to establishing and implementing the R-NDPS. The intended audience of the business plan is the Rwandan payments industry as a whole, including private sector actors, the BNR, and the entity (or entities) that will own and operate the R-NDPS.

The business plan has three main components:
- Design of the R-NDPS, which includes the use cases to be supported by the system, platform components and specifications, functional requirements, access regime, ownership and governance structure, and commercial model
- Financial plan, based on a financial model framework developed for the R-NDPS (see Excel)
- Implementation roadmap for Years 1 and 2 for both an existing and new entity, which lists the key activities to establish and implement the R-NDPS

PROCESS FOR DESIGNING THE R-NDPS

The design of the R-NDPS is based on inputs from stakeholders across the Rwandan payments industry, which were gathered between January and March 2018. The process for the development of this business plan is illustrated in the timeline below.

1. Assessment of the Rwandan NPS		3. R-NDPS Design Workshop		5. Validation and Sign-off
• Desk analysis • Stakeholder consultations		• Industry-wide design workshop • Consensus on key design features of R-NDPS		• Business plan validation meetings • Industry sign-off on business plan

	2. Off-site Analysis		4. Business Plan Development	
	• Data and information analysis • Development of payment system design options		• Development of business plan, financial model, implementation roadmap	

January 2018 — February / March 2018 — March 2018 — April – August 2018 — September 2018

1. VISION AND MISSION OF THE R-NDPS

VISION

The vision of the R-NDPS is the realization of a **cashless and inclusive economy** in Rwanda, which is supported by a **safe, robust, and efficient payment system**. With this vision, the R-NDPS supports the objectives of the Government of Rwanda's *Vision 2050* and the BNR's *National Payment System Framework and Strategy: Vision 2024*.

MISSION

To achieve this vision, the mission of the R-NDPS is to **accelerate the digitization of retail payments** across a range of digital channels and instruments **in a cost-effective and efficient manner**. With a centralized, digital retail payment platform that is accessible to a wide-range of payment system actors (both existing and new), the R-NDPS will enable end-to-end interoperability of bulk and low-value payments in Rwanda. Interoperability directly contributes to the objectives of a cashless and inclusive economy by:

- **Facilitating the sharing of payment infrastructure**: This, in turn, reduces the costs to providers and allows them to compete based on products and services, rather than on capital-intensive infrastructure; reduces the costs to end-users, as touch points become more accessible; and lowers the barriers for providers to participate in the payment system, thereby fostering competition and innovation in the market.
- **Creating a larger addressable market for digital payments:** Interoperability increases the utility of digital payment solutions for end-users, creating network effects that bring an increasing number of consumers into the system.
- **Increasing digital liquidity**: As interoperability improves the utility of digital payments, increases the number of end-users, and promotes greater usage of digital payments across various use cases, money will increasingly be kept in the system rather than withdrawn and spent in cash.

2. MARKET ANALYSIS

2.1. GAP ANALYSIS OF THE RWANDAN NPS / INTEROPERABILITY

The image below provides a mapping of the key actors in the national payment system, followed by the main findings from the interoperability assessment in Rwanda.
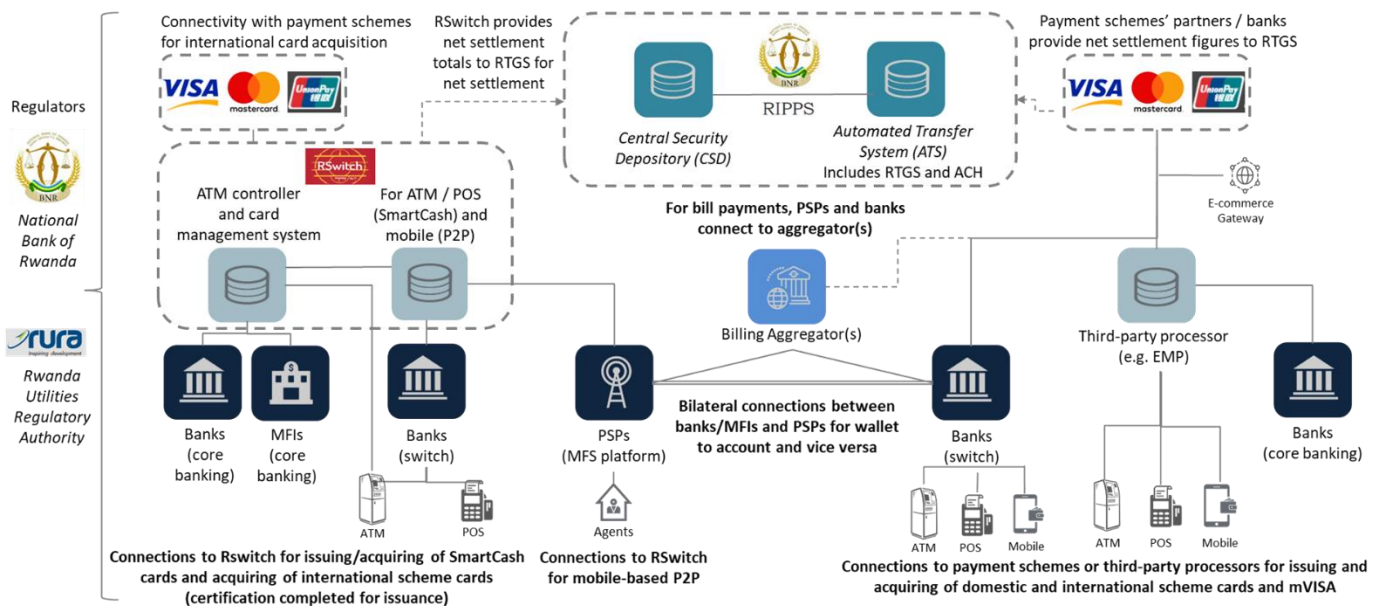
Interoperability of card-based transactions

Interoperability of card-based transactions exists in a limited capacity in Rwanda. There are two ways in which this is achieved:

1. Connections to payment schemes or third-party processors for issuing and acquiring of domestic and international scheme cards and mVisa
2. Connections to RSwitch for issuing/acquiring of SmartCash cards and acquiring of international scheme cards

In the first model, as illustrated in the first image to the right:

a. RSwitch is certified with Visa, MasterCard, and UPI, which enables international card acquisition for members (banks and MFIs) using RSwitch's ATMs and POS switching and driving services
b. RSwitch also provides card management services (SmartCash, a local scheme) which enables interoperability of ATM and POS networks for banks issuing/acquiring SmartCash.

However, because not all banks and MFIs are connected to RSwitch, ATM, POS, and SmartCash card interoperability through this arrangement is only partial.
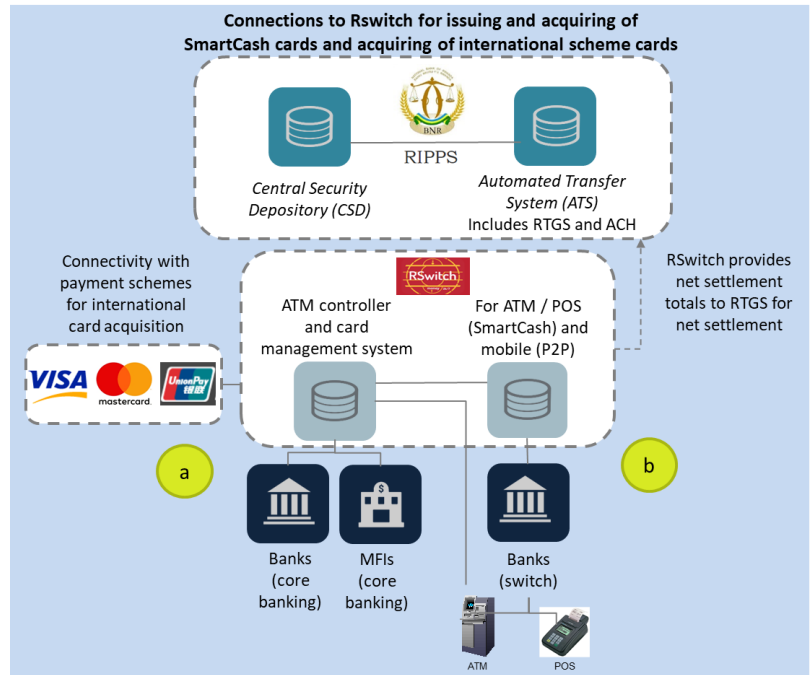
In the second model, as illustrated in the second image to the right:

a. Banks have a direct relationship with payment schemes for issuing and/or acquiring of domestic and international scheme cards and mVisa; or
b. Banks access payment schemes for issuing and/or acquiring of domestic and international scheme cards by connecting to a third-party processor, such as EMP

These arrangements provide interoperability across ATM and POS channels between banks issuing and acquiring Visa, MasterCard, and UPI cards. mVisa also enables interoperability across mobile channels (riding on the VisaNet card rails) between mVisa issuers and acquirers.

Connections to Rswitch for issuing and acquiring of SmartCash cards and acquiring of international scheme cards

Connections to payment schemes or third-party processors for issuing and acquiring of domestic and international scheme cards and mVISA

However, because not all banks are members of payment schemes (either directly or via a third-party processor), interoperability through these arrangements is also only partial.
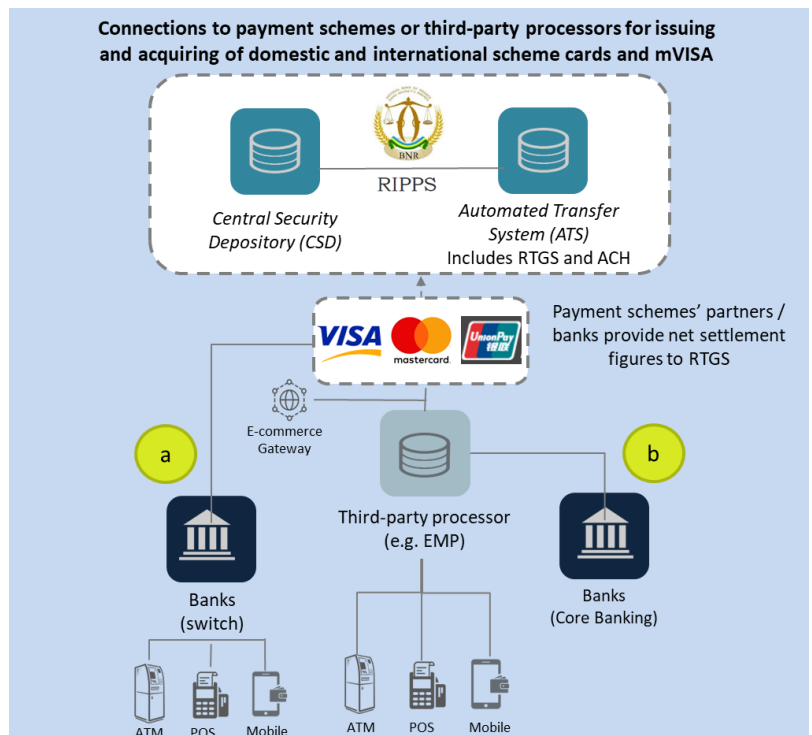
Interoperability of mobile-based transactions

Interoperability of mobile-based transactions also exists in a limited capacity in Rwanda. There are two ways in which this is achieved:

a. Banks / MFIs and PSPs connect bilaterally for push and / or pull services between wallets and accounts. Settlement takes place between the banks / settlement banks of both entities.

To date, mobile-based interoperability for P2P transfers has been achieved primarily bilaterally, as several agreements were negotiated before RSwitch had the capability for mobile interoperability. Interoperability through bilateral arrangements is inherently limited, since it only exists between the two parties.
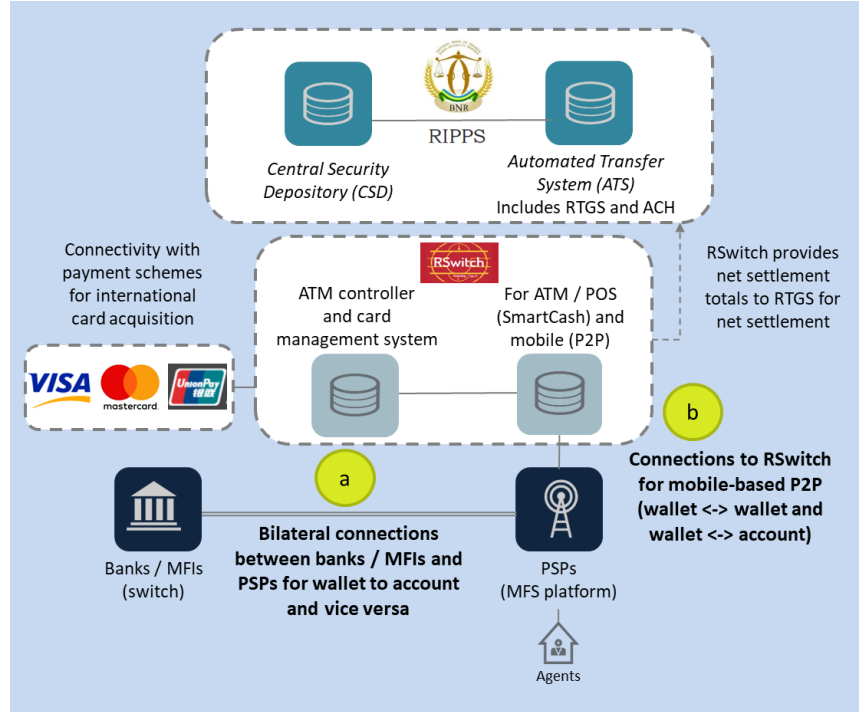
b. PSPs are connected to RSwitch, which enables P2P transfers between mobile wallets of two different providers and between wallets and bank / MFI accounts. The functionality for wallet to account / account to wallet transfers is new, and is currently being piloted with one bank and one PSP.

Because not all banks / MFIs and only two PSPs are connected to RSwitch, interoperability through this arrangement is only partial. Moreover, the use cases are currently limited to P2P scenarios (bank / MFI account to mobile wallet and vice versa).

The mapping of Rwanda's national payment system and the existing levels of interoperability demonstrate the following:

Interoperability exists to a certain degree
- Interoperability across ATM, POS, and mobile channels is not a new concept in Rwanda and has been partially achieved through different arrangements, including connections to RSwitch, connections to international schemes, and bilateral connections
- In the past, the BNR has also sought to achieve interoperability through various means, including establishment of RSwitch as the national retail payment switch and mandating interoperability through BNR policies and use cases

However, current arrangements are limited and not scalable
- For various reasons, including ownership and capability of RSwitch under its previous management structure, the nascent stage of mobile money in previous years, and competition dynamics in the bank and telco sectors, the way in which interoperability has been achieved is not scalable
- Specifically, the current arrangements are limited – both in terms of the number and types of participants involved, as well as the use cases for which interoperability is enabled

Existing arrangements are also inefficient
- Additionally, interoperability may exist, but through inefficient means
- The current state involves multiple bilateral connections and a mix of different types of arrangements, which lead to redundancies and increased costs and points of failure

2.2. MARKET OPPORTUNITY FOR THE R-NDPS

In light of this gap analysis, establishment of the R-NDPS presents immense potential to support the Rwandan payments industry in building a more inclusive and cashless economy. Interoperability leads to the following benefits for stakeholders in the payment system:

End-users	Financial Services Providers (Banks / MFIs / PSPs / Fintechs)	Government of Rwanda
• Improved customer convenience • Lower transaction costs • Increased value to using digital payments (network effects) • Improved range of products / services that meet customer needs	• Improved efficiencies in deploying and utilizing DFS touch points, lowering operating costs • Enhanced value of DFS to customers leads to increased volume / value of transactions • Increased opportunities to reach new markets	• Contribution to national strategies / goals to shift to a cashless economy and expand financial inclusion • Enhanced efficiency and effectiveness of the national payment system • Increased cost and time savings in administering G2P programs • Access to regional payment systems

Addressable Market

The potential market for the R-NDPS includes not only existing users of DFS, who would benefit from an increased range of use cases and improved convenience of digital payments, but also non-users of DFS – many of whom are currently completely excluded from the formal financial system.

The image below illustrates the addressable market for the R-NDPS and its participants that can be targeted to achieve greater financial inclusion and a cashless economy. These figures also present a sizable market opportunity for the R-NDPS to operate as a sustainable business entity.[4]

Breakdown of the total addressable market for the R-NDPS

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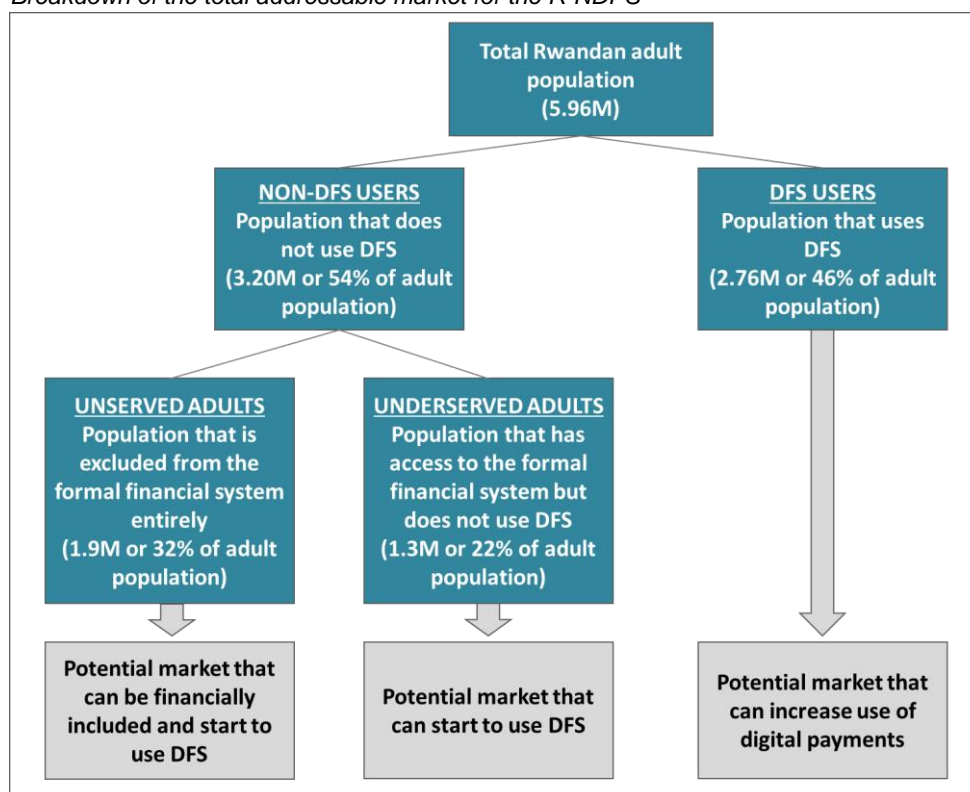
[4] *Digital Financial Services Survey in Rwanda*, Finscope Insights, Impact Assessment Note on FinScope 2016, Rwanda

The table below provides additional details on the figures for the total addressable market.[5]

Market segment	Description	Total number / percent of population	Relevance to the R-NDPS
Total Rwandan adult population	Total population aged 16 years and older	5,960,000 / 100%	
Population that does not use DFS	Adults who do not use services such as internet banking, mobile banking, mobile money, and cards for payments	3,200,000 / 54%	Total population that can be reached to start using DFS
	Females who do not use DFS	59%	
	Males who do not use DFS	46%	
Unserved adult population (excluded from the formal financial system)	Adult population that does not have an account from a formal financial institution (bank, MFI, SACCO, PSP, or insurance company)	1,907,200 / 32%	Potential market of those completely excluded by the formal financial system, who could be financially included and start to use DFS
	Females excluded from the formal financial system	37%	
	Males excluded from the formal financial system	26%	
Underserved adult population	Adults with access to some form of formal financial services, but who does not use DFS	1,292,800 / 22%	Potential market for those who could start to use DFS

2.3. ANALYSIS OF THE LEGAL AND REGULATORY ENVIRONMENT

a. Overview of the regulatory bodies for digital financial services (DFS) ecosystems

In a digital financial services (DFS) ecosystem where basic person-to-person (P2P) transfers are enabled, the regulatory bodies responsible for oversight typically include the central bank, telecommunications regulator, and anti-money laundering (AML), competition, and consumer protection regulators (if they exist separately from the central bank and telecommunications regulator). Indirectly and by default, an identity authority, tax authorities, and authorities overseeing commercial entities will also have some degree of oversight or will provide essential enabling frameworks.

