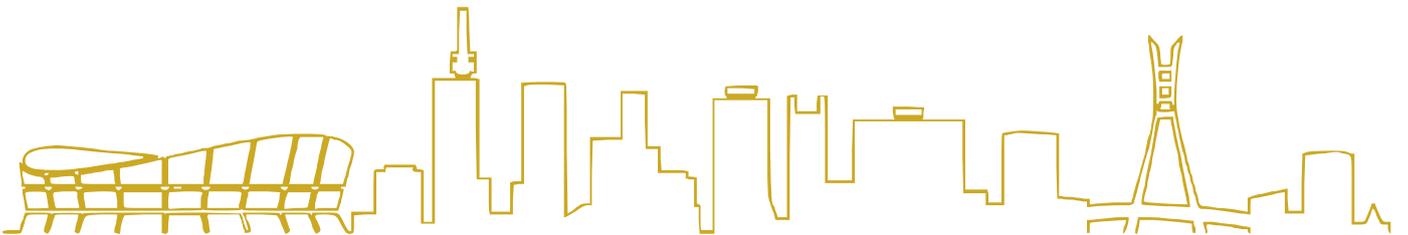


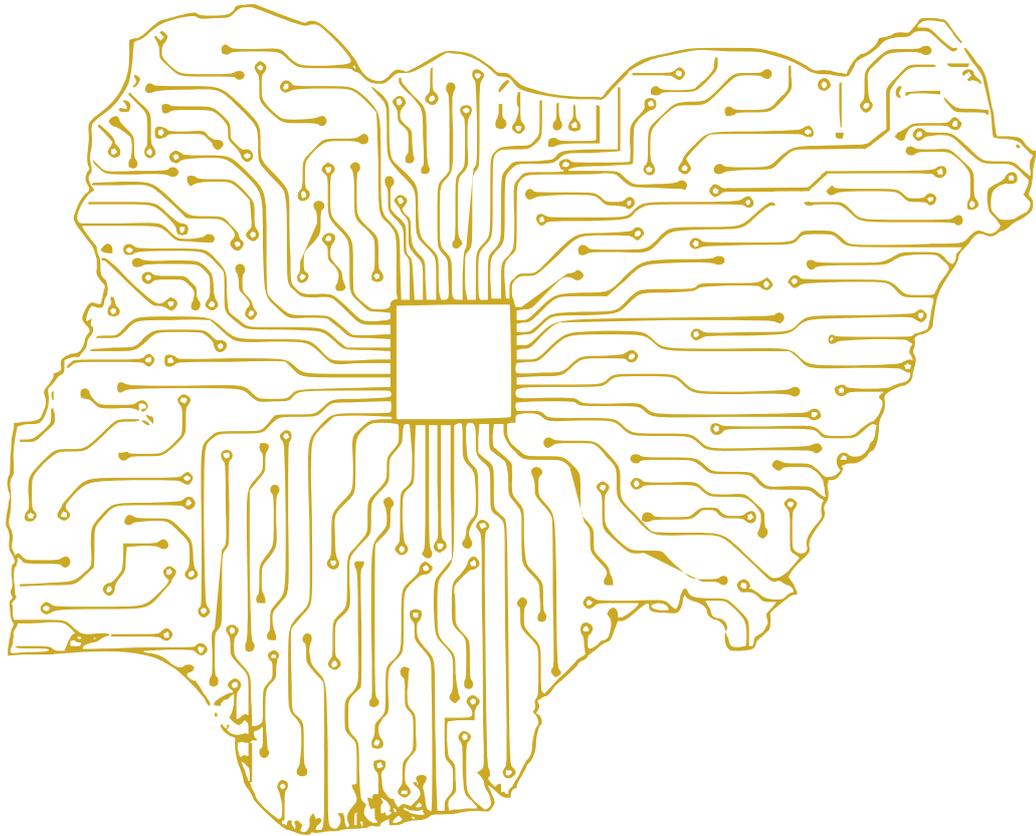
Financial Services

Nigeria Payments System Vision 2025

Nationally Utilised, Internationally Recognised







Nigeria Payments System Vision 2025

Nationally Utilised, Internationally Recognised

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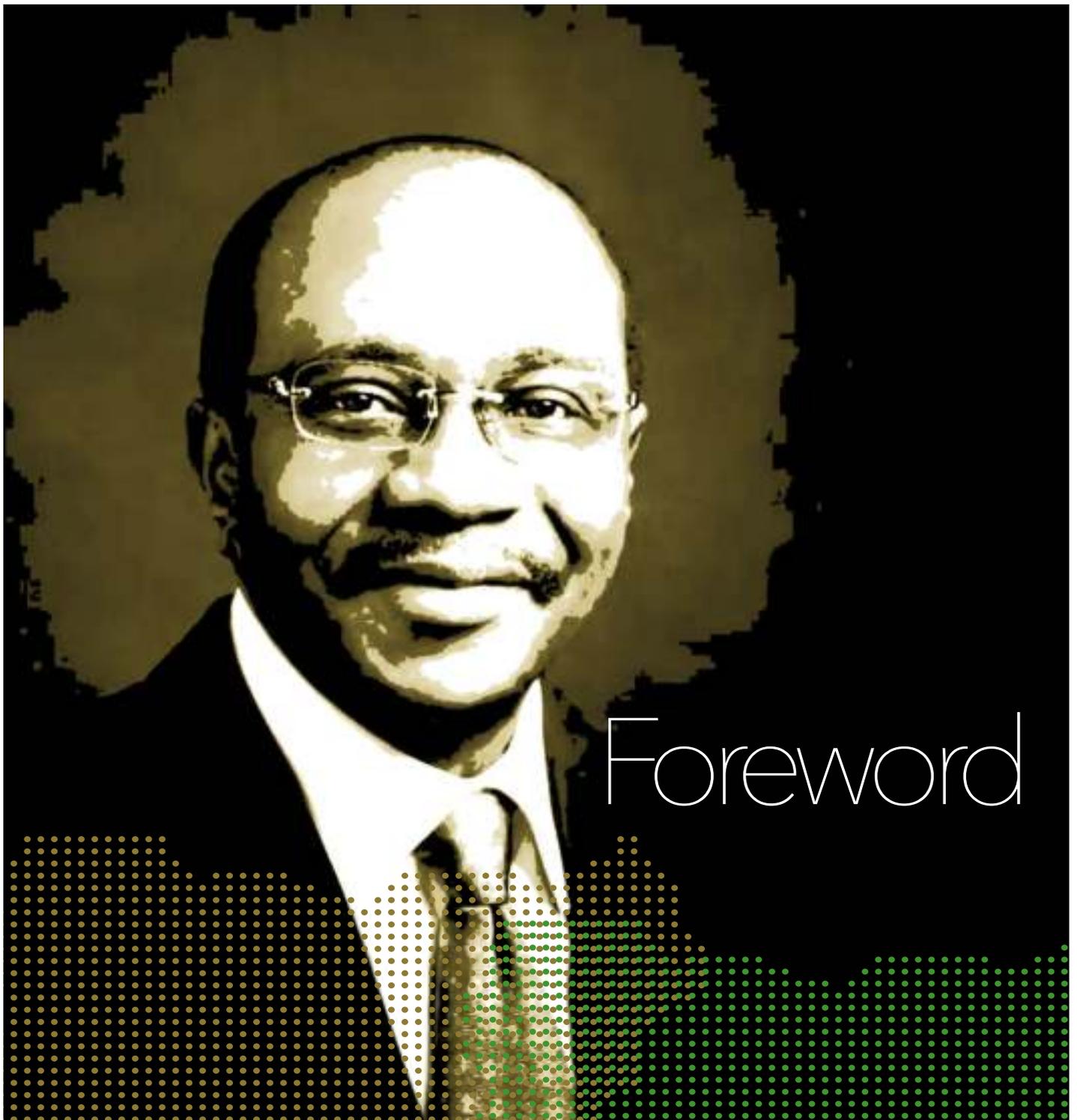
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Glossary



ACH -	Automated Clearing House
ALGON -	Association of Local Governments of Nigeria
ARDS -	Agriculture and Rural Development Secretariat
ATA -	Agriculture Transformation Agenda
ATM -	Automated Teller Machine
BIS -	Bank for International Settlements
BoA -	Bank of Agriculture
BVN -	Bank Verification Number
CAMA -	Companies and Allied Matters Act
CBN -	Central Bank of Nigeria
CPSS -	Committee for Payment and Settlement Systems
CSD -	Central Securities Depository
CoG -	Committee of Governors
DNS -	Deferred Net Settlement
EMV -	A standard for card security which stands for Europay, MasterCard and Visa
FEIPS -	Farmer Electronic Payments Incentive Package Scheme
FMARD -	Federal Ministry of Agriculture and Rural Development
FSS2020 -	Financial System Strategy 2020
IOSCO -	International Organisation for Securities Commissions
MFB -	Micro-Finance Bank
NASS -	National Assembly
NDIC -	Nigeria Deposit Insurance Corporation
NFC -	Near Field Communication
NGF -	Nigerian Governors' Forum
NIMC -	National Identity Management Commission
NIMS -	National Identity Management System
NIN -	National Identity Number
NIP -	NIBSS Instant Payments
NIRSAL -	Nigeria Incentive-based Risk Sharing for Agricultural Lending
NUBAN -	Nigeria Uniform Bank Account Number
PFMI -	Principles for Financial Market Infrastructure, a set of principle defined jointly by the Bank for International Settlement Committee for Payments and Securities Settlement (BIS-CPSS) and IOSCO
PMI -	Primary Mortgage Institution
POS -	Point of Sale Terminal
RTGS -	Real-Time Gross Settlement
RUFIN -	Rural Finance



Foreword

The Central Bank of Nigeria (CBN) published the Payments System Vision (PSV) 2020 in 2006, to provide a roadmap for the reform of the Nigerian payments system with the main goal of driving the adoption of electronic payments in different sectors of the economy and improving the resilience of the financial system. The strategy

was revised in 2013 to address emerging issues and market realities related to risk management, compliance, governance and supervision.

Following the implementation of the initiatives in the PSV 2020, the Nigerian payments system has witnessed tremendous transformation underpinned by the rapid pace of digital



innovation. Consequently, the system recorded significant increases in the volume and value of electronic payments as well as a proliferation of products, channels and participants. The payments system also contributed greatly to the increase in the financial inclusion rate, the reduction in the cost of financial services and improvement in quality of service, amongst others.

I congratulate all stakeholders in the Nigerian payments ecosystem for the landmark achievements recorded under PSV 2020 and acknowledge that the successes of the past decade would not have been possible without strong partnerships and collaboration by all ecosystem players - banks, payments service providers, regulatory authorities and other stakeholders in the public and private sectors. These partnerships aided the crafting of business rules and regulations which not only created a conducive environment for product development but also supported seamless settlement and resilience of payments infrastructure.

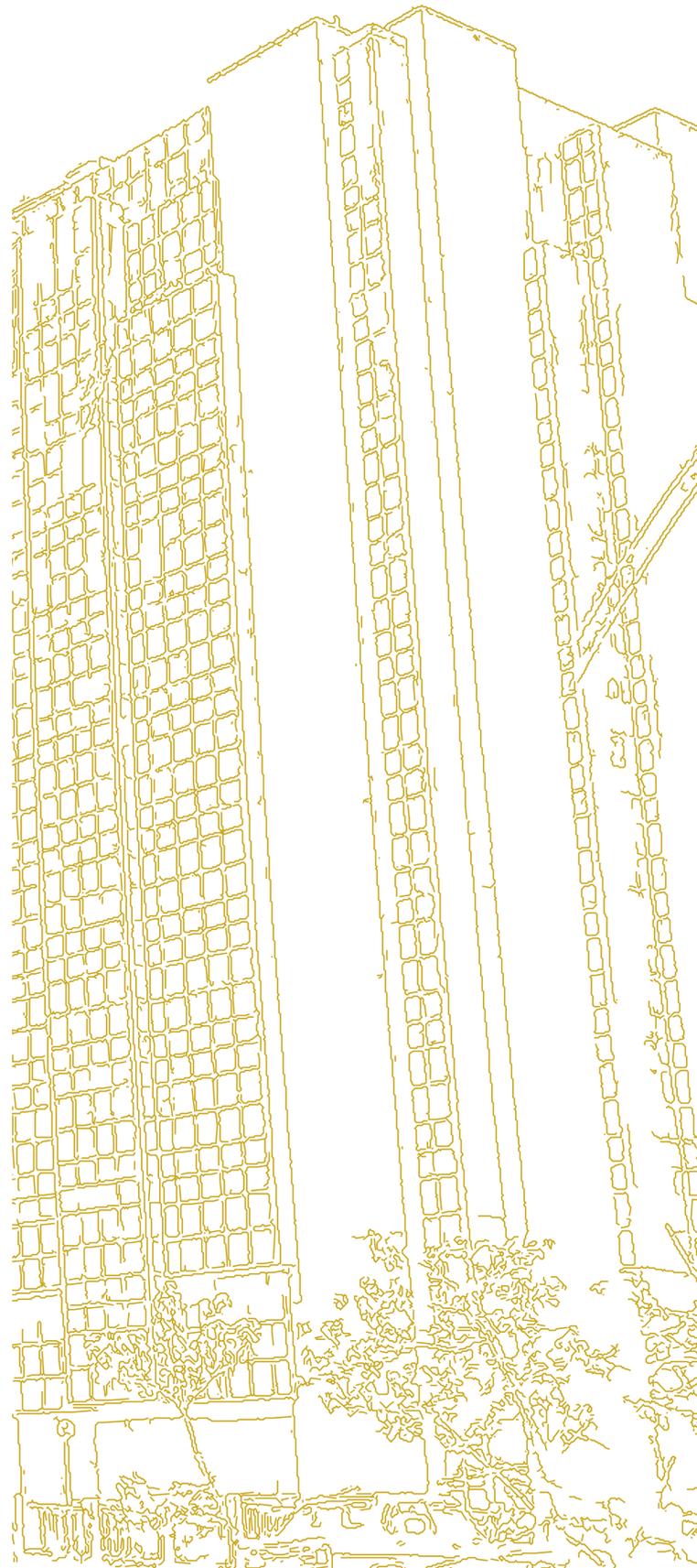
The PSV 2025 will focus the attention of critical stakeholders on contemporary developments that will drive digital innovations and payment in the future, such as contactless payments, big data, open banking, etc. I urge all stakeholders to join hands with the CBN to execute initiatives under the PSV 2025 towards fostering efficient and secure payments system in Nigeria.

