Arbitrating smart contract disputes: A comprehensive approach

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Smart contracts, self-executing digital agreements encoded on blockchain networks, have gained significant traction in various industries due to their potential to streamline transactions, reduce costs, and enhance transparency. However, as with any contractual arrangement, disputes can arise, necessitating effective dispute resolution mechanisms. Arbitration emerges as a promising approach to resolving smart contract disputes, offering advantages such as efficiency, flexibility, and enforceability across jurisdictions.

Understanding smart contracts

Smart contracts are computer programs that automatically execute predetermined terms and conditions when specific criteria are met. They operate on blockchain technology, a decentralized and distributed digital ledger that records transactions securely and transparently. Key features of smart contracts include self-execution, immutability (once deployed, the code cannot be altered), and transparency (all transactions are visible on the blockchain).

Smart contracts have diverse applications, ranging from financial instruments like cryptocurrencies and tokenized assets to supply chain management, real estate transactions, and intellectual property rights management. For example, the Ethereum blockchain has enabled the development of decentralized applications and smart contracts

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for various use cases, such as decentralized finance, non-fungible tokens, and decentralized autonomous organizations.

To illustrate a smart contract, consider a simple transaction between Buyer and Seller for 100 blue widgets. Traditionally, the parties would execute a paper agreement reading, in part, "Seller shall deliver to Buyer one hundred (100) blue widgets." A smart contract for the same transaction would read, "function

transferFrom(address _SELLER, address _BUYER, uint256 _100) public returns (bool success) require(_100 <= allowance[_SELLER] [msg.sender]); allowance[_SELLER][msg.sender] -= _100; _transfer(_SELLER, _BUYER, _100); return true". In either case, Seller would then gather the inventory of 100 blue widgets, package it securely, and deliver it to Buyer in exchange for an agreed-upon payment stated in a separate clause or code.

Potential disputes arising from smart contracts

Despite their potential benefits, smart contracts are not immune to disputes. Common sources of disputes in smart contracts include coding errors, ambiguous or incomplete contract terms, external factors (such as changes in regulations or market conditions), and issues related to the underlying blockchain network (e.g., network congestion or security vulnerabili-

ties). Consider the following hypothetical scenario: a smart contract is created to facilitate a real estate transaction between a buyer and a seller. However, due to a coding error, the contract fails to execute properly, leading to a dispute between the parties, or a dispute by a party against the person hired to "draft," or code the contract. This may also implicate insurance coverage issues, adding another layer of complexity.

Resolving such disputes through traditional litigation can be challenging due to the technical complexity of smart contracts, the decentralized nature of blockchain networks, and the potential for jurisdictional conflicts. Consider the scenario above where the Seller is delivering to Buyer one hundred (100) blue widgets. If there are any issues in the smart contract transaction the judge will need to understand and interpret the underlying computer code and the effect of its self-executing nature to come to an appropriate resolution. Thus, even "run-of-the-mill" contract disputes involving smart contract transactions will involve a lot of technical baggage that the judge must be able to unpack in order to efficiently resolve disputes. Traditional legal frameworks are not built for disputes with this level of requisite technological knowledge. Instead, if this dispute is sent to arbitration, the appointed arbitrator can be bi-lingual, and fluent in both English (the law) and Computer Code (the technology).

Benefits of arbitrating smart contract disputes

1. Efficiency and cost-effectiveness: Arbitration proceedings are typically faster and less expensive than litigation, which reduces the time and resources required to resolve disputes. According to a study by the American Arbitration Association, the average time to resolve a commercial arbitration case is around 16 months, compared to several years for litigation. For instance, consider a hypothetical dispute between two companies over a smart contract related to supply chain logistics. In a litigation scenario, the complexities of block-chain evidence could prolong the discovery process, leading to increased costs and time. Arbitration, on the other hand, could expedite this process by using a technical expert as the arbitrator who understands the underlying technology and can swiftly navigate through the specifics of the smart contract, significantly reducing the duration and cost of the dispute resolution.

2. Flexibility and experience: Parties can choose arbitrators with specific technical experience in blockchain technology and smart contracts, allowing a better understanding of the subject matter. This is particularly important given the complex and rapidly evolving nature of the technology. For example, in a dispute involving the execution of a smart contract for real estate transactions, the parties could select an arbitrator who not only has legal experience but also a deep understanding of blockchain technology. This would be advantageous over a traditional judge who may lack the requisite technical knowledge, thereby enhancing the accuracy and relevance of the decision-making process.

3. Confidentiality and privacy: Unlike public court proceedings, arbitration can be conducted privately, protecting sensitive information and trade secrets. This is a significant advantage for businesses operating in competitive markets or dealing with proprietary technologies. Consider a scenario where two tech startups are in a dispute over a smart contract that involves a proprietary algorithm. Arbitration would allow them to resolve their dispute without disclosing the algorithm or other sensitive information in a public forum, thus safeguarding their competitive edge.

4. Enforceability: Arbitral awards are generally enforceable across jurisdictions under the New York Convention, facilitating cross-border enforcement in smart contract disputes involving parties from different countries. As of 2024, the New York Convention has been ratified by 172 countries, indicating widespread recognition of arbitral awards. New York Convention, Contracting States, (last visited Sept. 16, 2024). This global enforceability is crucial, especially in cases involving international transactions, such as a smart contract for international goods trade. Should a dispute arise, the resulting arbitral award can be enforced in nearly any country where the losing party has assets, unlike court judgments which may face significant enforcement challenges abroad.

By focusing on these strengths, arbitration emerges as a particularly suitable and effective mechanism for resolving disputes arising from smart contracts, aligning well with the needs of modern digital commerce and technology-driven transactions.

Designing an arbitration framework for smart contracts

To leverage the benefits of arbitration for smart contract disputes, it is essential to design an appropriate framework. This includes incorporating arbitration clauses into smart-contracts. Smart contract codes can include arbitration clauses specifying the chosen arbitration institution, applicable rules, and procedures for initiating and conducting arbitration. This approach has been advocated by organizations like the JAMS Model Dispute Resolution Clause for Smart Contracts (last visited Sept. 16, 2024), which has developed a standardized arbitration clause for smart contracts.

Parties should carefully select arbitration institutions and rules tailored to smart contract disputes, with familiarity with blockchain technology and the ability to handle complex technical issues. Organizations like JAMS have developed specialized rules and protocols for arbitrating smart contract disputes. *Id.*

Conclusion

As the adoption of smart contracts continues to grow, the need for effective dispute-resolution mechanisms becomes increasingly crucial. Arbitration presents a promising approach to resolving smart contract disputes, offering advantages such as efficiency, flexibility, experience, confidentiality, and enforceability across jurisdictions.

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