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Developing World Shaping Solutions for a Global Economy

Whitepaper 3.0

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Introduction

Blockchain and cost-effectiveness

The economic efficiency of any organization or company largely depends on the level of coordination and usage of the necessary data. The more efficiently a company uses information resources, the less their associated costs become. That is true for financial institutions of all ranges: from small companies to government. A similar approach is considered in detail and studied in the framework of the so-called transaction cost theory [1].

At the same time, with the growth of the scale of the company, the amount of information used increases significantly. Their interconnections and channels of use are becoming more complex. All this leads to a significant increase in transaction costs and a decrease in the effectiveness of the company.

A possible effective solution to this problem is to use a distributed ledger technology (hereinafter - **DLT**). A blockchain technology (as a variety of the **DLT**) usage is a trend of recent years. However, until that time there was no single platform for multiple applications.

The Apollo DLT platform and, in particular, Apollo Fintech, are a universal solution for a wide range of applications that will be considered in this document.

It will be shown that usage of the Apollo Fintech is not limited to companies of a different scale: from customer to government. Apollo also offers a higher level solution - the Apollo National Currency Platform (see sec. 3. "Government Products" of the current document for details).

In all considered cases of application, regardless of the organization scale, Apollo platform allows to flexibly, efficiently and reliably organize the data management. Thus, it significantly reduces transaction costs and increases the efficiency of such an organization.

Executive Summary

Apollo Fintech is a fintech company established with the goal of being a world leader in financial technology on the consumer, corporate and governmental levels. Apollo Fintech currently boasts a number of accomplishments on each of those branches and continues to push the envelope of what is possible on every level.

Accomplishments

Apollo Fintech has become one of the leaders in the development of blockchain technology. A few of its accomplishments include;

- **Being the first company to release database sharding onto an active blockchain.**
- **The first to develop adaptive forging/staking.**
- **A node synchronization system.**
- **IP transport system.**
- **Two-second blocks.**
- **And one of the first companies to develop and integrate atomic swaps into cryptocurrency wallet.**

Apollo Fintech's flagship cryptocurrency (**APL**), is currently the fastest cryptocurrency available at sub-second to two-second transactions and one of the only cryptocurrencies with a truly sustainable blockchain.

Apart from technology, Apollo Fintech is one of the first blockchain companies to secure an MoU from a national government, one of the only blockchain companies with physical exchange locations.

Apollo Fintech: general description

According to the scale of use, the scope of Apollo Fintech can be conditionally divided into the following three categories (from larger to smaller):

- **Government products (i.e. Apollo National Currency platform and its services).**
- **Commercial solutions.**
- **Consumer solutions.**

For each of these levels, Apollo offers turnkey systems for solving a wide variety of tasks (see fig. 1). It should be noted that such a division in scale is conditional. For example, a bank transfer system can be implemented both at the government level and at the commercial level (within the framework of separate commercial organizations or between them).

Each target application (target system) of Apollo Fintech in accordance with Fig. 1 will be considered in detail in the current document.

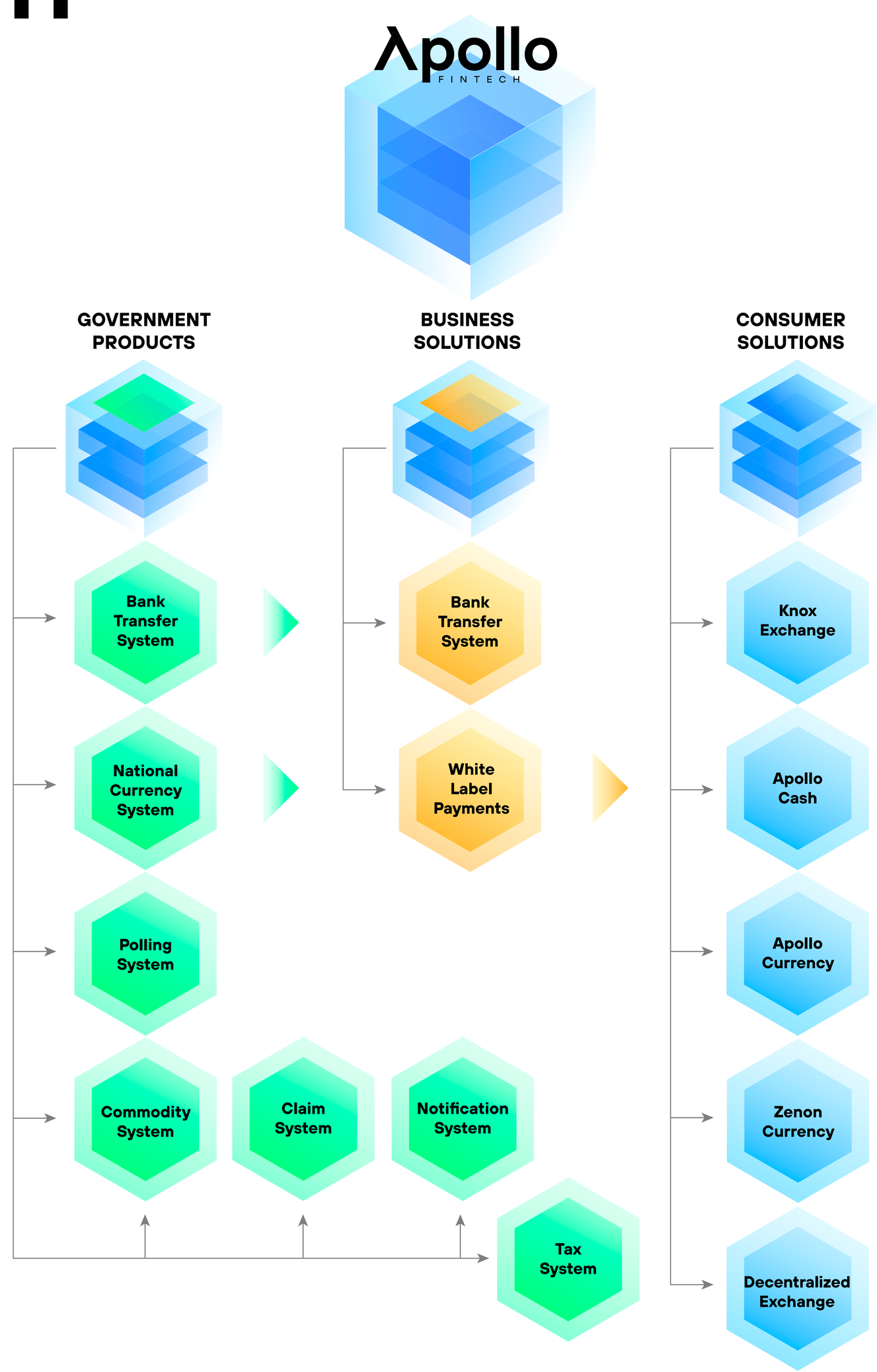


Figure 1.
Diagram of the Apollo Fintech Applications for different levels.

Government Products

The general concept of National Currency Platform

Today Apollo Fintech offers an all-inclusive government solution with the ability to cut government human resource demand and costs to a fraction of their current budget. These solutions will drastically:

- **Simplify government processes**
- **Increase government revenue**
- **Reduce crime**
- **Eliminate tax evasion & identity theft**
- **Bring complete control back to government executives**

The core of Apollo Fintech is the **National Currency Platform**. This platform gives every citizen of a nation the ability to access to all major government services in one place. This platform is accessible on nearly every electronic device and operating system.

The most powerful element of this all-inclusive system is the ability of the government to not only control its major systems in one place but also track the actions of every citizen on that same platform. The most important element of this ability is the **civilian registration system**. To add a citizen to the National Currency Platform government simply issues a person a new wallet ID.

By utilizing a biometric card, Apollo Fintech becomes the only national currency system that can be used without the use of an SMS.

The data available to authorized government personnel through the National Currency Platform allows its administrators the ability to follow nearly every action made by every individual, including transaction history, all taxes paid, poll participation, etc.

Another powerful aspect of the National Currency Platform is the **notification system**. Every citizen will have access to the National Currency Platform from their phone, computer, tablet, smartwatch, or via SMS messages. This notification system will allow authorized government personnel to publish nationwide notifications which will be sent to every citizen on all of their devices as well as an SMS text message.

The government using the National Currency Platform will also have the ability to create **public polls** to request input and gauge public options.

The most important feature of the National Currency Platform is the **National Currency System** itself. The National Currency System hosts a nation's currency and allows absolute control and oversight by executives in government.

The **Tax System** as a part of the Apollo National Currency gives the government the ability to seamlessly apply automatic tax payments to any transaction, account balance or specific action performed from any type of account.

It should be noted that described Apollo Fintech has a modular architecture. That means that the National Currency Platform may be fully implemented to the governmental system or partially. The level of implementation and integration will depend on the presented tasks.

Bank Transfer system

Blockchain is the safest way to run any financial platform because it ensures absolute security and immutability. Until now, however, blockchain has not been an option because of sustainability and speed limitations. Apollo is the only blockchain on the market with true sustainability. It's revolutionary technologies, such as sharding and adaptive forging, have made it not only the fastest but the safest financial platform on Earth.

Comparing with Visa, the World's largest and most trusted payment processor, the advantages are clearly seen. Visa can take 15 to 30 seconds to process a transaction and is capable of processing 1**,700 transactions per second**. Apollo, by comparison, is up to 30x faster with a transaction speed of sub-second to two Seconds. Its blockchain will soon be capable of more than **1,000,000** transactions per second, this is nearly 588 times the processing power.