As we implement the PSV 2025 agenda, the CBN will continue to ensure that the Nigerian payments system is widely utilised domestically, supports government's financial inclusion objectives and meets international standards whilst contributing to overall national economic growth and development of Nigeria.

Godwin I. Emefiele, CON

Governor

Central Bank of Nigeria, Abuja.



Preface

For almost two decades, the Central Bank of Nigeria (CBN) has been at the forefront of several landmark initiatives under the Payment System Vision 2020 reforms to promote an efficient and credible payment system in Nigeria. The overarching objective of PSV 2020 was to expand electronic payment options and promote its widespread adoption whilst also enhancing the resilience of payment system infrastructure.

The Nigerian payment system has evolved in response to the

implementation of the strategy, leapfrogging many of its counterparts in not only emerging and frontier markets, but also in advanced economies. The positive impact of PSV 2020 is evident given the astronomical growth in the volume and value of electronic transactions over the years, the variety of products, channels and participants, the increasing deployment of cutting-edge technologies in the payments industry and

significant foreign direct investments into the sector.

These developments have helped expand the financial system, improve financial inclusion and enhance the quality of financial services, all with consequent positive effects on economic growth. Following successful implementation of the PSV 2020, the CBN recognised the need for further enhancements to payment system regulation and infrastructure to align with fast paced innovation in the global payment ecosystem.

The Payments System Vision 2025 strategy refresh which defines the strategic roadmap for the Nigerian Payments System till 2025 seeks to further strengthen the adoption of electronic payments, enhance safety, reliability and resilience of the system, account for new products and participants, foster financial inclusion and catalyse Nigeria's economic growth and development.

Accordingly, the 2025 strategic blueprint proposes initiatives in the innovative areas of quick response code, open banking, distributed ledger technology for fiat currency, big data and artificial intelligence, digital identification, machine learning and robotic automation, amongst others. The strategy is expected to provide an enabling environment and further impetus for new products, business models and participants to enter the payments space.

This document is broadly divided into nine sections. Following the executive summary in Section 1, Section 2 provides background to the development



of the strategy. Section 3 gives insights on the intent of the strategy such as mission statement, guiding principles, etc whilst section 4 highlights some of the emerging trends in payments system. Section 5 highlights operational considerations for effective implementation of the strategy and section 6 details the required regulatory and governance structures for the Nigeria payments system. Section 7 highlights some key dependencies (infrastructure and capacity planning) underlying the delivery of outcomes under the strategy. Section 8 deals with assessment of the payment system against the Principles for Financial Market Infrastructure (PFMI) whilst section 9 presents

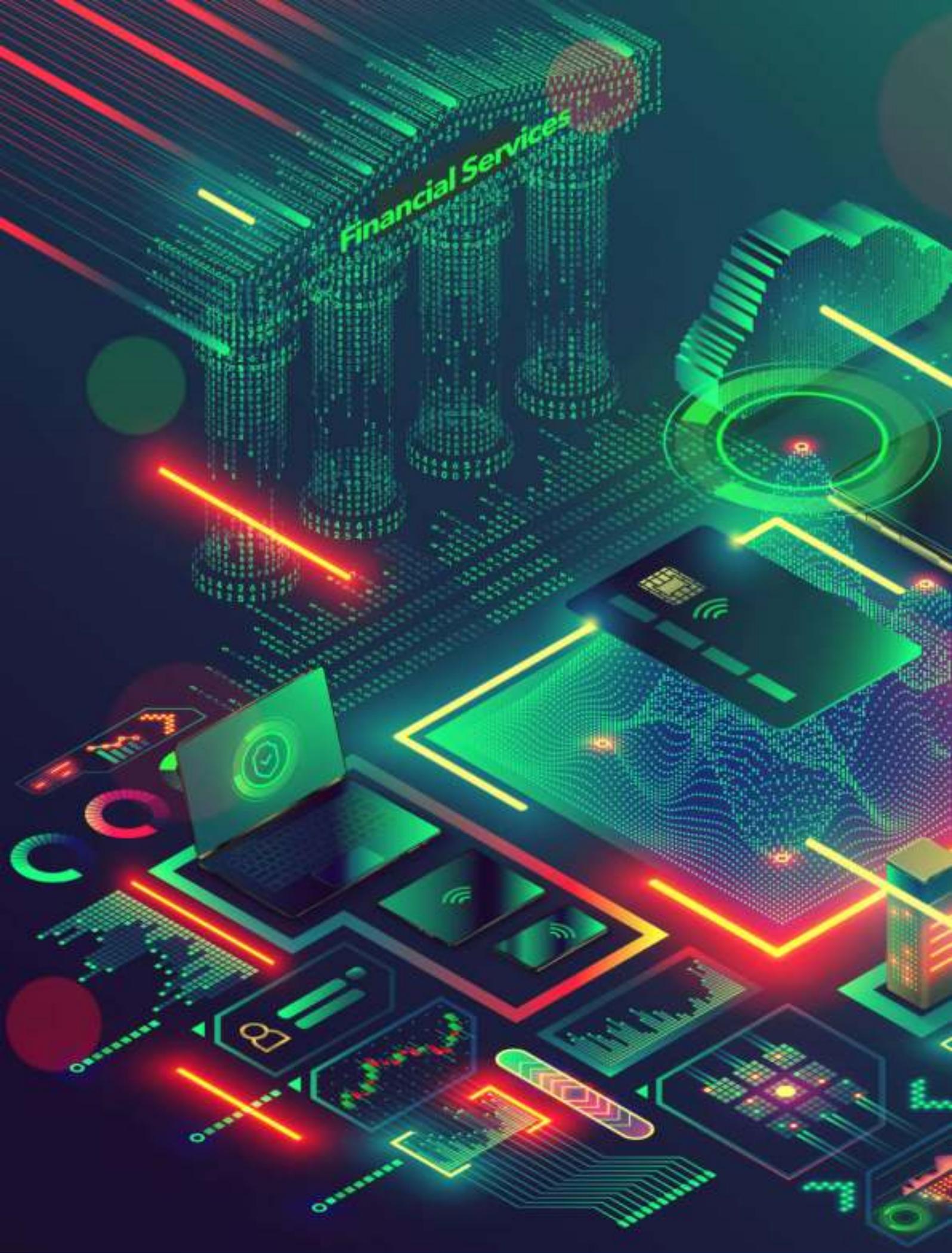
the glossary of the report.

PSV 2025 will no doubt strengthen Nigeria's position as a centre for cutting edge innovative payment solutions across Africa and the world. We would appreciate useful insights and feedback as we partner with multiple stakeholders across the ecosystem to implement these strategic initiatives.

Mrs. Aishah N. Ahmad, CFA

Deputy Governor,

Financial System Stability Directorate, Central Bank of Nigeria



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1.0 Executive Summary





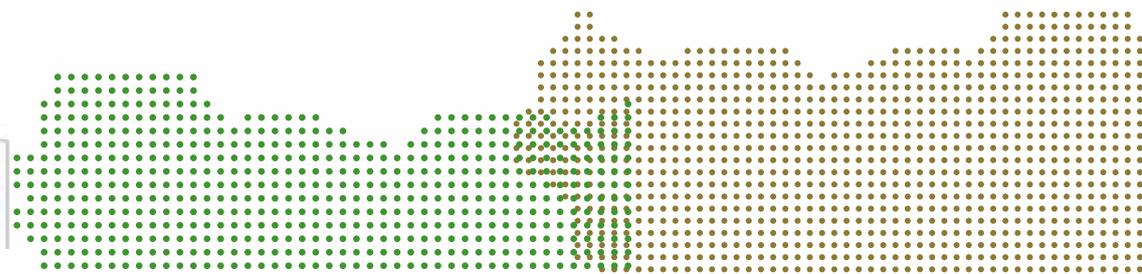
1.1

Introduction

The payments space has expanded rapidly both domestically and globally since 2006, when the Central Bank of Nigeria first issued the Payments System Vision (PSV) 2020 and revised in 2013. The Nigeria payments market has reached an inflection point where widespread adoption of electronic payments is occurring. Our previous Payments System strategy was to encourage the use of e-Payments. Today, users, consumers and businesses, need no convincing of the benefits of electronic payments. Innovation and competition are being driven by adoption of new technology solutions

and competition introduced by regulatory regimes that encourage new entrants.

The two previous releases of PSV 2020 largely achieved the objective of making the Nigeria payments system internationally recognised and nationally utilised. However, due to the innovations in the financial landscape, a new agenda is desirable for the payments system in Nigeria, hence the development of the PSV 2025, the blueprint that defines the roadmap for the next five years.



1.2

Global Trends

The PSV 2025 recognises the technology and business trends, in the local and global markets.

Specifically, recommendations are proposed for the key trends in the payments eco-system, such as: New Payment Methods; Open Banking; Digital Access, Distributed Ledger Technology (DLT); Big Data and Artificial Intelligence; Cyber-Security; Digital Identity and User Authentication; Machine Learning and Robotics Process Automation.



1.3

Our Approach

The Vision adopts internationally accepted best-practice for payment and settlement systems, namely the Principles for Financial Market Infrastructure

(PFMI). To achieve this, the strategy outlines several areas including but not limited to building centres of excellence and participating actively in discussions, workshops, pilot programs and provide operational solutions on key initiatives.

1.4

List of Payments System Vision 2025 Recommendation

The emerging payments initiatives and schemes identified are captured in the PSV 2025 with thirteen (13) recommendations highlighted below and details provided in relevant sections of this document.



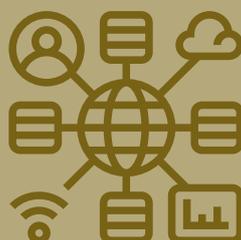
The CBN would initiate a review of the core payments infrastructure and central switching platform to ensure continued capability to meet payments demand.

The Bank would also review the potential for a Request for Payment (RfP) Scheme and the deployment of Contactless Solutions such as Quick Response Code, Contactless Card, etc.



A Workgroup drawn from all sectors of the industry would be tasked 2 for creating the Open Banking roadmap for Nigeria that includes a proposal for regulatory sandbox appropriate for the Nigerian Market. The mandate of the group would be to define the regulatory environment and structure.

The Workgroup would also define a library of APIs that should be supported by the local market. In addition, the CBN will consider implementing a regulatory sandbox that is appropriate for the Nigeria market.



The PSV 2025 shall accelerate the availability of basic banking and financial services to the unbanked and ensure that other industry stakeholders are supportive of achieving the objective.

The CBN would therefore, continue to drive the Agent Banking initiative, and support the industry to explore solutions that aid financial inclusion





The CBN would keep an active watching brief on Blockchain solution for the Naira while collaborating with relevant stakeholders to identify resources to track and report on potential deployments of Blockchain solution in other countries; engage with other central banks on potential joint venture to investigate and implement a Central Bank Digital Currency (CBDC) solution.

It would also monitor potential 'Smart Contract' solutions in other countries and/or regions and develop the strategy for its adoption in Nigeria.

A position paper that identifies potential use cases, deployment approaches and timescales would be developed, in collaboration with industry stakeholders.



The CBN would consider the development of a regulatory framework for potential implementation of 'Stable Coin.

It would also continue its watching brief on Initial Coin Offerings (ICOs) as well as work with Security Exchange Commission (SEC) to jointly develop a regulatory framework in the event of adoption of an ICO-based investment solution.



The CBN would initiate a workstream to identify key use cases for Big Data that has potential access to data in the payments system as well as support economic analysis.



The CBN minimum security requirements developed for banks would be reviewed to ensure they reflect the current industry best-practices.

A reviewed payments architecture would also be undertaken and ensure that the minimum standards for user authentication are included as part of a multi-layer security solution

8



The CBN would continue to support the use of BVN as an effective tool to check fraud.

The CBN would, at the appropriate time and working with other relevant agencies, review the extension of BVN to become a more general user ID by combining with other data sources and explore the potential for a Blockchain-based solution.

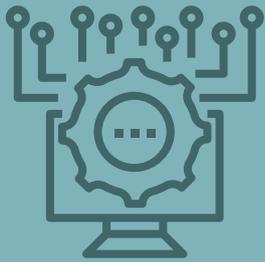
9



The CBN would request banks to strengthen Consumer Protection by issuing minimum required standards that ensure swifter dispute resolution.



10



Interoperability shall continue to be a core principle of payments system in Nigeria. The tests to ensure compliance and license renewal, shall form part of the periodic assessment of Payment Service Providers.



The current governance structure shall be strengthened with structured and regular quarterly reporting.

11



12

Wind-down the Initiative Working Groups that took part in the PSV 2020, recognising the valuable contributions by the members towards the achievement of the objectives of the vision.



