

Smart Contracts on Blockchain for Microtransactions and Transparent Revenue Sharing in Content Monetization

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Abstract— As the demand for high-quality video content continues to surge, traditional content monetization models face challenges related to transparency, efficiency, and the growing importance of microtransactions. This review paper explores the transformative potential of smart contracts on blockchain technology in addressing these challenges within the context of adaptive video streaming. We delve into the application of smart contracts for automating and optimizing content monetization models, with a focus on microtransactions and transparent revenue sharing. The paper presents a comprehensive overview of blockchain technology and smart contracts, highlighting their relevance in the video streaming industry. By examining real-world use cases and case studies, we illustrate how smart contracts can revolutionize the landscape, providing secure and efficient mechanisms for microtransactions and ensuring transparent revenue distribution. Furthermore, the paper discusses the challenges and limitations associated with implementing smart contracts in this domain and explores future directions and innovations. Through this exploration, we aim to provide valuable insights into the potential of smart contracts to reshape the future of adaptive video streaming and content monetization.

Keywords— Adaptive Video Streaming, Smart Contracts, Blockchain Technology, Microtransactions, Transparent Revenue Sharing.

I. INTRODUCTION

Adaptive video streaming [8], [10], [11] is a dynamic approach to delivering video content over the internet, tailored to accommodate varying network conditions and device capabilities. Unlike traditional streaming methods that offer a fixed video quality, adaptive streaming adjusts the quality of the video in real-time based on the viewer's internet speed and device specifications. This ensures a seamless viewing experience [9], preventing buffering or interruptions. The technology has gained immense importance as the consumption of video content continues to surge across diverse devices and network environments. Adaptive video streaming enhances user satisfaction by providing optimal visual quality [12], [13] while adapting to the constraints of the user's network connection [16], leading to a more immersive and uninterrupted viewing experience.

Traditional content monetization models often face challenges stemming from opacity and inefficiency. In conventional models, revenue distribution can be complex and non-transparent, with creators and stakeholders having limited visibility into how their content contributes to overall revenue.

Moreover, as microtransactions gain prominence in the digital era, the traditional payment infrastructure may become cumbersome and costly for small transactions. Additionally, content creators may encounter delays in receiving payments due to intermediaries in the monetization chain. These challenges highlight the need for innovative solutions that can streamline the monetization process, enhance transparency, and facilitate efficient revenue distribution.

Smart contracts [14], [22], [25] on blockchain present a promising solution to the challenges in traditional content monetization models. Blockchain is a decentralized and secure distributed ledger technology that enables transparent and tamper-resistant recording of transactions. Smart contracts are self-executing contracts with the terms directly written into code, automating the execution and enforcement of agreements when predefined conditions are met. In the context of adaptive video streaming, smart contracts can revolutionize the monetization process by providing a decentralized and automated mechanism for content creators and stakeholders. Microtransactions, which are integral to the digital economy, can be executed seamlessly through smart contracts, eliminating the need for intermediaries and reducing transaction costs. Furthermore, the transparency and immutability of blockchain ensure fair revenue sharing, as stakeholders can easily verify transactions and track the flow of revenue. The introduction of smart contracts in adaptive video streaming holds the potential to create a more equitable and efficient ecosystem for content monetization, addressing the shortcomings of traditional models and fostering a sustainable environment for content creators and consumers alike.

The review paper begins by introducing the escalating demand for high-quality video content and the concurrent challenges faced by traditional content monetization models, including issues related to transparency, efficiency, and the increasing significance of microtransactions. The focus of the paper revolves around the transformative role of smart contracts on blockchain technology in mitigating these challenges within the realm of adaptive video streaming. It comprehensively explores the application of smart contracts to automate and optimize content monetization, specifically emphasizing microtransactions and transparent revenue sharing. A thorough examination of blockchain technology

and smart contracts sets the stage, elucidating their relevance in the dynamic landscape of video streaming. Real-world use cases and case studies are scrutinized to illustrate how smart contracts can revolutionize the industry by providing secure and efficient mechanisms for microtransactions and ensuring fairness in revenue distribution. Additionally, the paper deliberates on challenges and limitations associated with smart contract implementation, offering insights into future directions and innovations. The ultimate goal is to provide a holistic understanding of how smart contracts hold the potential to reshape the trajectory of adaptive video streaming and content monetization.