Apollo, by comparison, is up to 30x faster with a transaction speed of sub-second to two Seconds." - our current speed is 2s when there's a transaction in a block. In case there are no transactions - block time is 10s (see Adaptive Forging description).

The Apollo bank transfer platform gives a central bank the ability to conduct instant payments to and from any bank in the network using local currency as well as foreign currency if needed. The platform can be used after a simple integration using the Apollo Bank Transfer API or instantly by using the stand alone platform. Payments can be sent, received and tracked nearly immediately.

Using the Apollo bank transfer system gives the following advantages:

- Unlike all current options, the Apollo payment transfer database allows for zero downtime or failures.
- The Central bank benefits from fees from every transfer sent within its nation
- The Central Bank can monitor all transactions sent or received in the nation. This includes bank to bank transfers from the Central bank to Commercial banks as well as payments between commercial banks to domestic and international commercial banks

- Payments can be made to international banks integrated in the platform instantly and funds can be sent in local currency only or exchanged instantly during transfer and received in the receiving bank's main currency.
- Payments are made on a distributed database that is incorruptible, unhackable and cannot be manipulated, even by bank staff.

Note that the Apollo bank transfer system can be implemented as a part of the government platform or separately, as an independent commercial solution. So, the proposed bank transfer system relates both to Apollo government solutions and commercial products of the Apollo (see fig. 1 above).

National Currency System

Perhaps the most important feature of the Apollo National Currency Platform is the National Currency System itself. The national currency system hosts a nation's currency and allows absolute control and oversight by executives in government.

Unlike physical bills, a digital national currency costs the government very little to set up and low maintenance costs, completely removing the pending burden of printing, distributing and maintaining physical paper bills, a cost that can exceed well **over 1.5% of GDP per year**. Moving from paper currency to a digital national currency provides immediate increases in the national fluency of technology. This fluency not only fuels innovation, but it also promotes entrepreneurship and propels knowledge forward.

Replacing a paper currency reduces drastically, theft, fraud, money laundering, assaults, and many other elements of a violent and non-violent crime, by as **much as 80%**. In the absence of cash money, utilizing the Apollo system, money laundering becomes a near impossibility and tax evasion is instantly eradicated. The estimated cost of financial and violent crime to a nation's economy can exceed well **over 6% of its GDP**, this is before factoring in loss of future business growth, loss of international investments, loss of investor confidence and revenue lost by tax evasion, customs, duty corruption and law enforcement spending. By utilizing the Apollo National Currency platform, the majority of these losses can be avoided by adding not only a substantial net gain in economic growth but also a near-immediate increase in international investments, investor confidence and a significant increase in government revenue.

The national currency system facilitates the sending and receiving of a nation's digital currency on an incorruptible ledger without the major issues of a centralized system. Issues such as server downtime, manipulation, and delayed transactions are permanently solved.

Benefits of the national currency system are as follows:

- Unhackable ledger.
- Sub-second transfer speeds.
- When the nation ID registration system is utilized, in conjunction, then identity fraud becomes impossible.
- The majority of crime is eradicated or significantly reduced.
- Little cost to the government to run.
- Minimal downtime.
- Limited supply creates instant investor confidence and demand, allowing for not only zero inflation but increasing currency value.
- The National currency platform offers unparalleled accessibility. Payments can be made and received on almost any device. Citizens can send from any desktop computer, tablet and smartphone using the dedicated government app or on a simple phone via SMS, as well as sent instantly using a 10 cent Biometric card.
- All transaction traceable.

Polling System

Executives in Government will also have the ability to create public polls to request input and gauge public options. The proposed government polling system allows a nation to conduct nationwide polls, instantly with the push of a button. Where a traditional poll/vote would require thousands of employees and millions of dollars in infrastructure, the government Poll system allows polls to be sent out to every citizen on every device with a small cost to the government.

Using Apollo Fintech's DLT technology to conduct polls gives the following advantages:

- Voting can take place on each citizen's device anywhere in the nation.
- No voting/polling centers/physical needed.
- No employees or volunteers needed.
- No infrastructure needed.
- As a result of items A-D, the proposed Apollo polling system significantly reduces the cost of organizing and conducting polls.
- Voting is 100% transparent.
- Results are incorruptible.
- No voting fraud (each citizen is issued one account and only they can vote).
- Applied security technologies minimize the likelihood of data falsification.
- Using Apollo's advanced features, such as the Apollo Biometric card, makes polls easier for both government and respondents.
- Implementation of Zero-knowledge proof protocol provides the anonymity of respondents during polling/voting.

Apollo Tax System

The government tax system is a system that operates in conjunction with the national currency system to deduct taxes automatically from citizens and commercial organizations.

These taxes can be withdrawn many different ways to fit nearly every type of tax, each method allows funds to go directly to the government's account.

Benefits of the Apollo tax system are as follows:

- Taxes are instantly deducted.
- Tax revenue is increased substantially.
- Tax Evasion becomes impossible.

Commodity System

Once the National Currency Platform is fully launched, the government will be able to turn its assets and natural resources into revenue on demand while maximizing profit. Utilizing the asset pegging feature and the built-in asset exchange, authorized government personnel will

be able to take commodities like gold and diamond and tokenize them, allowing the instant ability to sell to large and small buyers without the need to locate them. Buyers around the world, in nations such as China and Russia, will be forced to bid against each other for these assets guaranteeing the government gets the absolute highest prices for every commodity owned. Generally, that can be imagined as a single **Government Commodity System** that is based on the National Currency Platform.

The government commodity system allows governments to liquidate assets or commodities instantly without having to worry about funds transfer and for the highest prices possible. This is accomplished by determining the size of the supply of a given asset or commodity and then creating a token by which those assets or commodities are pegged. Government can then place the pegged token for sale in the government's dedicated assets exchange within the platform. Buyers across the world then place attempted buy orders and compete to purchase the tokens available. This competition and international availability ensures that the government always has a buyer and always gets the highest price possible. Collection of the given asset or commodity is then done at the token owner's convenience. Once the asset or commodity is redeemed that token is destroyed.

Using the government commodity system gives the following advantages:

- The system ensures Government always gets the highest price.
- The system Creates the ability to open up international participation in sales to millions of buyers, anywhere on Earth.
- Liquidation can be accomplished instantly.
- Payment happens instantly and automatically.
- Removes need for government to search for buyers.

Claim System

Government-citizen interactions may not be carried out through polls. Apollo Fintech offers a new tool that allows you to receive and process requests from residents.

Apollo Fintech offers a system for receiving and processing official claims from citizens of the country.

Apollo Mineral Claims System

The government claims system allows a mining ministry to replace paper maps or vulnerable centralized ledgers with one incorruptible system. This system connects all mining offices into one unhackable database that eliminates issues of downtime and manipulation. Reoccurring fees can be easily added and payment deducted automatically. When payments are made or not made claim ownership can be automatically updated, erasing the need for manual changes and preventing continual ownership from owners which do not pay dues, substantially increasing revenue immediately. The implementation and daily function can be administrated 100% by Apollo Fintech staff in each mining office, by a combination of current government employees, or by government staff on there own.

Benefits of the Apollo Mineral Claims System are as follows:

- Immediate, substantial increase in revenue
- All current and new mining claim ownership records added to a universal, easy to view digital system
- Connects records from all mining offices into one seamless database
- Eliminates ownership of claims by those that do not pay required reoccurring fees, opening up claim areas to those that will utilize them
- The distributed ledger is incorruptible, unhackable and impossible to manipulate
- Unlike centralized systems, there is no system failure, down time or risk of losing information
- There is no cost to government for implementation or administration if Apollo Fintech implements and administrates daily use on location.
- Can be customized to fit individual needs

Note that the Apollo Mineral Claims System is a separate products (from the Government Platform). So, it is not presented in fig. 1

Government Notifications

An additional powerful aspect of the national currency platform is the notification system. Every citizen will have access to the National Currency platform from their phone, computer, tablet, smartwatch, and SMS messages. This notification system will allow authorized government personnel to publish nationwide notifications which will be sent to every citizen on all of their devices as well as an SMS text message. Emergency notifications can be issued immediately using the same system and will go straight to the devices of the user with an additional emphasis to signify importance.

Example of National Currency Platform implementation: Lesotho

As declared above, the Apollo Fintech offers an all-inclusive government solution with the ability to cut government human resource demand and costs to a fraction of their current budget.

This initiative will be supported by Lesotho's government to provide essential technology to the citizens of Lesotho. That makes it possible for Lesotho to become the most technologically advanced nation in Africa.

The fastest way to get started with a new cryptocurrency wallet and launch it in the very minimal configuration in the shortest time frame is to create an asset, based on the Apollo blockchain and develop a new UI. Such an approach will be implemented by Apollo Fintech in the nearest future in Lesotho.

It will allow to quickly launch the project with a simple version that will keep all technical details from Apollo, fees paid in APL, and no taxes to governmental wallets before the project is developed to meet these requirements.

Our concept considers such kind of approach:

The whole project will be split into about three main iterations and further support.
The general timeline is forecasted to be about 6-7 months and includes the following stages:

- **1st stage** - Issuing an asset based on the Apollo blockchain platform.
- **2nd stage** - Adding Apollo ID, Certificates system, Taxes system, Send/Receive transaction via SMS.
- **3rd stage** - Voting system, User management, Notifications, Asset trading, Admin wallet.
- **Further support.**

Additionally to users' wallets, the newest KYC mechanism will be developed and implemented. It should allow the Lesotho government to restrict adding more than 1 wallet to one citizen will be proposed.