13

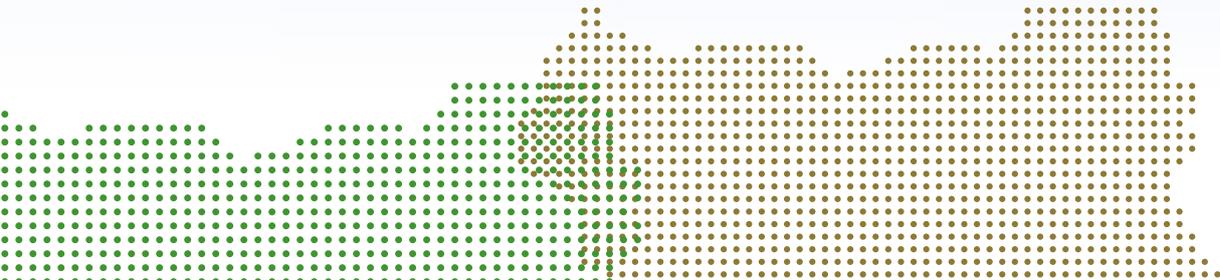
Continue the work of the Special Interest Working Groups, with the addition of a FinTech Special Interest Working Group.



2.0

Background to the Payments System Vision 2025







2.1

Introduction

In 2006, the CBN developed and issued payments system strategy roadmaps and reviewed in 2013. This strategy roadmaps are the Payments System Vision (PSV) 2020: Releases 1 & 2, that facilitated the emergence of a robust and well-utilised payments infrastructure in Nigeria. The payments space has expanded rapidly both domestically and globally since 2006. Innovation and competition are being driven by adoption of new technology solutions and competition introduced by regulatory regimes that encourage new entrants.

The two previous versions of PSV 2020 largely achieved the objective of making the Nigeria payment systems internationally recognised and nationally utilised. However, due to the innovations in the financial landscape, a new agenda is desirable for the payments system in Nigeria, hence the development of the PSV 2025, the blueprint that defines the roadmap for the next five years.

2.2

Approach to the Review of the Payments System Vision

Given the rapid pace of change in technology advancement, the PSV 2025 recognises the swiftly evolving user requirements, technical solutions, business models, regulatory environments and external threats that typify the industry. Therefore, the creation of PSV 2025 comprises three main phases:



Phase 3 Deploy

The deployment will be in sequence over a period which will be adaptable within the defined framework to respond to changes in technology and platforms. The PSV 2025 will introduce a new architecture where appropriate and seek to retire legacy systems that are no longer relevant.

Phase 1 Scope and Consult

This phase involved the development of a scope document that solicited inputs locally and internationally from stakeholders to develop the Vision.



Phase 2 Design and Plan

The inputs from phase 1 were used to develop the PSV 2025 framework that recognises the approaches adopted in other countries relevant to the Nigerian market. The Framework was concluded following the review of the industry feedback and led to the new payments strategy and deployment roadmap

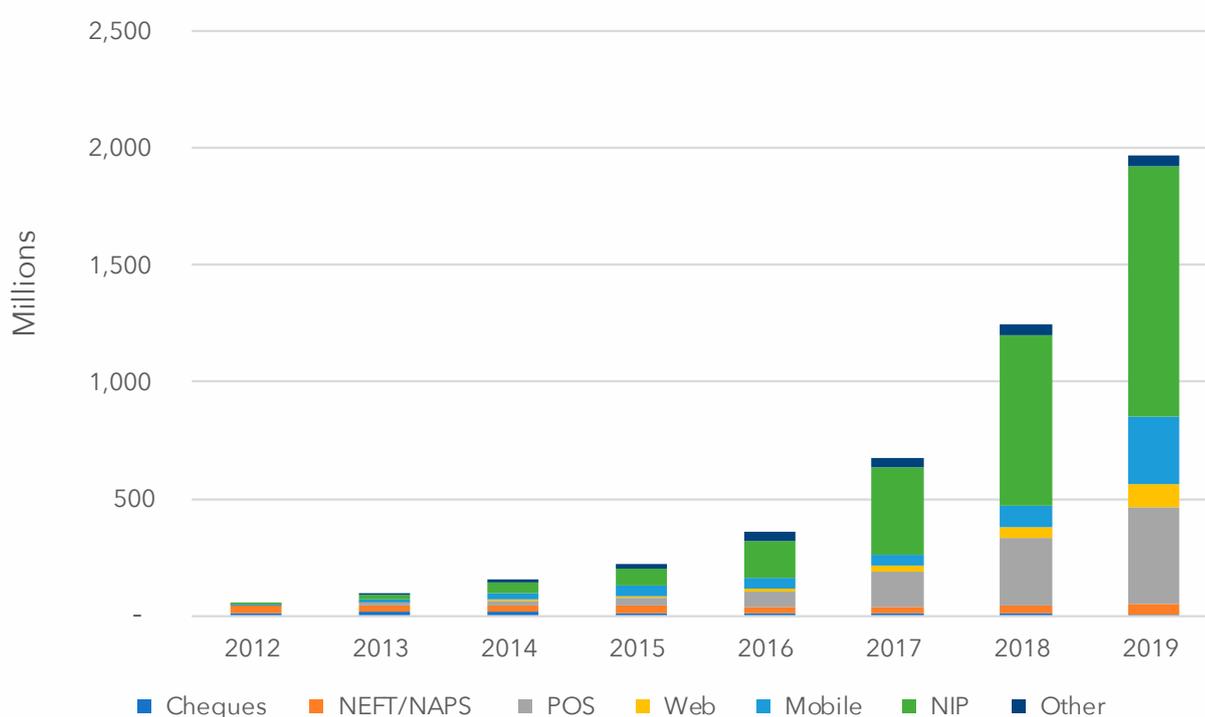


2.3

Achievements of Payments System Vision 2020

The first version of the PSV 2020 was launched in September 2006 with the overall objective of creating the payments environment that was 'Internationally Recognised, Nationally Utilised'. The second version was released in August 2013, to build on the significant successes of the first release and define new priorities for the Nigerian Payments Market.

Payment Volumes 2012 - 2019



2.3.1

Nationally Utilised

The payment methods introduced, in line with the PSV 2020, created impressive growth via new payments channels (Instant Payments, Point of Sale Devices and Mobile Payments). Also, the new functionalities which include biometric-based Bank Verification Number (BVN) and a harmonised Nigerian Uniform Bank Account Number (NUBAN) have improved the level of fraud detection and automation of payment

processing.

The adoption of new payment methods such as Instant Payments, Mobile Money and Card Payments have driven an impressive overall 62.5% Compound Annual Growth Rate (CAGR) of non-cash payments over the last five years which compares very favourably with an equivalent developing market growth of 16.5% and mature market growth of 7.1%. Over the last three years, cheque payments volume is annualised at the rate of 13.0%.

The progress over the last decade depicted in the graph below has been impressive.



2.3.2

Internationally Recognised

The CBN undertook three separate assessments against the benchmark for the payments system over the past five years to assess level of conformance to internationally accepted standards. The assessment was conducted using the Principles for Financial Market Infrastructure (PFMI) as defined by the Bank for International Settlements (BIS). The result showed a continued improvement in the overall resilience in the current market with significant improvements in the governance structure, clarity of rules and regulation, and reduction in the level of risk. The progress of the Nigerian Payments System is highlighted below.



2.3.3

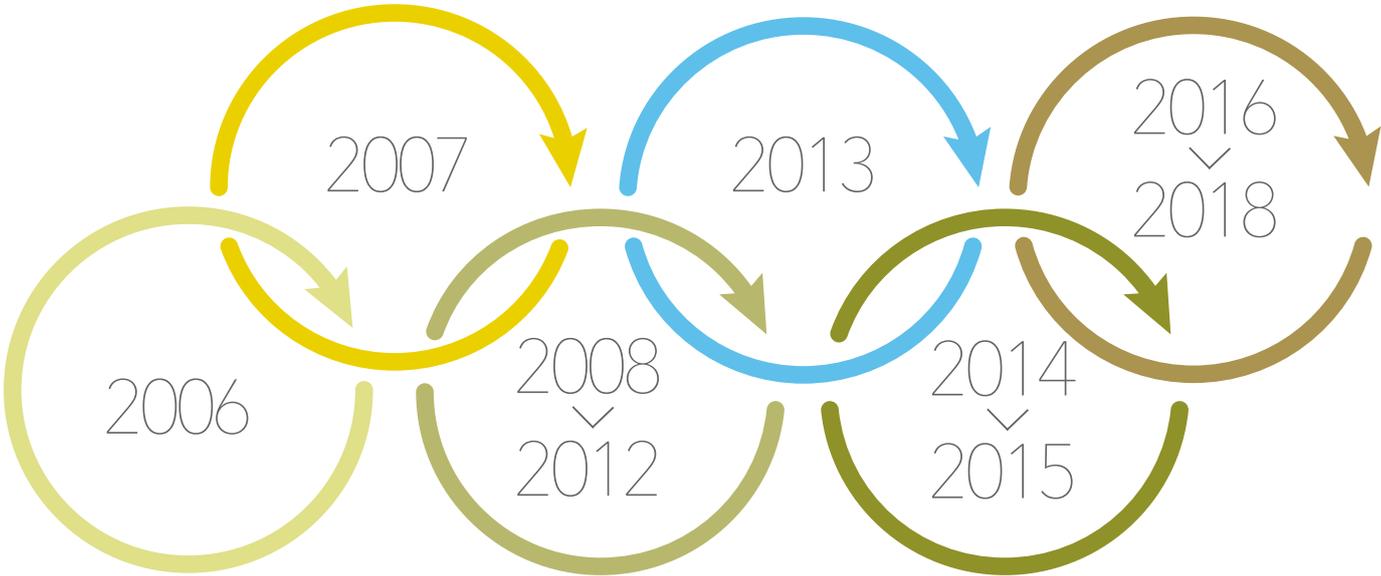
Nigerian Payments Landscape

The local market is now at the stage where we can reasonably state that we are ready to move to a new phase of the payment infrastructure development viz PSV 2025, a Vision that is relevant for the current and future market. This is because, the Nigerian financial services industry does not require regulatory drive for growth in payments system rather a regulatory environment that encourages the industry to sustain the growth.

- PSV2020-commenced review of payment systems
- Developed guiding principles
- Focus on cash to electronic

- Internationally recognized, Nationally utilised
- Published first assessment against 10 core principles
- Formalised role of Payments
- Infrastructure and Strategy Committee Inaugurated working groups

- PSV2020 conference to broaden industry engagement
- Focus on legal certainty and drafting payment System Management Bill
- Presidential mandate on Government e-payments
- Commence RTGS replacement program



- PSV2020 reissued – complete rewrite based on new PFMI Principles and substantial progress made since original review
- New Governance structure created – target to devolve management to industry participant
- International Payment Conference held in Lagos

- Updated CBN Guidelines for alignment with PFMI principles and current market practice
- Highlighted key areas of focus
 - Payment Finality and No Unwind, Collateral Management

- Reassessment of Payment Systems against PFMI
- Payment Finality formalised
- Major initiative on Risk-based Collateral Management







3.0 Payment System Vision 2025



3.1

Displacement of Cash

Cash is ubiquitous and transferable. The Nigerian payment landscape has many options that have displaced cash in recent time, including electronic bill pay, mobile phone top up, mobile payments and instant payments. The use of cash will naturally slow with the 'mobile first generation' who will be economically active by 2025, hence one of the focus of the PSV 2025 is on enhancing the cashless policy of the CBN.

Key drivers to accelerating the switch to electronic payments include:

- i.** Interoperability and the exchange of cash for digital counter parts in emerging payment systems.
- ii.** The 'mobile first generation' who are more inclined to instant access to funds, aversion to long queues in traditional banks but prefer to transact digitally.
- iii.** Responding to the concerns of the informal economy - to ease the difficulty in meeting tax obligations and increase transparency in business transactions.
- iv.** Continued adoption of mobile and digital wallets. The mobile and digital wallets should also be useable as merchant accounts; and
- v.** Enabling frictionless payments. This entails removing the need for OTP, based on the amount of security available at the initiating terminal.

3.2

Mission Statement

By 2025, Nigeria aspires to have a cashless and efficient electronic payment system infrastructure that facilitates financial services in all the sectors of the economy and provides secured, reliable, and user centric financial solutions in compliance with international standards, with a minimal risk to the

3.3

Guiding Principles

The previous two versions of the PSV 2020 were developed with clear guiding principles namely:

- i.** Serve the end-user via the Payment Service Providers.
- ii.** Facilitate nationally and internationally accepted payment methods.
- iii.** Encourage innovation and deployment by Payment Service Providers.
- iv.** Use common core infrastructure and enforce interoperability.
- v.** Recognise local geographic, market and cultural practices.
- vi.** Conform to internationally accepted risk principles.
- vii.** Adopt a clear and transparent legal and regulatory framework with specific, measurable, attainable, relevant and time-bound goals.



The above guiding principles are still relevant for the PSV 2025 and shall be a building block for the Vision. To further improve on the robustness of Nigeria Payments System, the PSV 2025 aims to facilitate economic activities by providing safe and efficient mechanisms for making and receiving payments with minimum risks to the CBN, Payment Service Providers and end users.

Secondly, the Vision will further drive the availability and usage to all sectors and geographies, banked and unbanked, and

conform to internationally accepted regulatory, technical and operational standards.

