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Interoperability Electronic Transactions and Block-chain Technology Security

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Abstract:- *Block-chain technology allows two actors in the system (called nodes) to transact in a peer-to-peer (P2P) network and stores these transactions in a distributed way across the network. The specific purpose aimed to develop to efficiency an interoperability electronic transaction and blockchain technology security to conducted in the quality-oriented approach to education, law, regulation, national strategy, national policy, literary and research policies related both domestically and internationally, including in-depth interviews. From groups with experts on various issues all of these. However, research has been carried out on the analysis and design of the new architecture of the blockchain that will be used for national electronic transaction services.*

Keywords: Interoperability electronic transactions, blockchain technology security.

Introduction

Distributed ledger technology is a technology that facilitates an expanding, chronologically ordered list of cryptographically signed, irrevocable transactional records shared by all participants to the network. Participants with the right access rights can trace back a transactional event, at any point in its history, belonging to any actor in the network. Technology stores transactions in a decentralized way. Value-exchange transactions are to be executed directly between connected peers and verified consensually using algorithms over the network. DLTs address a double-spending problem. Double spending problem refers to the fact that digital information can be copied using the internet e.g., somebody would send a digital asset like a digital paper of ownership of a car to someone else, then there is a risk that the sender sends a copy over the internet and still keeps as the original paper of ownership. (Zhang, P., White, J., Schmidt, D. C., and Lenz, G., 2017)

Traditionally, this risk has been mitigated by having trusted third parties or administrators, like banks, act as centralized authorities keeping track of transactions. This responsibility of validating the actual transfer of the asset to the whole network using carefully designed algorithms. This eliminates the need for a centralized database. Every actor in the network has a copy of the record of transactions, and any change of ownership of the digital assets in the system requires validation from its users. There is no clear consensus on the definition of distributed ledger technologies and blockchain technology. A token is a digital item that represents either the right to perform some operation. The idea of Bitcoin was introduced as a pure peer-to-peer (P2P) electronic transaction network. This network allows for direct financial transactions instead of via a financial institution (Vernadat, F. (2006). Blockchain technology allows two actors in the system (called nodes) to transact in a peer-to-peer (P2P) network and stores these transactions in a distributed way across the network (A. Geraciet et al.1991). It registers the owners of the assets that are transacted and the transaction itself. A transaction is verified by the network by a ‘consensus mechanism’, which allows users in the P2P network to validate the transactions and update the registry in the entire network. A consensus mechanism is used to establish trust in the accuracy of the data in the system which is traditionally established by an intermediary or an administrator in a centralized system. A consensus mechanism is a process by which nodes in a distributed network agree on proposed transactions. This mechanism provides a way to record information in a ledger in a manner that

ensures data integrity, immutability, and consistency. Consensus mechanisms are distributed network governance rules and protocols that enable the recording, completion, and execution of transactions under certain conditions. Therefore, a consensus can be built upon the previous transaction, forming a sequence of transactions, similar to a ledger. Blockchains, multiple transactions are clustered into a block which mathematically refers to the previous block. In the case of Bitcoin, after a set time, a new block is created with the occurred transactions included in the block and validated across the network. This forms a chain of blocks: hence the name 'Blockchain'. The Bitcoin blockchain was the first mechanism that implemented this decentralized, distributed ledger of cryptocurrency transactions-yet many alternatives have been introduced since. While the term "blockchain" refers to a specific technology stack, it is also increasingly used to refer to a loosely combined set of technologies and processes that span middleware, database, security, analytics/artificial intelligence (AI), and monetary and identity management concepts. Blockchain is becoming the common shorthand for a diverse collection of distributed ledger products (Tasca, P., and Tessone, C. J. . 2017). Another key feature leveraged by multiple blockchains is smart contracts. Smart contracts are pieces of software that execute a specified action based on the state of the system or a transaction that occurs. Smart contracts operate on a decentralized ledger. They are independent of human intervention and execute automatically. Smart contracts can be seen as private regulatory frameworks a system of rules that govern transactions between interested parties. Once established, smart contracts are irrevocable and binding, triggering, yet unresolved, the problem of handling damages caused by improper operation or errors in code. As stated earlier, blockchain technology is the most commonly known distributed ledger technology.

