UNION
WHITE PAPER

IN ACCORDANCE WITH TITLE II OF REGULATION (EU) 2023/1114

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DATE OF NOTIFICATION

This crypto-asset white paper (**“White Paper”**) was notified to the Dutch Authority for the Financial Markets (Autoriteit Financiële Markten, AFM) on 2025-08-05.

COMPLIANCE STATEMENTS

1. This crypto-asset white paper has not been approved by any competent authority in any Member State of the European Union. The offeror of the crypto-asset is solely responsible for the content of this crypto-asset white paper.

2. This crypto-asset white paper complies with Title II of Regulation (EU) 2023/1114 and, to the best of the knowledge of the management body, the information presented in the crypto-asset white paper is fair, clear and not misleading and the crypto-asset white paper makes no omission likely to affect its import.

3. The crypto-asset referred to in this white paper may lose its value in part or in full, may not always be transferable and may not be liquid.

4. The crypto-asset referred to in this white paper is not covered by the investor compensation schemes under Directive 97/9/EC of the European Parliament and of the Council.

5. The crypto-asset referred to in this white paper is not covered by the deposit guarantee schemes under Directive 2014/49/EU of the European Parliament and of the Council.

SUMMARY

Warning

This summary should be read as an introduction to the crypto-asset white paper. The prospective holder should base any decision to purchase this crypto-asset on the content of the crypto-asset white paper as a whole and not on the summary alone. The offer to the public of this crypto-asset does not constitute an offer or solicitation to purchase financial instruments and any such offer or solicitation can be made only by means of a prospectus or other offer documents pursuant to the applicable national law.

This crypto-asset white paper does not constitute a prospectus as referred to in Regulation (EU) 2017/1129 of the European Parliament and of the Council or any other offer document pursuant to Union or national law.

Characteristics of the crypto-asset

The Union token is a crypto-asset as defined by article 3(1)(5) of the Markets in Crypto-Assets Regulation (EU) 2023/1114 ("MiCA").

Symbol: U
Max supply: 10,000,000,000 tokens
Smart contract address: 0xba5eD44733953d79717F6269357C77718C8Ba5ed
Blockchain platform: Ethereum
Token Standard: ERC-20

The U Token is the native utility token of the Union network, a hyper-efficient zero-knowledge interoperability layer that enables trustless communication and asset transfers between different blockchain networks including Ethereum, Cosmos, Bitcoin L2s, and other Layer 1 and Layer 2 networks. The U Token serves multiple functions within the Union ecosystem:

- Network Security: Token holders can participate in securing the Union network through staking mechanisms
- Governance: U Token holders have voting rights on protocol upgrades, parameter changes, and governance proposals
- Transaction Fees: The token is used to pay for transaction fees and network operations on the Union Network
- Incentive Alignment: Validators and relayers are rewarded in U Tokens for maintaining network integrity and processing cross-chain transactions

Union's mainnet is scheduled to launch in Q3 2025, with the token distribution occurring upon network launch. The protocol leverages advanced cryptographic techniques including zero-knowledge proofs and BLS signatures to provide secure, efficient, and decentralized cross-chain communication without relying on trusted parties.

Key information about the offer to the public or admission to trading

The Union Foundation, a foundation established in Cayman Islands, is seeking admission to trading of the U token on multiple trading platforms within the EU.

PART A - INFORMATION ABOUT THE OFFEROR OR THE PERSON SEEKING ADMISSION TO TRADING

A.1 Name

Union Foundation

A.2 Legal Form

Cayman Island Foundation

A.3 Registered Address

Cricket Square, Hutchins Drive, P.O. Box 2681, Grand Cayman
KY1-1111, Cayman Islands

A.4 Head Office

Cricket Square, Hutchins Drive, P.O. Box 2681, Grand Cayman
KY1-1111, Cayman Islands

A.5 Registration Date

2 February 2024

A.6 Legal Entity Identifier

Not applicable

A.7 Another Identifier Required Pursuant to Applicable National Law

Registration No.: 406923

A.8 Contact Telephone Number

+44 20 7467 6300

A.9 E-mail Address

ops@union.foundation

A.10 Response Time (Days)

5 business days

A.11 Parent Company

Not applicable

A.12 Members of the Management Body

Full Name	Business Address	Function
Mark Mugglestone	Horizons Global SEZC, PO Box CEC-152, George Town Grand Cayman, KY1-9012, Cayman Islands	Independent Director
Paul Parker	PO Box 10035, Grand Cayman, KY1-1001, Caymans Islands	Supervisor

A.13 Business Activity

The Union Foundation is a not-for-profit organization dedicated to stewarding the Union Network and advancing secure, decentralized, and interoperable infrastructure across blockchain networks. As the ecosystem steward, the Foundation engages in the following core activities:

- Governance Support:
  The Union Network is governed by a decentralized autonomous organization (DAO) composed of U token holders. The Foundation supports the DAO's decision making process by providing administrative, legal, and infrastructural resources.

- Ecosystem Development:
  The Foundation allocates treasury resources, such as grants, partnership funding, and incentive programs, to accelerate protocol adoption, support integrations, and grow the Union ecosystem.

- Research and Development Coordination:
  The Foundation engages third-party technical contributors, including its development services partner Union.fi Labs, Inc., through formal service agreements to ensure the continued development and maintenance of the Union Network. The Foundation does not operate the protocol directly.

- Validator Support and Staking Delegation:
  The Foundation may delegate treasury-held tokens to validators to promote network security and decentralization. Staking rewards, if received, are redeployed solely to fund protocol development, infrastructure, and ecosystem support, consistent with the

Foundation's non-profit mission.

- Community Engagement and Education:
  The Foundation provides educational resources, technical documentation, and community support for developers, validators, and users to foster an open, decentralized contributor base.

The Foundation does not engage in commercial staking, profit-sharing, or financial return distribution. All assets under its control are used exclusively to support the Union Network's long-term sustainability, decentralization, and utility.

A.14 Parent Company Business Activity

Not applicable

A.15 Newly Established

True

A.16 Financial Condition for the past three Years

Not applicable

A.17 Financial Condition Since Registration

Since its establishment, the Union Foundation has maintained sufficient financial resources to support its non-profit mission of stewarding the Union Network ecosystem. While the Foundation itself has not raised capital through equity financing, it has operated to date using funds provided through intercompany loans and ecosystem contributions made by affiliated entities and early network supporters. These funds were used to initiate protocol development, ecosystem grant programs, and decentralized governance infrastructure.

The Foundation expects to repay these loans following the successful launch and capitalization of the Union Network network and its native token. Repayment will be made from the network treasury, subject to the availability of funds generated through protocol operations and ecosystem activity.

The Foundation's long-term financial sustainability will be supported by a treasury reserve denominated in the Union token and other digital assets. These resources will be allocated to

ongoing ecosystem development, technical maintenance, and community-led initiatives, in accordance with the Foundation’s non-profit mandate.

The Foundation does not engage in commercial activity and is not structured to generate profit. Its sole purpose is to support the growth, resilience, and decentralization of the Union Network.

Risk Disclosure:

The Foundation notes that its financial condition is currently dependent on the successful launch and adoption of the Union Network. Delays in network activation, failure to achieve adoption, or adverse market conditions could impair the Foundation’s ability to repay outstanding obligations or sustain long-term operations. These risks are mitigated through prudent treasury management and a phased funding strategy aligned with protocol milestones.

PART B - INFORMATION ABOUT THE ISSUER, IF DIFFERENT FROM THE OFFEROR OR PERSON SEEKING ADMISSION TO TRADING

B.1 Issuer different from offeror or person seeking admission to trading

True

B.2 Name

Union Build Ltd.