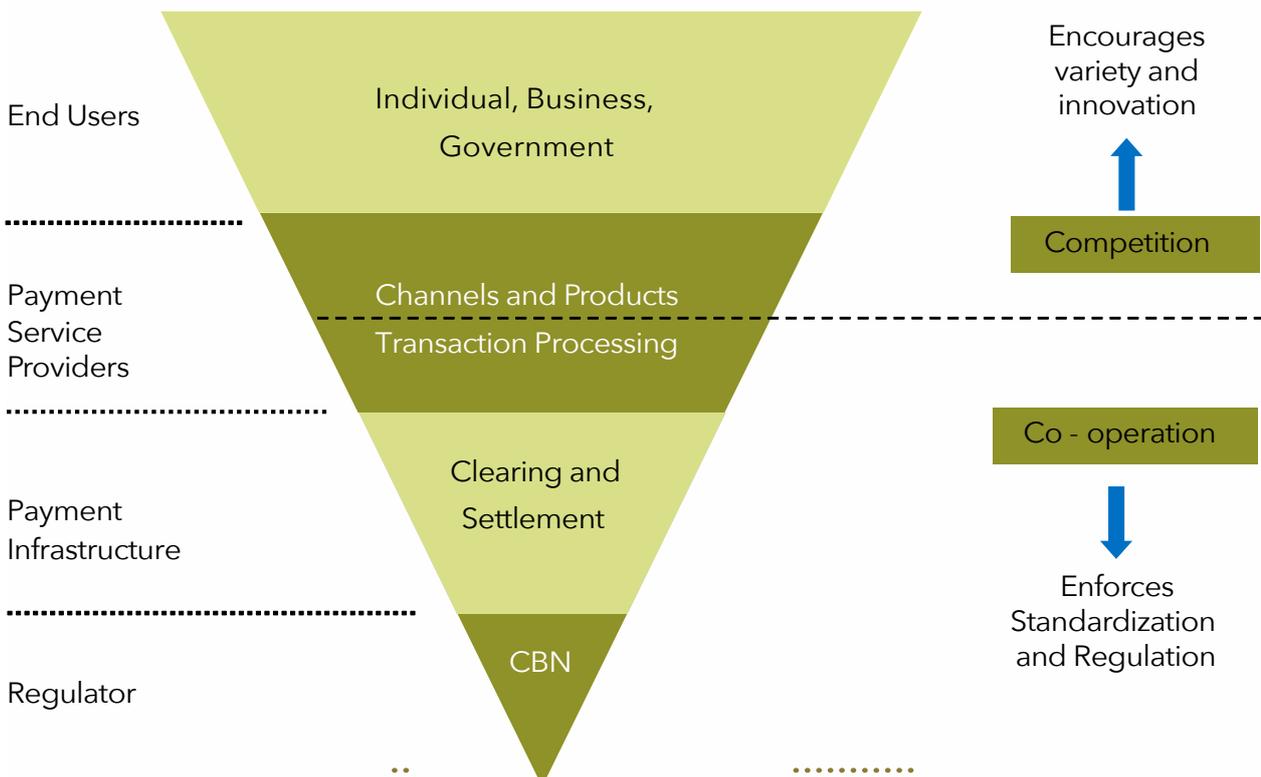
Thirdly, the payments system relies heavily on other dependencies such as power infrastructure and capacity planning, and the PSV 2025 requires collaboration with relevant stakeholders to ensure effective service delivery.

Finally, the Bank shall further leverage the local technical and business skillset and seek to create solutions that are transferable to other relevant markets.

3.4 Common Core Infrastructure

The guideline on common core infrastructure and interoperability has been a consistent principle from the PSV 2020 and is still relevant to PSV 2025.

The following diagram highlights the structure which represents the current position on 'co-operate' versus 'compete'.



3.5

Global Trends

The payments industry has evolved over the past few decades from the early days of electronic payment. The pace of change has driven by rapid advancement in technology, customer expectations and new business models (including Fintech).

The PSV 2025 was developed with consideration for global trends and new practices in payments that are relevant for the

Nigerian market, and other spheres where Nigeria plays a role in international financial flows and payments (regionally and globally).

The main trends and drivers are the following, details of which are in Section 4.

- i.** Open Banking
- ii.** Distributed Ledger Technology
- iii.** Big Data
- iv.** Artificial Intelligence and Machine Learning
- v.** Digital Identity and User Authentication

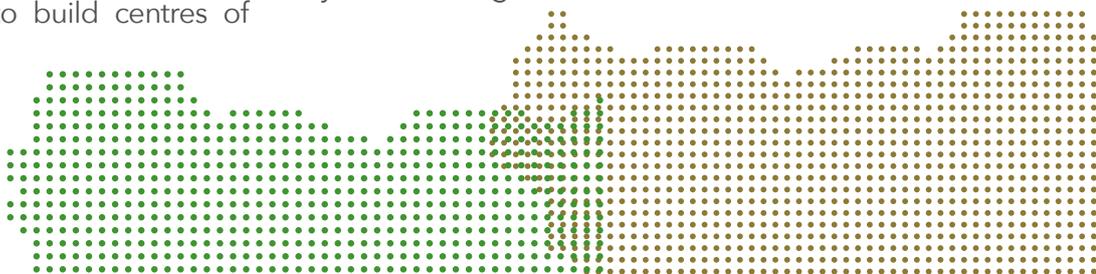


3.6

International Recognition

The Vision adopts internationally accepted best-practice for payment and settlement systems, namely the PFMI. To achieve this, the strategy outlines several areas where Nigeria pay attention to build centres of

excellence and participate actively in discussions, workshops, pilot programs and operational solutions on key initiatives. It also recognises the importance of the role of the CBN in Payments Systems oversight.





3.7

Supporting the End User

Market infrastructure must be able to support all the payment and settlement methods required by the User community. The underlying need for payments, consumer behavioural tendencies amongst others, determine the required payment channels for the payment of goods and services. The Vision aims at ensuring adequate and robust infrastructure to meet the payment needs of end users periodically.

4.0

Emerging Trends in the Payment Market



Blockchain

Digital Asset



Virtual Reality



4.1

New Payment Methods

Instant payments have created a fundamental shift in adoption of electronic payments in many countries. Real-time payments are the 'new normal'. Nigeria, as an early adopter of this payment method, has experienced strong growth in this area. Other emerging payments types, such as Request for Payment (RfP), are likely to see equally strong adoption. Mobile payment schemes and mobile phones as channels to banking services both continue to gain traction, particularly in Sub-Sahara Africa. Any new architecture should be able to support new payment methods without significant restructuring.

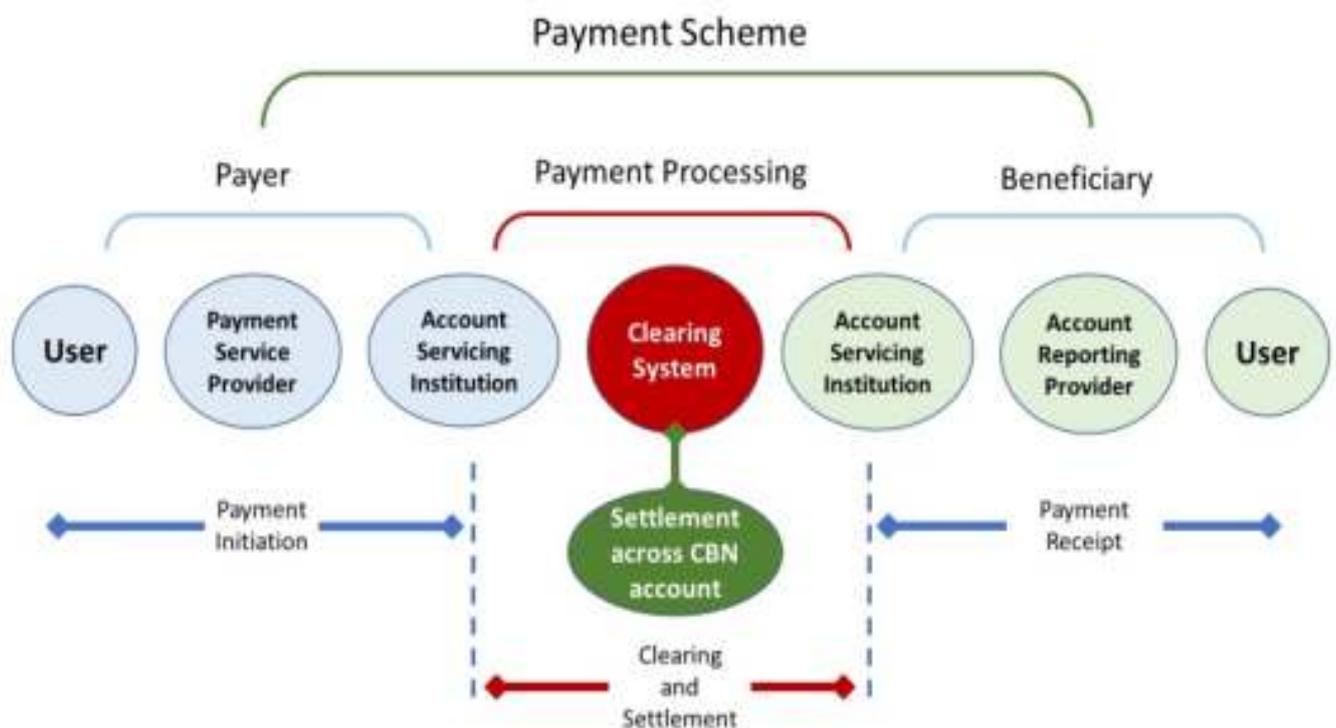
The value and volume of electronic payments in Nigeria have accelerated significantly over the

past five years with the growth driven mainly by new payment methods such as instant payments and mobile payments alongside more traditional card payments.

It is expected that physical cash will continue to decline, and in many countries the use of technologies such as contactless card payments, NFC (near field communication) on mobile devices and low-cost card acquiring solutions have made cash virtually redundant.

The term 'Payment Scheme' will be used to reference the overall client experience of payment initiation, clearing and settlement, and payment receipt. An example is the Direct Debit Scheme, where the term scheme covers the rights and responsibilities of payer and beneficiary, the rule and regulations, the operational aspects of payment processing and associated service levels.

For clarity, the diagram below shows that the process of paying and receiving funds will continue to be split into discrete roles and



functions for payers and beneficiaries and the clearing system involved.

In most situations, a single institution, typically a bank, plays both the role of Payment Service Provider (how the user initiates the payment request) and Account Servicing Institution (where the client account debit is posted). With new entrants in the market, and new services such as mobile money, this value chain is becoming more dis-aggregated.

Much of the market innovation can be driven purely around the step of payment initiation, using existing clearing and settlement processes through the current switching platforms. Other innovations, such as digital currencies and Distributed Ledger Technologies may require new clearing and settlement processes.

The landscape for payments is evolving rapidly and the potential areas to be explored are highlighted below:

- i.** USSD Payments.
- ii.** Contactless Payments using Card, Mobile, Wearables and IoT (Internet of Things).
- iii.** Quick Response (QR) codes.
- iv.** Voice-initiated through services such as Alexa, Siri and Google Assistant.
- v.** Request for Payment.
- vi.** Biometrics and/or Phone Number to link to bank account; and
- vii.** Recurring Payments and Bill Payments.

4.1.1

Payment Initiation and Receipt

The PSV 2025 envisages entities, current and new, developing and deploying new payment initiation techniques subject to ensuring resilience and security. The topic of potential new entrants is considered more fully in section 4.2 - Open Banking.

The overwhelming feedback is that the retail sector will be the primary driver for new and innovative payment initiation solutions. A key challenge for the industry is how to deliver solutions that support micro-payments where transactions can be completed in less than 3 seconds but are also available offline for remote areas with no online connectivity.

The gig economy presents a great opportunity but also a significant challenge, technically and behaviourally. Social implications include tax avoidance and privacy concerns, but there is a huge upside i.e. higher velocity of money and more traceable funds in the financial system. Any solution that is accepted by this segment could be transformative for the economy. Other sectors with significant potential include government, agriculture and transport

4.1.1.1 Unstructured Supplementary Service Data (USSD) Codes

Nigeria has built a ubiquitous and robust payments service using USSD codes. This has proved to be extremely popular due to the capability of deploying the solution across mobile devices at a relatively low cost.

USSD payments will continue to flourish in the local market as banks and other enabling service providers seize the opportunity to extend the functionality of the channel. Furthermore, Nigeria could look to become a centre of excellence in USSD and lead deployments in other markets with similar demographics and mobile profile. Work will continue with the Nigerian Communication Commission (NCC) to further drive down the cost of USSD messaging, making this solution even more attractive.

4.1.1.2 Quick Response (QR) Codes

The use of QR codes has been a feature of payments in Asia for the last decade. Usage has been generally successful with WeChat and Alipay, both offering proprietary solutions that are slowly gaining traction in China. Thailand, India, China, Singapore and Hong Kong have established payment services based on QR codes that are linked to the real-time payment infrastructure.

It has proven attractive to markets that do not typically offer electronic payment methods such as street vendors and motorbike taxis.

However, one envisaged limitation in the local market is the need for a mobile device that supports a QR code reader which implies acquiring a smartphone. As smartphones become more available and affordable, adoption of QR code technology will increase.

4.1.2 Payment Schemes

The PSV 2025 will promote new methods of initiation, such as Contactless Payments, QR codes and linkage of biometrics to account details (as in the examples below). The Nigerian Payments System shall benefit from a standardised industry approach that ensures solutions are interoperable.

Examples from other countries include:

i. Sweden - Swish launched in 2012 by the six largest Swedish

banks and connects bank accounts to mobile numbers, allowing money transfer in real time and eradicating the need for a card reader.

ii. Netherlands - iDEAL facilitates direct bank-to-bank payment

for online purchases. iDEAL payments are integrated in the online banking portals and mobile banking applications of most banks in the Netherlands and therefore extending availability to 90% of local account holders. It uses the concept of Request for Payment, where the payment request is initiated by the beneficiary/merchant.

iii. Malaysia - launched a real time Retail Payments Platform (RPP)

in 2019 as part of a strategic push for the move from paper to electronic. The initial services include Instant Credits and Real Time Debit for e-commerce merchants with payments approved through mobile banking applications and using the concept of Request for Payment.



4.1.2.1 Request for Payment (RfP)

Consumers and corporations around the world are increasingly demanding products and services to interact with them in real-time, and of course that includes the interaction with the payment. Faster Payments has created opportunity for 'extension services'

that build on the new 'rails' of Faster Payments. Request for Payment is one of such extension services. The Request for Payment is a form of payment that is initiated by the beneficiary and pulled from the payers account, like a direct debit (Highlighted below).

