



Real Estate STO Whitepaper Chapter 2

October 2022





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1. Introduction

Our initial whitepaper on the topic of security token offerings (“STOs”) within the real estate sector laid out the means by which security token offerings could be used to revolutionise capital raising within the real-estate sector.¹ In particular, we highlighted the following benefits and set out how the use of STOs could alleviate some of the pain points currently faced by industry participants.

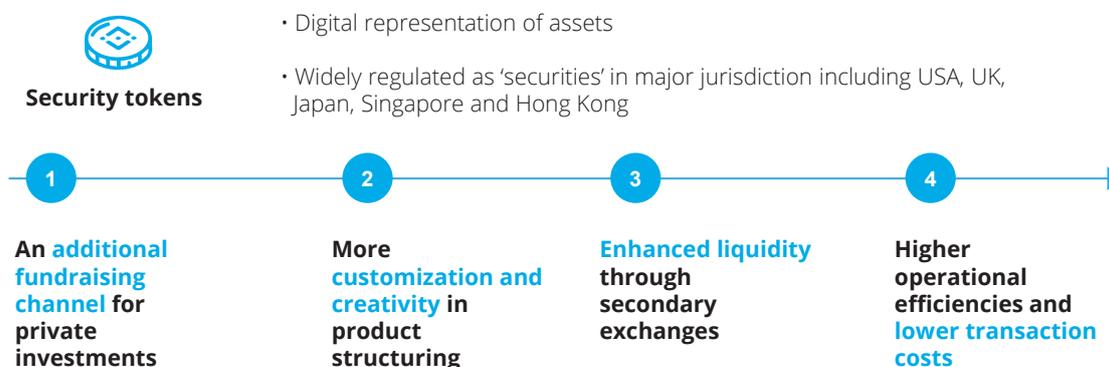


Figure 1: The summary of four general benefits of STOs.

We have also analysed the benefits of real estate STOs compared to two existing structures – private real estate funds and real estate investment trusts (REITs). The key differences are summarized below.

Key pain points of private real estate funds	Key pain points of REITs	Benefits brought by STOs
<ul style="list-style-type: none"> • High investment ticket size and long lock-up period, making these funds suitable only for institutions and/or ultra-high net worth individuals • Distribution methods and secondary trading are administratively burdensome, resulting in little to no liquidity in secondary markets and operational inefficiencies 	<ul style="list-style-type: none"> • High structuring costs and complexity • Highly regulated and subject to significant limitations on investment scope • More restricted than STOs given the limited flexibility for the portfolio components, nature of underlying asset and dividend distribution method 	<ul style="list-style-type: none"> • Low structuring costs and complexity • Greater flexibility in terms of investments scope, portfolio components and nature of underlying asset • Enhanced liquidity with a lower investment ticket size and no mandatory lock-up periods, making it more accessible by a broader range of prospective investors • Greater operational efficiency and liquidity through programmed distributions via smart contracts

Figure 2: The summary of key pain points of real estate private funds and REITs compared to the benefits brought by STOs.

¹ Real Estate Security Token Offering (STO) Whitepaper Chapter 1: Real estate STOs: overview and opportunities in Hong Kong and the Greater Bay Area (GBA)

Rising number of regulated STO players globally

2021 witnessed an increase in interest in STOs, with a marked rise in the number of exchanges that support STOs. Currently, there are approximately 20 exchanges or trading platforms globally that hold licenses to trade or issue STOs in compliance with local regulatory regimes.

Examples of global real estate STOs

We have previously referenced the issuance of Aspen Coin (a United States commercial REIT) and the Mapletree MERIT Fund (a European commercial real estate fund) as examples of successfully executed STOs. More recently, there have been a number of successful real estate STOs, including:

Real estate STO	Underlying real estate	Description	Jurisdiction	Securities type
Sunbelt Multifamily Fund ²	Portfolio of five multifamily apartment complexes in the US	Represent interests in a real estate fund, which in turn holds income-generating multifamily complex	Singapore	Equity
RedSwan CRE Value-Add Fund ³	Portfolio of diverse value-add commercial property across Texas, California and New York	Represent interests in a commercial real estate (CRE) fund, which in turn holds value-add commercial property	United States	Equity

Figure 3: Examples of successfully executed STOs.

Although the number of transactions is steadily increasing, we view the market as still being in the early stages. Our focus with this white paper is to dive deeper into the use of STOs within the real estate sector. In this paper, we will illustrate the end-to-end process of an STO and showcase featured examples of fundraising by way of a real estate STO. We will also highlight insights from capital markets practitioners on the key considerations for issuers and investors engaging in an STO.

Finally, we will explore the outlook of real estate STO opportunities in Hong Kong and GBA.

²ADDX: <https://addx.co/en/investments/sunbelt/>

³RedSwan CRE Marketplace: <https://redswan.io/redswan-cre-value-add-fund/>

2. Understanding the end-to-end process of a security token offering (STO)

STOs applications within the real estate sector globally have been on the rise with the onset of more successful fundraising use cases. Here, we set out the reasons for it being viewed as a reliable tool for fundraising, and break down the steps to be taken by respective professional service providers when utilising this new means of fundraising.

As security tokens are generally subject to the same regulatory requirements as traditional securities, the security token issuance process closely resembles that of traditional capital markets. With the participation of various professional service providers from financial advisor and legal counsel, through to accounting and tax professionals to technology enabler(s), it provides an additional layer of investor protection.

In addition to the traditional scope of the offering process, dealing with blockchain requires a significant degree of technology expertise. The following section is an illustration of how various professional service providers are involved in the issuance of security tokens. We will address in detail the role of the technology provider later in this section.

A summary of the end-to-end STO process with technical processes highlighted is set out below.

Stage	Activities	Professional service provider(s)
Pre-issuance	Issuer engages financial adviser (FA)	Financial adviser
	Due diligence performed on the issuer	
	Product structuring	Financial adviser, Tech adviser
	<ul style="list-style-type: none"> Basics: volume (total supply / issuance amount) Economics: payment terms / return profile (varying across equity / debt / CIS) Token features: additional rights (economics/ utility/ ownership) 	
	Legal structure	Legal counsel
	<ul style="list-style-type: none"> Offshore vs. onshore vehicle Fund: umbrella, master/ feeder structures Segregated assets and liabilities Regulatory considerations Documentation 	
	Valuation	Real estate valuers
	<ul style="list-style-type: none"> Net asset valuation (property NAV) Credit rating (for debt securities) 	
	(If structured as a fund)	Fund administrators
<ul style="list-style-type: none"> Net asset valuation (NAV) Fund accounting Data management 		
Taxation	Tax adviser	
<ul style="list-style-type: none"> Stamp duty (security token and its underlying real estate assets) LAT (land appreciate tax) Tax for transfer of property via acquisition Profit tax on asset holding SPVs 		
Tech advisory	Technology providers (Tokenization, Custody)	
<ul style="list-style-type: none"> Selection of blockchain Smart contract design Custody solutions Insurance on digital assets 		

Stage	Activities	Professional service provider(s)
Issuance	Platform: Tokenization and market making Tokenization (IT implementation) <ul style="list-style-type: none"> • Blockchain protocol selection • Smart contracts deployment • Security provisions (IT auditing) • Security token custody Roadshows and book building: <ul style="list-style-type: none"> • Investor subscriptions, allocation and settlement 	Technology providers Financial advisor/ underwriter
Post-issuance	Issuer tools <ul style="list-style-type: none"> • Dividend/ coupon distributions • Investor communication • Performance reporting (quarterly NAV report) • Capital call Exchange <ul style="list-style-type: none"> • 24/7 markets access • T+0 settlement 	Technology providers (Post-issuance management) Fund administrators Regulated digital asset exchanges

Figure 4. The end-to-end STO process with illustration of professional service providers involved.



"In a security token offering, a fund administrator continues to play an essential role in accounting, asset valuation, data transferring and managing investor relations. While the asset valuation reports will be synchronized on the blockchain, we also see great potential for a more transparent and real-time valuation of private market assets via streamlined data pulling from STO exchanges."

Mr. Davy Kong, Managing Director of ASCENT Fund Services (Hong Kong) Ltd.



A review of the end-to-end process shows STOs can bring greater efficiency to real estate financing activities at two levels.

Level 1: The use of the blockchain has removed the need for certain intermediaries (CSD, registrar and paying agents).

Traditionally, the buyers and sellers of securities rely on intermediaries for functions such as clearing, settlement and return distribution. The intermediary functions protect the parties involved in the transactions with their services and receive a fee providing such services. Below we explore how the use of the blockchain has removed the need for these intermediaries.