B.3 Legal Form

British Virgin Island Limited Company

B.4 Registered Address

Commerce House, Wickhams Cay 1, P.O. Box 3140, Road Town, Tortola, British Virgin Islands VG1110

B.5 Head Office

Not applicable

B.6 Registration Date

8 February 2024

B.7 Legal Entity Identifier

Not applicable

B.8 Another Identifier Required Pursuant to Applicable National Law

Company no.: 2141995

B.9 Parent Company

Union Foundation

B.10 Members of the Management Body

Not applicable

B.11 Business Activity

Union Build Ltd. is a company incorporated in the British Virgin Islands and serves as the issuer of the Union Token. It is a wholly owned subsidiary of the Union Foundation, an exempted limited guarantee foundation company established in the Cayman Islands. Union Build Ltd. carries out token issuance and administrative functions on behalf of the Foundation, including managing technical service agreements, protocol coordination, and network support operations.

B.12 Parent Company Business Activity

Union Foundation is an exempted limited guarantee foundation company incorporated in the Cayman Islands. It operates as a non-profit entity with the mission of supporting the growth, decentralization, and long-term sustainability of the Union Network. Its core activities include treasury stewardship, ecosystem development, validator support, grant funding, and coordination of protocol maintenance through third-party service providers. The Foundation does not engage in commercial staking or profit-sharing activities.

Union Build Ltd., the token issuer, is a wholly owned subsidiary of the Union Foundation.

PART C - INFORMATION ABOUT THE OPERATOR OF THE TRADING PLATFORM OR OTHER PERSONS DRAWING THE WHITE PAPER

C.1 Name

Not applicable

C.2 Legal Form

Not applicable

C.3 Registered Address

Not applicable

C.4 Head Office

Not applicable

C.5 Registration Date

Not applicable

C.6 Legal Entity Identifier

Not applicable

C.7 Another Identifier Required Pursuant to Applicable National Law

Not applicable

C.8 Parent Company

Not applicable

C.9 Reason for Crypto-Asset White Paper Preparation

Not applicable

C.10 Members of the Management Body

Not applicable

C.11 Operator Business Activity

Not applicable

C.12 Parent Company Business Activity

Not applicable

C.13 Other persons drawing up the white paper under Article 6 (1) second subparagraph MiCA

Not applicable

C.14 Reason for drawing up the white paper under Article 6 (1) second subparagraph MiCA

Not applicable

PART D - INFORMATION ABOUT THE CRYPTO-ASSET PROJECT

D.1 Crypto-Asset Project Name

Union

D.2 Crypto-Assets Name

U Token

D.3 Abbreviation

U

D.4 Crypto-Asset Project Description

Union Network is a hyper-efficient zero-knowledge interoperability layer designed to connect appchains, Layer 1, and Layer 2 blockchain networks. The protocol enables secure, trustless communication and asset transfers between different blockchain ecosystems without relying on trusted third parties, oracles, multi-signatures, or multi-party computation (MPC).

Union extends the Inter-Blockchain Communication (IBC) protocol using advanced zero-knowledge cryptography and BLS signatures, making it compatible with a wide range of blockchain networks including Ethereum, Cosmos, Bitcoin Layer 2s, and other emerging ecosystems.

Key Technical Components:

- CometBLS Consensus: An optimized consensus mechanism based on Tendermint BFT, enhanced with BLS (Boneh-Lynn-Shacham) signature aggregation for efficient zero-knowledge proof generation and verification.

- Galois Zero-Knowledge System: A permissionless consensus proving system that generates zero-knowledge proofs of validator consensus, enabling efficient and secure cross-chain state verification.

- Voyager Relayer Network: A permissionless relayer infrastructure that fetches data from source chains, aggregates information, and delivers cryptographic proofs to destination chains.

- Union Chain: A standalone blockchain serving as the protocol's backbone, secured by Delegated Proof-of-Stake consensus with validator slashing mechanisms for security and integrity.

- The protocol's trust-minimized architecture eliminates reliance on centralized authorities, multi-signature schemes, or trusted third parties, addressing security vulnerabilities that have historically affected cross-chain bridging solutions.

D.5 Details of all persons involved in the implementation of the crypto-asset project

Full Name	**Business Address**	**Function**
Mark Mugglestone	Horizons Global SEZC, PO Box CEC-152, George Town Grand Cayman, KY1-9012, Cayman Islands	Independent Director, Cayman Foundation
Paul Parker	PO Box 10035, Grand Cayman, KY1-1001, Caymans Islands	Supervisor, Cayman Foundation
Union Build Ltd.	Commerce House, Wickhams Cay 1, P.O. Box 3140, Road Town, Tortola, British Virgin Islands VG1110	Legally issues the Union token. Responsible for compliance with MiCA and managing the initial distribution.
Union Foundation	Cricket Square, Hutchins Drive, P.O. Box 2681, Grand Cayman KY1-1111, Cayman Islands	Manages treasury funds, ecosystem grants, and third-party service agreements in support of the Union Network.
Union.fi Labs, Inc.	300 Delaware Ave Suite 210 Wilmington, DE 19801	Develops protocol software, manages core infrastructure, executes roadmap
Cantina/Spearbit	1065 SW 8th St #2149, Miami, FL 33130	Independent auditors; Conduct smart contract audits and protocol security assessments
Harris and Trotter	101 New Cavendish St, London W1W 6XH	Professional services; Advise on company formation, audit services, corporate finance advice, and taxation

D.6 Utility Token Classification

True

D.7 Key Features of Goods/Services for Utility Token Projects

The Union Token is a utility token that provides access to core services within the Union Network ecosystem. It does not represent a claim on any assets, is not redeemable for fiat currency, and does not grant holders any profit-sharing or ownership rights. Its primary functions include:

- Network Participation and Staking Delegation:
  Token holders may delegate their Union Tokens to validators participating in the network's Delegated Proof-of-Stake (DPoS) consensus. This delegation helps secure the Union Chain and maintain the integrity of cross-chain messaging. Staking rewards, if any, are protocol-defined and serve to support continued validator participation and network operation.

- Transaction Fee Payments:
  Union Tokens are used to pay fees for executing transactions on the Union Network, including cross-chain asset transfers, message relays, and other protocol-level operations. Fees are calculated based on computational usage and network demand.

- Governance Participation:
  In future phases of the protocol, Union Token holders will be able to participate in decentralized governance by voting on proposals related to protocol upgrades, parameter adjustments, treasury management, and ecosystem development.

- Validator and Relayer Eligibility:
  The Union Token may be required as a prerequisite for running a validator node or operating a Voyager relayer. These roles are essential to maintaining the network's infrastructure, facilitating transaction validation, and supporting interoperability between chains.

The Union Token is classified as a "crypto-asset other than an asset-referenced token or e-money token" under Regulation (EU) 2023/1114 (MiCA), and is therefore subject to the provisions of Title II of the Regulation.

The token is not backed by fiat currency or other reserve assets, is not designed to maintain a stable value, and is not redeemable at par. Instead, it provides functional access to services within the Union Network ecosystem, including transaction processing, staking delegation, and governance participation.

As a Title II crypto-asset, the Union Token is not subject to reserve, own funds, or redemption obligations applicable to ARTs and EMTs, but remains subject to MiCA's requirements regarding white paper disclosure, fair dealing, and risk transparency.

D.8 Plans for the Token

The U Token implementation follows a structured development approach:

The Union token is designed to evolve alongside the growth of the Union Network ecosystem. While its initial functions focus on protocol access, transaction fee payments, and validator delegation the token’s utility will expand over time to include active participation in on-chain governance. This will enable holders to vote on key decisions such as protocol upgrades, treasury allocations, and ecosystem funding initiatives.

