

23. ETHEREUM BLOCKCHAIN

Yeseptionak A.A.

*Belarusian State University of Informatics and Radioelectronics
Minsk, Republic of Belarus*

Riabykh V.A. – Lecturer, Master of Arts

This article provides an overview of the Ethereum blockchain, a decentralized platform that enables the development and execution of smart contracts and applications. Ethereum's blockchain serves as a distributed public registry, maintaining transaction records and executing smart contracts. Ethereum's innovative capabilities make it a transformative force across various industries, offering trust, security, and decentralization.

Ethereum can be described as a decentralized platform that has the ability to run applications and contracts based on blockchain technologies. It allows users to develop smart contracts, deploy and interact with these contracts, which are self-executing agreements running on the blockchain. In addition, with the full approval of all its computing power and security, Ethereum allows the creation of new cryptocurrencies and tokens along with decentralized applications (dApps) that run on the network.

Blockchain technology can be called a distributed accounting system for making secure transactions, free from the participation of intermediaries or central authorities.

Ethereum, launched in 2015, is the most advanced blockchain network with enhanced capabilities compared to Bitcoin due to the expansion of capabilities that allow users to develop and run smart contracts and applications on the blockchain [1].

Smart contracts, on the other hand, are contractual agreements that contain pre-defined conditions and deadlines that are automatically set when such pre-defined conditions are met.

Applications will be those that run on the blockchain and perform tasks in accordance with a smart contract, and some of the very common ones in this regard include asset exchange, lending and borrowing, gaming, voting and the like. In general, Ethereum can be defined as a platform that supports anything — any applications or use cases — in need of trust, security and decentralization [2].

Ethereum consists of the following key components: the consensus mechanism, currently proof-of-work, the Ethereum Virtual Machine for executing smart contracts, and the native cryptocurrency Ether, used for transactions and contract execution.

The Ethereum blockchain is a distributed public registry containing all transactions and details of the execution of smart contracts on the Ethereum network. The network is maintained and constantly updated by the distribution of nodes that store data using the consensus protocol.

The consensus mechanism is a method by which network nodes agree on the state of the blockchain and the validity of transactions and smart contracts.

Currently, like bitcoin, Ethereum uses proof-of-work (PoW) as a consensus mechanism when solving cryptographic puzzles between network nodes so that they receive rewards and add new blocks to the chain.

The Ethereum Virtual Machine (EVM) refers to that part of the network, along with applications on the blockchain, on which smart contracts are executed. EVM is Turing complete, which implies that it can run any code written in a compatible programming language at will. EVM ensures that smart contracts and applications follow the rules and logic described in their code and are executed in a deterministic and isolated manner.

Ether (ETH), a proprietary cryptocurrency of the Ethereum network, serves various purposes within the ecosystem. It is utilized for transaction fees and the execution of smart contracts, functioning as a store of value, a medium of exchange, and a unit of account. Additionally, Ether facilitates interactions with smart contracts and applications, enabling transfers between accounts.

Gas represents the computational cost incurred per transaction within the network. It is also the expense associated with contract processing. Expressed in ether, the quantity required for a transaction or an entire smart contract is determined by its complexity and resource usage. This mechanism stimulates nodes to process transactions and smart contracts, while also serving as a deterrent against resource abuse [2].

In conclusion, Ethereum's blockchain technology has revolutionized trust, security, and decentralization. With its smart contract capabilities, Ethereum enables the creation of self-executing agreements and opens up opportunities in multiple industries. As Ethereum evolves, it has the potential to reshape digital transactions and applications, driving the advancement of blockchain technology and decentralized systems. The future of Ethereum is promising and transformative.

References:

1. Antonopoulos, A. M., Wood, G. *Mastering ethereum: building smart contracts and dapps.* / A. M. Antonopoulos, G. Wood – O'reilly Media, 2018, P. 1 – 3.
2. *The official Ethereum Website [Electronic resource]. – Mode of access: <https://ethereum.org/ru/what-is-ethereum>. – Date of access: 19.02.2024.*