

Urgenth: A New Era in Decentralized Logistics

1. Overview

1.1 Logistics in the Digital Age: Challenges and Opportunities

With the global surge in e-commerce, logistics has transformed into a high-speed, data-intensive industry. However, alongside these advancements, significant issues have emerged, including data privacy breaches, opaque supply chain operations, and inefficiencies in last-mile delivery. Existing centralized logistics frameworks often lack robust data privacy protocols, making them vulnerable to information leaks and cyber-attacks, with users' sensitive information frequently at risk. To address these challenges, Urgenth introduces a groundbreaking decentralized logistics framework focused on privacy, security, and operational transparency, using blockchain technologies to redefine how information flows securely across the supply chain.

1.2 Vision

Urgenth's vision is to reshape logistics into a secure, privacy-centered, and highly transparent industry, where users and enterprises can interact without compromising their data. Leveraging advanced cryptographic technologies and innovative blockchain frameworks, Urgenth aims to create a decentralized platform where logistics data flows securely and efficiently. This platform not only enhances user privacy and data integrity but also promotes transparency and accountability in logistics operations.

2. Technology Foundations

2.1 History of Zero-Knowledge Proofs (ZKP) and Its Application in Logistics

Zero-Knowledge Proofs (ZKP) were first proposed in the 1980s by researchers Shafi Goldwasser, Silvio Micali, and Charles Rackoff. The fundamental concept of ZKP is to allow one party to prove knowledge of certain information to another party without disclosing the actual information. Initially a theoretical breakthrough, ZKP has gained practical application with advancements in cryptography and computing power. ZKP's relevance in logistics lies in its ability to verify transaction data or credentials without exposing sensitive information, thus enabling secure interactions between users and enterprises.

In Urgenth's **Origin Chain**, ZKP serves as a privacy shield. By allowing data validation without data exposure, ZKP ensures that sensitive logistics details—such as customer identity, order specifics, and transaction history—remain confidential. This privacy-centric approach aligns with Urgenth's commitment to maintaining user confidentiality throughout the logistics process.

2.2 Evolution of OP Stack and Its Role in Scaling Blockchain

Optimistic Rollups and the OP Stack are relatively new developments in blockchain technology, focusing on scalability and transaction efficiency. Introduced in 2019, Optimistic Rollups are Layer 2 solutions that enable transactions to be executed off the main blockchain, with data periodically sent back to the main chain for validation. This approach allows for higher transaction throughput at a fraction of the cost, making it ideal for networks that handle large volumes of transactions.

Urgenth's **One Chain** employs the OP Stack to handle its high-frequency, user-facing logistics transactions. By executing transactions off-chain and confirming them periodically on the Ethereum mainnet, One Chain can manage a large number of transactions quickly and affordably. This scalability makes it suitable for supporting Urgenth's extensive logistics ecosystem, ensuring that the network can handle demand spikes without sacrificing speed or cost-efficiency.

2.3 Trusted Execution Environments (TEE): Ensuring Secure Off-Chain Processing

Trusted Execution Environments (TEE) offer an additional layer of security by creating a protected space within a device's hardware where sensitive data is processed securely. Originating from the need for secure mobile transactions, TEE has now become a key security feature in various applications, including blockchain. TEE ensures that data processed off-chain remains isolated and inaccessible to unauthorized parties, providing an extra layer of privacy for logistics transactions on **One Chain**.

3. Core Components of Urgenth

3.1 Urgenth Origin Chain: Securing Enterprise Data with ZKP

The **Urgenth Origin Chain** is a permissioned Layer 1 blockchain, optimized for enterprise use, which serves as the backbone of Urgenth's logistics framework. Origin Chain is built with the following objectives:

- **Privacy-First Transactions:** Leveraging Zero-Knowledge Proofs (ZKP), Origin Chain allows businesses to verify logistics transactions and share data without revealing sensitive details.
- **Data Ownership and Control:** Enterprises retain control over proprietary data while maintaining secure inter-enterprise data exchange through encrypted protocols.
- **Gas Fee Efficiency:** Powered by a stable token (USD Origin or \$USDO), Origin Chain provides predictable gas costs, facilitating cost-efficient operations for enterprise-scale logistics.