The issuer intends to implement a progressive decentralization roadmap, in which governance authority and key operational responsibilities will gradually transition from the Foundation and issuer to a community-goverened DAO structure. The governance system will be launched in a phase manner, starting with proposal submission and advisory voting, followed by binding onchain execution capabilities.

The Union Token will not undergo arbitrary modifications to its utility or rights. Any proposed material changes will be subject to governance procedures involving token holders, where applicable.

The issuer may support liquidity and token accessibility by pursuing listing on centralized and decentralized exchanges, with the goal of enabling ecosystem participants to engage with the protocol more easily. Market supposed activities will be conducted in accordance with applicable laws and without creating artificial pricing or return expectations.

The Union Network development team, operating under contract with the Union Foundation, maintains a technical roadmap including upgrades to crosschain messaging infrastructure, staking mechanisms, and relayer incentives. These upgrades may introduce new token use cases but will not alter the token’s fundamental classification or rights.

Any future issuance, burn mechanism, or reallocation of treasury-held tokens will be transparently disclosed and executed according to the community governance framework once it is operational.

D.10 Planned Use of Collected Funds or Crypto-Assets

While the initial distribution of the Union Token will not involve the collection of fiat or

crypto-assets from the public, the issuer and affiliated ecosystem entities may, over time, accumulate funds or tokens through other mechanisms, including:

- Transaction fees generated through protocol usage
- Allocations from treasury reserves
- Proceeds from token sales to strategic partners or grants to contributors
- Liquidity support or listing-related transactions on exchanges

All crypto-assets collected or received by the Union Foundation or other authorized parties will be used exclusively for purposes aligned with the non-profit advancement of the Union Network ecosystem. These purposes include, but are not limited to:

- Funding research and protocol development through third-party service agreements
- Supporting validator onboarding, relayer network growth, and ecosystem infrastructure
- Allocating grants to developers, researchers, or community contributors
- Marketing, educational initiatives, and community-building
- Legal, regulatory, and administrative support services

The Union Foundation will manage the treasury in accordance with its non-profit mandate and may delegate fund deployment authority based on governance decisions or operational requirements. No funds will be distributed as profits or dividends. Treasury activities may be subject to review and approval by the token-holder community through future Union Network governance mechanisms. The Foundation intends to periodically publish transparency reports outlining fund use, grant allocations, and reserves under management.

PART E - INFORMATION ABOUT THE OFFER TO THE PUBLIC OF CRYPTO-ASSETS OR THEIR ADMISSION TO TRADING

E.1 Public Offering or Admission to Trading

Admission to trading (ATTR)

E.2 Reasons for Public Offer or Admission to Trading

The Union Token will initially be distributed to various categories of early supporters.

Certain tokens will be allocated without payment or required consideration to community members, strategic contributors, and ecosystem participants. These allocations are intended to encourage broad participation in the Union Network and support the development of a diverse and decentralized ecosystem.

Separately, the Union Foundation will delegate tokens from its treasury to a selected set of early validators in order to support the security and functionality of the network. These validators will operate infrastructure to participate in consensus, process transactions, and maintain network uptime. While most staking rewards generated through this delegation will be subject to protocol-defined locking mechanisms, a limited portion may be made available to validators as operational compensation for their services.

The issuer also intends to seek admission of the Union Token to trading on one or more centralized exchanges operating within the European Union. The primary purpose of this listing is to increase accessibility to the token for individuals and organizations who wish to participate in the Union Network ecosystem. Trading venues provide a practical means for users to acquire tokens needed to:

- Pay protocol transaction fees
- Delegate to validators
- Participate in future Union Network governance
- Operate relayers or access staking-related functions

Facilitating secondary market access also supports broader decentralization by enabling a diverse and permissionless set of participants to engage with the protocol, rather than restricting access to initial recipients or strategic stakeholders. This aligns with the project's long-term goal of community-led governance and sustainable network growth.

The Union Token is not being offered or admitted for trading as an investment product, and no return, profit, or income is promised or implied. The listing is intended solely to support the functional utility and operational accessibility of the token within the Union Network network.

E.3 Fundraising Target

Not applicable

E.4 Minimum Subscription Goals

Not applicable

E.5 Maximum Subscription Goal

Not applicable

E.6 Oversubscription Acceptance

Not applicable

E.7 Oversubscription Allocation

Not applicable

E.8 Issue Price

Not applicable

E.9 Official Currency or Any Other Crypto-Assets Determining the Issue Price

Not applicable

E.10 Subscription Fee

Not applicable

E.11 Offer Price Determination Method

Not applicable

E.12 Total Number of Offered/Traded Crypto-Assets

10,000,000,000 U Tokens

E.13 Targeted Holders

The Union Token is intended for individuals and entities participating in the Union Network ecosystem, including developers, validators, relayer operators, and governance participants. The token is not marketed as an investment product and is designed solely for functional use within the protocol.

The token is not intended for distribution to, or use by, any person or entity subject to sanctions administered by the U.S. Office of Foreign Assets Control (OFAC), the European Union, or other applicable authorities. Compliance with jurisdictional restrictions remains the responsibility of each user and any trading venue on which the token may be listed.

E.14 Holder Restrictions

The Union Token will be available to eligible users through its initial distribution and on regulated trading platforms. Access may be subject to each exchange's compliance policies, including KYC/AML procedures, jurisdictional restrictions, and internal controls.

The issuer imposes no protocol-level transfer restrictions, except those related to vesting, governance participation, or validator delegation. The token is not intended for use by individuals or entities subject to international sanctions, including those administered by OFAC or the European Union. Compliance with local laws remains the responsibility of each user.

E.15 Reimbursement Notice

Holders of the crypto-asset may not be entitled to any reimbursement from the issuer or offeror in the event that the value of the crypto-asset decreases or is lost, unless otherwise specified in this crypto-asset white paper.

Certain token allocations (e.g., to contributors or validators) are subject to vesting schedules and may be subject to clawback if conditions are not met. Treasury grants are milestone-based and non-guaranteed. These arrangements do not grant public token holders any redemption or reimbursement rights.

E.16 Refund Mechanism

Not applicable

E.17 Refund Timeline

Not applicable

E.18 Offer Phases

Not applicable

E.19 Early Purchase Discount

Not applicable

E.20 Time-Limited Offer

False

E.21 Subscription Period Beginning

Not applicable

E.22 Subscription Period End

Not applicable

E.23 Safeguarding Arrangements for Offered Funds/Crypto-Assets

Not applicable

E.24 Payment Methods for Crypto-Asset Purchase

Not applicable

E.25 Value Transfer Methods for Reimbursement

Not applicable

E.26 Right of Withdrawal

Not applicable

E.27 Transfer of Purchased Crypto-Assets

Not applicable

E.28 Transfer Time Schedule

Not applicable

E.29 Purchaser's Technical Requirements

Purchasers must have:

1. A compatible digital wallet or exchange account
2. Internet access
3. A device (computer or mobile) capable of managing the wallet or account and executing transactions

E.30 Crypto-asset service provider (CASP) name

Not applicable

E.31 CASP identifier

Not applicable

E.32 Placement Form

NTAV

E.33 Trading Platforms name

Bitvavo, Kraken, and OKX.

E.34 Trading Platforms Market Identifier Code (MIC)

Not applicable

E.35 Trading Platforms Access

Investors can access trading platforms where U tokens are listed by creating an account on the respective platform, completing the required identity verification (KYC) processes, and funding their accounts with supported cryptocurrencies or fiat currencies. Once registered and funded, investors can search for the U token trading pair and place buy or sell orders directly through the platform's interface. Detailed guides and tutorials are typically available on the trading platforms to assist investors with navigating and using their services.

