



A Market Overview of Custody for Digital Assets

Digital Custodian Whitepaper

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Foreword

The growth of the digital assets market has been indisputable with the industry's estimated value reaching US\$ 239 bn, as measured by total cryptocurrency market capitalisation. Digital assets are already disrupting traditional financial services, and they have a key role to play in the future growth of the sector. Financial market participants and regulators of financial services will need to carefully consider digital assets in their strategic objectives before mainstream adoption. The Dubai International Financial Center (DIFC) and the Dubai Financial Services Authority (DFSA), together with financial services advisory firms such as Deloitte, are already adapting our business and supervisory practices to incorporate thought leadership in this exciting area of growth.

The DIFC, as the leading financial services hub for the region, is seeing continued and growing interest in digital assets. The DFSA welcomes this development in its renewed focus to promote the future of finance while ensuring consumers have appropriate protections and financial stability is safeguarded. Buy-in from institutional investors, financial institutions and the general day-to-day investor is the key enabler to unlock the next level of digital asset adoption. Instilling confidence in digital assets will be necessary to attract these investor groups and the role of digital asset custodians will be critical to achieve this.

Unlike traditional financial services products and providers who had years to define how the products and solutions operate, digital assets and their custody is still a nascent market. There are currently many options with differing approaches and strategies particularly relating to keeping the assets safe. As the market evolves, a common approach to custody should emerge, but will require close collaboration between the key market participants; primarily the regulators, providers and consumers.

The role of a regulator should be to encourage innovation whilst balancing the need to protect customers and maintaining financial stability. Therefore to support the journey towards collaboration the DFSA and Deloitte have developed this discussion paper which aims to scope the current digital custody landscape, the market solutions currently available, and the challenges and uncertainties the industry faces.

In the longer term, it is crucial for the development of well-structured and safe digital assets that digital custody develops and becomes trustworthy, accessible, affordable, and reliable.

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Custodians are critical to the widespread adoption of digital assets

The increasing interest in digital assets from both retail and institutional investors has given rise to the growth of custody options. As the market evolves, various types of custody options have emerged and new providers are seeking to establish the structures and controls that work best in their markets and for their propositions. With changing definitions and evolving structures, it is uncertain whether the current regulatory frameworks are applicable to custodians and whether additional controls should be added to existing frameworks.

With a growing user base that continues to find new use cases for the technology and service, there is an increasing global demand for suitable custodian options to help manage the use of digital assets. The emergence of the custodians is to be applauded as it is one of the key components in maintaining the growth and adoption of digital assets. However globally there are differing levels of clarity on the applicability of existing regulations towards the custody of digital assets which may potentially impede the development of globalised custodian options.

Given the uncertainty around their structures and evolving regulatory response to digital asset custody, this paper will seek to provide an overview of the digital custodian market. It will aim to facilitate a common understanding of what constitutes a custodian, provide an overview of the developments and challenges in the custodian market and explore the challenges and developments of regulations of custodians. However before investigating the custodians it is important to understand what it is they are storing.

What are digital assets?

The International Monetary Fund (IMF) defines digital assets as “digital representations of value, made possible by advances in cryptography and distributed ledger technology. They are denominated in their own units of account and can be transferred from peer-to-peer without an intermediary.” In simple terms, digital assets are assets that exist virtually, making them intangible but many are increasingly being linked to real world assets. While there is no universally accepted definition of digital assets, for the purposes of this paper digital assets have been broken down into five distinct categories.

Categories of digital assets



Security tokens

These are tokens of special characteristics that are similar to traditional instruments like shares, debentures or units in a collective investment scheme.
Example: **Science Blockchain token**



Utility tokens

Digital tokens seek to provide value to investors by giving them access to a future product or service. For example, a startup may develop a digital product/service and issue utility tokens to investors. Investors may then use those tokens at some future time, to obtain access to the issuers products/service.
Example: **Filecoin**



Cryptocurrencies (or exchange tokens)

Cryptocurrencies are the most common type of digital asset, and they use cryptography for security, designed to work as a medium of exchange.
Example: **Bitcoin**



