

CLAIMS

1. A computer-implemented method for cross-chain communication, the method comprises:
 - receiving, from a cross-chain smart contract of a blockchain node of a first blockchain network, and at a cross-chain relay component of a first cross-chain communication component in the first blockchain network, a message comprising: i) ledger data from the cross-chain smart contract of the blockchain node in the first blockchain network and ii) ledger proof of the ledger data, wherein the ledger proof comprises a digital signature generated based on the ledger data according to a predetermined encryption or cryptographic algorithm, wherein the digital signature is generated using a private key of the blockchain node;
 - determining, by the first cross-chain communication component, whether the ledger data is valid, wherein the determining comprises:
 - verifying, by an oracle machine of the first cross-chain communication component, the ledger data based on the ledger proof by verifying the digital signature included in the ledger proof;
 - in response to determining that the ledger data is valid, generating, by the oracle machine of the first cross-chain communication component, formatted ledger data based on the ledger data and the ledger proof; and
 - sending, by the cross-chain relay component of the first cross-chain communication component, a cross-chain message comprising the formatted ledger data to a second cross-chain communication component in a second blockchain network.
2. The computer-implemented method of claim 1, wherein the blockchain node in the first blockchain network comprises a service smart contract and the cross-chain smart contract, and the method further comprises:
 - receiving, by the cross-chain smart contract, the message comprising the ledger data from the service smart contract; and
 - sending, by the cross-chain smart contract, the message to the first cross-chain communication component.
3. The computer-implemented method of claim 1, further comprising:
 - sending, by the relay component, the ledger data to the oracle machine.

4. The computer-implemented method of claim 1, wherein the cross-chain relay component is a first relay component, the second cross-chain communication component comprises a second relay component, the blockchain node in the first blockchain network is a first blockchain node, the second blockchain network comprises a second blockchain node, and the method further comprises:

receiving, by the second relay component, the cross-chain message from the first relay component;

obtaining, by the second relay component, the formatted ledger data from the cross-chain message; and

sending, by the second relay component, the formatted ledger data to the second blockchain node.

5. The computer-implemented method of claim 4, wherein the cross-chain smart contract is a first cross-chain smart contract, a service smart contract is a first service smart contract, the second blockchain node comprises a second cross-chain smart contract and a second service smart contract, and the method further comprises:

receiving, by the second cross-chain smart contract, the formatted ledger data from the second relay component;

determining, by the second cross-chain smart contract, whether the formatted ledger data is valid;

in response to determining that the formatted ledger data is valid, obtaining, by the second cross-chain smart contract, the ledger data from the formatted ledger data; and

sending, by the second cross-chain smart contract, the obtained ledger data to the service smart contract.

6. A system for cross-chain communication, comprising:

one or more processors; and

one or more computer-readable memories coupled to the one or more processors and having instructions stored thereon that are executable by the one or more processors to perform the method of any of claims 1 to 5.

7. An apparatus for cross-chain communication, the apparatus comprising a plurality of modules for performing the method of any of claims 1 to 5.

8. A computer-readable medium encoding instructions operable to cause data processing apparatus to perform operations according to the methods of any of claims 1 to 5.