Monetary Authority of Singapore

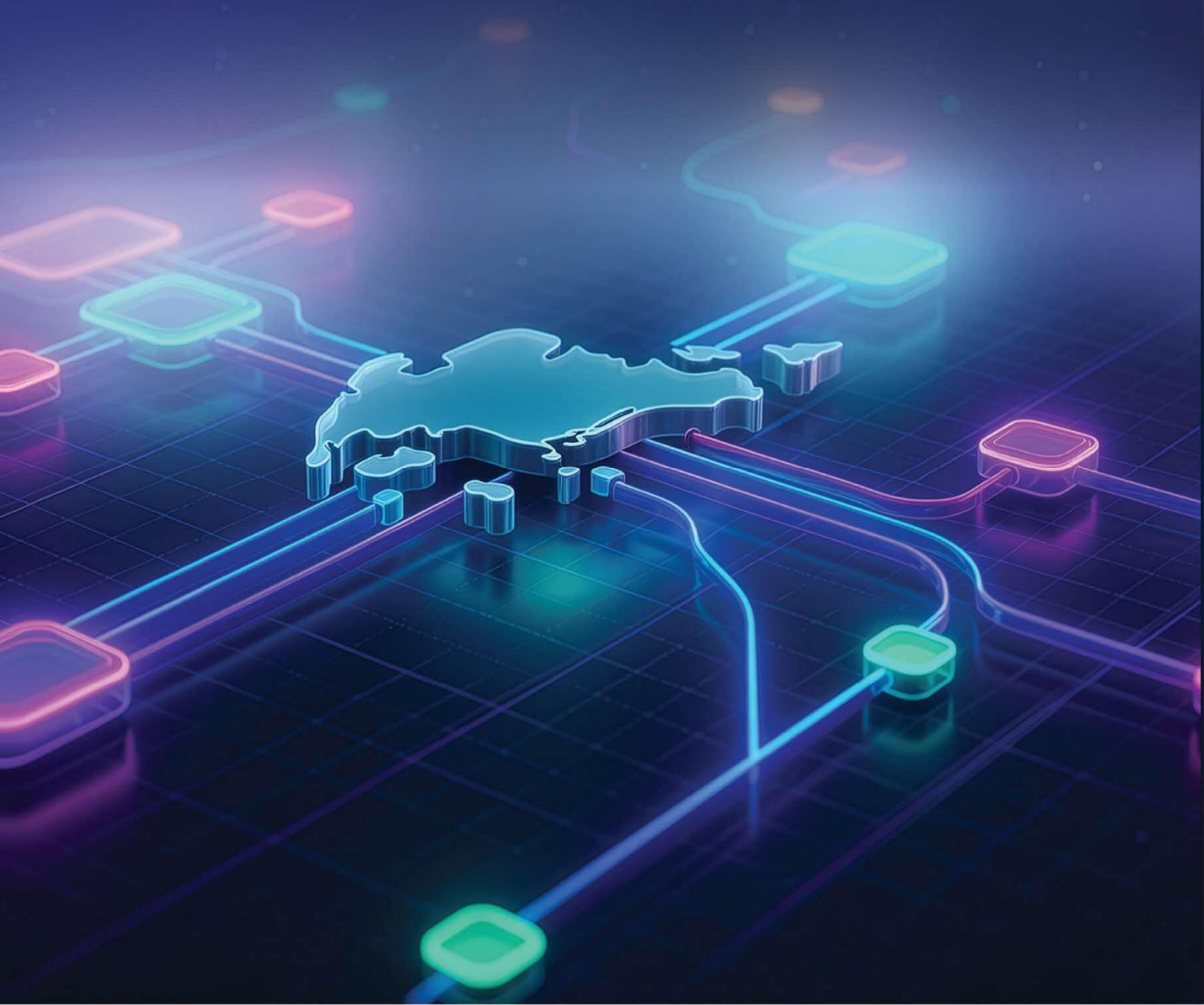
The Association of Banks in Singapore

PayNow Generation 2

Defining the next wave of innovation for Singapore's instant payments system

Phase 2 Report

November 18, 2026



Scope and objective of this paper

This report presents the findings of Phase 2 of the PayNow Generation 2 (Gen2) study, a joint initiative between the Monetary Authority of Singapore (MAS) and the Association of Banks in Singapore (ABS) to assess the feasibility of the priority enhancements identified in Phase 1, develop practical design choices, and advance them into implementation to strengthen Singapore's national payments infrastructure.

The findings are grounded in: (i) user validation through focus group discussions (N=48) testing appetite, trust and adoption considerations for selected propositions across Singapore residents, inbound tourists, e-commerce users, and merchants, complemented by MAS Behavioural Insights and Research Unit (BIRU) surveys of tourists (N=87) and Singapore consumers (N=559) on the tourist payment app and deep-linking propositions; (ii) international benchmarking of dispute resolution, surcharging, cross-border interoperability, and high-value and high-volume payment frameworks across 11 international jurisdictions; (iii) industry engagement and thought leadership through structured workshops and consultation with 37 organisations across banks, payment service providers, infrastructure operators, technology providers and other ecosystem participants; and (iv) early testing through proofs of concept and sandboxes for selected capabilities.

This report sets out MAS's proposed way forward and the key designs for each enhancement, to guide implementation and coordinate delivery across MAS, ABS and the broader payments ecosystem.

Chapter 5 looks beyond the immediate priority enhancements to the Future Payment Rails Blueprint, which will specify Singapore's broader e-payment rail plans, capabilities and infrastructure needed to support Singapore's next generation of payments.

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1. Preface

Phase 1 of the PayNow Generation 2 (Gen2) study reviewed PayNow's evolution since its 2017 launch, drawing on benchmarking against 11 international jurisdictions and engagement with 37 organisations across banks, payment service providers, marketplaces and government agencies. Released at the ABS Annual Dinner in June 2026, the Phase 1 report found that PayNow has become a widely adopted and trusted national payment method, with more than 9 in 10 Singaporeans and about 350,000 business entities registered on the scheme, and set out priorities for PayNow's next evolution:

1. Seamless, safe and inclusive payments
2. More connected QR payments in Singapore and overseas
3. Enabling Singapore's future economy

Phase 1 of the PayNow Gen2 study benchmarked Singapore against leading payment jurisdictions and identified critical gaps that must be closed for Singapore to remain at the forefront of payments innovation.

Phase 2 sets out an implementation roadmap to close these gaps expeditiously. MAS will lead this next phase of implementation, working with industry and public sector partners. The objective is to deliver the next generation of PayNow, and to strengthen the capabilities and foundations needed for the continued transformation of Singapore's payments infrastructure.

PayNow Gen2 is an important next step in the transformation of our national payment rails. The capabilities established through this programme will provide the foundation for the Future Payment Rails Blueprint, through which MAS will chart the next phase of Singapore's payments infrastructure for an increasingly digital, interconnected and automated economy.

2. Executive summary

Phase 2 sets out the implementation roadmap for PayNow Gen2, with seven enhancements to be delivered progressively between 2026 and 2028. Together, these enhancements will close the critical capability gaps identified in Phase 1, to make payments simpler, safer and more accessible for consumers and merchants, strengthen domestic and cross-border interoperability, and enable smarter business and government payments.

The seven enhancements achieve three priorities:

- Seamless, safe and inclusive payments: Inclusive QR apps will broaden access to digital payments for users, such as inbound visitors and some Singapore residents, who may not have ready access to Singapore's banking or payment apps. Deep-linking will simplify online PayNow checkout by reducing the manual steps between merchant or government checkout and the user's banking or payment app. High-value and high-volume payment enhancements will extend PayNow to selected larger-value government payments and improve the reliability of large-scale disbursements. PayNow P2M scheme rules will establish clearer and more consistent arrangements for disputes, refunds, fraud and scam recovery.
- More connected QR payments in Singapore and overseas: The SGQR+ switch will progressively connect domestic and regional payment schemes, including enabling interoperability between PayNow QR and NETS QR. Customers will be able to use participating payment apps at more merchants without having to determine which QR network the merchant accepts. In parallel, merchants can reach customers across a wider range of participating apps through their existing acceptance arrangements. As SGQR+ expands to more regional and global networks, it will also widen QR payment connectivity for visitors to Singapore and Singaporeans travelling overseas.
- Enabling Singapore's future economy: Micropayments/FAST-LITE will develop and test lower-cost processing approaches for very small, high-frequency transactions, including emerging automated payment use cases. Smarter business payments will introduce richer payment information to support automated reconciliation and more efficient business processes, while establishing tokenised payment credentials for recurring and contactless payments. Together, these capabilities will enable businesses to programme and automate their payment processes.

PayNow Gen2 will be advanced through a progressive roadmap, delivering foundational improvements in the near term, while building the capabilities required for more significant enhancements. MAS will drive the implementation of these enhancements working with industry and public sector partners to jointly deliver the following:

- Available / underway in 2026:
  - Selected tourist payment options are available, while deep-linking is already being used in some e-commerce and government payment journeys.
- 2027: Build the foundations and begin rollouts:

  PayNow Gen2 progresses into implementation across several enhancements:
  - Deep-linking: Common industry standards and a central facility will be developed by end-2027, enabling customers to pay directly from merchant checkout to participating banking and payment apps.
  - QR Interoperability via the SGQR+ switch: An initial rollout will connect the first participating QR schemes and support live transactions.
  - High-value and high-volume payments: A limited trial with one government agency will enable eligible government payments above today's PayNow transaction limit.
  - Smarter business payments: Richer payment information will begin to be introduced to support automated payment matching and reconciliation.

  - Micropayments/FAST-LITE: Testing to assess how very small, high-frequency payments can be processed economically.

- 2028: Expand adoption and reach:

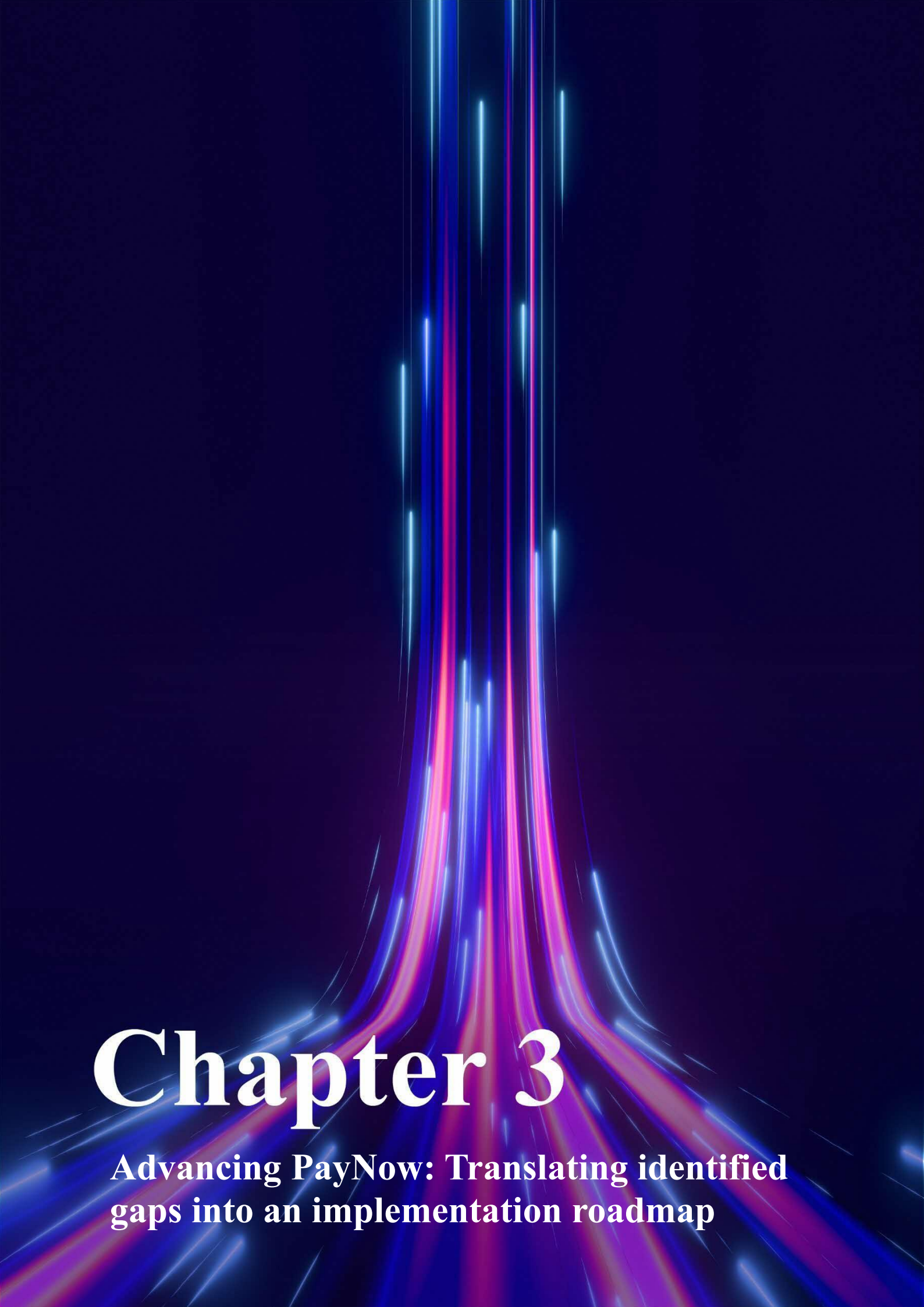
  The capabilities introduced in 2027 will be progressively extended:

  - Deep-linking: PayNow checkout will expand across more participating merchants, government services, banks and payment apps.
  - QR Interoperability via the SGQR+ switch: Interoperability will expand across local networks, including PayNow and NETS, before progressively extending to regional connections.
  - High-value and high-volume payments: Higher-value PayNow payments will extend to selected additional government agencies.
  - PayNow P2M scheme rules: Clearer and more consistent arrangements for disputes, refunds, fraud and scams will be introduced in stages.
  - Smarter business payments: Businesses and government agencies will be able to use richer payment information to reduce manual reconciliation and automate processing.

MAS will lead the next phase of PayNow's evolution, working with SPaN and the payments industry to put in place the payment standards, scheme rules, operating arrangements, infrastructure and safeguards needed to deliver the seven PayNow Gen2 enhancements.

Delivering the roadmap will also require a broader uplift in Singapore's payments capabilities. The governance, product, technology and engineering capabilities needed to implement PayNow Gen2 and Future Payment Rails will be strengthened in SPaN, BCS and MAS. These capabilities will then sustain continued innovation in Singapore's payment infrastructure. This involves establishing clear organisational accountabilities, establishing and building dedicated product and engineering capabilities, and adopting more modern ways of designing, developing and operating payment services.

PayNow Gen2 marks an important step in strengthening Singapore's payments capabilities and preparing for the next phase of transformation. Building on this foundation, MAS will develop the Future Payment Rails Blueprint from 2027 to shape the next generation of Singapore's payment rails and supporting infrastructure for an increasingly digital, interconnected and automated economy, while ensuring they remain resilient and trusted.



Chapter 3

Advancing PayNow: Translating identified gaps into an implementation roadmap

3. Advancing PayNow: Translating identified gaps into an implementation roadmap

3.1. Enhancing PayNow across the payment journey

Phase 1 identified critical gaps between PayNow's current capabilities and those of leading payment jurisdictions, spanning advanced payment initiation, cross-scheme QR interoperability, higher-value and high-volume payments, scheme-level dispute workflows, structured payment data and the ability to introduce new capabilities more rapidly. Phase 2 moves from identifying these gaps to closing them, translating the three priorities established in Phase 1 into seven enhancements and a phased implementation roadmap.

These enhancements address different parts of the payment journey, from who can pay and how payments are initiated and accepted, to the types of payments that can be supported, the protections available when something goes wrong, and how payment information can support greater automation. These enhancements will be translated into common standards, infrastructure, scheme rules and operating arrangements.

1. Inclusive QR apps will make Singapore's digital payment ecosystem more accessible through new, purpose-built payment apps for inbound visitors and residents who may not have ready access through existing banking and payment apps.

2. Deep-linking will simplify mobile PayNow payments by taking customers directly from an e-commerce or government checkout into their banking or payment application, reducing manual steps in the payment process.

