**DFCRC RESEARCH PROPOSAL**

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Australia Payments Plus

**LIQUIDITY ISSUES FOR TOKEN INTERCHANGE**

The programmability of digital tokens facilitates novel systems for automated, permissionless, continuous, and cross-border value exchange. Token-based systems support atomic settlement of transactions outside traditional banking and clearing infrastructures, and have begun to reconfigure commercial and regulatory structures in core financial jurisdictions. Token-based financial technology also supports a proliferation of different forms of tokenised “money” within a single currency denomination, challenging monetary singleness and traditional channels of maturity transformation and institutional liquidity management. The effective ability to interchange between tokenised monies, and between tokenised money and money in conventional payment systems, will take on increasing importance.

The proposed PhD research will investigate design options for token interchange schemes, monitoring and management controls, and potential failure modes. These will be evaluated through a combination of qualitative analyses and quantitative analytic and simulation-based methods. Evaluations will be carried out in the context of use cases sourced from the participation of Australia Payments Plus (AP+) in Project Acacia as a lead entity, and from future sandbox or innovation activities with AP+ and its member organisations. The research outcomes are intended to inform the future development of schemes for token interchange.

***How will the emerging digital token economy affect the management of institutional liquidity?***

* What are the liquidity requirements of digital token interchange systems?
* How do these requirements affect integration with existing financial market infrastructures?
* How can institutional *schemes* support resilient and efficient systems for digital token interchange?
* To what extent does the programmability of tokenised money and assets allow *schemes* to be implemented *as code*?

**Australian Payments Plus** (AP+) is the operator of Australia’s retail Payment Schemes; NPP, eftpos, and Bpay. These Schemes are unified multilateral arrangements that define payment systems rules and governance for Australian banks and payments providers. As the ‘neutral’ national industry body and Scheme operator, AP+ has a strategic objective in coordinating the integration of token-based technologies (and associated liquidity flows) into Australia's existing banking and payments architecture. This objective can be advanced through the development of an industry Future Payments Scheme to govern token-based interchange systems.

A Future Payments Scheme would follow the precedent set by Australia’s existing clearing and retail payment schemes; each being an industry response to a digital transformation in payments technology. New electronic systems (rails) have successively demanded the design of multilateral frameworks (rules) for their operation and governance. In the absence of a proactive strategy by Australian industry, non-domestic token-based financial products and services could attract significant domestic market share and potentially undermine demand for the domestic currency. An industry Scheme for token-based money and assets will support the competitiveness of member institutions and the stability of the domestic financial system – key national interests during a disruptive global transition.

The essential elements of a Future Payment Scheme are broadly outlined in three AP+ ‘use case’ submissions accepted by the Reserve Bank for Phase 2 (‘Experiment’) of Project Acacia:

**1.**   **NPP - Token Integration (Coin to Account / Account to Coin).** Enabled by the 2018 addition of the Fast Settlement Service (FSS) extension of RITS, the New Payment Platform (NPP) is the national infrastructure for 24/7 real-time interbank retail (low value) payments. While the NPP is a retail scheme, the infrastructure is general purpose and suitable for wholesale markets. AP+ proposes the introduction of an NPP on/off ramp for tokenised assets, enabling bi-directional transfer of value between tokens and fiat using ISO20022 and EVM standards. This use case explores how the NPP could be utilised to support digital asset settlement through the intermediation of ESA holders and the participation of SWIFT – the international financial messaging service that provides core infrastructure to the domestic NPP.

**2.**   **Token Interchange.** AP+ proposes to serve as the neutral operator of a public ledger-based platform for Scheme members to atomically swap stablecoins, deposit tokens and potentially other forms of tokenised money. The interchange will utilise an EVM-compatible tokenised mirror representation of Central Bank Money (“M0”) as cross-asset ‘hub token’ for settlement, employing smart contracts for token swapping. The interchange operates on a permissioned instance of Hedera Hashgraph and incorporates an inter-ledger bridge to Ethereum. Different implementations of this interchange resemble **Models A, C and E** from the **2024 Project Acacia Consultation Paper.** As the core component of a Future Payments Scheme, the Token Interchange service would support the singleness of the national currency, in the same manner that the use of ES balances to settle interbank payments preserves the fungibility of cash and deposits.

**3.**  **Settlement Coordinator Services.** Supporting services for NPP-token integration and token interchange, including key-management services, digital identity services (for KYC etc), Proof of Reserves, and general Scheme operation. This submission proposes to expand the range of wholesale entities utilising Scheme-backed tokenised money and the range of tokenised assets exchanged by these entities, exploring how liquidity for atomic settlement might be managed by Scheme participants across multiple chains and protocols. Another Project Acacia lead entity has since become the lead entity for this use case, with the experiment proposing to tokenise tradeable Certificates of Deposits and Annuities for Australian money markets, settling with a privately issued stablecoin.

The industry PhD project sponsored by AP+ aims to use these experiments as a basis for exploring the liquidity requirements of digital token interchange systems under alternative technical specification and operational rules. Effective liquidity is expected to be more challenging in a tokenised economy because it is needed on-demand within the context of individual atomic transactions, and because there can be greater liquidity fragmentation across multiple token platforms and existing financial market infrastructures. However the introduction of programmable collateral also has the potential to unlock transformative new sources of cross-border liquidity.

The project’s objective is to motivate and inform the design of a Scheme for token interchange that effectively manages liquidity across interoperable platforms and fully utilises these platforms’ programmability in its operations. The project will combine the modelling and simulation of liquidity networks under alternative scenarios with stakeholder consultation and practical experiments building upon the AP+ response to Project Acacia (including utilisation of the Future Payments Sandbox). The project will have three main components:

1. Review of institutional liquidity management under domestic and international payment schemes; review of the emergence of token-based platforms and protocols and criteria for their evaluation; review of tokenisation-related initiatives by systemically important financial institutions; review of relevant cross-disciplinary academic literature.
2. Evaluation of the impact of retail stablecoins (and their regulatory collateral requirements) on domestic and cross-border money markets. Scheme options for assessing operational liquidity requirements for token-fiat conversion. Evaluation of hub-token architectures and the use of common settlement assets for multilateral token exchange. Comparison of distributed ledgers and synchronisation mechanisms.
3. Simulation of the impact of money tokenisation on systemic liquidity and financial intermediation using networks of agents.  Simulations and adaption of financial stress-testing methodologies to multi-chain, multi-asset arrangements for programmable tokens and automated markets. Technical and operational Scheme design recommendations that effectively address failure scenarios and support monetary policy objectives.

The intended outcomes of this research project will include analytical frameworks and tools for liquidity monitoring and optimisation adopted for token interchange system, along with Scheme design recommendations that effectively manage financial risks emerging from these systems adoption and their integration with traditional infrastructures.