

The Munii Protocol: A Savings and Equity Blockchain

DECENTRALIZED FINANCE.

BLOCKCHAIN POWERED.

Version 0.1.0

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Abstract

This paper provides a functional overview of Munii Protocol and the MFX token, and the role these will play in a new class of Digital Credit Unions that operate on a distributed ledger system.

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This Document is not a technical specification

This document does not constitute nor imply a technical specification of a banking protocol. Information presented in this whitepaper, technical or otherwise, is meant to outline the general idea of the banking core, its design and its use-cases and is subject to change with or without notice.

Introduction

The **Munii Protocol** is a decentralized finance (DeFi) savings and equity blockchain construct that uses the **MFX token** to execute transactions. The MFX blockchain is the common record of ownership for all assets and resources on the Munii Protocol. This DeFi network will support Federally Chartered Credit Unions (CU), Credit Union Support Organizations, and Vendors with a focus on community development. Munii will rely on a custom blend of proof-of-stake (e.g., CU deposits) and proof-of-authority (e.g., CU Loan Officers) validations to conduct business using a unique banking core.

The CU regulatory body – the National Credit Union Association (NCUA) – has a member focus and strives for security and risk reduction in cooperative banking. The NCUA mission is a natural fit to both the social and technical motivations to blockchain’s distributed ledger technology development. The Munii Protocol will embody this technology to provide the Credit Union (CU) movement a modern approach to a strong, secure, reliable, compliant, and cost-effective community-based banking system. The building blocks for this system are described in the sections that follow.

Munii Nodes and Staking Pools

The primary nodes in the Munii Protocol are the non-profit, member-owned, Chartered Credit Unions. Each CU is a staking pool. The Members of the CU deposit their fiat to acquire both redeemable and irredeemable tokens: MFXr (share deposits) and MFXi (donated equity), respectively. These tokens are delegated to the CU staking pool. The MFXr represent the cash flow in the banking network to carry out member transaction. Think of MFXr as remittance receipts for fiat currency. The MFXi represent the donated capital within each CU used for investments and capitalization. Both are asset-backed credits (ABC) within the system – they are backed by either fiat or hard commodities such as gold. The initial value of these ABCs will be 1 MFXr = \$1.00 and 100 MFXi = \$1.00 U.S.

Since MFX are asset receipts issued by the CUs to represent redeemable or irredeemable credits, they will be unregulated by any agency outside of the U.S. National Credit Union Administration (NCUA) or the U.S. National Credit Union Share Insurance Fund (NCUSIF). The Federal Credit Union Act¹ stipulates that agencies such as the U.S. Securities and Exchange Commission (SEC) and the U.S. Commodities Futures Trading Commission (CFTC) have no jurisdiction in Credit Union operations since CUs are non-profit and member-owned. Therefore, MFX may be transacted freely within the Munii Protocol and according to NCUA regulations without additional outside scrutiny. This makes CUs the perfect opportunity to fully explore blockchain-based DeFi instruments to their fullest potential.

¹ Federal Credit Union Act <https://uscode.house.gov/view.xhtml?path=/prelim@title12/chapter14&edition=prelim>

Additional nodes in the Munii Protocol will include Corporate CUs, liquidity providers, and other Credit Union Service Organizations (CUSO) that provide resources to the CUs (see Figure 1). The node operators provide services exclusively within the Munii Protocol in accordance with the CU regulatory bodies. These utility nodes will allow CUs to extend their staking pools or to leverage their staking pools to acquire additional resources for CU membership (loan instruments, retirement accounts, certificates of deposit, insurance, etc.). CU members also may stake directly into these nodes to support specific activities on the Munii Protocol.