This report looks at the ongoing exploration of blockchain technology by governments. Ongoing the research bring incremental rather than fundamental changes to the operational capacities of governments. Nevertheless, some of them propose a clear value for citizens. The technological and ecosystem maturity of distributed ledgers have to increase to unlock the transformative power of blockchain. policy agenda should focus on non-technological barriers, such as incompatibility between blockchain-based solutions and existing legal and organizational frameworks. Blockchain technology architecture on electronic interoperability transactions by adapting technology to legacy systems. It requires using the transformative power of blockchain used to create new processes, organizations, structures, and standards. Research objectives in two mains were followed:

a) For analyzed the approach for the development of the architectural framework for electronic transaction document interoperability of Thailand and abroad.

b) For developing an architecture for interoperability electronic transactions documents that are highly efficient and secure with Blockchain for supporting the development of a sustainable digital economy in Thailand.

Literature reviews

A Blockchain Technology

Blockchain is the most well-known and used distributed ledger technology. Blockchain is the type of ledger in which value-exchange transactions (in the form of cryptocurrencies, tokens, or information) are sequentially grouped into blocks. Each block contains a signature that is based on the exact content (a string of data) of that block. The next block contains this signature as well, linking all previous blocks to each other up until the first block. Blocks are immutably recorded across a peer-to-peer network, using cryptographic trust and assurance mechanisms. Cryptocurrencies are a decentralized subset of digital currencies, based on a set

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of algorithms and protocols that enable a peer-to-peer, cryptographically based payment mechanism, a medium of exchange, and a store of value, the best-known example being bitcoin (Alqassem, I., and Svetinovic, D. 2014). A token is a digital item that represents either the right to perform some operation or a physical object of value. Key benefits of blockchain technology offer new algorithm-based mechanisms to establish and manage trust across entities. As the cost of providing algorithmic trust is likely to be much lower, these technologies can be impactful for interactions between citizens, businesses, and governments. Real-life transactions typically suffer from a huge trust deficit and in most cases require costly monitoring, reputation checks, or third-party intermediation. The technical characteristics of blockchain present several key generic benefits that are widely regarded to occur in most domains (Zheng, Z., Xie, S., Dai, H., Chen, X., and Wang, H. 2017) were followed:

a) Distributed ledger shares content across multiple parties. This shared nature makes transactions easily tractable and fully dis-closable even in large and complex ecosystems.

b) Physical decentralization of the storage of transaction details is argued to provide security integrated into the design of the technology stack. This feature eliminates the risk of a single point of failure, where one node is critical for the operation of the network and vulnerable to cyber-attacks.

c) New entries are recorded in an append-only manner and linked to the previous transactions. The entries cannot be changed, which safeguards data integrity on the ledger.

d) Transactions are verified via a peer-to-peer consensus mechanism ensuring a common truthful ledger. Centralized parties are no longer needed to assure transaction validity. Consequently, blockchain shifts power from an intermediary towards the ecosystem. This decentralization of control and power establishes ownership of the nodes and introduces checks and balances ingrained in the technology stack.

e) Combination of a distributed, append-only ledger and a consensus mechanism is argued to present disintermediation: the elimination of middlemen or brokers and removing any middlemen or broker-related transaction costs.

Significantly Blockchain and Digital Objects

At their core, blockchains are decentralized databases maintained by a network of computers. Blockchain technology enables the digital representation of assets and their secure transfer of value (Zheng, Z., Xie, S., Dai, H., Chen, X., and Wang, H. 2017). By design, the security of the value transfer is guaranteed by the interaction protocol itself and obviates the need for trusted transaction intermediaries. Bitcoin has emerged as the first blockchain application of a decentralized crypto-currency system (Tasca, P., and Tessone, C. J. . 2017). Even though Bitcoin blockchain was implemented as a decentralized currency system, the application is, in fact, a software system that executes a scripting language in a distributed environment. To think beyond the payment system required new developments in the technology itself which led to the development of the Ethereum project (Kruijff, J. De, and Weigand, H. 2017). Ethereum was developed as a platform that could run programmed applications on the blockchain through smart contracts. Thus, it created a wide variety of decentralized applications which opened the technology to the possibility of digital assets and tokens (Stapleset, M. et al. 2017). With the ability to tokenize and decentralize not only cryptocurrency but also other scarce assets the blockchain technology significantly expanded its disruptive potential. Blockchain technology offers a verifiable way to track digital transactions. This makes this technology useful for digital asset management systems. Such functionality offers the storage and transacting of crypto-assets (Chen, D. 2006). This is a use case where a system holds a crypto asset and the user will be able to transfer the asset between

systems. Blockchain also allows crypto assets to be distributed while protecting them from being copied. Thus, the technology is useful to track assets as they move through the systems in a distributed environment (Buterin, V. 2016). The advantage of a low transaction fee and not having to rely on a single entity are the main benefits of this technology.