However, as services move beyond basic P2P transfers and become more sophisticated, varied, and integrated into the national fabric, other regulators – such as those overseeing credit or insurance provision – may also become involved and need to exercise their remit over participants, technology components, and services. Bilateral or multilateral Memoranda of Understanding (MOU) between these various regulators are necessary to coordinate oversight and to prevent regulatory arbitrage.

The following sections provide an analysis of the legal and regulatory environment, including an overview of the regulatory bodies overseeing the Rwandan national payment system and recommendations to support the implementation of the R-NDPS. The analysis is based on the laws and regulations in effect in

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[5] *Digital Financial Services Survey in Rwanda*, Finscope Insights, Impact Assessment Note on FinScope 2016, Rwanda

Rwanda as of 11 March 2018, including the 2018 regulations governing payment services providers, payment initiation and aggregation services, and money remittance services.[6]

As the new PSP regulation was passed in March 2018, the focus of this analysis and recommendations is on the *implementation* of the new regulation and the resultant interaction with and impact on other laws and regulations, as well as on the regulatory domains of other regulators. This section also focuses on any gaps in coordination frameworks between regulators that may impact proper operation of the R-NDPS, as well as any evolving areas of focus – technology or otherwise – that the BNR (and other potentially impacted regulators) should be aware of as implementation of the R-NDPS progresses and as services and participants increase. These include matters of consumer protection, cyber-security, data protection and privacy, frameworks to facilitate rapid implementation of new innovations, new technologies, mobile number portability, and use of new forms of identity, as discussed below.

b. Overview of the regulatory authorities overseeing the Rwandan national payment system

In Rwanda, the main regulatory bodies that oversee the DFS ecosystem include:

National Bank of Rwanda	**Overall role** The BNR has statutory responsibility to promote a sound financial system through traditional prudential supervision of financial institutions, including banks, microfinance institutions (MFIs), and savings and credit cooperatives (SACCOs), as well as to oversee payment systems. **Payment systems** BNR's mandate over payment systems derives from the BNR Law 55/2007 and the National Payment Systems (NPS) Law 03/2010. The former establishes the BNR and its roles, powers and remit. The latter provides for the modalities of how that remit will be executed in relation to payment systems and services. Article 6 of the BNR Law empowers the central bank to *inter alia* supervise and regulate payment and banking systems, providing the BNR's remit over PSPs (including MNOs acting as PSPs), banks, SACCOS, MFIs, card providers, and technical service providers. BNR sets general criteria for access to the national payment and settlement system, modulating this access according to whether a participant has sufficient settlement collateral and poses a systemic risk to the payment system as a whole. In 2018, the BNR passed a new payment service provider regulation that regulates the activities of payment initiation service providers and aggregators, thereby enabling a wider range of market participants to access the national payment system. **Innovation and catalytic role** In addition to overseeing the payments systems in Rwanda, the BNR is also mandated to act as a catalyst to develop new payment services and to establish, own, operate, and participate in the ownership or operation of settlement, clearing, and securities settlement systems. **R-NDPS-relevant Remit** The remit of the BNR with respect to the R-NDPS includes regulation and oversight over activities pertaining to: banking, payments, capital markets, interoperability, payment security.
Rwanda Utilities	**Overall role** Rwanda Utilities Regulatory Authority (RURA) was created by Law 39/2001 to regulate certain public utilities, including the telecommunications network and / or telecommunications services and electricity.

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[6] The analysis is based on the draft versions of these regulations, which were the most recent versions available at the time of the drafting of this business plan.

Regulatory Authority	With respect to telecommunications and ICT generally, its role is outlined in the ICT Law 24/2016 which *inter alia* provides for its remit in relation to its licensees; cyber-security; data privacy; mobile number portability; market dominance and implications thereof, consumer protection; electronic signatures; and electronic contracts and records. **R-NDPS-relevant remit** The remit of RURA with respect to the R-NDPS includes regulation and oversight over activities pertaining to: ICT, telecommunications, information security, access channels, competition, telecommunications infrastructure security, data privacy. In particular, RURA would have exclusive or co-remit with BNR over issues relating to cyber-security, and cyber-resilience; monitoring of DFS-related transaction data for AML and tax revenue purposes; and data-protection issues related to extraction of customer financial data derived from mobile usage ('CDR') records.
National Identification Agency	**Overall role** The National Identification Agency (NIDA) is responsible for population registration, civil registration, and issuance of the national identity card. **R-NDPS-relevant Remit** The remit of NIDA with respect to the R-NDPS pertains to the issuance of IDs for payment authentication.
Rwanda Inspectorate, Competition and Consumer Protection Authority	**Overall role** The Rwanda Inspectorate, Competition and Consumer Protection Authority (RICA) is reportedly in the process of being established. Based primarily on Law 61/2013, its purported remit is to regulate fair competition and consumer protection in Rwanda. This includes investigations of anti-competitive trade practices, merger control, and consumer complaints, as well as checks to ensure conformity with standards of products and services under its competence. It is not yet clear whether RICA has financial services in its remit, and if there will be, whether this a competency shared with other regulators. The 2017 law establishing RICA contemplates the formation of a consumer protection ombudsman to undertake investigations and resolution of consumer complaints, including financial consumer protection issues. **R-NDPS-relevant remit** The remit of RICA with respect to the R-NDPS includes regulation and oversight over activities pertaining to: consumer protection, ombudsman, and fair competition.

c. *Recommendations to enhance the legal and regulatory environment for DFS*

Based on a review of the laws and regulations governing DFS in Rwanda[7], the following table includes recommendations for strengthening the enabling environment. Implementation of these recommendations would promote interoperability / digitization of payments and facilitate successful implement the R-NDPS.

Area	Recommendations
Payment systems	• To reduce their costs of access and absolute need for settlement banks, BNR should facilitate the ability of qualified MFIs, SACCOs, and e-money issuers to participate in the national payment and settlement system. • To reduce compliance burdens – particularly in light of the reporting requirements in Article 40 of the regulation on PSPs – and to improve efficiencies in analysis of reporting of supervised entities, the BNR and RURA should undertake joint

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[7] Specifically, the laws and regulations that were in effect or in draft form as of 11 March 2018.

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	initiatives to develop APIs for regulatory technology ("regtech")-based reporting. This could include access to and analysis of 'big data' contemplated the National Data Revolution Policy built on the broader ICT strategic expectation of "open by default, security by design, privacy protection, innovation and public-private partnership" as enshrined in the Smart Rwanda 2020 Master plan.
Data privacy & protection	• The MOU between the BNR and RURA should be updated to include provisions around data privacy and cyber-security, particularly the roles and responsibilities of those who transmit data ("in transit") and those who hold data ("at rest") as well as use of MNO Call Data Records for creating profiles of prepaid customers for alternative credit-scoring purposes. This would also include procedures to be followed where there are data privacy breaches as a result of a security intrusion affecting customers utilizing the R-NDPS and its components. A cyber-resilience framework to harden any telecommunications and payments infrastructure should also be contemplated in an updated MOU.
Consumer protection	• While a consumer law is being contemplated, BNR, RURA, and RICA should sign a multilateral MOU to include provisions around consumer protection, particularly on processes to be followed when consumers lodge complaints. In particular, this would provide for procedures to be followed when the contemplated consumer ombudsman refers issues to the BNR and RURA that require specialized intervention and information for resolution of single and/or class complaints that may be beyond the immediate and general capabilities of the contemplated ombudsman.
	• Regulation 09/2017 on "Determining Key Facts Statements and Disclosure for Accounts" should be updated to specify that participants should provide retail customers with specific details of any rights and obligations, as well as any dispute procedures that a consumer may potentially use.
	• Any dispute resolution procedures contemplated in the internal processes of the R-NDPS should conform to existing or contemplated provisions of consumer protection laws and regulations (in particular those from RICA, RURA, and BNR).
Cybersecurity and cyber-resilience	• The current MOU between BNR and RURA was last updated in 2013. Issues of cyber-security and cyber-resilience around payments that have evolved since this time should be included in a new MOU, specifically indicating who should have oversight over insecure USSD channels; who should be notified of breaches in USSD, when, and responses thereto; who is ultimately responsible for any loss of consumer funds because of such breaches; and who should handle any consumer complaints where USSD-based breaches result in loss of consumer funds. The MOU should be updated to include provisions around infrastructure security, particularly roles and responsibilities of those who transmit data ('in transit') and those who hold data ('at rest').
	• The BNR should issue directives on ISO 12812 for MFS Standards and ISO/IEC 27000-series on Information Security Management Systems. These directives should fasten on all participants in the R-NDPS. The directives should also take into account Article 125 of the ICT Law of 2016 relating to obligations of the licensee in providing network security, where a licensee is also a financial / payment service provider; or, where a financial / payment service provider uses as it would for DFS, a telecommunications licensee's infrastructure.
	• New reporting requirements for infrastructure breaches or loss / leak of customer should be developed, possibly as part of a regtech solution.
	• Minimum standards for cybersecurity should also fasten on applications developed by app-only ("Over-the-Top") payment service providers, if so categorized.
	• Minimum security standards for standard POS and similar fob-style devices should be contemplated.

Mobile number portability	• The MOU between BNR and RURA should contemplate situations of potential transfer of customer value to new accounts when mobile number portability (MNP) is introduced in Rwanda. The MOU provisions should guide each regulator in implementation of any law or regulation that mandates MNP in so far as MNP has any effect on reliable consumer access to their funds. In particular, procedures should be contemplated that ensure that there is no need for a customer to cash-out from his/her fiat-based electronic wallet when undertaking porting of their mobile number from one MNO to another.

3. DESIGN OF THE R-NDPS

3.1. MAPPING OF THE R-NDPS ARCHITECTURE

The diagram below presents a mapping of the R-NDPS architecture, illustrating the R-NDPS platform components, participants and their relationships to each other / connections to the platform, and linkages to other systems in the Rwandan National Payment System.
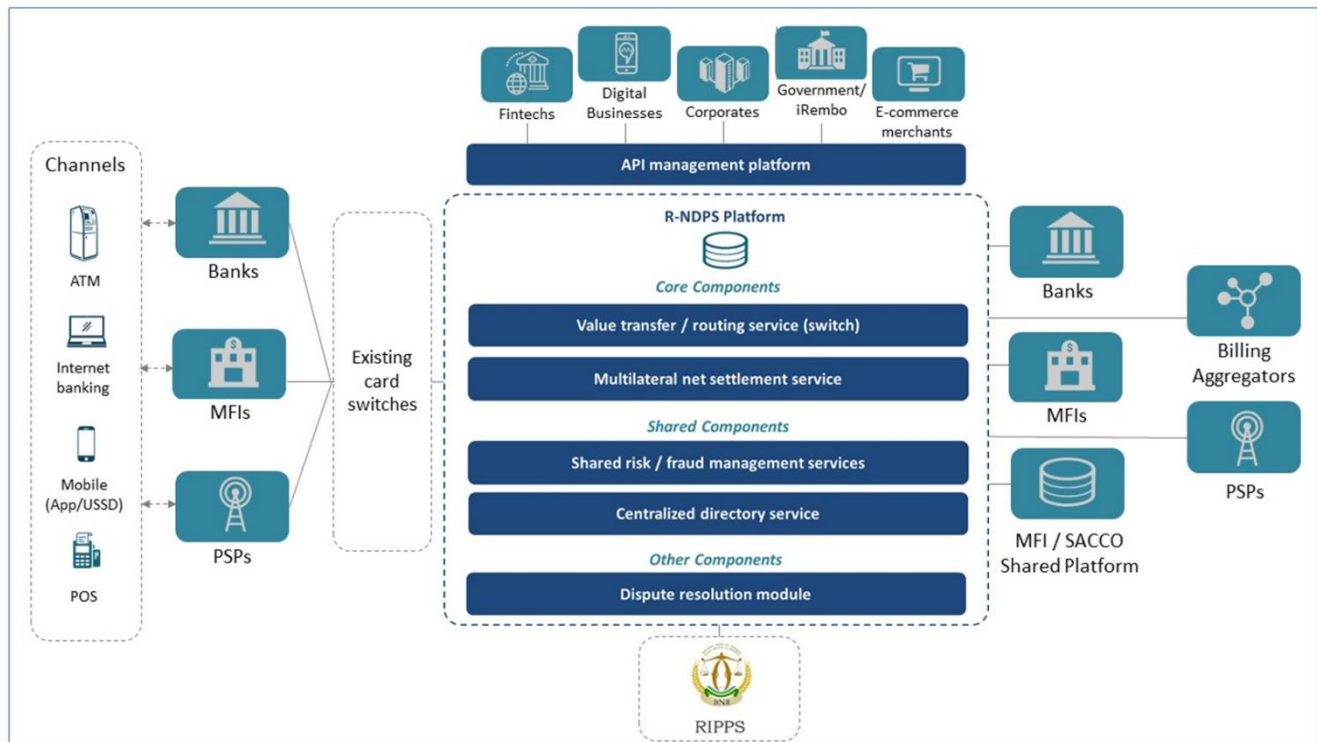
3.2. DESIGN PRINCIPLES

The following principles have guided the design of the R-NDPS:

Principle	Description
Open-loop system, enabling end-to-end interoperability	Interoperability of card- and mobile-based transactions exists in Rwanda, but is achieved through several different arrangements (e.g. connections to RSwitch, connections to payment schemes, and bilateral relationships), to which not all DFS providers are party. As a result, interoperability is currently only partial. To achieve full interoperability, the R-NDPS is designed to be an open-loop system, which will be accessible to any licensed financial services provider in Rwanda (both banks and non-banks). The R-NDPS will also enable end-to-end interoperability across a range of digital channels (cards, mobile) and use cases.
Centralized platform, with single set of rules and standards	The design of the R-NDPS is based on the desire of the Rwandan payment industry to establish a centralized, digital payment platform to which all providers connect, and which is governed by a single set of rules and standards. This model is deemed to be the most efficient means of achieving interoperability in the country. As a centralized platform, the R-NDPS would enable transfers between various accounts (e.g. bank / MFI / mobile wallet accounts) of different customers across financial services providers (i.e. "any-to-any" transfers). Although enabling any-to-any transfers is feasible through bilateral arrangements, the technical and operational costs would be higher compared to a single integration with the R-NDPS. In this context, the R-NDPS enables interoperability in an efficient manner.
Instant (real-time) payments	The R-NDPS will support instant payments, with funds availability in real-time. Instant payments respond to increasing end-user demands for fast, convenient payment services.
Fair and reasonable pricing for participants and ultimately, end-users	One of the highest priorities cited by the Rwandan payments industry is an interoperable system that is affordable – offering services with fair and reasonable pricing for the participants, which ultimately benefits end-users. The design of the R-NDPS, specifically in the structure of the governance and commercial models, therefore reflects the need to ensure that pricing remains reasonable and that the system serves the interest of all participants and Rwandan citizens. Guiding principles for the pricing of transactions processed by the R-NDPS include: • The R-NDPS should have consistent pricing across all participants for individual use cases • Pricing by the R-NDPS should be a flat fee instead of percentage-based for each use case • Participants should not charge their customers more for off-net transactions than on-net transactions
Secure and reliable system / services	As with any other component of Rwanda's national payment system, the R-NDPS must adhere to standards that protect the safety and soundness

of the financial system. Moreover, the system must be reliable with high availability, particularly since it is expected to offer online, near-real-time payments. The platform specifications for the R-NDPS therefore specify the minimum standards for security, scalability, performance, and availability, with which the technology powering the R-NDPS will need to comply.

3.3. USE CASES SUPPORTED BY THE PLATFORM

The R-NDPS will enable several use cases, which will be implemented in a phased approach.[8] The image below provides a snapshot of the use cases that the Rwandan payments industry has prioritized to be supported immediately by the R-NDPS (estimated to begin in Year 2 following the establishment of the R-NDPS), and use cases that will be phased-in on an on-going basis.

Although industry stakeholders have indicated that all use cases below should be supported by the R-NDPS, there is a need to prioritize the services that will be enabled immediately versus in later implementation phases to ensure smooth implementation and considering the limited availability of resources. The immediate use cases reflect those which the industry has indicated would be important to successfully promote usage of the R-NDPS from the outset.

Immediate					To be phased in		
P2P (sending money)	P2P (request to pay)	Collections (P2G)	P2B (merchant) payments	Bulk disbursements (B2P)	B2B payments	Cash-in at off-us agent	Cash-out at off-us agent

Prioritization of the use cases was based on two main considerations. Priority use cases should:

- Bring funds into the system and keep money circulating in the system
- Reflect transactions with the potential for high volumes

For example, bulk disbursements, which include salary payments from government agencies and businesses, facilitate the loading of funds into a large number of wallets / accounts. Consumers may then use those funds for P2P transfers, tax and health insurance premium payments, and merchant payments, without the need to cash-out. The specifications of the use cases such as transaction limits, channel, instrument, and client type will be finalized during the implementation phase of the project.

Descriptions of each use case, as well as the rationale for prioritization are included in the table below. Annex 1 includes the transaction flows for each of these use cases.

