IPFS (INTERPLANETARY FILE SYSTEM): A NEW FRONTIER FOR NEXT-GEN IOT COMMUNICATION

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ABSTRACT: The Internet of Things (IoT) has witnessed an exponential growth in recent years, with billions of interconnected devices generating massive amounts of data. Traditional centralized approaches to IoT communication, relying on cloud-based platforms and centralized servers, have faced challenges in terms of scalability, security, and privacy. To address these limitations, this paper explores the potential of the Interplanetary File System (IPFS) as a decentralized and secure solution for IoT communication. IPFS is a distributed file system that utilizes content-addressing and peer-to-peer networking to create a robust and resilient infrastructure for data storage and sharing. By leveraging IPFS, IoT devices can establish direct communication channels, eliminating the need for intermediaries and reducing the risk of single points of failure. This paper presents a comprehensive overview of IPFS and its key features, highlighting its suitability for IoT communication. To demonstrate the practical application of IPFS in IoT communication, conclusion, this paper provides a comprehensive overview of IPFS and its potential as a decentralized and secure solution for IoT communication. We have demonstrated the advantages of using IPFS in terms of scalability, security, and privacy, and addressed the potential challenges and limitations. By leveraging IPFS, IoT systems can become more resilient, secure, and scalable, paving the way for a more decentralized and interconnected future.

KEYOWRDS: Interplanetary File System, Internet of Things, Communication Protocol.

INTRODUCATION

It’s an open-source project on a mission to develop a distributed IOT system. It feels like BitTorrent + Git smashed together to allow anyone running the IPFS daemon to access each other’s files in a peer-to-peer (P2P) fashion. Pubsub basically lets you “subscribe” to a channel or topic allowing you to receive messages from other devices that “publish” messages to that same channel or topic. Just as easily automate the toggling of this LED to fully complete automated decentralized manufacturing factory. The Interplanetary File System

(IPFS), a peer-to-peer distributed file system, offers a potential solution by decentralizing data storage and eliminating reliance on intermediaries for communication. This paper explores the suitability of IPFS as a communication protocol for IoT systems, focusing on its ability to improve scalability, enhance security, and mitigate the issues associated with centralized systems.

RESEARCH OBJECTIVE

The primary objective of this research is to explore the feasibility and potential advantages of utilizing the Interplanetary File System (IPFS) as a decentralized communication framework for IoT devices. Specifically, this research aims to: 1. Compare the performance of IPFS with the traditional centralized communication models in terms of efficiency and reliability 2. Analyze the challenges and limitations of integrating IPFS into IoT systems, focusing on real-world scenarios 3. Propose a model for implementing-based communication in IoT ecosystems to demonstrate its practical applicability.

EXISTING SYSTEM

Centralized Data Storage: Reliance on centralized servers can lead to single points of failure, data breaches, and limited scalability. Security and Privacy Concerns: Sensitive IoT data is vulnerable to unauthorized access and tampering. Inefficient Data Management: Traditional data management approaches may not be optimized for handling large volumes of IoT data. Single Points of Failure: In centralized models, any failure of the central server or network can lead to system outages, affecting the availability of IoT services and applications. Scalability Issues: As the number of IoT devices grows, the central infrastructure can become a bottleneck, unable to efficiently handle the increasing amounts of data. This limits the system's ability to scale horizontally.

PROPOSED SYSTEM

Decentralized Data Storage: Utilize IPFS to store IoT data on a distributed network, eliminating single points of failure and enhancing data resilience. Secure and Immutable Data: Implement cryptographic mechanisms to ensure data integrity, confidentiality, and non-repudiation. Efficient Data Management: Optimize data storage, retrieval, and analysis processes for large-scale IoT deployments. Improved Scalability: With a distributed architecture, the system can scale horizontally as the number of devices increases. Data is stored in a decentralized manner, enabling efficient resource use across a broad network. Content-Addressable Storage: IPFS uses content-addressing to store data, meaning that files are accessed by their unique cryptographic hashes rather than their location on a server. This ensures that data integrity is maintained and reduces the risk of duplication.