Blockchain Technology Architecture with Digital Government Publics

Digital government publics are the former, much narrower, the concept of e-government acknowledged the role of digitalization as an input or enabler of modernization of the public administration. Digital government publics take a step ahead and focus on the provision of user-centric, agile, and innovative public services. These services and service delivery models should leverage digital technologies and governmental and citizen information assets. Blockchain is one of the most innovative digital technologies that have to be considered under the new paradigm of governmental policymaking and service delivery. The main benefits of applying blockchain technology architecture on electronic interoperability transactions for efficiency and security to be: (a) reduced economic costs, time, and complexity in inter-governmental and public-private information exchanges that enhance the administrative function of governments, (b) reduction of bureaucracy, discretionary power and corruption, induced by the use of distributed ledgers and programmable smart contracts, (c) increased automation, transparency, auditability, and accountability of information in governmental registries for the benefit of citizens, (d) increased trust of citizens and companies in governmental processes and recordkeeping driven by the use of algorithms which are no longer under the sole control of government publics (Alipour-Hafezi, M., Horri, A., Shiri, A., and Ghaebi, A. 2010). In the context of blockchain technology architecture with digital government, the public has the potential of facilitating direct interactions between public institutions, citizens, and economic agents. At the most basic level, this implies improved public services in information registration and exchange processes. Is it a combination of several existing, but distant, technologies that form a new decentralized information infrastructure? Decentralization of blockchains is the core feature that can reshape the way governments interact with citizens and with each other (Chen, D., Doumeingts, G., and Vernadat, F. 2008). Blockchain technology architecture could take away a large part of the administrative tasks that fulfill in Government publics possibly do not have to provide, on their own, information storage and information exchange processes to facilitate economic activities in societies, as this could be provided by the blockchain protocol.

Methodology

This research is qualitative research both to participatory action learning for the qualitative data a review of documentary including in-depth interviews to analyzed the architecture development of efficiency interoperability electronic transactions and Blockchain technology security. From groups with experts on various issues all of these. However, research has been carried out on the analysis and design of the new architecture of the Blockchain that will be used for national electronic transaction services. were to data method.

Sampling Method

The results sampling method that will be used in this study with 25 experts were interoperability electronic transactions, organization architectures, cyber security, blockchain technology, digital economy, and chief information officer. There all were purposive sampling and focus groups.

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Collection Method

Respondents were asked to respond to the qualitative data employed a review of documentary to conducted in the quality-oriented approach to education, law, regulation, national strategy, national policy, literary and research policies related both domestically and internationally, including in-depth interviews by an interview with experts were interoperability electronic transactions, organization architectures, cyber security, blockchain technology, digital economy, and chief information officer into the instrument study are perceived for participatory action learning of the data.

Data Analysis

The purpose of the data analysis for qualitative data was analyzed by using three main stages, i.e., data reduction, data organization, data interpretation to the conclusion.

The results

1. Approach for development of an architectural framework for electronic transaction document interoperability of Thailand and abroad were to;

1.1 European Union countries (EU) that to develop of inter-transaction electronic transactions under Europeans Interoperability Framework(EIF) there are the architecture framework consists of 4 steps including the political awareness and understanding, recognition at the organization level, recognition of the flats to be built and use of technology focuses on systematic working to covers risk management based on the factors as people, process, and technology.

1.2 Commercial facilitation center and united nations electronic trend (UN/CEFACT) to encourage the development and transition to the exchange of electronic transactions, which is a prototype for developing a national single window in Thailand.

1.3 The projects of government data center and cloud service (GDCC) to a goal for achieving centralized virtual server hosting services that meet standards and highest security for government agencies that are not ready for data center care and lack of personnel.