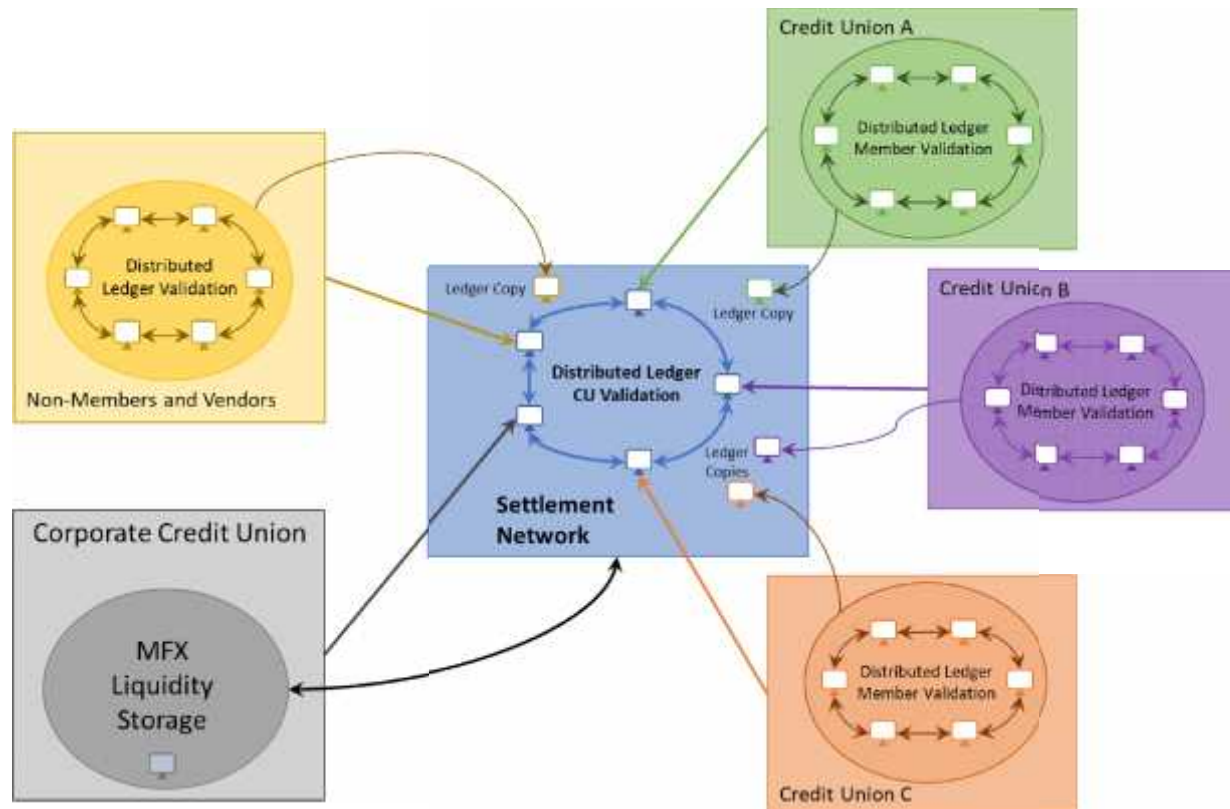


Figure 1: Munii Protocol structure and settlement network. Settlement network also keeps copies of credit union ledgers as backup. The Corporate Credit Union stores excess MFX tokens and adds liquidity to the settlement network as needed.

Passbook Ledgers

The blockchain within each CU is created and managed by the banking core. The banking core is also the aggregator and recorder of consensus among the nodes. Each CU transaction journal is referred to as a Passbook – the CU’s distributed ledger of transactions. The CU Passbook is made of the individual member passbooks – their private copies of the transactions in their accounts. For a given credit union, the validation will be accomplished internally by the membership. Transactions between CUs, CUSOs, and on-network vendors will be validated by the Munii Protocol nodes. Periodic backups of the CU Passbooks will be written to the Munii Protocol blockchain and validated by Munii validation nodes. The Munii Protocol blockchain will

be backed up daily utilizing multiple storage system types like servers, hard drives, Arweave² and/or Filecoin³.

Proof of Stake (PoS)

The transactions within a CU will be recorded in an automated database to execute immediately, and then the transactions will be logged to the CU Passbook by validation through proof-of-stake every 10-15 minutes. This is the time to create, validate, and write the new block to the blockchain.