II. BLOCKCHAIN TECHNOLOGY IN VIDEO STREAMING

Blockchain [18], [26], [3] is a decentralized and distributed ledger technology that underlies cryptocurrencies like Bitcoin and Ethereum. It operates as a chain of blocks, where each block contains a record of transactions, and these blocks are linked in a secure and tamper-resistant manner. Key features of blockchain include decentralization, immutability, transparency, and security. Decentralization ensures that no single entity has control over the entire network, enhancing resilience and reducing the risk of a single point of failure. Immutability ensures that once a block is added to the chain, it cannot be altered, providing a secure and trustworthy record of transactions. Transparency allows all participants in the network to view the transaction history, promoting accountability, and security features like cryptographic algorithms safeguard the integrity of the data.

Discussion on How Blockchain Can Address Challenges in the Video Streaming Industry:

Blockchain technology can address several challenges in the video streaming industry. Firstly, it enhances transparency by providing an immutable and auditable record of transactions related to content consumption, payments, and revenue distribution. This transparency mitigates issues related to opacity in revenue sharing and provides content creators with a clear view of how their content contributes to overall revenue. Additionally, blockchain's decentralized nature reduces reliance on intermediaries, which can streamline the monetization process, reduce transaction costs, and eliminate delays in payment distribution. The security features of blockchain protect against fraudulent activities, ensuring the integrity of the content monetization ecosystem. Blockchain can also enable the creation of a secure and standardized system for digital rights management (DRM), preventing unauthorized distribution and protecting intellectual property rights.

Smart contracts are self-executing contracts with terms directly written into code. They automatically execute and enforce the terms of an agreement when predefined conditions are met. In the context of adaptive video streaming, smart contracts play a pivotal role in automating various aspects of content monetization. For instance, they can automate the distribution of microtransactions, ensuring that content creators receive fair compensation for each view or interaction with their content. The automation provided by smart contracts reduces the need for intermediaries, streamlining the

payment process and decreasing the likelihood of errors or disputes. Smart contracts also facilitate programmable and customizable revenue-sharing models, allowing for more flexible and adaptive approaches to compensate different stakeholders within the video streaming ecosystem. Overall, the introduction of smart contracts brings efficiency, transparency, and automation to the complex landscape of adaptive video streaming and content monetization.

III. SMART CONTRACTS IN ADAPTIVE VIDEO STREAMING

Smart contracts can be applied to adaptive video streaming to revolutionize the content monetization process [17], [4], [5]. One primary application is in the execution of microtransactions. Smart contracts facilitate automated and secure microtransactions, allowing viewers to make small payments for specific content interactions, such as watching a particular scene or accessing premium features. This microtransaction capability aligns with the user-centric nature of adaptive streaming, providing a granular payment model where users pay for the exact content they consume. Additionally, smart contracts can be programmed to adjust streaming quality dynamically based on payment, ensuring that users receive the level of service commensurate with their financial commitment.

Several key characteristics of smart contracts make them particularly relevant to content monetization in the adaptive video streaming domain. Transparency is a fundamental characteristic, as all transactions and revenue distribution rules are encoded in the smart contract and visible on the blockchain. Immutability ensures that once the terms are set, they cannot be altered, providing a tamper-resistant and trustworthy mechanism for revenue sharing. Automation is another critical characteristic, allowing for the automatic execution of payment and revenue distribution when predefined conditions are met. Smart contracts also enable decentralized control, reducing the need for intermediaries and fostering a more direct and equitable relationship between content creators, consumers, and other stakeholders.

Examples of Existing Platforms or Projects Leveraging Smart Contracts in Video Streaming:

Several platforms and projects are already leveraging smart contracts in the video streaming industry. One notable example is Theta Network, a decentralized video delivery network that incorporates blockchain and smart contracts. Theta enables users to share their excess bandwidth and resources in exchange for Theta tokens, creating a peer-to-peer streaming network. Smart contracts on Theta govern the token rewards and revenue distribution among network participants, ensuring a transparent and fair compensation model. Another example is Livepeer, a decentralized video streaming infrastructure that uses smart contracts on the Ethereum blockchain. Livepeer allows content creators to broadcast video through a decentralized network of nodes, with smart contracts automating the payment process based on viewer interactions and engagement.

These examples showcase how smart contracts are actively being used to address challenges in traditional content monetization models, offering decentralized, transparent, and

efficient solutions in the context of adaptive video streaming. As the industry continues to evolve, the integration of smart contracts is likely to become more widespread, fostering innovation and enhancing the overall user experience in the world of video content consumption.