As for the SMS sending feature, it will be developed using a common token system. That means that there will be a randomly generated token that will be sent as a link via SMS to the recipient and he/she will be able to receive a transaction by this token.

The National Currency Platform will be expanded in other regions and countries after it's launched as a live version in Lesotho.

The Functionality of The National Currency Platform also should be extended.

Commercial Solutions

Bank Transfer system

The Apollo bank transfer system can be successfully implemented at government level (see "Government Products" section above) as well as at the commercial stage.

The Apollo bank transfer platform gives a bank the ability to conduct instant payments to and from any bank in the network using local and foreign currency. The platform can be used after a simple integration using the Apollo Bank API or instantly by using a dedicated standalone platform. Payments can be sent, received and tracked nearly immediately. The Apollo Bank Network allows any bank to offer its customers an instant, trusted transfer method at no cost, creating additional revenue while adding value and convenience for customers.

The Apollo bank transfer system provides the following benefits for the commercial banks:

- Payments can be sent to any international banks integrated in the platform. Funds can be sent in local currency only or exchanged instantly during transfer and received in a number of currencies.
- Payments are made on a distributed database that is incorruptible, unhackable and cannot be manipulated.
- Unlike all current options, the Apollo payment transfer database allows for zero downtime or failures.
- There is a little cost for a bank to integrate or use
- Revenue is created from fees on all payments sent.
- Transfers on the Apollo Bank Network can be offered to customers as an additional option to send instant payments Without the need to remove or replace current transfer options.

White Labels Payments

A white label payment is a payment method that allows any bank or commercial entity to provide payment processing services for third-party companies under their brands using Apollo blockchain. That means that in a white-label payment solution, the company uses its own 'label' on top of the Apollo's white label. By utilizing this payment system, a business can save a substantial amount of time and resources and gain access to technology that not only proven but far superior to traditional platforms.

So, the Apollo Fintech proposes to use its infrastructure to execute payments and funds transfer by third-party companies. That will help companies to improve their image and reputation in the eyes of their clients, card members, etc.

White label payments are a direct result of Apollo Currency System implementation at the Governmental level.

Using the Apollo white-label payment system gives the following advantages:

- All transactions are made on a distributed database that is incomparably reliable, incorruptible and unhackable.
- Unlike all other available blockchain technologies that suffer from sustainability issues, such as blockchain bloat. the Apollo payment platform's blockchain core utilizes world leading technology, such as Sharding and adaptive forging, to provide the fastest, most advanced, truly sustainable distributed ledger.
- Options for Compatibility with Apollo Cash payment system and other payment systems across Africa. This gives your customers more incentive to register as it offers them the ability to send funds instantly to friends and family around the world on the same system and allows your company to profit on international transfers and repatriation of funds abroad.
- Unparalleled customer accessibility. Payments can be made and received on almost any consumer device. Citizens can send and receive payments from any desktop computer, tablet and smartphone using your dedicated app or on a simple phone via SMS. Additionally, biometric cards or traditional pay cards can be distributed at customer registration for as little as 10 cents a card opening up the market to customers without access to communication devices or those in areas with limited signal.
- Multiple currencies can be added to facilitate the sending and receiving of a number of currencies on the same system.
- Unlike all current options, the Apollo ledger provides zero downtime or failures.
- Transactions are settled as fast as sub-second. Faster than any other solution on the market.

Customer Solutions

Knox Exchange

Apollo proposes the centralized Knox Exchange service to exchange the currency.

Unlike the Decentralized Exchange (see "Decentralized Exchange" section below), the Knox Exchange can be deployed by some government at the national stage. And it can be adopted for the concrete conditions of usage.

For example, the Knox Exchange can be applied by the government to simplify the national cryptocurrency usage by the citizens.

Knox World Pay

An essential feature of the universal blockchain platform is the ability to conduct transactions in the absence of access to the network. So, if all user's accounts (i.e. wallets) are on the blockchain network, an online confirmation of both sending funds and receiving them is necessary for the transaction. This is not convenient, for example, in the case of impermanent access to the Internet.

Apollo offers a solution named Knox World Pay that is based on so-called SMS transactions. The main idea of this Apollo solution is that the sender and receiver are not online at the same time. In fact, these are offline payments.

The essence of the proposed Apollo offline transactions is as follows:

- **User 1 (sender) initiates the transaction of funds sending to User 2. The transaction is signed by the private key of User 1. The amount for sending funds is reserved in the wallet of the User 1.**
- **A special transaction code is generated. It is sent to User 2 as an SMS.**
- **User 2, using the received transaction code and his own public key, confirms the crediting of the funds sent to his own Apollo wallet.**

The reserved amount in the sender's wallet will be withdrawn and transferred to the recipient (in case of confirmation of the transaction). Otherwise, the transaction amount will be unlocked after the set time. The time interval is set by the authorized system administrator depending on the purposes of application (for example, 2 weeks for payment system).

That means that the sender and the receiver for the successful transfer of funds may not be online at the same time. That is, the sender initiates the transfer of funds at any time. In this

case, the recipient confirms receipt of funds at a convenient time, but no later than the deadline (for example, 14 days). So, the code from SMS is a guarantee that the recipient will be able to receive their funds.

Both sending and receipt can be executed in any preferable way (using the mobile application, web-interface, etc.).

It should be noted that Knox World Pay will be the World's first blockchain that uses the SMS phone payment system.

In fact, Apollo for the first time offers an offline payment system using the blockchain platform.

The indicated code (from the SMS) for receiving funds can also be successfully used for the following purposes:

- **Offline payments (as described above).**
- **Bearer check with a code for receiving funds. Anyone with the code will be the recipient.**
- **Prepaid cards. Anyone with the card (with code) will have access to the defined funds. Apollo blockchain platform with proposed Knox World Pay outperforms the competitors on the payment solutions like EcoCash [2].**
- **First of all, Apollo is a complete solution. A progressive payment system is one important component of it.**
- **Knox World Pay system successfully solves the problem of transactions in the absence of permanent access to the Internet.**
- **As a payment system, Apollo offers a number of additional solutions for its integration at the national level. This is described in detail later in the current document.**

Apollo Currency

The Apollo platform operates its own **APL cryptocurrency (hereinafter - APL)**. It is Apollo Fintech's first blockchain product. The APL is currently the fastest, most feature-rich cryptocurrency on the market. Boasting a community of **over 300,000** with over **400,000 wallets** created, Apollo has been a consistent top 150 coin.

The following innovative technologies and new ways to use the Apollo blockchain platform provide high popularity and liquidity for the APL currency:

- **Apollo smart contract,**
- **Decentralized filesharing,**
- **Decentralized applications infrastructure.**

Next, we will consider each of these points in detail.

The reserved amount in the sender's wallet will be withdrawn and transferred to the recipient (in case of confirmation of the transaction). Otherwise, the transaction amount will be unlocked after the set time. The time interval is set by the authorized system administrator depending on the purposes of application (for example, 2 weeks for payment system).

That means that the sender and the receiver for the successful transfer of funds may not be online at the same time. That is, the sender initiates the transfer of funds at any time. In this case, the recipient confirms receipt of funds at a convenient time, but no later than the deadline (for example, 14 days). So, the code from SMS is a guarantee that the recipient will be able to receive their funds.

Both sending and receipt can be executed in any preferable way (using the mobile application, web-interface, etc.).

It should be noted that Apollo Cash will be the World's first blockchain that uses the SMS phone payment system.

In fact, Apollo for the first time offers an offline payment system using the blockchain platform.

The indicated code (from the SMS) for receiving funds can also be successfully used for the following purposes:

- **Offline payments (as described above).**
- **Bearer check with a code for receiving funds. Anyone with the code will be the recipient.**
- **Prepaid cards. Anyone with the card (with code) will have access to the defined funds. Apollo blockchain platform with proposed Apollo Cash outperforms the competitors on the payment solutions like EcoCash [2].**
- **First of all, Apollo is a complete solution. A progressive payment system is one important component of it.**
- **Apollo Cash system successfully solves the problem of transactions in the absence of permanent access to the Internet.**
- **As a payment system, Apollo offers a number of additional solutions for its integration at the national level. This is described in detail later in the current document.**

Decentralized filesharing

The Apollo platform makes it possible to **store the digital content** and provide its sharing from the creators and consumers without a fee for the intermediary (for the Apollo distributed storage) like were declared in Tron White Paper [12].

Applied Apollo blockchain technology can cut out the middlemen for this process. All of the stored data will be cryptographically secure via the blockchain, and the creators retain all of their profits instead of other companies taking a cut. The modular architecture of the Apollo platform will allow it to be adapted for various types of stored content and conditions for its use.

Let's compare the Apollo with the Tron [12] as the biggest blockchain platform for filesharing.

Unlike the Tron that uses Delegated Proof-of-Stake (DPoS) consensus algorithm, the Apollo platform proposes the variability. Also that allows adopting the Apollo network depending on stored data type, data access speed, etc.

Both the Apollo platform and Tron support smart contracts. However, Apollo proposes more wide possibilities for its application. For integration with Apollo and smart contract application, a lot of programming languages can be used.