The MFXr will be validated by participating CU members through proof of stake (shares deposit). A member may establish a validation node by staking 10 MFXr (\$10) or more into the node. Members who participate in the validation process within a CU will be eligible for extraordinary dividends proportional to their staked MFXr and the percentage of transactions in which their validation node attempted to validate transactions. In addition, MFXr will be minted each block to maintain the CU's liquidity pool and to provide rewards for the validators. A validator chosen at random will mint the new MFXr and will receive an extra share of the validation rewards.

Adding New Member accounts or new subaccounts to existing Member Accounts will be accomplished through each CU's Proof of Authority process. Once the accounts are created, the balances will be generated through the MFXr and MFXi validation processes to log the initial balances into the CU Passbook.

MFXi transactions, likewise, will be validated by MFXi holders using a proof of stake mechanism. MFXi holders will be able to create a node and stake their MFXi holdings (minimum 1000 MFXi) independently or to delegate all or part of their MFXi (minimum 10 MFXi) to other validators or to validation nodes that represent products or interests favored by that member within a CU or elsewhere on the Munii Protocol. Any member who participates in the validation process will be eligible for extraordinary dividends proportional to their staked or delegated MFXi and the percentage of transactions in which the validation node attempted to validate transactions. New MFXi will be minted by a randomly selected Proof of Stake participant node during each block validation to maintain the CU's liquidity pool and to provide rewards for the validators. The validator selected to mint the new MFXi will receive an extra share of the validation rewards.

Any MFXr or MFXi node that acts contrary to the interests of the CU or the Munii Protocol risks losing its node stake. Intentional disruption or theft on the network will result in loss of MFX stake, suspension of member services, and possible legal action. The block validations will be reviewed daily to isolate and examine contradicting results that may indicate a faulty node or a group of bad actors. There is no penalty for a node not being available to participate in validations, since that simply reduces the node's validation attempts (participation); and therefore, reduces the distribution of extraordinary dividends to that node.

² <https://www.arweave.org/>

³ <https://filecoin.io/>

Proof of Authority (PoA)

Proof of Authority validation is used by the Management and Board Members of a CU, CUSO Management, and the Network Operator whenever an account is created or a subaccount is added, and whenever a new CU, CUSO, Vendor, etc., is added to the network. POA results are logged into the blockchain by the MFXr and MFXi proof of stake validation process through majority/super-majority consensus.

PoA is also the mechanism used for member voting in the CU. Any measure or issue in the CU that requires a membership vote will use the Member PoA to record the voting results to the blockchain. Each account will have one PoA token that can be used to cast a vote: one account – one vote. This allows each member to have an equal voice in matters pertaining to their CU, regardless of the share balance in their accounts.

When it comes to voting on matters involving an investment, the PoS mechanism is used for voting. Only members with shares or tokens staked in an investment account may vote on issues regarding the investment. Each member's vote is weighted by the number of shares or tokens they have staked – the more a member has staked in the investment, the more their vote influences the decision.

The nuance here is that a decision whether to create an investment vehicle for a CU may involve a membership PoA vote. Once the investment is formed and members stake their MFX or shares in the investment, then the PoS voting mechanism is used for decision making.

Minting MFX

The Munii Protocol will pre-mint 377,000,000 MFXi to create the liquidity required for the first CU to begin operations. These will be valued at 100 MFXi = \$1.00 U.S., making each MFXi equivalent to \$0.01 initially. The value of MFXi will be determined by the value of the donated assets backing MFXi and profits made on those assets. MFXi will be capped at 1,418,970,000 digital tokens. There is no limit to MFXr, since these tokens are simply digital remittance receipts for fiat currency and maintain the value of 1 MFXr = \$1.00 U.S or as a CU board of directors deems appropriate.