Use Case	Description	Rationale
Immediate use cases		

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[8] As a switch, the R-NDPS platform will enable the transactions for different use cases to pass through the system. However, R-NDPS is not a service provider. Therefore, market actors would still need to provide the services based on the prioritized use cases.

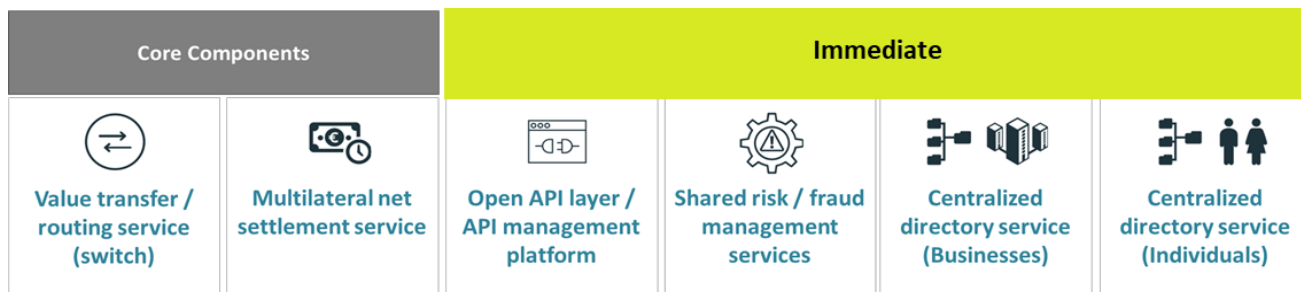|		
Person-to-person (P2P)	P2P transfers include transfers between: • Mobile wallet to mobile wallet • Mobile wallet to bank account (both commercial bank and MFI) • Bank account to mobile wallet • Bank account to bank account Currently, "push-and-pull" services are available in Rwanda between mobile wallets and bank or MFI accounts, but these services are only between a customer's own wallet and own account. This use case refers to an "any-to-any" transfer between accounts and wallets of different customers across financial services providers.	• P2P interbank bank account-to-account real-time transfer does not exist in the market at the moment; existing interbank account-to-account transfer is not real-time and still has manual processing at the bank-end • P2P is a basic service, which customers expect to be fast and convenient • Central to the cashless agenda; keeps cash in the system • Diverts customers from bank branches and agent locations
Collections (P2G)	P2G payments refers to payments from citizens to the government, and includes payments of taxes and community-based health insurance premiums. The iRembo initiative has made significant progress in digitizing P2G payments, but payments and the payment gateway are limited to certain digital channels / providers. The R-NDPS would facilitate P2G payments from digital channels of all financial service providers.	• Efforts have been made to digitize P2G payments, but payments are not available through the full range of digital channels/providers
Merchant payments (P2B)	Merchant payments refer to payments from consumers to merchants for the purchase of goods and services.	• Presents high potential for transactions at small businesses / merchants • Keeps cash in the system • Transactions are settled instantly, which improves the value proposition for merchants • May potentially drive digitization of B2B supply chains
Bulk disbursements (B2P, G2P)	Bulk disbursements include payments from businesses to individuals (e.g. for salary payments) and from government to citizens (e.g. for pension payments and social welfare payments). Of the two payment streams, the Rwanda stakeholders prioritized B2P payments over G2P payments, as many G2P payment streams are already digitized.	• B2P payments offer a large opportunity to bring funds into the system and improve business efficiency
To be phased-in		
Business-to-business (B2B)	B2B payments refer to payments between businesses (such as payments to suppliers)	• B2B payments should be offered by the R-NDPS, but with lower priority since the

		value of B2B transactions is typically high and volume low
Cash-in at off-us agents	Cash-in at off-us agents refers to the cashing-in of funds into a mobile wallet at an agent outside of the network of the customer's provider	• Gets cash into the system • Promotes shared use of infrastructure • Relative to other "inflow" payment streams, however, (e.g. B2P), this is lower priority
Cash-out at off-us agents	Cash-out at off-us agents refers to the cashing-out of funds from a mobile wallet at an agent outside of the network of the customer's provider	• People need to be able to get cash out of the system, or they will not use it • Ultimately, however, the goal is to disincentivize cashing-out

3.4. PLATFORM COMPONENTS

In addition to the use cases, the Rwandan payments industry identified the platform components, or the set of services that the R-NDPS will provide to its participants. The R-NDPS components by order of priority and a mapping of the components are illustrated below.[9]

Core Components		Immediate			
Value transfer / routing service (switch)	Multilateral net settlement service	Open API layer / API management platform	Shared risk / fraud management services	Centralized directory service (Businesses)	Centralized directory service (Individuals)

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[9] Note: During the industry workshop, the dispute resolution module was added by industry stakeholders as a component that they would like to implement as part of the R-NDPS. However, it was not prioritized. Further consultations would be needed to determine stakeholder needs / preferences for phasing-in this component.
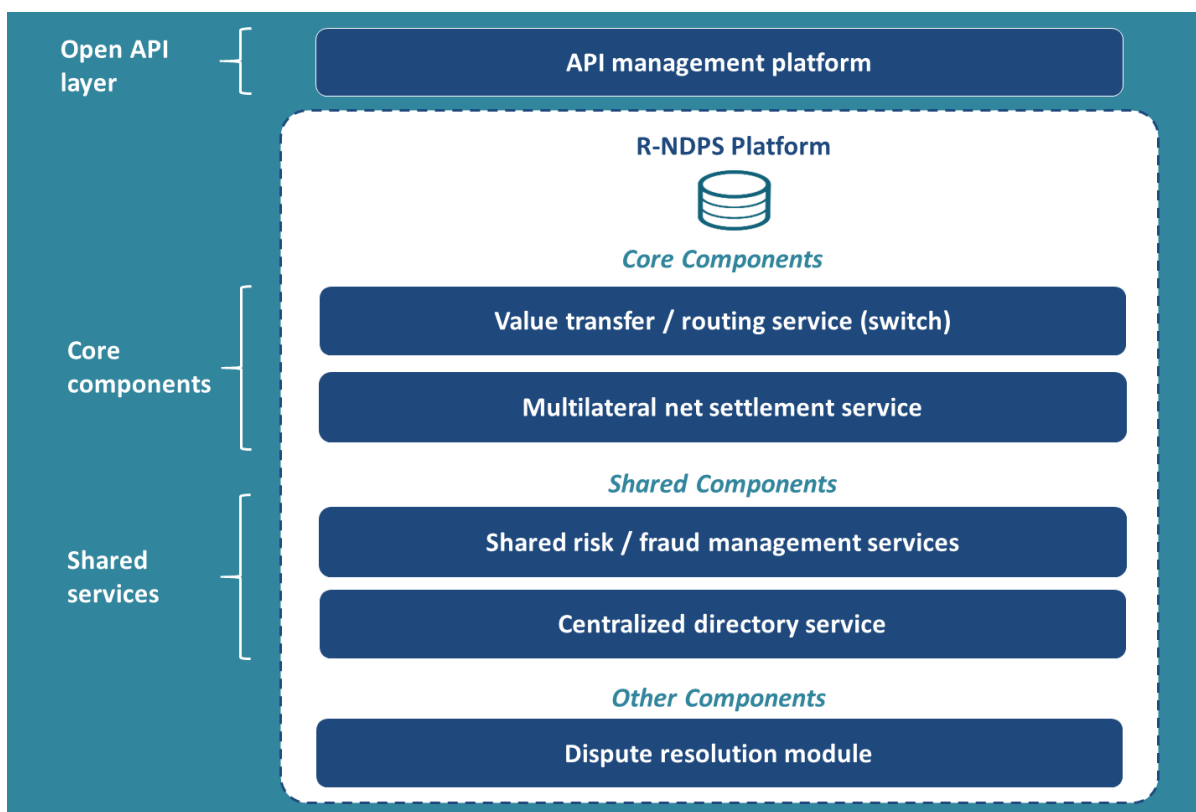
A description of each of these components is included in the following sections.

a. Value transfer / routing service (switch)

The value transfer / routing service, or the switch, is one of the core functions of the R-NDPS. Its main purpose is to perform clearing (i.e. receive payment messages and route messages to other participants). The switch applies a business logic depending on transaction details including but not limited to the participant, instrument, channel, transaction type, transaction amount.

For a typical push payment, the transaction process flow is as follows:

Initiation	• The payment request can be initiated either by the customer or in a P2B context, by the merchant as a "request to pay"
Authentication and authorization	• Authentication and authorization will be typically done by the customer's own bank • After authorization, the customer's bank will push the clearing message
Clearing	• Clearing will take place through the R-NDPS in real-time
Settlement	• Post clearing, the R-NDPS performs net-off calculations and the positions are settled in the RTGS / RIPPS

Value transfer / routing service (switch)	Prioritization	Importance to the R-NDPS
	Immediate implementation	• Core function

b. Multilateral net settlement service (MNSS)

The multilateral net settlement service (MNSS) is also one of the core functions of the R-NDPS. The MNSS determines the fee / interchange components to be distributed between the issuer and acquirer, calculates net settlement positions for all participants, and communicates net positions to RIPPS for settlement.

Multilateral net settlement service	Prioritization	Importance to the R-NDPS
	Immediate implementation	• Core function

c. Open API layer / API management platform

In addition to the core functions of the R-NDPS, an open API layer will be implemented immediately as one of the platform components in the R-NDPS. The open API layer enables non-traditional payment system participants (such as fintechs, digital businesses, aggregators, and e-commerce merchants) to interact with the platform in a secure manner and bring new services (namely, overlay services) to consumers on their own front-end channels.

By implementing an open API layer, the R-NDPS contrasts with traditional models of payment schemes, which allow only banks to integrate using pre-defined messaging formats. In the typical four-party model (e.g. that of Visa and MasterCard), the role of the switch is restricted to integrating with acquirer and issuer banks. If a new and innovative payment interface is to be introduced, all participating institutions must upgrade their systems to accommodate the new payment interface. The traditional model is therefore restrictive and limits the entry of new providers.

Implementing an open API layer on top of the R-NDPS through an API management platform provides an alternate paradigm to the traditional model. Specifically, the API management platform allows third parties to directly and securely interact with the payment platform. Non-traditional payment system participants may then access the R-NDPS to provide end-users with overlay services that enrich their experience of using digital payments (see text box below on overlay services).

In addition to implementing the API management platform, the R-NDPS will also enable the provision of overlay services by supporting integration of third-party overlay service providers (OSPs); defining functional and technical standards for OSPs; and supporting additional data in payment messages beyond basic payment messages. Potential OSPs include aggregators, fintechs, and digital businesses in Rwanda such as Pivot Access, mVend, and Yegomoto.

Overlay Services

An overlay service is a tailored payment or payment-related service that is provided by a third party, and which can be deployed on the R-NDPS to deliver added value to a specific group of subscribers and end-users. While the R-NDPS will facilitate the fast, 24x7 processing of payments, overlay services will enable end-users to take advantage of faster, more convenient payments across a range of scenarios. For example, an overlay service may enable end-users to:

Pay a restaurant bill and split the amount between friends

Allow third-party billing aggregators / payment initiation service providers to initiate payments

For businesses, enable integrated invoicing and payments reconciliation

Open APIs are increasingly supported by payment systems globally. Examples include:

Visa Developer

Visa has launched Visa Developer, a platform that makes Visa Payments Processing APIs available to independent software vendors, merchants, and member banks, providing access to Visa's products and services. Visa Developer's APIs include an authorization API to request approval of card or token-based transactions; a capture API to initiate the clearing and settlement of a previously approved authorization request; sale and refund APIs for the purchase and return of goods and services; and a verification API to validate cardholder account information.

How Visa Payments Processing API Work: https://developer.visa.com/capabilities/vpp/docs#how_does_it_work
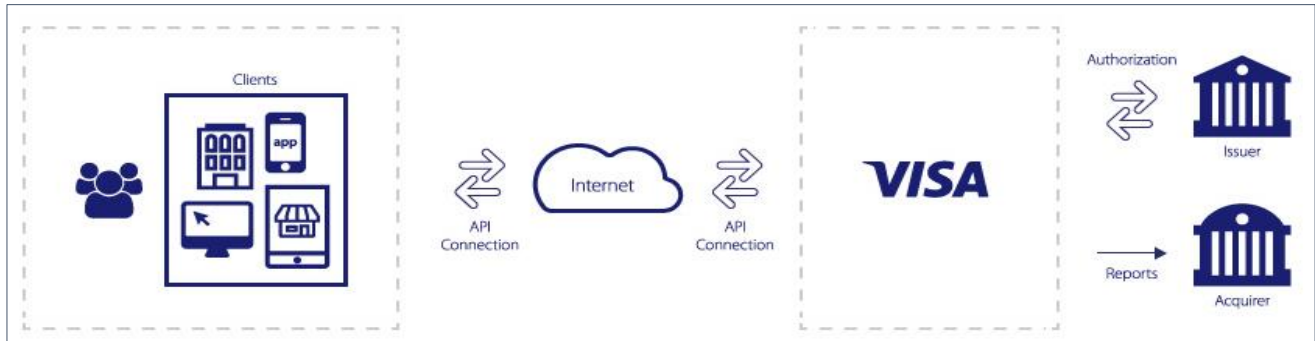
Unified Payments Interface (UPI)

In India, the National Payments Corporation of India (NPCI) launched the Unified Payments Interface (UPI). The UPI offers API specifications to facilitate digital payments and provides payment system providers with a single interface for all systems managed by the NPCI. Furthermore, to enable a secure mobile-first payment model, UPI created its own mobile software development toolkit (SDK),[10] which payment system providers embed in their applications to link to any financial service provider's account / wallet and initiate payments from within the app.

Schematic of the NPCI's Unified Payment Interface (UPI)

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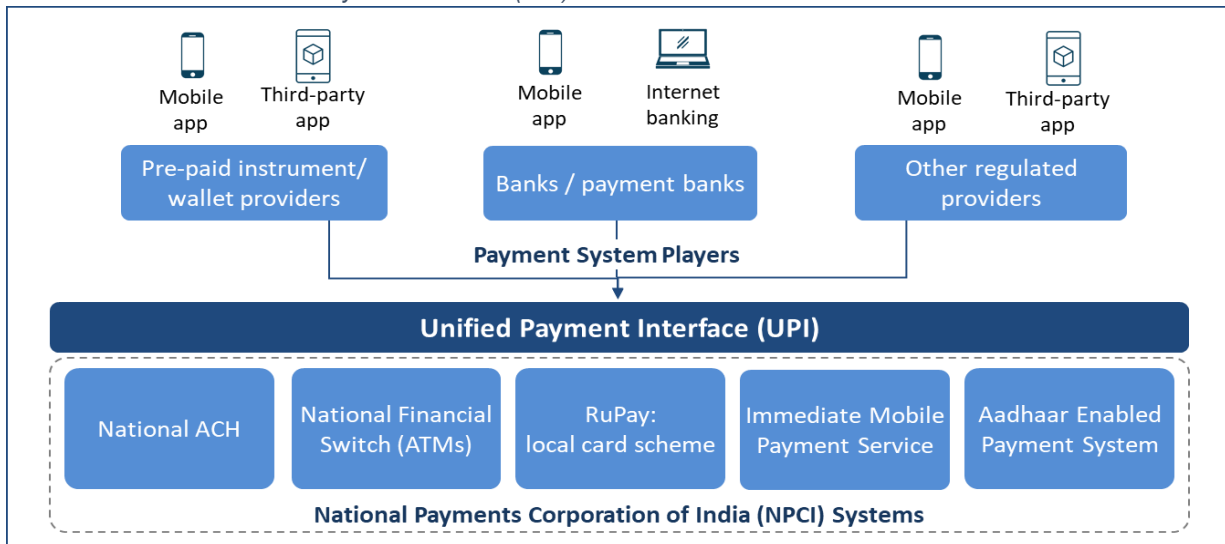
[10] SDK refers to a Software Development Toolkit. In the case of UPI, this refers to the set of libraries which are provided by UPI and which a payment service provider must embed in their application. The libraries ensure secure capture of access credentials allowing third party PSPs to enable linking of bank accounts or mobile wallets for purpose of transfers and payments.

Open API layer	Prioritization	Importance to the R-NDPS
	Immediate implementation	• Enables new players to enter the market • Improves efficiency of integration • Promotes competition and innovation

d. Shared risk / fraud management services

The shared risk / fraud management services component is a single platform interface for detecting and managing potential risks, including fraud and money-laundering. The component will be capable of detecting suspicious transactions and smurfing[11], conduct velocity checks, and identity and block users on sanction lists. As a shared service, the component enables participants to avail of efficient risk / fraud management services in a low-cost manner. The industry also agreed that there is a need for BNR and RURA to work together to review the process and develop safeguards related to SIM swaps and registration to eliminate financial fraud.

Industry stakeholders have determined that such a shared service is important to reduce the costs to participants for risk and fraud management and have identified the service as an immediate priority.

Shared risk / fraud management services	Prioritization	Importance to the R-NDPS
	Immediate implementation	• Reduces costs of risk management for participants

e. Centralized directory service – businesses and individuals

Finally, the centralized directory service is a shared service that provides a directory of aliases for payments addressing. An alias is commonly a mobile phone number or other format that is easy to remember.

With a central directory service, sending parties do not need the detailed account information of the recipient, such as bank codes and bank account numbers. Rather, payments can be addressed to an alias, which is mapped by the central directory to the corresponding financial institution / recipient account. A centralized directory service therefore simplifies transactions and enhances privacy by eliminating the need to share sensitive account information.

Industry stakeholders acknowledged the importance of such a service and have **prioritized a centralized directory service for businesses and individuals**. Such a service would facilitate merchant payments, which is one of the priority use cases of the R-NDPS.

Globally, payment systems have deployed different models for a centralized directory service.

PayID in Australia

PayID is the central directory of aliases in Australia's New Payments Platform (NPP). A PayID can be a phone number or email, which is linked to a specific bank account.

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[11] The act of breaking down a transaction into smaller transactions to avoid regulatory requirements or an investigation by the authorities.

To transfer funds, a sender only needs to know the recipient's PayID; other details, such as the recipient's bank name or account details, are not needed.

