

BOCHK 's Programmable Payment and Unified Wallet Use Cases Under Phase 2 of the e-HKD Pilot Programme

1. Overview

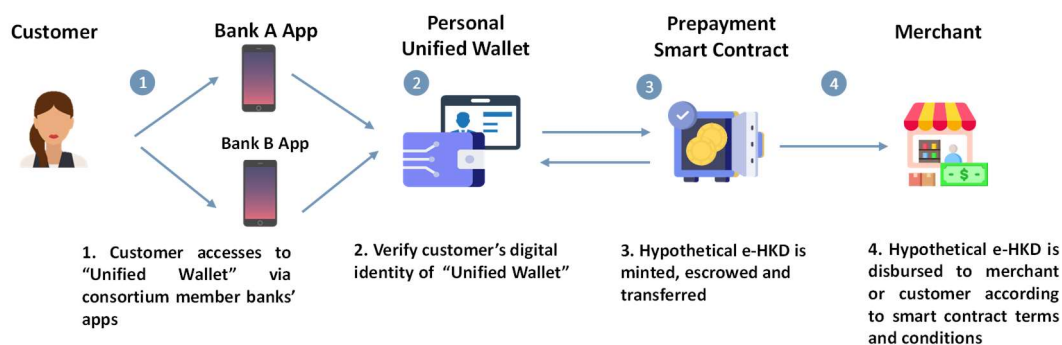
Bank of China (Hong Kong) ("BOCHK") has completed two potential use cases under Phase 2 of the e-HKD Pilot Programme, exploring the programmability feature of a hypothetical e-HKD that can be potentially used by individuals and corporates. BOCHK developed a private permissioned consortium blockchain infrastructure as the pilot prototype, with the aim of delving into the digital money ecosystem to be adopted by the public and private sectors, and examining the commercial viability and implementation challenges of a hypothetical e-HKD.

	Consortium Members	- The consortium, comprising a central banking institution, commercial banks, and an identity validator, assigns each member distinct roles and responsibilities, all bounded to a unified consortium governance and operation framework, to ensure effective collaboration and operational efficiency. - BOCHK has simulated all participating member nodes and operations mechanism. A renowned local bank has been invited as a node owner to provide feedback on the user experience.
	Blockchain Platform	- Assume that the consortium blockchain is interoperable with existing banking systems and compatible with different forms of digital money. - BOCHK has developed a blockchain platform including a smart contract management portal, a customer-facing interface, token issuance and transfer, as well as identity verification.
	Unified Wallet	- Each customer is provided with a dedicated personal "Unified Wallet", which is used for seamless on-chain digital identity verification. - Streamline the operation of wallet management across various banks in terms of wallet balance enquiry, wallet information checking and prepaid contract subscription via identity verification.