E-Money tokens

These are tokens that are designed to function as a form of electronic money that represent a claim on the issuer, are issued on receipt of funds for the purpose of making payment transactions, and are accepted by a person other than the issuer.
Example: **Libra**



Stablecoins

Stablecoins are digital assets that attempt to stabilize its volatility by typically pegging themselves to a stable asset such as the US Dollar or gold. They are slowly gaining traction with investors who favour security over high returns.
Example: **Gemini dollar**

*Source: FCA Guidance on Cryptoassets – Feedback and Final Guidance to CP 19/3

The digital asset market is currently valued over US\$ 239bn, as measured by total cryptocurrency market capitalisation, with this figure only looking set to rise further as the adoption of these assets becomes commonplace. Although this figure represents a market that is still very much in its infancy, the early asset custody providers are beginning to build a burgeoning global landscape, hence why the need to agree an appropriate regulatory regime is becoming increasingly necessary.

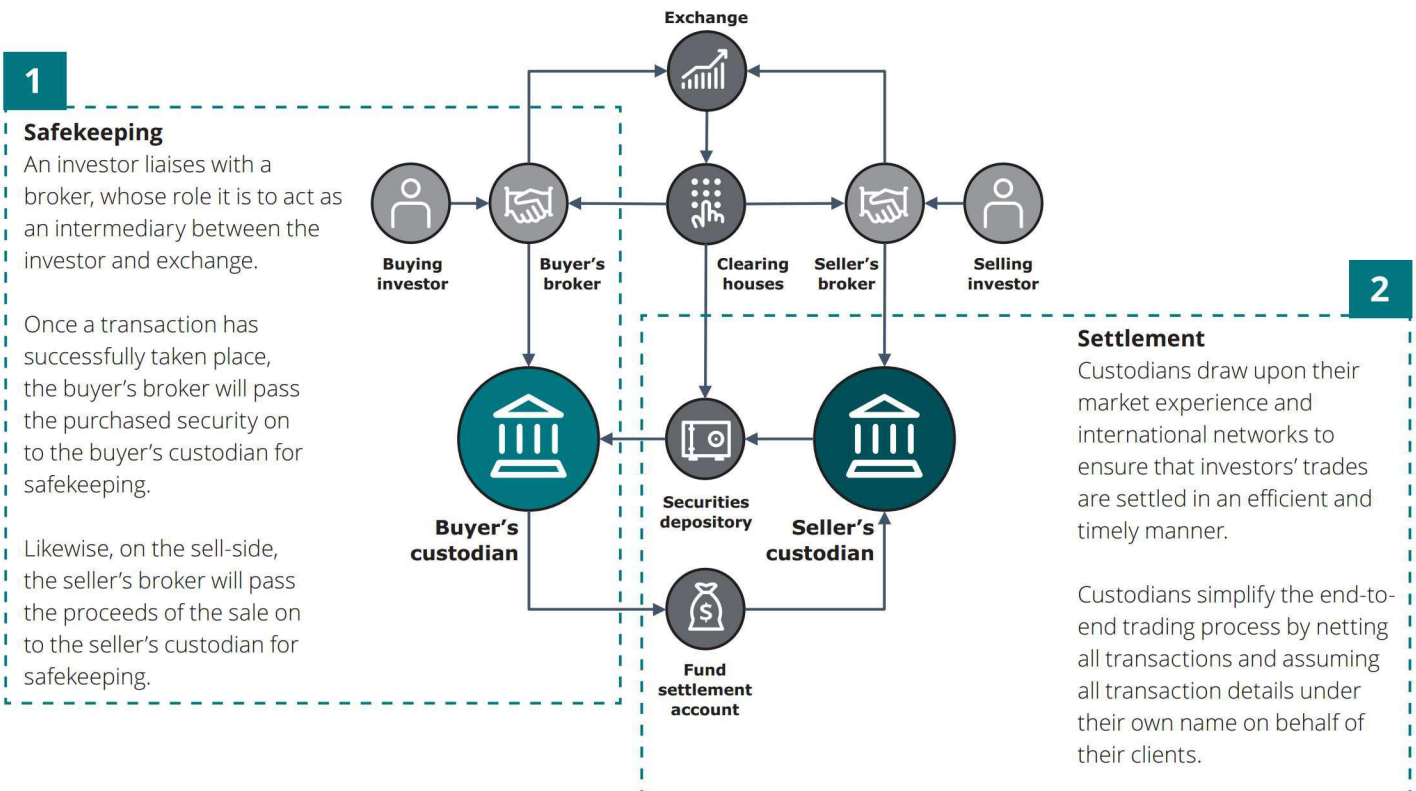
Before discussing the regulatory considerations, it is important to understand the role of custodians in the market.