Central Securities Depository (CSD)

In the UK, a central securities depository (CSD) is an institution that holds financial instruments such as bonds, equities and mutual funds. CSD allows the ownership of financial instruments to be transferred in electronic form through updating book-entry records, which are electronic records.

The Stock Exchange of Hong Kong uses CCASS. The clearing services determine stock and money obligations of participants in a securities transaction, then deliver the securities or cash to the relevant participants. The clearing services also provide settlement services and deliver the securities to participants' CCASS stock accounts, and funds are then recorded in their money ledgers on settlement day.

For security tokens, as the transactions take place on the blockchain, the distributed ledger itself serves as the single source of truth of all transaction records without the involvement of an intermediary party. Statutory requirements may be applied in certain jurisdictions nonetheless, such as the EU and the UK, where the clearing and settlement of security tokens are to be effected on a regulated CSD.

Registrar/ Transfer agent

Share registrars and transfer agents assist companies with the maintenance of registers of holders of securities, including issuing certificates for securities, updating registers to reflect transfers and processing shareholder entitlements such as voting and distributions.

For security tokens, the transfer of ownership is handled by the blockchain itself, finalized by the native consensus mechanism. The blockchain enables a real-time immutable statutory record of registered security token holders, as well as real time tracking on the ownership transfer among parties on the blockchain.

Level 2: How smart contracts further drive streamlined operations.

Faster settlement of security tokens compared to traditional securities

Currently, the market norm for settlement of securities transactions in leading markets is a T+2 process (as in NYSE, LSE, HKEX). Leveraging on the blockchain technology (the native consensus mechanism), security tokens can be settled within the same day (effectively, T+0).

	Traditional securities	Security tokens
Settlement period	T+2	T+0 (Same day settlement)
Process	Securities are cleared and settled with the Central Securities Depository, where ownership is transferred through book entries.	Details of transaction such as price, asset, and ownership, are recorded, verified, and settled within a day across all nodes.

Figure 5: The settlement process comparison

Automated compliance and corporate actions

The offer and issue of securities are generally subject to certain compliance requirements across jurisdictions, including investor qualification requirements, offering requirements and AML requirements. Furthermore, a variety of post-issuance corporate actions may need to be fulfilled by the issuers depending on the underlying asset type.

Security tokens can facilitate a higher degree of regulatory oversight with many built-in compliance modules available in major smart contract standards and their high programmability to encompass asset-specific features. For example, the ability to create white-lists and restrict transfers to ensure that only investors who fulfill relevant eligibility and qualification requirements are able to hold security tokens is a built-in function of smart contract standards such as ERC 1400 (an Ethereum standard for security tokens). The smart contracts can also embed the business parameters of dividend/ coupon distributions by specifying terms such as the frequency of dividend payouts (quarterly/ biannually) and the eligible investors to whom distributions should be made. A few more examples of compliance and corporate action scenarios are highlighted below.

	Automated compliance	Corporate actions
Illustrated scenarios	<ul style="list-style-type: none"> • White-listing • Restricted transfers (among KYC-ed investors who fulfill on-boarding procedures) • Securities lock-up period • Forced transfers for court actions 	<ul style="list-style-type: none"> • Dividend/ coupon distributions • Capital call • Performance reporting • Drag-along rights

Figure 6: Automation of compliance and corporate actions for security tokens

The roles of the technology providers

As discussed throughout this section, there is a spectrum of benefits brought by the application of the blockchain. As an STO can only be supported and issued by blockchain, it is essential for the issuers to understand the roles of the technology providers. Below we break down the key roles of the technology providers in three scenarios – token product structuring, smart contract auditing, and digital asset custody.

Token product structuring

The technology provider works hand in hand with the financial advisor and legal counsel to ensure that the token structure fulfills the compliance and commercial requirements of the issuers. In Hong Kong, as STOs are regulated under the securities regime, an issuer must comply with all applicable statutory requirements including the offering process and sales restrictions.

The technology provider should also ensure that the issuer's intended product structure can be implemented on the blockchain, such as encompassing both economic rights and utility components for token holders. This entails coding the logics of operational processes (e.g. dividend distribution, corporate actions) and other actions to be taken by the investors (e.g. exercising option rights) on the smart contracts to allow for seamless interactions within the blockchain.

Smart contract auditing

There has been increasing demand globally from regulated exchanges and custodians for virtual asset projects – including STOs – to undergo smart contract audits, due to their nature as programming codes. When the tokens represent high asset values, any simple bug or vulnerability in network or program codes can result in substantial losses. A smart contract audit is typically conducted by specialized blockchain security firms, where the process typically involves the smart contract codes undergoing an extensive methodical examination in evaluating how the codes interact with the blockchain. This is to identify issues or errors in execution that may restrict the intended action or performance of the codes or other security vulnerability that cause failure of the transactions. Suggestions will then be made on how the issues can be addressed.

Custody (with insurance coverage)

Traditionally, professional investors in hedge funds and private equity investments will deposit their securities in a custodian facility while they maintain positions in the market. This same principle applies to security tokens that are sold or bought on the blockchain, so that they can be safeguarded in a custodial or non-custodial blockchain wallet.

While non-custodial wallets give the investors full control of the private keys of the security tokens (which governs the access to the tokens), the risk of loss arises if the wallet is hacked or the private keys are stolen. If the private keys are lost, the assets in the non-custodial wallets are not recoverable.

In contrast, with custodial wallets, investors entrust a third-party to safeguard their private keys. Custodial wallets typically have a higher degree of security with institutional-grade infrastructure in place. These wallets are typically provided by licensed exchanges or trust/ custody providers. Under this arrangement, the custodian will be responsible and typically offers some degree of insurance coverage if a hack occurs or security tokens are lost from the custodian.

On balance, custodial wallets are likely to be a better solution for security token investors as the value at stake is typically high with private markets investments, meaning investors cannot afford any loss of assets due to hacking. In addition, custodial wallets also may offer other value-added solutions such as intra-custody settlement, which help investors better manage secondary transactions. Below is a comparison between custodial and non-custodial wallets.

Custodial wallet is more suitable for professional investors with its one-stop solutions

	Custodial wallet	Non-custodial wallet
What does it mean	Users entrust a third party to protect their digital assets (private keys)	Users have sole control of their own private keys; also solely responsible for NOT losing their private keys
Supported tokens	Depending on the custody provider	Metamask only supports Ethereum based tokens
Key comparisons		
Insurance	Depending on the custody provider	Typically not available
Value-adding services	Can offer settlement solutions, and participate in yield generating solutions (staking, lending) on behalf of clients	Users need to complete the technical operations on their own
	Suitable for professional investors who seek one-stop solutions for digital assets	Best suited for active DeFi users

Figure 7: Custodial wallet vs. Non-custodial wallet

While custodial wallets generally offer a higher degree of security, they are not immune to hacking. This is where digital asset insurance as an additional layer of protection comes in. Digital asset insurance is a form of general insurance to cover incidents concerning the token private keys. Custodians with insurance coverage provide the ultimate safety net for security token holders. A summary of the insurance coverage typically offered is set out below.

What is covered	What is not covered
3rd party hacks, copying, fraud or theft of private keys	Any technological failure such as network, blockchain or smart contract failure
Internal theft or fraud by company employees or executives	Any failure or malfunction of the hardware security module
Physical damage of private keys (e.g. flood, fire)	Any loss caused by or involving any person that owns more than 5% of the Insured
N/A	Force Majeure

Figure 8: Typical coverage of digital asset insurance policies

Market landscape for digital asset insurance

by OneDegree, the first Asia-headquartered insurer to bring protection for digital assets

While the demand for insurance coverage for digital assets has been increasing in the recent years alongside the growing digital asset market capitalization, the supply from the global insurance market is still low. The lack of appetite from insurers is mainly due to the lack of data and specific knowledge about the digital asset industry. While data is essential for insurance analytics and pricing, inter-disciplinary knowledge is also required to bring insurance expertise together with blockchain, digital asset, cyber and compliance matters. The lack of such knowledge and information has significantly hampered the growth of insurance products that are designed specifically to cater the needs from the digital assets industry.