IV. MICROTRANSACTIONS IN CONTENT MONETIZATION

Traditional payment models for video streaming face a myriad of challenges that have become increasingly pronounced in the digital age [24], [7], [15]. One significant challenge is the inefficiency of large-scale, centralized payment systems. Traditional models often involve multiple intermediaries, each taking a share of the revenue and contributing to delays in payment processing. Additionally, the fixed subscription-based models may not align with the diverse preferences of users who may only want to consume specific content or engage in short-term viewership. Furthermore, the traditional systems may struggle to handle microtransactions effectively, which are becoming more prevalent with the rise of shorter, on-demand content and the desire for a more personalized and pay-as-you-go approach.

Microtransactions involve small financial transactions typically conducted electronically. In the context of video streaming, microtransactions refer to users making small payments for specific content interactions or premium features. The potential benefits are significant. Microtransactions allow for a more granular and flexible payment model, where users pay only for the content they consume, creating a more user-centric and personalized experience. This model is particularly well-suited for adaptive video streaming, where content may be consumed in short bursts or in a non-linear fashion. Microtransactions also provide a new revenue stream for content creators, making it economically viable for them to produce niche or short-form content that may not fit into traditional subscription models.

Smart contracts play a pivotal role in addressing the challenges of microtransactions in video streaming. The security and efficiency offered by smart contracts are paramount in facilitating seamless microtransactions. Firstly, smart contracts eliminate the need for intermediaries by automating the execution of predefined conditions encoded in the contract. This not only speeds up the payment process but also reduces transaction costs. The transparency and immutability of smart contracts ensure that all parties involved can verify and trust the transaction history, mitigating fraud and disputes. In the context of microtransactions, where the value of each transaction may be relatively small, the cost-effectiveness and efficiency introduced by smart contracts become particularly significant.

Additionally, the programmability of smart contracts allows for the creation of intricate rules and conditions governing microtransactions. Content creators can set specific payment thresholds for different types of interactions, ensuring a fair compensation model. Furthermore, smart contracts can dynamically adjust streaming quality based on the microtransactions, providing a direct link between the user's financial commitment and the quality of service received. In essence, smart contracts bring a level of

automation, transparency, and security that is essential for the successful implementation of microtransactions in the adaptive video streaming landscape. As the industry continues to evolve, the integration of smart contracts is poised to redefine how microtransactions are executed and monetization is achieved in the digital video content space.

V. TRANSPARENT REVENUE SHARING

Revenue sharing models in the video streaming industry form the economic backbone of content distribution [2], [20], [6]. These models define how revenue generated from user subscriptions, advertisements, or other monetization channels is distributed among the various stakeholders involved, such as content creators, streaming platforms, and advertisers. Common revenue sharing models include subscription-based, ad-based, and hybrid models. In subscription-based models, revenue is shared based on the number of subscribers, while ad-based models distribute revenue based on ad views or clicks. Hybrid models combine elements of both. The complexity of these models lies in the need for fair and transparent mechanisms to allocate revenue among the diverse participants in the streaming ecosystem.

Transparency issues and disputes often arise in revenue sharing within the video streaming industry due to the lack of visibility and accountability in traditional models. Content creators, for example, may struggle to understand how their content contributes to overall revenue, leading to opacity and potential disputes with streaming platforms. Additionally, discrepancies in reporting and revenue calculations can give rise to conflicts between different stakeholders, eroding trust within the ecosystem. These challenges highlight the critical need for transparent and accountable revenue sharing mechanisms to ensure fair compensation and sustainable partnerships among all parties involved.

Smart contracts on blockchain offer a transformative solution to the transparency and efficiency issues in revenue sharing within the video streaming industry. Blockchain's decentralized and transparent nature addresses the transparency challenges by providing an immutable and publicly accessible ledger of all transactions. Smart contracts, being self-executing and tamper-resistant, automate the execution of predefined revenue-sharing agreements when specific conditions are met. This automation eliminates the need for intermediaries and ensures that revenue is distributed in a transparent, timely, and accurate manner.

Smart contracts can encode complex revenue-sharing rules, taking into account factors such as the number of views, user engagement, and subscription levels. Stakeholders can easily verify these rules, and the automated execution ensures that disputes arising from manual errors or intentional manipulation are minimized. The use of blockchain technology ensures that the transaction history is secure and tamper-proof, providing a clear audit trail for all revenue-sharing activities. This transparent and automated approach not only enhances trust among stakeholders but also reduces the administrative burden associated with revenue distribution.