Decentralized applications infrastructure

As the blockchain develops, decentralized applications (hereinafter - **DApp**) are gaining more and more popularity.

A DApp has its backend code running on a decentralized peer-to-peer network. Contrast this with a “typical” app where the backend code is running on centralized servers.

As shown above, the Apollo platform features, such as smart contracts implementation, are designed to significantly expand the range of Apollo applications. A variety of projects can be deployed at the considered Apollo platform. This will allow the Apollo to be called a universal and multi-purpose blockchain platform.

Apollo Smart Contract

Apollo Smart Contract is the implementation of the mechanism of smart contracts for the Apollo blockchain. It is the ability to create complex data processing scenarios, the possibility of tokens generating and conducting the Initial Exchange Offering (**IEO**).

Apollo's smart contract will be based on universal Apollo smart contract engine. It allows using different popular programming languages like Java, Kotlin, Scala, Javascript, etc. to create smart contracts.

The smart contract code (see fig. 2) can be written in any supported language, and has access to the full capabilities of the language, including the following rules:

- **Checking the number of inputs, outputs, commands, time-window, and/or attachments;**
- **Checking the contents of any of these components;**
- **Looping constructs, variable assignment, function calls, helper methods, etc.;**
- **Grouping similar states to validate them as a group (e.g. imposing a rule on the combined value of all the cash states)**
- **A transaction that is not contractually valid is not a valid proposal to update the ledger, and thus can never be committed to the ledger.**

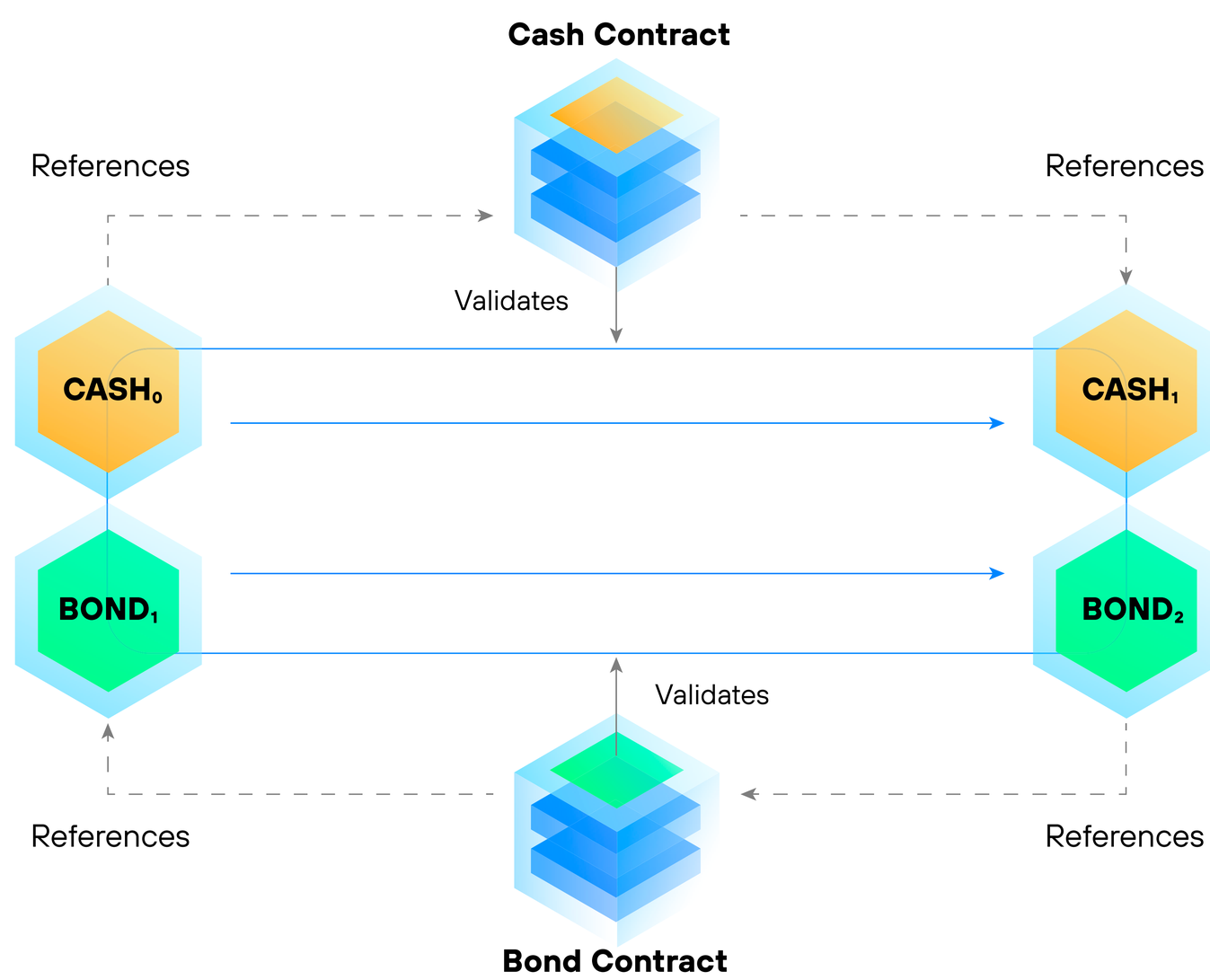


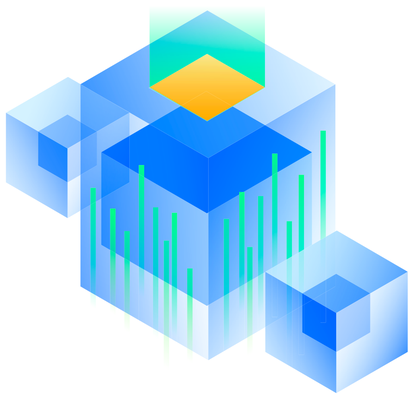
Figure 2. General scheme of smart contract validation.

Specialized Apollo smart contract engine will be used for the Apollo smart contracts implementation. That means that a lot of programming languages can be used for smart contract creation.

Smart contracts will be executed inside the very restricted sandbox.

Smart contracts are supposed to be a binary file with a special manifest and cryptographic signatures.

As a result of usage of the universal Apollo smart contract engine, a wide spectra of programming languages may be used to create smart contracts.



Physical and Online Exchanges

Usually, a cryptocurrency is inaccessible to the majority of the world as it requires a bank account, computer, knowledge, and patience. At the same time, physical exchanges promote unparalleled mass adoption and crypto access. Our solution to this barrier is to initiate a decentralized network of physical locations allowing anyone to walk in and purchase Apollo, simply with cash. This will open up cryptocurrency to the vast majority of people without a bank account.

The Apollo Decentralized Bank Network will consist of thousands of locations worldwide. We anticipate Apollo Decentralized Banks and Apollo ATMs in every major city on Earth. Cryptocurrency will finally be open to the World.

Nowadays, Apollo proposes the physical exchange at all continents as follows:

- **Wasilla, USA**
- **Cedar Rapids, IA, USA**
- **Osmanağa Mahallesi, Turkey**
- **Tbilisi, Georgia**
- **Salisbury East, Australia**
- **Potts Point NSW SE, Australia**
- **Klerksdorp, South Africa (3 banks)**

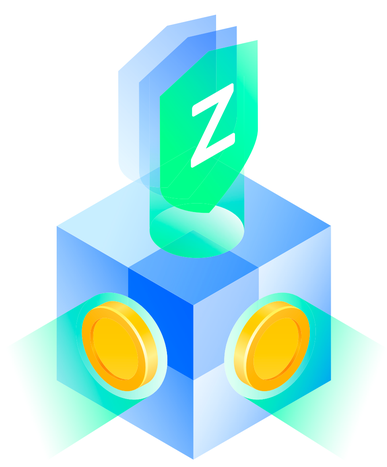
The current map of banks and branches for exchange is presented on the official Apollo website [13].

The APL exchange will expand to the following directions:

- **Geographically: more exchange banks over the world.**
- **An online exchange will expand to accept many fiat currencies on a regional level. This allows for near-instant deposit and withdrawal.**

To protect the crime and money laundering, the Apollo proposes the patented Smart KYC verification system for physical and online currency exchange. That proprietary KYC system allows a 2 minute KYC acceptance. The Apollo team will then follow up to verify, but the trader can start trading with few limits almost immediately after submitting documentation. This greatly speeds up and simplifies trading operations.

Note. For the first step of the Apollo Fintech implementation, the external (prepaid) KYC-service can be used. Further, it will be replaced by the native Apollo KYC service.



Zenon Currency

Today, a typical transaction time in the Apollo network is 2 seconds. An implementation of new features makes Apollo's transactions faster significantly.

The Apollo Fintech will include an extra fast distributed network and it will be used for real-time transactions. So, the Apollo Fintech will create the Zenon as a new fast cryptocurrency. It can be used for different commercial applications. But the main direction is to use Zenon for extra fast funds transactions.

Zenon-based extra fast transactions can be applied for different stages:

- **Commercial (bank-to-bank transactions).**
- **Governmental (central bank to other commercial banks).**
- **International (global cross-border transactions).**

A system can compete with another transfer system like XRP be Ripple that is said to be the most efficient settlement option for financial institutions and liquidity providers for interbank flows. At the same time, the Zenon transactions are much faster than the XRP version.

Note that the proposed Zenon-based transaction system is compatible with other Apollo Fintech services like exchanges (centralized or decentralized), Apollo cash, etc.