The methods of a traditional custodian may need to be updated to cater for the unique features of digital assets.

Asset custodianship

To define custodianship, it is worth looking at it within the context of traditional capital markets. Generally speaking, custodians are institutions that provide customers with an array of financial services including the likes of trade settlement, exchange, clearing, and corporate action execution. However, one of their most notable roles is in the safekeeping of investors' assets. Custodians are like 'vaults', holding investors' assets in both electronic and physical form, charging investors a fee in exchange for maintaining them securely. They enter into agreements with investors, whereby the asset remains temporarily in the custodian's safekeeping, subsequently being returned to the investor upon request. Custodians harness their market expertise to minimise the risk of fraud, theft or loss to those assets.

The figure below depicts the complex interactions between various parties within traditional capital markets. Within this framework, custodians play a vital role in facilitating the safekeeping of investor's assets, and ensuring market efficiency.



Digital asset custodians

In the digital asset space, custodians operate in a similar fashion to traditional financial markets in that their primary role remains the responsibility for, and the safekeeping of customer's digital assets. This is achieved through safe key management, which allows the assets to be cryptographically secured. However, unlike for traditional assets, an entity has custody of a digital asset simply by holding the private key on behalf of the asset holder, ensuring that it cannot be accessed by any other party. Limiting access to private keys is paramount, particularly given that most transactions, depending on the type of Distributed Ledger Technology (DLT) used, are likely irreversible. Moreover, if a key is lost or stolen, recovery of a digital asset by its rightful owner may be difficult unless the digital asset is a representation of an actual asset e.g. a security token offering, where an actual asset may remain secure and a new token or digital asset can be issued.

The security of any asset is a key consideration for any investor and plays a key role in entrusting the asset to a custodian. Fortunately, digital assets have inherent security features that can provide a level of protection. Firstly, the assets are usually reflected on distributed ledgers in the form of random binary digits (which represent a series of characters in decimal, hexadecimal or some other numeral system). This provides security for a transaction because the record of transfers are secured on an independent ledger which is difficult to alter. Secondly, protection exists over the use of the asset in that they can only be accessed via public and private keys. These keys enable the investor to use the digital asset.



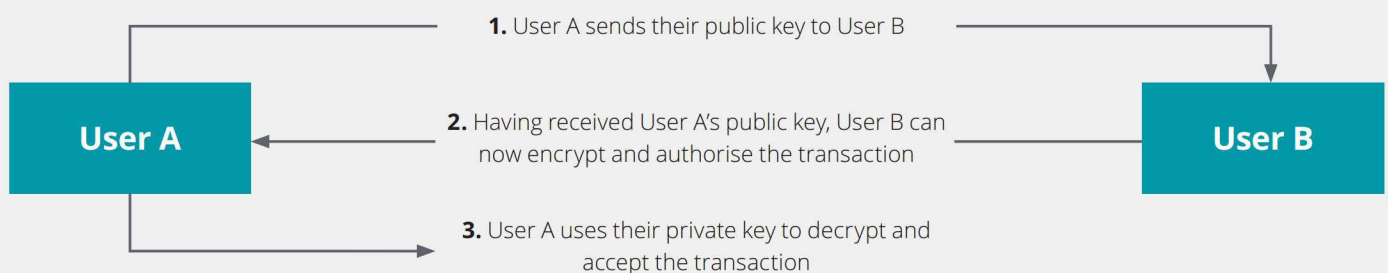
A **private key** is essentially a randomly generated binary number that is used to encrypt and decrypt information, and is only made available to the originator of the encrypted content. Subsequently, this private key is all that is required to confirm a transaction.