E.36 Involved Costs

The use of services offered by Exchanges may involve costs, including transaction fees, withdrawal fees, and other charges. These costs are determined and set by the respective

Exchanges and are not controlled, influenced, or governed by the Issuer. Consequently, any changes to fee structures or the introduction of new costs are solely at the discretion of these Exchanges.Purchasers are advised to familiarise themselves with the respective fee structure before accessing the Exchanges.

E.37 Offer Expenses

Not applicable

E.38 Conflicts of Interest Potential conflicts of interest include:

The Issuer is not aware of any potential conflict of interest among its management body members or any other persons within the Issuer with respect to the admission of the Token to trading. Should any potential conflicts arise, they will be promptly disclosed and managed in accordance with applicable regulatory requirements and best practices to ensure fair and transparent trading conditions.

E.39 Applicable Law

Laws of England and Wales

E.40 Competent Court

Arbitration as per the rules of the International Chamber of Commerce

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PART F - INFORMATION ABOUT THE CRYPTO-ASSETS

F.1 Crypto-Asset Type

The Union Token (“U Token”) is classified as a **crypto-asset other than an asset-referenced token or an e-money token**, pursuant to Article 3(1)(5) of Regulation (EU) 2023/1114 (MiCA).

The token is not redeemable for fiat currency, is not intended to maintain a stable value by reference to a basket of assets or currencies, and does not represent a claim against the issuer for repayment or redemption.

As such, the U Token does not meet the criteria of an **asset-referenced token (ART)** under Article 3(1)(6) or an **e-money token (EMT)** under Article 3(1)(7), and is therefore classified as a **utility token** falling within Title II of MiCA.

F.2 Crypto-Asset Functionality

According to the article 3(1)(5) of MiCA, a crypto-asset is a digital representation of a value or of a right that is able to be transferred and stored electronically using distributed ledger technology or similar technology. As reminded by the European Banking Authority (“EBA”) , the term ‘right’ should be interpreted broadly in accordance with Recital (2) of MiCA.

The Token qualifies as a crypto-asset within the meaning of MiCA, as it is a digital representation of the right to access the Ecosystem and participate in the Ecosystem’s governance. The Token can be transferred and stored using distributed ledger technology (“DLT”).

The U Token serves three primary functions within the Union Network:

1. Transaction Fees: Payment for network operations including cross-chain messaging, asset transfers, staking operations, and governance voting.

2. Network Security: Staking mechanism for Proof-of-Stake consensus where validators and delegators stake tokens to secure the network and earn proportional rewards while facing slashing penalties for misbehavior.

3. Governance Rights: Voting power on protocol upgrades, parameter modifications, treasury allocation, validator set changes, and ecosystem development proposals through Union Network governance mechanisms.

F.3 Planned Application of Functionalities

The U Token enables access to key application functionalities within the Union Network ecosystem, including fee payment, staking, governance, and relayer operations.

These functionalities are described in detail in:

- Section F.2 – Crypto-Asset Functionality (primary use cases)

- Section A.13 – Business Activity (issuer’s coordination of development and staking systems)

Token utility is implemented through smart contracts and decentralized application interfaces, allowing users to interact with the protocol for the purposes of network participation, transaction execution, and governance. A web-based interface and compatible wallet integrations will facilitate access to these features.

F.4 Type of white paper

OTHR (Other - crypto-assets other than asset-referenced tokens or e-money tokens)

F.5 The type of submission

NEWT (New)

F.6 Crypto-Asset Characteristics

The U token is a crypto-asset as defined by article 3(1)(5) of the Markets in Crypto-Assets Regulation (EU) 2023/1114 ("MiCA").

Symbol: U
Max supply: 10,000,000,000 tokens
Smart contract address: 0xba5eD44733953d79717F6269357C77718C8Ba5ed
Blockchain platform: Ethereum
Token Standard: ERC-20

F.7 Commercial name or trading name

U

F.8 Website of the issuer

The website containing relevant information about the issuer, the U token, and the Union Network ecosystem is: https://union.build

Union.fi Labs, Inc. is a core development contributor to the Union Network and maintains this site on behalf of the broader ecosystem. Union Build Ltd. (BVI), the token issuer, does not maintain a separate public website at this time but is referenced in relevant sections of this site.

F.9 Starting date of offer to the public or admission to trading

2025-09-01

F.10 Publication date

2025-09-01

F.11 Any other services provided by the issuer

The services provided by Union are entirely within the regulatory framework established by MiCA (Regulation (EU) 2023/1114). These services focus specifically on crypto-asset activities,

particularly the trading of the Union token and its platform features. The company's operations do not currently extend into areas that would require compliance with additional EU or national regulations.

Any future expansion of services beyond MiCA's scope would require separate regulatory notifications and compliance with applicable frameworks. In such cases, Union would clearly disclose these additional services along with references to their governing legal requirements.

F.12 Identifier of operator of the trading platform

Not applicable

F.13 Language or languages of the white paper

English

F.14 Digital Token Identifier Code used to uniquely identify the crypto-asset or each of the several crypto assets to which the white paper relates, where available

Not applicable

F.15 Functionally Fungible Group Digital Token Identifier, where available

Not applicable

F.16 Voluntary data flag

False - This white paper submission is mandatory under MiCA

F.17 Personal data flag

True

F.18 LEI eligibility

False

F.19 Home Member State

Netherlands

F.20 Host Member States

Austria
Belgium
Bulgaria
Croatia
Cyprus
Czechia
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Italy
Latvia
Liechtenstein
Lithuania
Luxembourg
Malta
Norway
Poland
Portugal
Romania
Slovakia
Slovenia
Spain
Sweden
Switzerland

PART G - INFORMATION ON THE RIGHTS AND OBLIGATIONS ATTACHED TO THE CRYPTO-ASSETS

G.1 Purchaser Rights and Obligations

Holders have the right to use the U Token for protocol functions including staking, governance, and payment of transaction fees. They have no rights to profits, ownership, or reimbursement. Use is subject to protocol rules.

G.2 Exercise of Rights and Obligation

Rights are exercised through on-chain actions such as staking, voting, and transacting, using a compatible wallet and internet access. All interactions follow smart contract logic and protocol governance procedures.

G.3 Conditions for Modifications of Rights and Obligations

Modifications require approval through on-chain governance by token holders, in accordance with the protocol's decentralized decision-making process. Changes are implemented via protocol upgrades.

G.4 Future Public Offers

Information on future token distributions will be subject to:

- Community governance decisions on token allocation and distribution mechanisms
- Compliance with applicable regulatory requirements in relevant jurisdictions
- Transparent communication through official channels and governance proposals

G.5 Issuer Retained Crypto-Assets

Union Build Ltd. will not retain long-term holdings of the U Token. Tokens allocated for governance, the DAO treasury, and ecosystem initiatives will be transferred to the Union Foundation or community-controlled wallets. These tokens are subject to protocol-defined governance, vesting, or usage restrictions.

G.6 Utility Token Classification

True

G.7 Key Features of Goods/Services of Utility Tokens

The U token provides access to the Union ecosystem, offering ongoing access to network utilities, such as:

- Continuous access to cross-chain interoperability services
- Ongoing participation in network governance and decision-making
- Perpetual staking opportunities for network security participation
- Access to validator operations and reward earning mechanisms

These characteristics align with the fundamental definition of a utility token, as it provides token holders with direct access to the technological infrastructure and services created by the token issuer.