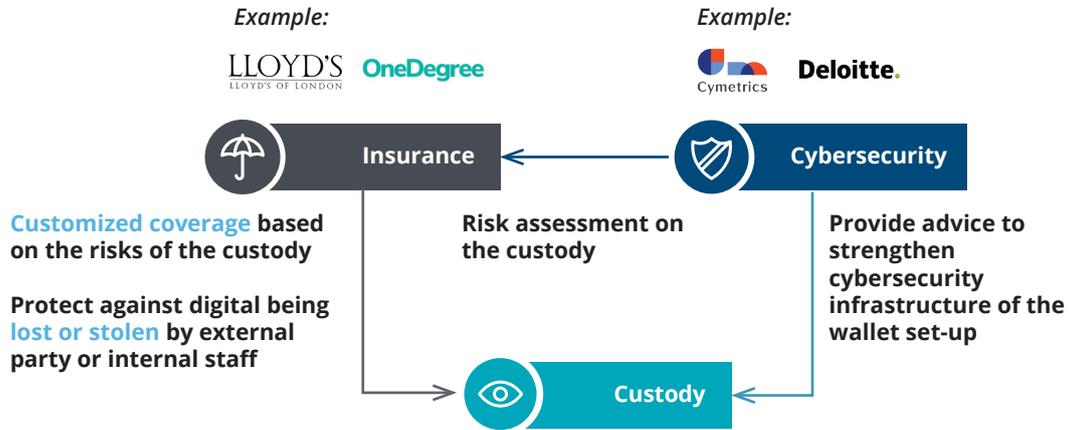
As the proportion of aggregate investments comprising digital assets steadily increases, participating investors demand higher standards of corporate governance and protection from the relevant service providers. Cyber and Wallet insurances which protect against theft or damage of digital asset and private keys have become the key concern for institutional investors. Demand for other conventional corporate insurance products such as Directors and Officers and Professional Indemnity has also been increasing significantly. The below table provides an overview over the two types of insurance available for digital asset custodians in the market.

	Digital asset wallet coverage	Conventional corporate coverage
Type of insurance	<ul style="list-style-type: none"> • Crime insurance • Specie insurance 	<ul style="list-style-type: none"> • Professional indemnity • Directors & Officers liability
Scope	Protection against digital asset being lost or stolen	Protection against losses arising from investigations / claims against the company or its directors / officers
Who is it for	Digital asset custodians, technology provider, exchanges, etc.	Corporations, e.g., asset management companies, exchanges engaging in digital asset activities
Example of insurers	 	  <p>(Examples of insurers who offer these coverages for corporates engaging in digital asset-related business)</p>

Individual digital asset investors are required to maintain their own cybersecurity and security risk controls over their private keys. The risk transfer mechanism, such as insurance, is however limited due to the decentralized nature of wallet addresses, i.e. the insurer cannot properly perform claim forensics to prove that the stolen funds were transferred to a wallet address that was not controlled by the individual claimant. Nevertheless, individuals and institutional digital asset investors can enjoy insurance coverage by keeping their digital assets at an insured institutional custodian.

With the demand for insurance capacity in the digital asset space growing, participants of the insurance market need to equip themselves with inter-disciplinary knowledge, to better understand the emerging risks in the digital asset sector and to provide more suitable insurance solutions to the digital asset market. One of the key areas in the risk management assessment for digital asset wallet coverage is cybersecurity. Insurers can equip themselves with the relevant knowledge to support their insurance appetite by working with cybersecurity and digital asset service providers. The following graph illustrates the synergy between insurance and cybersecurity in providing business solutions to the digital asset custodians.

OneInfinity (by OneDegree): Market landscape for digital asset insurance



In view of the shortage of supply and the significant shortfall from demand, the insurance market should be more proactive in providing capacity. This is essential for the healthy development for both the digital asset industry and the insurance industry.

3. Featured examples of real estate STO fundraising

The property development lifecycle

The property development lifecycle spans the initial stages of strategic planning, land acquisition and construction, through to operation and redevelopment of the property and finally, the sale and demolition of the property. Property developers face various challenges throughout the development lifecycle, including intensive capital outlays, complex transaction structures and high project risk. The provision of capital is particularly a challenge where multiple costs such as construction, renewal, maintenance, and end of life costs are incurred at different phases.

In this section, we will look into two featured examples of fundraising via real estate STOs. We will discuss the token structures and tokenomics within these examples and highlight the key benefits compared to their traditional counterparts. We will explore other potential product structures which harness the broad flexibility of security tokens.

Property development lifecycle

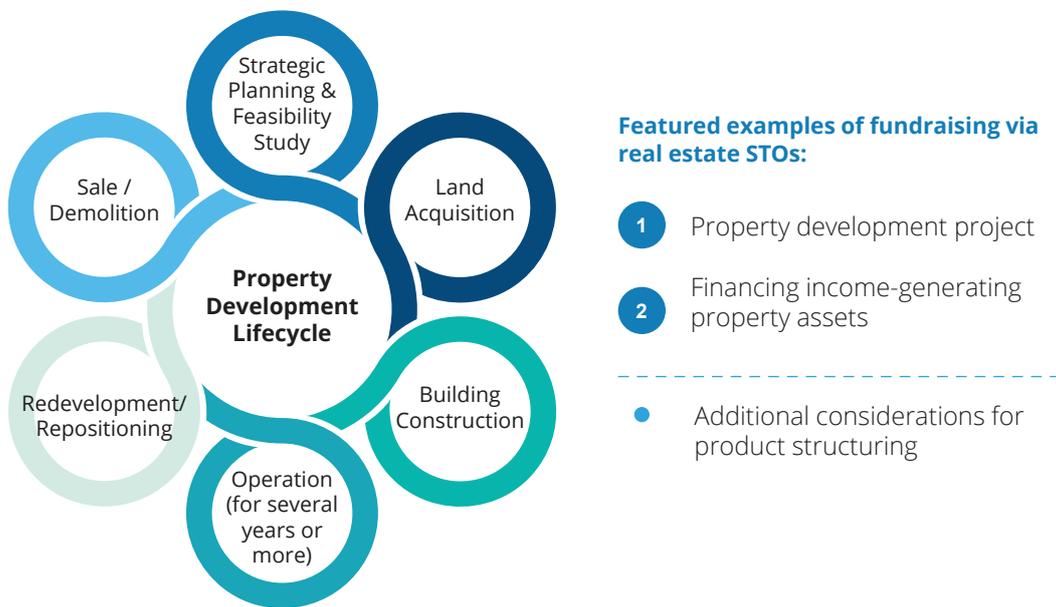


Figure 9: Property development lifecycle and featured examples of real estate STOs

The property development lifecycle

Before diving into the featured examples, it is worth examining how real estate investments are typically funded. Real estate investments are usually made up of both debt and equity financing, catering for different needs in stages and purposes of the investment. Both the debt and equity components formulate the capital stack for the entire property development lifecycle.

Typical real estate capital stack

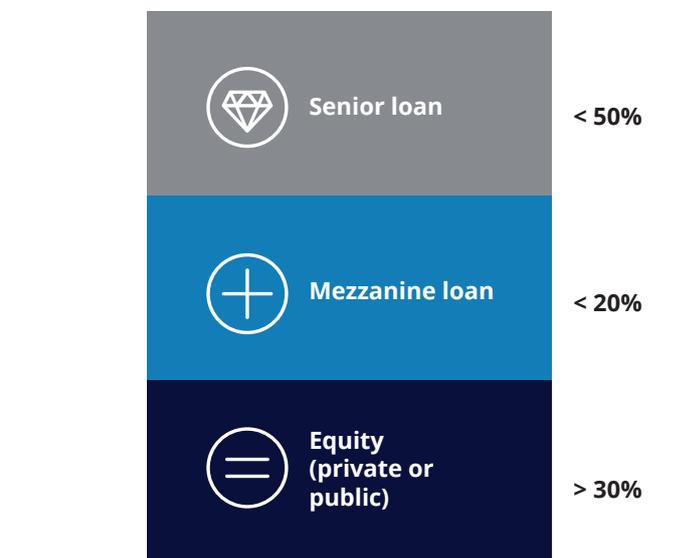


Figure 10: Illustration of a typical capital stack for real estate fundraising

The capital stack in a real estate STO is similar with the key difference being that the debt or equity instruments are tokenized. Below we discuss two featured examples across the property development lifecycle – (1) early-stage property development project and (2) financing income-generating property asset.

Featured example 1: STO for property development projects

The first featured example concerns a greenfield property development project. Let’s take an example of the development of a commercial real estate (e.g. an office block) in the Kowloon East area of Hong Kong in early 2022. The property carries a gross floor area of 400,000 square feet with an expected development period of 5 years.

STO for property development project



Greenfield development of an office block in Kowloon East



Token structure

Standardized limited partnership interest in a private equity fund



Investor rights

- Fund’s preferred return
- Potential capital gain from distribution waterfall

Key project assumptions

Gross floor area (sq ft)	400,000
Total capital need (HKD)	10 billion
Private fund ST proportion	10%
Development period	5 years
Monthly unit rent (HKD/ sq ft/ month)	35
Occupancy rate (stabilised)	90%
Management fee	Net
Total development cost (HKDmn)	4,800.0
<i>Land acquisition unit cost *</i>	<i>8,000.0</i>
<i>Office development unit cost *</i>	<i>4,000.0</i>
Estimated exit price (HKDmn)	9,596.0
Discount rate	4.75%

**Unit cost: HKD per sq ft of GFA*

Figure 11: Token structure and key assumptions of the greenfield property development project.