In the PayID model, the central directory maps the alias to a specific financial institution. From there, the financial institution maintains its own directory that maps the alias to an account number. In other words, PayID does not map aliases directly to a recipient's account but leaves this to the financial institution.
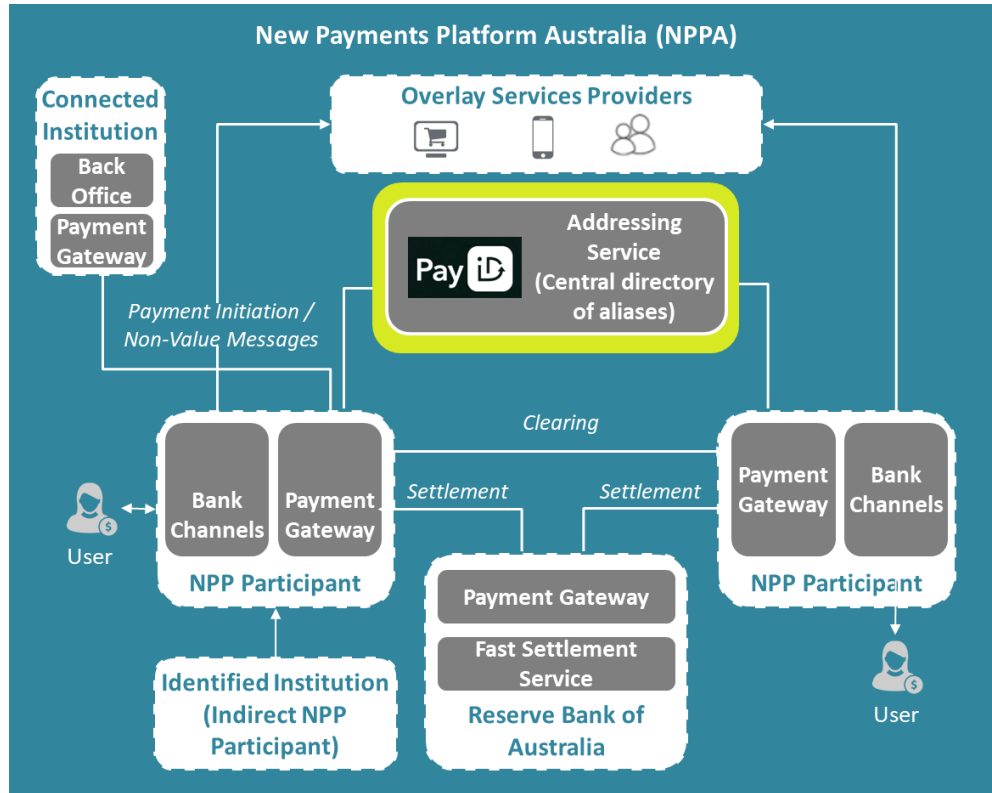
Jordan Mobile Payments System (JoMoPay)

The JoMoPay mobile payment switch in Jordan also includes a central directory service as a component of the national system.

The JoMoPay model provides a centralized directory of aliases (a mobile number), which are linked to national ID numbers and mapped to mobile wallet details. Like PayID, funds can be transferred if the sender knows the alias; the sender does not need to know receiver's bank / PSP name or wallet details.

However, the central directory of JoMoPay is different from the PayID model since it stores both aliases and account details. JoMoPay maps the alias to the account details at a central level (rather than mapping the alias to the mobile wallet provider, which then maps the alias to the account).
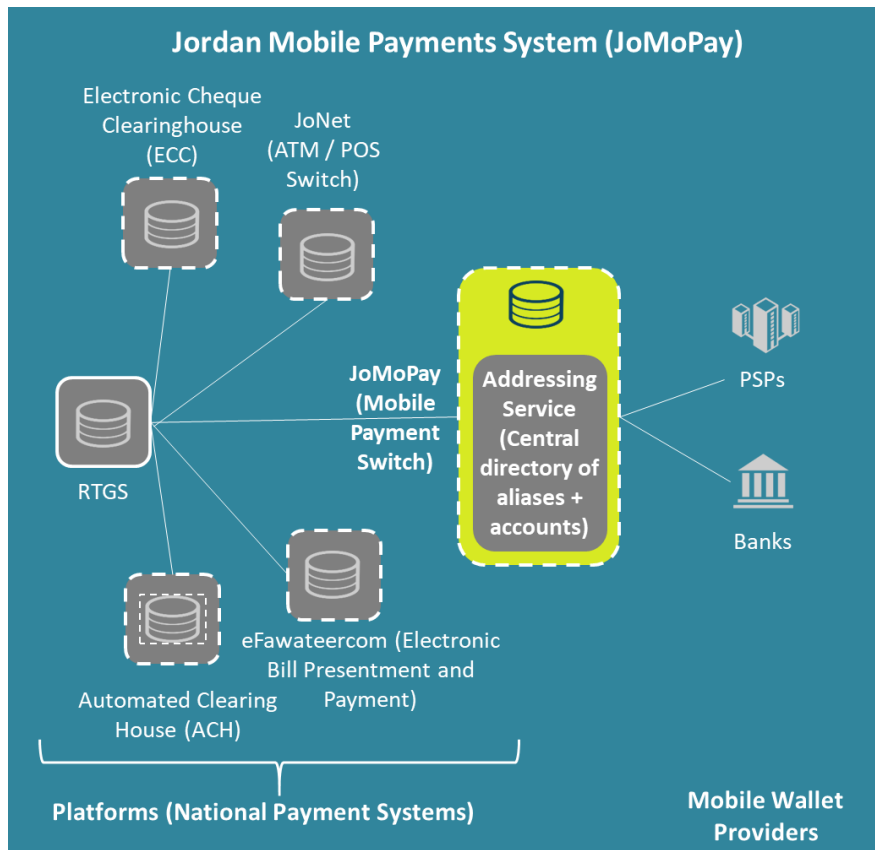
Further discussions are needed during implementation to determine the specific model that would be most appropriate for the R-NDPS' centralized directory service.

Component	Prioritization	Importance to the R-NDPS
Centralized directory service – businesses	Immediate implementation	• Simplifies transactions • Facilitates merchant payments
Centralized directory service – individuals	Immediate implementation	• Simplifies transactions • Enhances privacy (reduces need to share sensitive, personal information)

3.5. FUNCTIONAL REQUIREMENTS

Consistent with the design principles for the R-NDPS, industry stakeholders determined the required functionalities of the R-NDPS. The functional requirements are illustrated below.

Core Functional Requirements					Optional
Push payments	Confirmation of transactions to payer	Dynamic calculation of net-off positions	Multiple settlement cycles within a day	Net debit cap enforcement	Support for biometric authentication

A description of each functional requirement, as well as their importance for the R-NDPS, is included in the following sections.

a. Focus on push payments primarily

Industry stakeholders agreed that the R-NDPS should primarily support push payments. At a later stage, pull payments may be added as a functionality. With push payments, the payer initiates the payment, the payer's financial institution enters the payment instruction into the payment platform, and funds are pushed into the payee's account. Once made, transactions are irrevocable. Push payments may also be conducted through "requests to pay" in which a payee initiates the request to a payer for a payment to be made.

Push payments only	Prioritization	Importance to the R-NDPS
	Immediate implementation	• Allows for greater customer control • Reduces the risks implicit in pull payments

b. Confirmation of transactions to the payer

As noted above, transactions in a push payment model are irrevocable. To minimize the occurrence of human errors when initiating a transaction, confirmation of transaction details to the payer is therefore important. The functionality to provide confirmation of transactions to the payer prior to executing the transaction includes validation of details on the payer's channel such as:

- Payee's account number
- Ability of account to receive the required amount of credit
- Account title by payee to payer so the payer can verify the details before committing the transfer

For additional details on the process flow please refer to the use cases in Annex 1.

Confirmation of transactions to the payer	Prioritization	Importance to the R-NDPS
	Immediate implementation	• Provides assurances to customers of their transactions, enhancing trust in the system • Mitigates the risk of misdirected payments

c. Dynamic calculation of net-off positions; multiple settlement cycles within a day; and net debit cap enforcement

One of the design principles of the R-NDPS is that it is open-loop and accessible to a wide-range of financial services providers, including banks and non-banks. As non-traditional players gain access to the system, however, the risks of their participation must be appropriately managed, particularly when offering instant payments. The next set of functional requirements serve to minimize the degree of settlement risk posed by participants.

- **Dynamic calculation of net-off positions:** This functionality refers to the R-NDPS' calculation of net-off positions in real-time, with net positions for each of the participants updated after each transaction. As a "dynamic" calculation, the cleared transaction is immediately considered when calculating each participant's net debit cap, as opposed to having a deferred calculation for net-off positions. Exposures of each participant can therefore be closely monitored.

- **Multiple settlement cycles within a day**: Rather than settlement of funds taking place only at the end of the day, the R-NDPS will have the functionality to settle funds between institutions multiple times within a day.

- **Net debit cap enforcement:** Additionally, the R-NDPS will set a maximum negative position for each participant, with automated enforcement of net debit cap limit.

• Dynamic calculation of net-off positions • Multiple settlement cycles within a day • Net debit cap enforcement	Prioritization	Importance to the R-NDPS
	Immediate implementation	• Prevent large net exposures from building up intra-day • Minimizes liquidity and settlement risks posed by individual participants • Facilitates participation of non-bank participants (specifically, acquirers) in the system by reducing the participants' cost of liquidity (costs which are higher with less frequent settlement cycles) • Facilitates participation of non-bank participants (e.g. MFIs) in the system by reducing the liquidity / settlement risks they pose

d. Support for biometric authentication using the national ID system (NIDA)

Finally, industry stakeholders expressed interest in eventually implementing the functionality to use biometrics for payments authentication. However, this is a much lower priority than other functions. The industry's rationale for the low prioritization of biometric authentication is that the majority of the population currently does not have biometric IDs and the cost of rolling-out biometric authentication infrastructure will be high compared to the benefit that it will provide.

With such functionality, the R-NDPS would connect to the National Identification Authority of Rwanda (NIDA), which maintains a database of biometric details for Rwandan citizens. Instead of using a payment instrument, such as a card or a mobile, an end-user could use a biometric scan. Based on the scan, the R-NDPS would send an authentication request to NIDA for prior to authorization.

The benefit of such functionality is that it enables widespread access to the system by end-users and promote greater financial inclusion. End-users would not need to have access to a card or mobile phone, but would only need to use his / her biometrics to conduct transactions. One example of where this is being done in other markets is included in the text box below.

> **Example of biometric authentication in other markets: India's Aadhaar Enabled Payment System**
>
> In India, the Aadhaar Enabled Payment System (AEPS - a system managed by the National Payments Corporation of India) is linked to the Unique ID Authority of India (UIDAI). UIDAI provides a unique ID (Aadhaar number) to each citizen and is developing a large database of multi-modal biometrics (finger print and IRIS scan). Since the Aadhar ID is linked to all bank accounts and PSP mobile wallets, Aadhaar ID and biometric authentication can be used during payment authentication. Customers who want to transact may use their Aadhaar ID to access their bank account after authenticating themselves with biometrics. The AEPS is connected to the UIDAI to allow real-time authentication of the customer before routing the transaction to the respective bank / PSP for authorization.
>
>
>
> To conduct a transaction, customer enters:
> 1. His/her Aadhar number (national ID no.)
> 2. Finger print data
>
> Authentication is done by UIDAI and switching, clearing, and settlement is through the AEPS

Support for biometric authentication using the national ID system (NIDA)	Prioritization	Importance to the R-NDPS
	To be phased in	• Since not everyone has a payment instrument (card or mobile), biometrics enables authentication for the entire population, thereby advancing financial inclusion

3.6. PLATFORM SPECIFICATIONS

The R-NDPS platform will enable interoperability between different stakeholders and will operate as a 24x7 real-time retail payment system. This section describes the core specifications with which the selected platform / technology for the R-NDPS must comply.

The requirements are structured along the life cycle of payment transactions. Typically, a payment would involve:

    a.   Initiation
    b.   Clearing
    c.   Settlement

      d.   Post settlement operations (reconciliation, dispute management, etc.)

a.   *Payment initiation*

As described in the design principles and functional requirements of the R-NDPS, the system will primarily support push payments. These transactions can be initiated from / by:

- A participating bank's or PSP's delivery channels (web, mobile, etc.)
- A government entity (in the case of G2P payments)
- A third-party (payment initiator) as a "request to pay"

The process flow illustrating the steps in the payment process by each actor involved is provided below.
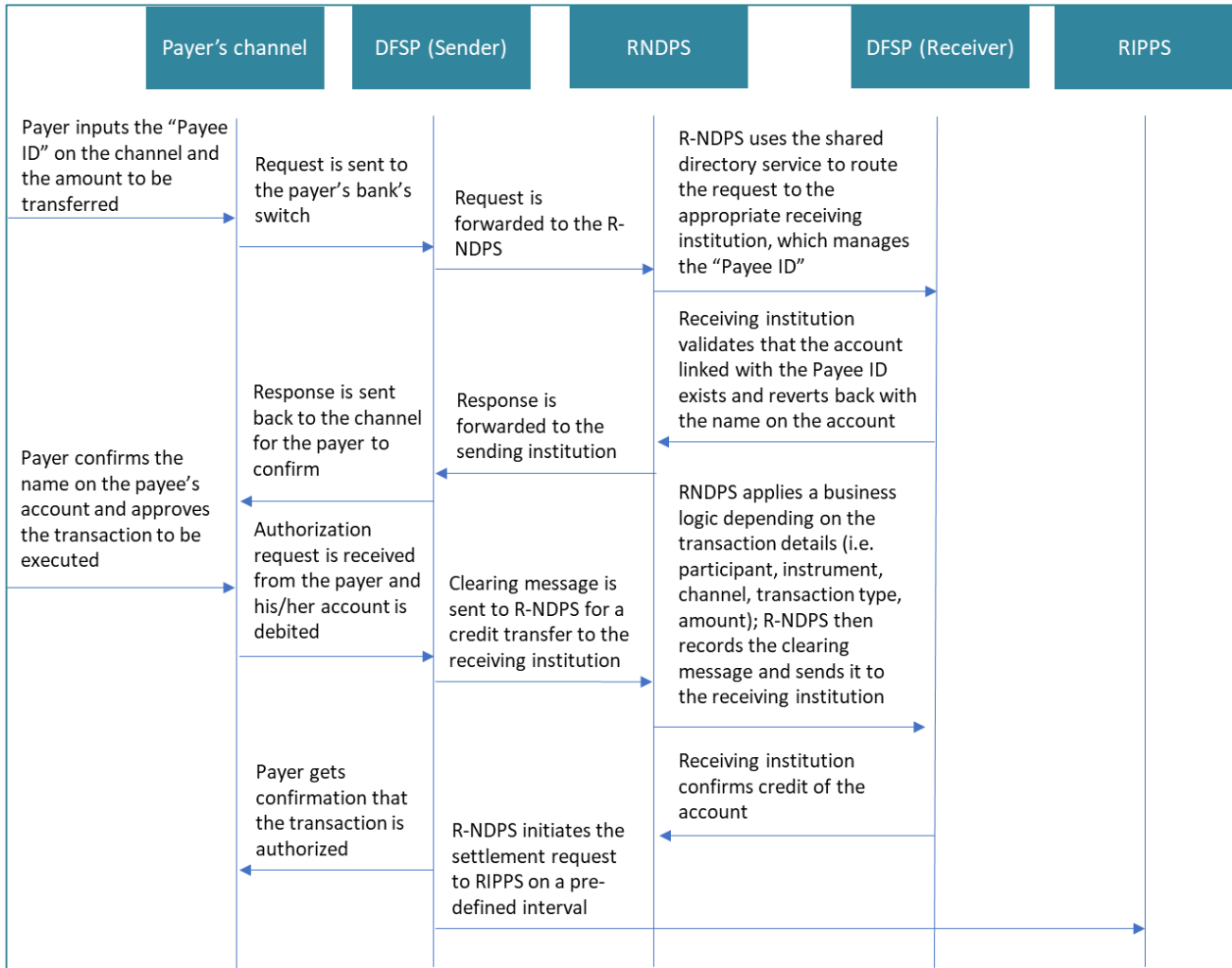
Integration

The institutions initiating the payments will require integration with the R-NDPS for financial and non-financial messages. The platform should support integration through industry standard protocols. It is preferred to use ISO20022 as the native message format for integration.

ISO 20022 is the agreed methodology used by the financial industry to create consistent message standards across all the business processes of the industry. The format is being adopted by many payment systems across the world and will ensure that future integration of R-NDPS with regional or international payment systems will be seamless.

There are several reasons for using ISO20022 over typically-used protocols such as ISO8583. These include:

- The ISO8583 protocol was designed specifically for card-based transactions.
- The ISO20022 message format is XML-based and allows for easy extension of messages to include much more detailed information about a payment. For example, in a "Request to Pay" message, the payment initiation service provider can include information about the invoice being sent for payment in a structured manner.
- Looking ahead, if the R-NDPS is to be linked with the East African Community payment systems, then support for ISO20022 as standard for messaging interoperability will be useful.

However, it is important that the integration layer of the payment system be flexible and allow banks and PSPs with legacy systems to integrate using web services / APIs to the R-NDPS platform (in case they do not support ISO20022 specifications).

Migration to ISO20022

Historically, the ISO8583 message format has been used for interoperability of credit and debit card transactions. However, this format is limited, as it was not designed for interoperable payment transactions that contain a rich set of information.

Since the use cases supported by R-NDPS include non-card interoperable payments, it is recommended to use ISO20022. Adoption of the new message format may be a challenge since the switches of participating banks may not support this format. The R-NDPS platform should thus provide supporting tools for translation so that payment switches of banks and PSPs that do not support ISO20022 can also integrate through commonly-supported message formats in the intermediate phase of co-existence.

b. Payment processing – clearing

The R-NDPS platform should support following modes of financial clearing:

    a.   Single credit transfers
    b.   Bulk credit transfers

Message routing

The platform should allow for both static and dynamic routing of messages. Static routing means that the message can be routed based on the contents of any field within the message itself. Dynamic routing also includes other variables besides message content (for example: route messages to Node 1 instead of Node 2 if Node 1 is not available).

Message Flows

In a real-time payment system, the system must be able to support various message flows depending on the use cases. For example:

- For a push message of a single credit transfer, the system will be required to receive the message, validate it, and store the message before responding to the sender institution and forwarding the advice message to the recipient institution.
- For a bill payment credit advice, the incoming credit push message needs to go to the biller's financial institution to credit its account and a copy also needs to go to the billing aggregation system to mark the bill as paid.
- For a financial clearing message, once the request is received, the platform may require sending a copy of the message to the risk / fraud management component.

Ideally, the platform should allow configuration of different message flows based on each use case through a graphical user interface like a business process management (BPM) orchestrator so that any modifications to the flow can be easily made.[12]

Risk management controls

The platform should provide for risk management controls, which allow control of transaction messages using a rule-based criterion defined in the system to accept or reject any messages. For example:

- Participant "A" cannot send clearing messages for a certain type of transaction
- Transaction Type "X" cannot have one transaction of value over amount 99999.

c. Non-payment processing

Fee and interchange management

The platform should support configuration of different types of fees based on business requirements. The fees refer to the transaction fees applied to each participant. For each type of fee, the platform should be able to specify at least:

- Type of fee
- Fee calculation method (fixed, percentage of amount, slab based, etc.)
- Charged to (sending party, receiving party, both)

Interchange, on other hand, is the fee charged by one participant to another and is not treated as income / revenue of the platform. The platform should allow for the definition of interchange between two participants at a pair-level basis. The interchange values can be pre-agreed by the participants and defined as a parameter in the interchange management module.