3. QR interoperability via SGQR+ switch will allow customers to use their preferred participating payment app at more merchants, while enabling merchants to reach customers across multiple participating schemes through a more connected acceptance network. It will also support broader QR acceptance across borders.

4. Micropayments/FAST-LITE will develop and test lower-cost processing approaches for very small, high-frequency payments that today's infrastructure was not originally designed to process economically at scale, enabling emerging usage-based, machine-initiated and AI-driven use cases.

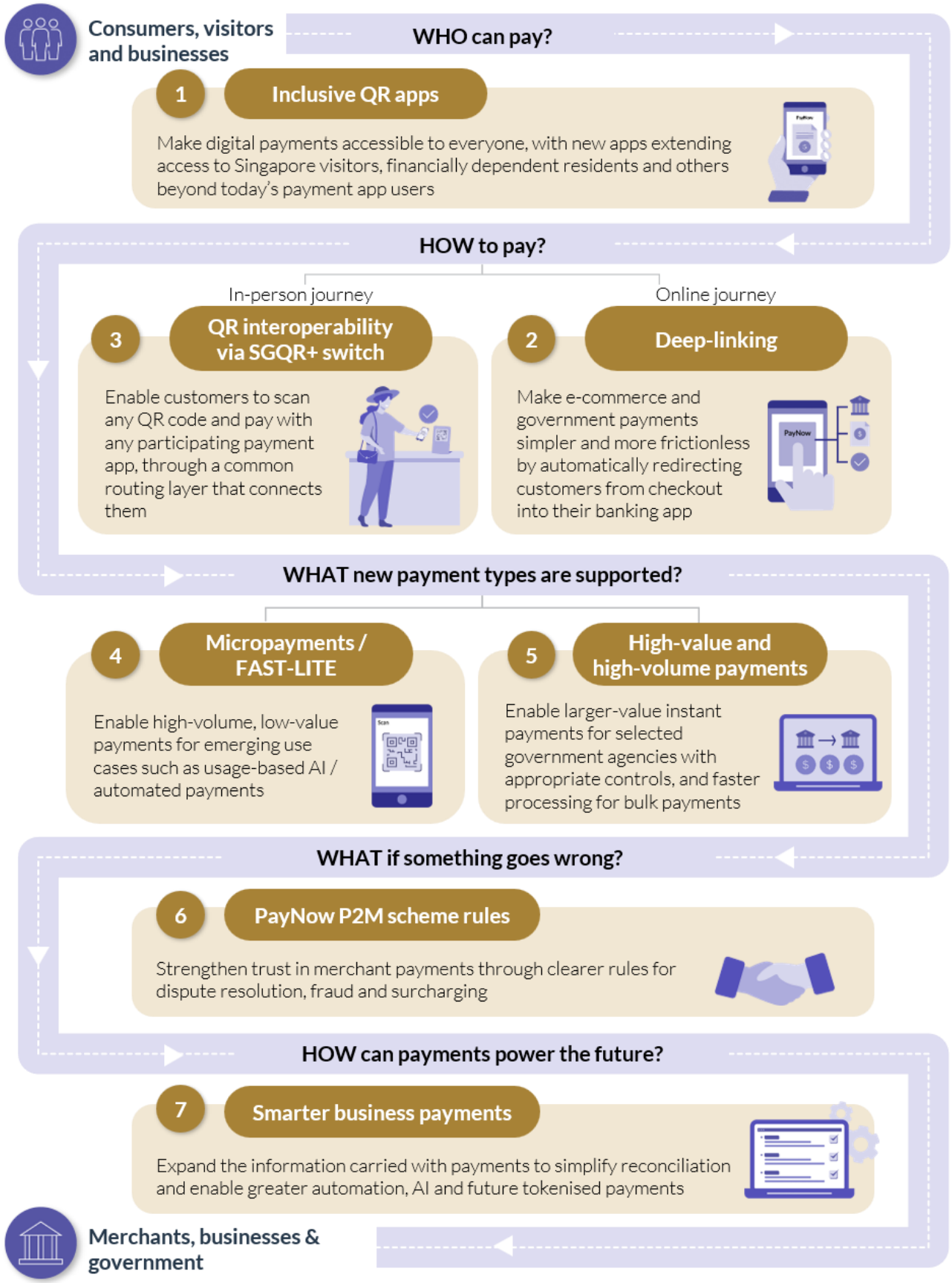
5. High-value and high-volume payments will extend PayNow to selected larger-value government payments through targeted higher limits and improve the speed and reliability of large-scale disbursements.

6. PayNow P2M scheme rules will establish clearer and more standardised approaches to disputes, fraud and scam recovery, and surcharging, strengthening confidence for consumers and merchants.

7. Smarter business payments will introduce richer payment information to support automated reconciliation and more efficient business processes, while testing tokenised payment credentials for recurring and contactless payments.

Exhibit 1

How PayNow Gen2 expands the possibilities for digital payments



3.2. Key priorities guiding PayNow Gen2

The enhancements build on the Phase 1 priorities, translating them into practical areas for PayNow's continued development. Together, they address the most immediate gaps in PayNow's capabilities while establishing foundations that can support further payment innovation over time.

Exhibit 2

Phase 2 builds on the priorities established in Phase 1

Phase 2 builds on the Phase 1 priority themes through 7 enhancements

Seamless, safe & inclusive payments

Enable frictionless and trusted everyday payments that extend access to all



Global interoperable payments

Expand payment reach across apps, schemes and borders



Enabling Singapore's future economy

Build scalable, data-rich rails for emerging payment use cases



1 Inclusive QR apps

Interoperable apps that enable locals and tourists to scan and pay seamlessly, with an exploration of NFC-based offline payment resilience

Industry partners

2 Deep-linking

Deep-linking that auto-directs users directly into their banking app at checkout for e-commerce and government payments, supported by a single registry of merchant and agency deep-links

Industry partners

5 High-value and high-volume payments

Higher transaction limits, and faster bulk payments through processing-lane design and capacity management, for government and financial institution use cases

SPaN

6 PayNow P2M scheme rules

Enhancing and standardising dispute, fraud and surcharging rules to strengthen user confidence in payments

SPaN

3 QR interoperability via SGQR+ switch

A national switch routing QR payments across domestic and cross-border schemes and refined QR scheme rules for seamless QR interoperability

SPaN

4 Micropayments/FAST-LITE

Low-cost micropayments rail to enable high-volume, low-value payments at appropriate per-transaction cost economics, starting with a sandbox implementation

BCS Industry partners

7 Smarter business payments

PayNow tokenisation and enhanced payment data fields designed for businesses and financial institutions

BCS Industry partners

3.2.1. Seamless, safe and inclusive payments

The immediate priority is to broaden access, simplify payment journeys and strengthen safeguards as PayNow supports a wider range of users and payment needs. Inclusive QR apps will extend access for users who may not be readily served through existing banking or payment applications, while deep-linking will simplify the path from online checkout to payment. High-value and high-volume enhancements will extend PayNow to selected larger-value government payments and improve the reliability of large-scale disbursements.

New payment experiences are already emerging through Inclusive QR apps and deep-linking. Further options and support for all Singapore residents are being developed, while some payment options for inbound tourists are available. Deep-linking is also being used in selected e-commerce and government payment journeys, simplifying the path from checkout to payment. The next stage is to broaden these experiences and establish the common foundations needed to support them at scale. For deep-linking, common industry standards can support more direct and consistent online payment journeys across participating providers, while the detailed scope of the central deep-linking facility and respective responsibilities remain to be determined in consultation with the industry. Customer education and trusted payment journeys will also be important to adoption, including helping customers recognise legitimate payment links and visitors understand how to access and use Inclusive QR apps.

High-value and high-volume payments will address different payment needs. Higher transaction limits could extend PayNow to selected payment types currently constrained by the SGD 200,000 limit, beginning with government collections. A targeted limit model is planned for testing through a limited trial, while retaining the existing limit for other PayNow payments. In parallel, work on high-volume payments could explore faster processing of large-scale disbursements by separating bulk traffic from time-critical payments and managing processing capacity accordingly.

For PayNow person-to-merchant (P2M) payments, the next stage is to strengthen common arrangements for dispute resolution, including clearer rules, evidence and data requirements, service standards and digital workflows. SPaN (Singapore Payments Network) will provide scheme governance and oversight for this work. For customers and merchants, this could provide a more consistent dispute experience, with clearer processes and, in certain cases such as technical disputes, the potential for faster resolution. The broader PayNow P2M scheme rules are expected to be introduced progressively.

Over time, further improvements to the payment experience could include enhanced QR controls, such as allowing a QR code to expire after a set period or be used only once, giving merchants and users greater control over payment instructions. As payment initiation becomes increasingly automated, agentic commerce could allow authorised software to initiate and complete payments on a user's behalf. This would require clear identity and consent arrangements, delegated authority, spending limits, validity periods and revocation, alongside appropriate monitoring and intervention. Micropayments functionality could provide part of the processing foundation for such high-frequency activity, while further scheme rules and payment controls would be needed to support software-initiated transactions safely.

3.2.2. More connected QR payments in Singapore and overseas

SGQR+ will provide the common interoperability layer needed to connect participating QR payment schemes while preserving existing payment networks, acquiring relationships and merchant arrangements. The immediate priority is to make PayNow QR and NETS QR work more seamlessly together through SGQR+. For consumers, this means being able to use a preferred participating banking or payment app at more participating merchants without checking which QR scheme is accepted. For merchants, this means reaching customers using a wider range of participating apps while retaining their existing acquiring relationships. The same foundation can subsequently connect more local and regional QR networks.

To deliver this experience, participating payment schemes will need common arrangements for routing payments, participation, settlement, fees, refunds, disputes and fraud management. Existing PayNow QR and NETS QR arrangements, merchant relationships and bilateral cross-border links will continue to operate as

SGQR+ is introduced. The switch will provide an additional connection between participating schemes rather than require merchants or payment providers to replace their existing arrangements.

A limited rollout in 2027 will connect an initial group of participating schemes and test live payment journeys. In 2028, the service will expand in scope, starting with broader interoperability between local networks, including PayNow and NETS, and progressively adding regional connections. As participation grows, consumers will be able to use participating apps at more merchants; merchants, including small businesses, will be able to accept payments from a wider pool of local customers and visitors through their existing QR acceptance arrangements.

Beyond the current interoperability work, further opportunities could extend participation and connectivity across the payments ecosystem. Broader participation could allow additional banks, including foreign banks operating in Singapore, and non-bank payment service providers to participate through tiered or sponsored arrangements, while maintaining clear access, settlement and liability frameworks.

Interoperability with emerging forms of digital money could also become increasingly relevant as tokenised deposits and other digital money models develop. This would require wallet connectivity, transaction routing, clearing and settlement, and supporting compliance arrangements. Potential use cases include programmable payments, where tokenised funds or assets are released automatically when predefined conditions are met, such as verified delivery milestones or government subsidies restricted to specific purposes.

3.2.3. Enabling Singapore's future economy

PayNow Gen2 will develop the capabilities needed for new transaction patterns and increasingly automated business processes.

Micropayments/FAST-LITE will develop and test lower-cost approaches for very small, high-frequency payments while maintaining interoperability with Singapore's existing payment infrastructure. Payments simulator testing is planned to assess two potential approaches: a cost-optimised rail for economical processing of micropayments, and a programmable settlement layer using tokenised deposits, delegated payment authority and interoperable clearing and settlement. The results will inform the viability and potential progression of these approaches.

Smarter business payments will extend the information carried with PayNow transactions to support invoicing, reconciliation and other business workflows. Enhanced payment data fields are expected to progress towards implementation, providing more structured information for businesses and government agencies. These capabilities could also provide a foundation for greater automation and, over time, emerging use cases involving AI-driven, tokenised and programmable payments.

As payment activity becomes more diverse, automated and embedded in digital workflows, further opportunities could extend PayNow into a broader range of business processes. Request to Pay could allow merchants or billers to send payment requests for payer review and approval. Deeper integration with billing and enterprise systems, supported by standardised APIs and developer tools, could reduce manual processing and support new business services built around payment data and real-time payment flows, including credit assessment for MSMEs with limited traditional credit history, liquidity management and working capital solutions.

Resilience and continuity will become increasingly important as digital payments become more embedded in everyday economic activities. Beyond conventional infrastructure redundancy and disaster recovery, further work will focus on developing offline payment capabilities to enable essential digital payments to continue during disruptions to connectivity or the underlying payment infrastructure.

3.3. Implementation roadmap, 2026 to 2028 and beyond

As PayNow Gen2 progresses, these enhancements represent the current priorities for its next stage of development.

Implementation will proceed in phases from 2026 to 2028 and beyond, reflecting the different levels of maturity across the seven enhancements. Capabilities already available or underway provide the starting point in 2026. In 2027, MAS and industry will develop common standards and shared infrastructure, commence targeted trials and limited rollouts, and introduce richer payment data. In 2028, key capabilities will expand across more users, merchants, payment networks and government agencies.

2026: New payment experiences reach users

- Inclusive QR apps: Inclusive QR apps are available to the broader population for everyday QR payments, with targeted features for Singapore residents and inbound visitors. New options are being introduced for Singapore residents[1], supporting greater independence in everyday payments with appropriate family oversight. Some visitor payment options are already implemented[2], with further options expected to follow, helping visitors "pay like a local".
- Deep-linking (Phase 1): Selected e-commerce and government payment journeys[3] currently employ deep-linking, allowing customers to move directly from checkout into their banking app to complete a PayNow payment.

2027: Foundational development and initial adoption

- Deep-linking (Phase 2): Development of common industry standards to support more consistent and direct journeys from online checkout into participating banking or payment apps. A central deep-linking facility is targeted for pre-release in late 2027.
- QR interoperability via SGQR+ switch (Phases 1-2): A limited rollout will connect an initial group of participating QR schemes and test live transactions. This will lay the foundation for PayNow and NETS QR interoperability and subsequent regional connectivity.
- Micropayments/FAST-LITE: Development of a payments simulator to support Micropayments/FAST-LITE development and assess the viability of a potential lower-cost, high-frequency payment rail.
- High-value and high-volume payments (Phase 1): Initial limited trial of higher-value PayNow payments, beginning with the first government agency in late 2027.
- Smarter business payments (Phase 1): Richer PayNow payment information is targeted to be introduced from end-2027. This will allow banks and payment providers to begin developing services that help businesses and government agencies match payments to invoices and automate reconciliation.

2028: Broader rollout and adoption

- Deep-linking (Phase 3): Progressive launch of the central deep-linking facility is planned commencing early 2028, building on its targeted pre-release in late 2027.
- QR interoperability via SGQR+ switch (Phase 3): SGQR+ will expand first across local networks, including PayNow and NETS, so users of participating apps can pay at more participating merchants without checking which QR scheme is accepted. Regional connections will progressively widen the payment options available to visitors in Singapore and Singaporeans overseas. For merchants and SMEs, broader

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1 Examples include the enhanced NETS app, which offers sponsored wallets with spending limits for financially dependent residents.

2 Examples of visitor payment options already available include Wise and the enhanced NETS app, which enable inbound visitors to make PayNow QR payments at participating merchants.