G.8 Utility Tokens Redemption

U Tokens are not redeemable for specific goods or services but provide ongoing access to network utilities, such as:

- Continuous access to cross-chain interoperability services
- Ongoing participation in network governance and decision-making
- Perpetual staking opportunities for network security participation
- Access to validator operations and reward earning mechanisms

These characteristics align with the fundamental definition of a utility token, as it provides token holders with direct access to the technological infrastructure and services created by the token issuer.

G.9 Non-Trading Request

True - Admission to trading is sought for the U Token

G.10 Crypto-Assets Purchase or Sale Modalities

Not applicable

G.11 Crypto-Assets Transfer Restrictions

Not applicable

G.12 Supply Adjustment Protocols

False

G.13 Supply Adjustment Mechanisms

Not applicable

G.14 Token Value Protection Schemes

False

G.15 Token Value Protection Schemes Description

Not applicable

G.16 Compensation Schemes

False

G.17 Compensation Schemes Description

Not applicable

G.18 Applicable Law

Laws of England and Wales

G.19 Competent Court

Arbitration as per the rules of the International Chamber of Commerce

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PART H – INFORMATION ON THE UNDERLYING TECHNOLOGY

H.1 Distributed ledger technology

Union operates as a hyper-efficient zero-knowledge infrastructure layer built on distributed ledger technology that facilitates general message passing, asset transfers, NFTs, and decentralized finance operations across blockchain networks. The platform functions as a specialized Layer 1 blockchain utilizing the Cosmos SDK framework with custom modules for interoperability, serving as a central hub that maintains the cryptographically verified state of all connected blockchain networks. Union's distributed ledger architecture enables trustless consensus verification without dependencies on trusted third parties, oracles, multi-signatures, or multi-party computation protocols, relying instead on mathematically verifiable zero-knowledge proofs and cryptographic consensus mechanisms.

The native Union token (U) will be deployed as an ERC-20 token on Ethereum mainnet, enabling seamless integration with the Ethereum ecosystem and existing DeFi protocols, while simultaneously maintaining full functionality within the Cosmos ecosystem through Union's proprietary Crosschain Governance module. This dual-chain architecture allows U token holders

to stake, delegate, and participate in governance operations directly from Ethereum using familiar EVM wallets, while the underlying staking and governance logic executes on the Union chain without requiring token bridging or cross-chain transfers. The distributed ledger maintains immutable records of all cross-chain transactions and consensus proofs, ensuring complete auditability and regulatory compliance while enabling rapid transaction settlement across connected networks.

Union's ledger technology represents a novel approach to blockchain interoperability, combining the security guarantees of traditional distributed ledgers with advanced cryptographic techniques to create a unified infrastructure layer capable of supporting the next generation of cross-chain decentralized applications and financial services.

H.2 Protocols and Technical Standards

Union's technical infrastructure is underpinned by a comprehensive suite of established and proprietary protocols that ensure secure, efficient, and compliant cross-chain operations, such as:

- Custom IBC (Inter-Blockchain Communication) Protocol implementation developed natively with Union-specific extensions for enhanced cross-chain functionality.
- CometBLS Consensus: An optimized consensus mechanism based on Tendermint BFT, enhanced with BLS (Boneh-Lynn-Shacham) signature aggregation for efficient zero-knowledge proof generation and verification with the same security guarantees as individual signature verification.
- Groth16 zero-knowledge proof system with the largest trusted setup ceremony to date, see: https://blockworks-research.beehiiv.com/p/union-sets-cryptography-record-262638fb2d77bfe3
- Cosmos SDK framework with custom modules for interoperability.

H.3 Technology Used

Union employs a sophisticated technology stack comprising established cryptographic frameworks and proprietary innovations to deliver secure, scalable cross-chain interoperability. The platform's zero-knowledge infrastructure is built using Gnark, the industry's best-performing zk-SNARK library, which communicates over gRPC, a high-performance, open-source universal RPC framework. The consensus layer utilizes CometBLS, an enhanced version of Tendermint BFT consensus optimized for zero-knowledge proving, incorporating BLS signature aggregation and MiMC cryptographic hashing to reduce computational constraints within zero-knowledge circuits. Union's architecture is built upon the Cosmos SDK framework with custom modules specifically designed for cross-chain interoperability, enabling native integration across multiple execution environments including Ethereum Virtual Machine (EVM), Move runtime, CosmWasm and more. The platform implements Groth16 zero-knowledge proofs for consensus verification,

providing mathematically verifiable security guarantees while maintaining computational efficiency suitable for deployment across resource-constrained blockchain environments. This comprehensive technology foundation enables Union to process cross-chain transactions with minimal latency while maintaining the highest standards of cryptographic security and regulatory compliance.

H.4 Consensus Mechanism

Union operates on CometBLS, a proprietary consensus mechanism that represents a significant enhancement of the proven Tendermint Byzantine Fault Tolerance (BFT) protocol, specifically optimized for zero-knowledge proof generation and cross-chain consensus verification. The consensus mechanism maintains the security guarantees of traditional BFT systems, requiring only that two-thirds of validators remain honest to ensure network integrity, while introducing critical optimizations that enable efficient interoperability operations. CometBLS incorporates Boneh-Lynn-Shacham (BLS) signature aggregation technology, which allows multiple validator signatures to be combined into a single aggregate signature, substantially reducing transaction size compared to ECDSA verification and decreasing Union Network computation costs. The protocol employs MiMC cryptographic hashing functions in place of traditional SHA-256, providing equivalent security guarantees while significantly reducing the computational constraints required for zero-knowledge circuit operations.

Union's consensus mechanism supports epoch-based validator management, combining design elements from Polkadot consensus with Cosmos governance models to minimize unnecessary light client updates and optimize proof generation efficiency. The system is designed to scale to hundreds of validators and thousands of chains without compromising performance or bridging latency, ensuring robust decentralization for efficient cross-chain operations. This consensus architecture enables Union to generate cryptographically verifiable proofs of consensus state that can be efficiently validated across multiple blockchain environments, providing the foundational security layer for trustless cross-chain interoperability while consuming significantly less energy per transaction than alternative interoperability protocols or general-purpose zero-knowledge proving systems.

H.5 Incentive Mechanisms and Applicable Fees

Union employs a sophisticated dual-layer incentive mechanism comprising validator staking rewards for network security and an adaptive fee market structure for transaction processing efficiency. The platform operates on a Proof-of-Stake consensus model where validators are incentivized through block rewards and transaction fees proportional to their delegated stake, ensuring network security through economic alignment while enabling token holders to participate in governance and earn staking rewards across multiple blockchain environments through the Crosschain Governance module.

Union implements an enhanced Additive Increase Multiplicative Decrease (AIMD) EIP-1559 fee market mechanism that dynamically adjusts base fees based on network congestion, utilizing adaptive learning rates that scale more aggressively during periods of high demand and less aggressively during low utilization periods. This fee structure incorporates configurable parameters including target block size, maximum block size, alpha and beta coefficients for learning rate adjustments, and gamma thresholds for determining fee adjustment behaviors, ensuring optimal resource allocation while maintaining predictable transaction costs for users.

The platform's fee mechanism addresses traditional EIP-1559 limitations by considering historical block utilization windows rather than single-block metrics, enabling more responsive fee adjustments that better reflect actual network demand. Additionally, Union's permissionless proving and relaying infrastructure allows participants to earn rewards for generating zero-knowledge proofs and facilitating cross-chain message delivery, creating multiple revenue streams that support network decentralization while ensuring sustainable economic incentives for all ecosystem participants.

