

Cross-Chain Action Protocol (CAP) - Full Product Vision

1. Introduction

The Cross-Chain Action Protocol (CAP) is a no-code automation platform designed to enable DAOs, DeFi protocols, and Web3 projects to create rule-based workflows across multiple blockchains without requiring developer expertise. By leveraging ICP's Chain-key Signatures, HTTPS Outcalls, Canister Heartbeats, and Internet Identity, CAP facilitates trustless cross-chain automation.

2. Problem Statement

Multi-chain operations today are fragmented, requiring manual oversight and centralized intermediaries. Existing solutions often rely on custodial bridges, which introduce security risks, or require developer knowledge for smart contract automation. CAP aims to eliminate these barriers by providing a decentralized, no-code framework for automating cross-chain workflows.

3. Solution Overview

CAP allows users to set up “if-this-then-that” (IFTTT) automation rules without writing code. The platform monitors blockchain states and executes predefined actions when conditions are met. Key features include:

- **Cross-chain event triggers:** Detect and respond to blockchain activities across multiple chains.
- **Trustless execution:** Utilize ICP's Chain-key Signatures for secure cross-chain transactions.
- **No-code workflow builder:** A drag-and-drop interface for creating and managing automation rules.

- **Auditability:** On-chain logging via Proof-of-Action NFTs for transparency.

4. Core Features

4.1 Rule-Based Workflow Automation

Users define automation rules through a visual workflow editor. Examples:

- **Example 1:** “When ETH balance on Arbitrum exceeds 1 ETH, auto-stake ICP at 7% APY.”
- **Example 2:** “When an NFT is minted on Solana, trigger a mirrored DAO on ICP.”

4.2 Cross-Chain Event Monitoring

CAP continuously monitors external blockchain events through HTTPS Outcalls and validates them using ICP’s canister system.

4.3 Secure Execution via Chain-key Signatures

Using ICP’s cryptographic capabilities, CAP ensures secure signing and execution of transactions across supported blockchains.

4.4 Proof-of-Action NFTs

Every executed rule generates an NFT containing metadata about the action, ensuring transparency and traceability.

4.5 Community-Driven Template Marketplace

Users can share and monetize pre-built automation templates, reducing the technical barrier for new adopters.

5. Technical Architecture

5.1 High-Level System Components

1. **Frontend:** A web-based interface built with React, providing drag-and-drop workflow creation.
2. **Backend (ICP Canisters):** Manages rule storage, execution logic, and event monitoring.
3. **Blockchain Interactions:** Uses HTTPS Outcalls for fetching external blockchain data and Chain-key Signatures for secure execution.
4. **Data Storage:** On-chain logging of execution history and Proof-of-Action NFTs for auditability.

5.2 Execution Flow

1. **User defines a rule** in the visual editor.
2. **CAP stores the rule** in a smart contract canister.
3. **Blockchain events are monitored** via HTTPS Outcalls.
4. **If conditions are met**, the CAP engine triggers execution.
5. **Chain-key Signatures sign transactions** and send them to the relevant blockchain.
6. **Execution details are recorded** on-chain via Proof-of-Action NFTs.
7. **User is notified** of successful execution.

6. Roadmap & Milestones

Milestone 1: Core Engine and Visual Workflow Builder (4-6 weeks)

- Develop CAP engine to support triggers and actions.

- Build a no-code workflow editor.
- Implement Chain-key Signatures for transaction signing.

Milestone 2: Multi-Chain Integration & Template Marketplace (4-6 weeks)

- Integrate Ethereum, Solana, and Bitcoin via ckBTC.
- Launch a marketplace for community automation templates.

Milestone 3: Enterprise Features and Security Enhancements (4-6 weeks)

- Add multi-signature approvals and enterprise permission controls.
- Implement compliance modules such as automated OFAC checks.

7. Competitive Advantage

- **No-code automation:** Reduces reliance on developers.
- **Trustless execution:** Eliminates centralized relayers.
- **Multi-chain compatibility:** Works across Ethereum, Solana, ICP, and more.
- **Built-in monetization:** Enables revenue generation through templates and premium features.

8. Monetization Strategy

- **Freemium model:** Free basic rules; Pro/Enterprise plans for advanced features.
- **Transaction fees:** Small percentage on cross-chain transactions.

- **Marketplace commissions:** Revenue share on template sales.

9. Future Vision (12 Months & Beyond)

- Expand integrations to additional blockchains.
- Develop AI-driven rule recommendations.
- Transition governance to a DAO model.
- Build enterprise-grade compliance and security modules.

10. Conclusion

CAP is positioned to revolutionize cross-chain automation, making decentralized workflows accessible and trustless. By leveraging ICP's unique capabilities, it bridges the gap between fragmented blockchain ecosystems, empowering DAOs, DeFi protocols, and Web3 projects with automation that is secure, scalable, and open-source.