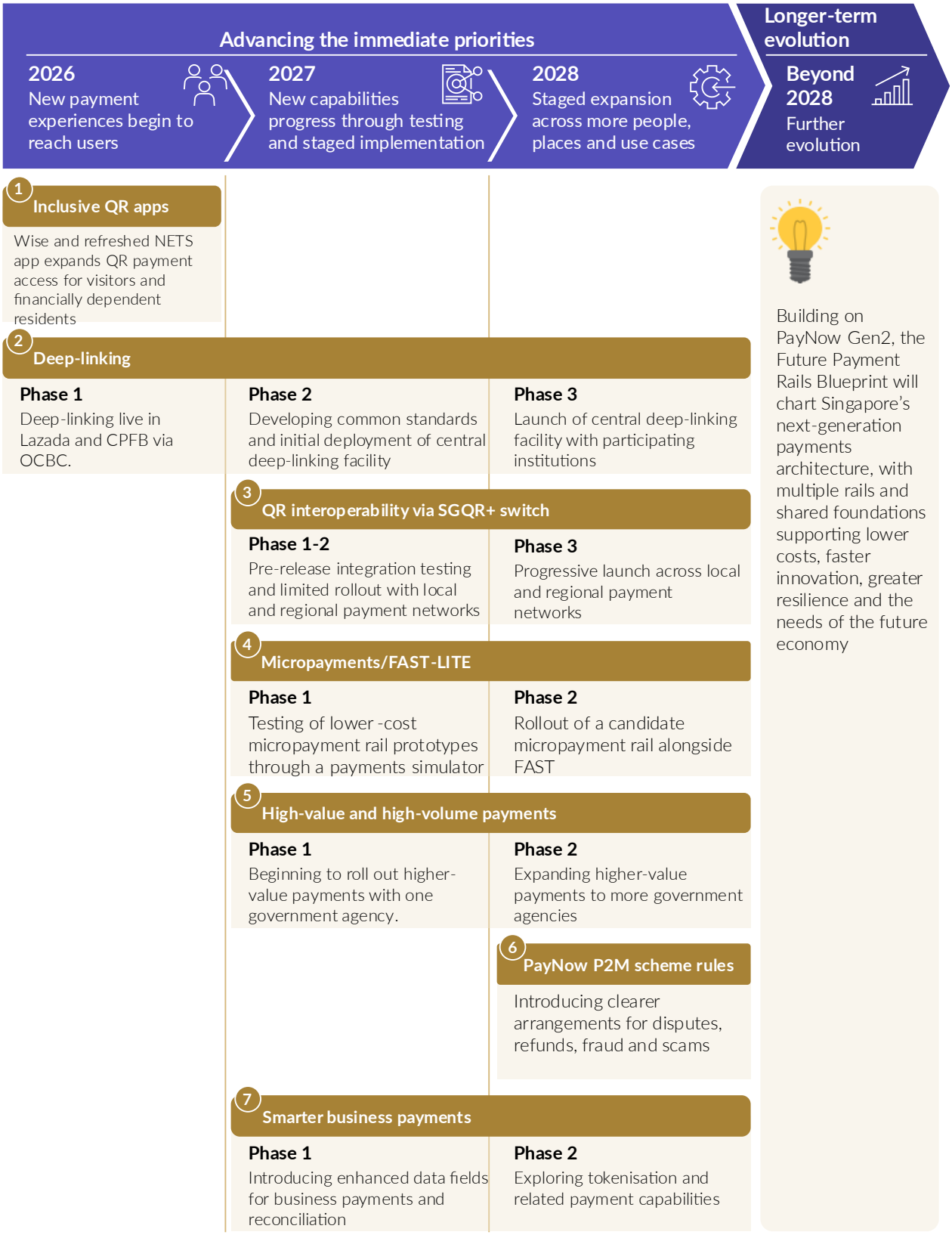
3 Examples of deep-linking currently in use include direct PayNow checkout on Lazada for OCBC customers, and payments to the Central Provident Fund Board (CPFB) through OCBC's mobile banking app.

participation means being able to accept payments from a wider pool of local customers and visitors through their existing QR arrangement.

- High-value and high-volume payments (Phase 2): Expansion of higher-value PayNow payments to additional government agencies, extending the use of PayNow to a broader range of larger-value government transactions.
- PayNow P2M scheme rules: Introduction of clearer and more consistent arrangements for handling disputes, refunds, fraud and scams, providing greater clarity and confidence for consumers and merchants as the broader P2M scheme rules are introduced in stages over 2028.
- Smarter business payments (Phase 2): Services using richer PayNow payment information can begin to be offered, helping businesses and government agencies reduce manual payment matching and automate reconciliation. Exploration of tokenised payment credentials and other future business-payment capabilities will continue separately.

Exhibit 3

PayNow Gen2 implementation roadmap, 2026 to 2028 and beyond



3.4. Building the capabilities to deliver PayNow Gen2

Delivering the PayNow Gen2 roadmap requires more than implementing individual enhancements. It requires building the capabilities to continually develop and improve Singapore's payment infrastructure as technology, business models and user needs evolve.

MAS will lead this capability uplift, working with SPaN, BCS, and industry and public sector partners. This includes clearer organisational accountabilities, stronger product and engineering capabilities, and more modern approaches to designing, developing and operating payment services.

These capabilities will support the delivery of the PayNow Gen2 enhancements while strengthening Singapore's ability to introduce new payment capabilities more rapidly as technology and user needs evolve. In this way, PayNow Gen2 will not only deliver the current implementation roadmap, but also establish an important foundation for the longer-term transformation of Singapore's payment infrastructure and the Future Payment Rails Blueprint.

3.5. Findings informing PayNow Gen2 Phase 2

Phase 2 brings together four complementary sources of evidence to inform the design of the enhancements and validate key choices as they progress towards implementation.

User validation tests how people and merchants respond to proposed payment experiences. Focus group discussions with 48 participants across Singapore residents, inbound tourists, e-commerce users and merchants explored interest, trust and willingness to adopt Inclusive QR apps, deep-linking and QR interoperability via SGQR+ switch. These were complemented by MAS BIRU surveys of 87 inbound tourists and 559 Singapore consumers, providing additional quantitative evidence on the tourist payment app and deep-linking propositions. Across the research, participants valued simpler journeys and broader payment access, while emphasising the importance of trust, control and clear payment confirmation. The findings also reinforced that new propositions are most compelling when they provide clear additional value over payment methods that users already find familiar and convenient.

International benchmarking informs how payment systems globally have approached similar opportunities and design choices, including dispute resolution, surcharging, cross-border interoperability, and high-value and high-volume payments. Key jurisdictions have adopted different models depending on their existing infrastructure, market structure, degree of standardisation, participant roles and specific payment needs. These approaches provide reference points for the design choices facing Singapore.

Key insights from global peers show how payment systems are evolving to support broader payment needs. For dispute resolution, leading schemes are strengthening common rules and processes for disputes, fraud and payment errors, while participating institutions continue to investigate and resolve individual cases. For high-value payments, jurisdictions use different transaction-limit models, with some allowing higher limits for selected payment types to balance flexibility and risk. For cross-border QR payments, bilateral linkages remain common across Southeast Asia, while newer connectivity models are emerging, including shared hubs that connect multiple payment systems and jurisdictions. For high-volume payments, jurisdictions use different approaches beyond capacity expansion alone: participants schedule or stagger bulk payments, some systems separate bulk from time-critical transactions, while others move non-critical activities, such as reconciliation, outside the core payment process.

Industry engagement and thought leadership bring perspectives from across the payments ecosystem into the development of the enhancements. A consistent theme has been to build on Singapore's existing payment infrastructure and relationships where they work well, while developing the common standards, rules and responsibilities needed as new capabilities scale.

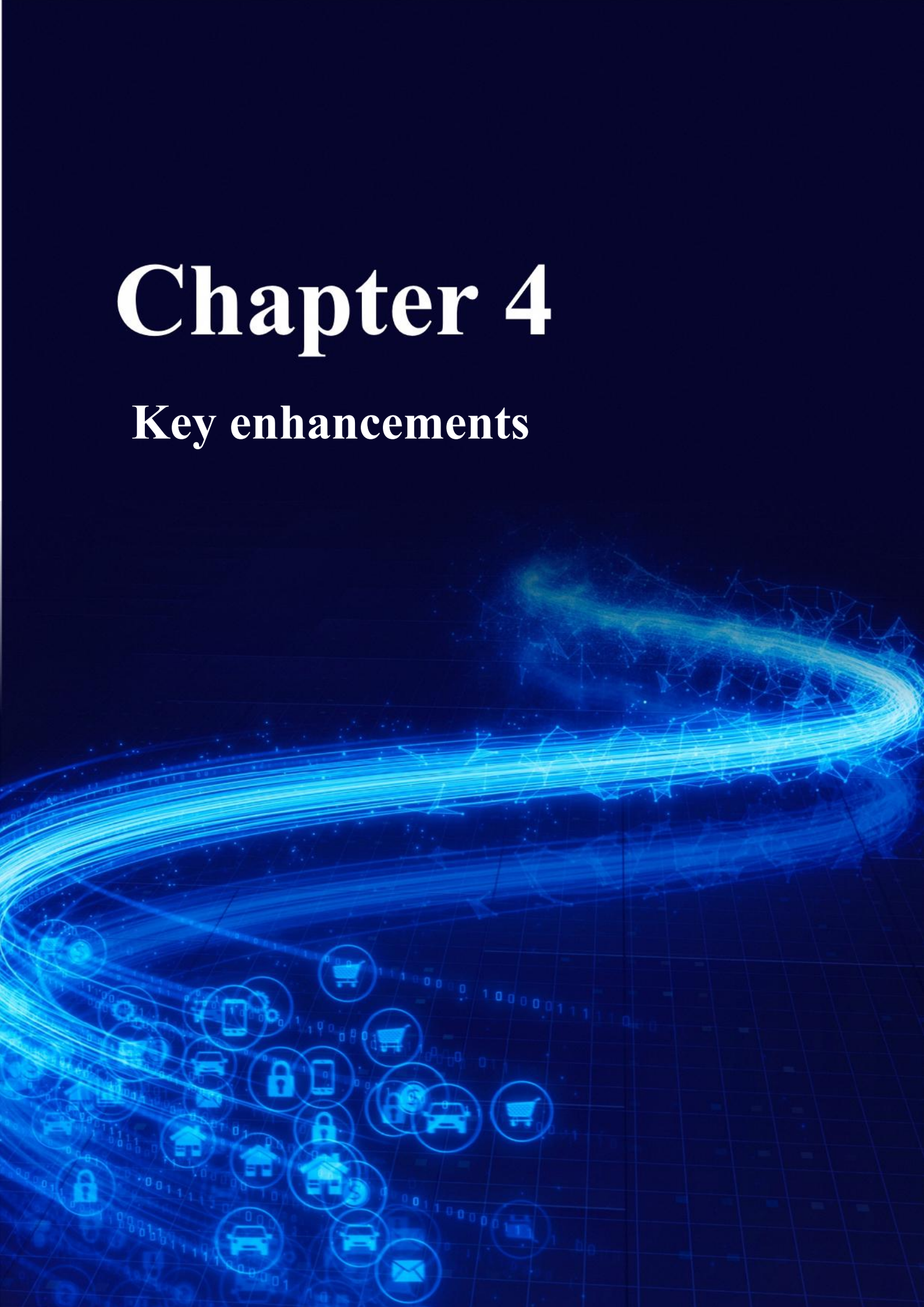
Proofs of concept and payments simulator testing put selected capabilities into practice before staged rollout, allowing their design, operation and infrastructure requirements to be tested in a controlled environment.

Rollout is expected to be staged, starting with a share of participating banks, users or merchants and widening over time.

Further detail on the findings from these validation activities is set out in Chapter 4 and the supporting appendices. Together, these inputs will continue to inform the enhancements as they move towards implementation and broader adoption.

Chapter 4

Key enhancements



4. Key enhancements

4.1. Inclusive QR apps

4.1.1. Singapore context

QR payments have become a familiar part of everyday commerce transactions in Singapore, supported by the widespread adoption of PayNow and SGQR. More than 9 in 10 Singaporeans and around 350,000 business entities are registered on PayNow, giving most users access to local QR payments through existing banking and payment applications. The remaining PayNow access gap is limited to a smaller group of users: selected dependants, such as young adults and seniors, who may rely on another person to fund or manage their spending, and inbound tourists who are more accustomed to using cards and whose usual payment methods are not accepted at some hawkers and small merchants.

4.1.2. Key gaps and opportunities

Most residents already have effective QR payment access, supported by widespread adoption of PayNow and SGQR. The remaining access gap is limited to selected dependants and visitors whose usual payment methods are not accepted at some hawkers and small merchants.

For selected dependants, including some youths and elderly family members, there is an opportunity to provide greater independence in everyday payments where they currently rely on a parent, guardian or caregiver to fund or manage their spending. A separate payment balance could give the dependant greater control over everyday spending while allowing the sponsor to set spending limits, view transactions and apply appropriate controls. Features such as separate balances, spending limits and transaction visibility could complement existing payment options where a genuine caregiver need exists.

For inbound visitors, internationally issued cards already provide convenient payment access across much of Singapore. MAS BIRU's survey of 87 inbound tourists found that 78% used cards as their primary payment mode in Singapore, while respondents reported few major payment difficulties. The gap for Inclusive QR apps is therefore limited to circumstances where visitors' usual payment methods may be less readily usable, such as hawker centres and smaller merchants where some visitors currently rely on cash. The survey also found meaningful interest in the proposed tourist app, with 49% of respondents expressing positive interest. At the same time, the findings suggest that adoption would depend on the proposition providing sufficient incremental value over existing payment options.

4.1.3. Key considerations

Two complementary propositions could extend access to QR payments for the user groups identified above: a sponsored payment instrument for selected dependants, and a locally usable payment instrument for visitors whose usual payment methods may not be readily usable in some everyday settings. Both would provide access to a funded payment instrument, but would require different approaches to funding, controls and delivery.

Sponsored payment access for selected dependants

For selected dependants, one option is a sponsoring arrangement in which an authorised sponsor, such as a parent or guardian, funds and oversees the dependant's payments. The sponsor could fund a separate balance, set spending limits and monitor transactions, while the dependant uses the instrument for everyday payments without accessing the sponsor's principal bank account.

Phase 2 focus group discussions highlighted that a viable sponsoring arrangement would need sufficient controls to balance payment independence with sponsor oversight[4]. Spending limits were the most consistently selected feature, while transaction notifications and visibility over transaction records were also valued by participants. Separate balances and approval above specified thresholds were identified as additional features that could be considered. The appropriate combination of controls would vary by user: younger dependants may benefit from greater sponsor oversight, while elderly dependants may place greater emphasis on visibility and safeguards. Secondary approval could also introduce friction in some situations, with one participant noting that requiring approval for individual payments could be impractical. The design would therefore need to distinguish the core sponsoring arrangement from the supporting controls, which can be calibrated to provide an appropriate balance of independence and oversight.

A second consideration is where the sponsoring arrangement should be offered: within an existing banking app or through a separate payment app. The choice would need to consider the features already available through banking apps, as well as trust in the provider and ease of use for both sponsors and dependants. Further testing would help determine which approach works best for different users before launch.

Local payment access for inbound tourists

Some merchants, including hawker stalls, may accept only cash or selected local payment apps, leaving visitors from markets without a connected QR corridor, such as Japan, the UK and the US, reliant on cash. One option is a mobile application or digital wallet that would enable inbound tourists to make QR payments using an overseas funding source, without requiring a Singapore bank account.

Focus group discussions with 12 visitors across six markets, including Australia, Mainland China, Japan and the United Kingdom, highlighted that the proposition should be simple and convenient for short-stay visitors.

- Funding model: Participants generally preferred using their own card as the underlying funding source rather than pre-loading a balance; a card-linked model would need to take account of card-scheme rules, transaction classification and commercial viability.
- Simple onboarding: Registration should be proportionate to the length of the visit, with participants identifying lengthy registration and the need for a Singapore mobile number as potential barriers.
- Transparent pricing and balance management: Fees and foreign-exchange rates should be clearly communicated, with a straightforward way for visitors to recover any unused balance at the end of their visit.
- Limits and responsibilities: Further consideration would be needed on wallet or transaction limits and the allocation of customer due diligence responsibilities between any common framework and individual providers.

Payment capability could be offered through a dedicated visitor application or incorporated into an existing local payment application, with more than one provider potentially serving the use case. Another option is for licensed Singapore payment providers to partner with overseas providers, enabling visitors to pay at participating Singapore merchants using their existing overseas payment applications. The licensed Singapore provider would remain responsible for meeting local scheme requirements and operational controls.

For a locally provided application, trust in the provider could also influence adoption: 76% of tourists surveyed indicated they would be more likely to trust a Singapore Government-backed app, while 70% said they would be more likely to download one[5]. Awareness and accessibility would also be important, given the short duration of many visits, with government agencies, issuers, card schemes and travel-related partners identified as potential channels. Language support could also broaden accessibility.

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[4] PayNow Gen2 Phase 2 focus group discussions (five sessions, 48 participants, four cohorts of 12). Findings are qualitative and directional. Methodology is set out in Chapter 6.12.

[5] Same internal MAS BIRU survey of inbound tourists (N=87).

4.1.4. Way forward

The next step is to translate the two inclusion enhancements into workable designs that can be assessed with industry.

For dependants

- Eligibility and sponsorship: clarify who can participate and who can act as a sponsor.
- How it will work: a sponsoring arrangement (e.g. administrator, dependant/parent-child) should be offered through a banking app or payment app.
- App Controls: determine what financial controls are needed for different dependent requirements.