The algorithm for calculating fees is:

1. Block consumption calculation: blockConsumption = sumBlockSizesInWindow(window) / (window * maxBlockSize)
2. Learning rate adjustment: Conditional logic based on gamma thresholds
3. Final fee calculation: newBaseFee = currentBaseFee * (1 + newLearningRate * (currentBlockSize - targetBlockSize) / targetBlockSize) + delta * netGasDelta(window)

Source:
https://github.com/skip-mev/feemarket/blob/main/x/feemarket/README.md#aimd-eip-1559

H.6 Use of Distributed Ledger Technology

False - The Union blockchain is operated as a decentralized network by independent validators rather than by the issuer or third parties acting on the issuer's behalf

H.7 DLT Functionality Description

Not applicable

H.8 Audit

True

H.9 Audit Outcome

Union has undergone comprehensive security audits conducted by leading blockchain security firms to ensure the protocol's safety, reliability, and regulatory compliance across all critical system components. The audit program encompasses multiple phases of evaluation, including

a Q3 2024 comprehensive protocol audit performed by Informal Systems covering the core Union infrastructure, a specialized Q1 2024 zero-knowledge components audit conducted by Spearbit focusing specifically on CometBLS consensus mechanism and Galois proving system with expert cryptographic review by CPerezz and Eduard Sanou, and a Q2 2025 audit by Cantina examining IBC-Union integration and UCS03-Zkgm components.

These independent security assessments validate Union's zero-knowledge cryptography implementation, recursive consensus and state proof mechanisms, and the permissionless architecture that eliminates dependencies on multisignatures or trusted third parties. The audit outcomes confirm that Union's protocol correctly implements merkle-inclusion proofs based on state roots provided by Light Clients, validates the security of the permissionless zero-knowledge proof generation system requiring only 5GB RAM without reliance on large proving markets or server farms, and verifies the integrity of asset locking and unlocking mechanisms alongside solver-based order fulfillment for faster-than-finality transfers. All audit reports are publicly available and maintained as a historical record, demonstrating Union's commitment to transparency and providing stakeholders with comprehensive documentation of the protocol's security posture and continuous improvement over time. The successful completion of these multi-vendor audits by recognized industry experts establishes Union's technical foundation as meeting the highest standards of security and operational reliability required for regulatory compliance and institutional adoption.

Source: https://github.com/unionlabs/audits

PART I – INFORMATION ON RISKS

Subject only to the limitations and requirements of MiCA and applicable mandatory statutes, each user of the crypto-asset as covered by this white paper acts in their own sole responsibility and on their own sole risk. All liability in regards to the risks mentioned herein is excluded, as far as legally permissible.

I.1 Offer-Related Risks

The Union Foundation is a not-for-profit organization dedicated to stewarding the Union Network and advancing secure, decentralized, and interoperable infrastructure across blockchain networks. The Foundation does not engage in profit-sharing or financial return distribution. All assets under its control are used exclusively to support the Union Network’s long-term sustainability, decentralization, and utility.

Against this background, the following risks provide an overview of considerations relating to the U token admission to trading. While these are general market risks and not specific to Union,

token holders are encouraged to conduct their own assessment before engaging with the token. Naturally, other risks may exist that cannot be currently foreseen or predicted at this time, and as a result this overview should not be considered as an exhaustive list of all potential risks.

Trading Platform Risks**:** The Union Foundation does not act as a contractual party in transactions between U token holders and trading platforms, as these platforms operate independently under their own terms and conditions. Platform operational disruptions, technical failures, or cybersecurity incidents could significantly impact trading activities for the U token. The Foundation cannot guarantee that the U token will maintain its listing status on any trading platforms, including both centralized exchanges and decentralized trading protocols. In the event of delisting, U token holders may face significant challenges in trading their tokens, potentially resulting in reduced liquidity and adverse impacts on token value. Token holders might experience difficulty finding alternative markets or trading counterparties. In extreme cases, platform bankruptcy or regulatory actions could result in substantial or complete losses for U token holders.

Market and Liquidity Risks**:** There is no guarantee of sustainable market depth or sufficient liquidity in the secondary market for U tokens, as trading volumes may fluctuate significantly, affecting price discovery and execution. Market accessibility could be further limited by technical or operational constraints affecting trading platform operations. The token's market performance may be subject to significant volatility due to limited trading activity or concentrated ownership patterns.

Operational and Infrastructure Risks: Trading platforms may commingle user assets rather than maintaining segregated wallets, leading to increased vulnerability through centralization of assets in platform wallets. Platform failures could affect U token transfers, trades, and settlement processes. Technical integration challenges between the U token system and trading platforms may impact overall functionality, particularly affecting standard ERC-20 operations and wallet compatibility.

Regulatory and Compliance Risks: Changes in regulatory requirements could impact trading conditions for the U token and may require operational adjustments to platform operations. Trading restrictions could be imposed due to regulatory changes, necessitating continuous monitoring and adaptation to regulatory frameworks to maintain compliance and operational continuity across trading venues.

Unforeseen Risks: Beyond the risks detailed in this Section, unexpected risks may develop. Additionally, novel risks could arise as unanticipated variations or combinations of the risks addressed in these Sections I.1 to I.5.

I.2 Issuer-Related Risks

Union Build Ltd. is a company incorporated in the British Virgin Islands and serves as the issuer of the Union Token. It is a wholly owned subsidiary of the Union Foundation, an exempted

limited guarantee foundation company established in the Cayman Islands. Union Build Ltd. carries out token issuance and administrative functions on behalf of the Foundation, including managing technical service agreements, protocol coordination, and network support operations. The corporate structure and operational responsibilities of the issuer give rise to several categories of risk that could materially affect token holders.

Jurisdictional and Regulatory Risks: The regulatory frameworks in the British Virgin Islands and Cayman Islands may undergo changes that could impact the issuer's operations, compliance obligations, or ability to continue token-related activities. Regulatory developments in either jurisdiction could affect the issuer's legal status, operational capacity, or the validity of token issuance activities. Cross-border regulatory coordination between multiple jurisdictions may create compliance complexities that could impact the issuer's ability to maintain operations.

Corporate Structure and Governance Risks: As a subsidiary entity, Union Build Ltd.'s operations are subject to oversight and control by the Union Foundation. Changes in the Foundation's governance structure, strategic direction, or operational priorities could directly impact the issuer's ability to fulfill its token-related obligations. The subsidiary relationship may create potential conflicts of interest or operational constraints that could affect token holder interests. Corporate restructuring, dissolution, or changes in ownership structure of either entity could significantly impact token operations and holder rights.

Operational and Administrative Risks: Union Build Ltd.'s operational capacity is dependent on maintaining qualified personnel, technical infrastructure, and administrative systems necessary to support token issuance and administrative functions. Operational failures, personnel changes, or technical disruptions could impair the issuer's ability to fulfill its administrative and coordination responsibilities. The issuer's reliance on third-party service providers for technical services and operational support creates additional counterparty risks.

Financial and Solvency Risks: The issuer's financial stability and ability to meet ongoing operational obligations is dependent on funding from the Union Foundation and revenue generated through its activities. Changes in the Foundation's financial position, funding priorities, or strategic focus could impact the issuer's operational sustainability. In the event of financial distress, insolvency, or bankruptcy of either Union Build Ltd. or the Union Foundation, token holders may face significant losses and limited recourse for recovering their investments.

Unforeseen Risks: Beyond the risks detailed in this Section, unexpected risks may develop. Additionally, novel risks could arise as unanticipated variations or combinations of the risks addressed in these Sections I.1 to I.5.