In summary, the integration of smart contracts on blockchain in revenue sharing models for adaptive video

streaming introduces a new era of transparency, efficiency, and fairness. The decentralized and automated nature of smart contracts addresses the challenges inherent in traditional revenue-sharing models, fostering a more collaborative and equitable environment for content creators, streaming platforms, and other stakeholders. As the industry continues to evolve, the adoption of blockchain-based solutions is poised to redefine how revenue is shared and contribute to the sustainability and growth of the video streaming ecosystem.

VI. USE CASES AND CASE STUDIES

Real-world applications of smart contracts in content monetization for adaptive video streaming have witnessed notable success stories, showcasing the transformative impact of blockchain technology in the industry. Platforms like Veracity have implemented a Proof-of-View (PoV) model using blockchain and smart contracts. Veracity's system ensures that content creators are rewarded based on actual viewer engagement and attention, as recorded on the blockchain. This approach addresses the issue of fraudulent views and provides a transparent and verifiable method for compensating content creators. Furthermore, the integration of Veracity's system has led to increased viewer trust, as they can be confident that creators are fairly rewarded for genuine interactions with their content.

One prominent case study is the implementation of smart contracts on the Theta Network. Theta, a decentralized video delivery network, uses blockchain technology to create a peer-to-peer streaming ecosystem. In Theta's model, users share their excess bandwidth and resources to relay video streams to others. Smart contracts govern the incentive mechanism, where users are rewarded with Theta tokens for their contributions. This decentralized approach not only improves the efficiency of video delivery but also ensures a fair and transparent compensation system. The success of Theta Network exemplifies how smart contracts can create decentralized, community-driven platforms for content delivery, reshaping the traditional video streaming landscape.

Another compelling case study is Livepeer, a decentralized video streaming infrastructure built on the Ethereum blockchain. Livepeer utilizes smart contracts to automate the process of video transcoding and distribution across a network of nodes. Content creators can broadcast their videos through the decentralized network, and smart contracts manage the payment system. Users pay for transcoding services using Livepeer's native token, and smart contracts ensure the fair compensation of node operators. Livepeer's model not only enhances efficiency by decentralizing video processing but also ensures a transparent and automated revenue-sharing mechanism through smart contracts.

Audius is an example of a platform that leverages blockchain and smart contracts for content monetization in the music streaming industry. Audius allows artists to publish their music directly to the blockchain, providing transparency and traceability of ownership. Smart contracts automate royalty payments based on actual streaming data, ensuring that artists receive fair compensation for their work. Audius demonstrates how blockchain and smart contracts can

empower creators by eliminating intermediaries and creating a direct connection between artists and their audience.

These case studies illustrate the diverse applications of smart contracts in content monetization for adaptive video streaming. From tackling fraudulent views to creating decentralized, community-driven ecosystems, these platforms showcase the potential of blockchain technology to revolutionize how content is distributed, consumed, and monetized in the digital age.

VII. CHALLENGES AND LIMITATIONS

While smart contracts bring numerous advantages to the context of adaptive video streaming, they are not without challenges and limitations. One significant challenge is the potential for coding errors or vulnerabilities in smart contracts. These errors, commonly known as smart contract bugs, can lead to serious consequences, including security breaches and financial losses. The immutable nature of the blockchain makes it difficult to rectify such errors once they are deployed. Additionally, the complexity of encoding intricate revenue-sharing rules and conditions in smart contracts may lead to unintended consequences if not thoroughly tested and audited.

Another challenge is the potential for legal and contractual ambiguities. The automated execution of smart contracts relies on predefined conditions, and any ambiguity or lack of specificity in the contract terms could result in disputes. For instance, defining clear criteria for user engagement or what constitutes a view can be challenging and may vary based on the nature of the content.

Scalability is a critical consideration when implementing smart contracts for adaptive video streaming, especially given the large and growing user bases of popular streaming platforms. The current limitations of blockchain technology, particularly in terms of transaction processing speed and capacity, can pose challenges. As the number of transactions increases, there may be delays and increased costs associated with processing smart contracts. This scalability concern is vital for ensuring that the system can handle the high volume of microtransactions and interactions typical in the video streaming industry.