For inbound tourists

- Funding model: determine the appropriate approach to funding the solution.
- Onboarding and identity verification: develop a simple and proportionate onboarding process for short-stay tourists.
- Limits and pricing: determine appropriate wallet or transaction limits and provide transparent fees and foreign-exchange rates.
- Balance management: provide a straightforward way for tourists to recover any unused balance at the end of their visit.

Industry participants would need to develop the relevant capabilities and controls for both propositions, while access to participating merchants would need to align with the interoperability work set out in Section 4.3. For inbound tourists, the visitor payment proposition can provide an interim route to local QR acceptance while broader interoperability expands access to participating home payment applications.

QR payment options for Singapore residents and inbound tourists are being introduced in 2026, building on options for inbound tourists that are already available[6]. The delivery model, eligibility and supporting controls for the dependant proposition will continue to be refined through further development and testing.

For inbound tourists, the ambition is to make everyday payments in Singapore feel as simple and familiar as they do for residents, so that they can move through daily life, from hawker centres to neighbourhood merchants, with the confidence to "pay like a local".

Taken together, they would extend digital payment access to users who may not be well served by existing arrangements, while preserving a simple, trusted and accessible payment experience as PayNow reaches a broader range of users and circumstances.

[6] The Wise app is available to visitors in Singapore, and the enhanced NETS app was released in November 2026.

4.2. Deep-linking

4.2.1. Singapore context

Online shopping and e-commerce are becoming more prevalent, and PayNow's current online checkout requires customers to leave the merchant page and switch to their banking or payment app, adding manual steps that can contribute to drop-offs. Deep-linking simplifies this by taking customers directly from checkout to their banking or wallet application, with payment information carried across for review and authorisation.

The same model can support government collections, although these use cases may require additional arrangements around eligibility, audit and reconciliation, and payments by organisations. Early evidence from a live implementation suggests that shorter payment flows can improve completion rates and reduce completion time[7].

4.2.2. Key gaps and opportunities

PayNow lacks a common cross-provider deep-linking standard. The current journey requires manual app switching and QR handling: customers may need to save or screenshot a QR code, leave the merchant page, open their banking or payment application and import the QR code before reviewing and authorising the payment. These additional steps can contribute to drop-offs during checkout.

In Phase 2 focus group discussions, participants were asked where the PayNow journey could be made more seamless, and they identified the e-commerce merchant checkout with the PayNow banking or payment application as the clearest opportunity for simplification, particularly removing the manual steps involved. The MAS BIRU survey of 559 Singapore consumers reinforced and quantified this finding: 66% rated the enhanced journey as easy or very easy, compared with 50% for the current journey, while 38% reported having abandoned a PayNow purchase previously[8]. The main friction points identified were app-switching (71%), saving QR codes (57%) and uploading QR codes (48%). At the same time, the survey suggests that reducing friction alone may not materially shift established payment preferences: while 50% said they would use the enhanced PayNow journey more, only 13% of current non-users indicated an intention to use PayNow following the enhancement.

The enhancement is therefore unlikely by itself to convert many current non-users; its value lies in streamlining the PayNow checkout journey by removing unnecessary steps between the merchant page and payment. For customers, this could make payments faster and more convenient, while for merchants, a simpler checkout journey could reduce drop-offs and support higher payment completion. This should be achieved while preserving the features customers value, including control, security and clear payment confirmation.

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[7] "Deep-linking for Digital Payments: Bringing Government Services & E-Commerce Into the Mobile-Journey Age," Antom / 2C2P by Antom (Chapter 6.2 of this report). Across observed deployments, payment success rate rose from 84.64% to 93.73% and completion time fell from 61.72 to 50.80 seconds. Results are directional.

[8] Internal MAS BIRU survey of Singapore consumers (N=559).

4.2.3. Key considerations

Potential operating models for enabling PayNow deep-linking

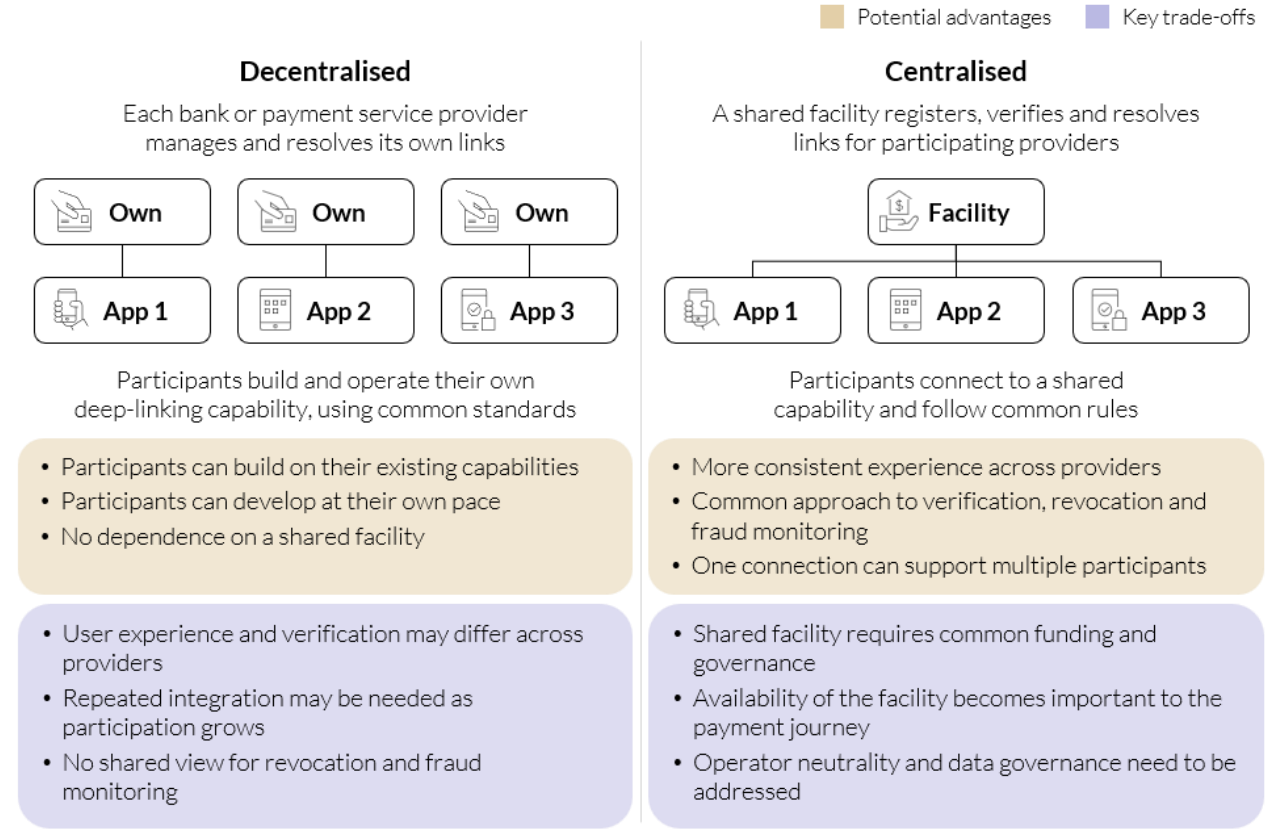
The opportunity for deep-linking is to make PayNow checkout simpler by taking customers directly to their banking or payment app with payment details pre-filled, while preserving safeguards against phishing and link misuse. The design therefore needs to consider both the seamlessness of the payment experience and the trust required for customers to complete the transition with confidence. As participation expands, the key design choice is how this connection should be organised:

A. Decentralised model: Participating institutions and payment service providers connect directly with each other, either under common scheme-level standards or through bilateral arrangements. This can allow participants to implement deep-linking at their own pace and retain control over their connections, but requires separate integrations as participation expands and can result in differences in implementation and service levels across providers.

B. Centralised model: Participating institutions and payment service providers connect once to a shared facility that applies common standards and processes. This can reduce repeated integration, provide greater consistency across participants and make it easier to expand coverage as new participants join, but requires greater upfront coordination and shared investment, and creates a common dependency whose resilience, governance and ongoing operation would need to be managed across the ecosystem.

Exhibit 4

Two operating models for PayNow deep-linking differ in how links are managed, with implications for consistency, resilience, governance and cost



Source: PayNow Gen2 international benchmarking; industry consultations

The design will need to balance the benefits of different operating models with the common standards and technical requirements needed for a scalable and trusted deep-linking capability.

Trade-offs between the models

The choice of model involves trade-offs across merchant reach, implementation, cost and technical performance:

- Merchant reach: In a decentralised model, merchants need additional integrations to reach customers across more participating providers. A centralised facility could provide access to customers across participating providers through a common connection.
- Speed to implementation: A decentralised model can allow individual participants to launch without waiting for shared infrastructure to be established. A centralised model requires greater upfront coordination but can reduce the integration required as participation expands.
- Cost: A decentralised model can require less shared investment upfront, but integration and maintenance are repeated across individual connections. A centralised model requires investment to build and operate the shared facility but can reduce duplication as more participants and use cases are added.
- Availability: Decentralised architectures provide greater fault isolation, as an issue with one participant's resolver would not necessarily affect others. A centralised facility could create a broader point of dependency if the shared service becomes unavailable.
- Performance and latency: Decentralised resolution can avoid an intermediary and reduce network hops. A centralised facility may introduce additional latency where the shared service needs to interact with the originating provider.
- Resilience and operational complexity: Decentralisation distributes infrastructure maintenance, incident management and upgrades across participants, while centralisation simplifies integration but creates a more complex shared platform to operate and recover.
- Scalability: Decentralised participants can scale their infrastructure according to their own demand, while a centralised facility must accommodate peak aggregate traffic, including simultaneous bursts across participants.

International experience

International examples illustrate different approaches to standardisation:

- India: UPI defines a common intent mechanism and deep-link standard at scheme level[9]. The National Payments Corporation of India (NPCI) also operates the central switch through which every transaction is processed, while individual banks and payment apps build their own customer-facing checkout journey to that standard.
- Brazil: Pix centralises the addressing directory (DICT) and settlement rail (SPI), both operated by the central bank[10]. Payment initiation and the customer journey take place within the customer's own bank or payment app.
- United Kingdom: Open Banking provides a common set of API, security and customer-experience standards, underpinned by a central Open Banking Directory that provides a trust framework for regulated participants[11]. Individual account providers and third-party providers continue to operate their own customer-facing services and payment journeys.

[9] "Circular on bank compliances to enable the UPI merchant ecosystem," National Payments Corporation of India, 2017.

[10] "Fast Payments Toolkit: Brazil Pix Case Study," World Bank, May 2022.

[11] "Open Banking Directory," Open Banking Limited.

Common design foundations

Whichever model is adopted, some elements are likely to benefit from common standards. These include:

- Link format and payment parameters
- Verification, expiry and revocation
- Resolution and presentation of participating applications
- Payment status returned to the merchant

App selection is also a design consideration. Standard iOS and Android links open an associated application, while offering customers a choice across multiple participating apps requires an additional resolver or equivalent mechanism[12]. On-device app detection also differs by operating system, making a consistent installed-app-only experience more difficult to implement across devices.

User and participant requirements

Customer experience and trust

The customer interface needs to balance simplicity, choice and user control. Focus group participants generally saw value in making a preferred payment application easy to select, including through a user-selected default for repeat payments. At the same time, participants wanted to retain the ability to choose another participating application when needed.

Automatically detecting which applications were installed on the customer's device raised privacy concerns for some participants, suggesting that convenience should not depend on device-level personalisation that customers do not expect or understand.

Across the discussion, the more consistent requirement was not a particular chooser layout but a journey that remained recognisable and under the customer's control. Participants wanted to see the merchant and payment amount clearly before authorisation and to complete authentication within their banking or payment application.

Trust remains important as the journey becomes more seamless. Some participants were initially cautious about an automatic hand-off into their banking application, reinforcing the importance of a clearly recognisable transition and familiar bank authentication. The design should preserve visibility of the merchant and amount before authorisation, particularly as some participants continued to prefer cards for higher-value purchases because of rewards and perceived dispute protection.

Recent QR-code scam experience in another ASEAN country, where malicious QR codes have been used to redirect users to fraudulent websites, payment gateways or applications, further illustrates the importance of trusted link verification and rapid revocation[13]. This reinforces the need for strong controls, but does not by itself determine where those controls should sit.

Merchant considerations

For merchants, the value of deep-linking varies by payment context and business model. Higher-volume merchants saw clearer value in reducing customer steps and manual handling, while others saw less incremental benefit from shortening an already workable journey.

Across the discussions, the more consistent merchant need was reliable payment confirmation and sufficient reference information to match payments to orders. Merchant adoption will therefore depend not only on a

[12] "Allowing apps and websites to link to your content," Apple Developer Documentation; "About App Links," Android Developers.

[13] "QR code scams on the rise in Malaysia: police," The Star, republished by Asia News Network, September 3, 2026.

simpler checkout experience, but also on operational benefits and a viable commercial model, particularly given sensitivity to incremental payment costs.

Government payments

Government payments can use the same underlying initiation model, with the customer moving directly from an agency payment page into the banking application and relevant payment details carried across for review and authorisation. This can remove the same screenshot, app-switching and return-to-page friction seen in e-commerce, while allowing authentication and authorisation to remain within the banking application.

Government use cases may, however, introduce additional requirements around eligibility and permitted uses, audit and reconciliation, constraints on funds resting with an intermediary, and payments made by organisations as well as individuals. These requirements need to be accommodated within the common design rather than through a separate deep-linking architecture.

Governance and operational model

Governance and accountability

A shared deep-linking capability would also require clear governance over the common standards, shared infrastructure and participating institutions. The governance model would need to clarify ownership and accountability for the shared facility, responsibility for setting and maintaining common standards, oversight of participant access and compliance, and responsibility for operational performance and incident management. The appropriate allocation of these responsibilities will depend on the degree of centralisation adopted and remains to be determined.

The governance model would also need to determine whether common standards operate as scheme requirements or voluntary guidance and establish clear responsibilities and liability for failures in the deep-linking journey, including incorrect routing or payment-status information.

Resilience and servicing

Resilience and servicing arrangements also need to be considered alongside standardisation. A common registry or shared standards layer could support functions such as participant registration and trusted verification, while payment providers would continue to handle the customer-facing authentication, authorisation and payment processes within their own applications. Industry participants also raised the option of retaining direct-to-bank connectivity as a fallback if a central gateway is unavailable.

The domestic eGIRO experience was also cited as a servicing consideration, where issues can become harder to diagnose when banks, merchants and an intermediary each see only part of the transaction chain.

Overall consideration

International experience illustrates different ways of distributing these functions between shared infrastructure and individual participants, rather than pointing to a single model for Singapore. The relevant consideration for Singapore is therefore how a common standards and registry layer can support trusted, consistent participation while payment providers retain responsibility for the customer-facing payment journey. The more transferable consideration is whether the chosen approach can combine common standards and trusted verification with broad participation, clear governance, manageable operational dependencies and a consistent customer experience.

4.2.4. Way forward

PayNow Generation 2's roadmap provides for the development of a central deep-linking facility for PayNow, supported by common industry standards, while allowing for existing bilateral deep-linking arrangements to continue alongside the shared capability. Its detailed scope and allocation of functions will be defined in

collaboration with the industry. The deep-linking model will ensure neutrality, resilience and effective governance, with clear roles and responsibilities for the facility operator.

The first priority is to establish what should be common across the market. Industry standards could define how links are created and resolved, how their origin and payment details are verified, and how payment status is returned to the merchant. These foundations would support a more consistent experience across banking and wallet applications while allowing flexibility in how the capability is implemented. Security, authentication and governance should form part of these common foundations, alongside the technical standards needed to support a consistent and trusted payment experience. Existing deep-linking arrangements can continue to develop in the near term, while aligning with common industry standards as these are developed to support wider adoption. Common industry standards for deep-linking are targeted for release in 2027, covering link format and payment parameters, verification, expiry and revocation, app resolution and payment status returned to the merchant.

The second priority is broad participation and trust. Banks and payment service providers need to support the standard within their applications, while merchants need a practical way to issue deep links without multiple provider-specific connections. Customers should also be able to recognise a legitimate deep-linking journey, including understanding when they are being taken into their banking app rather than redirected to a browser page. Customer education and appropriate security and monitoring controls will therefore be important alongside the technical capability.