A **public key** is essentially a long numeric code that is cryptographically derived from a specific private key. The public key is available to many, and is available in an online directory. The public key must be paired with the correct, corresponding private key for a transaction to be executed.

How does public key cryptography work?

If two parties want to transact, public key cryptography begins by allowing each party within a transaction to create two distinct keys, a public key and a private key. These keys are connected to one another.



Options for digital custody

A number of custody options are available today, both to individual investors and institutional players, with each having its own benefits and disadvantages.



Self custody

These may include hardware, software or paper wallets, where the digital asset investor uses software, hardware (e.g. a USB device), or simply a piece of paper to store private keys.

Pros

- Relatively secure
- Greater control

Cons

- Burden of responsibility for asset
- More susceptible to hacking or loss of assets



Exchange wallets

Solutions where the investor gives control and management of public and private keys to an exchange, but maintains access via an online wallet. The exchange holds possession of private keys, and by extension, the digital asset itself.

Pros

- Simple
- Ease of access

Cons

- Counterparty risk
- Commingling



Third party custodian

A service provider that stores digital assets on behalf of customers using clearly defined features and controls to provide certainty over the safekeeping of the asset. Typically, this solution is designed for institutional investors, and will therefore implement institutional grade security and insurance.

Pros

- Clearly defined rules
- Flexibility
- More secure and likely to be insured

Cons

- Cost for retail use
- Regulatory uncertainty

Custodians safeguard digital assets by ensuring that investors' private keys are maintained securely. This is achieved by either storing the assets online, a method called hot storage, or offline, known as cold storage, or through a multiple approval approach, known as multi-signature and smart contract wallets.

1. Hot storage	2. Cold storage	3. Multi-signature wallet	4. Smart contract wallet
Online custodianship	No internet connectivity	Online custodianship	Custody of smart contract tokens e.g. Ethereum
Access the asset via a digital private key	Private key to access digital wallet stored offline	Multiple approvals required for transactions	Online custodianship
Increased ease of access to the digital asset	Adds a manual aspect to accessing assets	'De-centralised' wallet that can be accessed by multiple users	Controlled by code and a master account private key
Increased vulnerability to hackers	Reduced onset of fraud and risk of being hacked	Additional level of security to access the assets	Wallets are customisable unlike accounts

The growing importance of digital asset custodians

A key feature shared by almost all market participants globally, ranging from single investors, to some of the largest institutional investors, is the desire for asset security and ease of transacting. Custodians play a vital role in facilitating these goals.

While the digital asset market continues to grow, there is an ever increasing volume of digital assets flowing through the financial system. Individuals and institutions therefore begin to accumulate digital assets that exhibit significant value, thus safeguarding of these assets begins to take on greater priority. Furthermore, the very nature of digital assets means that they are more vulnerable than traditional assets, which is why we are beginning to see a rise in the prominence of digital asset custodians.

As the digital asset market continues to grow, the role of custodians to maintain the safekeeping of these assets is becoming ever more important.

Some of the key reasons why the custody of digital assets is becoming increasingly important are:

1. **Reduced risk and complication:** From an investor's perspective, storing your assets with a custodian can be significantly easier than taking care of your own assets. All investors, regardless of invested amounts, can benefit from ease of use, increased security and overall reduction of risk that using a custodian provides.
2. **Increased security:** The online nature of digital assets presents an array of security risks, not least a vulnerability to hackers. However, custodians should have the necessary resources to mitigating these risks, thereby providing investors with a safe and regulated storage platform for their digital assets.
3. **Recourse for investors:** If investors hold assets privately or with unlicensed custodians they have increased risk of losing the asset value in the case of loss from hacking or other loss leading events. Meanwhile, licensed custodians can provide a level of certainty of value through recourse in the event of failure at the custodian, and are also more likely to have access to trusted insurers, helping to provide investors with greater comfort.
4. **Safer than exchanges:** The alternative of storing digital assets on an exchange presents greater risks because of the higher possibility of exchanges being targeted by hackers given most of them co-mingle the assets and store assets with significantly higher value. Exchanges are also more susceptible to going bankrupt or being shut down by authorities.
5. **Operational efficiency:** Potential investors in digital assets may be detracted by the perceived complex nature of the market. However, custodians can leverage their technology and regulatory expertise to provide investors with a greater sense of comfort and encourage increased market participation.