Security is paramount in the implementation of smart contracts for adaptive video streaming. The decentralized and transparent nature of blockchain technology provides a robust foundation, but smart contracts themselves must be secure. Ensuring secure coding practices, thorough auditing, and regular updates to address emerging threats are crucial. The immutable nature of the blockchain means that once a vulnerability is exploited, rectifying the situation can be challenging. Security concerns also extend to the storage and transmission of sensitive user data, which must be handled with utmost care to protect user privacy.

Smart contracts in the context of video streaming may encounter regulatory challenges, particularly in regions where blockchain and cryptocurrency technologies are subject to evolving legal frameworks. Regulatory uncertainty surrounding the classification of digital assets, compliance with data protection laws, and the legal enforceability of smart contracts can impact the widespread adoption of such systems.

Addressing these concerns involves close collaboration with regulatory bodies and policymakers to ensure that smart contract implementations align with existing legal frameworks and promote a secure and compliant environment.

In conclusion, the challenges and considerations in implementing smart contracts for adaptive video streaming encompass technical, legal, and regulatory dimensions. While these challenges are real, ongoing advancements in blockchain technology, rigorous testing, and collaborative efforts between the industry and regulatory bodies can contribute to overcoming these hurdles and unlocking the full potential of smart contracts in content monetization for adaptive video streaming.

VIII. FUTURE DIRECTIONS AND INNOVATIONS

The evolution of smart contract technology for video streaming is poised for exciting advancements. One potential area of improvement lies in the development of more sophisticated and flexible smart contract languages. Current smart contract platforms predominantly use languages like Solidity, but advancements could lead to the creation of languages that are more user-friendly, secure, and allow for greater expressiveness in defining complex revenue-sharing models. Additionally, advancements in formal verification tools may enhance the security of smart contracts, enabling comprehensive audits to identify vulnerabilities before deployment. Improved tooling and standardized frameworks could further streamline the development and deployment of smart contracts, reducing the barriers for content creators and platforms to adopt blockchain technology.

Several emerging trends and innovations are reshaping the intersection of blockchain, smart contracts, and video streaming. Non-fungible tokens (NFTs) [23], [19], [1] have gained prominence as a means to represent ownership of unique digital assets, including video content. This trend opens new possibilities for content creators to tokenize their work, enabling novel monetization strategies and fan engagement. Decentralized finance (DeFi) protocols are also making inroads into the video streaming space, offering decentralized lending and borrowing options, providing alternative funding mechanisms for content creation.

The concept of decentralized autonomous organizations (DAOs) is another intriguing trend. DAOs leverage smart contracts to create autonomous entities governed by community consensus. In the context of video streaming, DAOs could empower viewers and content creators to collectively make decisions regarding platform governance, content curation, and revenue distribution. This decentralized governance model aligns with the ethos of blockchain technology, promoting inclusivity and community-driven platforms.

An emerging innovation involves integrating blockchain technology into content delivery networks (CDNs). This approach aims to leverage the decentralized and distributed nature of blockchain to optimize content delivery, reduce latency, and enhance the overall streaming experience. By decentralizing content distribution, platforms can potentially improve scalability and reduce reliance on centralized server

infrastructure. Smart contracts within this framework could automate the incentivization of node operators in the CDN, creating a more efficient and robust content delivery ecosystem.

Interoperability between different blockchain networks is gaining attention as an essential factor for the broader adoption of blockchain in video streaming. Smart contracts that can operate seamlessly across multiple blockchains may enable more extensive collaboration between platforms, creating a unified ecosystem for content creators and viewers. This interoperability can open up new possibilities for cross-platform monetization strategies, audience engagement, and content distribution.

Innovations in decentralized identity solutions, facilitated by blockchain and smart contracts, could redefine user engagement in video streaming. Users could have more control over their identity and preferences, leading to personalized content recommendations and targeted advertising. Decentralized identity also enhances user privacy and security by reducing the reliance on centralized databases.

In summary, the potential advancements and emerging trends in smart contract technology for video streaming are diverse and promising. From improved smart contract languages and formal verification tools to the integration of blockchain in CDNs and the rise of decentralized governance models, these developments signify a transformative period for the industry. As blockchain technology continues to mature, the synergy with smart contracts and video streaming is likely to bring about innovative solutions, offering new opportunities for content creators, platforms, and viewers alike.