In 2027, work will focus on developing common deep-linking standards and a central deep-linking facility, with initial deployment targeted for late 2027 and a progressive rollout beginning in early 2028. The facility's detailed scope, operating model, governance, responsibilities and controls will be developed with industry, including how existing bilateral connections will coexist with the shared capability. Progress could be assessed against agreed outcomes, including merchant reach, payment completion, reliability and the consistency of the customer experience across participants. Establishing these measures early would provide a basis for assessing the effectiveness of the model as participation grows.

4.3. QR interoperability via SGQR+ switch

4.3.1. Singapore context

SGQR was introduced in 2018 to bring multiple QR payment schemes together under a single QR label, simplifying how merchants present QR payments. SGQR+ was introduced in 2024 to extend this beyond QR presentation by enabling merchants to accept payments from multiple participating schemes through a single acquirer[14]. For consumers, the payment experience remains broadly unchanged, but they can use their preferred participating payment application at more merchants.

Cross-border QR acceptance has also developed through a mix of bilateral and commercial arrangements, including links between NETS QR and QR schemes in Malaysia, Indonesia and Thailand[15]. Commercial initiatives have also extended this reach. For example, Liquid Group's RoamQR, which builds on the SGQR+ initiative, connects participating payment applications with overseas QR networks including WeChat Pay in China, KHQR in Cambodia, VietQR in Vietnam, SeoulPay and JejuPay in South Korea, and Pix in Brazil[16]. The next phase aims to make QR payments more widely usable across schemes and markets, so customers can use their preferred payment applications at more merchants in Singapore and overseas, while merchants can reach more customers through a simpler and more connected acceptance network.

4.3.2. Key gaps and opportunities

QR payments are widely available, but acceptance remains fragmented across schemes. Industry input and Phase 2 research point to three current gaps:

- Inconsistent acceptance and unclear acceptance cues: Customers cannot always use their preferred application at every QR-enabled merchant, and acceptance cues are not always clear at the point of payment. Some QR-led merchants and consumers may fall back on cash where their preferred payment method is not accepted.
- No common cross-scheme operating arrangements: There are no common arrangements across schemes for refunds, disputes, reversals and reconciliation, adding complexity as transactions span schemes.
- Repeated integration as cross-border reach expands: Bilateral linkages have extended Singapore's QR connectivity across markets, but each new link requires repeated onboarding, integration and operating arrangements across schemes and acquirers[17].

[14] "Singapore introduces world's first unified payment QR code," Monetary Authority of Singapore, September 17, 2018; "MAS to launch SGQR+ proof of concept to enhance interoperability for QR payments," Monetary Authority of Singapore, October 31, 2023; "SGQR+ islandwide rollout," NETS, November 7, 2024.

[15] "Launch of cross-border QR code payments connectivity between Malaysia and Singapore," Bank Negara Malaysia and Monetary Authority of Singapore, March 31, 2023; "Launch of cross-border QR payments linkage between Indonesia and Singapore," Monetary Authority of Singapore and Bank Indonesia, November 17, 2023.

[16] "Where can I use LiquidPay?," Liquid Group Help Centre; "Liquid Group Rolls Out roamQR to Link E-Wallets and QR Networks," Fintech News Singapore, November 7, 2024.

[17] "ASEAN's Digital Payment Revolution: A New Frontier for Regional Integration," IMF Selected Issues Paper SIP/2026/013, International Monetary Fund, February 2026.

4.3.3. Key considerations

International experience shows that QR interoperability can be achieved at different layers of the payment stack. Domestically, markets range from common national QR schemes to shared routing infrastructure across existing schemes. Cross-border, interoperability has developed through bilateral linkages, multilateral hubs and multi-network switches, with different implications for connectivity, routing, settlement, foreign exchange and scheme rules.

Domestic QR interoperability

Singapore already has a common QR presentation layer through SGQR. The proposed SGQR+ switch would add interoperability at the routing layer, connecting existing payment schemes and merchant networks while retaining their underlying infrastructure and operating arrangements[18].

Malaysia and India illustrate more consolidated models. Malaysia established DuitNow QR as a common national QR standard supported by shared clearing and settlement infrastructure, while allowing banks and wallets to retain their customer-facing applications and branding[19]. India went further by establishing UPI as a unified national scheme and common payment infrastructure, with participating banks and third-party applications operating on the same rail and interoperable QR framework[20].

The key difference is therefore the layer at which interoperability is introduced. A common national scheme can create greater consistency across acceptance, routing and scheme rules, but requires greater consolidation of infrastructure and operating arrangements. The proposed SGQR+ approach instead introduces common routing across existing schemes.

Within this model, a further choice is the degree of routing centralisation. A centralised switch can provide a common connection point, more consistent routing and greater transparency, while a more decentralised model retains greater control with existing networks and makes fuller use of current infrastructure. Industry discussion also raised whether these approaches could be sequenced over time.

Cross-border QR interoperability

Cross-border QR connectivity has developed through three broad models, which differ in how domestic payment schemes connect across markets and how responsibilities are divided between schemes and participating banks or payment service providers (PSPs).

A. Bilateral linkages

- How it works: two domestic payment schemes establish a direct connection, with each retaining its own scheme rules and operating arrangements.
- Role of schemes and banks/PSPs: The schemes agree the cross-border connectivity and arrangements for routing, settlement, foreign exchange, fees and dispute handling, while banks and PSPs continue to serve customers and merchants within their respective markets.
- Examples: Singapore's cross-border QR linkages include NETS QR with Malaysia's DuitNow QR, Indonesia's QRIS and Thailand's PromptPay.

[18] "The Future of Payment Connectivity: Cross-Border QR Interoperability and Next-Bound Payment Rails," BCS, NETS Solutions (Chapter 6.10 of this report); "Inclusive QR Payments: QR Interoperability, Tourist App and NFC resiliency," NETS (Chapter 6.1 of this report).

[19] "Interoperable Fund Transfer Framework," Bank Negara Malaysia, June 30, 2026, paragraphs 8.1 to 8.7.

[20] "The organisation of digital payments in India: lessons from the Unified Payments Interface (UPI)," BIS Papers No 152, Bank for International Settlements, December 2024.

B. Multilateral hub

- How it works: Multiple domestic payment schemes connect once to a shared hub, rather than establishing separate connections with every other market.
- Role of the hub, schemes and banks/PSPs: The hub provides a common connectivity layer and can support common technical and operating arrangements, while participating schemes retain their domestic payment and settlement infrastructure and banks and PSPs continue to serve customers and merchants.
- Examples: Project Nexus is being developed as a shared hub connecting Singapore, India, Malaysia, Indonesia, the Philippines and Thailand[21]. Private-sector models such as Alipay+ and PayPal World similarly provide shared connectivity across multiple payment ecosystems, although at a different layer[22].

C. Multi-network switch

- How it works: A domestic payment scheme extends acceptance into overseas markets through local acquiring or switching partners, without requiring a reciprocal connection with the foreign domestic scheme.
- Role of the scheme and banks/PSPs: The home scheme can coordinate cross-border elements such as foreign exchange, clearing and settlement, while local banks, PSPs or other network partners provide merchant access and remain responsible for local merchant-facing activities.
- Example: India's UPI uses this model for some of its international expansion, with NPCI International Payments Limited (NIPL) coordinating foreign exchange, clearing and settlement, while international partners are responsible for merchant acquisition, validation, reconciliation and merchant-facing dispute management[23]. UPI is live for outbound acceptance in nine international markets[24], with plans to expand further.

These models are not mutually exclusive. Bilateral linkages remain common in Southeast Asia, while multilateral hubs and scheme-led arrangements provide alternative ways to expand cross-border acceptance. The main differences are in how connectivity is established and how responsibilities for routing, settlement, foreign exchange and local merchant operations are allocated.

Global experience also highlights that cross-border expansion raises considerations beyond connectivity, including data governance, security and control over payment infrastructure.

Learnings for Singapore: Singapore is well positioned to leverage its existing bilateral linkages as a strategic foundation, while building towards multilateral models that can support cross-border QR acceptance at scale, balancing control, scalability, data sovereignty and consumer protection. The SGQR+ switch can serve as a critical enabler, extending domestic QR interoperability to support broader cross-border QR acceptance.

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[21] "Project Nexus," Bank for International Settlements.

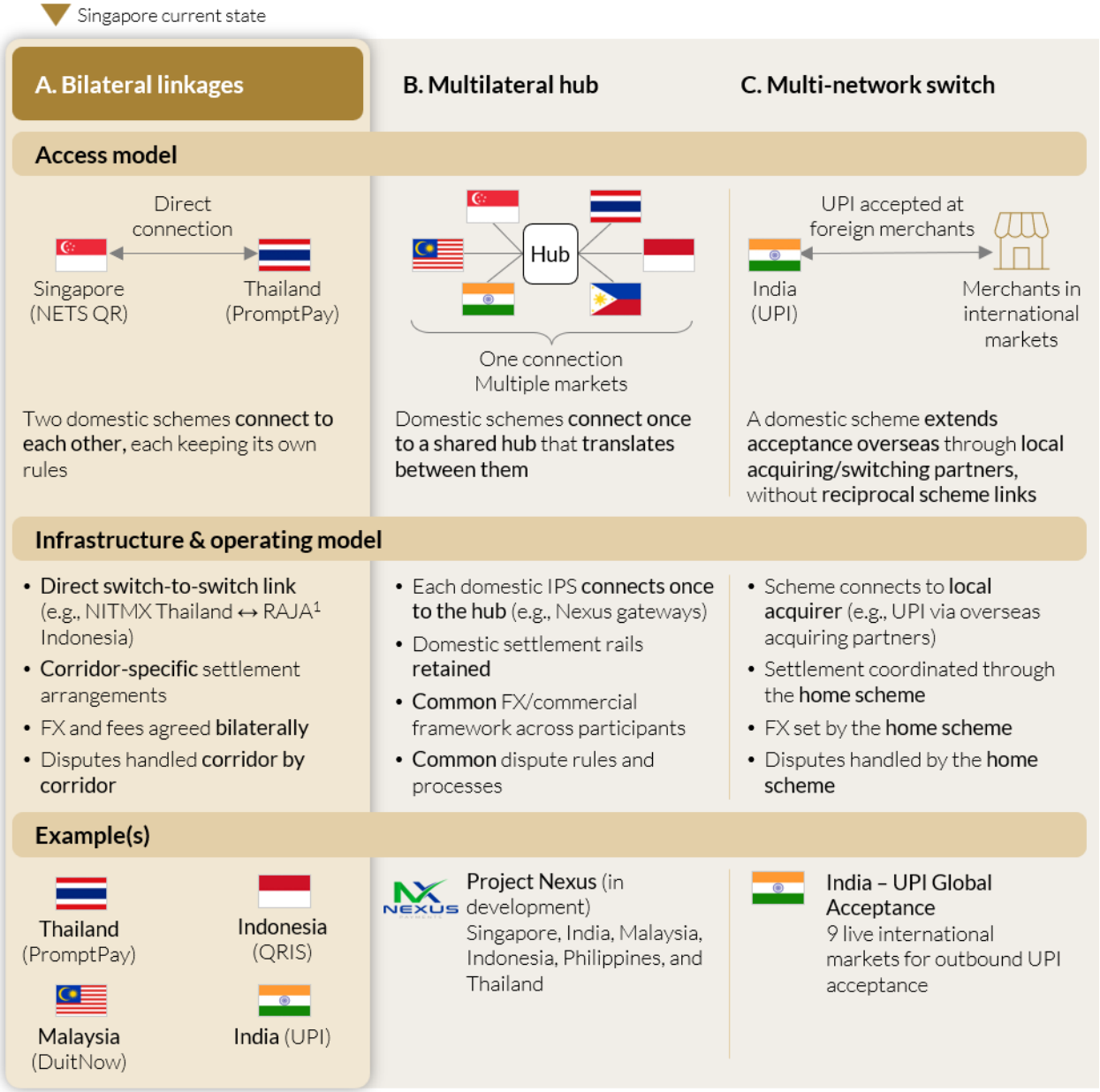
[22] "Frequently Asked Questions (FAQs)," Alipay+, Ant International; "Introducing PayPal World: A Global Platform Connecting the World's Largest Payment Systems and Digital Wallets, Starting with Interoperability to PayPal and Venmo," PayPal, July 23, 2025.

[23] "Global NIPL Network Operating Regulation - UPI International, Version 1.0," (published via Lyra developer documentation).

[24] "NPCI International and ACLEDA Bank launch cross-border UPI payments in Cambodia via KHQR, Cambodia's national QR code," Press Information Bureau, Ministry of Finance, India, June 3, 2026.

Exhibit 5

Three archetypes are emerging for scaling cross-border QR acceptance, and Singapore has built its current reach through bilateral linkages



[1] RAJA refers to Indonesia's four domestic payment switching operators: Rintis, Artajasa, Jalin and ALTO

Source: Bank Indonesia; Bank of Thailand; BIS Innovation Hub (Project Nexus); Monetary Authority of Singapore; NPCI International Payments Limited; PayNet Malaysia

Considerations for QR interoperability via the SGQR+ switch

The domestic and cross-border experience points to six interrelated design considerations for the SGQR+ switch[25]:

- Commercial and foreign exchange: The commercial model will need to establish how interoperability costs are recovered and shared across participating networks, including onboarding, annual participation and transaction fees. A key consideration is whether switching fees should apply only to transactions routed through the switch, and how these fees could be allocated between issuing and acquiring networks while preserving existing merchant-acquiring arrangements. Fee structures will also need to account for differences in transaction values and merchant costs, particularly for smaller merchants. For cross-border payments, the model will need to establish which party performs currency conversion, sets the exchange rate and any mark-up, and how these charges are disclosed to customers. Fee transparency would also be important where sponsored access or additional routing arrangements introduce further charges. These elements need to be considered together given the role of the switch as a utility and the need for a sustainable cost-recovery model.
- Routing and merchant resolution: The model will need to determine how transactions are routed between participating payment networks, particularly for off-us payments where the payer and merchant use different schemes. On-us transactions could continue to be processed within existing networks, while the switch provides connectivity where no direct arrangement exists. It will also need to determine how the route is selected where a merchant participates in more than one QR scheme, or where the payer's application supports several. A related choice is whether merchant routing information remains with participating schemes or is maintained through a common directory, and how far routing should be centralised without duplicating existing infrastructure.
- Clearing and settlement: Existing clearing and settlement arrangements, including FAST for PayNow transactions, could continue to support payment execution, while additional arrangements may be required to settle off-us transactions between participating networks, particularly for cross-border payments. Potential arrangements include appointed settlement banks or settlement partners for individual cross-border corridors. Settlement timing will also need to be considered, as merchants may receive payment confirmation or funds before settlement between the relevant networks is completed. This raises questions about settlement guarantees, counterparty risk and the respective responsibilities of participating institutions. The model will also need to determine whether routing and settlement should operate as an integrated arrangement or as separate components.
- Participation model: This will determine who can join and connect to the switch, including eligibility and onboarding criteria for participating payment networks, which would continue to manage their own issuers, acquirers and merchants. Criteria could cover regulatory and governance requirements, technical readiness, operational capacity and risk controls. The model will also need to determine whether overseas networks access the switch directly or through domestic participants, and whether sponsored arrangements could support broader access. As participation expands, a further consideration is how to encourage sufficient participation by major schemes, accommodate networks outside the initial group and determine how transactions involving non-participating issuers would be handled.
- Scheme rules and governance: The framework will need to establish who sets and changes the rules, how common switch rules interact with those of participating schemes, and how responsibilities are allocated across the switch operator, payment networks, issuers and acquirers. Common requirements could cover participant eligibility, technical certification, settlement, liability, refunds, disputes, fraud management, data protection and service levels. Particular consideration will be needed where transactions cross scheme boundaries, including which party handles disputes and refunds, how liability is allocated and how consistent resolution timelines are maintained. The framework will need to establish the operator's

[25] "The Future of Payment Connectivity: Cross-Border QR Interoperability and Next-Bound Payment Rails," BCS, NETS Solutions (Chapter 6.10 of this report); "Inclusive QR Payments: QR Interoperability, Tourist App and NFC resiliency," NETS (Chapter 6.1 of this report).

responsibilities for service availability, resilience, incident management, auditability and reporting. Common switch rules will need to be developed alongside the PayNow P2M scheme rules (Section 4.6). For cross-border payments, merchant payments will need to be distinguished from personal transfers where different compliance requirements apply.