The module will be integrated with on-line transaction processing so that appropriate fee or interchange values are stored in the transaction records as they are cleared and used in calculating the net-off position for each participant at time of settlement (which can happen multiple times in a day).

Non-financial messages

The platform should support at least the following types of messages:

- Account inquiry message to validate destination account before initiating a transfer
- Bill inquiry message to validate a bill and fetch the amount before initiating a payment
- Request to pay message
- Payment status inquiry message to confirm the status of a payment transaction from other participants
- Payments notification message to inform a third-party payment initiation platform about completion of a payment transaction.
- Administrative messages for exchange of information between participants.

System logs

The platform should record all the transaction events in the system logs so that if any issues arise, the complete chain of events can be traced through the system logs. The logs should be time-stamped and carry the reference details of transactions to easily review the chain of events.

The system logs should not carry any confidential or sensitive information in clear. If any sensitive information is present, it should be masked.

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[12] An exhaustive list of messaging patterns is covered on this website:
http://www.enterpriseintegrationpatterns.com/patterns/messaging/

d.   Settlement services

The platform should allow for integration with the RTGS for settlement of transactions. Once the transactions are cleared and their impact is recorded in the net-off calculation, the platform should allow for periodic settlement by integration with the RTGS.

Depending on the capability of the RTGS system, it can be done in real-time or through a net-off file transfer to the BNR. Specifically, if the RTGS system supports an online message interface, communication of net-off positions can be through the message-based interface. If not, the communication can be through a pre-agreed file, which is placed on the RIPPS platform after an interval.

e.   Support for relevant security standards

Finally, the platform should adhere to the following security standards:

- The organization housing the platform should have a well-defined security management system. Ideally, it should be designed along the lines of a standard framework, such as ISO 27001.
- The platform should comply with the requirements for a standard security framework around access control, which includes role-based access, secure management of user credentials, and policies around passwords.
- The platform should comply with cryptography requirements related to encryption of message interfaces. Ideally, asymmetric encryption should be used for encryption. In the case of symmetric encryption, dynamic key exchange should be supported.
- If any authentication mechanism requires entry of sensitive data, such as "pin" on a third-party channel, then the system should ensure end-to-end encryption of data. Ideally, this should be done using a PKI infrastructure.
- All the security operations around encryption key management and pins should be handled through a hardware security module (HSM).
- If pin data entry is done on mobile or internet enabled devices, the platform should provide its own SDKs to third parties, which follow secure pin entry standards such as (PCI Software pin entry on COTS).
- The payment platform should be developed using secure coding standards (e.g. SEI CERT coding standards).

f.   Performance requirements

The performance requirements of the platform is usually measured by the number of transactions that can be processed without any failure or queuing up of transactions within the system.

The standard performance benchmark parameters are:

1. "Peak Transaction Per Second (TPS)"
2. Peak utilization of system resources (CPU, memory)
3. Average Response Time

Benchmarking should be done with a sustained run to evaluate platform performance in case of a sustained load over a long period of time. The benchmarks should involve a complete transaction mix to ensure all type of use cases are covered.

The platform should ideally be benchmarked by an independent assessor and benchmarks should be published.

g. Scalability

Since the peak TPS requirements of the platform will grow over time, it is important to confirm how the system scales-up as the requirements of peak transaction processing increase. In terms of scaling, there are two types of models:

- Horizontal scaling
- Vertical scaling

Horizontal scaling means that as the requirements for processing an increasing number of transactions increase, the platform is designed such that adding more machines in the pool of resources allows the application to scale linearly. Vertical scaling, on other hand, requires the addition of more resources (CPU, memory, etc.) in same machine to allow the application to scale.

Horizontal scaling is recommended and would require the platform to be designed as state-less as much as possible on the service side so that it can be managed through a cluster of hardware resources operating in parallel.

h. Availability

The expectation is for the platform to be available 24 x 7 x 365, as it will be used by different participants for the online real-time transfer of money.

To ensure the availability requirements, redundancy should be an integral part of the platform. This means that the platform architecture should be such that in case of failure, of one the hardware components of the system continues to run seamlessly on redundant hardware (high availability).

The platform should support an active-active architecture so that it can be deployed on multiple-sites, which remain synchronized. This is an important element, as it ensures availability of the platform even if one of the sites require down-time due to infrastructure maintenance.

Another aspect that is important from an availability perspective is that the design should allow updates in the software components to be applied without putting the entire platform offline. This method is called "rolling upgrade," where the upgrade of a system requires zero down-time.

i. Configurability

The platform should be configurable and parameterized. This applies to different technical components within platform.

The core interoperability switch layer should be configurable in terms of:

- Time-outs for various integration end-points based on transaction type and source
- Supported message types
- Supported routing mechanisms and transaction flows
- Application of custom business logic within specific transactions
- Allow rule-based risk management checks on different message fields
- Validation of online transaction processing limits

The multi-lateral net settlement component should allow for parameterization of different types of fee / interchange components of transactions. Such parameterization may include:

- Ability to define fixed fee or variable fee (embedded in the message by a transaction initiator) for each type of transaction

- Ability to define the split of fee / interchange value between different participants in the transaction

Application of all new configuration parameters should be through the user interface within the platform and should have dual control (maker / checker) configuration.

j. Monitoring capabilities

The R-NDPS must also have pro-active monitoring capabilities defined in its architecture. This includes monitoring of:

- All system resources
- Individual components of the system from a throughput perspective
- Transaction monitoring (success / failure rates, no transaction alerts)

Monitoring should be done through system alerts (which can be delivered through SMS, e-mail, or mobile notifications, which can be dynamically configured (for example: "generate alert if x% of the transactions in last 5 minutes are declined").

In addition to monitoring through alerts, the platform should allow for simple dashboards for the operations team to immediately visualize any abnormal conditions and take required corrective actions.

The platform should also support a reporting component to provide up-time reporting data to the regulator.

k. Business continuity requirements

It is important to define the business continuity plan (BCP) for the R-NDPS in the event of any man-made or natural disaster.

Business continuity objectives should be clearly defined and should cover:

- Business continuity strategy
- Identification of critical functions
- Resumption and recovery objectives (RTO, RPO)

The BCP should be drawn for various disaster scenarios. These scenarios are documented as Business Impact Analysis (BIA), which involves assessing the likelihood and impact of each disaster scenario.

Depending on the objectives defined for business continuity, the platform should support:

- Active-Active configuration
- Active-Passive configuration

Although the first choice is for the platform to support active-active configuration, this entails operating two fully-functional sites, and therefore requires additional investment in operational costs. Depending on transaction volumes, the platform can be first set-up with an Active-Passive configuration, and later be enhanced to an Active-Active configuration.

Every six months, BCP drills should be made part of the plan and proper reporting of such drills should be prepared and shared with regulators.

l. Customer service module

Finally, the platform should provide for a customer service module to register complaints from participants of the system and ensure their timely resolution.

The customer service module should consist of the following:

- Ticketing system (portal, e-mail based, etc.)
- Live chats with a customer service representative
- Service level agreement (SLA) management for complaint resolution
- Reports on customer tickets and their resolution

m. Dispute management module

Ideally, the dispute management module should be integrated withing the core system. Once transactions have been cleared, then participants should be able to search them and record any disputes around the transaction.

Typically, in a push payment environment, the transactions are instantly cleared and settled within the day (depending on frequency of settlement cycle). If, for any reason, the payer has a problem and wants to raise a dispute, the same should be communicated by the payer to his / her bank or PSP, which will initiate the dispute.

The specifications of this module will depend on the dispute management process. However, general guidelines are as follows:

- The module should reflect clearly the state of the transaction in terms of clearing and settlement of funds.
- The module should allow configuration of various reasons for why a dispute can be initiated.
- SLA management is an integral part of the module. In the context of dispute management, the SLA refers to obligation by the parties to respond within pre-agreed times to any dispute. If the dispute is not responded to by the other party within this time frame, the automated SLA management should trigger the next action (e.g. it can be the reversal of funds from payee bank to payer bank).

3.7. ACCESS REGIME

The access regime for the R-NDPS will include three levels of participants:

- Direct participants
- Indirect participants
- Connected institutions

A summary of the access regime is included in the image below, with additional details provided in the table.

Access Regime Overview
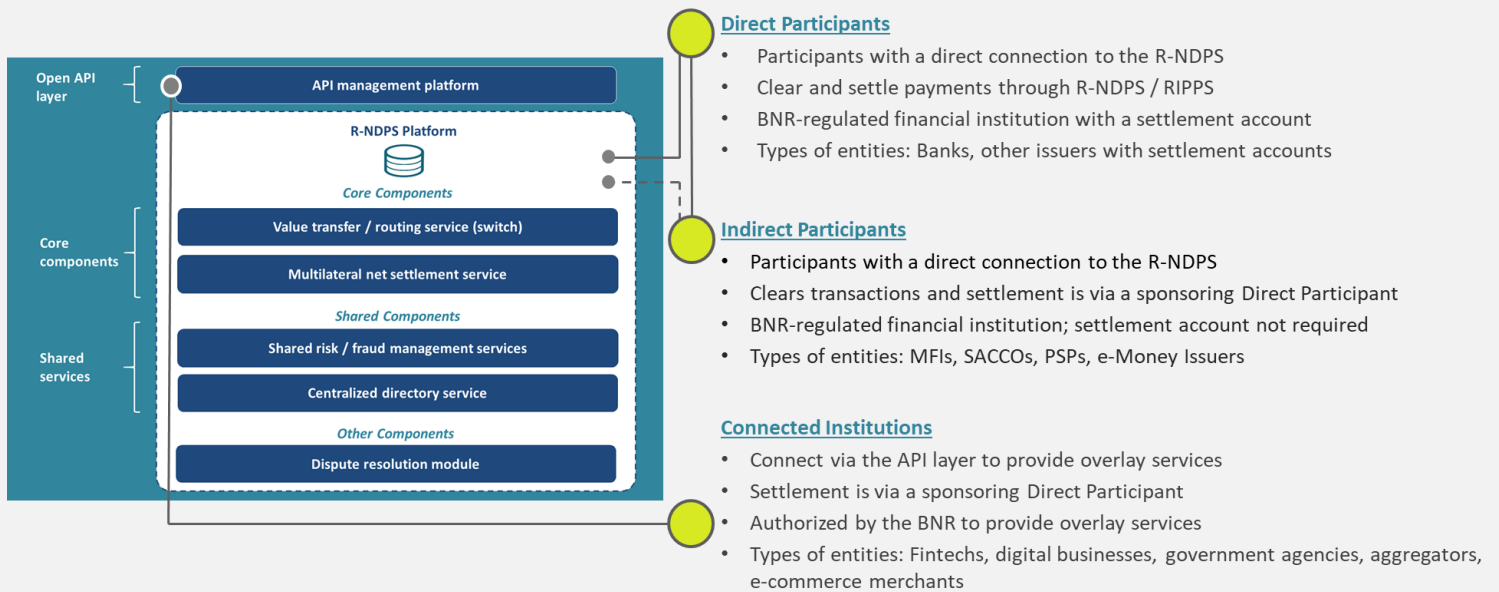
Component	Description	Criteria	Types of entities that qualify
Direct participants	• Participants with a direct connection to the R-NDPS to provide payment services • Clear and settle payments through R-NDPS / RIPPS	• Licensed / regulated financial institution by the BNR • Maintain a settlement account at the BNR • Meets minimum functional and technical requirements for integrating with the R-NDPS	• Banks • Other issuers with settlement accounts at the BNR
Indirect participants	• Participants with a direct connection to the R-NDPS to provide payment services • Settlement is provided via a sponsoring Direct Participant	• Licensed / regulated financial institution by the BNR • Settlement account at the BNR is not required • Meets minimum functional and technical requirements for integrating with the R-NDPS	• MFIs, SACCOs, PSPs, and other issuers without settlement accounts at the BNR
Connected institutions	• Connect via the API layer to provide overlay services • Cannot settle transactions directly;	• Authorized by the BNR to provide overlay services • Must be a registered business in Rwanda with the purpose	• Fintechs, digital businesses, government agencies, aggregators, and e-

	must do so through a sponsoring Direct Participant	capability of providing an overlay service, as demonstrated by a comprehensive business plan	commerce merchants that provide payment-related services to end-users

Access Rights by Step in the Payment Transaction				
	Initiation	**Clearing**	**Settlement**	**Value Added Services**
Direct participants	✓	✓	✓	•
Indirect participants	✓	✓	X	•
Connected institutions	✓	X	X	•

3.8.   OWNERSHIP STRUCTURE

In terms of ownership, the R-NDPS will be **privately-owned**. The exact shareholding structure has yet to be determined, specifically regarding the degree of ownership by participants versus a third-party. Additionally, the industry unanimously agreed that considering the size and dynamics of the Rwandan market, the country should only have one switch.

Considering that the R-NDPS will be privately owned, the scheme will be managed as a **for-profit entity**. However, profit will be nominal and will serve only to incentivize efficiency and innovation. Although it will be for-profit, the R-NDPS will ultimately be managed to serve the interests of the Rwandan public. Pricing will therefore remain fair, reasonable, and accessible for all participants.

Moreover, while the R-NDPS will be privately-owned, there will be a strong governance structure in place, which provides for substantial involvement of the government (through agencies such as the Ministry of Finance and Ministry of Information Technology & Communications) and close regulation by the BNR. The role of the government and regulators will be, *inter alia,* to ensure that the R-NDPS does not serve only to maximize profits for its shareholders, but rather, to serve the interests of the public as a whole.

3.9.   GOVERNANCE MODEL

a.   Overview

While industry stakeholders have agreed that the R-NDPS will be privately-owned, discussions need to be finalized on whether the R-NDPS will be owned by its participants or by a third-party. These ownership decisions must be concluded to finalize a governance model and legal framework for its operations.

Although the final ownership structure is a pre-condition to defining the governance model, some principles can be established that would apply regardless of the ultimate ownership structure. In particular, formation and proper operation of the R-NDPS requires a sound, transparent, democratic, and non-discriminatory governance model, and may revolve around the following components:

- Modalities around **formation** of the R-NDPS
- **Board structure** of the R-NDPS
- **Voting rights** – if any – of each member of the board

- **Voting thresholds** for key board decisions
- **Working groups** of the R-NDPS
- **Rights and obligations** of the participants

b. *Formation of the R-NDPS*

Formation of the R-NDPS should be based on a legal governance structure that would take the form of a constitution or articles of association (AoA). While there are variations in applications, an entity with a constitution is generally characteristic of an industry association / non-profit structure, while AoA are generally more applicable to legal structures that are profit-oriented.

Common traits between these two frameworks include the structure of the board controlling the entity, membership canards, rights and obligations of the parties involved in the entity, and voting rights. These and other precepts should generally be outlined the constitution or AoA, example of which are shown below.

Recommendation: At the formative plenary meeting of the R-NDPS, the following items and components in the constitution / AoA are recommended for discussion:

Item	Significance
Name	Official name and abbreviation (if any)
Interpretation	Description of what services may be provided, or any other matter requiring upfront clarification
Purpose	To act in the interests of those who provide digital financial services in Rwanda and generally dealing with matters related to the provision of these services and information in Rwanda
Mission	*Inter alia*, to accelerate the digitization of retail payments across a range of digital channels and instruments in a cost-effective and efficient manner by providing a structure in which industry participants and their customers receive world-class service
Structure	This would consist of general members; Board; working groups, and administrative arms. Any dispute resolution procedure using independent adjudicators should ideally be done on an arms-length contractual basis.
Membership	Membership will be open to entities that meet the qualification threshold for providing payments or payment-related services in Rwanda. The threshold could be influenced by any criteria or rules set by BNR or any other government body.
Finances	These may involve any fees set by the Board and/or administration of the R-NDPS, and rules around defaults in payment of these fees.
Structure of the Board	This will be determined by the ultimate ownership structure of the R-NDPS, but general principles may apply.
Conduct of Board members	This will include overriding duties of Board members, as well as working group members, to act in the best interests of R-NDPS as a whole, and not for any sectional, commercial, or personal interest.
Duties of the Board	The primary duty is to further R-NDPS's mission and to report to any plenary meetings, or to members when certain extraordinary circumstances arise. This may also include provision of minutes of Board meetings to members.
Powers of the Board	These may be general powers and that may *inter alia* involve administering any assets of the R-NDPS; opening bank accounts; and dealing with any legal issues that may arise.
Annual and special general meetings	The nature and timing of these meetings will be set through the formative meeting of R-NDPS.
Working groups	These relate to any working groups that may be established by the plenary meeting and the Board. This may also include provision of

	minutes of working group meetings to the Board and / or members, as required.
Legal personality	This will depend on the ownership structure and / or any rules set by BNR and / or any other government body, but generally will mean the R-NDPS will be a juristic person capable of acquiring rights, incurring obligations, entering into legal transactions, and of suing and being sued in its own name.
Accounting	This relates to the use and disbursements or any funds received and spent.
Indemnity	This is a boilerplate legal clause that may indemnify each participant for any legal jeopardy in relation to the activities of the entity as a whole. In particular, it would also relate to indemnification – in their individual capacities – of board members who have acted in a proper, legal, ethical, and non-negligent discharge of their specified duties as board members. This may be overridden by any laws relating to corporate governance, or if a competent court finds egregious breaches of fiduciary duties of the Board and / or any of its members.
Dissolution	This clause is an extraordinary but necessary provision in situations such as unsalvageable financial distress, and / or some other administrative failure. Usually two-thirds of the members at a general meeting or at a special general meeting convened for this purpose is required. BNR consent may also be required.
Alteration of the constitution/AoA	The constitution/AoA or any part thereof could be altered by a resolution passed by not less than 75% of members present at a general meeting or a special meeting convened for this purpose, and convened with sufficient notice.
Implementation	This relates to the threshold of when / if the constitution / AoA will be made effective.
Miscellaneous	Any issues not directly addressed within the constitution / AoA.
Language(s)	The languages to be used for all documents disseminated and used by the R-NDPS, and in what circumstances. If multiple languages are contemplated for use in communications and rule-making by the R-NDPS, and there is a dispute between the language versions, then one language should be specified in the constitution / AoA to take precedence over any other language versions.

c. R-NDPS Board

Overview

Industry stakeholders support broad representation on the board, to include the main participants in the payments and banking sector, as well as non-commercial participants such as government entities. Stakeholders also indicated that board term limits and powers should be included in the constitution / AoA.

In all, the board will act as the governing body of the R-NDPS to execute on the mission of the R-NDPS. Board members will be voted in by participants at a plenary meeting.

Board structure and terms

Potential board members could include commercial participants in the payments and banking ecosystems, including banks, MFIs, SACCO, PSPs, and MNOs.