Security token structure

Early-stage investors typically participate in the equity tranche of the capital stack to compensate for the higher project risk. In this example, the security tokens represent limited partner interests in a private real estate fund, which in turn holds an equity interest in the development project. The investors have priority in accessing the project’s upsides through the fund’s preferred return, in addition to sharing in other capital gains that may be allocated in accordance with the fund’s distribution waterfall. Moreover, the security tokens structured as a debit-like instrument that takes the place of mezzanine loan are issued in the example.

The property development STO can be used to supplement the immense capital required by a project of this scale. While a developer can continue to tap a mixture of traditional channels such as bank loans and cornerstone investors, the tokenized fund can represent a portion of the total capital need at the start, e.g., 10% (the total development cost for the 400,000 square feet in East Kowloon is expected to exceed HKD 10 billion; the tokenized fund will represent HKD 1 billion of funding source).

Typical real estate capital stack

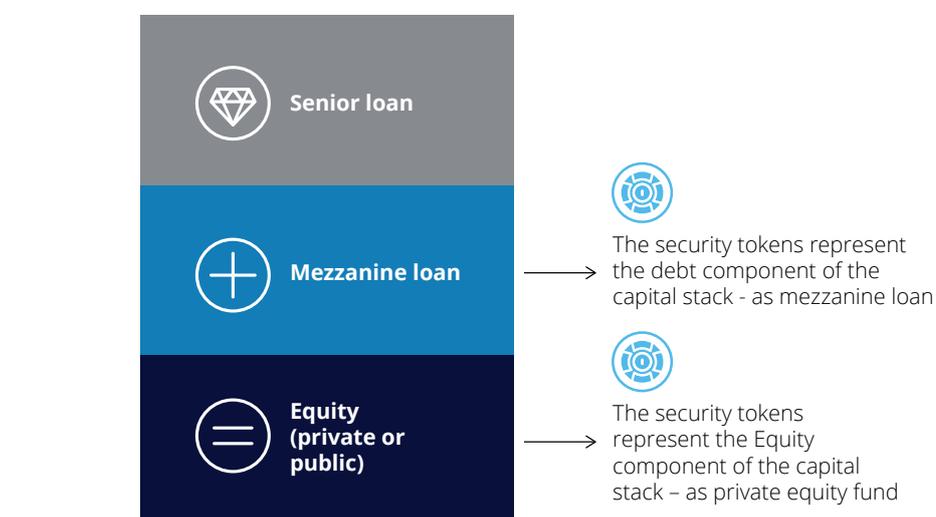


Figure 12: What the property development STO represents in the real estate capital stack

Advantages of Equity STOs for property development project

When compared to the traditional fund raising, the major benefit for developers using Equity STO for property development project is that it saves time as Equity STO lowers the investment entry barrier so that more investors, such as high net worth individuals and family offices with smaller ticket sizes, can participate in the project. This feature is beneficial to the developers as it is time sensitive to raise capital to acquire land and start the construction. The ability for tokens to segregate economic rights from other equity rights such as voting also helps avoid the traditional dilemma where equity investors are less willing to participate in deals where they don’t obtain a controlling stake.

Below we illustrate more benefits of this type of Equity STO.

	Traditional structure	Tokenized structure
Time to fundraise	<p>Longer</p> <p>The minimum investment amount for private equity real estate funds is usually high, which results in a smaller group of eligible investors and a longer time to secure the required investments</p>	<p>Shorter</p> <p>STOs can provide a lower barrier to entry and lower minimum investment thresholds due to fractionalized investments, allowing issuers to raise funds faster from a broader pool of potential investors</p> <p>(STOs can bring down the typical ticket size of USD5 million to USD100,000)</p>
Cost	<p>High</p>	<p>Lower</p> <p>Project cost of capital can be reduced due to a lower illiquidity premium paid for security token investors</p>
Transparency	<p>Less</p> <p>Limited information about underlying asset performance may be available for secondary market investors</p>	<p>More</p> <p>Offering memorandum and NAV reports are synchronized on the blockchain, providing greater information transparency for secondary market investors when assessing whether to invest</p>

Figure 13: Summary of key benefits of the tokenized structure compared to traditional structure.

Advantages of Equity STOs for property development project - Mezzanine loan

While mezzanine loans can increase the upper limit of the LTV ratio by up to an additional 20-30%, they carry far higher interest rates as a form of subordinated debt (typically 10% - 15% p.a., depending on asset type, asset income level and the landlord’s credibility). In a distressed situation where the land was acquired at a lower cost, the interest rate of such mezzanine loan can be higher than the aforementioned 10% -15% p.a. which shall be exceptionally attractive to the potential investors while the cost of capital of developers can still be optimized.

“The immediate promises of tokenized real estate are fractional ownership of a discrete real estate property and increased liquidity. With the expected growth of tokenized real estate, investors will have easier access to the global property markets, with blockchain technology being a strong vector in driving future innovation in the real estate market.

Investors will have to bear in mind the key considerations ranging from legal rights and protections provided, governance and property management, distribution of cash flows generated by the property, ensuring the safe custody of the digital assets, to the compliance for selling or transferring tokens.”

Mr. Dimitri Vardakas,
Managing Director of DeFi Consulting Group

Featured example 2: STO for financing income-generating property asset

The second featured example concerns the financing of an income-generating property asset. Continuing with the commercial real estate example illustrated earlier, let’s now assume that the office block in the Kowloon East area has now completed, and is income-generating with a steady stream of rental revenue. The office has an occupancy rate of 90% and a rental income stream of HKD35 per square feet per month. The investment period is 30 years.

STO for income-generating property asset



Financing an income-generating office block in Kowloon East



Token structure
Senior loan/ Mezzanine loan



Investor rights

- Coupon payments
- Capital gain from asset disposal

Key project assumptions

Gross Floor Area (sqft, A)	400,000
Unit price (HKD per sqft, B)	15,000
Monthly unit rent (HKD/sqft/mth)	35
Occupancy rate (stabilised)	90%
Management fee	Net
NOI income	85% of rent
Acquisition price (HKD mn, A x B)	6,000.0
Disposal cost	1.5% of est. exit price
Cap rate	2.75%
Terminal growth rate	2.00%
Investment period	30 years
Estimated exit price (HKD mn)	11,125.0
Discount rate	4.75%

Figure 14. Token structure and key assumptions of the underlying asset (for illustration purposes only)



Security token structure

Traditionally, the purchase of a completed income-generating asset will typically be financed through a mixture of equity from the landlord or property investors and bank debt. In this example, we assume that security tokens are structured as a debt-like instrument that takes the place of senior loan and in the capital stack. Security tokens representing the Equity component of the capital stack can also be applied in this example. For the avoidance of unnecessary duplication, please refer to featured example 1 on page 16 for details.

The security token investors receive coupons throughout the lifetime of the debt and the tokens will be redeemed in full at the end of the investment period. The coupon payments are funded by 70% of the net operating income (“NOI”) of the office building. As the upside, the security token investors are also eligible to participate in 70% of any capital gain on disposal of the asset at the end of the holding period.

Typical real estate capital stack

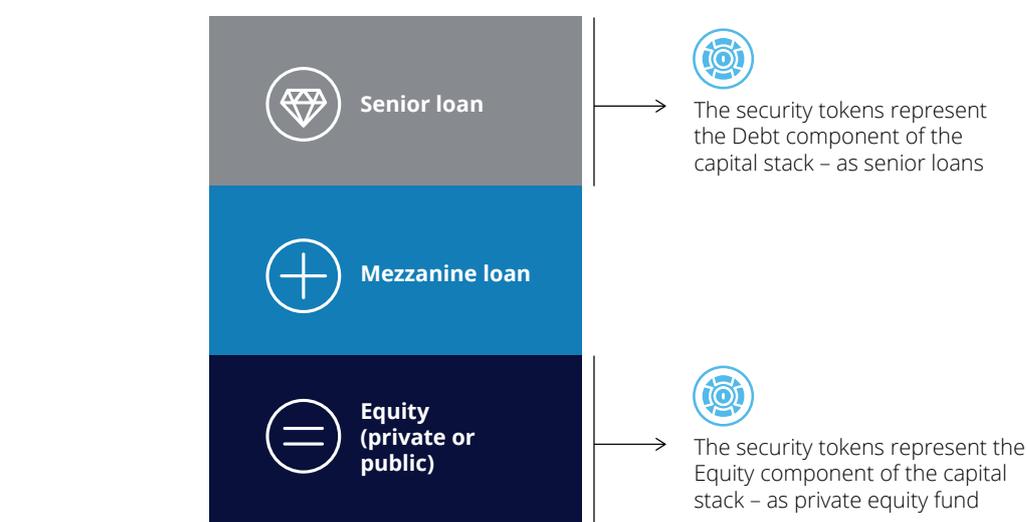


Figure 15: Capital stack of an income-generating property asset.