2. Use Case Design

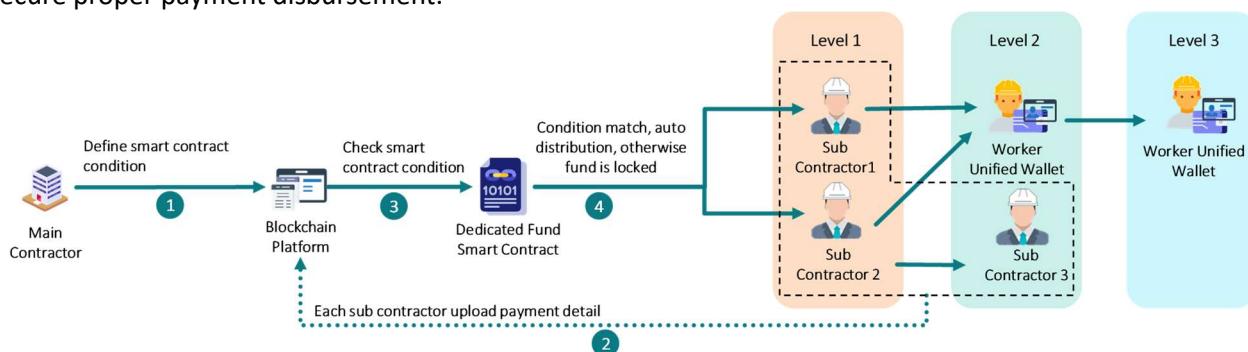
(A) Retail Prepayment

Drawing insights from Phase 1, BOCHK delved deeper into the application of prepayment services using blockchain technology and an "Unified Wallet" concept. Customers are provided with their own "Unified Wallet" upon successful identity authentication by the identity validator. Prepayments made in hypothetical e-HKD are secured by smart contracts, which ensure automatic execution of disbursements according to predefined smart contract terms and conditions established by the merchant. Throughout the transaction, customers and banks are required to perform dual-signature authentication to ensure security. If the merchant fails to honour the contract, any remaining hypothetical e-HKD is refunded to the customer.



(B) Dedicated Fund for Corporate Customers

BOCHK partnered with Sanfield (Management) Limited to simulate dedicated payments that are automatically transferred to designated accounts upon meeting predefined conditions of the smart contract, thereby protecting the rights and interests of all stakeholders. The construction industry operates in complex layers of employment contracts amongst main contractor, sub-contractors, and site workers. Main contractor and sub-contractors can establish smart contract execution rules based on their agreed payment distribution to minimise human intervention. At various construction project milestones, main contractor and sub-contractors can confirm and verify payment details, as well as streamline the approval process and secure proper payment disbursement.



3. Key Findings and Learnings

For (A) Retail Prepayment use case, pilot results and survey findings indicated that retail customers expected the new solution to improve financial protection, security, and trust. However, a structural tension remains: consumers are willing to make prepayments in hypothetical e-HKD only if more incentives are offered, while merchants are reluctant to offer more and are concerned about liquidity and cash flows. Unless these opposing expectations are reconciled, launching programmable prepayment schemes will be commercially challenging.

BOCHK's e-HKD+ pilot prototype details		Key findings of the survey		
1500 + Real-value transactions in more than a month	1 Large enterprise	82% respondents agree the Unified Wallet can simplify identity verification process	72% respondents consider automatic refund safeguard customer's right	93% respondents perceive hypothetical e-HKD can increase trust in prepaid services
Nearly 500 Individual participants	2 Commercial banks	Participants express equal importance of both privacy and performance	80% respondents indicate the discount level for hypothetical e-HKD should be 5% higher than existing digital payments	Merchants that are dependent on prepaid business or sufficient cash flow have less interest in escrow fund services

For (B) Dedicated Fund for Corporate Customers use case, focus group was conducted with construction contractors and pointed out that system integrations with core ancillary facilities are critically challenging and should be tested in the future, such as workers' attendance records, acceptance of works and material inspection results, to facilitate the utilization of smart contract for securing dedicated payments.

Should an e-HKD be extended to retail and corporate scenarios, the following aspects should be carefully considered:

Commercial Viability
- Reconcile the structural tension between customers and merchants for a wider adoption of programmable prepayment initiative - Programmable prepayment is suitable for large enterprises that have low reliance on liquidity - Discovery on more feasible and sustainable business use cases
Implementation Challenge
- Obtain the optimal balance¹ of performance & data protection when the emerging technology becomes more sophisticated - Afford the substantial costs associated with the technical development - The legal right of smart contract that locks hypothetical e-HKD in the escrow should be defined
Governance and Scalability
- Effective hybrid collaboration of trustworthy public and private sectors in a joint ecosystem - Appoint an accredited institution as the digital identity validator of "Unified Wallet" - Obtain full consensus on a united consortium governance framework and operating model - Support other types of digital payment instruments such as tokenised deposit, stablecoin and other forms of currencies

Note: ¹BOCHK has conducted research studies for privacy handling techniques that can be applied on consortium blockchain model, such as Hyperledger Besu, zk-Rollups and pseudonymous wallet address.