Decentralized Exchange

As declared above, the Apollo Platform uses its own APL digital currency. To make it truly universal, liquid, and convenient, Apollo launched a Decentralized Exchange (hereinafter - **DEX**).

Apollo DEX is a software package for the exchange of digital assets at peer-to-peer networks. Unlike traditional (centralized) exchanges, DEX does not have a single center acting as a guarantor of the transaction. In fact, assets are transferred directly from the sender to the recipient within DEX excluding third parties. That gives Apollo DEX several advantages:

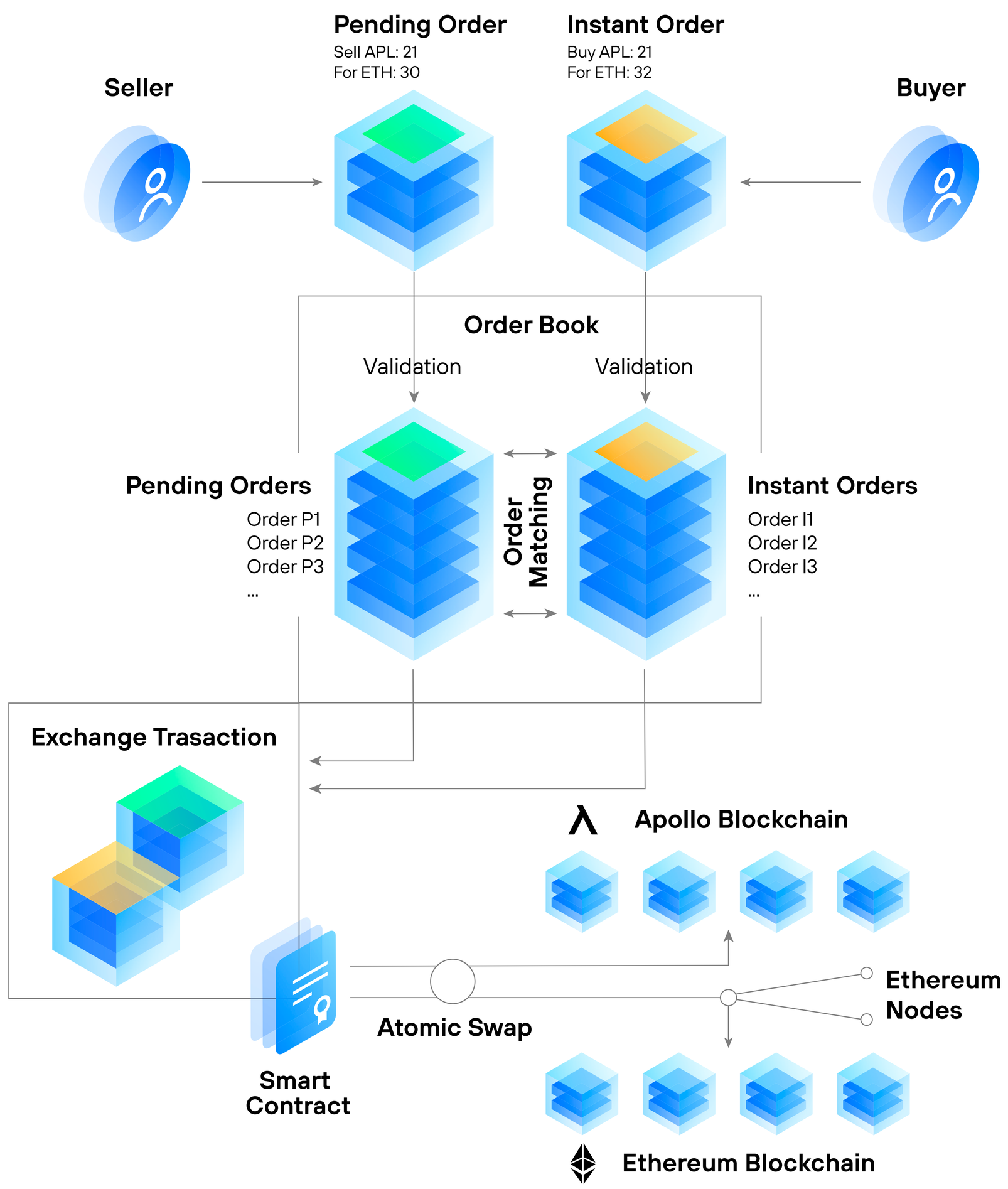
- **Decentralization and separation of powers:** There is no single entity responsible for all trading operations. That means that each member of the network supports the work of the exchange, ensuring its stable and uninterrupted operation. So, the platform is decentralized across the globe and available for trading 24/7.
- The nodes of the Apollo network interact according to a protocol that does not know the consequences associated with the assets involved. This ensures the **correct processing of contracts** by network nodes and eliminates the manipulation of data and assets.

- DEX allows operations with **any type of asset** or its digital counterparts.
- **Reliability and security**. User funds and transactions are protected utilizing modern cryptographic methods. An unauthorized party will not be able to access users' assets or change the terms of the transaction.
- **Fast**. Apollo platform performs almost instant transactions with APL cryptocurrency. Thus, the speed of the Apollo DEX can be very high and is determined only by the speed of transaction processing by third-party blockchains.
- **Minimal fees**. The absence of a third-party (like centralized exchange) leads to the minimization of contract fees and associated costs.

All this allows us to consider the Apollo DEX as an example of the modern and one of the most technologically advanced decentralized exchanges.

Apollo DEX allows exchanging (purchase or sell) the APL to other digital assets at peer-to-peer networks. Trading on the Apollo DEX is performed by placing appropriate orders. The User has the opportunity to specify the desired conditions of the contract (exchange rate). This undoubtedly provides a benefit to the User.

Figure 3. General scheme of Apollo DEX functioning.



The contract execution at the Apollo DEX includes the following sequence of actions:

- **User 1** (named "Seller" in fig. 3) places a pending order to sell (exchange) some asset at the desired rate through a corresponding user interface. This pending order is checked and placed in the order book.
- **User 2** (named "Buyer" in fig. 3) places an instant order to buy (exchange) another asset at the desired rate. This instant order is checked and also placed in the order book.
- **The order matching system** searches for a suitable counter order. User orders 1 and 2 turned out to be the most comparable in the system.
  Note that the order matching system searches for a suitable counter order for each new order in the order book. A suitable order can be found by the order matching system immediately after placing the order by User 1.
- **By the atomic swap mechanism**, Apollo DEX forms a smart contract that reserves assets for an exchange on the users' accounts and waits for confirmation of the exchange from Users 1 and 2.
- **After the mutual confirmation** of the asset exchange, Apollo DEX exchanges crypto assets. Information about the transaction is entered into the blockchains of both cryptocurrency systems between which the exchange was carried out.

Apollo team focuses on making the Apollo DEX the most secure, efficient and easy to use on the market. Let's take a look at the main features of the Apollo DEX, which distinguish it from other similar platforms.

Atomic swap is a technology that allows two parties to exchange crypto assets between two blockchains without intermediaries. Atomic swap solves the problem of performing related operations in unrelated blockchains (for example, Apollo and Ethereum) when both parties must complete their set of actions under the contract, otherwise, the whole transaction will not take place.

TradingView© (https://www.tradingview.com) is a graphical representation of the change in the price ratio of two selected assets. Such a tool allows a user to quickly navigate in the current market situation and perform transactions at the most favorable rate. The TradingView (c) graph and tools will be included on the “Exchange” page of the Apollo web wallet.

Own Ethereum nodes have been deployed for safe and controlled interactions with the Ethereum blockchain. Using own Ethereum nodes allows not to use third-party services to provide interaction of Apollo with Ethereum blockchain.

Matcher is an automated algorithm that allows to find mutually complementary orders and carry out a transaction as soon as possible. Verification is performed after placing each individual order.

Smart Contract. Apollo DEX uses Ethereum smart contract to create and execute orders with some additional conditions and rules. In particular, Ethereum smart contract allows to transfer of funds with confirmation from the recipient and to set a time limit for the entire procedure. Currently Apollo DEX supports Ethereum and PAX pairs only, new currencies may require other gateways and smart contracts to be applied.

A number of the most significant technical and ideological solutions that give Apollo a number of advantages have been considered above. However, the Apollo team does not stop at the achieved successes. A number of challenges described below are designed to expand the scope of the practical application of the Apollo cryptocurrency platform as never before.

Note that the described sharding procedure is Apollo DB dividing by date size only, i.e. vertical sharding.

The next step is Apollo DB dividing by the set parameters (vertical sharding). This step is necessary by the project evolution and increasing the number of different applications (voting, payment transactions etc.).

Conclusion

The inefficient business processes can be compared with non-environmentally friendly internal combustion engines. They have been replaced by modern and environmentally friendly engines. In a similar way, the DLT will replace some inefficient IT technologies, such as centralized databases. This will reduce the cost of managing information flows, make the business "more environmentally friendly".

The considered Apollo Fintech is designed to increase the efficiency of many business processes from the national range till consumer one. Flexibility and adaptability of applied technologies will allow using the Apollo platform in different scopes of application.

The Apollo Foundation has extensive plans for further development and improvement of the platform. Apollo platform will implement a modern DLT algorithms to eliminate these shortcomings and further develop the project to replace the existing blockchain. Such an implementation will give the Apollo platform many competitive advantages over nearly all cryptocurrency platforms on the market. In particular, multiple increases in the number of transactions, the total amount of users, and a significant reduction in its processing time are expected. The ability to use smart contracts, the launch of DApp platform, the optional choice of consensus algorithm based on the project's modularity, and launch of Apollo decentralized filesharing, open up a virtually unlimited scope for Apollo usage.