Advantages of STOs for income-generating property assets

The traditional leveraged structure described above i.e., the senior loan, typically is subject to a highly regulated loan-to-value (“LTV”) ratio. Senior lending in Hong Kong is highly regulated by the Hong Kong Monetary Authority (the “HKMA”), at a maximum LTV ratio of 50%.

On balance, a debt-like security token backed by an income-generating asset can effectively improve the leverage restriction and therefore open up opportunities for developers to better optimize the cost of capital. As income-generating assets typically require some form of restructuring and securitization, security tokens also provide better disclosure to the cash flow performance of the underlying asset. Below we illustrate more benefits of this type of STO.

	Traditional leveraged structure	Tokenized structure
Transparency	<p>Less Investors rely on the monthly remittance report to see information about the performance of the underlying asset performance</p>	<p>More Asset information can be recorded on the blockchain in real time, which better enables future investors to make decisions</p>
Time to fundraise	<p>Longer The capital requirement of investing in real estate with traditional methods such as RMBS/ CMBS is usually high (USD 2 million), as a result of which it generally takes issuers a longer time to gather the required number of eligible investors</p>	<p>Shorter STOs provide a lower entry barrier for investors through fractionalizing investment threshold, allowing issuers to raise funds faster from a broader group of investors</p>
Debt servicing	<p>Less optimal Typically, issuers will need to negotiate the covenants for each individual deal during the underwriting phase</p>	<p>More streamlined With standardized covenants, issuers can automate default handling (e.g. balloon payment arrangement) with smart contracts once a covenant is broken. Issuers can also automate multiple payment streams (e.g. coupon, amortization and principal) to the investors.</p>

Figure 16: Summary of key benefits of the tokenized structure compared to traditional leveraged structure.





"The Asset-backed Securities ("ABS") market was once very popular in the global markets, until the Lehman's Minibond bubble burst. As a result, most of the structured products have become much less popular for investors.

STOs for income-generating assets are a new investment instrument which many investors will find similar to asset-backed securities ("ABS"). By leveraging smart contracts coupled with its asset-backed nature with strong cash flow projects such as real estate, STO addresses the illiquidity concern of traditional Asian ABS markets and provides an additional layer of security to financial market participants.

With the latest rapid developments in the digital asset markets, to join the market bandwagon via investing in an asset-backed STO would be a good option to start getting involved in this space."

Dr. Jason Ho, Senior Managing Director at FTI Consulting (Corporate Finance & Restructuring)

Additional ideas for security token product structuring

From the above two featured examples, it is evident that real estate security tokens can be structured to meet the fundraising needs of developers at different stages of the development cycle. In light of the flexibility presented by security tokens, real estate developers can consider incorporating additional innovative features as a means of differentiating their offerings from existing real estate investment products and building an enduring relationship with investors. In addition to the above featured examples, below we provide some more product structuring ideas following three key objectives.

1. Yield enhancement for the overall investment

Property developers can further enhance the yield by sharing the profit from the proceeds of investment exit or asset disposal at the end of the investment horizon. For example, in the above second featured example of a debt-like security token representing an income-generating asset, the debt security token holders will receive a share of the asset disposal at maturity. While this may be common for equity investors, debt investors typically don't get to enjoy this upside.

The debt security token can also be structured to include a call option to purchase units of the office block at replacement cost toward the end of the investment horizon. The arrangement is akin to the sweetener arrangement in a traditional equity plus warrant offering.

For the private fund token, it can be designed so that the existing token holders enjoy priority subscription rights for security tokens representing future private funds. Investors will find this proposition attractive particularly when the developer has a solid pipeline of investment projects that are otherwise inaccessible. The issuer may also consider waiving or discounting the management fee payable by a security token holder if an investor subscribes early.

2. Incorporating utility benefits as rewards for investors

In addition to sharing economic rights with security token investors, property developers can leverage their resources to provide utility benefits. These benefits can vary in format across different types of properties. For instance, in the case of Aspen Digital Token (a single-asset REIT investing in the St. Regis resort in Aspen, Colorado), the Aspen Digital Owner Benefit Program entitles holders of the tokens as part owners of the property to receive cashback, equal to a percentage of the bill from their stay at the resort. The cashback amount received will vary depending on the number of tokens owned. The program is tier based and provides the following benefits:

- Tier 1: a minimum of 10,000 Aspen Digital Tokens: 20% cash back
- Tier 2: a minimum of 100,000 Aspen Digital Tokens: 35% cash back
- Tier 3: a minimum of 500,000 Aspen Digital Tokens: 50% cash back

Below are a few more ideas of how developers can leverage their estate portfolio to enhance the attractiveness of the security tokens.

Underlying asset types	Data center	Shopping mall	Senior living residential complex
Potential utility benefits to security token holders	Offering discounted usage of data storage facilities	Offering business collaboration opportunities with the “star” leasing tenants i.e. top global luxury brands	Sponsoring access to at-cost facilities/ services e.g. medical checkups
Key beneficiary group	Investors who run businesses with the need of data center services (cloud computational power)	Strategic investors who seek opportunities of cross-over initiatives with the mall and its brand relationship	HNWIs who look to investing for their own retirement

Figure 17: Summary of alternative product structuring beyond traditional properties and their potential utility rights.

3. Involving real estate ownership rights as rewards for security token investors

A further innovative feature relates to the transfer of property ownership rights. This is particularly relevant for residential properties where an investor can eventually become a homeowner at the end of the real estate development project cycle. Security tokens can be designed to gradually confer upon token holders cumulative discounts or credits that can be applied towards the purchase price of the relevant property if the token holder holds the token until maturity.

Let’s take an example of a security token representing an interest in the development of a senior living residential complex with an investment horizon of 8 years. Assuming that each token holder will accrue the benefit of a discount each year, equal to 0.5% of the aggregate value of the complex, upon maturity the token holder will be entitled to an aggregate discount equal to 4% of the aggregate value of the complex. Assuming that the purchase price of a unit within the complex is equal to 10% of the aggregate value of the complex, at maturity the token holder could exercise an option to purchase a unit at the residential complex and fund the purchase price by applying the accrued 4% credit on the security tokens that are already held by the token holder and acquiring additional security tokens that carry credits equal to the outstanding 6%.

Alternatively, the token holder could also exercise a put option to sell its 4% accrued credit back to the property developer, which will provide the token holder with additional upside for holding the security token until maturity and allow them to fully exit their investment.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Total
Economic rights	Preferred return payments								
Ownership	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	4%
Ownership (cumulative)	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%	4%

Assumptions: 10% ownership equals a unit at the residential complex

Figure 18: Illustration of accumulation for transfer of ownership rights.

4. Key considerations for issuers and investors

Real estate STO fundraising can involve much complexity at both the underlying asset and security token levels. The underlying asset can consist of a variety of commercial structures, with different implications across professional disciplines such as legal and tax. As an emerging technology, there exist misconceptions of what the blockchain technology is capable of doing. As a guide to new STO issuers and investors alike, a list of frequently asked questions is set out below.

Issuers

Pre-issuance

1. What is required in terms of professional advisors?

As illustrated in the end-to-end STO process (Section 2), issuers are recommended to engage professional service providers from financial advisors and legal counsel that are sufficiently qualified and experienced, to technology providers that assist with the tokenization, custody and corporate actions. Given that STOs are still in its infancy, it is particularly important to ensure that projects meet the issuer's compliance and commercial needs.

2. Is there a specified security token product structure?

Given the inherent flexibility of security tokens, they can represent not only economic rights but also customized utility features such as property access or usage rights to make it attractive to the target investors. For example, a data centre developer can securitize not only the future cash flow of a project, but also usage rights of its data facilities to attract target investors from e-commerce and telecommunications industry.

More ideas regarding product structuring have been discussed in the previous section "Additional considerations for product structuring".

3. What legal structures are the most suitable for real estate STOs?

The ideal structure for a particular real estate STO will depend on the facts and circumstances including the commercial objective, the target investors and the regulatory framework. In deciding on the optimal structure, key factors to be considered include:

- The local laws of the jurisdiction in which the real estate is located. In particular any local constraints which may necessitate offshore structures or licensing requirements that may be required to manage the underlying real estate assets.
- The local laws of the jurisdiction in which the issuer is domiciled, including whether stamp duty is payable on share transfers (which would inhibit the development of secondary market liquidity), the requirement for licenses or registration to issue tokens and the applicability of rules governing the maintenance of registers, significant controllers and ultimate beneficial owners which may impact 24/7 trading of shares (but not other types of economic interests).
- The rights and interests that the tokens will carry and whether the tokens are securities, which will affect the offer, distribution and secondary trading of tokens.
- Tax considerations including whether distributions or redemption proceeds paid by the issuer will be subject to taxation in the issuer's jurisdiction of domicile.