Checkout	Consumer chooses to pay from a bank account rather than using a credit or debit card
RfP initiation	Merchant initiates RfP and sends to consumer's bank
Approval	Consumer authenticates the payment request, reviews the payment details and approves
Confirmation	Merchant receives confirmation that the consumer's bank will be making the payment
Payment	The consumer's bank makes the payments to the merchant, ideally through the instant payments scheme

4.1.3 Clearing Systems

The process of clearing and settlement is central to the payments flow but is less visible to the end users. The Nigerian Clearing and Settlement system is robust and may not require significant re-engineering as it could accommodate new forms of payment initiation. However, new technology infrastructure like blockchain may give rise to changes in the clearing and settlement system.

Examples from other countries that have created new core payments clearing infrastructure

include:

i. India - Unified Payments Interface (UPI) is an instant real-time payment system developed by National Payments Corporation of India facilitating inter-bank transactions. The interface is regulated by the Reserve Bank of India and works by instantly transferring funds between two bank accounts on a mobile platform. As of June 2019, there were 142 banks live on UPI with a monthly volume of 754 million transactions and a value of ₹1.465 trillion (US\$19 billion).

ii. Australia - the New Payments Platform (NPP) is an industry-wide payments platform for Australia, national infrastructure for fast, flexible, data rich

payments in Australia. It was first made accessible to the public on the February 13, 2018 with the launch of PayID, a simple addressing capability, and Osko, the first NPP Overlay Service, operated by BPAY.

4.1.4

Summary of New Payments Methods

The impressive growth of electronic payments is likely to continue using current payment methods. To reach new users and support new flows requires that the industry continues to innovate.

Payment initiation would remain a competitive service offering to foster innovation.

The three areas of focus for PSV 2025 are:

i. a regulatory regime that disaggregates the payments value chain through adoption of

Open Banking
(see Section 4.2 - Open Banking);

ii. a review of the need for new clearing and settlement infrastructure driven by deployment of a fiat digital currency (see Section 4.4-Distributed Ledger Technology (DLT) for Fiat Currency); and

iii. development of potential national standards for Contactless Payment initiation (QR Codes, NFC etc).

Recommendations

01

CBN would initiate a review of the core payments infrastructure and central switching platform to ensure continued capability to meet payments demand.

The CBN would also review the potential for a RfP Scheme and deployment of Contactless Solutions such as Quick Response Code, NFC etc.



4.2

Open Banking

Most countries with mature banking infrastructure are opening access to new entrants to encourage innovation and competition. In Europe, Payment Services Directive (PSD2) has created different levels of service provision, from pure payment initiation and balance reporting (but not account holding) through to full-service account and credit provision. Such structures must support new entrants whilst not undermining the resilience of banking and payment services.

An outcome from the Europe PSD2 regulation is the adoption of Application Programming Interfaces (APIs).

4.2.1

Adoption of an Open Banking Regulatory Structure

There is cautious stakeholder support for an open banking regulatory regime that fosters competition and innovation without compromising on service quality, security, resilience and trust. The greater support for open banking was shown by potential new entrants, with the incumbent financial institutions showing a little more caution.

Open banking will contribute to a more vibrant payments sector – one where financial institutions and payments service providers will innovate, collaborate and compete to bring new services to the market. A robust open banking regime will bring solutions for enhanced financial inclusion. These solutions will remain under the clear oversight by the CBN.

By opening access to data, open banking will foster local innovation and the fintech ecosystem in Nigeria, supporting a leadership position for the country in the digital commerce space.

The Europe PSD2 is recognised as a well-structured approach, and one clear option is to localise this regulation to meet the needs of the Nigerian market.

The concerns noted are:

i. Requires a carefully defined regulatory framework and heavy investment, with the European example showing that it takes time to be developed to move from theory into practice.

ii. Local market readiness for open banking.

iii. Access to banking infrastructure and data either directly or

indirectly needs to be controlled and available only to operators who comply with all the data access and usage guidelines, and who are offering vetted products.

iv. An open banking environment requires rule of law and compliance with data protection and privacy policies as well as provider ethics. Currently, these are just evolving and nascent in Nigeria.

v. Breach of customer data privacy, issues around customer consent, cyber security risks, customer data vulnerability due to multiple movements between multiple parties and a lack of alignment of incentives among the counter-parties.

vi. The stability of the payments network and the uptime for 24/7 clearing of payments which most Payments Service Providers (PSPs) will want

and what other open banking jurisdictions are providing.

vii. Need for a dedicated dispute resolution mechanism, spanning both a clear set of rules and a communications platform, and leveraging the Card industry's extensive expertise of handling disputes.

viii. Lack of requisite privacy laws and a judicial system that is sophisticated enough to handle cases where people may want to seek redress for breaches.

Countries deemed to have an effective regulatory regime for open banking include the Singapore FinTech Division of their Monetary Authority, the Mexico's model where FinTechs are required to be licensed. Furthermore, the US and EU markets are good role models for open banking although there was caution about the compulsory rule used by the Competition and Markets Authority (CMA) in the UK; with a market-friendly collaborative approach being proposed.

The adoption of open banking shall be considered in the context of the broader regulatory framework. Data security and privacy concerns could be reduced by implementation of regulations like those imposed in Europe through the General Data Protection Regulations (GDPR) and PSD2 framework. Failure to accommodate GDPR and PSD2 regulations as part of the open banking framework may expose banks to the risk of financial or reputational loss. Adapting to such new regulations requirements will need a lot of investment on behalf of the industry.





Recommendations



- A Workgroup drawn from all sectors of the industry would be tasked with creating the Open Banking roadmap for Nigeria.

The mandate would be to define the regulatory environment and structure, most likely based on the Europe PSD2 model, and a timeline for adoption.

- Separately, the workgroup would define a library of APIs that should be supported by the local market.
- The CBN would consider implementing a regulatory sandbox that is appropriate for the Nigeria market.



4.3

Financial and Digital Inclusion

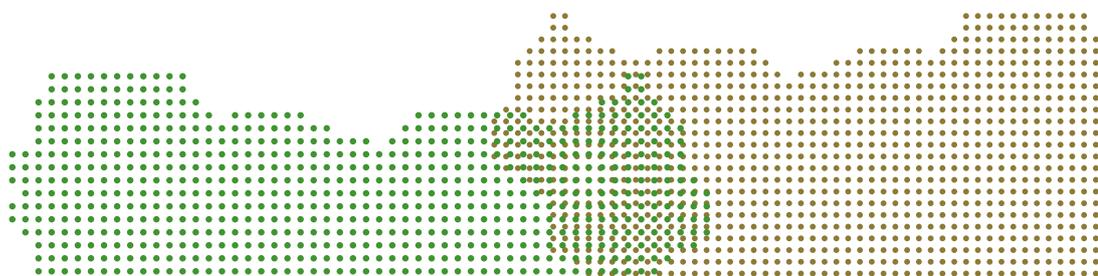
Accessing banking services through digital channels will become the norm for all payment solutions, be it through mobile devices for retail banking, or more sophisticated electronic channels for businesses. The pace of adoption varies by region, with solutions in sub-Saharan Africa requiring the use of older technologies such as USSD codes that are available alongside smart phone solutions that dominate in most G20 markets. In Nigeria, deployment of USSD based mobile solutions has made access to electronic payments and other banking services more broadly available.

Digital exclusion is a growing challenge in all markets, recognising that lack of access to digital solution can inhibit social mobility. This is mitigated in part by using agent services to facilitate access by sections of the community that lack the knowledge or devices to access digital services.

4.3.1

Support Financial Inclusion

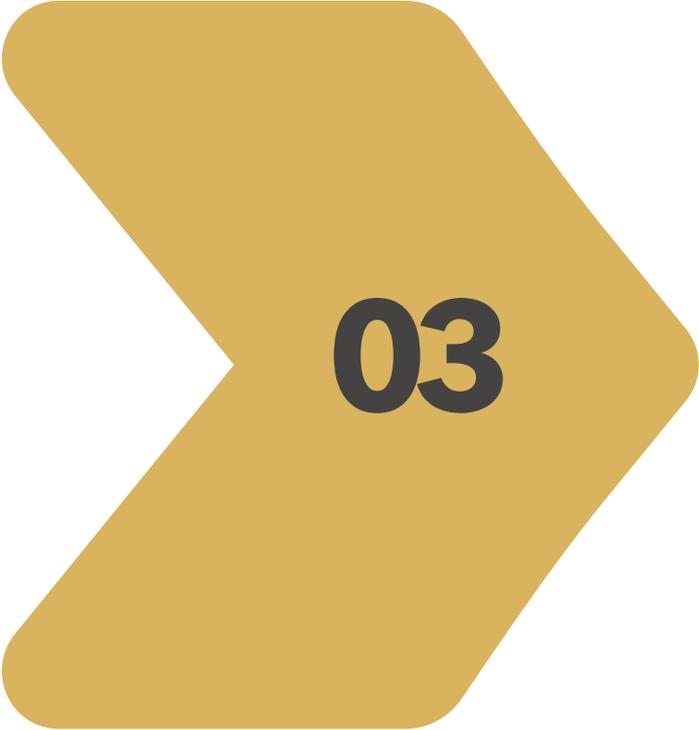
The two previous versions of the PSV 2020 strategy have been very effective at improving the resilience of the payments infrastructure and increasing the level of banking solutions. Some of these, such as mobile payments and the Agriculture initiative, are extending the availability of core banking services to the under-banked and unbanked. Financial inclusion remains a key priority to achieve a payments environment that is truly 'nationally utilised'.



The focus of PSV 2025 is to ensure that the currently underbanked and unbanked have access to affordable and simplified digital financial services, although many of the barriers apply equally to the banked community. In Nigeria, the

barriers to digital access are numerous. Many of these barriers are outside the direct control of the banking industry and therefore requires co-operation with other industry stakeholders.

Recommendations



03

The PSV 2025 shall accelerate the availability of basic banking and financial services to the unbanked and ensure that other industry stakeholders are supportive to achieve the objective.

The CBN would therefore, continue to drive the Agent Banking initiative, and support the industry to explore solutions that aids financial inclusion.

4.3.2

Digital Inclusion

Digital Inclusion is the ability to access and use information and communication technologies. Providing access to digital and financial services is a key requirement for any society that seeks to provide opportunities for all sectors of the society, and as such, should form a core element of CBN payments system strategy. Significant progress has been made through the Agent Banking initiative which provides access for those that cannot directly access digital financial services and electronic payments. The use of biometrics

for BVN has enabled its wide adoption, and the use of biometrics could further enable access to sectors of the society that have less formal education.

In Nigeria, there are three financial inclusion categories namely banked, underbanked and unbanked.

i. Banked - include the older generation and the millennials. While millennials are more digitally savvy, some work can be done

to provide and promote digital access to the older generation who prefer traditional banking models that involve walk-in branches and paper-based evidence of transactions. Also notwithstanding that millennials are more digitally advanced, there is a large segment who do not utilize the functionalities that are digitally available.

ii. Underbanked - include the Y generation who are tech driven, willing and able, and who will be the primary target market for digital products, digital access; and who are seen to be the influencers of the future. Also included in this market would be certain business organizations who utilize a small portion of digital access with online banking and who do not use many of the other technologically advanced products such as mobile banking or e-wallets.

iii. Unbanked - include those in the rural and farming areas who have limited access to banking services. There are significant opportunities to create financial inclusion services for this segment.

The most cited barriers to digital inclusion are:

- i.** Cost of devices (handsets and POS).
- ii.** Cost of data (internet connectivity).
- iii.** Education and digital literacy.
- iv.** Limited telephone network/ internet penetration coverage in rural areas.
- v.** Licensing and taxation of digital services which prevent broad scale adoption.
- vi.** Regulation around services (USSD, SMS etc).
- vii.** Lack of central digital identity database.
- viii.** Inadequate fraud protection.
- ix.** Cost of access to existing digital identity.
- x.** Time to resolve disputes or process refund.
- xi.** Infrastructure inefficiency.

4.4

Distributed Ledger Technology (DLT) for Fiat Currency

Blockchain has been a mainstream topic of discussion. A more generalised description of Blockchain is Distributed Ledger Technology (DLT) which captures the essence of the design - allowing verifiable records of ownership to be distributed rather than relying on a single central ledger.

Some countries and major banks are piloting schemes, which have the potential to improve speed of payment processing, reduce transaction cost, limit points of failure for payment transactions, introduce greater

security and traceability, and providing a platform for innovative business processes using smart contracts.

Distributed ledger is potentially a powerful disruptive technology and enabler of new solutions and business processes. However, its applicability as a direct replacement for the existing payment processes is still being analysed by most jurisdictions. PSV 2025 will weigh the potential cost implication and look to develop an informed position on DLT as a solution for Naira payments.





4.4.1

Considerations for Central Bank Digital Currency (CBDC)

Digital currencies built on blockchain/DLT are technical and economic innovations that can enable fast and cheap value transfers to be made without the need for a central intermediary, and with enhanced trust, simplicity, operational efficiency, and customer experience.

Notwithstanding the cautious approach by central banks, there is a strong appetite from industry stakeholders to explore a potential national digital fiat currency solution.