Some stakeholders also support the notion of representation of non-banks, such as fintechs and payment aggregators, either individually or through a representative from their respective industry associations (if such associations are to be formed). However, there was no consensus on the minimum number of board seats per ecosystem participant, for example whether there should be reserved seats for the top three or four banks (by volume) operating in Rwanda.

Non-commercial board members could include a representative from the Ministry of Finance, Rwanda Development Board, RURA, or the proposed national consumer protection ombudsman to look after consumer-related interests. Most stakeholders indicated that due to potential "player-and-referee" conflicts, that BNR should have non-voting, observer status on the board.

Other suggestions from industry stakeholders for board membership included an independent chairman or independent board member(s), as well as the CEO of the R-NDPS.

Term limits on the chairman or individual board members, or on specific large banks, should also be contemplated.

For governance and transparency purposes, all minutes of the board should be made public in summary form on the R-NDPS web site and / or provided upon request to any requestor. Exceptions to any publication of the summary of these board minutes may apply if there are compelling public policy or reputational reasons not to release the minutes, or if there are specific commercial reasons affecting the ongoing viability of the R-NDPS. In this case, the board may have the right to restrict publication of the minutes for a period not exceeding six months. Members of the R-NDPS may, however, request minutes by exception.

Recommendation: Subject to voting thresholds, the board should contain 9 or 11 members (must be an odd number), with minimum representation consisting of:

- The four largest banks by volume (rotated every 2 years)
- MNOs/PSPs though an industry association or individual MNOs/PSPs
- R-NDPS CEO
- An independent board member
- A government / BNR / consumer protection member as non-voting observer(s)

Board Powers

The powers of the board should be enumerated in the constitution / AoA and voting thresholds should be set for operational and strategic decisions by the board.

All decisions and deliberations of the board should conform to any law, regulation, and court decision that is in effect in Rwanda. No deliberations or decisions should be considered or undertaken by the board which could be considered as amounting to collusive behavior in the ordinary meaning of the term, or in terms of any such applicable prohibition by any law, court decision, or regulation in Rwanda.

All decisions and deliberations of the board should conform to good governance principles. Board members should agree not to act solely or mainly in the interests of the entities or organizations they are employed by, but rather to act in the interests of the R-NDPS as a whole.

Recommendations: The Board should have the power and authority to undertake, *inter alia,* the following:

- Propose amendments to the constitution / AoA
- Withdraw or to reinstate a member's status of good standing
- Dissolve the R-NDPS [subject to approval of the BNR]
- Constitute, establish, maintain, or dissolve any working group
- Initiate and validate any operational expense, or initiate processes to terminate any such expense
- Authorize, when necessary, the employment of any person as a permanent or temporary staff member of the R-NDPS
- By two-thirds majority, suspend or remove a board member for good cause
- Remove or suspend any member of the R-NDPS for good cause
- Authorize the termination of any staff member of the R-NDPS for good cause
- Enter into any agreement with another body in furtherance of the goals and mission of the R-NDPS
- Act to defend any legal action against the R-NDPS as a distinct legal entity

- Act to initiate any legal action by the R-NDPS as a distinct legal entity
- Act to facilitate provision of ongoing legal assistance to any board member sued solely in, and because of, their capacity as a board member of the R-NDPS, and where the legal action results from the action or statements of the board of the R-NDPS, unless that member acted *ultra vires* (beyond one's legal power or authority)
- Allow any person to address the board in person for purposes of clarifying any issue or matter

Voting rights and decision thresholds

To ensure collegiality, all board member votes should carry the same weight. No board member should have veto rights over any board decision. Because of systemic considerations, the only veto right should be that of the BNR in regard solely to the question of whether the R-NDPS should or can be dissolved.

Recommendation: The following voting thresholds are recommended for decisions by the board.

Issue	Voting Thresholds
Annual budget	Board: 50%+1
Extraordinary CAPEX / OPEX	Board: 50%+1
Approve / fire the CEO	Board: 60%
Pricing changes	Board: 80%
Rule changes	Board: 80%
Change constitution / AoA	Board: 90% *Plus* Members: 70%
Eject / reinstate a member	Board: 80%, *plus* Members: 70%
Fine / discipline a member	Board: 80% *Plus* Members: 70%
Suspend / reinstate a member	Board: 80% Plus Members: 70%
Staff hiring	CEO: 1:1, *plus* Board: 50%+1
Dissolve association	Board: 90%, *plus* BNR: 1:1
Create / suspend / dissolve working group(s)	Board: 70%

d. Working groups

While its administrative structure will undertake the day-to-day operations of the R-NDPS, much of the strategic, technical, and operational planning should take place within working groups constituted for specific domains, as enumerated below.

The working group members should be drawn from the general membership of or participants in the R-NDPS, with members nominated by their individual companies. No working group should have more than one person from the same member company. A quorum for a working group should be five members of the R-NDPS, all in current good standing. Members of the working group shall elect a chairperson of the working group.

Good standing means that the member – as a company, and not necessarily the person representing that company – of the working group is not delinquent in any dues to the R-NDPS of more than 90 days; has not been sanctioned by a disciplinary working group of the R-NDPS in the past 12 months; has not been sanctioned by BNR or any other regulator in the past 12 months; and has no pending criminal or fraud complaint pending in any public legal process.

Where a member of a working group has a conflict in discussing some working group or sub-working group activities, this conflict should be disclosed upfront, and may ordinarily result in their withdrawal or removal from that working group for the purposes of discussing the matter relating to the conflict. If there is a dispute as to whether there is indeed an invalidating conflict, the board should decide on the outcome.

Any decision of any working group should ideally be via consensus, but if there is no consensus, a simple majority decision of that working group's members should prevail.

Any member who has previously had an adverse finding of conduct against them by a court of law, an adjudicator of the R-NDPS, or the BNR in the previous 12 months but who sits on the Scheme Rules working group and who is still a member in good standing, may still participate in that working group unless discussing matters or sections of the Scheme Rules that gave rise to that adverse finding against them.

All minutes of each working group activity should be circulated to the board in summary form within a week of the conclusion of its last meeting. Unless there is some compelling reason not to do so, all minutes provided to the board should be un-redacted. As a default, the minutes should be made public on the R-NDPS web site, and / or provided on request to any requestor unless the un-redacted release of the minutes would have an undesirable effect on the R-NDPS generally or any member specifically. However, the nature and extent of the release should ultimately be determined by the board.

The board may decide by majority board vote to accept, reject, or refer back to the same or another working group as the case may be any decision of a working group that has an effect deemed undesirable or against the general interests of the general membership of the R-NDPS, on the R-NDPS itself, on consumers, or potentially on the systemic reliability of the banking and payment systems in Rwanda.

Recommendation: The following working groups should be established for the R-NDPS:

- Operations (covering scheme rules, technical, and dispute resolution)
- Legal and compliance
- Technology
- Products and services

3.10. COMMERCIAL MODEL AND PRICING

a. Switch fees

As a commercial entity, the R-NDPS will charge its participants a set of fees to recover its costs and provide a nominal return to its investors / shareholders (per Section 3.8. Ownership Structure). The pricing structure will include the following fees:

Pricing category	Definition	Frequency of Fee		
		One-time	Recurring	Transaction-based
Integration / certification fee	Fee to integrate and comply with the technical requirements, per component or service	X		
Processing fee	Fee per transaction; amount is specific to each use case			X
Network fee (subscription fee)	Fee to support, operate, and maintain the system		X (monthly)	
Shared services fee	Fee payable to access shared services; fee is payable only to participants that choose to access the shared services		X	

Other switch fees considered for the commercial model included:

- **Joining / Membership fee**, which is a fee payable to the R-NDPS to become participants of and gain access to the system. However, based on stakeholder feedback, a membership fee will not be charged by the R-NDPS since the R-NDPS is designed to be as open and accessible as possible. A membership fee would present a barrier to entry and would therefore be contrary to the system's design principles. Moreover, a membership fee will not be charged since participation in the system may be mandatory.

On the network fee, industry stakeholders debated whether the pricing structure should include this recurring fee. One argument against a network fee was that the certification fee and processing fee should be sufficient to cover the costs of operating and maintaining the system. However, it is recommended that the R-NDPS includes a network fee at least at the outset so that the sustainability of the system is not fully dependent on the volume of transactions. Moreover, the R-NDPS may refine the pricing structure to include different configurations – for example, one in which the network fee covers a certain volume of transactions, above which participants would need to pay a transaction fee.

b. Interchange

During the stakeholder consultation workshop in March 2018, a discussion on interchange was initiated, focused on the P2P use case. Stakeholders discussed interchange specifically for two types of P2P transactions: bank account to bank account and mobile wallet to mobile wallet.

Question	Options
Who should pay whom?	- No one pays - Sending institution pays (sending party pays) - Receiving institution pays (receiving party pays)
What is the nature of the fee?	- Flat fee - Percentage-based - Tier-based

There were differing views on interchange, with valid arguments for and against each model. A summary of the main interchange models discussed is as follows:

	Account to Account		Wallet to Wallet	
	Sender pays	**Receiver pays**	**Sender pays**	**Receiver pays**
Processing Fee	Rational: • Providing a service to own customers • Initiated the transaction • Can pass on charges to the customer	Rational: • Receives liquidity • Can pass on charges to the customer	Rational: • Providing a service to own customers • Initiated the transaction • Can pass on charges to the customer	Rational: • Receives liquidity • May earn from cash-out
	No interchange	**Receiver pays**	**No interchange**	**Receiver pays**
Interchange	Rational: • Providing a service to own customers • Tomorrow, sender may be the receiver; commercials ultimately balance out	Rational: • Sending party made the investment to bring in the deposit • Can earn on the deposit	• Providing a service to own customers	Rational: • Sending party incurred cost to bring money in • Sending party earned commission on the transaction • Prevent from charging customer

As the subject of interchange requires extensive stakeholder discussions, achieving consensus on an interchange model for the R-NDPS was not possible during the time allotted for the stakeholder consultation workshop. **Further consultations with industry stakeholders are therefore required to achieve consensus on the interchange model for each use case supported by the R-NDPS.** In conducting such consultations, it is recommended that the BNR and industry stakeholders allocate sufficient time for working sessions dedicated solely to the subject of interchange.

3.11. RIGHTS AND OBLIGATIONS OF PARTICIPANTS

In defining the rights and obligations of R-NDPS participants, two areas are of importance:

- Data protection rights and obligations applicable to R-NDPS participants and end-users
- Dispute resolution procedures for participants and end-users

During implementation of the R-NDPS, frameworks and procedures must therefore be developed that address these two areas. Guidelines for the development of these frameworks / procedures are provided in the sections below.

a. Data protection for R-NDPS participants and their users

The R-NDPS is designed and anticipated to process large amounts of customer and provider transactional data. Therefore, the need to protect that data during transit across providers and systems and at rest within the R-NDPS and its providers' domains is paramount.

To achieve this, there must be a common understanding among R-NDPS participants on how to identify and protect sensitive payment data and how to manage risks throughout the end-to-end payments process. A data protection framework is required to facilitate this process, which should be incorporated into the R-R-NDPS design and scheme rules.

A data protection framework should include the following considerations:

- Data privacy: Risk of a data privacy breach or data inadvertently being shared with a third party outside the permissions given.

- Data ownership: Risk of data being misused or mishandled if no data ownership and responsibility is well-defined throughout the whole journey.

- Data structure: Risk that if data structure is not met, the receiver of the data will not be able to access it, or the data itself might be altered or corrupted.

- Data storage: Risk that storing data for a short period of time might impact regulatory bodies needing to audit participant's data. Additionally, storing data for too long can be detrimental for both the provider and for end-users.

Recommendation: A data protection framework for the R-NDPS should be developed based on the following guidelines:

- The framework should be stakeholder-developed and industry-adopted, and should serve to protect sensitive payment data at rest and in transit, for participants and their customers
- The R-NDPS should conduct an analysis and publish a list of existing standards and requirements that:
  - Address payment data protection
  - Set baseline security for protecting payments data by participants across the end-to-end payment transaction processes and de-valuing payment data wherever possible (for example, data and system security requirements, domain specific credentials, multi-factor authentication)
- Governance should be in place that requires all participants to demonstrate a minimum standard of information security
- A cyber-resilience framework should be developed that aligns with the Bank for International Settlements' cyber-resilience framework for financial market infrastructures

b. Dispute resolution procedures for participants and participants' customers

In high-velocity value transfers facilitated by payment switches, disputes invariably arise between commercial participants, and between participants and their customers. For example, classes of disputes could arise because of transactional failures and / or loss of value due to failures of the R-NDPS, or failures between participants in the R-NPDS.

Managing and resolving disputes should ideally be done internally using dispute resolution frameworks and procedures developed by and for the R-NDPS and its participants. The overall goal is to resolve, where possible and legally / ethically permissible, all disputes within the R-NDPS and its internal rules and dispute resolution procedures, thereby avoiding external litigation unless all internal resolution procedures have been exhausted.

External dispute resolution relating to customer-related disputes may be unavoidable if there are obligatory processes specified in laws and regulations. For example, the obligatory need to use an ombudsman in cases of consumer disputes of certain values or ranges, or where there is potential vicarious liability due to losses sustained resulting from transactional or data protection failures.

Where obligatory external dispute resolution processes are not specified in law or regulations, the R-NDPS should devise its own customer-participant dispute resolution processes where one leg of the disputed transaction – domestic or international – flows through the R-NDPS.

Where there are disputes between participants in relation to transactions or processes that flow through the R-NDPS, a dispute resolution mechanism to resolve the issue should be similarly developed and invoked if the parties to the dispute cannot multilaterally or bilaterally resolve their dispute.

In any dispute involving customers and participants, and between participants, resolution should – unless disallowed by a law or regulation – ideally be mediated by an independent adjudicator, preferably a non-conflicted ICT lawyer appointed by the R-NDPS. For customer-participant dispute resolution procedures, the customer should not bear any part of the cost thereof.

Any decision of any adjudicator appointed by the R-NDPS should be appealable. The appeal process should consist of a non-conflicted three-person appeals panel consisting of a minimum of two ICT lawyers.

In all cases, use of the internal processes developed by the R-NDPS and its organs to resolve disputes should not and will not override any applicable rights of any party to a dispute to seek external legal recourse through the legal system, and / or through a regulator or ombudsman where applicable.

Recommendation: Dispute resolution procedures for the R-NDPS should be developed, based on the following guidelines:

- For customer disputes of transactions through the R-NDPS:
  - Attempts should be made to resolve the dispute at the customer-service provider / participant level
  - If this process is exhausted and without resolution, the dispute could be escalated using mechanisms put in place to resolve disputes between customers and providers
  - Any decision of an adjudicator as part of an R-NDPS-developed dispute resolution process may be appealed

- For participant disputes of transactions through the R-NDPS:
  - Attempts should be made to resolve the dispute bilaterally between participants
  - If this process is exhausted and without resolution, the dispute could be escalated using mechanisms put in place to resolve disputes between participants
  - Any decision of an adjudicator as part of an R-NDPS-developed dispute resolution process may be appealed

4. MANAGEMENT AND ORGANIZATIONAL STRUCTURE

The proposed management and organizational structure for the R-NDPS will be finalized by the board of directors during the implementation phase. The functional areas such as compliance, audit, legal and risk, technology, operations, business and project management should be considered by the board of directors as they finalize the management and organizational structure.

5. KEY PERFORMANCE INDICATORS

To track and monitor the performance of the R-NDPS, the following key performance indicators (KPIs) are proposed. These KPIs are initial and not exhaustive. Data for these metrics should be collected, analyzed monthly, and used for internal analysis, as well as shared in aggregated form with the payments industry.

- Participants
  - Number of participants in the R-NDPS
  - Type of participant
  - Customer base of each participant
- Use cases
  - Number of payment use cases enabled by the R-NDPS
  - Volume and value of transactions per use case
  - Volume and value of transactions per channel
- Channels and instruments
  - Number of channels (distribution points) accessible via R-NDPS participants (e.g. agents, merchants, ATMs, POS. e-commerce)
  - Number of instruments issued via R-NDPS participants (cards, mobile wallets)
- Platform performance and availability
  - Network uptime / availability
- Other
  - Number of unsuccessful transactions
  - Number of fraud attempts

6. FINANCIAL MODEL

The financial model is provided as an Excel spreadsheet in Attachment 1.

The following section provides the narrative for the financial model, which includes an explanation of the structure of the model and the assumptions contained therein.

The business model for R-NDPS is designed to provide an overview of the revenue and expenses associated with the establishment and operations of the R-NDPS for Interoperability of Digital Financial Services in Rwanda. The model is designed on a five-year term.

The model is in form of an Excel workbook which has three main tabs:

- Inputs
- Outputs
- Summary

The Inputs tab summarizes different variables, which form the basis of the financial model. The variables are grouped into following categories:

Basic	These variables contain basic project information and parameters such as project start date, conversion rate between USD and RWF, and statistics about population, population growth rate, financial inclusion, and active users of mobile money in Rwanda. Currently, the variables related to population, banked population, and active mobile money customers are not used for any calculations in the model. However, in the future, if data becomes available from demand side surveys indicating the average number of transactions that a banked customer typically conducts, the data points may be used to evaluate the market size for payments. This data can then be used to further refine the estimates for the potential volume of transactions that go through R-NDPS.

Revenue Variables	**Non-Transactional Revenue**
	• This includes following revenues:
	○ Joining / membership fee (One-time) – currently zero, as no joining / membership fee is anticipated faced on industry feedback
	○ Integration / certification fee (one-time at start and on any re-certification event)
	○ Network fee / monthly subscription fee
	○ Miscellaneous fees
	• The fees are specified in USD
	• Miscellaneous fees refer to any ad-hoc fee income that is received by the R-NDPS for providing services to its members (e.g. after initial integration, if a participant changes its systems in the future and requires re-certification, then a certification fee can be charged). All ad hoc revenue entered in the Inputs tab will be accounted for in last month of the corresponding year.
	Transactional Revenue
	• For each use case, the transactional revenue inputs provide the variables to be entered to allow estimation of transactional revenue for the R-NDPS. The variables consider following:
	○ Current market size of the use case (transaction volume)
	○ Percentage of the overall market volume that will flow via the R-NDPS
	○ Revenue per transaction (fee charged in RWF by the R-NDPS)
	○ Month in which the use case will go live
	• Transactional revenue increases based on the growth rate variables which directly impact the potential market size of the use case. For measuring the growth rate, two variables are used:
	○ Short-term growth rate: first 12 months
	○ Long-term growth rate: next 48 months
	The rationale for having a separate percentage for short-term growth rate is that when a use case goes live, the volume will initially be low and hence month-on-month the growth rate will be higher. The two separate variables allow for modelling a tapered growth after one year.