4. Are some assets better suited for tokenisation than others?

Assets with reasonable running yield, i.e. over 4%, will be more suited for tokenization than others. If the running yield is too low, there will be limited surplus for the developer after paying out the dividends to token holders.

For example, Hong Kong office property might not be the ideal underlying asset with the running yield of about 3%. Below is an analysis on the typical running yield illustration across different real estate investment strategies and their overall post COVID-19 sentiment.

Type	Risk level	Returns level (historic avg.)	Example Asset (illustrative)	Post COVID-19 shifts: Global Markets	Post COVID-19 shifts: Asia Pacific Markets
Core	Low	7-11% (with low leverage)	<ul style="list-style-type: none"> Well-furnished office building in the city center Generates stable cash flows, e.g. rental income 		
Core+	Low/moderate	8-12%	<ul style="list-style-type: none"> A 15-year, well-conditioned building with minimal improvements in the suburbs Stable cash flows prior to investment, increases post-investment 		
Value-add	Moderate/high	10-15%	<ul style="list-style-type: none"> An old residential building from the 1980s, with plans to renovate into a historic café No cash flow at acquisition, but with significant revenue generating potential post-investment (value-add) 		
Opportunistic	High	>12% (with high leverage), up to >20%	<ul style="list-style-type: none"> An empty land in the suburbs with a run-down vintage building No cash flow at acquisition, >3 years to realize expected returns 		

Figure 20: Real estate strategies with projected sentiments (Source: Cushman Wakefield The Signal Report: The Global Guide to CRE Investing in 2021)

5. What are the technology options available to support an STO?

As security tokens are created with smart contracts deployed on the blockchain, below is a summary of technology options and key considerations:

	Options	Key considerations
a.	Public (permissionless) vs. private (permissioned) blockchain	Interoperability with the existing market infrastructure e.g. global STO exchanges, NFT marketplaces
b.	Blockchain protocols e.g. Ethereum, Polygon, Tezos, Binance Smart Chain (BSC), Solana, Algorand, etc.	Transaction fees (“gas”) occurred in actions e.g. token creation, transfer, updating token information, etc. The level of programmability to incorporate the issuer’s needs Do the relevant jurisdictions carry sufficient technical knowledge toward the selected protocol?
c.	Smart contract standards e.g. Ethereum based standards (ERC20/ 777/ 1400)	Which standard comes with the built-in functions that best suit the issuer’s needs?

Figure 21: Summary of technology options and key considerations

6. Are there ESG risks associated with the creation of security tokens?

The primary argument for digital assets (particularly tokens created on blockchain) such as Bitcoin not being ESG-friendly centers around the electricity required to support the computing power in mining tokens and completing transactions on the blockchain. Below is a summary of the potential risks and analysis of whether security tokens are subject to these risks.

	Potential risks	Are security tokens prone to these risks?
Environmental	Energy usage, electronic waste	While certain coins (such as Bitcoins and other proof-of-work cryptocurrencies) exhibit evidence of higher impact, identifying where mining occurs and what energy sources are used is key to assessing the actual emission profile. There is also a paradigm shift towards proof-of-stake as the consensus model for several of the leading alt coins by market capitalisation (such as Cardano, Solana, Algorand and Ethereum 2.0). The Ethereum Foundation said that the proof-of-stake is up to 99.9% more energy efficient than its predecessor proof-of-work.
Social	Investor protection and education as a new asset class	Risks may arise from transaction disputes when purchasing/ trading cryptocurrencies and accepting them as payment. Security tokens on the other hand are asset-backed by nature and regulated as securities, providing a clearer framework for the proper conduct and regulation of distribution and sales activities.
Governance	Tokenomics, anti-money laundering (“AML”)	While certain segments of the virtual assets ecosystem which are unregulated, such as decentralized finance (DeFi) projects and some cryptocurrencies, may carry an increased risk of fraudulent or other illicit activities, security tokens are issued under the existing robust securities framework and typically include the involvement of professional service providers (such as financial advisers, legal counsel, auditors.) which may lower this risk. On the AML side, the Financial Action Task Force (“FATF”) has given and regularly updated its guidance on how virtual assets should be regulated with a view to eliminating money laundering and terrorist financing activities. FATF’s guidance has largely been adopted by its member countries to combat the risk of money laundering.

Post-issuance**1. What actions can be streamlined via blockchain?**

As described earlier in this paper, the use of smart contracts will allow issuers to automate compliance and corporate actions. Therefore, it is essential for issuers to consider how they can make use of this capability and seek support from their technology provider to customise for their specific security tokens.

Actions	How can it be streamlined via blockchain?
a. Distribution of dividend/ coupon and principal repayment	<p>Recurring distributions can be coded on the smart contracts. Eligible recipients will be identified via a snapshot function prior to the distribution (akin to traditional ex-dividend date) and the payouts can be done by way of stablecoin airdrops in a T+0 manner.</p> <p>Similarly, principal repayment can also be done with smart contract technology at the end of a project.</p>
b. Securities roll-over	<p>Smart contract technology can enable prospective options to roll over investment e.g. at the end of a bond tenor.</p>
c. Disclosure of performance report	<p>All relevant asset performance reports (e.g. quarterly NAV, monthly remittance report) can be synchronized on the blockchain (as a hashed document store in a distributed manner). Investors can enjoy full and transparent access to performance reports and related disclosure.</p> <p>The blockchain infrastructure further enables the ability to track the underlying asset performance data on chain e.g. records of rental revenue collection, to provide a truly transparent disclosure.</p>
d. Capital call	<p>If fund contributions are collected in the form of stablecoins, the capital call logic can be coded on smart contracts to draw down capital in a pro rata manner from security token holders.</p>

Figure 22: Examples of action that can be streamlined via blockchain.

The above actions may require customisation on the token smart contract design and the issuer portal offered by the technology provider. Issuers need to ensure that the technology provider is capable of the relevant customisations for the optimal experiences

⁴Stablecoins are cryptocurrencies whose value are tied to a “stable reserve” like the U.S. dollar to provide stability

Investors

Recognizing that prospective investors of real estate STO may vary in degrees of familiarity and experience with private markets assets (particularly real estate) and digital assets, we have categorized the FAQs from the lens of investors without prior experience investing in real estate and digital assets in general (such as cryptocurrencies).

All investors

1. Can I invest in security tokens?

In Hong Kong, security tokens can be offered to professional investors⁵ only.

2. Are there any required virtual asset licenses to invest in security tokens?

Generally speaking, no license is required to invest in security tokens.

However, Hong Kong based portfolio managers will need a Type 9 (asset management) license from the SFC to carry on a business of managing a portfolio that invests in any securities (including security tokens) and/or futures contracts, and obtain further approval from the SFC if they intend to invest more than 10% of the gross asset value of a portfolio in any virtual assets (including security tokens).

3. What are the risks of investing in real estate STO?

The risks of investing in real estate STOs are analogous to the traditional real estate investments. Although, investors might enjoy higher security due to the immutable nature of the blockchain to track ownership and record every transaction, investors will also be subject to the risks associated with hacking and loss of private keys.

4. How is investing in security tokens different from traditional securities?

While the investment nature remains similar as the tokens are backed by assets, security tokens may adopt more innovative product structures (such as utility rights) compared to traditional securities, which makes it essential for investors to understand what rights they are entitled to and the evaluation metrics of such investment opportunity.

5. Is there a secondary market for security tokens?

	Options	Description
a.	Private sale	Issuers can hold a certain percentage of security tokens during issuance and trade it in the secondary market to create liquidity
b.	Regulated exchange/ OTC	Market makers help to increase liquidity by buying and selling security tokens on regulated exchanges/ OTC
c.	(Potential) Decentralized finance solution	Automated market maker (AMM) is an autonomous protocol that uses smart contracts to define the price of security tokens and trade to provide liquidity

Figure 23: Channels of secondary liquidity for STOs.

⁵ The term "professional investor" is as defined in the Securities and Futures Ordinance (Cap 571 of the Laws of Hong Kong) and its subsidiary legislation, the Securities and Futures (Professional Investor) Rules (Cap. 571D of the Laws of Hong Kong).

Investors with no prior investment experience in digital assets

1. Are real estate security tokens likely to face the same price volatility as Bitcoin?

In short, the highly volatility we see in Bitcoin and other cryptocurrencies is not likely to be a feature of real estate security tokens because the security tokens are asset-backed, meaning the price can largely be determined by the value of the underlying asset. This is in contrast to cryptocurrencies like Bitcoin which have no intrinsic value and therefore experience periods of significant volatility.