Importance of Origin Chain in the Urgenth Ecosystem Origin Chain's role is crucial in handling secure, private, and regulatory-compliant data trans-

actions among logistics stakeholders. As a trusted platform, it enables Urgenth to deliver an enterprise-grade logistics network that respects data privacy while ensuring smooth cross-entity operations.

3.2 Urgenth One Chain: A Public, Scalable Layer for User Interactions

The **Urgenth One Chain** is a Layer 2 network tailored to manage user interactions, such as order placement and package tracking, at scale. By implementing the OP Stack, One Chain provides a highly efficient and user-friendly environment.

- **High Scalability with OP Stack:** The OP Stack processes numerous transactions off-chain, periodically verifying them on the Ethereum mainnet, offering Urgenth a cost-effective, high-throughput solution.
- **Dual Token System (ETH and URT):** Users can pay transaction fees using ETH or URT, with URT offering gas fee discounts and incentivizing participation in the Urgenth ecosystem.
- **TEE Integration:** Trusted Execution Environments (TEE) ensure that user data processed off-chain remains secure and isolated from potential threats, maintaining user privacy even in high-frequency interactions.

Importance of One Chain in the Urgenth Ecosystem One Chain is integral to ensuring user accessibility and scalability within Urgenth. By facilitating efficient, affordable transactions, One Chain empowers consumers to seamlessly participate in the logistics network while maintaining data confidentiality.

3.3 Cross-Bridge: Secure Data Transmission Between Chains

Cross-Bridge is Urgenth’s proprietary protocol that securely transmits data between One Chain and Origin Chain. To ensure data integrity and privacy during transmission, Cross-Bridge incorporates several advanced security techniques:

- **Inter-Blockchain Communication (IBC):** Cross-Bridge uses IBC protocols to enable seamless, reliable data exchange between chains.
- **Multi-Party Computation (MPC) and ZKP:** Before transmission, data is encrypted and validated using MPC and ZKP, ensuring privacy and reducing the risk of data exposure.
- **Resilient and Reliable:** Cross-Bridge guarantees that enterprise and consumer data flow securely between chains, underpinning the Urgenth network’s interconnected structure.

Significance of Cross-Bridge in Urgenth’s Framework Cross-Bridge acts as the glue binding Origin Chain and One Chain, enabling Urgenth to function as a unified logistics network. It ensures that data integrity and privacy are maintained while facilitating real-time, cross-chain transactions.

4. Blockchain Explorer: Transparency and User Trust

The **Urgenth Blockchain Explorer** offers users a transparent tool to track their logistics data and verify transactions within the network:

- **Real-Time Transparency:** Users can verify their transaction history and package status, enhancing trust in Urgenth’s logistics services.
- **Immutable Tracking:** Transaction data is stored immutably, allowing for comprehensive tracking and preventing tampering.
- **Privacy-Oriented:** Data displayed is anonymized through ZKP, so users can verify transaction legitimacy without exposing sensitive details.

5. Tokenomics

5.1 Utility and Incentives in the Urgenth Ecosystem

Urgenth’s dual-token economy incentivizes participation and ensures smooth network operations.

- **URT Token:** The primary utility token used for gas fees, incentivizing participation through discounts and rewards.
- **Token Allocation and Unlocking:**
 - **Total Supply:** 10 billion URT
 - **Allocations:** 15% for the team, 13% for community rewards, 10% for Urgenth Foundation, 22% for partners, and 30% for user airdrops.

5.2 Unlock Schedule

The unlocking of tokens follows a linear schedule to promote network stability, with specific vesting periods for each allocation to align with Urgenth’s long-term vision.

6. Appendix

6.1 Technical Specifications

- **Consensus Mechanism:** Both chains use a Proof of Stake mechanism.
- **Encryption Standards:** AES-256 for data at rest, RSA-2048 for data in transit.
- **Cross-Bridge Protocols:** Incorporates IBC, MPC, and ZKP to ensure secure data transmission.

6.2 Glossary

- **Optimistic Rollup (OP Stack):** A Layer 2 scaling solution that processes transactions off-chain, reducing congestion on the main blockchain.
- **Zero-Knowledge Proofs (ZKP):** A cryptographic method allowing verification of information without revealing the information itself.

- **Trusted Execution Environment (TEE):** A hardware-based secure area for processing sensitive data securely.