1.4 Developing blockchain as a reliable technology.

1.5 Fundamentals of cyber security were confidentiality, integrity, and availability.

2. Developing architecture for interoperability electronic transactions documents that are highly efficient and secure with Blockchain for supporting the development of a sustainable digital economy in Thailand at a “key” of 4th architecture frameworks were followed:

2.1 Blockchain qualification in bringing the system to work with the electronic transaction switching architecture of NSW system and THAILAND GATEWAY concept with government networks of all sectors to shown in figure 1.

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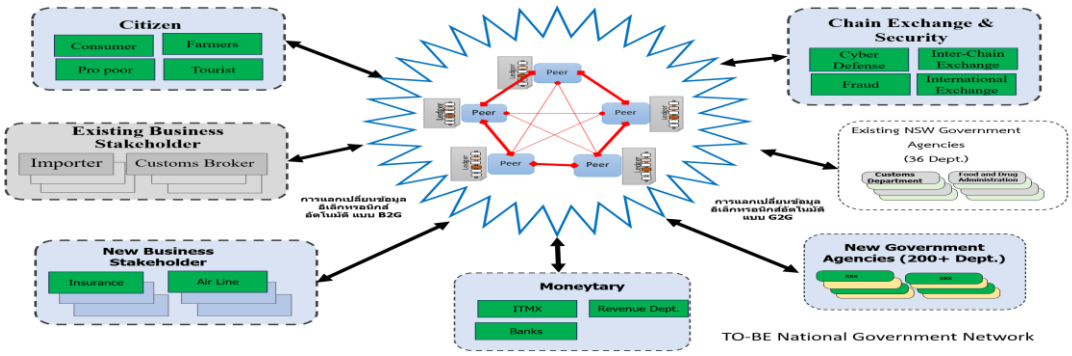

Figure 1. Blockchain qualification in bringing the system to work with the electronic transaction switching architecture of NSW system and THAILAND GATEWAY concept with Government networks of all sectors

Blockchain qualification in bringing the system to work with the electronic transaction switching architecture of NSW system and THAILAND GATEWAY concept with Government networks of all sectors that using TOGAF was the organization architecture frameworks, which a developing process of Architecture Development Method (ADM) in 9th step development cycle.

2.2 Electronic transaction switching architecture with document delivery process through the blockchain networks and basic mechanisms for shifting electronic documents with intermediary switching model that uses data encryption to shown on figure 2.

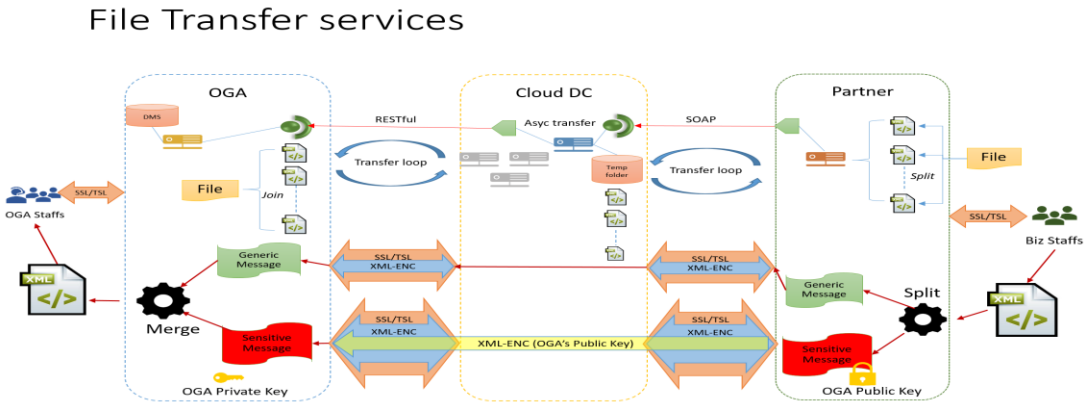

Figure 2. Electronic transaction switching architecture with document delivery process through the blockchain networks and basic mechanisms for shifting electronic documents with intermediary switching model that uses data encryption**.**

Electronic transaction switching architecture with document delivery process through the blockchain networks and basic mechanisms for shifting electronic documents with intermediary switching model that uses data encryption to important processes and procedures for sending files between each other that needs to support large data files which are unable to use general news delivery mechanisms of a "Key" process include a cutting the large data files to enough the small parts for will be used to the general messages, sending each sub-data files of Asynchronous from continuous transmission by general data transmission mechanism, compile the file back to the original file.