Potential advantages of CBDC include:

i. Reduction in the cost of cash management - Through the issuance

of a CBDC, the CBN could save significantly on the costs associated with minting and issuing physical notes and coins, secure transportation, storage, and distribution, and the collection and replacement of damaged notes and coins.

ii. Non-counterfeit - The CBDC is cryptographically produced and cannot be counterfeited. The CBDC money supply will be exclusively issued and monitored by the CBN. The system proves authenticity constantly through cryptographic verification, and every transaction taking place in CBDC is verified by the distributed ledger for authenticity and will not be processed unless it is issued by the CBN.

iii. Auditability - Each CBDC transaction is immutably recorded and can also be viewed and tracked in real-

time, facilitating better compliance with Anti-Money Laundering (AML) and Counter Financing of Terrorism (CFT) frameworks.

iv. Logistical Advantages - Instant CBN issuance and distribution of DNGN will eliminate the time, costs, and other challenges of distributing and managing physical cash. An account based CBDC could serve as a practically costless medium of exchange. Such accounts could be held directly at the central bank itself or made available via public-private partnerships with commercial banks.

v. Payment Efficiency - CBDC will be able to facilitate lower cost of transactions, compared to existing mechanisms such as wire transfers, cheques, inter-bank transfers, bill payment, etc. lowering the overall cost of doing business.

vi. Monetary Policy - Real-time detailed information and reports on transaction activity including number of transactions, speed of transactions, and velocity of circulation of money are available with such a system. This gives the CBN the ability to accurately monitor the effect of monetary policy actions and adjust accordingly. Further to this, an interest-bearing CBDC could provide a secured store of value, with a rate of return in line with other risk-free assets such as short-term government securities. The CBDC interest rate could serve as the main tool for conducting monetary policy.

vii. Price Stability - The real value of CBDC would remain stable over time in terms of a broad consumer price index. Such a framework would facilitate the systematic and transparent conduct of monetary policy. Further, a CBDC could significantly enhance the stability of the financial system. In a financial crisis, the central bank would be able to expand the supply of digital cash as needed to carry out its role as lender of last resort, while the interest rate on digital cash could be adjusted downward to discourage runs from other

financial assets into digital cash.

viii. Financial Inclusion - Because universal financial inclusion underpins eight out of the seventeen 2030 Sustainable Development Goals (SDGs) (particularly those related to poverty and inequality), the World Bank has set a goal of universal financial access by 2020. Traditionally, commercial banks have had prohibitive costs and requirements for products and services resulting in the exclusion of many, especially the most vulnerable in society. CBDC will enable all users to access a broad range of affordable financial services, but this could potentially be most meaningful for the unbanked, underbanked and underserved.

ix. Control - CBN will be able to not just monitor but also exercise a measure of control in order to effect, for example, freezing and/or blacklisting of accounts/wallets as necessary. The widespread use of CBDC and the obsolescence of paper currency would be helpful in discouraging tax evasion, money laundering, and other illegal activities.

x. Fostering competition - the introduction of a CBDC for retail transactions on mobile wallets in particular, has the potential to drive further innovation and efficiency by boosting competition with the existing financial institutions' retail payments products (including debit cards, credit cards, ATM machines, mobile banking apps, internet banking, etc.), to the benefit of the consumer.

xi. Economic Development - Many central banks globally are considering CBDCs, and experimentation and adoption rates are increasing. According to the Bank of England, a CBDC has numerous macroeconomic benefits



- CBDCs are likely to cause lower real interest rates, reduce monetary transaction costs, grow the economy, stabilize the business cycle, and improve monetary policy effectiveness and financial sector stability.

4.4.1.1 Implementation Approach

Blockchain solutions come in different implementation approaches which are:

i. Permission-less blockchain networks power up most of the current digital currencies. They allow every user to create a personal address and begin interacting with the network, by submitting transactions, and hence adding entries to the ledger. Such implementation requires computing intensive algorithms to prove ownership of an asset.

ii. Permissioned blockchains act as closed ecosystems, where users are not freely able to join the network, see the recorded history, or issue transactions of their own. Private blockchains have the advantage of being run by specific members of consortiums or companies, and members need to opt-in for the creation of such a network.

It is likely that intelligent combination of a permissioned DLT, a fast and lightweight consensus mechanism (such as Proof of-Audit), strong cryptography, and best-of-breed traditional technologies have the potential to offer a robust deployment model for such a CBDC payments network.

A permissioned DLT can provide a tamper-proof audit trail of all digital currency transactions, including:

- Digital currency issuance and withdrawal by the central bank.

- Distribution of digital currency to commercial banks by the central bank.

- Digital currency value transfers between merchants, consumers, government entities, and other parties.

A permissioned DLT can also maintain appropriate degrees of data privacy. For example, ensuring that commercial banks can see only their own transactions, and that regulators can gain access to data for a period for compliance audits.

Inefficient consensus mechanisms have been a key obstacle to the scaling of DLT use cases. For example, Proof-of-Work (or mining) requires prohibitively large amounts of computing power, energy, and is far too slow and expensive for enterprise-scale applications.

A fast and lightweight consensus mechanism, such as Proof-of-Audit, can enable transactions that are fast (near-real-time), efficient (require comparatively little computing power and energy), and economical (do not require a crypto-token to “fuel” transactions).

Strong cryptography is essential as it can help to prevent digital currency double-spending and make the payment system highly resistant to double-spend, fraud, and counterfeiting.

The approach to be taken for a Naira CBDC will be subjected to further analysis, however, the PSV 2025 shall consider a Private, Permissioned solution.

4.4.1.2 Potential Timescales

A CBDC has the potential to be an enabler for transformation in the Nigerian economy. The consensus is that a 3-5-year implementation of a CBDC solution is achievable. There are many requirements for a successful deployment of a widely used CBDC in Nigeria. However, a CBDC represents an ‘act of faith’ – a deployment could be transformative for the economy or could be disruptive with no tangible benefit.

Recommendations

04

- CBN would continue to study and develop the enabling environment for the implementation of a CBDC.
- CBN will consider the applicability for API integration on CBDC to foster innovation.
- Potential Smart Contract solutions would be monitored in other countries and/or regions and develop the strategy if or when effective use cases are identified.
- CBN will engage relevant stakeholders to review and implement remittance solutions using blockchain technology.
- A position paper that identifies potential use cases, deployment approaches and timescales would be developed, in collaboration with industry stakeholders.

4.4.2 Distributed Ledger Technology for Stable Coin Offerings

A stable coin in cryptocurrency is a token which has its value pegged to the price of a national currency to combat its volatility. For example, Cross-border B2B Payments: When two parties agree to transfer funds, they write a settlement request to the Blockchain. The Settlement Network reads the Blockchain and transfers the funds between the two banks. It then writes a confirmation of transfer to the Blockchain. JPM Coin operates in a similar way, as does offering from few other networks - using the currency as a central 'counterparty' currency against two different fiat currencies and therefore requiring a bank in one country to only hold its domestic currency and the crypto-currency.

Stable Coin implementations are likely to be a

successful payment mechanism. There is a need to develop a regulatory framework for such implementation that almost certainly will be used in Nigeria.

4.4.3 Distributed Ledger Technology for Initial Coin Offerings

An Initial Coin Offerings (ICO) is a mechanism for raising investment that combines elements of crowd funding and Initial Public Offerings (IPOs). In an ICO, a company makes digital tokens available for sale at an initial low price for a period, to raise funds to create an app. Interested parties are able to invest in the company by purchasing the digital tokens during the sale.

The digital tokens typically have some utility within the app, plus a fixed supply, and this leads investors



to believe that if the app is successful, then the digital tokens will appreciate on the open market due to their demand.

The digital tokens launched via ICOs can either be general-purpose digital currencies (e.g.: Monero), or “utility tokens” that have a specific use in the app that the ICO is associated with (e.g.: carVertical, Ethos).

As ICOs are unregulated, there have been numerous examples where ICO

issuers have absconded with the funds, or failed to deliver on their promises, causing investors to lose their investments.

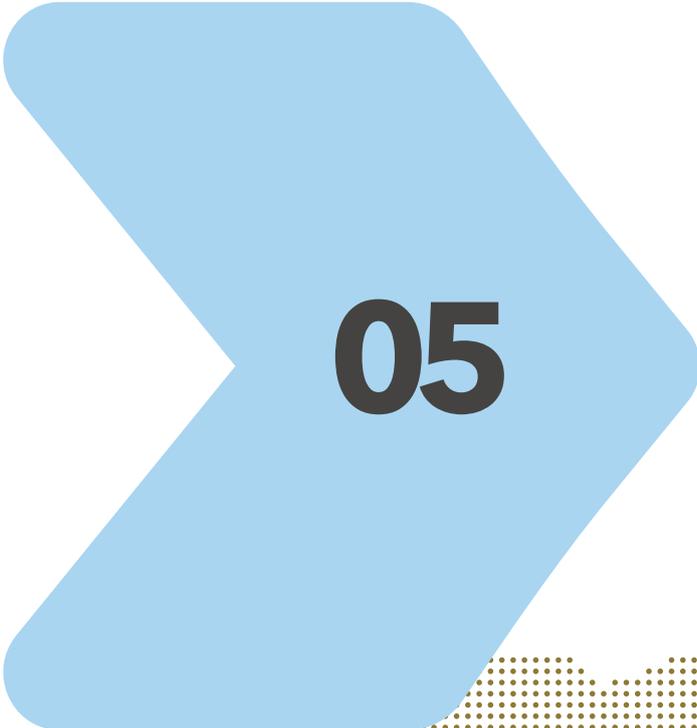
There is little appetite to adopt the current round of ICOs given their lack of regulation. However, given the role of ICOs as an asset class, there is potential for adopting the technology of ICOs as a new approach to fund- raising for capital projects (in the wholesale market) or peer-to-peer lending or crowd funding (for the retail market).

If implemented properly and supported with the right rules and regulations, ICOs could be turned into Financial Instruments and Investment Options, creating a new way to attract Foreign Direct Investment (FDI) and raise capital.

An interesting use case could be in the Power (utility) sector where people can crowd-fund a power project initiative by investing money in return for a coin as equity. Further, the tokens created as in the case of Power could be used to provide access to power for participants. On one hand, it could be used as an investment tool and on the other hand, it could be used as a passage for access to a product or service.

Given that the solutions are essentially for fund raising, CBN would have a role in the payment aspect, but SEC would need to provide a regulatory framework since the tokens would be a new asset class.

Recommendations



05

- CBN would consider the development of a regulatory framework for potential implementation of ‘Stable Coin Offerings’.
- CBN would continue its watching brief on ICOs as well as work with SEC to jointly develop a regulatory framework in the event of adoption of an ICO-based investment solution.

4.4.4 Distributed Ledger Technology and Smart Contracts

As with many exciting new opportunities, DLT has a mix of hype and reality. The hype of specific implementations such as Bitcoin should not detract from the potential of DLT to radically transform the current solutions for transferring ownership of assets, physical and virtual.

An area of great potential is that of smart contracts - pieces of code that are executed on a distributed ledger - where for example, the transfer of funds can be dependent on specific condition. Another example is the transfer of ownership of financial securities or completion of a commercial trade. Linking settlement to transfer of ownership through Smart Contracts appears to offer tangible potential benefits. PSV 2025 will explore potential solutions for Smart Contracts, and how the technology would



4.5

Big Data and Artificial Intelligence

The ability to analyse massive datasets can provide deep insights, and the data contained in payment flows is information rich. Analysis of economic

activity, fraud detection and anti-money laundering, speedy detection of operational issues and real-time risk management are some of the early applications being deployed.

The ability to analyse payment flows offers significant opportunities in many areas of economic analysis, operational controls, risk management and fraud prevention. The PSV 2025 is to identify potential uses of the available datasets, which in turn may define specific data that would be valuable to collect as part of the payment flow.

An open question, and current challenge, is how to collate



data for 'on-us' transactions. If a single bank maintains the debit and credit account for a payment, it is operationally simpler and cheaper to process as a book transfer across the accounts of that bank, rather than pass through the clearing system. However, this removes the visibility of these flows from the central data repository.

There could be great potential for creating economic and social value from the data being transferred through the payments system. However, due regard should be given to the resulting privacy and data protection implications of access to such a powerful dataset. With the potential introduction of Nigeria Data Protection Regulation (NDPR) and the amendments to the National Information Technology Development Agency (NITDA) Act, data privacy will be under ever increasing scrutiny.

The overwhelming industry view is that Big Data should be at the heart of any new architecture. And if possible, the principles of Big Data should be engineered into the current

infrastructure.

Numerous and varied examples of the benefits of Big Data were identified and are listed below:

- i.** Ease of fraud detection and prevention.
- ii.** Monitoring of payment process and utilisation of the payment system.
- iii.** Supporting credit score analysis for consumer lending.
- iv.** Identifying valuable economic insights into the consumption habits of communities.
- v.** Providing insights that can help inform social, economic and fiscal policy at a high level, and benefit international organisations, NGOs and local financial and commercial institutions.
- vi.** Industry-wide analytics of customer transactions to validate if initiatives embarked upon by the regulators and individual institutions are delivering the desired outcomes locally or nationally; and
- vii.** Analysis across ecosystem actors that will give the Apex bank insights into performance and operational levels of all financial service providers (FSPs).

Recommendations

06

CBN would initiate a workstream to identify key use cases for Big Data that has potential access to data in the payments system as well as support economic analysis.



4.6

Cyber-Security

Cyber-security has been cited as one of the greatest economic and social risks, and most countries rate the threat of cyber-attacks from hostile nations and organised crime as high as physical attacks. Potential attacks are wide-ranging from those using technology tools to gain unauthorised access into systems, denial-of-service attacks, through to those based on social engineering that exploit human weaknesses.

Creating secure and robust infrastructure has become a critical requirement. The payments architecture should be built to the highest data security standards, covering not just the technical and telecommunications threats to the core infrastructure, but tools that identify and block potential attacks that originate

outside the core infrastructure.

The G7 Fundamental Elements of Cybersecurity for the Financial Sector (G7FE) recommends that Public Authorities should map critical economic functions in their financial systems as part of their risk and control assessments to identify single points of failure and concentration risk.

As processes and data become more real-time, the risks increase since there is less time to respond to potential breaches. Conversely, with Big Data and electronic flows, it may be possible to shift from fraud detection to fraud prediction.

Advanced cyber-attacks like zero-day attacks, foreign state sponsored attacks etc are threats to national security as well as the banking and payments industry. Cyber threats are a clear danger, and as payment flows become faster and more automated, the impact of the threat increases. Financial institutions are the major targets of cyber criminals and increasing use of the internet for financial operations makes vulnerability to cyber-attacks huge.



Security solutions that protect networks are generally most effective, using encryption for data privacy and authentication for non-repudiation. Attacks on networks are generally successful if the security solutions have been poorly implemented.