Use Cases Considered for Transactional Revenue

Based on the business plan and the priority of use cases identified in Section 3.3, the model is currently configured with following use cases.

General Assumptions and Comments:

- It is assumed that project start date is July 2018 and the first use case will go live in January 2019 (R-NDPS go-live month).
- Beginning on the go-live month for a given use case, a short term and long-term growth rate is applied. The actual growth will be dependent on several variables which includes the number of R-NDPS participants joining the use case, their customer base, and the inclusion of new participants in the platform. Since it is difficult to make independent assumptions for each of these variables, a simplified approach has been taken based on current market size and an assumption of the percentage of transactions that will pass through R-NDPS.
- For each use case, the transactional revenue is reflected as a flat fee.

Assumptions per use case are explained below.

Use Case 1: P2P (Send Money and Request to Pay)

For P2P transactions, the assumptions are based on the baseline data provided by the BNR. As per the data provided by BNR, the total number of P2P transactions in the mobile money space in 2016 was 17,459,206. In 2017, the figure was 22,912,335.

This indicates a growth of 31.2%. For Year 2019, the model therefore assumes an annual total industry volume of 29,560,597 transactions. The baseline number for total industry volume is the monthly number of transactions based on this annual volume.

For short-term and long-term month-on-month growth rate, the variables are 2.5% (Yearly 30%) and 2% (Yearly 24%), respectively.

The percentage of interoperable transactions that will pass through the R-NDPS is assumed to be 5% of the total industry volume. This assumption is based on the following rationale: Currently, there is no P2P (instant transfer) service between bank accounts. It is likely that with P2P enabled through R-NDPS, there will be surge in the number of such transactions. The bi-lateral integrations that currently enable account to wallet and wallet to account use cases will also gradually shift to R-NDPS, which will increase the volume substantially.

Use Case 2: P2G

For P2G transactions, the model only considers the payments for different government services. The large volume of tax payments is not considered because currently, all the banks and PSPs in Rwanda have direct arrangements with RRA, and it is unlikely that these will be channelized through the R-NDPS.

On the other hand, iREMBO currently allows for following payment methods:

- Visa/MasterCard credit and debit cards
- Mobile money (MTN, Airtel, Tigo)

The payment of P2G services using internet banking and mobile app channels of commercial and microfinance banks is not available.

- According to the data collected from iREMBO: A total of 1,779,870 transactions were conducted in 2017 with only two Banks, three PSPs / mobile money providers and three MFIs in Rwanda.
- This number will grow further once other members join R-NDPS and iREMBO is integrated with the R-NDPS.
- The estimate for total industry volume of 1,957,857 transactions for 2019 is based on the assumption of 10% growth from 2018.
- The starting month for this use case is the 6th month of Year 1 (5 months after the first use case is launched).
- The percentage of interoperable transactions is kept at 2% to allow for a conservative growth figure, as initially only customers of banks will be using this service through the R-NDPS since all mobile money providers / PSPs are directly connected with iREMBO.
- The growth rate is assumed at 3% and 2.5%, respectively as the current volumes are very low.

Use Case 3: P2B (Merchant Payments)

The number of merchant payments transactions provided by the BNR for 2016 and 2017 were 1,039,091 and 7,485,505, respectively. In 2016, the total number of mobile money agents was 59,952 and 83,550, respectively.

The above numbers depict 720% growth over the last year (possibly because merchant payments were only recently introduced, with substantial uptake). If only 10% of agents are offering merchant payments, the numbers translate into 173 transactions per merchant per year in 2016 and 895 transactions per merchant per year in 2017.

For the baseline volume, the model assumes 7,485,505 transactions per year (i.e. 623,792 per month).

- The model applies 5% as the interoperable transaction share, considering that merchant payments will be offered by agents of two mobile money providers or some banks who are in the acquiring business, whereas all the other member bank's customers will use the service for payment.
- Since the volume is comparatively low (from P2P and P2G transactions), the model assumes a comparatively higher percentage in the short- and long-term both to reflect the initial growth.
- P2B payments are estimated to go-live after one year of operations of the R-NDPS.

Expenses

For the expenses of the R-NDPS, the model allows for entering the capital expenses and operating expenses separately.

Capital Expenses

- The capital expenses include the one-time cost of procuring the core solution and infrastructure components (hardware, operating software, databases, other ancillary software, security tools etc.)
- A provision has been kept in the model to allow for any grants / funding from donor agencies.
- The capital costs are depreciated over the number of months, which is specified in the variable.

Currently, capital costs have been estimated as USD 3.5 million. This estimate is conservative. If a bespoke payment system solution is procured from a vendor with previous experience in national payment systems, the costs for the complete solution may be higher.

An alternate option, which is more viable, is to offer the supplier of software a portion in revenue share and in lieu of that, discount the upfront costs and keep recurring costs (such as annual maintenance) at a minimum threshold and tie the payout with revenues realized from transactions.

Operating Expenses

The operating expenses are divided into following major categories:

- Human resources costs
- Administrative and operating costs
  - .1. Office rent
  - .2. Outsourced data center services fee
  - .3. Annual maintenance expenses (AMC costs of infrastructure software, database licenses etc.)
  - .4. Miscellaneous costs of operation
  - .5. Marketing expenses

Note:

- All expense categories are in USD
- For annual maintenance costs, the model considers 18% as the average maintenance for USD 2 million of the upfront CAPEX cost.
- The depreciation period is currently set at 48 months (4 years). The monthly depreciation cost thus appears for 4 years only.

Outputs and Summary

- The Output tab presents a tabular view of revenue and expenses.
- The revenue and expenses can both be viewed on monthly basis and yearly basis.
- Profit/Loss is visible at the bottom of Output sheet.
- The summary tab shows both tabular and graphic view of the revenue/expense and profit/loss.

The anticipated costs for participants / members are provided in Annex 2.

7. RISKS AND MITIGANTS TO IMPLEMENTATION OF THE R-NDPS

The table below presents potential risks to the implementation of the R-NDPS, as well as measures to eliminate or reduce the impact of those risks.

Risk	Description of potential risk	Mitigants
Dominance by a market actor / perceived impartiality of the system	The R-NDPS may be dominated by the priorities of a single party or sector, creating actual or perceived conflicts of interest and impartiality.	• The ownership structure will be private sector owned to ensure agility, responsiveness, and constant innovation, but the governance structure will be designed to protect the interests of all payment industry actors and the Rwandan public as a whole • Specifically, the board will have minimum representation of banks, PSPs, a government agency, and the BNR as a non-voting observer to ensure fairness and a focus on the national agenda • The business and commercial model will be designed to lower the costs of and barriers to entry of smaller and non-traditional market actors • Reports of R-NDPS operations will be shared with all the participants of the scheme and BNR, while ensuring confidentiality of sensitive data.
Lack of ownership for the R-NDPS project	Key stakeholders do not engage and own the iniative	• National Payment Council (NPC) takes a formal decision to start R-NDPS initiative based on industry consensus • NPC establishes a project 'Steering Committee (SC)' and develops a "ToR" for SC to implement R-NDPS • SC identifies and selects a team of specialists to establish a project management unit (PMU) to support the implementation of R-DNPS. • SC to develop ToR for working groups (WG) from the industry. Industry to nominate resources for WGs.
Delay in decision to appoint entity to own and manage R-NDPS	The NPC and BNR delays the process of appointing the entity to own and manage R-DNPS	• NPC gives first right of refusal to existing entity to submit a response to the ToR • Existing entity submits the application and is selected after detailed review • BNR designate the selected entity as the scheme owner and operator of R-DNPS
Lack of stakeholder engagement from early phase of project	Stakeholders commit but do not provide time and resources for the initiative	• NPC and BNR to play active role in engaging management of payment ecosystem stakeholders to ensure commitment of participation and availability of resources to launch the R-DNPS • PMU to work with the nominated person(s) from each stakeholder throughout the implementation process
Lack of readiness on part of different	Stakeholder are not ready to participate, or pilot use cases designed by R-DNPS	• PMU to share technical and operational requirements to stakeholders for the

Risk	Description of potential risk	Mitigants
stakeholders to start implementation activities		• integration to the platform for priority use cases • Continuous engagement through WGs and workshops to ensure adherence of timelines for the launch of R-DNPS
Non-traditional payment system actors face challenges accessing the R-NDPS	The access regime is not open to all actors in the payment ecosystem, whether due to regulatory constraints or other requirements that effectively prevent access to the system (e.g. limited access to a settlement account at the BNR therefore requiring a tiered access system, burdensome licensing / authorization requirements for overlay service providers)	• Industry stakeholders have indicated a desire, in principle, for the R-NDPS to be open and accessible to all participants offering payment-related services, so long as there is careful consideration and management of the risks posed to the R-NDPS by these participants • In updating the PSP regulations, developing the requirements for overlay service providers, and finalizing the details of the access regime, the BNR and industry stakeholders must therefore ensure that the regulations and requirements for accessing the system reflect the principles of openness and accessibility, as agreed to by the industry
Higher than expected platform costs	The technology platform and implementation cost is higher than initially estimated	• The company will identify relevant benchmarks upfront to understand the potential variations in costs and plan accordingly • The board will ensure sufficient funding commitment by the owners in case of variation in costs
Slowness of participants to join the interoperable switch	Participants may not be timely in joining the R-NDPS, due to reasons such as non-readiness of technical infrastructure for integration or lack of sufficient resources available to carry integration project. This may result in delays in execution of the implementation plan.	• The BNR should lead efforts so that stakeholders understand the work required on their end to ensure technical and operational readiness • The overall implementation of the R-NDPS should be managed by a dedicated and professional project management team that has experience carrying out similar projects, and which reports to the National Payment Council (NPC) • The NPC should oversee this project and review progress on a regular basis • Additionally, it is important to create awareness / engagement mechanisms for industry players (e.g. for fintechs, digital businesses) so that they are aware of the R-NDPS and actively work to align their systems and processes
Initially identified partners for pilot use cases change stance	Participants change their minds to partner on the initial set of uses case to be piloted on the R-NDPS (e.g. due to a change of business priorities)	• The scheme will get written commitments and sign MOUs with participants for pilot use cases • The scheme will offer incentives for early adopters
Limited relevance of use cases to	The use cases prioritized by industry stakeholders may not	• Industry stakeholders have agreed to an initial set of use cases to be supported by the

Risk	Description of potential risk	Mitigants
demand-side needs and preferences	be reflective of demand-side / end-user needs.	scheme based on supply- and demand-side needs and requirements • In rolling-out the use cases, providers will take an iterative approach to piloting and testing products, allowing for flexibility to tweak them as needed to meet market demands • Any future use cases and their priority of implementation will be supported by a business case that will be approved by the board
Industry does not actively engage in working groups	There is low attendance or interest in participating in and contributing to the interim working groups created from within the industry to launch and establish the R-NDPS	• The Scheme will demonstrate to the working groups that their input is taken seriously and implemented (where practical and applicable) by referring to actions taken in previous working groups • The Scheme will request BNR support to encourage industry participation, as a last resort
Resistance from incumbents who are committed to maintaining status quo	The incumbents do not participate in the R-DNPS (if not mandated by BNR)	• The NPC and the BNR to reiterate that the R-NDPS is here to stay and while it can help, the threats to their businesses are real. In case incumbents still do not respond, reorient attention towards smaller players
Low market uptake of DFS	The demand for and uptake of DFS and mobile money may be limited, which jeopardizes the sustainability of the R-NDPS	• A national marketing strategy roadmap will be developed to communicate the benefits of using the scheme-branded products and services • The participants of the scheme will also be responsible for marketing R-DNPS powered products and services to their target market • The BNR and the government of Rwanda will develop national financial awareness and education campaigns to run in parallel to the marketing activities of the R-NDPS • Government agencies should also catalyze usage of the R-NDPS by leveraging it for all G2P and P2G payment initiatives; since many agencies are already working on digitization of payments (e.g. iRembo), those platforms should route all payment authorization requests through the R-NDPS
Technology that powers the R-NDPS presents limitations or the final system has architectural flaws	The technology / platform that is procured is not flexible or scalable enough to meet participant requirements or support the relevant use cases / digital transaction volumes	• The Scheme will work with the business and product working groups and industry stakeholders to determine the system capability required to manage existing and projected use case volumes • A comprehensive BRD will be developed for existing and planned use cases and platform components to ensure vendor proposals reflect the existing and future requirements of R-NDPS • Evaluation and selection of the technology and the vendor will be supported and validated by payment technology experts

Risk	Description of potential risk	Mitigants
Government use cases necessitate technology upgrades, causing delays	The G2P payments rely on internal infrastructure and systems of the government, which may be limited and cause delays in implementation	• The Scheme will identify requirements and align with government stakeholders from the out-set of implementation • The Scheme will test the system early on and allow for adjustment time to ensure implementation within the timelines
Financing / funding constraints	The scheme does not have the adequate investment to fund the initial cost of the switch infrastructure set-up and / or to manage and operate in a cost recovery or thin profit margin model	• A five-year financial model with capital and operational expenses has been developed to include revenue streams and costs of managing and operating the scheme, providing a picture of the financial sustainability of the scheme • The entity that will own the R-NDPS must update the plan and financial model to reflect recent data (as it becomes available) and refine the assumptions as needed • The R-NDPS may seek grants from donors interested in promoting financial inclusion to facilitate the setup of this switch (e.g. Bill & Melinda Gates Foundation www.leveloneproject.org) • Arrangements can be made with an existing payment system operator to become the operator of the R-NDPS and provide the required infrastructure based on a revenue share model (subject to the operator meeting all technical and operational requirements)
Regulatory risks	Regulations may restrict or limit the participation of and or services from non-bank digital business (e.g. integration to the switch or banks via APIs)	• The PSP and remittance regulations are being developed / updated to keep up with the changing dynamics of the payment system • New payment initiation and payment gateway regulations are also in final drafting phase to support the R-NDPS and emerging technologies for digital payment and financial services • A proportional approach to regulations will be considered, which balances integrity, inclusion, and stability
Systemic risks	If the process for settlement of national payment transactions is not properly defined, participants may build-up large exposures (i.e. participant(s) is unable to meet its settlement obligations), posing risks to the overall system	• Settlement of R-NDPS will take place in the RTGS at the BNR based on daily net-off positions of participants provided by the R-NDPS • Functionalities to manage settlement and liquidity risk, such as dynamic calculation of net-off positions, net debit cap enforcement and multiple settlement cycles during the day, will also be incorporated as functional requirements to minimize systemic risk from participants other than commercial banks
Operational risks	The process for reconciliation and settlement, network uptime and management, data protection, and confidentiality and cyber security is not	• Detailed standard operating procedures (SOPs), including roles and responsibilities of the scheme and its participants, will be developed and implemented

Risk	Description of potential risk	Mitigants
	adequately defined or implemented. There are also potential risks of ID / KYC theft or fraud increase due to the open-loop nature of the scheme .	• RURA / BNR / NIDA to work together to minimize these risks by addressing gaps through standards and guidelines for systems and processes with respect to mobile technology, agent swim swaps, and ID theft
Reputational risks	The process of customer dispute resolution, network, availability and legal arbitration between participants is not adequately developed and / or implemented by the Scheme	• A push-payment only model will minimize the potential for customer disputes • The customer dispute resolution process will be developed and shared with all the participants. The R-DNPS will not be an end-user facing system and it will be the responsibility of individual participants to adhere to and implement customer dispute resolution process at an institutional level. • A 24/7 365-day-a-year network monitoring and management system will be established, including the availability of the R-NDPS staff for any issues that might arise with participants of the scheme itself

8. GUIDELINES TO DEVELOP A MARKETING STRATEGY

During implementation of the R-NDPS, a marketing strategy will need to be refined and developed. Recommendations for the development of the marketing strategy are outlined in the table below.

Strategic area of focus	Recommendation
Vision and mission / brand and logo	The vision and mission statement of the R-DNPS should be reflected in the branding and logo that is created by the creative agency (to be identified during implementation). The brand / logo should communicate speed, security, affordability, and reliability of using a payment instrument powered by the R-NDPS.
Target market	The target market of the R-NDPS includes: • Participants: Government agencies, commercial banks, microfinance banks, MFIs, SACCOs, PSPs, bill and agent / merchant aggregators, independent merchants, e-commerce marketplaces, fintechs, and digital businesses • End-users: Rwandan citizens
Unique selling point (USP)	• Individuals: The USP of the R-NDPS should be centered around Rwandans being able to use one wallet / account for all of their payment needs. • Businesses: The USP of R-NDPS should be focused on the openness and scale that the platform provides to the participants to make and receive payments in real-time.
Connected institutions	• Connect via the API layer to provide overlay services • Cannot settle transactions directly; must do so through a sponsoring Direct Participant
Positioning / marketing methods	The positioning and communications of the R-NDPS should be through a mix of TV, print, and social media platform activities that are conducted independently for brand awareness and to convey the benefits of the scheme. Marketing should be conducted in partnership with participants for

	existing and new products and services that are launched periodically. An R-NDPS website, Twitter, and LinkedIn page should also be developed.
Partnerships	The R-NDPS will partner with the Government on national financial awareness and education campaigns on an on-going basis to communicate the benefits of DFS
Budget / KPIs	A budget will be allocated for marketing activities including KPIs that will be review quarterly to track performance vs budget

9. IMPLEMENTATION ROADMAP

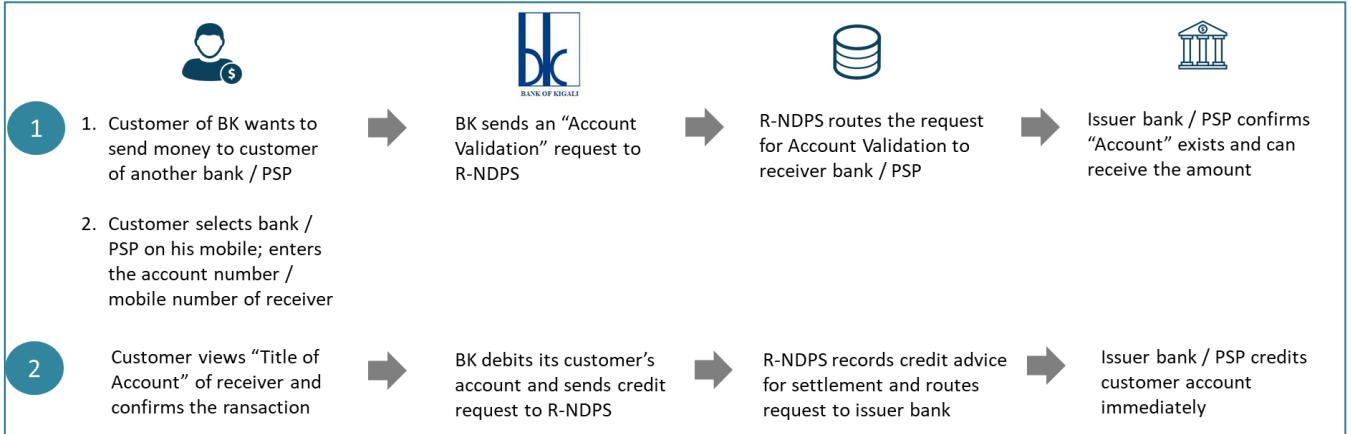The Implementation Roadmap is provided as an Excel document in Attachment 2.