The pre-minted MFX will be brought into circulation as the PoA process brings new members into a CU, or as an existing member, CUSO, or Vendor brings more fiat or assets into the network. Then the PoS process logs these new tokens into the passbook of the CU that the member joins (or into the passbook of the existing member, CUSO, or Vendor). The fees for the PoS validators are derived from the new MFX minted during each block period. The MFXi will be minted at an initial rate of 233 per block period but will decrease according to the Fibonacci Sequence (233, 144, 89, 55, 34...) over a prescribed timeline as the total number of MFXi approaches the maximum of 1,418,970,000 tokens.

During each block period a single validation node is selected at random to mint MFX tokens and to receive the extraordinary dividends. The probability in percent of a node being selected to mint new MFX is:

Probability for Selection = $100 * (\text{MFX}_{\text{Validation Node Stake}} / \text{MFX}_{\text{Total Validation Staked}})$

For example, say that there is a total of 500 MFXr nodes that each staked 1000 MFXr. The probability in percent of each node being selected to mint new MFXr each block period is:

Probability for Selection = $100 * (1000 / (500 * 1000)) = 100 * (1000 / 500,000) = 0.2\%$

The more tokens delegated to a node, the higher probability that node has of winning the chance to mint new MFX. Once a node is selected to mint new MFX, it is not eligible to mint new MFX again for a time out period equal to a number of blocks weighted by its Probability for Selection:

Time Out = $((N_{\text{Nodes}} * (\text{Probability for Selection} / 100)) * 10)$ Block Periods

In the prior example of 500 nodes with a Probability for Selection of 0.2%, each time a node wins it may not be selected to mint MFX for the next 10 block periods. A node that is excluded from minting MFX may still participate in validations and receive a share of those extraordinary dividend distributions.

The distribution of newly mined MFX will be as follows:

- 10% is awarded to the validation node responsible for minting the tokens.
- 10% is placed in the extraordinary dividend pool to distribute to participating validation nodes.
- 80% is added to the CU's MFX liquidity pool.

The minting award will be distributed as extraordinary dividends and added to the MFX staked in the winner's validation node. The winner can then decide whether to leave the MFX staked in the validation node or move it elsewhere. The extraordinary dividend pool will be distributed on a weekly basis to those nodes that participated during the period based on the percentage of MFX staked in the validation pool and the percentage of blocks validated during the week.

Management and Information Security

A decentralized, validated distributed ledger system is a highly accurate and secure means of recording data. By definition, a distributed ledger has more than one copy kept in more than one place. Data integrity is maintained by ensuring that enough nodes are in place to minimize the risk of a coordinated external attack or the ability of an insider to manipulate ledger data. This is why the CU Members will be incentivized with extraordinary dividends and minting rewards to operate validation nodes or to delegate (loan) some of their shares or MFX to other validation nodes. Validation nodes will be limited in size to ensure that no one validation node has more than 2% of the PoS validation power. Therefore, a minimum of 50 Member Validation Nodes is required to maintain the CU Passbook.

Privacy is achieved using encryption for each block added to the blockchain. Each block contains its own hash – a mathematical function that turns digital information into a string of numbers and letters – along with the hash of the block before it, as well as a synchronized time stamp. If that information is edited in any way, the hash code changes as well. An additional encryption layer is added to ensure that individual privacy is maintained according to laws and regulations. Most DeFi institutions also require a

supermajority (60-80%) consensus among the nodes for validation to occur. The time sequencing, hash encoding, and encryption ensure that the distributed ledgers can be validated and stored efficiently without the information being revealed from within the blockchain.

Each account holder possesses their own private key that decrypts their account information when they access their personal passbook. This allows members to access account information and execute transactions as needed. The CU Management maintains view keys to access information within a Member's Passbook if authorized by the Member. View keys also allow the CU Management to comply with subpoenas and warrants presented by authorized law enforcement agencies and courts when needed.

Anti-Money Laundering (AML) documentation will be generated and filed automatically to ensure individual privacy without compromising compliance. This information also will be written to the blockchain as part of the Member's Passbook to maintain the record. Recurring Know-Your-Customer (KYC) verification will be accomplished and documented in the blockchain as well. This automated documentation and encryption ensures the CU maintains a robust KYC/AML program that is efficient, compliant, cost effective, and minimizes human error.