Terms and Abbreviations

3D – Three-Dimensional.

APL – Apollo currency.

DApp – Decentralized application.

DEX – Decentralized Exchange (by Apollo).

DLT – Distributed Ledger Technology.

DPoS – Delegated Proof-of-Stake (consensus algorithm).

GDP – Gross Domestic Product.

ID – Identifier.

IEO – Initial Exchange Offering.

IoT – Internet of Things.

IP – Internet Protocol.

IT – Information technology.

KYC – Know Your Customer.

MoU – Memorandum of understanding.

NFC – Near-Field Communication.

PoC – Proof-of-contribution (consensus algorithm).

PoS – Proof-of-Stake (consensus algorithm).

PoW – Proof-of-Work (consensus algorithm).

SMS – Short Message Service.

TPS – (number of) Transactions Per Second.

UI – User Interface.

Citation

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Appendix 1.

User interface of the National Currency Platform

Figure A1.

Form of logging in.

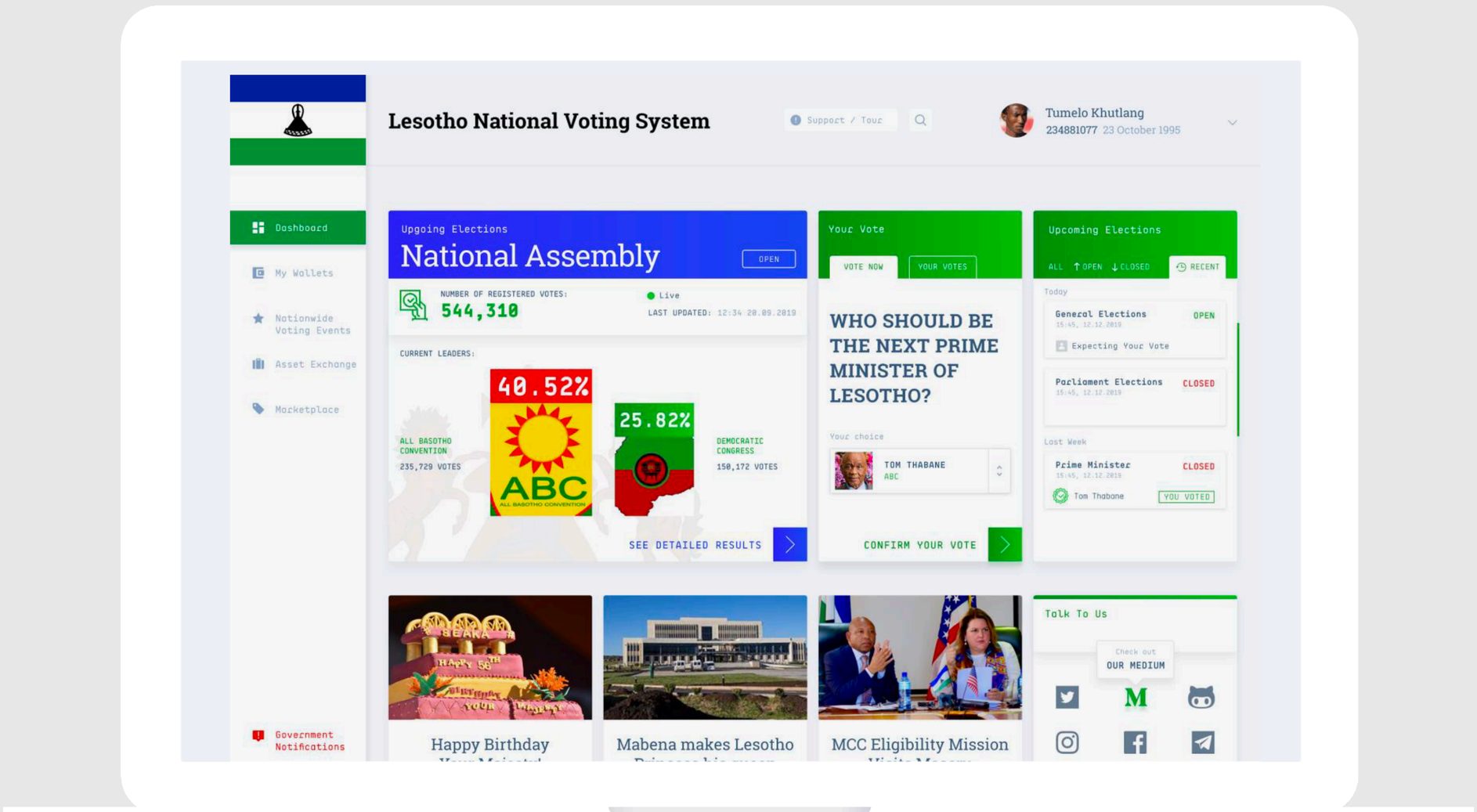

Figure A2. Dashboard. Sample 1.

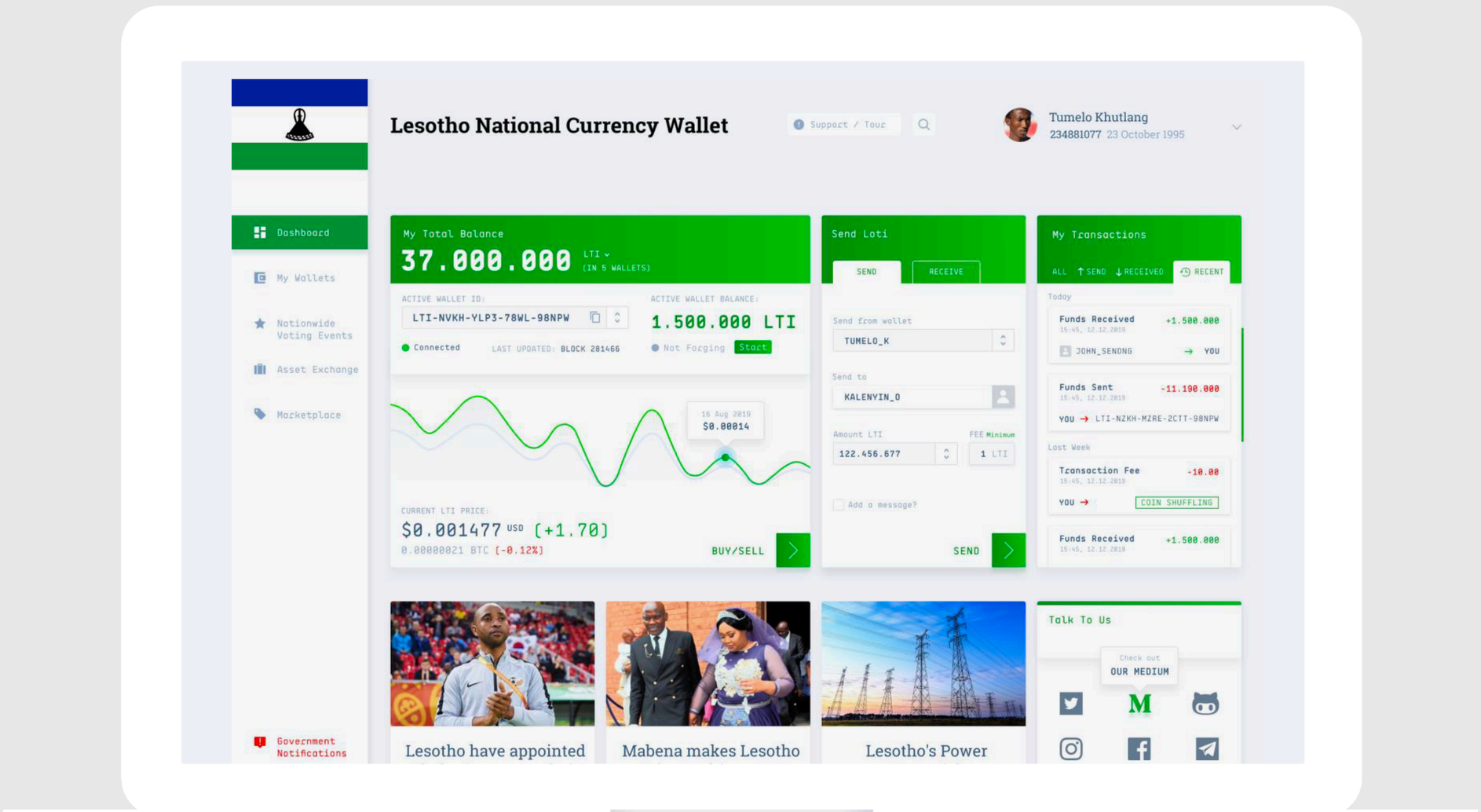

Figure A3. Dashboard. Sample 2.