	Workstreams / Activities	Resources Required	Year 1 Q1	Q2	Q3	Q4	Year 2 Q1	Q2	Q3	Q4
1	**Establishment of the R-NDPS**									
1.1	BNR to nominate the National Payment Council to lead the process of setting-up the R-NDPS, which involves, at the outset, engaging the industry to finalize the details of the ownership and governance of the R-NDPS (the "Scheme") based on the business plan	NPC	█							
1.2	Develop the application process to identify / solicit interest from potential Scheme owner(s)	NPC	█							
1.3	Invite applications from potential owner(s) of the R-NDPS (the application timeframe for ownership should remain open for one year, with applications accepted on a rolling basis)	NPC, Consultants	█	█	█					
1.4	Evaluate applications and select the initial set of owners of the Scheme	NPC, Consultants	█							
1.5	Constitute an interim board of directors and company secretary	Owners, NPC, BNR	█							
1.6	Consult a legal firm to support in developing the Articles of Association and registering the company with the Rwanda Development Board	Company Secretary	█							
1.7	Develop roles based on job descriptions (as per the management and organization structure in the business plan) and initiate hiring of key staff for the Scheme	Interim Board, Consultants	█	█						
1.8	Establish Working Groups (WG), nominating members from the owner(s) and select industry actors to support the initial set-up and operations for the Scheme, specifically the WGs for Legal and Compliance, Scheme Rules, Technical, Finance, Consumer Protection, Membership and Disciplinary, Product, Pricing, Risk Management	Interim Board, NPC, Consultants	█	█						
1.9	Establish project management unit (PMO) to assist the WGs and manage implementation of the scheme formation and switch technology	Consultants (referred to as PMO in the plan below until full time PMO staff is hired)	█	█						
1.10	Develop pitch decks for investors / donors to potentially fund a portion of the cost of the initial implementation	Interim Board, AFR		█						
1.11	Close the timeframe for accepting ownership applications and finalize the ownership and governance structure	Interim Board, CEO				█				
1.12	Develop and roll out the application process for direct and indirect participants, and connected institutions	NPC, PMO			█					
1.13	Invite applications from potential participants (direct, indirect, connected) for the initial set of use cases	NPC, PMO				█	█			
1.14	Finalize the development of the Scheme's business rules (standard operating procedures, rights and obligations of participants), operational processes (e.g. clearings, reconciliation, settlement), certification criteria for integration / connectivity with the switch	NPC, WG, PMO, Vendor					█			
1.15	Hire operations team and execute transfer of activities from PMO/ consultant team and vendor staff	CEO, PMO							█	
2	**Laws, Regulations, Policies**									
2.1	Coordinate with the BNR (and other government agencies, as needed) for regulatory adjustments / changes to enable new types of participants' access to the Scheme, to enable the offering of new use cases (e.g. payment initiation and payment gateway), and to update regulations pertaining to PSPs and remittances	NPC, CEO	█	█	█	█	█			
3	**Business Requirements**									
3.1	Build complete user journeys for prioritized use cases based on industry consensus (as outlined in the business plan), as well as a more detailed analysis of commercial viability, implementation complexity, and end-user demand	Product WG, PMO			█	█				
3.2	Build back-end processes for use cases including reconciliation, settlement, and dispute resolution	Product, Technical, Operations, Risk WG, PMO			█	█				
3.3	Propose, discuss, and finalize interchange for prioritized uses cases to implemented in Year 1	Product WG			█					
3.4	Develop a framework / sections for business requirement documents (to be developed for the initial set of use cases prioritized in the business plan)	Product, Technical, Operations, Risk WG			█					
3.5	Identify and sign MOUs with initial participants to pilot and test the prioritized uses cases when they are launched	Interim Board, NPC				█				

4	Technical	
	Expressions of Interest (EOI)	
4.1	Develop the list of potential vendors (including those who attended the Stakeholder Workshops in March)	NPC, BNR, Consultants
4.2	Define criteria for shortlisting of vendors	Technical WG, Consultants
4.3	Draft and launch request for EOI based on requirements identified	Technical WG, Consultants
4.4	Shortlist vendors based on EOI responses	Technical WG, Consultants
4.5	Develop the functional and non-functional requirements for the final solution, including: - Business requirements - Core components and their functional requirements - System integration requirements with other entities in the payments ecosystem (e.g. existing payment systems)	Technical WG, Consultants
	Request for Proposals (RFP)	
4.6	Assign a procurement committee from the NPC and working group members	Interim Board
4.7	Finalize the budget available for the technology procurement, as well as the vendor contract, terms, and conditions	Interim Board, Consultants
4.8	Define the structure, finalize the content of the RFP, and get NPC approval	Technical WG, Consultants
4.9	Conduct a legal review of the RFP	Company Secretary
4.10	Publish the RFP, sharing it with the shortlisted vendors who participated in EOI process	Interim Board
4.11	Shortlist vendors based on RFP responses	Technical WG, Consultants
4.12	Invite shortlisted vendors for proposal presentations and negotiations	Technical WG, Head of Technology, Consultants
4.13	Select vendor for the technology platform for the Scheme and sign contract	Technical WG, Head of Technology, Vendor
4.14	Start implementation of the RNDPS System - Prepare infrastructure - Finalize Functional specifications based on RFP/BRD and the prioritized use cases. - Deploy and configure system - Share technical standards, integration specifications with first batch of participants who will integrate with system. - Perform system integration testing with participants and BNR	PMO, Vendor
5	**Use Case / Product Launch**	
5.1	Participants to develop their internal project plans to ensure technical and operational readiness	Participants
5.2	Design the user acceptance testing (UAT) for use case 1 and 2 with agreed participants	PMO, Vendor
5.3	Build test environment with the participants	PMO, Vendor
5.4	Develop and share UAT and pilot project plans with participants and select end-users to participate in the testing	PMO, Participants
5.5	Start UAT	PMO, Participants, Vendor
5.6	Develop training material in partnership with the participants for staff at individual institutions	PMO, Vendor, Participants
5.7	Complete UAT and make changes based on end-user feedback	Vendor, PMO, Participants
5.8	Conduct a security review of the entire infrastructure and system deployed for the R-NDPS	PMO, Security Assessor, Vendor
5.9	Acquire approval / no objection certificate from the BNR to launch the Scheme	CEO
5.10	Continue to integrate additional participants for the use cases that have been launched by R-NDPS and work on the remaining use cases outlined in the implementation scope	Vendor, PMO, Participants
6	**Sales and Marketing**	
6.1	Prepare budget for marketing	CFO
6.2	Develop an RFP for creative agency / marketing firms	CEO
6.3	Evaluate proposals and select agency	CEO, Business Development
6.4	Finalize branding, logo, and communication media	CEO, Business Development
6.5	Finalize co-branding and marketing plans with participants	CEO, Participants
6.6	Develop financial awareness campaigns in partnership with the government	CEO, BNR, Ministry of Finance
6.7	Execution of the financial literacy campaign	

7	R-DNPS Launch									
7.1	Select media agency to promote the launch of the R-DNPS	Business Development Head								
7.2	Select and invite local and international guests to the event	Business Development Head								
7.3	Launch the R-DNPS	Business Development Head								
7.4	Planning for connecting with Regional Switches	PMO								
7.5	Execution of regional switch connectivity	PMO								

ANNEX 1: USE CASE TRANSACTION FLOWS

a. P2P Transfer (Sending Money)

1 1. Customer of BK wants to send money to customer of another bank / PSP 2. Customer selects bank / PSP on his mobile; enters the account number / mobile number of receiver	BK sends an "Account Validation" request to R-NDPS	R-NDPS routes the request for Account Validation to receiver bank / PSP	Issuer bank / PSP confirms "Account" exists and can receive the amount
2 Customer views "Title of Account" of receiver and confirms the ransaction	BK debits its customer's account and sends credit request to R-NDPS	R-NDPS records credit advice for settlement and routes request to issuer bank	Issuer bank / PSP credits customer account immediately

b. P2P Transfer (Request to Pay)

1 Customer of KCB Bank wants to receive money from customer of another bank / PSP

Customer selects other bank / PSP and enters the account number and requested amount

KCB Bank sends the request to R-NDPS → R-NDPS routes request for payment to other bank / PSP for authorization → Bank receives request from R-NDPS and notifies its customer of incoming request and asks for authorization → Customer views requested amount and requestor's ID and authorizes request on her mobile phone with her PIN

Customer gets notified on her mobile phone ← KCB Bank credits its customers account with funds received ← R-NDPS records the transaction response for settlement and sends response to KCB Bank ← Issuer bank / PSP debits the customer

c. Collections (P2G)

P2G collections can be done through two models:
- Customer of a bank / MFI / PSP initiating a transaction from his institutions' channel
- Customer of a bank / MFI / PSP initiating the transaction from an aggregator (e.g. iRembo)

In both cases, the payment will be authorized by the customer and funds will be pushed from the financial institution to the settlement bank where the government entity maintains the account

Tax Payment   Pension Contribution   Health insurance (Mutuelle de Sante) Contribution   iRembo

R-NDPS

Bank 1   Bank 2   MFI 1   MFI 2   PSP

d. Merchant Payments (P2B)

🏪 **Merchant Payments**

- For in-store merchant payments using the push-based method, options include:
  - For customers with smart phones
    - Merchant-presented dynamic QR code (containing Merchant ID and Transaction Amount)
    - Merchant-presented static QR code (containing merchant ID); customer enters the amount
  - For customers with feature phones
    - Merchant-initiated request to pay
    - Customer-initiated push payment (using merchant's ID and entering amount)
- For online merchant payments, payment gateways can be used which connect via R-NDPS to different participants for payment authorization

e. Bulk Disbursements (e.g. B2P and G2P payments)

1. Businesses / government agency send bulk disbursement data with employee national ID and amount to be disbursed to R-NDPS

2. At the R-NDPS, the system holds lookup data for routing

National ID → (bank/PSP and account number)

Request is routed to the respective bank / PSP; if a customer changes banks, s/he can update this information with either his/her employer / government agency or new bank / PSP

3. Bank / PSP credits customer account and notifies the customer

4. Transaction is settled by the R-NDPS through BNR

Salaries   Social Aid   Pensions

R-NDPS

Bank 1   Bank 2   MFI 1   MFI 2   PSP

f. Cash-in at off-us agent

1
Customer comes to an MTN agent to cash-in
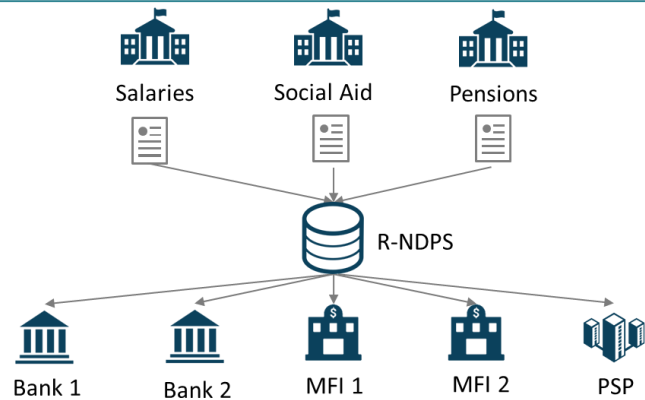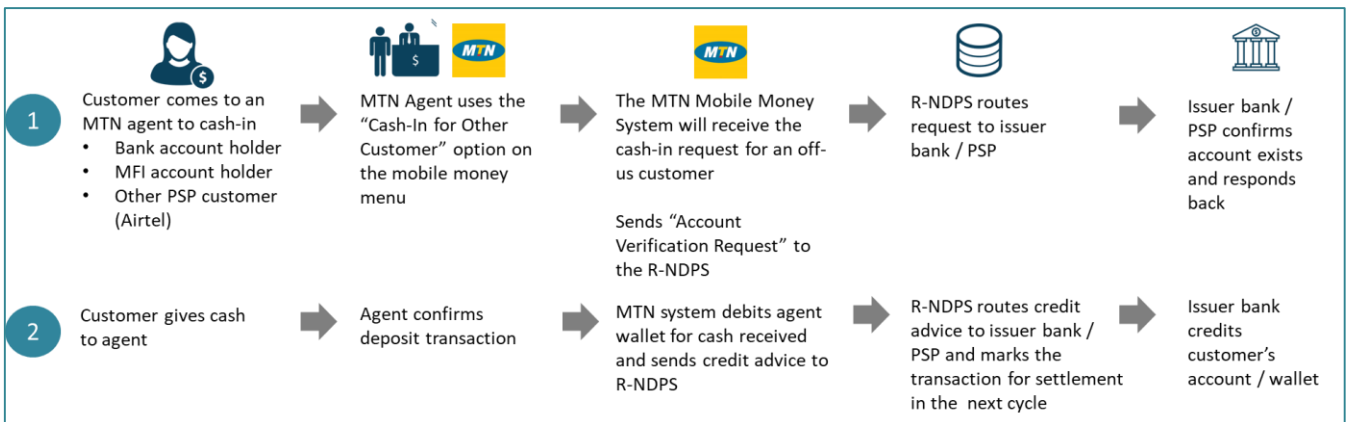- Bank account holder
- MFI account holder
- Other PSP customer (Airtel)

MTN Agent uses the "Cash-In for Other Customer" option on the mobile money menu

The MTN Mobile Money System will receive the cash-in request for an off-us customer

Sends "Account Verification Request" to the R-NDPS

R-NDPS routes request to issuer bank / PSP

Issuer bank / PSP confirms account exists and responds back

2
Customer gives cash to agent

Agent confirms deposit transaction

MTN system debits agent wallet for cash received and sends credit advice to R-NDPS

R-NDPS routes credit advice to issuer bank / PSP and marks the transaction for settlement in the next cycle

Issuer bank credits customer's account / wallet

g. Cash-out at off-us agent

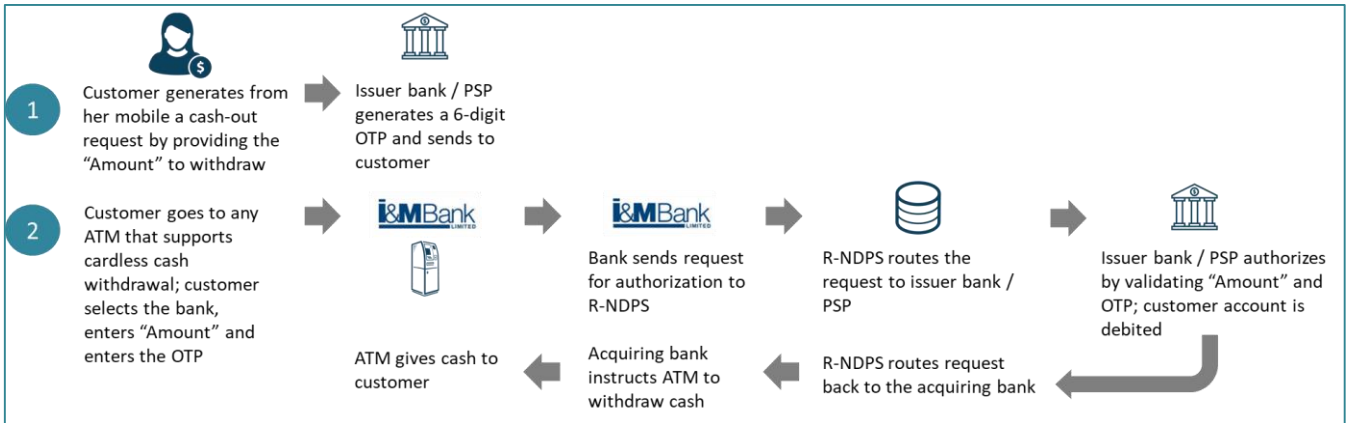|	
1	Customer comes to an Airtel agent for cash-out from his other bank account/wallet • Bank account holder • MFI account holder • Other PSP customer (MTN)	Airtel agent uses the "Cash Out for Other customer" option on the mobile money menu	Airtel mobile money system receives cash out request and sends authorization request to R-NDPS	R-NDPS routes request to issuer bank / PSP	Issuer bank / PSP sends an "Authorization Push Message" through USSD to its customer	Customer confirms by entering the mobile pin on the phone authorizing the transaction
	Agent gives cash to customer	Airtel system credits agent and sends confirmation to agent to cash-out	R-NDPS responds to acquiring agent's mobile money network	Issuer bank validates the pin and responds to R-NDPS	

h. Business-to-business (B2B) payments

Business-to-Business (B2B) Payments

- Typically, the business that is expecting a payment generates an invoice and sends it to the business that needs to pay
- Unlike P2P or P2B payments, a typical B2B payment is:
  - Larger in amount
  - May require authorization of multiple people managing the business
- The role of the R-NDPS will be to provide the rails to make the B2B payment possible. A service provider can develop services such as an e-invoicing platform to digitize the payment life cycle and the platform can use R-NDPS to facilitate the transfer.

i. Card-less cash-out at any ATM

1	Customer generates from her mobile a cash-out request by providing the "Amount" to withdraw	Issuer bank / PSP generates a 6-digit OTP and sends to customer			
2	Customer goes to any ATM that supports cardless cash withdrawal; customer selects the bank, enters "Amount" and enters the OTP	I&M Bank	Bank sends request for authorization to R-NDPS	R-NDPS routes the request to issuer bank / PSP	Issuer bank / PSP authorizes by validating "Amount" and OTP; customer account is debited
		ATM gives cash to customer	Acquiring bank instructs ATM to withdraw cash	R-NDPS routes request back to the acquiring bank	

ANNEX 2: ANTICIPATED COSTS FOR PARTICIPANTS / MEMBERS

Pricing category	Definition	Frequency of Fee (USD/ RWF)		
		One-time	Recurring	Transaction-based
Participant fee	Fee payable to the R-NDPS to become participants of, and get access to, the system	None		
• Direct Participant	Fee payable for direct participation in the system, settlement, board membership, voting rights	None		
• Indirect Participant	Fee payable for indirect participation in the system	None		
Shared Platform Services Fee	Fee payable to access shared services such as: Shared Fraud Management Services, Shared KYC services	TBD	TBD	TBD
Network Fee	Fee to support, operate and maintain the system		USD 2,000 / month	
Certification Fee	Fee to integrate and comply with the technical requirements, per component or service	USD 1,000		
Processing Fee	Fee per transaction, specific to use case, e.g., P2P G2P P2B			RWF 200 100 100