These design features of a Savings and Equity Blockchain make it nearly impossible (never say "Never...") for either an inside CU employee or an outside hacker or thief to embezzle, steal, or fraudulently obtain assets from a CU Member or the CU writ large. The consensus and validation process ensures early warning of suspicious activity as well as rapid restoration of the network following any disruption. The validation process also acts as an audit of the ledger each time a block is written. If a mistake does make it into the ledger, it can easily be found and corrected through the PoA of both the CU and the Members involved, and then it is documented on the blockchain using PoS. This creates a robust audit trail if additional questions arise later.

Asset Backed Credit

The blockchain structure within a CU allows the members and the CU management to convert any asset into a digital receipt that can be exchanged between members and between CUs on the network. Just as the MFXr creates a digital receipt for \$US, any asset or liability can be digitized into an equity block and transacted (Figure 2Figure 2).

Blockchain Simplifies Transfer of Ownerships and Payments

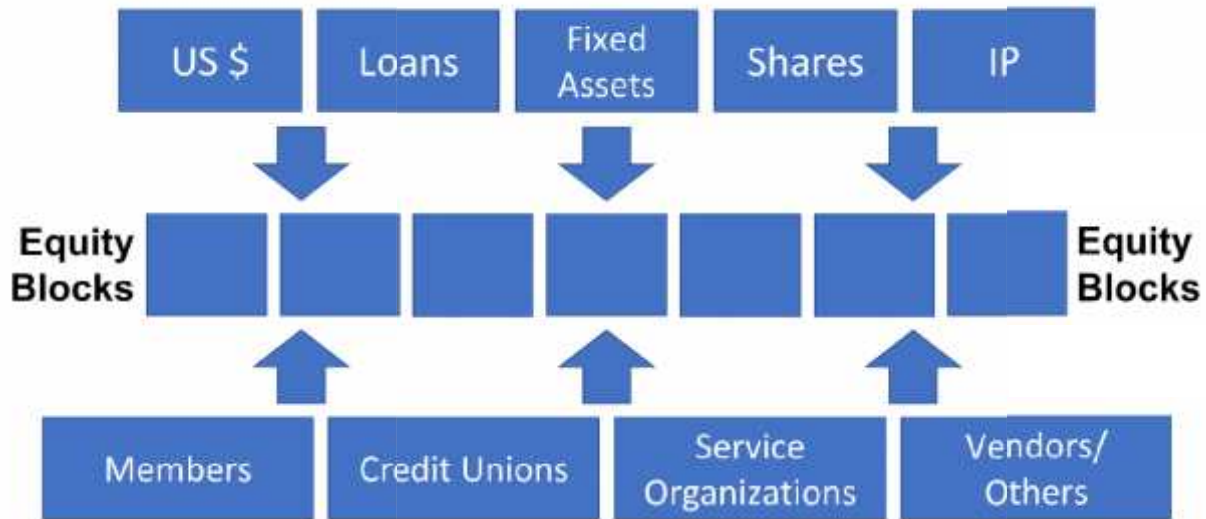


Figure 2. Assets and liabilities may be converted into equity blocks that can be transacted, collateralized, or otherwise tracked as digital receipts without comingling funds.

The equity blocks record the digital asset and assign ownership of the receipt. When the receipt is transacted (e.g., collateral is put up for a loan) then the equity block is recorded as to the new ownership (or in this case, a lien) and the new digital receipt is generated for the equity holder. This allows members direct control and visibility over their assets and liabilities. This creates the ability to move a group of independent transactions in one package without comingling funds.

This method of creating digitized receipts on the blockchain facilitates peer-to-peer transactions within the Munii Protocol and eliminates the need for escrow accounts and the need for third parties in many types of transactions. This is achieved directly or indirectly through the use of Smart Contracts.

Smart Contracts

Smart contracts are functions that automate the peer-to-peer relationship based on trust. These transactions are unique and recorded to the blockchain at the time of the transaction. The Munii Protocol supports the following smart contract functions:

1. **Vote** - Command function to facilitate membership's ability to come to a consensus on community matters in the Credit Union and on the Money Network.

