Infocomm

LIGHTCHAIN: DHT-BASED BLOCKCHAIN FOR RESOURCE CONSTRAINED ENVIRONMENTS

Abstract

The technical problems that this technology provides a solution for are: communication and storage scalability, fairness and consistency.
By communication scalability, we mean an efficient imposed communication overhead to the system for generating a single transaction or block.
By storage scalability, we mean an efficient storage overhead on the participating nodes of the blockchain protocol. By fairness, we mean the uniform chance of the participating nodes in block generation decision making regardless of their influence in the system. By consistency, we mean a identical view of all participating nodes towards the blockchain.

The present invention relates to a blockchain architecture with improved communication and storage efficiency. Present invention provides addressable peers, blocks and transactions within the network; making them efficiently accessible in an on-demand manner by all the peers using the skip graph lookup operation where no peer is required to store the entire blockchain and stores a replicated subset of the blocks and transactions and answers other peer's queries on those blocks and transactions. Invention discloses a fair blockchain with a uniform chance for all the participating peers to be involved in the consensus protocol regardless of their influence in the system with an improved consistency in that it governs a deterministic fork-resolving policy.

Problem solved with the technology

The invention is the first blockchain architecture that considers the communication and storage efficiency, consistency and decentralization of the blockchains altogether.

The invention is a consistent and communication and storage efficient blockchain with fully decentralized and uniform block generation decision-making that operates on top of a Skip Graph-based structured P2P overlay.

The invention is fair in the sense that each of the participating peers in the system has a uniform chance of being involved in the consensus regardless of its influence: e.g., processing power, available bandwidth, stakes value.

Having n peers and b blocks in the system, compared to the existing solutions that require the storage and communication complexity of O(n) and O(b), respectively, our proposed the invention requires O(b/n) storage on each peer and incurs the communication complexity of O(log n) on generating a new block. These asymptotic operational complexities make the invention suitable for resource-limited environments.

KOÇ UNIVERSITY
DIRECTORATE OF RESEARCH AND PROJECT DEVELOPMENT

Potential Application

By providing a light communication and storage overhead, the invention is very suitable for resource-limited environments like peer-to-peer systems and Internet-of-Things applications where the devices have a limited storage and communication set of capabilities:

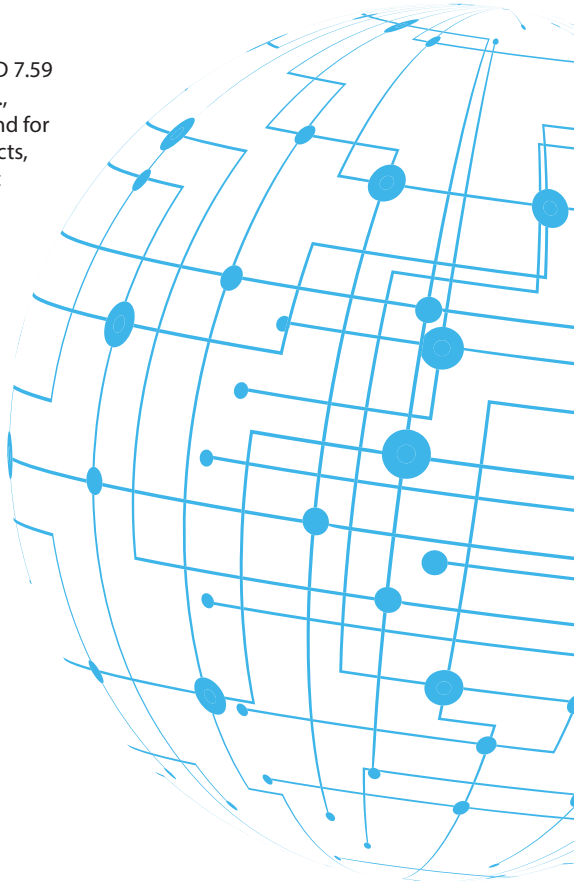
- Internet-of-things (IoT)
- Storage constraint devices e.g., smart phones
- Power constraint devices
- Bandwidth constraint devices e.g., home subscribers

Customer Benefits

This technology is the first blockchain architecture that considers the communication and storage efficiency, consistency, and decentralization of the blockchains altogether. Disclosed technology is a consistent, and communication and storage efficient blockchain with fully decentralized and uniform block generation decision-making that operates on top of a Skip Graph-based structured P2P overlay. Technology is fair in the sense that each of the participating peers in the system has a uniform chance of being involved in the consensus regardless of its influence: e.g.,processing power, available bandwidth, stakes value.

Market Trends

The global blockchain technology market size is expected to reach USD 7.59 billion by 2024, according to a new report by Grand View Research, Inc., registering a 37.2% CAGR during the forecast period. Increasing demand for this technology across financial services, consumer or industrial products, technology, media and telecom, healthcare, transportation, and public sectors is largely responsible for market growth.
(grandviewresearch.com)



Additional Technical Information

Patent Info: PCT/TR2019/050199

Assignee: Koç University

Keywords: Blockchain, DHT, Security

KOÇ ÜNİVERSİTESİ
Rumelifeneri Yolu Sarıyer 34450
İstanbul, Türkiye
T: +90 212 338 12 77
tto@ku.edu.tr tto.ku.edu.tr