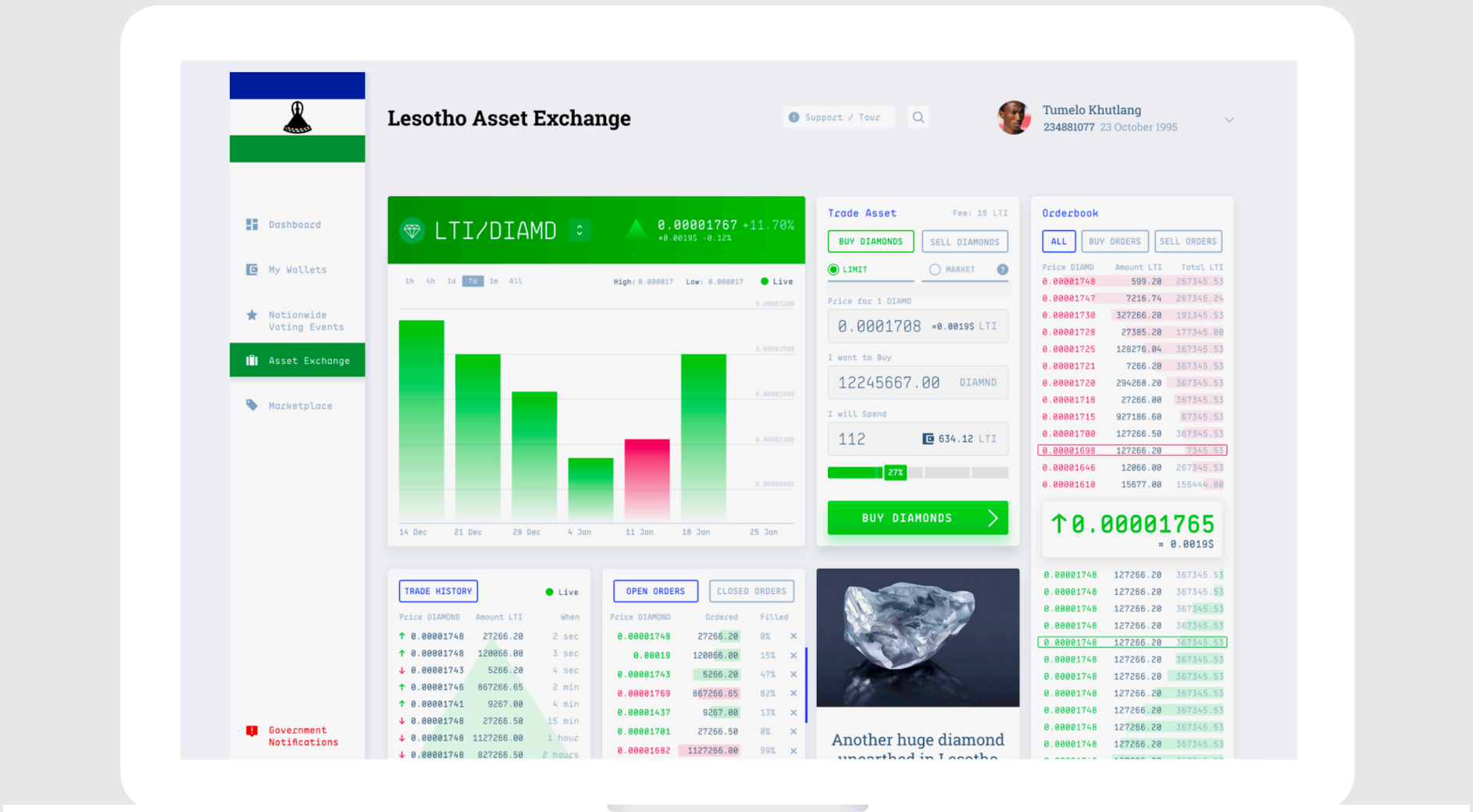

Figure A4. Asset Exchange page.

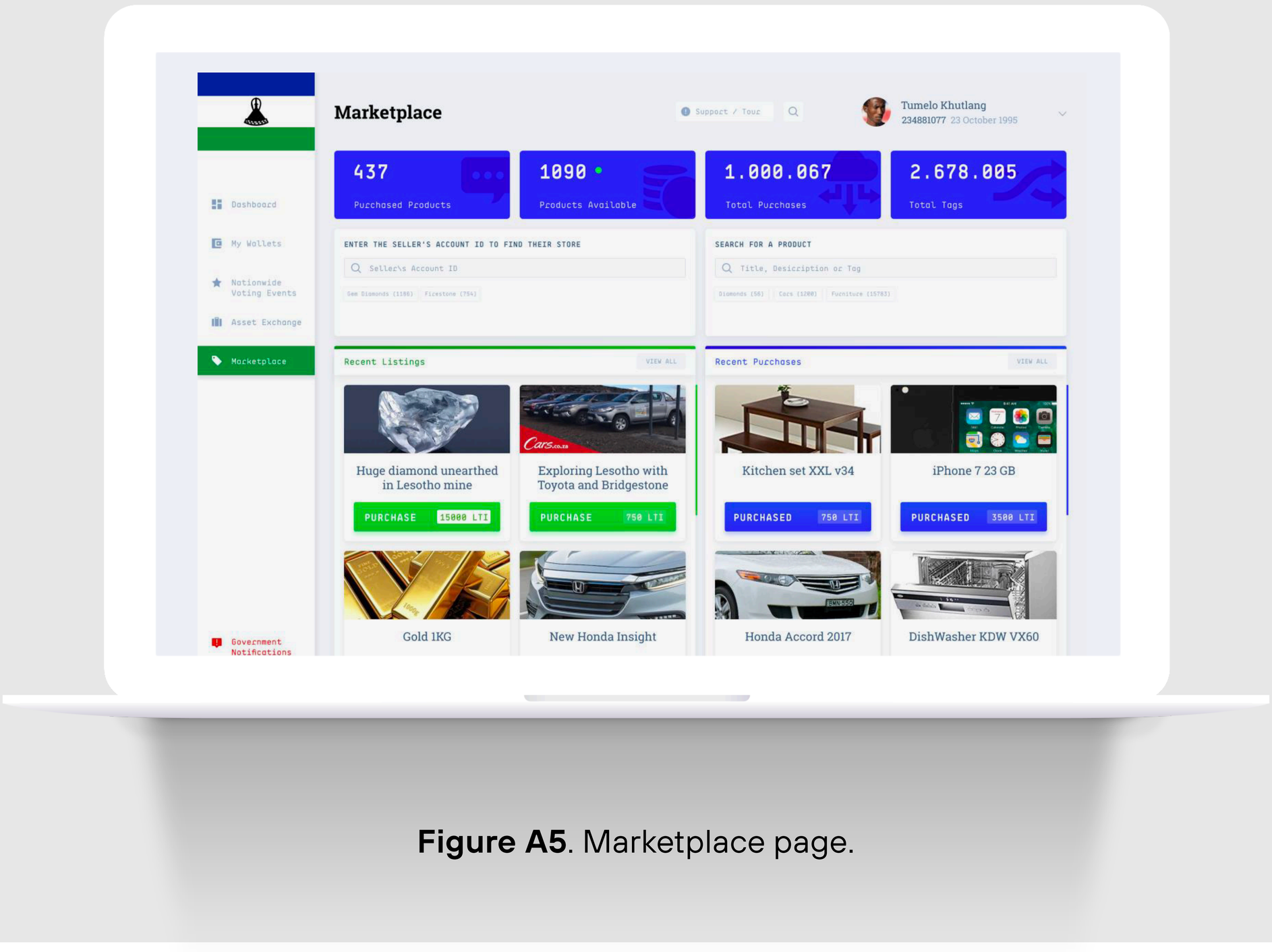

Figure A5. Marketplace page.