- Transition and coexistence: The model will need to integrate with the existing ecosystem without disrupting live merchant and scheme relationships. Existing domestic PayNow acceptance and bilateral connections should continue to be supported, while the SGQR+ switch provides additional connectivity where current arrangements do not. The transition approach will need to address how existing merchants and payment networks join the interoperability arrangements and whether existing static and dynamic QR codes require changes, recognising that existing merchants and bilateral arrangements may not transition automatically and that merchant onboarding is expected to remain with participating schemes. The common acceptance mark will also need clear usage rules to indicate accurately which payment schemes a merchant can accept. The longer-term question of whether Singapore should move towards a single interoperable QR remains open.

The key design choices concern the commercial and foreign exchange model, routing and settlement arrangements, participation requirements, scheme rules and governance, and transition from existing arrangements. Further work is particularly needed to determine the interoperability fee structure, the settlement model and whether domestic and cross-border connectivity should be handled through separate components. These decisions will need to be considered together, given their implications for commercial viability, operational responsibilities and the overall operating model.

4.3.4. Way forward

Industry engagement has helped narrow the key design questions for SGQR+ and provides a basis for taking forward the detailed operating model. The emerging direction is to build on the existing QR and payment infrastructure, while introducing the interoperability needed to connect participating schemes. The model could preserve existing merchant-acquiring relationships and network investments, with merchant onboarding, pricing and customer servicing continuing to sit with the relevant acquiring network. The interoperability layer would provide connectivity between participating schemes, rather than taking on the role of a central issuer, acquirer or merchant aggregator. This approach could provide continuity for merchants and participating schemes while minimising the need to replace existing infrastructure.

The next phase will focus on three areas:

- Infrastructure and operating model: Working through routing, connectivity, clearing and settlement arrangements, alongside the commercial and foreign exchange model. This includes determining how off-us transactions are settled and priced, balancing affordability for smaller merchants with sustainable cost recovery.
- Scheme rules and governance: Developing common rules, participation requirements and governance arrangements, including responsibilities across participating schemes and the switch operator.
- Participant and merchant integration: Assessing integration requirements for participating schemes, acquirers and payment providers, including how existing QR arrangements would transition to interoperable acceptance and whether Singapore should eventually move towards a single interoperable QR.

MAS will work with industry to deliver the SGQR+ switch, including coordinating the scheme rules, infrastructure and participant integration required for implementation. Detailed operating arrangements will be finalised in 2027 to support the initial rollout, before the switch expands in scope from 2028.

The first priority will be broader interoperability between local networks, including PayNow and NETS, enabling customers to use participating payment apps at more merchants without having to determine which QR network the merchant accepts. Regional connections will progressively extend this interoperability overseas, widening payment options for visitors to Singapore and Singaporeans abroad. Merchants, including small

businesses, will in turn gain access to a wider pool of local and overseas customers through their existing QR acceptance arrangements.

4.4. Micropayments/FAST-LITE

4.4.1. Singapore context

Small-value payments, potentially including sub-cent transactions, already arise today in limited settings, such as small increments charged for digital services, connected devices or purchases at vending machines. These transactions may occur at high frequency, and existing processing costs can be high relative to transaction value, creating a need for a low-cost micropayment processing model should such use cases scale.

As technology evolves, there is also increasing attention on agentic commerce, where software can initiate payments on a user's behalf in exchange for greater convenience and speed. This could create further low-value, high-frequency payment use cases. Together, these developments create an opportunity to explore how PayNow's payment infrastructure could support low-value, high-frequency and increasingly automated payments.

The micropayments rail is also being considered alongside the broader digital money landscape. Digital money arrangements, including tokenised forms of money like tokenised deposits and regulated stablecoins, could further support the emerging profile of sub-cent, high-frequency and machine-initiated payments. The detailed treatment of digital money rails, their cross-border connectivity and how different arrangements can operate across networks and jurisdictions is being taken forward under BLOOM[26]. Settlement considerations, including finality, liquidity and risk, are being addressed through the Digital SGD work.

4.4.2. Key gaps and opportunities

FAST and PayNow are well suited to conventional retail and business payments, but are not designed to process sub-cent or very small, high-frequency transactions economically at scale. The gap covers per-transaction cost, processing profile, reconciliation and controls for automated payment authority. Authentication, messaging, fraud controls, reconciliation, liquidity management and settlement all carry costs that do not reduce in proportion to transaction value. As values fall, these costs can therefore become a material share of each payment, making the economics of the current model less favourable at scale.

Micropayments may also generate a very different transaction profile. Instead of discrete payments initiated by people or businesses, emerging use cases may involve large numbers of transactions initiated continuously by software and connected devices. This creates an opportunity to consider how processing, reconciliation and settlement can evolve to support these transaction patterns efficiently across the ecosystem.

Some use cases may also require capabilities not typically needed for conventional payments, including transactions below the minimum currency unit and payments executed automatically within predefined conditions or limits[27]. Supporting these use cases could therefore involve capabilities beyond those required for today's conventional payments.

The opportunity is therefore to determine how very small, high-frequency payments can be supported at an appropriate per-transaction cost while preserving the reliability and interoperability expected of Singapore's national payment infrastructure.

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[26] BLOOM (Borderless, Liquid, Open, Online, Multi-currency) is an MAS initiative, launched in October 2025, to enable settlement in tokenised bank liabilities and well-regulated stablecoins across currencies and borders.

[27] "A big future for small payments? Micropayments and their impact on the payment ecosystem," European Central Bank, 2023.

4.4.3. Key considerations

Potential approaches for enabling low-cost, high-frequency payments

Two potential approaches have been identified for supporting emerging micropayment use cases:

A. Cost-optimised micropayments rail: Focused on reducing the cost of processing very small, high-frequency transactions.

B. Programmable settlement layer: Focused on enabling payments to execute automatically based on predefined rules or conditions.

Both approaches would operate alongside Singapore's existing payment infrastructure rather than replace it. Further assessment would be needed to determine their respective roles, sequencing and how they could work together.

A. Cost-optimised micropayments rail

One approach is a dedicated payment rail designed specifically for low-value, high-frequency transactions[28]. The aim would be to retain key characteristics of Singapore's existing payment infrastructure, including 24/7 availability, immediate confirmation and interoperability with FAST and PayNow, while simplifying the underlying design to reduce the cost of each transaction.

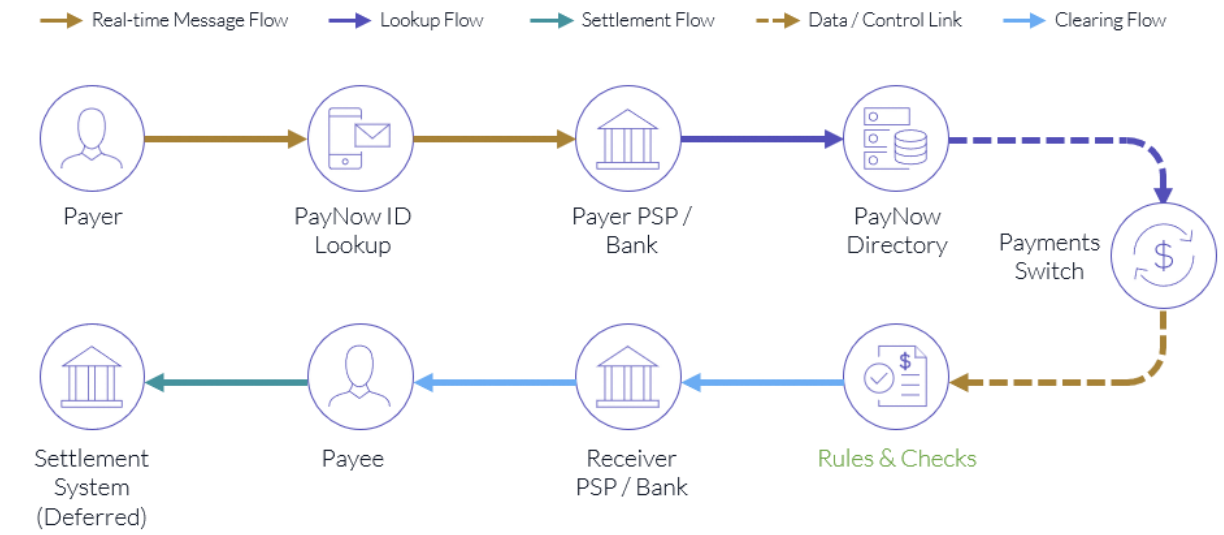
The proposed model would prioritise cost efficiency over feature richness, with only the capabilities needed to support micropayments at scale. Potential design features include a single application programming interface (API) connectivity model, cloud-based infrastructure that scales with transaction volumes, modular processing services that can be upgraded independently, greater automation of operational processes and less frequent settlement where appropriate. Together, these measures are intended to create a leaner operating model for transactions where processing cost is particularly important relative to the value being transferred. The model would also depend on sufficient transaction volumes to support a viable cost model, while lower settlement frequency could improve cost efficiency but would need to be balanced against liquidity and settlement considerations.

[28] "The Future of Payment Connectivity: Cross-Border QR Interoperability and Next-Bound Payment Rails," BCS, NETS Solutions (Chapter 6.10 of this report).

Exhibit 6

A leaner processing model could support very small, high-frequency payments while retaining real-time confirmation and interoperability with existing rails

Micropayments/FAST-LITE Rail Proof of concept (POC)



Source: BCS

B. Programmable settlement layer

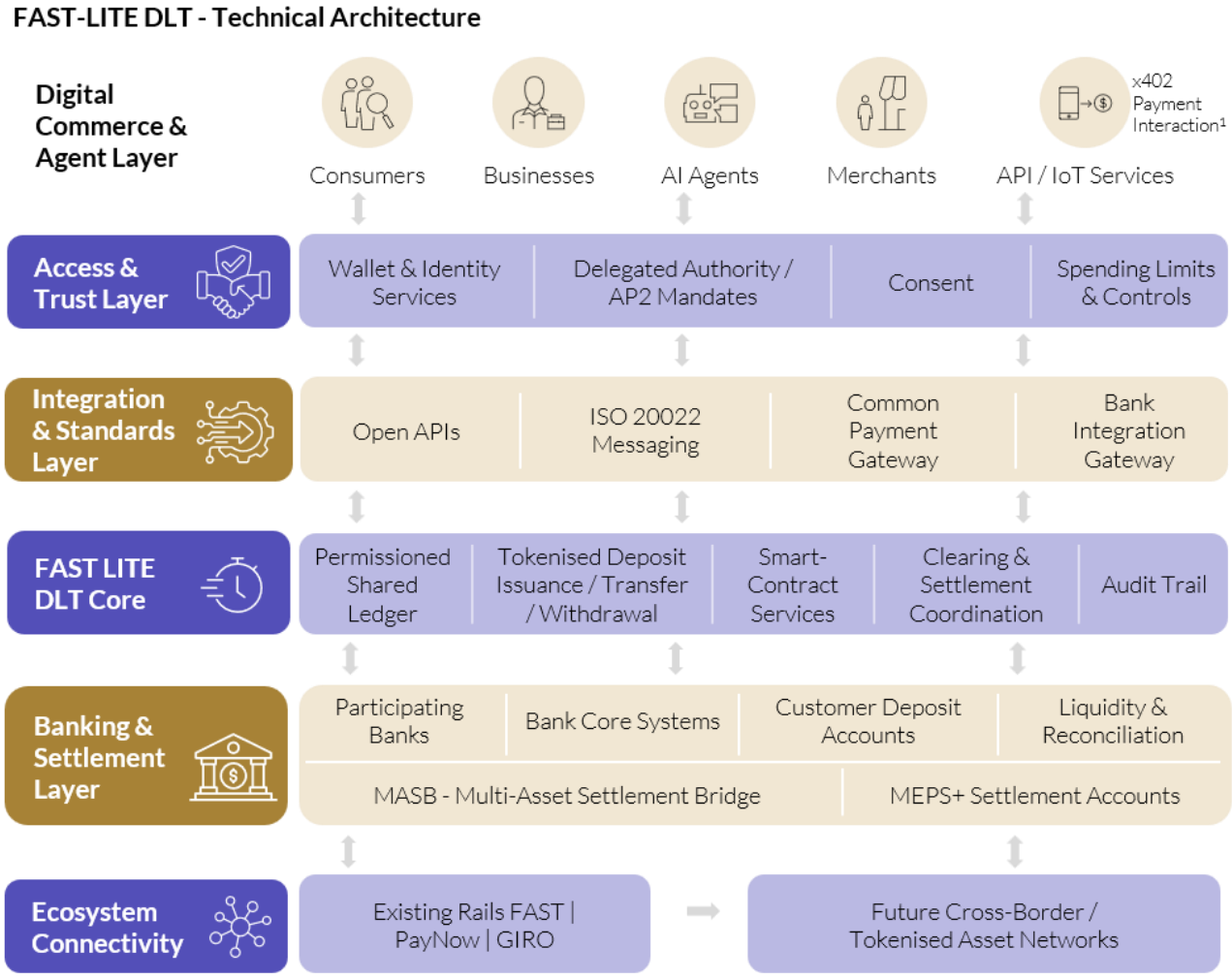
A second approach would address use cases where the requirement extends beyond transferring funds to controlling how and when a payment is executed. Industry input proposes a shared programmable settlement layer using tokenised Singapore dollar bank deposits, operating alongside FAST, PayNow, GIRO and MEPS+.

This could support payments that are released only when predefined conditions are met, delegated payment authority for AI agents operating within approved limits, automatic splitting or allocation of funds across multiple parties, escrow or milestone-based payments, and more granular transaction values including sub-cent payments[29]. The objective is to provide these capabilities through shared infrastructure rather than requiring individual institutions or applications to build them separately. Implementation would depend on integration with existing bank infrastructure and common arrangements for interoperability, governance and permissioning. The greater flexibility of programmable payments would also need to be balanced against the additional operational and risk-control requirements associated with automated and delegated payments.

[29] "Agentic Commerce and Instant Payments," Amazon (Chapter 6.5 of this report).

Exhibit 7

Illustrative architecture for programmable settlement layer



1. x402: An open payment protocol that enables applications and autonomous software agents to make programmatic payments for online services through HTTP.

Source: NETS Solutions

India is extending UPI to support agentic payments within user-defined limits. India is developing a national framework for agentic payments on UPI that would allow AI agents to make small-value payments on behalf of users without requiring approval for every transaction. The proposed Unified Agentic Protocol would build on existing UPI infrastructure, with users setting the permissions and limits within which an agent can act. NPCI is also developing mechanisms to identify and verify participating AI agents, reflecting the additional governance and control requirements that arise when payment authority is delegated to software[30].

The example illustrates a different route to enabling agentic commerce from the tokenised-deposit model described above. Rather than creating a new settlement layer, India is exploring how existing instant-payment infrastructure can be extended with additional capabilities for delegated authority, agent identification and transaction controls. This broadens the design question for emerging micropayment use cases from the choice of settlement technology to the capabilities that need to sit around the payment rail.

[30] "India Plans AI-Powered UPI Payments Framework Through Unified Agent Protocol," Outlook Business, July 9, 2026, citing Business Standard.

Key considerations for further assessment

Across both approaches, six design questions would need to be resolved:

- Cost economics: whether the end-to-end cost, including costs borne by participating institutions, is low enough to make micropayments viable at scale.
- Settlement model: how frequently obligations should be settled, balancing cost efficiency with liquidity and settlement risk.
- Infrastructure design: how the infrastructure should be built to support very high transaction volumes at low cost, including the connectivity, processing and settlement capabilities required.
- Interoperability: how any new infrastructure would connect with FAST, PayNow and existing bank accounts without creating a separate closed system.
- Participation and standards: what access criteria, technical standards and operating rules would be needed to support broad participation.
- Risk and controls: how authentication, fraud controls and delegated authority should work where transactions are initiated automatically rather than directly by users.