- a. **Verify** – A function for validators and validation nodes. Validators must be willing to stake their MFX to vote on a block of transactions as valid. Validating invalid transactions will lead to loss of MFX.
- 2. **Store** - Command function that recognizes shares on deposit that are staked for a base rate dividend calculation + extra ordinary dividends based on a time schedule of how long shares are not moved. This can be used for Certificates of Deposit, Retirement Accounts, and so forth.
- 3. **Transfer** - Command function to transfer shares and/or assets from one member to another member.
 - a. **Buy** - A subtype of transfer for acquisitions or purchases.
 - b. **Sell** - A subtype of transfer to redeem or transfer shares to another member in exchange for consideration.
 - c. **Send** - A subtype of transfer of value to another member which is balance negative.
 - d. **Receive** - A subtype of transfer of value from another member which is balance positive.
 - e. **Deposit** - A subtype of transfer to recognize value input as balance positive.
 - f. **Draft** - A subtype of transfer to recognize value output as balance negative.

This smart contract functionality combined with the equity blocks gives the Membership full control of their assets.

For example, consider a situation in which a CU member has a family emergency and needs immediate access to \$10,000. The member has previously purchased a CU bond instrument whose maturity value is \$12,000 six months from now. The member can post this asset for sale in the CU's Digital Marketplace, and another member may decide to purchase it for \$10,000. Once the parties agree on the price, they initiate a smart contract. The contract validates that both parties have the agreed-upon assets in place, and the transaction takes place in a matter of minutes – the time it takes to record the transaction to the blockchain. The first member receives a digital receipt for the fiat (\$10,000) at exactly the same time that the second member receives the digital receipt for the \$12,000 CU Bond. The transaction is fully automated – no third party is required – and the secure transaction takes place within the CU network. The members trust and understand that both parties are fully verified as CU members, and the transaction cannot take place without clear, validated ownership of the assets. The Munii Protocol provides the smart contract infrastructure to carry out such a peer-to-peer exchange using asset backed credits with almost zero risk to either party or the Credit Union(s) involved.

Likewise, individual liabilities such as CU member home loans may be digitized and transacted by members who wish to invest in real estate. The payments for these assets can be separated into components for the principal and interest, mortgage insurance, escrow accounts, transaction fees, origination fees, and so forth using smart contracts. This provides transparency for the homeowner, who knows exactly who owns their loan, receives insurance payments, pays their property taxes, and so on. It also allows vendors and investors the flexibility to participate only in the portion of a transaction that they understand and on which they chose to risk their capital. Even if a group of investors wishes to pool funds for home loan investments, these assets are individually documented and digitized – thus maintaining full traceability for every asset and every payment using the distributed ledger.

Asset backed credits and smart contracts can take many forms and provide a wide variety of benefits to the CU membership. It opens a wide range of investment and savings opportunities for members and allows them opportunities to invest in their community as each member chooses. Likewise, this infrastructure makes it cost effective for CUs to provide microloans and short-term bridge loans to the membership. This helps build community involvement, engagement, and investment among the membership.

Summary

This paper describes the intended functionality of the Munii Protocol in support of a blockchain-based Credit Union. The security and automation provided by this model reduce the costs to operate a credit union and will provide a wider range of products to the Membership at lower initial investments. Likewise, this system allows products such as micro-loans and overdraft protection at reasonable interest rates for members.

The Munii Protocol decentralized finance (DeFi) savings and equity blockchain, the MFX token, and the use of smart contracts provide the core functionality to execute transactions. Munii relies on a custom blend of proof-of-stake and proof-of-authority validations to conduct business using a unique banking core.

The NCUA mission is a natural fit to both the social and technical motivations to blockchain's distributed ledger technology development. The Munii Protocol will embody this technology to provide the Credit Union (CU) movement a modern approach to a strong, secure, reliable, compliant, and cost-effective community-based banking system that encourages savings and allows capital to remain in a community for continued development.