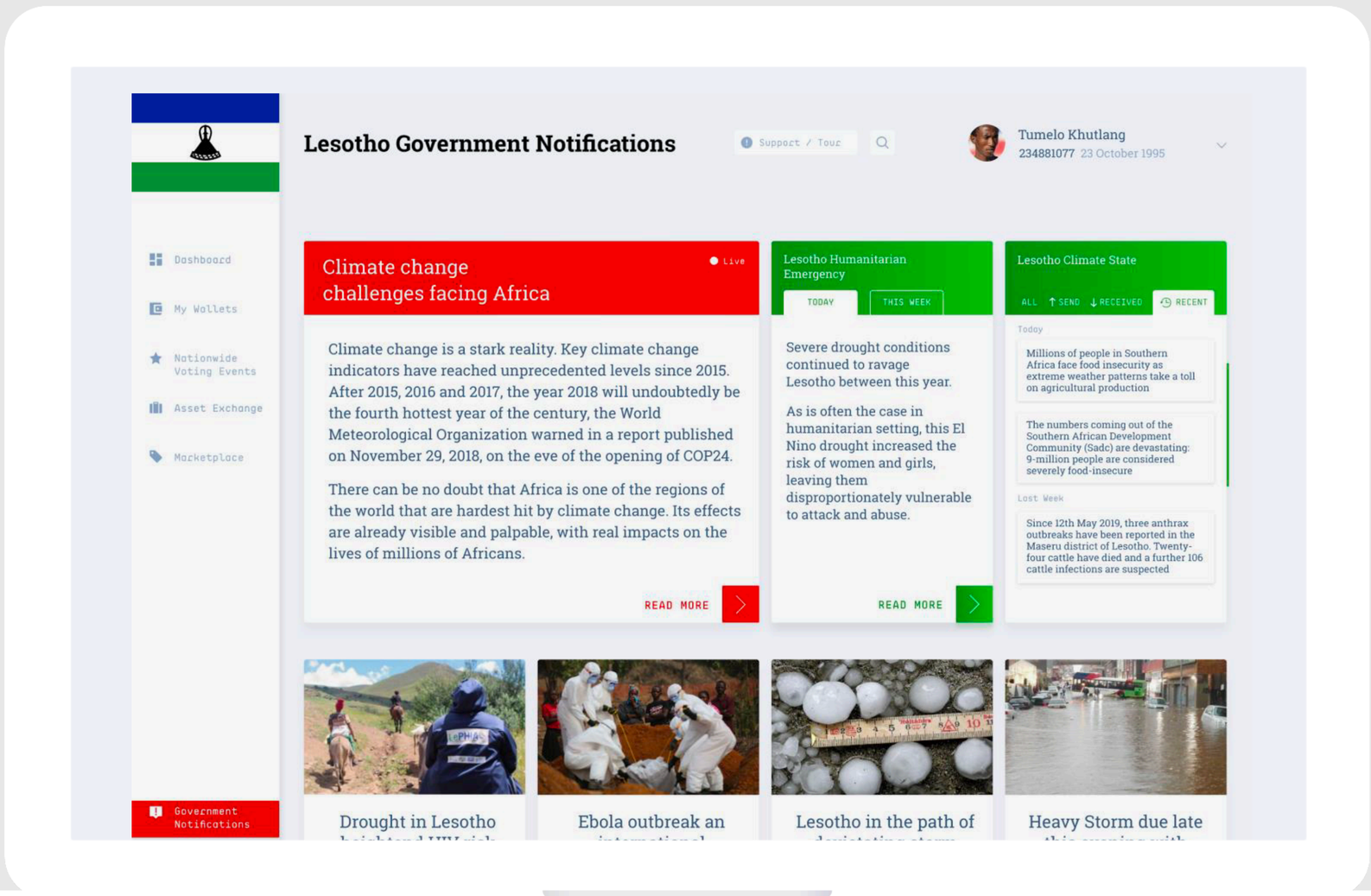

Figure A6. Government Notifications page.

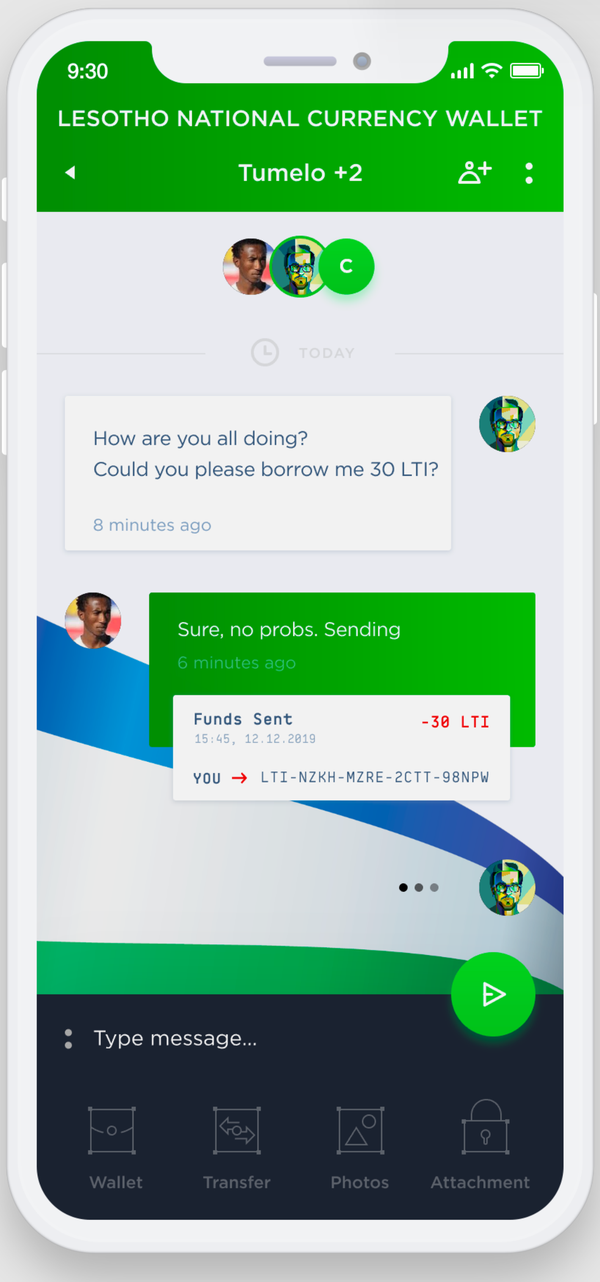

Figure A7.
Chat with currency transfer option.

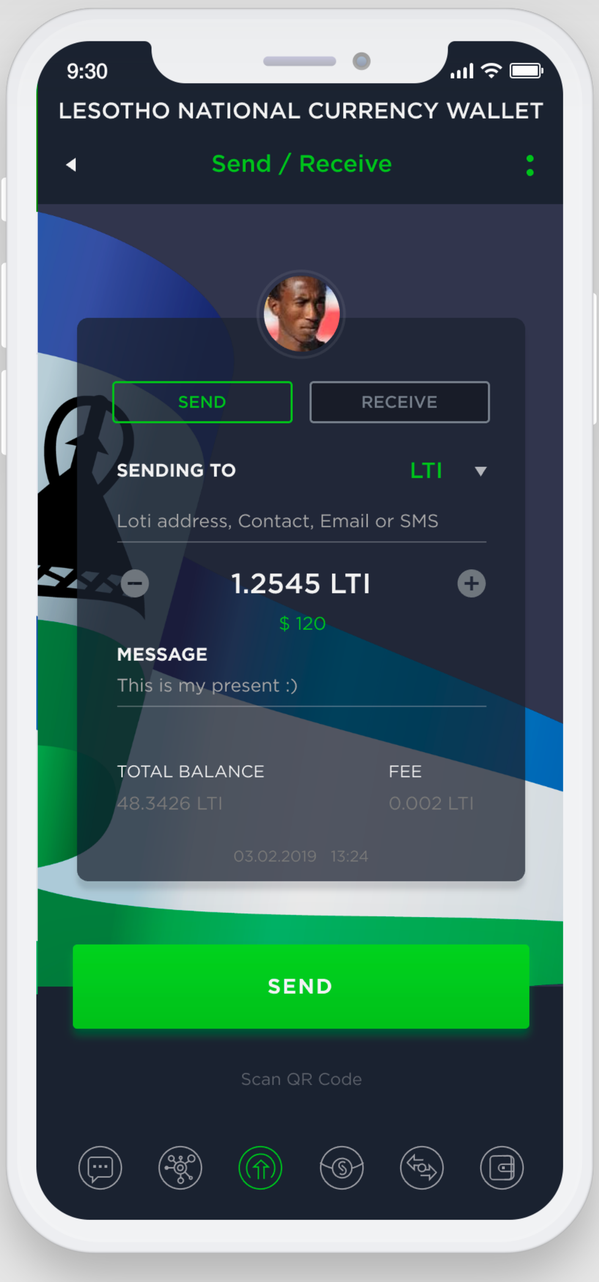

Figure A8.
Currency sending tool.

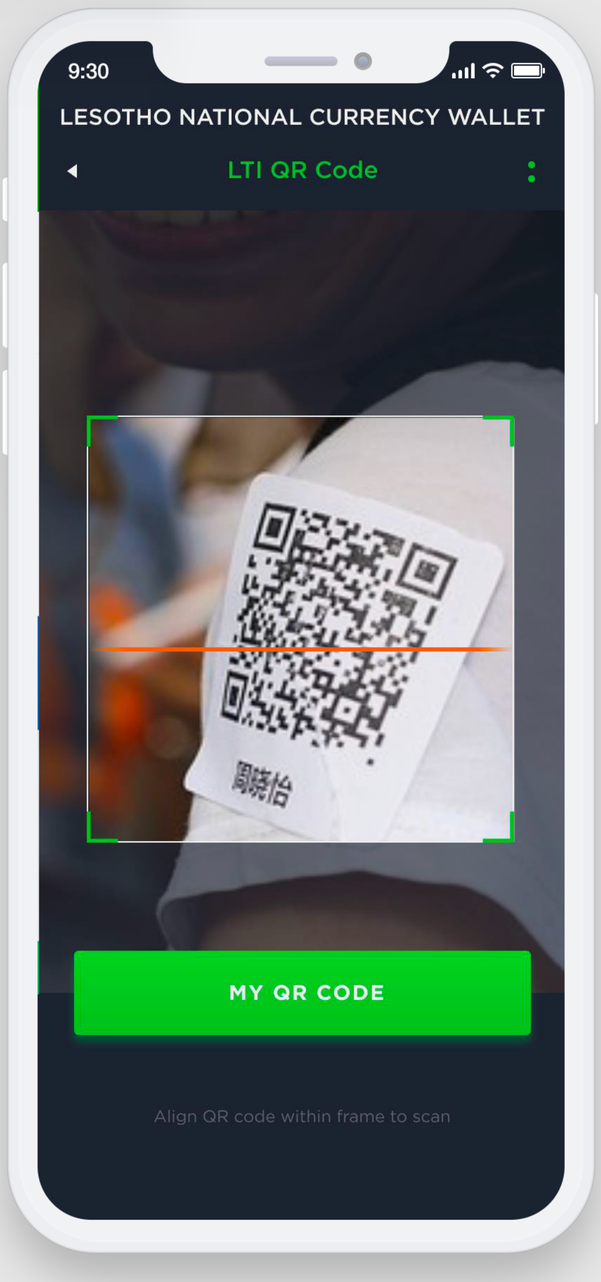

Figure A9.
QR code scanner tool for currency transfer.

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