The challenges facing digital asset custodians

One of the key challenges currently facing digital asset custodians is striking the correct balance between usability and safety. Digital asset transactions are multi-stage processes. They need to be conducted with maximum efficiency, whilst ensuring that no potentially fatal errors, such as the loss or theft of assets, occur. This dilemma for custodians is arguably best represented in deciding whether to offer cold storage or hot storage solutions:

- Hot storage solutions increase the ease of access to the digital assets. However, they also face greater vulnerability to hackers, given their online nature. Additionally, online custodians often restrict access to the private key. The drawback of this approach is in the event of a shutdown or failure, the investor's entire portfolio could be lost. The key benefit of hot storage is also its key challenge. Its connectivity to the internet provides it with the convenience element but also leaves it vulnerable to cyber security threats.
- Cold storage solutions will typically maximise security by holding private keys offline, reducing susceptibility to hacking. However the offline nature of the solution means it is not a convenient user experience. Additionally, cold storage solutions often use archaic mechanisms such as providing keys on a printable piece of paper. This increases risk because if destroyed, access to the asset is lost too.

Cyber security is another challenge given the online nature of digital assets and their increased vulnerability to hackers. According to Coindesk, there has been a 13-fold increase in the amount stolen from cryptocurrency exchanges between 2017 and 2018, a figure that stands at almost US\$ 2.7 m per day. If these cyber security issues are not managed effectively, then this figure will likely continue to rise, especially as hackers' methods grow in complexity. In particular, custodians with a high Value of Assets under custody, and large volume of transactions, may be more susceptible to cyber threats.

In response, custodians are prioritising both the development of necessary risk controls and utilising various insurance options to protect against the challenges associated with custodianship of assets, which can be both costly and onerous.

Ultimately the success of a custodian comes down to trust and whether the investors trust the custodian with their asset(s). Therefore demonstrating safety, stability and certainty is crucial. Clearly, custodians are developing propositions to try meet these objectives however they are not in control of all the market conditions. For example, regulators play a role in providing certainty to investors. Unfortunately, a definitive regulatory landscape for digital assets is still emerging.

Despite the considerable global interest in digital assets and their custodianship in recent years, this growth has not been without its fair share of challenges and skeptics.



Value of Assets under Custody

As the value of a custodian's Assets under Custody (AuC) rises, the profile of the custodian subsequently rises. Hackers become more likely to target them, putting the AuC at risk.



Volume of transactions

The more active the use of digital assets by a custodian, the more susceptible those assets become to being compromised.

The regulatory landscape

In the current setting, consumers and investors are increasingly open to exploring opportunities in new and emerging technologies. Usually, early adopters pioneer new technologies until mainstream consumers realise the opportunity for them and seek to tap into the market.

Digital assets appear to have reached the mainstream, and now the consumer requires the market to demonstrate more certainty and reduced risk, otherwise enthusiasm and adoption could waiver. Currently, within the digital assets regulatory landscape, there is uncertainty whether the existing custodial framework is fit for purpose to accommodate digital assets, or if there is a need to put in additional systems and controls to address some of the other risks that arise due to the nature of these assets.

At present, the digital asset regulatory landscape is characterised by uncertainty on whether existing custodial frameworks are applicable to digital assets.

Below we outline some of the current considerations relating to the regulation of digital assets and the custody of them:

Safety of the asset: Custodians are trusted with the security of the asset delegated to them. With traditional assets like gold, this a straightforward task - simply put the asset in a physical safe. However with the digital assets, custody becomes far more complicated. The ownership and use of the asset centers on asset owners providing full control of the asset, therefore handing the private key data to the custodian. This creates questions for regulators: Is the consumer protected in this scenario? How can the custodian provide certainty of security with the hot storage option? Will security measures in place now be suitable to combat future security threats?