I.3 Crypto-Assets-Related Risks

Market Risk: Crypto assets, including U tokens, exhibit high volatility and may undergo substantial price fluctuations within brief timeframes, elevating the risk of rapid and significant financial losses. Such price risk emerges as the market valuation of a crypto asset may not

consistently correlate with its intrinsic utility or fundamental value and remains subject to market perception. U token holders face exposure to potential losses stemming from the U token's value variations, influenced by diverse factors including market sentiment, macroeconomic trends, encompassing interest rate movements, domestic and international market shifts, technological developments, regulatory modifications, and media influence. Particularly noteworthy is that speculative pricing in crypto asset markets has historically led, and may persistently lead, to conjecture regarding future value appreciation or decline, thereby amplifying volatility and potentially creating price distortions. U token holders additionally encounter liquidity risk, wherein insufficient market depth or restricted trading activity may impede the execution of transactions at advantageous prices, potentially resulting in considerable losses during volatile market periods. Furthermore, financial stability and collateral risk may emerge when the U token serves as financing for additional ventures, particularly in leveraged transactions or as loan security. Substantial value fluctuations in the U token could negatively impact holder solvency, especially when the token functions as collateral.

Market Manipulation and Fraud Risk: This encompasses the risk of financial loss resulting from deceptive practices or fraudulent schemes targeting U token holders by malicious entities. Such fraudulent activities include but are not restricted to social media or email phishing attacks, fraudulent promotional campaigns, impersonation of Union Build Ltd., the Union Foundation, or its leadership, deployment of counterfeit U tokens, distribution of fake U token promotional offers, misrepresentation of official Union communications, and deployment of malicious smart contracts falsely claiming Union protocol association.The fundamental characteristics of crypto assets and their supporting infrastructure may be exploited by certain market participants to conduct manipulative trading practices including front-running, spoofing, pump-and-dump operations, and fraudulent activities across various platforms, systems, or jurisdictions.Legal and Regulatory Risk: The absence of regulatory harmonization and consistency globally creates divergent regulatory environments and potential future regulatory developments. These factors could adversely impact U token value, utility, and overall sustainability and, in severe cases, compel Union Build Ltd. or the Union Foundation to discontinue operations. Although U tokens do not establish or grant contractual or other obligations against any entity, certain non-EU regulatory bodies may classify them as securities, financial instruments, or payment mechanisms under their respective legal systems. Such classifications could impose particular regulatory restrictions, necessitating substantial modifications in U token structure, issuance, acquisition, or trading processes. Developing regulations could significantly increase compliance expenses and operational requirements, while new or restrictive regulations could cause the U token to lose functionality, decline in value, or become prohibited or impossible to utilize, purchase, or sell in specific jurisdictions.

Unforeseen Risks: Beyond the risks detailed in this Section, unexpected risks may develop. Additionally, novel risks could arise as unanticipated variations or combinations of the risks addressed in these Sections I.1 to I.5.

I.4 Project Implementation-Related Risks

Protocol Development Risk: The Union network represents a complex interoperability infrastructure built upon cutting-edge zero-knowledge cryptography and consensus mechanisms that continue to evolve. The implementation of CometBLS consensus, Galois proving systems, and custom IBC protocols involves experimental technologies where operational behavior under all conditions cannot be fully predicted. Software components may exhibit unexpected interactions, performance limitations, or security vulnerabilities that could compromise network functionality. Protocol upgrades, bug fixes, or security patches may introduce new risks or temporarily disrupt network operations, potentially affecting U token utility or value.

Cross-Chain Integration Risk: Union's core functionality depends on successful integration with multiple heterogeneous blockchain networks, each operating under different consensus mechanisms, security models, and technical specifications. Changes in connected blockchain protocols, network upgrades, or incompatibility issues could impair Union's ability to provide seamless interoperability services. The failure of light client implementations, proof verification mechanisms, or message relay systems could result in transaction failures, asset locks, or loss of cross-chain communication capabilities, directly impacting the utility and demand for U tokens.

Governance Mechanism Risk: The Union network employs a distributed governance model where U token holders participate in protocol decisions through on-chain voting mechanisms. Governance proposals may introduce technical modifications, economic parameter changes, or strategic direction shifts that could negatively impact network performance or token value. Low voter participation, contentious proposals, or coordinated voting attacks could result in suboptimal governance outcomes. The crosschain governance functionality, while innovative, creates additional complexity where governance decisions must be coordinated across multiple blockchain environments, potentially creating synchronization issues or conflicting states.

Infrastructure Dependency Risk: Union's operational success relies on maintaining robust validator infrastructure, relayer networks, and proving systems distributed across multiple hosting providers and geographic regions. Infrastructure failures, cyber attacks on hosting providers, or geographic restrictions could disrupt network operations. The network's dependency on external blockchain networks for settlement and verification creates systemic risks where failures in connected chains could cascade to Union's functionality. Additionally, the requirement for specialized hardware or software to operate Union infrastructure components could limit decentralization or create single points of failure.

Adoption and Network Effect Risk: The value proposition of Union's interoperability services depends on widespread adoption by blockchain networks, decentralized applications, and end users. Insufficient adoption could result in low transaction volumes, reduced network security, and diminished token utility. Competing interoperability solutions with superior technology, user experience, or market positioning could capture market share and reduce demand for Union's

services. The network effect required for successful cross-chain protocols means that early adoption challenges could create lasting competitive disadvantages.

Regulatory Compliance Risk: Union's operation across multiple jurisdictions and interaction with various blockchain networks creates complex regulatory considerations. Changes in crypto asset regulations, cross-border transaction requirements, or compliance obligations could necessitate protocol modifications or operational adjustments. Regulatory uncertainty regarding interoperability protocols, zero-knowledge proof systems, or crosschain governance mechanisms could impact Union's ability to operate in certain jurisdictions or provide services to specific user categories.

Unforeseen Risks: Beyond the risks detailed in this Section, unexpected risks may develop. Additionally, novel risks could arise as unanticipated variations or combinations of the risks addressed in these Sections I.1 to I.5.

I.5 Technology-Related Risks

Zero-Knowledge Proof Risk: Union's reliance on Groth16 zero-knowledge proofs introduces dependencies on complex cryptographic systems and the integrity of its trusted setup ceremony. Cryptographic vulnerabilities, quantum computing advances, or proof generation errors could compromise network security or create performance bottlenecks affecting system functionality.

Consensus Algorithm Vulnerabilities: The CometBLS consensus mechanism, while optimized for zero-knowledge applications, inherits complexity risks from its Tendermint foundation. Validator coordination failures, Byzantine Fault Tolerance attacks, or epoch-based management synchronization issues could disrupt consensus formation and compromise network security.

Interoperability Protocol Risk: The custom IBC implementation introduces risks related to message serialization and state synchronization across heterogeneous blockchain environments. Protocol interpretation errors, light client bugs, or incompatibilities with network upgrades on connected chains could cause cross-chain communication failures.

Smart Contract and Virtual Machine Risk: Deployment across multiple execution environments (EVM, Move, CosmWasm and more) creates exposure to virtual machine-specific vulnerabilities and smart contract bugs. Contract upgrade mechanisms, gas optimization issues, or cross-contract interaction failures could compromise system functionality.

Network Architecture Risk: The distributed architecture involving Galois proving networks, Voyager relayer systems, and validator nodes creates multiple failure points. Network partitions, DDoS attacks, malicious participants, or scalability bottlenecks could fragment the system or limit overall throughput and reliability.

Unforeseen Risks: Beyond the risks detailed in this Section, unexpected risks may develop. Additionally, novel risks could arise as unanticipated variations or combinations of the risks addressed in these Sections I.1 to I.5.