The distinction is therefore between making very small payments economical to process and enabling payments to execute automatically under predefined rules. Further assessment should be undertaken through cross-industry engagement involving MAS, ABS, banks, payment service providers and other relevant ecosystem participants, including payments simulator testing, to determine which capabilities are most relevant for Singapore's emerging use cases and how they could be introduced while preserving interoperability with the existing payments infrastructure.

4.4.4. Way forward

MAS will work with industry to develop and test the two proposed approaches, determining how emerging micropayment use cases can be supported at viable cost and with the required level of interoperability and control. This work will validate future payment needs and identify the infrastructure capabilities Singapore will require.

For the cost-optimised rail, payments simulator testing will assess the end-to-end payment flow, processing scale, settlement model, risk controls, API standards and liquidity management, establishing whether a lower-cost processing model can operate effectively across participating institutions.

For the programmable settlement layer, a focused prototype will test agentic commerce use cases using tokenised deposits, delegated payment authority and interoperable clearing and settlement[31], assessing how automated payment execution, permissions and controls operate in practice.

In 2027, MAS and industry will develop and test both approaches through the payments simulator. The results will determine the viability, sequencing and implementation pathway for each approach, positioning Singapore to process very small, high-frequency payments economically and to support emerging automated payment models, while preserving the interoperability and reliability of the existing payment system.

[31] "The Future of Payment Connectivity: Cross-Border QR Interoperability and Next-Bound Payment Rails," BCS, NETS Solutions (Chapter 6.10 of this report).

4.5. High-value and high-volume payments

4.5.1. Singapore context

PayNow has become a widely used real-time payment method for consumers, businesses and government, but its current transaction limit of SGD 200,000[32], a safeguard to restrict losses that may be suffered by consumers from fraud and scams, limits its use for some high-value payments, such as certain property-related payments, taxes and duties.

Government agencies and businesses also have high-volume payment needs, including large-scale disbursements of grants, pensions, social support payments, tax refunds and payroll. For these payments, the priority is not necessarily immediate settlement of each transaction, but reliable processing of the full batch within the required payment window.

Some government agencies therefore require both capabilities: higher transaction limits to support high-value collections and the capacity to process large volumes of disbursements reliably and on time.

4.5.2. Key gaps and opportunities

The current SGD 200,000 limit means some higher-value consumer-to-government payments, including tax, duty and property-related collections, may need to be split across multiple transactions. Peer systems provide more headroom through higher scheme ceilings, use-case-specific limits or bank-set limits, whereas PayNow currently applies one SGD 200,000 ceiling. Targeted higher limits could allow more of these payments to be made through PayNow, supported by appropriate risk-based controls and safeguards.

While FAST processes individual payments in real time, large-scale disbursements are subject to an industry throughput limit designed to maintain system stability. Participants therefore stagger the release of bulk payment files, resulting in recipients being credited at different times of the day. Alternative batch payment rails do not settle on weekends, further limiting the flexibility of bulk disbursements. Peer systems use pacing, differentiated processing lanes and streamlined core processing to manage bulk volumes, while Singapore currently staggers bulk files under a throughput limit. These constraints highlight an opportunity to improve the predictability, certainty and efficiency of bulk payment processing without affecting time-critical real-time payments.

4.5.3. Key considerations

Government and business use cases point to two capabilities: higher-value instant payments, supported by transaction limits and risk controls, and faster processing of bulk payments, by separating bulk traffic from time-critical payments and managing capacity accordingly.

High-value payments: calibrating transaction limits to the use case and risk

Several government and business use cases require higher-value instant payments, including tax, duty and property-related government collections, which can exceed the current SGD 200,000 PayNow limit. International benchmarking points to three approaches to managing transaction limits:

- Single scheme-wide ceiling: The scheme sets one common transaction ceiling across payments. This is simple and consistent, but a higher ceiling would apply across the scheme, including payments that do not require higher limits. Singapore currently applies an SGD 200,000 limit for PayNow, which constrains its use for some high-value payments above this threshold. The UK, by contrast, progressively raised its Faster Payments limit over more than a decade, from GBP 10,000 (SGD 17,200) before 2010 to GBP 1 Mn (SGD

[32] "Response to Letter 'Review daily Fast limit as cheque use declines' - The Straits Times, 10 August 2023," Monetary Authority of Singapore, August 15, 2023.

1.7 Mn) in 2022, supporting high-value real-time payments. SGD equivalents are approximate and are converted at average exchange rates for January to June 2026[33].

- Scheme limits by use case: The scheme sets differentiated limits for defined transaction types or customer groups. This enables high-value payments to be supported selectively while retaining the standard limit elsewhere, but requires clearer eligibility criteria and greater scheme-level governance. For example, UPI applies higher limits to selected use cases[34], while DuitNow applies different limits for consumer and business payments[35].
- No scheme-wide ceiling: The scheme does not set customer-facing limits, with banks setting limits based on customer profile and risk. This maximises flexibility, but places greater responsibility for limit-setting and risk management on participating banks and can result in different limits and controls across the market. For example, Brazil's Pix does not impose a uniform scheme-level ceiling for authorised participants, with banks setting customer limits based on risk and other factors[36].

The three archetypes differ in how the scheme sets transaction limits, whether through a single scheme-wide ceiling, differentiated limits by use case or no scheme-wide ceiling. Under any of these models, banks may set lower customer-level limits based on customer profile, risk considerations and liquidity constraints.

Learnings for Singapore: Singapore could explore transaction limits calibrated to specific use cases, balancing flexibility and risk management to unlock high-value payment flows across consumers, businesses and government. The Payments Production-Parallel Environment under PayNow Gen2 provides a testing ground to prototype and assess these capabilities before broader implementation.

[33] SGD equivalents in this report are approximate and use the simple mean of monthly average exchange rates for January to June 2026, "G.5 Foreign Exchange Rates (Monthly)," Board of Governors of the Federal Reserve System.

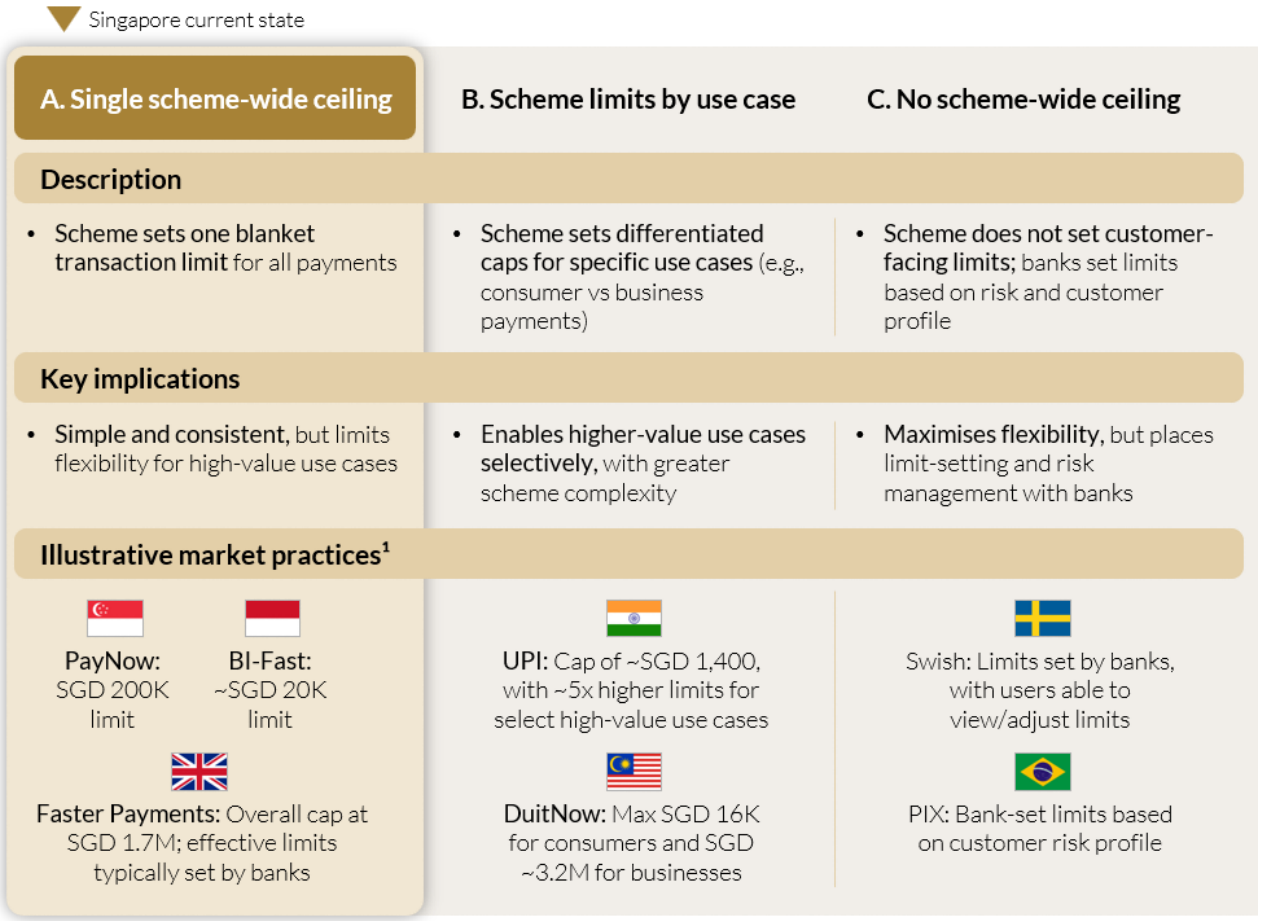
[34] "UPI: Transforming India's payment landscape," Press Information Bureau, August 24, 2026.

[35] "DOBW FAQ: Transaction Limits & Fees," Payments Network Malaysia Sdn. Bhd. (PayNet). Limits vary by bank; most banks support up to RM50,000 per day for individuals, and businesses up to RM10,000,000 per transaction.

[36] "Voto 105/2025-BCB," Banco Central do Brasil.

Exhibit 8

Markets balance high-value access and risk through three limit-setting models, and Singapore applies a single scheme-wide limit today



[1] Examples illustrate distinctive elements of each model; markets typically combine participant-, scheme- and regulatory-level mechanisms

Source: Association of Banks in Singapore; Banco Central do Brasil; Bank Indonesia; Getswish AB; National Payments Corporation of India (NPCI); Pay.UK; PayNet Malaysia

The benchmark indicates that high-value access does not necessarily require a uniform increase across the scheme. UPI and DuitNow use differentiated limits for selected use cases or segments, while Swish and Pix give participating banks greater discretion over customer limits. The common principle is that limits can be calibrated to the payment context and associated risk.

This is particularly relevant for government collections, where industry has proposed higher transaction limits for approved beneficiaries and eligible payment purposes, while retaining the standard limit for other transactions. Such an approach would require consideration of four areas:

- Eligibility and governance: Clear eligibility criteria, governance arrangements and validation of approved beneficiaries and payment purposes.
- Transaction limits and customer safeguards: Clear interaction between scheme-defined limits and bank-managed controls, including customer-specific limits, fraud and behavioural monitoring, and enhanced verification. Common guidance could also be considered for customer-requested limit increases, enhanced authentication, cooling-off periods and participant approval processes.
- Liquidity management: Appropriate management of FAST net debit caps, which limit how far a participating bank's outgoing payments can exceed its incoming payments. Larger transactions could increase banks' intraday funding needs, making liquidity availability outside business hours an important consideration.

- Payment security: Clear beneficiary information, customer authentication and fraud checks to reduce the risk of mistaken or fraudulent higher-value payments.

The implementation approach is also an important consideration. An initial limited trial involving a government agency and participating bank can provide an opportunity to test the end-to-end payment flow, controls and operational requirements before broader implementation, while other government agencies can remain closely engaged as potential future adopters.

For Singapore, the main design choice is therefore not only the level of the limit, but where, when and for whom a higher limit should apply, and the controls, governance and operational arrangements required to support it. This would provide a basis for extending PayNow to selected larger-value payments while retaining the existing limit for other transactions.

High-volume payments: processing bulk payments efficiently while preserving real-time capacity

Large-scale disbursements, such as government payments to many recipients at once, create a different requirement. The priority is not necessarily to process every payment immediately, but to complete the full payout reliably within the required payment window. Leading systems combine pacing of payment submissions, separate processing for time-critical and bulk payments, and streamlined processing of non-critical activities such as reconciliation to protect capacity as volumes scale.

International benchmarking points to three approaches to managing these payment volumes:

A. Operational demand management: pacing or scheduling large payment runs to spread submissions over a defined period and avoid concentrated peaks, where payment timing is flexible. The Netherlands illustrates how several PSPs break bulk payments into "buckets" that are processed during off-peak hours, with smoothing mechanisms to balance load across receiving PSPs[37].

B. Differentiated lanes: separating time-critical payments from bulk or non-urgent payments through a separate processing track, with bulk payments completed within a defined window, such as within a few hours or by the end of the same day, rather than instantaneously. Hong Kong SAR uses C1 for real-time, high-priority payments, C2 for general payments handled "as soon as possible", and C3 for non-time-critical bulk payments such as monthly salaries. Brazil similarly separates instant priority traffic from non-priority and batch traffic[38].

C. Streamlined payment processing: keeping non-critical activities such as reconciliation and exception handling outside the core transaction path where possible. India separates settlement cycles for payment authorisation from dispute-related processing, so dispute activity does not compete directly with live payment processing[39].

Together, these approaches show that high-volume capability depends on managing when and how transactions enter the rail, not only on increasing central throughput.

Learnings for Singapore: Singapore could explore different processing options for bulk payments, such as prioritising time-critical transactions and moving non-core activities outside the payment path, rather than relying on capacity expansion alone.

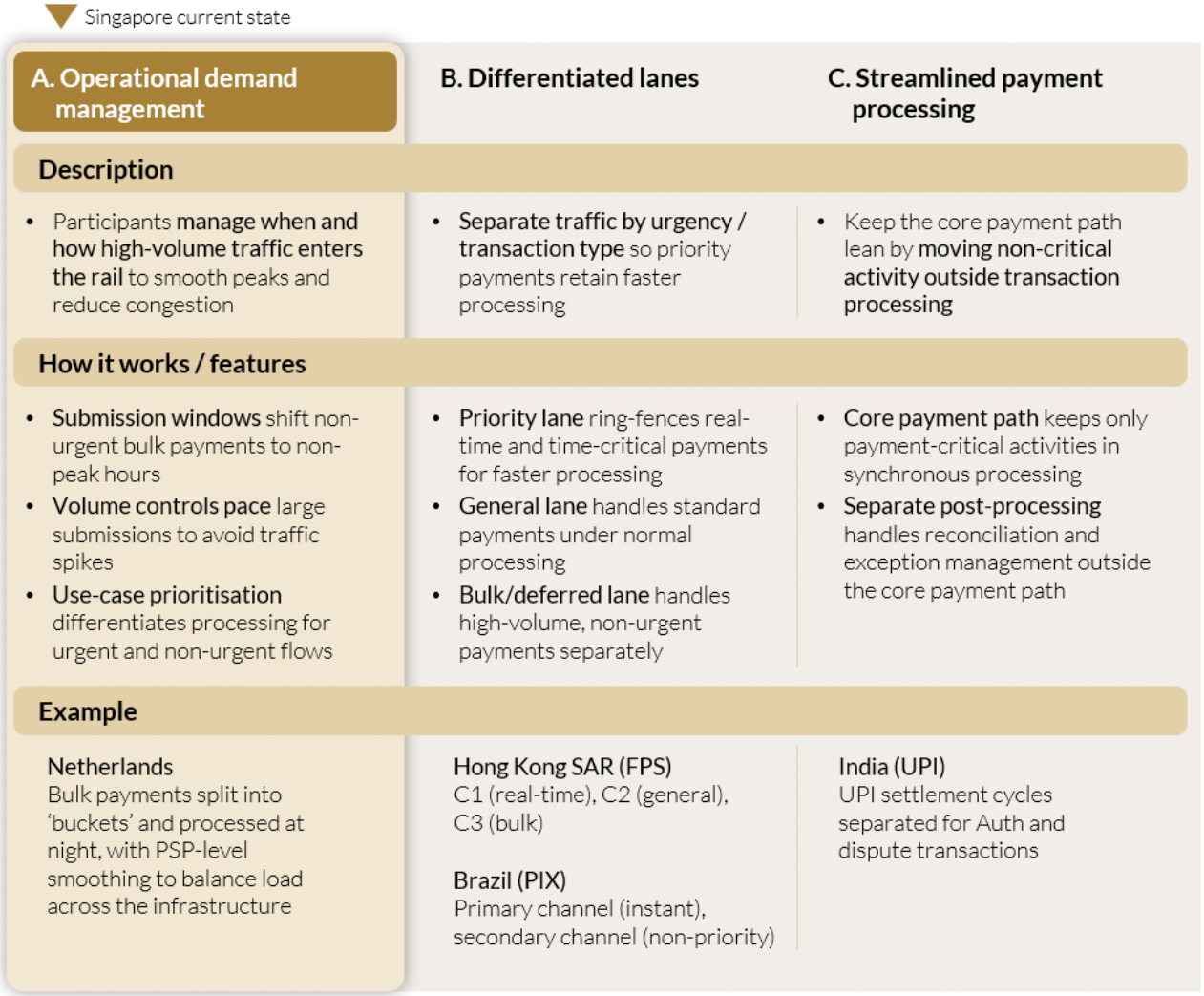
[37] "How the Dutch became the frontrunners in payment transformation," European Payments Council, February 23, 2023.