Human beings remain the weakest link in the security chain either by error of omission, commission, or lack of awareness. Cyber criminals employ various forms of social engineering to prey on the ignorance of their targets. The cyber-security threats include but are not limited to:

- i.** Phishing
- ii.** Spear Phishing
- iii.** Distributed Denial of Service (DDoS)
- iv.** Ransomware
- v.** Key-logging
- vi.** Cookie Stealing
- vii.** IoT Attacks
- viii.** Click-Jacking
- ix.** SQL Injection.

4.6.1.1 User authentication

An area of great focus is user identification and

authentication. This is covered in the section on User Identity.

4.6.1.2 Cyber regulation

Many jurisdictions rely on existing cybersecurity standards often contained in national frameworks e.g. Nigeria's 2015 Cyber Crimes Act. If CBN adopts the approach in countries like the US, UK and Hong Kong, choosing to define specific cybersecurity frameworks for the financial sector, it must take care to ensure that it establishes where the weakest link in the value chain lies, or where the greatest vulnerability to cybersecurity incidents exists.

Industry standards with regulatory oversight would seem to be the most efficient model, leaving the implementation down to individual entities. If a decision is taken to create a centralized repository using Big Data techniques, then this can be leveraged to add a further level of review and oversight. The use of Machine Learning and AI will further strengthen the defence mechanisms if applied centrally, helping to identify vulnerabilities that may not be spotted by individual institutions.

Recommendations



07

- The CBN minimum security requirements developed for banks and payments would be reviewed to ensure they reflect the current industry best-practice.

- A reviewed payments architecture would also be undertaken and that minimum standards for user authentication are included as part of a multi-layer security solution.



4.7

Digital Identity and User Authentication

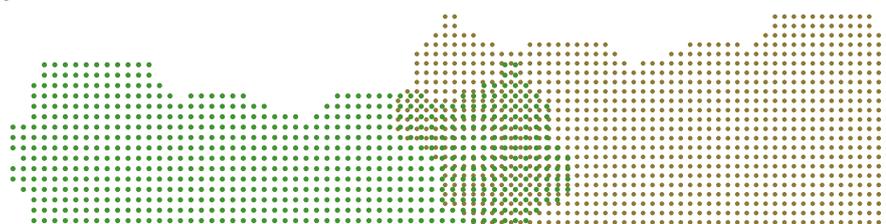
Reliably identifying individuals, in the physical and virtual worlds, is a core component of data security. Nigeria has a world-class solution with Bank Verification Number (BVN) - a unique identifier required for any individual that has a bank account and verified by biometrics to ensure that any individual can only have one BVN.

Digital identity and User Authentication will generate much investment as organisations build tighter customer online relationships, reducing fraud and increasing customer loyalty. Drivers for new solutions include:

i. Internet-of-Things (IoT) will become the internet of authenticators as forward-looking businesses use a variety of trusted endpoints to reach consumers, creating a fabric of continuous authentication that enables instant checkout for both digital and physical point-of-sale transactions.

ii. Voice authentication will form part of the purchasing journey, allowing Natural Language Processing to evolve from informational to transactional commands, starting with low-value low-risk transactions, delivering on consumers' expectation of a more seamless and natural form of digital engagement.

iii. As Augmented Reality and Virtual Reality become integrated into the purchasing process, authentication methods will increasingly use computer vision - facial recognition, behavioural biometrics and gesture-based biometrics for a



faster, more secure online experience.

iv. Big Data and Machine Learning technologies

will allow businesses to rapidly combine and analyse multiple sources of data so they can transform authentication requests from one-size-fits-all to tailored, situationally relevant and highly personalized forms.

4.7.1

Digital Identity

BVN will continue to form the foundation of digital identity in any new payment frameworks in Nigeria, but it may be possible to use different biometric approaches and/or additional elements to further improve the authentication.

Other digital identity schemes exist in Nigeria, such as:

- National Identity Number (NIN)
- Mobile SIM card registration
- International Passport
- National Driver License
- Voters Registration

Digital identity is rightly viewed as a powerful tool for reducing fraud and increasing the level of user confidence in digital services. Combining the various schemes to create a single identity scheme for multiple uses would put Nigeria at the forefront of the user identity industry and would be a strong enabler for an increasingly digital society.

Clearly, such a joint scheme would require the support of multiple agencies and the endorsement of government.

4.7.2

User Authentication

Two-factor authentications (2FA) is accepted as a minimum level of user authentication. 2FA consists of any two of three attributes – something I know (password), something I am (fingerprint or facial recognition) and something I have (One Time Password sent to registered mobile number/ email address). There is always a balance of ease-of-use versus security. For dumb channels (e.g. USSD), limits should be made to the number and value of transactions. Currently for mobile payments, any individual payment of NGN 20,000 or cumulative payments greater than NGN 100,000 per day will require 2FA.

A strong consumer authentication strategy is very effective to ensure security and quality of transactions, but only if used with a best-in-class consumer experience. Many of the financially excluded are not digitally educated and 2FA can become a burden – they are either easily deceived or they find the process onerous.

The more robust security solutions perform checks that are not immediately apparent to the user and can trigger alerts if unusual actions occur. A seamless authentication solution, through any device, between any merchant and any cardholder is key. With multi-factor authentication, the market is moving away from active towards passive

methods, improving the security of users and the experience of customers.

Advantages of multi-factor authentication are:

- i.** Reduces cardholder friction by using passive authentication techniques.
- ii.** Does not rely on vulnerable systems like SMS or static passwords.
- iii.** Enables advanced options like Single Sign-On (SSO).
- iv.** Leverages additional layers of security - exchanges additional data elements to strengthen issuers' risk-based assessment (RBA).

Layered intelligence enables omni-channel authentication across devices - certain standards utilizing multi-factor authentication should be mandated for all issuers and stakeholders. However, these requirements should be designed diligently to ensure best-in-class experience for consumers.

Fraud prediction is being increasingly adopted, with the credit card industry deploying solutions that enable analysis and scoring of transactions at different steps of the payment flow to identify fraudulent transactions, reduce false declines and increase approval rates.

These tools should help issuers ensure a more satisfying consumer experience without incurring greater risk. For instance, issuers can make use of real-time decision solutions that apply thousands of data points and sophisticated modelling techniques to each transaction thereby simplifying transaction attributes, risk scoring and consumer segmentation insights into a single decision score.

These solutions assess both negative and positive data points to calculate a single score that shows where the transaction falls on a scale from decline to approve - thus helping issuers authorize more transactions with confidence, increase their profitability and improve the consumer experience.

While authentication credentials such as biometrics and Global Positioning System (GPS) information will continue to be stored on individual consumer devices rather than centralized platforms, payment standards such as 3-D Secure and the FIDO Alliance will help drive a consistent authentication experience for users as device manufacturers are compelled to follow a common framework

The BVN has been an excellent tool for providing a greater degree of certainty for user identification. BVN can act as a unique identifier for citizens and can be very effective for not only future of payments infrastructure but also non-payment use cases, if the digital identity ecosystem is designed, governed and enforced with right principles, tools and policies. Biometric information collection during BVN generation is a significant value-addition to build an effective ecosystem as biometrics can enable avoiding physical interaction and shift payments and other interactions to digital space with the same level of security and assurance.

A blockchain based identity solution could replace the BVN wherein the digital identity owners can hold the claim and will be able to securely share the identity. There are numerous white papers and start-up ventures that are



exploring or deploying the use of blockchain for digital identity.

To reduce data redundancy and duplication of data, the government should implement a long-term system that would uniquely identify individuals. Also, it is important that this system is safe, fast and convenient. In the interim CBN could work with relevant agencies to explore the possibility of using the identity information of mobile subscribers as an equivalent digital identity with lower thresholds for authorization and value than the BVN. This will help accelerate financial inclusion.

One of the most critical aspects of digital identity is its reusability. A reusable Digital Identity allows individuals to identify themselves to gain access to multiple services with speed, convenience, and security – based upon verification of both static and dynamic identity

data.

BVN uniquely identifies individuals. Many countries are introducing a similar scheme for business – Legal Entity Identifiers (LEI). There was cautious support for adoption of a LEI for Nigerian businesses. The BVN could become a stronger form of identity especially in this digital age, if its use is extended as a Legal Entity Identifier similar to the Social security Number currently used in the US. Introducing a unique ID for business entities (and making use of digital applications as much as possible) will promote formalization of the economy, support more efficient tax collection and improve access of businesses to financial services and government benefits.

Recommendations



08

CBN would continue to support the use of BVN as an effective tool to check fraud.

CBN would, at the appropriate time and working with other relevant agencies, review the extension of BVN to become a more general user ID by combining with other data sources and explore the potential for a Blockchain-based solution.



4.8

Machine Learning and Robotics Process Automation

Payment Service Providers can lead the way through a focus on simplicity and ease of use of payments such as mobile and contactless solution. With Artificial Intelligence (AI), there is the potential to transform customer experiences and establish entirely new business models in banking. To achieve the highest level of results, emphasis should be placed on solutions that provide a humanized experience that is tailor-made for each



customer, some of which are:

i. Upgraded ATMs - Automated Teller Machines (ATMs) should be optimized to perform all other financial services outside cash - credit scoring, loans disbursement, and to be available in remote areas.



ii. Voice Banking - Financial Institutions should move from basic dialogue and account inquiries to doing transactions using voice commands. This can include being able to execute payments using the commands, as well as doing account transfers and establishing account alerts using same.



iii. Encourage the establishment of **digital banks** with complete focus on digital inclusion.

iv. Partnerships - Banks need to engage in partnerships with financial technology companies to survive in the digital era of banking.



v. Wearables - Bank applications need to fully integrate into wearables (smart glasses and watches) for fully digitalized banking.



5.0

Operational Considerations







5.1

Common Core Platform and Interoperability

The concept of common core platform relates primarily to the clearing and settlement process. A key design criterion is to achieve a core clearing and settlement infrastructure that is not constrained by volume or value of payments, but one that is efficient and streamlined. For settlement, the current single settlement account of Deposit Money Banks at CBN works effectively and this approach will continue for settlement of all Naira obligations. For clearing, NIBBS currently operates a central switch for all Deferred Net Settlement payment schemes, calculating net settlement positions at set times throughout the day

and settling these positions across settlement accounts at CBN.

One of the key guiding principles of the current payment infrastructure is interoperability. This implies that it must be possible to initiate a payment instruction with one financial institution (FI) and/or payment service provider (PSP), and move funds to any other FI or PSP in the same scheme. This principle has created a broader level of acceptability of new payment methods such as mobile payment and Instant Payments, and is enabled through a central switch, to which all other switches must connect.

The PSV 2025 should support all appropriate payment instruments, covering those currently in use (unless scheduled for retirement) and new payment methods as and when required.



High-volume retail payments versus high-value financial flows clearly have a different profile and risk implications. Historically, separate infrastructure has been implemented to support these different flows. But with advances in processing power and telecommunications bandwidth, it is important to determine whether this distinction is still relevant. A single infrastructure offers clear benefits around collateral and risk management and consolidation of information and control but increases the risks of single point of failure.

The cards infrastructure requires specific decisions due to the inter-dependence on the international Payment schemes (Verve,

MasterCard, Visa, American Express, UnionPay etc.) and the adoption of formats and processing rules specific to the payment industry.

Certain functions such as collateral management for risk mitigation and the underlying settlement functions will be common across clearing systems. The PSV 2025 will fast-track the realisation of the Collateral Management project which highlights the key benefits of a single collateral pool. The single collateral pool will require a single process for tracking collateral and availability of funds for real-time position management in the settlement process.

5.2

Operating Hours for the Settlement and Clearing System



The payments system currently enables 24 x 7 for payment initiation and processing, implying that funds can be transferred from payer to beneficiary account in real-time. However, the impact on settlement is less obvious. Regular settlement windows will be required in order to reduce settlement risk between participants. As weekend payment processing becomes more

widely used, the need for out-of-hours funding of settlement positions will increase, with a resulting impact on the working window for the banks' treasury, operations and systems, and many other players in the financial eco-system. Any decision to proceed to out-of-hours and/or weekend settlement needs a very clearly defined set of benefits for all parties involved in the ecosystem.



5.3

Real-Time Position Management and Collateral Management

The Collateral Management System is a risk management tool aimed at reducing settlement, liquidity and credit risks. However, the current collateral management is static and does not require real-time position management. The PSV 2025 will focus on creating a collateral management system that is dynamic and require real-time position management for the smooth functioning of a real-time payments system.

Similarly, a single flexible collateral pool is deemed critical for an efficient payments system. The guiding principle for effectively managing settlement risk (liquidity and credit risk) is for either pre-funding of the settlement account or temporary credit through intra-day repos backed by liquid collateral. No



settlement bank will be able to breach its funded position.

While this approach is appropriate in reducing settlement risk, it introduces potential operational and resilience issues:

- i.** Customer transactions failing could cause lack of trust in the payment system where payments are initiated but cannot be executed due to the bank breaching its limit.
- ii.** High operational overhead for players and operators increasing cost of transaction processing.
- iii.** Difficult for small actors to pre-fund positions. Pre-fund outages can be mitigated through guarantees and provision of lines for the right actors.

5.4 Payment Tracking

The banking industry should look to emulate efficient functionality that exists in other industries. For example, when comparing traditional texting with applications such as WhatsApp, one key differentiator is that of message status - in WhatsApp the sender knows when the other party has received the message, the last time the receiver was online, and when the message has been read. A similar payment tracking could revolutionise the confidence in payment processing. Other features, such as location tracking, could support greater fraud protection.

The industry is currently implanting a revised Collateral Management approach, with four workgroups assigned to the following topics:

- WG1 - Position tracking system and process
- WG2 - Real-Time Position Management and Centralised Collateral Pool
- WG3 - Criteria for Direct Membership
- WG4 - Multiple Clearing Cycles and for 24 x 7 RTGS

The activities of these workgroups remain the single critical outstanding recommendation from the PSV 2020 Release 2 issued in 2013. Completion of this initiative is a high priority for CBN and will be carried forward into the PSV 2025.