2. What technological infrastructure will be required to invest in security tokens?

Investors will need to have a digital wallet e.g. a custodial wallet provided by a licensed trust/ custody entity) to store their security tokens.

Also, as distributions (dividend/ coupon) can be made in the form of a stablecoin airdrop, investors may want to find a reliable off-ramp solution (e.g. crypto-fiat exchange) to convert their in-kind proceeds into fiat monies.



5. Future outlook of real estate STOs in HK and GBA

In the previous whitepaper, we argued that the outlook for real estate STOs in Hong Kong and the GBA is immense with both market and government-driven developments. Indeed, we are seeing a rising demand for office, logistics and industrial properties, driven by the strong regional GDP growth and government policies to develop free trade zones. We have also observed an increase of residential projects catering for senior living in light of the aging population.

Strong property growth outlook in the next 10 years

Hong Kong and the GBA being one of the world’s largest urban agglomerations, over the long run we see particular demand for real estate projects due to the strategy of interconnectivity laid out for the region. It is also well understood that the property markets in this region are heavily driven by government policies, and we have continued to see relevant development plans in the recent released policies.

Office growth in HK and GBA

Within the office sector, we have found that the high rates of GDP growth and high growth in office employment go hand in hand. In fact, expansion in office employment drives economic growth as much as economic growth drives demand for office space. Tier 1 cities in mainland China, such as Shenzhen and Guangzhou, are expected to maintain their high GDP growth until at least 2030. It should therefore be no surprise that Shenzhen also stands out globally in terms of office-based employment, with Guangzhou not too far behind.

As of end-H1 2021, combined Grade A office stock in Hong Kong, Guangzhou and Shenzhen stood at 20.2 million square metres. It is worth noting that the COVID-19 pandemic resulted in only a brief economic downturn in China, in H1 2020. Notwithstanding that minor blip, office space in Shenzhen and Guangzhou has been growing faster than expected, reflecting both a rapid recovery in demand and abundant supply, especially in Shenzhen.

Increasing demand for GBA grade A office stock

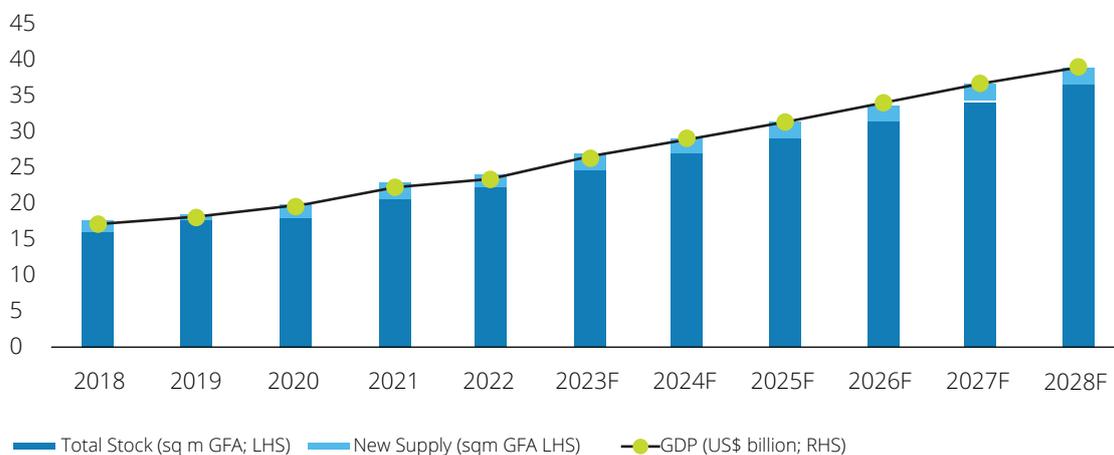


Figure 24: We forecasted an increasing demand for grade A office stock in HK and GBA.

Policy-driven large scale development projects

Government policies are a constant driving force of real estate development within Hong Kong and the GBA. Hong Kong alone has massive land development projects that have been announced for Lantau Island and Northern New Territories by former Chief Executive Carrie Lam in her 4th and 5th Policy Addresses respectively. Both projects that could take over 7 years to complete are expected to begin as soon as 2023, representing an aggregate value of over HKD1 trillion.

Below are some of the various large scale development projects taking place in Hong Kong SAR and GBA:

Premium Estates	Lantau Tomorrow Vision	Northern Metropolis	Julongwan, PRC	Zhongshan Theme Park, PRC
Value	HKD 624B	HKD 100B	HKD 85.69B	HKD 4B
Developer	Undetermined*	CK Asset, SHK, Henderson Land, New World	Guangzhou Pearl River Development Group Co Ltd, Swire Properties	Melco International Development, Agile Group Holdings
Location	Artificial islands near Lantau Island, Hong Kong SAR	Yuen Long District and North District, Hong Kong SAR	Julongwan, Liwan District, Guangzhou	Zhongshan, GBA
Estate type	Undetermined	Undetermined	Commercial	Residential, Commercial
Land size (sq. meter)	16 million	9.88 million	0.25 million	0.74 million
Project start	2025	2023	Undetermined	Undetermined
Expected completion	2032	Undetermined	Undetermined	2025

Figure 25: There are various large scale development projects taking place in HK and GBA.
 (Project values are estimated based on the costs to build infrastructure.)



Tightening lending policies hindering growth prospect for developer funding sources

Recently there have been more tightening measures imposed on property developers in China by the central government. Below we examine two key lending policies that affect the real estate sector.

Cap on real estate-related lending

Since 1 January 2021, the People's Bank of China and the China Banking and Insurance Regulatory Commission have required domestic banks to limit the ratio between outstanding property loans and total loans⁷. Under these restrictions, property-related loans of large Chinese banks have been limited to 40% of their total loans, while home mortgage loans can comprise no more than 32.5% of their total loans. Small to medium-sized Chinese banks and other financial institutions have been subject to even lower caps on the aggregate property-related loans and home mortgage loans.

Although the People's Bank of China eased these restrictions slightly by announcing on 8 February 2021 that bank loans to fund affordable rental housing projects are will be excluded from the calculation of lending ratios under the aforementioned property credit controls⁸, the restrictions imposed since 1 January 2021 are still applicable to all other types of property-related loans and home mortgage loans.

The "3 Red Lines"

In August 2020, the Chinese central government imposed the "3 Red Lines"⁹ on 12 pilot developers, which constrain their access to debt. In short, future access to financing will be predicated on a developers' adherence to the following criteria, each a "red line":

01. Liability-to-asset ratio (excluding advance receipts) of less than 70%
02. Net gearing ratio of less than 100%
03. Cash-to-short term debt ratio of more than 1x

When a developer fails to meet one or more of the red lines described above, regulators can impose limitations on the developer's allowable annual growth in debt. Developers are allowed to have a maximum annual growth in debt of 15% without breaching the three red lines, but this could be reduced to somewhere in the range of 0% - 10% depending on the number of red lines that the developer breaches.

⁷ Source: Reuters (<https://www.reuters.com/article/china-economy-property-idUSL1N2JB0B5>)

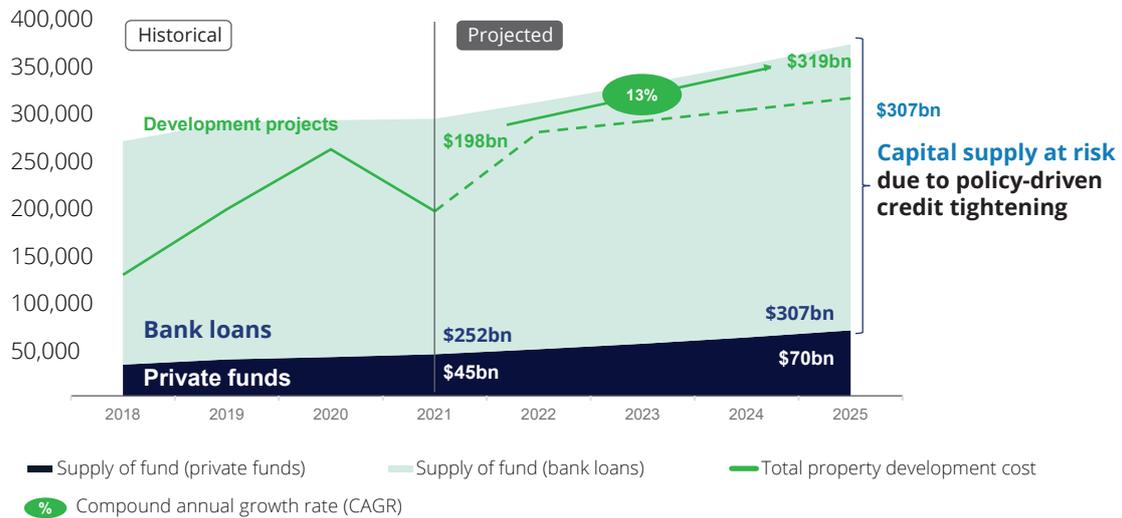
⁸ Source: PRC State Council (http://english.www.gov.cn/statecouncil/ministries/202202/09/content_WS62030c75c6d09c94e48a4d9c.html)

⁹ Source: UBS (<https://www.ubs.com/global/en/assetmanagement/insights/thematic-viewpoints/apac-and-emerging/articles/china-three-red-lines.html>)

Putting it all together: real estate STOs are well positioned to alleviate the at-risk capital supply in the next five years

Real estate STOs are well positioned to alleviate the capital supply at risk

GBA real estate development demand and supply of capital (in USD million)



Source: Lands Department (Hong Kong), Guangdong Bureau of Statistics, HKMA, CEIC, Preqin

Note: The land development demand and supply data from Macau are not factored in the calculation due to limited available data and the relative small size compared to Hong Kong and Guangdong.