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2.3 Using XML Envelope together with the coding of Base 64 and using XML Envelope with coding XML to standard according to XML-ENC to shown in figure 3.

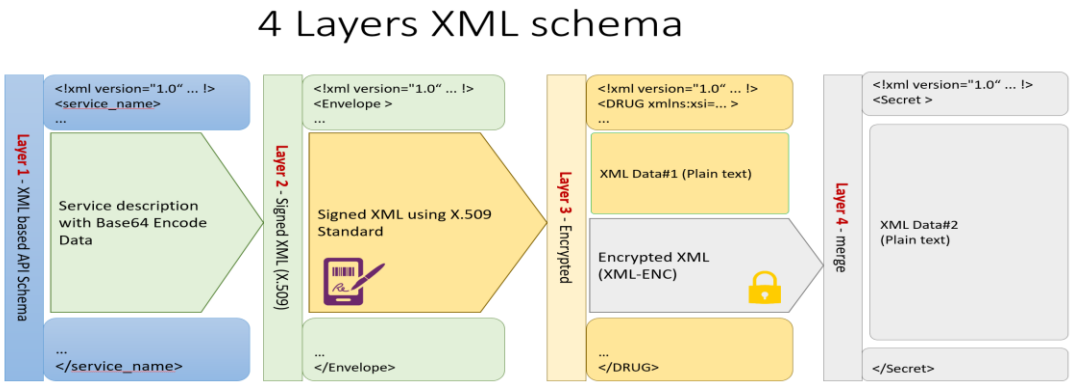

Figure 3. Using XML Envelope together with the coding of Base 64 and using XML Envelope with coding XML to standard according to XML-ENC

Using XML Envelope together with the coding of Base 64 and using XML Envelope with coding XML to standard according to XML-ENC from sent to the messages in XML documents system of 4th layers as following:

a) The outer layer is the layer that specifies. Also, a class is not open to anyone who can send and receive information because for must be used to deliver documents to the destination.

b) The data layers used to confirm senders such as the electronic signature of senders, etc.

c) Data layers that don't need encryption, this layer is like a data of postcard which are parts of non-confidential information to intermediary in delivery can see the content of this layers.

d) Data encoded step by Receiver's public key must be worn of Receiver's private key for decoding.

2.4 Networks usage NSW joins the new blockchain networks with networks consisting of many protocols to connect with external a single API and architectural framework factors of electronic document switching blockchain technology to show in figure 4.

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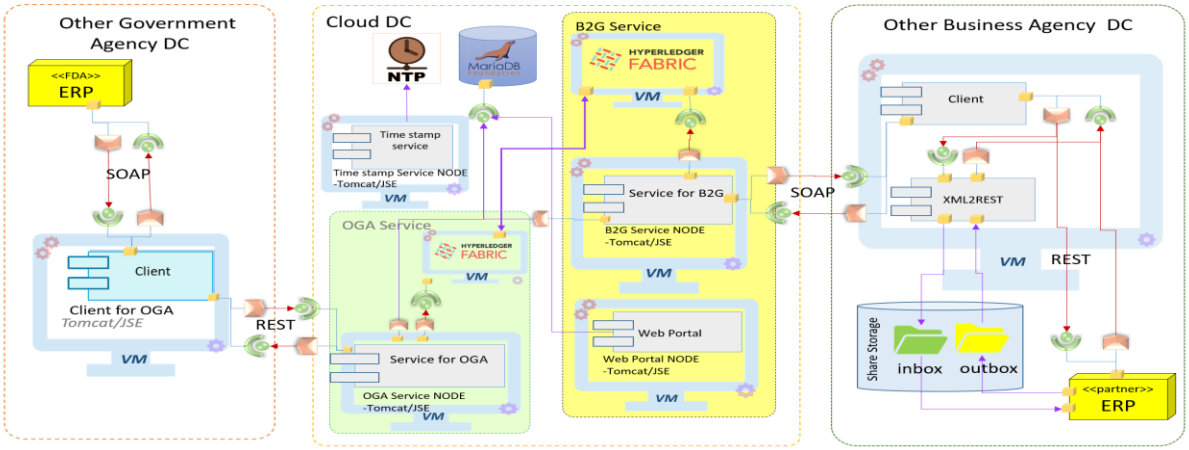

Figure 4. Networks usage NSW join the new blockchain networks with networks consisting of many protocols to connect with external a single API and architectural framework factors of electronic document switching blockchain technology

Networks usage NSW join the new blockchain networks with networks consisting of many protocols to connect with external a single API and architectural framework factors of electronic document switching blockchain technology to "Key" factors were followed:

a) Datacenter of organization government agreement (OGA) to transaction provided of system component as process transactions of ERP, and interface which serves to send data of the networks.

b) Data Center of business sector user/request for the services which has connections that use REST and use connections using data files of inbox/outbox.

c) Data Center of intermediary data transmission service providers including blockchain database, web portal for providing member services, connection to OGA and business sector, database management system, and time stamp service.