5.5

Data Standards

The new PSV2025 shall encourage that data standards meet the latest internationally accepted data standards, ISO20022 for payments and reporting, and ISO8583 for card transactions.



5.6

APIs versus Message-Based Solutions

Traditionally, the payment systems have been based on message-based and/ or file-based communications between the Service Providers. Increasingly, the use of APIs that drive Open Banking and CBDC is being encouraged to create more flexible and interactive sessions among service providers.

5.7

Differing Levels of Functionality

Consideration should be given to the potential need for different levels of functionality if a common infrastructure for all payment flows is considered appropriate. Not all payment methods will require all available features. For example, advising the payer that the beneficiary account has been credited, or payment tracking, could be value-add features that are optional. Any new architecture should allow end users to select such optional features.





5.8

Operational Control

The PSV 2025 should support a real-time operational dashboard, which could include information such as status of participating institutions, security and fraud alerts, volumes and values of flows by payment instrument, current net settlement positions, usage of intra-day collateral and other pledged assets and transaction processing times.

5.9

Quality of Service

Assessments of service quality, at all levels of the payments system from core infrastructure through commercial solutions, has typically been either subjective and/or through periodic assessments. There have been some notable advances, such as the real-time tracking of payment volumes and values of certain payment methods through the NIBSS Industry Statistics portal (<https://nibss-plc.com.ng/report/>). The PSV 2025 shall provide an opportunity to embed quality of service indicators into the architecture - potentially both objective measures (such as transaction processing times, failure rates, service provider up-time) and subjective (based on user experience).



5.10

Consumer Protection

Creating consumer confidence is of paramount importance, particularly when offering services to first-time users. The PSV 2025 aims to make payments error-free by providing robust consumer protection mechanism. This shall be achieved through a wide-ranging scope from consumer awareness, appropriate guidelines and regulations, provision of accurate data to support problem resolution, and operational process to handle initial enquiries through to potential escalation and arbitration.

Recommendations

09

CBN would request banks to strengthen Consumer Protection by issuing minimum required standards that ensure swifter dispute resolution.



5.11

Disaster Recovery and Contingency

As with cyber-security, the need for rigorous disaster recovery capability is compelling. As a result, the PSV 2025 aims to develop guiding principles for the approach to disaster recovery and contingency.

5.12

Domestic and International Flows

One of the focus for the PSV 2025 is domestic flows, since these are under the direct regulatory purview of CBN. However, the strategy should consider how any new architecture could integrate with potential regional payment schemes, and more broadly how to link to international payments, either directly or via the traditional correspondent banking model.



Recommendations

10

CBN would request banks to strengthen Consumer Protection by issuing minimum required standards that ensure swifter dispute resolution.



6.0

Regulatory and Governance Structure



One of the key deliverables from the second release of PSV 2020 was the creation of an appropriate and effective governance structure to drive the payments system vision in Nigeria. The structure comprises of Payments Strategy Scheme Board, Payment Initiative Coordinating Committee, Payment Scheme Boards, Payments Initiative and Special Interest Working Groups. This structure largely facilitated the achievement of PSV 2020 and will be maintained as appropriately.

6.1

Principles of Financial Market Infrastructure Conformance

The PFMI will continue to form the basis of validating that the payments system is Internationally Recognised. The PSV 2025 shall ensure that the deployment of any new architecture will result in closer conformance to these principles.



6.2

Legal Framework

The Payments System Management Bill is currently passing through the legislative process. The PSV 2025 shall highlight and pursue any areas of potential change that may be required in the legal framework.





6.3

Regulatory and Governance Structure

The CBN shall continue to retain responsibility for regulatory oversight on all payments service providers, with the Payment System Strategy Board (Chaired by the CBN Governor) being the pinnacle body that oversees all payments system activity.

The Payments Scheme Boards (PSB), reporting to the Payments Initiative Coordinating Committee (PICC), Chaired by the Director, Payments System

Management Department (PSMD) of the CBN shall continue to make key recommendations on the PSV 2025. Both the PSBs and PICC comprise industry representatives and CBN. The Special Interest Working Groups and the Payment Scheme Boards to drive this vision will be constituted on a need basis.

Governance shall be strengthened through a more structured and formalised quarterly reporting. The reporting line should include, on an advisory basis, the Bankers' Committee and its Payment System and Infrastructure Sub-Committee, to ensure good communication to the core user group.

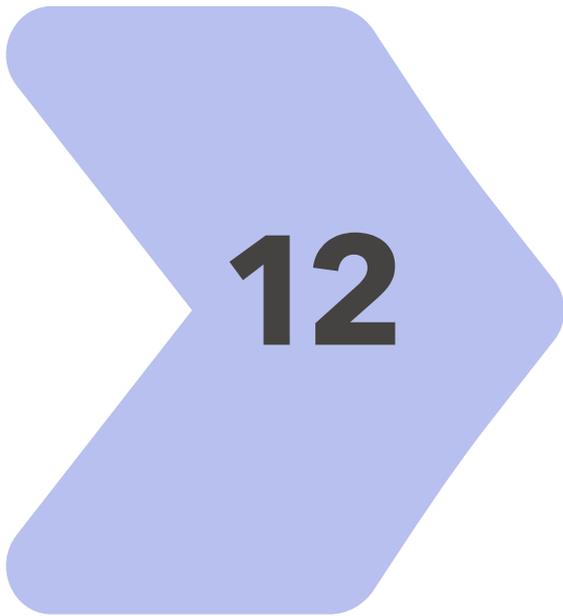
Recommendations

11

The current governance structure shall be with a more structured and formalised quarterly reporting.

The Initiative Working Groups were introduced to promote the adoption of electronic payments in various industry ecosystems at a time when use of electronic payments required a significant focus and drive. Given the current adoption rates, such an industry focus is no longer required. Commercial pressures will drive innovative solutions within specific industries.

Recommendations



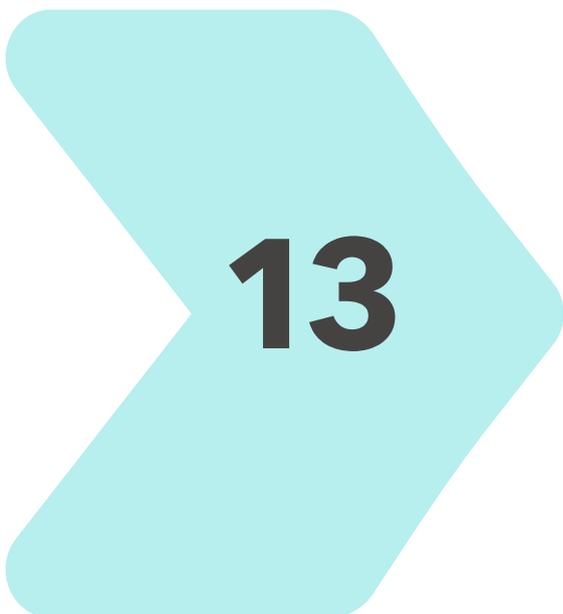
Formally wind-down the Initiative Working groups that took part in PSV 2020, recognising the valuable contributions by the members towards the achievement of the vision.

The Special Interest Groups (SIGs), covering Information Security and Risk, WAMZ, Public Awareness and Legal, continue to play important roles in providing unique and specialised advice from time to time.

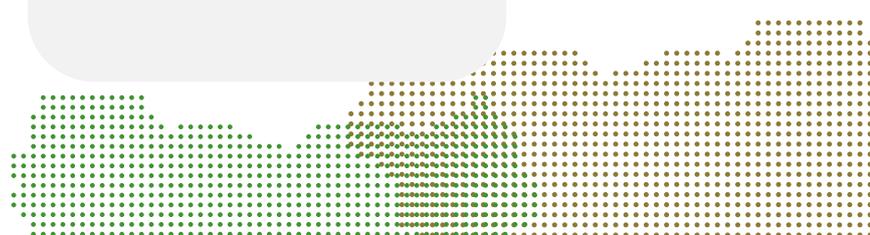
Given the emergence of a strong technology

sector in the payments business, CBN has agreed to the creation of a FinTech Special Interest Group whose mandate will be to foster industry led initiatives for the FinTechs and ensure seamless development of FinTechs in the payments space in Nigeria, collaborating with other regulators of FinTech operations across the financial industry.

Recommendations



Continue the work of the Special Interest Groups, with the addition of a FinTech Special Interest Working Group.





6.4

Compliance Monitoring

Tools to monitor compliance to the participation criteria should be built into the new framework, thus providing real-time compliance monitoring and period status reports rather than relying on inspection of prior performance. Examples of compliance checking could be adherence to rule on liquidity and collateral, operational performance standards, resilience and disaster recovery testing.

7.0 Dependencies

The payments system has key dependencies with other sectors such as telecommunications and power. The scope of dependencies will be identified, and stakeholders from relevant industries will be invited to collaborate with the CBN.





7.1

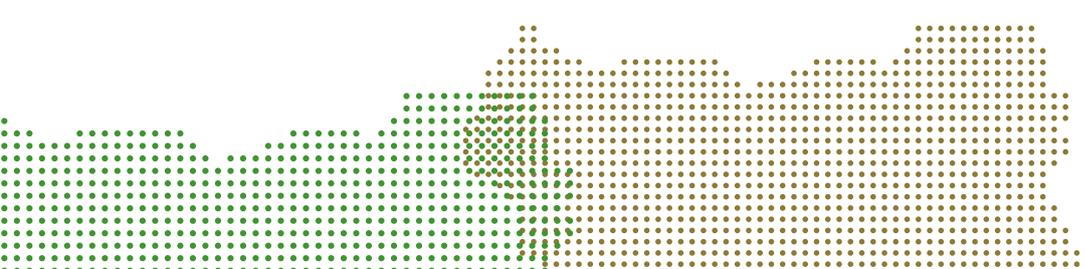
Infrastructure

An electronic payments system is dependent on efficient infrastructure, with an emphasis on telecommunications and power. Any specific concerns in this area shall be addressed by relevant special interest working groups.

7.2

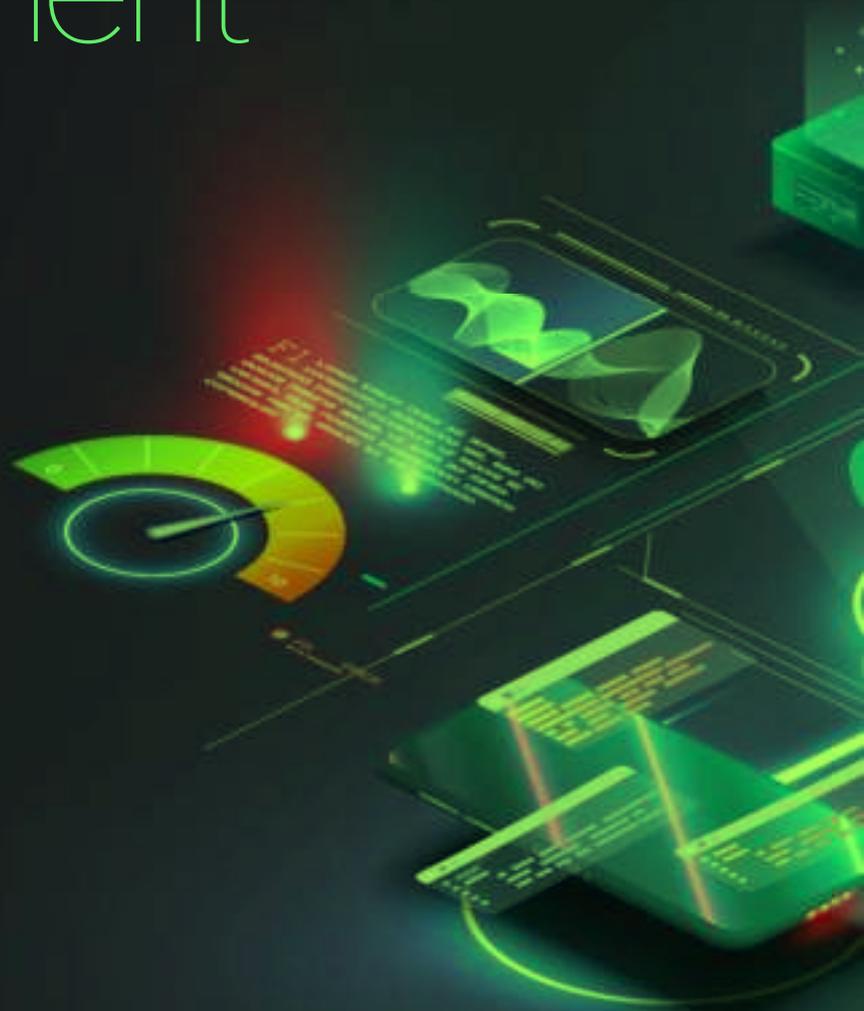
Capacity Planning

Training and public awareness is required to support deployment of any new payments system. Capacity Planning is required at different levels (industry expertise, technical skills, internal service provider training for operational support and customer servicing, compliance and risk training, and end user awareness) and would be one of the focus of PSV 2025.



8.0

Payment System Assessment



Overall Assessment

The CBN conducts PFMI assessment exercises based on verbal interviews with CBN, market participants and service providers rather than a full audit of source documents and other physical evidence to substantiate any assertions. This effort should be sustained going forward.

The PFMI sets a very high target for conformance. Several countries undertake regular reviews and implement corrective actions.

Even with this focus, there are no infrastructure that claims 100% compliance with the full requirements of all 24 Principles.

However, the current assessment of the Nigerian market is being judged against world-class – a tough standard for a relatively nascent electronic payments market but a standard to which the PSV 2025 aspires.



Nigeria Payments System Vision 2025

Nationally Utilised, Internationally Recognised



Nigeria Payments System Vision 2025

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