The exploration of adaptive video streaming and content monetization through the lens of blockchain and smart contract technologies has revealed several key findings and insights. Firstly, the traditional payment models in video streaming face challenges related to inefficiency, lack of transparency, and the inability to handle microtransactions effectively. The introduction of microtransactions, facilitated by smart contracts on blockchain, emerges as a potential solution to provide users with more flexible and personalized payment options while creating new revenue streams for content creators. Additionally, the transparency and automation inherent in smart contracts address challenges in revenue sharing, fostering a more equitable ecosystem.

The case studies of platforms like Theta Network, Livepeer, and Audius illustrate real-world applications of smart contracts in content monetization [21]. These platforms showcase the versatility of smart contracts in addressing challenges such as fraudulent views, decentralized video delivery, and fair compensation for artists. The success stories indicate the potential of blockchain and smart contracts to revolutionize the way content is distributed, consumed, and monetized.

The implications for the future of adaptive video streaming and content monetization are profound. The integration of smart contracts on blockchain introduces transparency, automation, and efficiency into the monetization process, fundamentally altering traditional models. Microtransactions,

enabled by smart contracts, can lead to a shift in payment paradigms, providing a pay-as-you-go approach that aligns with the evolving preferences of digital consumers.

Decentralized video delivery networks, governed by smart contracts, can reshape the infrastructure of video streaming, potentially reducing latency, enhancing scalability, and fostering community-driven platforms. The concept of decentralized autonomous organizations (DAOs) may empower users and content creators, giving them a more significant role in platform governance and decision-making.

The continued advancements in smart contract technology, along with emerging trends such as NFTs, DeFi integration, and decentralized identity, suggest a dynamic and evolving landscape for adaptive video streaming. As blockchain technology matures and becomes more widely adopted, the synergies with smart contracts are likely to usher in innovative monetization models, personalized content experiences, and enhanced user engagement.

Overall, the implications extend beyond the technical aspects of blockchain and smart contracts, touching upon the democratization of content creation, increased user agency, and the potential for a more inclusive and fair video streaming ecosystem. The future of adaptive video streaming and content monetization appears to be intricately tied to the ongoing evolution of blockchain technology and the creative applications of smart contracts in the digital content landscape.

IX. CONCLUSION

The exploration of adaptive video streaming and content monetization through blockchain and smart contract technologies has provided valuable insights, but the journey is far from complete. A call to action for further research and development in this area is essential to unlock the full potential of these technologies and address existing challenges.

Further research should delve into the user experience aspects of adaptive video streaming enhanced by smart contracts. Understanding how users interact with microtransactions, personalized content recommendations, and the dynamic adjustments in streaming quality based on payments is crucial. User feedback and behavior analysis can provide insights into optimizing the user interface and ensuring a seamless and enjoyable viewing experience.

As microtransactions become a central element in content monetization, researchers need to focus on scalability solutions for blockchain networks. Investigating technologies like layer 2 solutions, sharding, and interoperability protocols can help address the scalability challenges associated with handling a large volume of microtransactions on a blockchain. This will ensure that the system remains efficient and cost-effective even as user engagement and transaction frequency increase.

Research in adaptive video streaming should pay close attention to privacy and security concerns related to user data and transactions. Innovations in privacy-preserving smart contracts, advanced cryptographic techniques, and decentralized identity solutions can contribute to creating a secure and private environment for users. This aspect is

crucial for building trust among users and content creators who may be concerned about the protection of their personal information.

Given the evolving regulatory landscape surrounding blockchain and digital assets, further research should explore the legal and compliance aspects of implementing smart contracts in video streaming. Collaborative efforts between industry stakeholders, legal experts, and policymakers are essential to navigate regulatory challenges and ensure that smart contract implementations comply with existing and emerging regulations.

Encouraging collaboration between industry practitioners and academic researchers is paramount for advancing the field of adaptive video streaming with smart contracts. Industry insights, real-world use cases, and practical challenges can inspire innovative research agendas, while academic rigor can contribute theoretical frameworks, novel algorithms, and methodologies. Joint efforts can lead to the development of practical solutions that bridge the gap between theory and implementation.

In conclusion, a call to action for further research and development in adaptive video streaming with blockchain and smart contracts emphasizes the need for a multidisciplinary approach. Researchers, developers, industry professionals, and policymakers should collaborate to explore new avenues, address technical challenges, and ensure that the integration of smart contracts in video streaming aligns with user expectations, regulatory requirements, and industry standards. By fostering an environment of continuous research and innovation, we can collectively shape the future of adaptive video streaming and content monetization in a blockchain-powered era.

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