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BLOCKCHAIN FOR SPACE: TOKENIZATION AND DECENTRALIZED AUTONOMOUS ORGANIZATIONS (DAOS) FOR SPACE CONTRACTS

Abstract

As commercialization and exploration of space advance, so does the complexity of space asset management, contracts, and international collaborations. Traditional contract and financial mechanisms are slow to catch up with the rapid and multi-jurisdictional nature of space projects. Blockchain technology offers a groundbreaking approach to space asset tokenization, smart contracts, and decentralized governance, enabling increased efficiency, transparency, and security in space activities.

This article talks about the use of blockchain in space tokenization and how Decentralized Autonomous Organizations (DAOs) can be used in space contract management. Tokenization allows for the fractional ownership of space assets, including satellites, lunar infrastructure, and mission resources, which can be exchanged and utilized in decentralized financial ecosystems, facilitating investment and reducing barriers to entry for newcomers. DAOs, which are made possible by smart contracts, offer a new system for autonomous contract fulfillment, mission funding, and decision-making among international collaborators.

We offer case studies and technical architectures for:

1. Space Asset Tokenization: - Creation of digital tokens for ownership or usage rights of satellites, lunar landers, and other space infrastructure. - Enabling liquidity and investment in space projects through blockchain-based markets.

2. Smart Contracts for Space Operations: - Automating financing of missions, supply chain contracts, and satellite leasing through self-executing contracts. - Enabling more transparency and reducing disputes in multi-party agreements across borders.

3. DAOs for Space Governance and Funding: - Decentralized space organizations where stakeholders vote on mission priorities and resource allocation. - Blockchain-based governance for international space collaborations, ensuring trust, compliance, and reduced bureaucracy.

4. Regulatory and Technical Considerations: - Surpassing jurisdictional challenges, compliance with international space law, and enforcement of smart contracts. - Examining cross-chain interoperability solutions for the seamless integration of current space agencies and private enterprises.

Harnessing the power of blockchain technology, we present a decentralized, open, and scalable system for space industry contracts, funding, and governance. The paper identifies actual use cases and presents possible roadmaps for incorporating blockchain in upcoming lunar, Martian, and deep-space missions.