Figure 27: There is a gap between expected capital needs (from growing office and policy driven projects) and existing secured capital.

Against the backdrop of a strong real estate sector in Hong Kong and GBA, we foresee that the demand for capital from developers to increase at a compound annual growth rate (CAGR) of 13% in the next five years. Analyzing the existing channels of the supply of capital from private funds and bank loans, we see a potential deteriorating credit environment due to the tightening policies and the strengthening interest rate environment, which hints that developers would need to seek alternative fundraising channels for projects to start in the next few years.

In this paper, we demonstrated the advantages of real estate STOs as the new capital raising avenue for developers from greenfield development projects to income-generating properties. We also illustrated the end-to-end process with two featured examples showcasing how real estate STOs can be structured, the key considerations for issuers and investors and the additional innovations that can be created to make the deals more attractive. With the vast flexibility offered by security tokens, we are optimistic and expect to see more innovative use cases for STOs pioneered by developers in the years to come.

Appendix. Illustration of project economics for income-generating property asset STOs

Project financing setup

For simplicity, we have prepared the case study using an assumed hybrid security token which has both debt and equity characteristics. This is not unlike mezzanine capital, which is a hybrid of debt and equity financing. While the precise characteristics remain to be determined, in reality, we expect that security tokens will be more clearly delineated between debt-style tokens and equity-style tokens.

Income-generating office asset

Key assumptions			
Gross floor area (sq ft, A)	400,000	Investment period	30 years
Unit price (HKD per sq ft, B)	15,000	Senior LTV ratio	50%
Monthly unit rent (HKD/sq ft/mth)	35	Disposal cost	1.5% of est. exit price
Occupancy rate (stabilised)	90%		
Management fee	Net	Cap rate	2.75%
NOI income	85% of rent	Terminal growth rate	2.00%
Acquisition price (HKD mn, A x B)	6,000.0	Discount rate	4.75%
Estimated exit price (HKD mn) (= terminal value in DCF)	11,125.0		

Source: Colliers, the above assumptions are for illustration purposes only.

A purchase of this type will typically be financed through a mixture of equity from the landlord or property investor, bank debt and mezzanine financing. Senior lending in Hong Kong is highly regulated by Hong Kong Monetary authority (HKMA), at a maximum loan-to-value (LTV) ratio of 50%. Mezzanine loans are a form of subordinated debt carrying far higher interest rates – typically 10-15% p.a. depending on asset type, asset income level and the landlord's credibility – and normally increase the LTV ratio by up to an additional 20-30%. In our example, we assume the following financial structure:

Acquisition financing, traditional method			
Form of financing	HKD 624B	% of total	Interest rate (%)
Equity	2,400.0	40%	nil
Bank debt	3,000.0	50%	2.5%
Mezzanine loans	600.0	10%	10.0%
Total	6,000.0	100%	3.8% (weighted average)

Source: Colliers

Let us assume that security tokens take the place of the bank debt and mezzanine financing. We expect that holders of the security tokens will require full redemption of the instruments at the end of the investment period as compensation for the risk of investment. In that sense, the tokens resemble debt. However, in place of payment of coupon interest (i.e., a fixed percentage of the principal loan), we assume that the holders will receive 70% of the net operating income of the office building. This is similar to real estate investment trusts (REITs), whose shareholders receive 90% of net rental income after tax distribution as dividend. In addition, we assume that the token holders will be entitled to 70% of any capital gain on disposal of the asset at the end of the holding period.

Using hybrid security tokens, the financial structure of the purchase will look like this:

Acquisition financing, with tokenization			
Form of financing	HKD mn	% of total	Return
STO holders	3,600	60%	Guaranteed: 70% of annual NOI and capital gain plus redemption of principal at project end
Equity	2,400	40%	Variable
Total	6,000	100%	n/a

Source: Colliers

Project economics under various financing mixes

We assume a holding period for the asset of thirty years. This is a reasonable assumption for a large property developer, although a financial investor would not normally hold a commercial property asset for more than about ten years. We present discounted cash flow (DCF) valuations of the asset under three different structures: 100% equity ownership, together with the traditional financing and tokenized structures outlined above.

Discounted Cash Flow, if 100% equity								
(HKD mn)	2022	2023	2024	.....	2049	2050	2051	2052
Year	1	2	3		28	29	30	31
Cash outflow	(6,000.0)							
Rental income	151.2	155.0	158.9		294.5	301.9	307.9	314.1
<i>Rental increase p.a.</i>		3.0%	3.0%		3.0%	3.0%	3.0%	3.0%
NOI	128.5	132.4	136.3		285.5	294.0	299.9	305.9
Terminal value*								11,125.0
Disposal cost								(166.9)
Net terminal value								10,958.1
Cash Flow	(5,871.5)	132.4	136.3		285.5	294.0	11,258.1	
<i>Running Yield</i>		2.2%	2.3%		4.8%	4.9%		
NPV	(99.7)							
IRR	4.67%							

* Estimated as (Year 31 cash flow / cap rate). Source: Colliers

Discounted Cash Flow, if traditionally leveraged								
(HKD mn)	2022	2023	2024	.....	2049	2050	2051	2052
Year	1	2	3		28	29	30	31
Cash outflow	(2,400.0)							
Rental income	151.2	155.7	160.4		335.9	345.9	352.9	359.9
<i>Rental increase p.a.</i>		3.0%	3.0%		3.0%	3.0%	2.0%	2.0%
NOI	128.5	132.4	136.3		285.5	294.0	299.9	305.9
Terminal value*								11,125.0
Disposal cost								(166.9)
Principal repayment								(3,600.0)
Net terminal value								7,358.1
Cash Flow	(2,406.5)	(2.6)	1.3		150.5	159.0	7,523.1	
<i>Running Yield</i>		(0.1%)	0.1%		6.3%	6.6%		
NPV	327.6							
IRR	5.27%							

* Estimated as (Year 31 cash flow / cap rate). Source: Colliers

Discounted Cash Flow, tokenized								
(HKD mn)	2022	2023	2024	.....	2049	2050	2051	2052
Year	1	2	3		28	29	30	31
Cash outflow	(2,400.0)							
Rental income	151.2	155.7	160.4		335.9	345.9	352.9	359.9
<i>Rental increase p.a.</i>		3.0%	3.0%		3.0%	3.0%	2.0%	2.0%
NOI	128.5	132.4	136.3		285.5	294.0	299.9	305.9
Annual dividend to token holders	(90.0)	(92.7)	(95.4)		(199.8)	(205.8)	(209.9)	0.0
Market value at (t)	6,170.8	6,341.7	6,512.5		10,783.3	10,954.2	11,125.0	
Capital appreciation	170.8	170.8	170.8		170.8	170.8	170.8	
Annual return (capital appreciation)	(3.4)	(3.4)	(3.4)		(3.4)	(3.4)	(3.4)	
Cash flow for distrib.	35.1	36.3	37.5		82.2	84.8	86.6	
Terminal value*							11,125.0	
Disposal cost							(166.9)	
ST repayment							(3,600.0)	
Net terminal value							7,358.1	
Cash Flow	(2,364.9)	36.3	37.5		82.2	84.8	7,444.7	
<i>Running Yield</i>		1.5%	1.6%		3.4%	3.5%		
NPV	372.3							
IRR	5.38%							

* Estimated as (Year 31 cash flow / cap rate). Source: Colliers

As illustrated via the above DCF valuations, the tokenized case has demonstrated the highest potential project return (IRR) beyond the other benefits addressed in the whitepaper.

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