Classification of the digital asset; is it a security, commodity, currency or other? The way a digital asset is classified from a regulatory perspective is of interest to a custodian because it will determine the regulatory approach to follow and the regulations to be mindful of. However, the definition and classification of a digital asset is uncertain, as there is no universal approach being taken. Recent work undertaken by the Financial Stability Board, the Basel Committee and the Financial Stability Institute (and by many other standard setters and international bodies) illustrates the differences across various jurisdictions. This has led to uncertainty in regard to the applicable regulatory requirements. With conflicting thoughts across jurisdictions, classification of the digital asset is very much an evolutionary thinking.

The challenge for custodians, especially custodians with a global ambition/footprint, is that interpretations and applicable regulations vary from jurisdiction to jurisdiction. Different regimes take a different view point or no view point on how to treat a digital asset. As a consequence, custodians are left to deal with the challenge of identifying the applicable regulatory requirements.

Next steps

The burgeoning digital asset market means there will be a growing demand for secure and trusted custodian services and each participant such as regulators, custodians and investors can play a key role in developing the security and stability of the custody sector.

The regulator

Consumers and market participants are looking to the regulator to provide certainty and clarity, but it requires thought leadership and global co-ordination which will take time to achieve. KYC, AML and CTF regulatory requirements should be applicable regardless of the digital or traditional nature of the asset, and adherence to these rules should be the focus for any incumbent and new digital asset based applicant.

In addition, regulators should seek to embed ethical principles, which are ingrained into traditional financial services, into the custody market. Regulators can promote the embedding of ethical principles by requiring prospective custodians to provide proper standards of service to clients, comply with known legal and regulatory obligations, comply with proper governance and risk principles and seek to protect investor's financial and personal interests at all opportunities.

As seen in other sectors, regulators could seek to provide consumers and other market participants with greater clarity and knowledge about the custodian industry and the minimum required compliance standards.

The custodian

The need for digital asset custody is undeniable. As the market has grown and interest in digital assets has broadened, secure and stable custody providers are in demand. Despite regulatory uncertainty, the growth of the custody market can continue. To do so, custodians must consider the following:

1. **Do the basics well:** Investors are looking for custodians to focus on safeguarding the assets and ensuring the internal operating procedures, hardware, software and people are designed to protect any asset under custody, not just in the present but in light of future technological developments.
2. **Maintain awareness of regulatory developments:** keeping up to date with market developments and engagement with regulators is essential. This two way conversation should ensure that there is transparency on the services provided by the custodian and the activities adhere to the services authorised.
3. **Self control:** In the absence of regulatory certainty, custodians could take the lead in setting the market standard practices and instilling self-monitoring mechanisms based on discussions with the regulator. There is precedence for this approach for example, the Asian Securities Industry & Financial Markets Association (ASIFMA), a trade association in Asia with over 100 members, released its best practices for Digital Asset Exchanges, and the Global Digital Finance industry membership body released its key takeaways on "Crypto Asset Safekeeping and Custody."

The investor

Whilst regulation has consumer protection at its core, the investor themselves must take responsibility to protect their own interests, potentially asking themselves would they invest in the asset and use the custodian if it wasn't cutting edge or digital. As the regulatory framework for the custody of digital assets develops, extra caution should be practiced by the investors when selecting a custodian. Identifying one's own custody needs and scrutinising the available custodian options is a critical process to be followed. Investors should consider the following questions:

- What are the security provisions used by the custodian?
- What processes are in place for key generation, storage and access?
- What are the authentication and transaction safeguards employed by the custodian?
- What recourse do I have against the custodian in the event of a cyber incident that results in a loss or theft of my asset?

Usability of the service provided by the custodian can be assessed looking at the proof of their existence, governance mechanisms in place, subscribed insurance policies and the current levels of assets under custody. As the regulatory market develops, more certainty will be provided and the assessment of the custodians should become a more certain and simpler process.

Conclusion

The digital assets industry is both globalised and localised, with borderless exchange operations, as well as geographically condensed mining activities. Additionally, the industry is becoming more fluid, as the lines between exchanges and wallets are increasingly blurred and a multitude of cryptocurrencies, not just bitcoin, are now supported by a growing ecosystem, fulfilling an array of functions. Therefore, the issues of security, regulatory compliance and general viability of the digital custodian are likely to remain prevalent for years to come. Hence, it is important for regulators to work with the custodians and investors to deal with these issues while on the other hand not obstructing innovation.

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