I.6 Mitigation Measures

While Union Build Ltd and the Union Foundation do not exercise direct control over the Union network's decentralized operations, several risk mitigation measures have been implemented to address technological, regulatory, and operational challenges:

- Security Audits: The protocol undergoes regular security audits by reputable third-party firms, most recently in April 2025 and Q3 2024.
- Formal Verification: Critical components use formal verification methods to ensure correctness
- Gradual Rollout: Mainnet launch will follow extensive testing on testnets with gradual feature rollout, with the first Union testnet having launched in June 2024.
- Trusted Setup: Conducted one of the largest Groth16 trusted setup ceremonies with over 5,000 participants
- Open Source Development: Core protocol code is open source, enabling community review and contributions by anyone with the requisite technical knowledge and skills.
- Diverse Team: Team includes experts from various blockchain ecosystems and cryptographic backgrounds.
- Partnership Strategy: Strategic partnerships with major blockchain projects to ensure robust integrations.
- Counterparty management: Union prioritises a diverse set of counterparties that continue to demonstrate sound, viable and ethical businesses, including trading venues, liquidity providers and custodians.
- Regulatory and Compliance: we retain global and local legal counsel plus participate in industry working groups to keep abreast of rapidly evolving changes in the industry.

However, many risks remain inherent to innovative blockchain interoperability technology and the rapidly evolving regulatory landscape, making complete risk elimination impossible despite these comprehensive mitigation efforts.

PART J - INFORMATION ON THE SUSTAINABILITY INDICATORS IN RELATION TO ADVERSE IMPACT ON THE CLIMATE AND OTHER ENVIRONMENT-RELATED ADVERSE IMPACTS

J.1 Mandatory information on principal adverse impacts on the climate and other environment-related adverse impacts of the consensus mechanism

The energy consumption of Union's consensus mechanism is derived using a bottom-up methodology, focusing on validator node-level energy usage across distributed server infrastructure companies. This approach accounts for hardware specifications based on Union's minimum foundation validator requirements of 25 servers with 8 vCPUs each, consuming approximately 110W per server under operational load, with energy consumption figures derived from AWS compute instance specifications and validated operational parameters. Based on current estimations, the total annual energy consumption attributable to Union's consensus mechanism is approximately 24,090 kWh, distributed across the minimum validator infrastructure necessary for secure network operations.

Union's CometBLS consensus mechanism is specifically designed for enhanced energy efficiency compared to traditional proof-of-work systems and resource-intensive zero-knowledge proving protocols. The protocol employs BLS signature aggregation and MiMC cryptographic hashing to minimize computational overhead, enabling consensus proof generation with only 5GB RAM requirements on consumer-grade hardware rather than industrial server farms. While Union facilitates cross-chain transactions that may interact with energy-intensive Layer 1 networks, the protocol's purpose-built consensus verification architecture significantly reduces per-transaction energy consumption compared to alternative interoperability solutions through optimized proof generation and validator efficiency mechanisms.

S.1 Name

Union Foundation

S.2 Relevant legal entity identifier:

Not applicable

S.3 Name of the crypto-asset

U Token

S.4 Consensus Mechanism

Union operates on CometBLS, a proprietary consensus mechanism that represents a significant enhancement of the proven Tendermint Byzantine Fault Tolerance (BFT) protocol, specifically optimized for zero-knowledge proof generation and cross-chain consensus verification. The consensus mechanism maintains the security guarantees of traditional BFT systems, requiring only that two-thirds of validators remain honest to ensure network integrity, while introducing critical optimizations that enable efficient interoperability operations. CometBLS incorporates Boneh-Lynn-Shacham (BLS) signature aggregation technology, which allows multiple validator signatures to be combined into a single aggregate signature, substantially reducing transaction size compared to ECDSA verification and decreasing Union Network computation costs. The protocol employs MiMC cryptographic hashing functions in place of traditional SHA-256, providing equivalent security guarantees while significantly reducing the computational constraints required for zero-knowledge circuit operations.

Union's consensus mechanism supports epoch-based validator management, combining design elements from Polkadot consensus with Cosmos governance models to minimize unnecessary light client updates and optimize proof generation efficiency. The system is designed to scale to hundreds of validators and thousands of chains without compromising performance or bridging latency, ensuring robust decentralization for efficient cross-chain operations. This consensus architecture enables Union to generate cryptographically verifiable proofs of consensus state that can be efficiently validated across multiple blockchain environments, providing the foundational security layer for trustless cross-chain interoperability while consuming significantly less energy per transaction than alternative interoperability protocols or general-purpose zero-knowledge proving systems.

S.5 Incentive Mechanisms and Applicable Fees

Union employs a sophisticated dual-layer incentive mechanism comprising validator staking rewards for network security and an adaptive fee market structure for transaction processing efficiency. The platform operates on a Proof-of-Stake consensus model where validators are incentivized through block rewards and transaction fees proportional to their delegated stake, ensuring network security through economic alignment while enabling token holders to participate in governance and earn staking rewards across multiple blockchain environments through the Crosschain Governance module.

Union implements an enhanced Additive Increase Multiplicative Decrease (AIMD) EIP-1559 fee market mechanism that dynamically adjusts base fees based on network congestion, utilizing adaptive learning rates that scale more aggressively during periods of high demand and less aggressively during low utilization periods. This fee structure incorporates configurable parameters including target block size, maximum block size, alpha and beta coefficients for

learning rate adjustments, and gamma thresholds for determining fee adjustment behaviors, ensuring optimal resource allocation while maintaining predictable transaction costs for users.

The platform's fee mechanism addresses traditional EIP-1559 limitations by considering historical block utilization windows rather than single-block metrics, enabling more responsive fee adjustments that better reflect actual network demand. Additionally, Union's permissionless proving and relaying infrastructure allows participants to earn rewards for generating zero-knowledge proofs and facilitating cross-chain message delivery, creating multiple revenue streams that support network decentralization while ensuring sustainable economic incentives for all ecosystem participants.

The algorithm for calculating fees is:

4. Block consumption calculation: blockConsumption = sumBlockSizesInWindow(window) / (window * maxBlockSize)
5. Learning rate adjustment: Conditional logic based on gamma thresholds
6. Final fee calculation: newBaseFee = currentBaseFee * (1 + newLearningRate * (currentBlockSize - targetBlockSize) / targetBlockSize) + delta * netGasDelta(window)

Source:
https://github.com/skip-mev/feemarket/blob/main/x/feemarket/README.md#aimd-eip-1559

S.6 Beginning of the period to which the disclosure relates:

2025-08-05

S.7 End of the period to which the disclosure relates:

2025-12-31

S.8 Energy consumption:

24,090.00000 kWh

S.9 Sources and methodologies:

The energy consumption calculation is based on Union's minimum validator infrastructure requirement of 25 foundation validators, representing the baseline necessary for secure network operations. This configuration utilizes 25 AWS servers with 8 vCPUs each, consuming approximately 12-15W per vCPU under load, resulting in 100-120W per server. The total power draw of 2,750W (25 servers × 110W average) operating continuously for validator operations, consensus mechanisms, and Galois proving results in an annual energy consumption of 24,090

kWh (2,750W × 8,760 hours). This calculation assumes 24/7 operations for continuous validation and consensus operations, includes network overhead for cross-chain communication and IBC operations, and reflects AWS infrastructure efficiency with optimized cooling and power distribution. The figure represents computational infrastructure energy consumption for Union's distributed ledger validation and maintenance operations, expressed in the required kilowatt-hours format for MiCA regulatory compliance, excluding additional AWS facility overhead managed by the cloud provider's data center operations.

This white paper is prepared in compliance with Regulation (EU) 2023/1114 (MiCA) and contains forward-looking statements. Past performance does not guarantee future results. Cryptocurrency investments carry inherent risks including total loss of capital.