Discussion

Developing architecture for interoperability electronic transactions documents that are highly efficient and secure with Blockchain for supporting the development of a sustainable digital economy in Thailand at a "key" of 4th architecture frameworks including the blockchain qualification in bringing the system to work with the electronic transaction switching architecture of NSW system and THAILAND GATEWAY concept with government networks of all sectors, electronic transaction switching architecture with document delivery process through the blockchain networks and basic mechanisms for shifting electronic documents with intermediary switching model that uses data encryption, using XML Envelope together with coding of Base 64 and using XML Envelope with coding XML to standard according XML-ENC, the networks usage NSW join the new blockchain networks with networks consisting of many protocols to connection with external a single API and architectural framework factors of electronic document switching blockchain technology, there are the intermediary data transmission service providers including blockchain database, web portal for provide member services, connection to OGA and business sector, database management system, and time stamp service that interoperability refers to the ability of two or more systems to provide service or accept service from the other system and to utilize the service of a common exchange effectively together (Tasca, P., and Tessone, C. J. . 2017). The linkage should allow these

connected systems to exchange data accurately, effectively, and consistently. That means the application that operates on each system must understand the functionality, which is available for the other system. Software-level interoperability is essential since it allows information to be shared without an intermediary. Furthermore, a common standard will enhance the possibility of in-built interoperability (Chen, D., Doumeingts, G., and Vernadat, F. 2008). For a blockchain technology-based system, interoperability refers to cross-communication between different blockchains that enables to exchange or retrieve information or values. This deals with information obtained from another system and makes a change to the state of that system based on the received information. However, inherently the blockchain is an 'append only' model, and the state can only be appended through transactions, by nodes within its network using their consensus mechanism (Hui, Y. 2012). Therefore, here the underlying assumption is that "cross-communication is not intended to make direct state changes to another blockchain system. Instead, a cross-communication should trigger some set of functionalities on the other system that expected to operate within its network", as an example, verifying the authenticity of information requested within its network. However, for the process of interoperability cross-communication remains a challenge - because interoperability requires the integration of different interlinked information sources. Interoperability approaches aim to address interoperability barriers however, we must consider how these barriers are removed (Kruijff, J. De, and Weigand, H. 2017). Because some approaches may lead the system to change its security model. Considering the decentralized nature of the architecture, where multiple nodes participate in the process to reach finality, nodes must retain the same result. For that, nodes must have or be given the information to process the transaction. If the nodes are set to fetch data from other blockchain systems, the dynamic nature of values would interfere with the consensus. Therefore, the exchange process must be carefully designed following the system goal. This leads to the interoperability focusing on two types of approaches: centralized and decentralized.

Conclusion

Architecture development of efficiency interoperability electronic transactions and Blockchain technology security that the fundamentals of cyber security were confidential, integrity, and availability as developing architecture for interoperability electronic transactions documents that are highly efficient and secure with Blockchain for supporting the development of a sustainable digital economy in Thailand at a "key" of 4th architecture frameworks including the blockchain qualification in bringing the system to work with the electronic transaction switching architecture of NSW system and THAILAND GATEWAY concept with government networks of all sectors, electronic transaction switching architecture with document delivery process through the blockchain networks and basic mechanisms for shifting electronic documents with intermediary switching model that uses data encryption, using XML Envelope together with coding of Base 64 and using XML Envelope with coding XML to standard according XML-ENC, the networks usage NSW join the new blockchain networks with networks consisting of many protocols to connection with external a single API and architectural framework factors of electronic document switching blockchain technology.

Implementation: Blockchain technology offers a verifiable way to track digital transactions. This makes this technology useful for digital asset management systems. Such functionality offers the storage and transacting of crypto assets.

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