[38] "Relatório Anual do SPI 2025," Banco Central do Brasil.

[39] "Segregation of UPI settlement cycles for Auth and dispute transactions," National Payments Corporation of India, circular NPCI/2025-26/UPI/222, September 12, 2025.

Exhibit 9

Payment systems manage high volumes through three approaches



Source: Banco Central do Brasil; Dutch Payments Association; Hong Kong Interbank Clearing Limited; National Payments Corporation of India (NPCI)

For Singapore, planned large-scale disbursements could be staggered or processed separately from time-critical payments, where appropriate, to manage transaction volumes while preserving capacity for payments requiring immediate processing. Any enhancement would need to account for receiving-bank capacity, as increasing central processing capacity alone may not improve completion times if participating banks cannot handle transactions at the same rate. Key design considerations include whether bulk payments should use a separate processing track, the appropriate service levels for payments that do not require immediate processing, and arrangements for handling exceptions and disruptions.

Where differentiated processing is introduced, clear governance would also be needed to determine who assigns payment priority, prevent payments from being unnecessarily classified as urgent, establish service levels for each category and ensure priority information is communicated consistently across participants.

Taken together, the benchmark points to a combination of traffic management, differentiated processing and a leaner core payment path to support large payment runs predictably while preserving capacity for time-critical transactions.

4.5.4. Way forward

For high-value payments, a targeted limit model will be tested through a limited trial with one government agency. The trial is targeted for late 2027, retaining the SGD 200,000 limit for other PayNow payments while enabling the raised limit for whitelisted participants during testing, with planned expansion to additional agencies in 2028. The trial would test the end-to-end payment journey, eligibility and register administration, transaction validation and operational performance. The model would then be refined based on the testing outcomes.

The next phase will therefore focus on validating the operating model and controls needed to support these high-value payments safely at scale. This includes confirming eligibility criteria and governance, beneficiary and payment-purpose validation, customer safeguards and fraud controls, as well as liquidity and operational requirements for participating banks. As the model expands to additional government agencies, early engagement can help assess different use cases and support consistent implementation across agencies. Over time, the approach could also be considered for other use cases where there is a clear need for high-value real-time payments, subject to further assessment and appropriate safeguards.

For high-volume payments, the first step is to establish where the current constraint sits across central infrastructure, receiving-bank processing and payment design. The second step is to determine the appropriate approach for faster bulk disbursements, including whether separate processing lanes, additional capacity or other traffic-management measures are required, while preserving capacity for time-critical real-time payments.

4.6. PayNow P2M scheme rules

4.6.1. Singapore context

PayNow has established a strong foundation for person-to-merchant (P2M) payments, but as these payments become more widely used, customers and merchants need clearer and more consistent ways to resolve cases where a payment is mistaken, disputed or otherwise requires recovery of funds. Existing PayNow scheme rules provide guidance on handling payment issues, while participating institutions manage individual cases. Building on these arrangements, there is an opportunity to strengthen common scheme rules and processes, including clearer responsibilities, liability allocation, evidence requirements, resolution timelines and escalation procedures.

4.6.2. Key gaps and opportunities

PayNow has scheme guidance, but P2M dispute and recovery handling remains largely participant-led, with variation across institutions, manual inter-bank processes, limited case-status visibility, and unresolved treatment of some technical reversals. Phase 1 industry consultation highlighted greater standardisation of dispute management and fund recovery, further digitisation of inter-bank processes, and clearer visibility over case status as areas for development. Further digitisation of processes, including recall-of-funds and inter-bank handling, could improve efficiency and consistency across participants.

Phase 2 industry engagement reinforced the opportunity for greater consistency as the range of P2M use cases expands. Disputes can arise from different circumstances, including consumer disputes over goods and services, fraud and scams, misdirected or erroneous payments, and technical failures, each of which may require a different resolution approach. Technical failures can be particularly challenging where a customer receives confirmation of a successful payment and leaves with the goods, but the merchant is not credited, raising questions over the appropriate recovery or reversal process. A related issue arises where a merchant receives confirmation of a successful payment and releases goods, but the funds are subsequently reversed following a FAST processing time-out. This highlights an opportunity to strengthen payment certainty by reviewing the underlying FAST processing and reversal arrangements, alongside improvements to dispute resolution.

Industry engagement also highlighted the importance of clear roles and responsibilities across the payment chain, particularly where resolution requires coordination between payer and receiving banks, merchants, payment service providers and other intermediaries. As P2M use cases broaden, greater scheme-level standardisation, more digitalised recovery and reversal processes, and clearer end-to-end case handling could build on today's arrangements to support a more consistent dispute-resolution experience.

4.6.3. Key considerations

The next evolution of PayNow's P2M scheme arrangements will need to address how disputes are handled and how the scheme supports sustainable merchant economics. Within dispute resolution, the key questions are which disputes should be covered through common scheme arrangements and what role the scheme should play in resolving them, and how these arrangements can be operationally sustainable, economically viable and effectively enforceable. International experience provides useful reference points across both areas but does not point to a single model for Singapore.

Dispute resolution

An effective dispute resolution framework requires several elements to work together. These include clarity on the disputes covered and how they are treated, common rules and processes, clear roles and accountability, appropriate liability and recovery arrangements, reliable data and evidence, and effective mechanisms for

escalation and appeals. The framework also needs sustainable arrangements for operating these capabilities and sufficient authority to implement dispute outcomes.

Scope and treatment of disputes

Different dispute types require different resolution pathways. Four broad categories are relevant:

- Consumer disputes over goods and services: The payment was completed as intended, but the dispute concerns the underlying purchase, such as goods and services not being delivered or not being as described.
- Fraud and scams: The payment resulted from fraud or deception, including transactions the customer did not authorise and transactions the customer authorised after being deceived.
- Misdirected or erroneous payments: The customer intended to make the payment, but sent it to the wrong recipient, entered the wrong amount or otherwise made an error in the payment instruction.
- Technical failures: The payment was affected by a processing or operational error, such as an incorrect transaction outcome or failure in the payment process.

Participant-to-participant disputes are distinct from these customer-facing categories. They arise where institutions disagree over adherence to scheme requirements and may require separate escalation arrangements.

International experience reinforces this differentiated treatment. Brazil's Pix Mechanism for Special Return (MED), for example, covers fraud and specified operational failures but excludes commercial disagreements over the underlying purchase[40]. The United Kingdom similarly distinguishes unauthorised payments, authorised push payment scams and private commercial disputes[41], while Malaysia separates scam handling from commercial DuitNow QR disputes[42]. The consideration for Singapore is therefore which cases should be addressed through common PayNow arrangements, and which should continue through merchant relationships, existing fraud and scam-response processes or external redress channels.

Dispute-resolution model

International benchmarking identifies three levers through which instant-payment disputes can be addressed: participant-led resolution, scheme-led resolution and regulatory protection. These are not mutually exclusive and can be combined depending on the type of dispute and the role of the scheme.

A. Participant-led resolution: Case handling remains largely with payment service providers, which investigate and resolve disputes bilaterally. Singapore today sits closer to this end of the spectrum, with PayNow providing scheme rules and process-flow guidance while participating institutions administer individual cases.

B. Scheme-led resolution: The scheme introduces common rules, workflows and capabilities across participants to support more consistent dispute handling. India's Unified Dispute and Issue Resolution (UDIR) framework provides a common workflow across UPI participants, including in-app initiation, unique case references, status tracking and automated or rule-based treatment for selected scenarios[43]. Brazil's MED supports coordinated fraud recovery, including fund blocking and tracing beyond the first recipient

[40] "Guia MED" and "MED 2.0 - Circuito Pix," Banco Central do Brasil.

[41] "APP scams reimbursement: consolidated policy statement (PS25/5)," Payment Systems Regulator, May 2025.

[42] "Frequently Asked Questions (FAQs) - Dispute Management," Payments Network Malaysia Sdn. Bhd. (PayNet); "National Fraud Portal to solidify coordinated efforts in curbing financial scams," Bank Negara Malaysia, August 20, 2024.

[43] "Streamlining Dispute Resolution for Digital Transactions: All you need to know about NPCI-Led UDIR," Razorpay Blog, February 22, 2024.

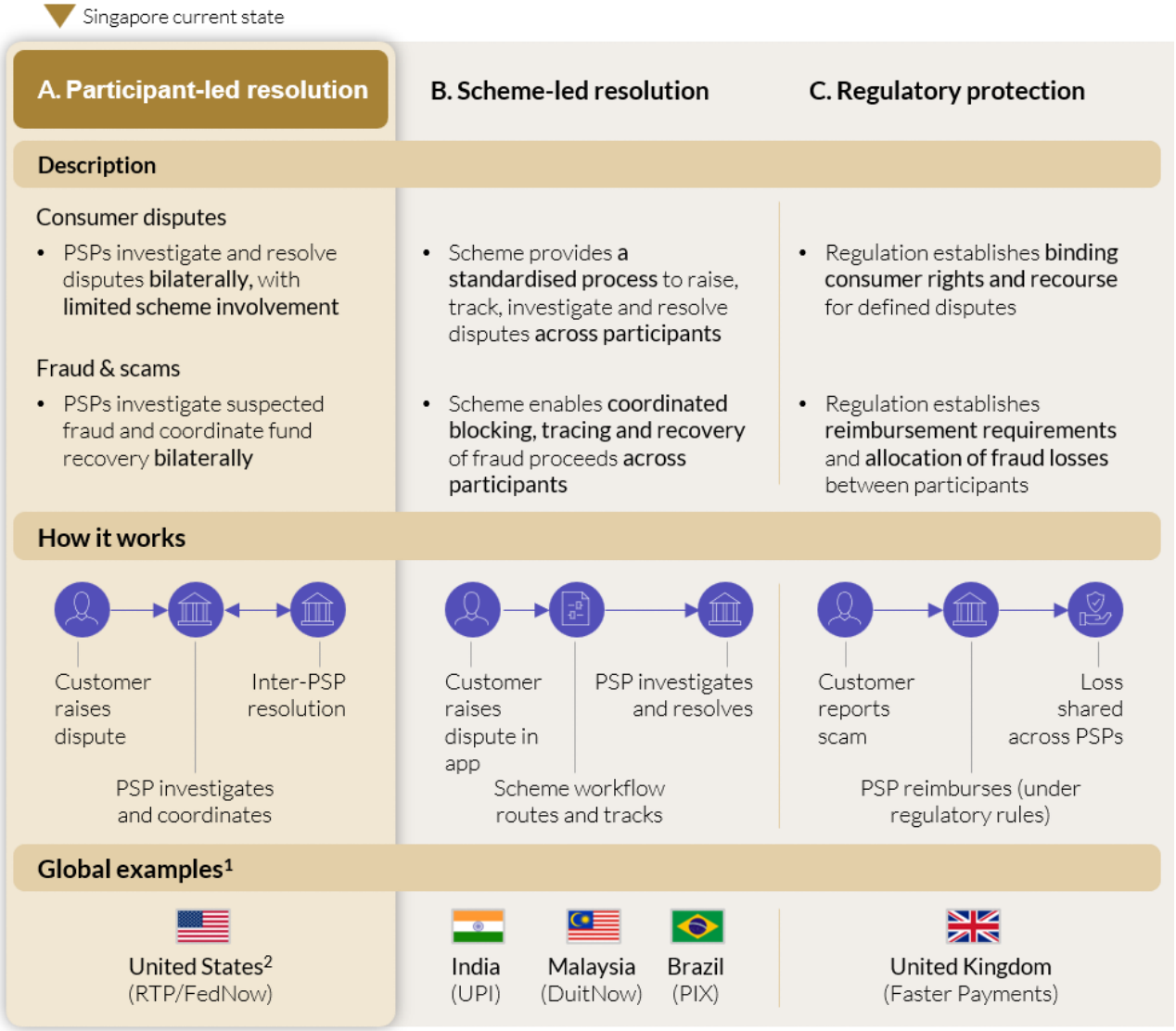
account. Malaysia combines a scheme-level dispute process with separate national scam-response arrangements.

C. Regulatory protection: Regulation establishes binding customer rights, reimbursement obligations or allocation of losses for defined cases. The United Kingdom relies more heavily on regulatory protection for qualifying authorised push payment scams.

Learnings for Singapore: Singapore is progressing towards greater scheme-level consistency through the PayNow P2M scheme rules enhancement, covering dispute resolution, fraud and scam recovery, liability, timelines and governance. This could be complemented by the SGQR+ switch, which could enhance interoperability across participating schemes and provide the infrastructure through which common scheme arrangements could be applied.

Exhibit 10

Three levers shape the dispute-resolution process for instant payments



[1] Examples illustrate distinctive elements of each model; markets typically combine participant, scheme and regulatory-level mechanisms

[2] Participant-led resolution via a scheme-provided shared case-management channel (ERS); FIs investigate and resolve disputes bilaterally; not covered in detailed benchmarking

Source: Banco Central do Brasil; Federal Reserve (FedNow); National Payments Corporation of India (NPCI); Pay.UK; Payment Systems Regulator (UK); PayNet Malaysia; The Clearing House (RTP)

The central design choice is how far scheme involvement should extend. Greater standardisation could cover dispute eligibility, reason codes, evidence and data requirements, service standards, response timelines, recovery and reversal mechanisms, case-status visibility and escalation. Greater scheme involvement can improve consistency, but also increases the need for common governance, operating ownership, funding and integration across participants. It does not necessarily require the scheme to adjudicate individual cases: common case-routing, evidence requirements, service levels and escalation arrangements can coexist with participant-level investigation and decision-making.

Roles and responsibilities

A clearer allocation of responsibilities would provide the foundation for implementation:

- Scheme: Establish common rules and standards for dispute scope, reason codes, evidence and data requirements, service standards and timelines, liability, escalation, appeals and enforcement of outcomes.
- Banks and PSPs: Continue to receive and investigate cases, assess evidence and apply participant-level fraud, authentication and risk controls. The receiving or relevant participant would determine the outcome where case-specific assessment is required.
- Merchants and acquirers: Provide transaction, fulfilment and other evidence relevant to merchant-related disputes and comply with the applicable scheme requirements.
- Regulators and redress bodies: Continue to perform their respective roles under existing arrangements, including the Shared Responsibility Framework and the Financial Industry Disputes Resolution Centre (FIDReC), with clear interfaces to the PayNow scheme framework[44].

Where several parties are involved, a further consideration is how responsibility for an individual case is coordinated. A single point for initiating and tracking a case, with hand-offs between responsible parties managed within the process, could reduce the need for customers to determine which party or process applies.

Where a case cannot be resolved, escalation could follow a tiered process, moving from resolution between participants to scheme-level review or arbitration, with existing regulatory and redress channels providing further recourse where appropriate.

Recovery and liability

Recovery and liability arrangements also differ by dispute type and operating model. India's UPI framework provides chargeback mechanisms for specified disputes, alongside defined turnaround times for failed transactions, including automatic reversals and customer compensation where applicable[45]; Brazil can block and trace recoverable funds through MED, and the United Kingdom separates customer reimbursement from recovery against the recipient. PayNow today provides a merchant-initiated refund function over FAST and best-effort recall arrangements, without a merchant chargeback mechanism.

For Singapore, the framework would need clear liability principles and appropriate mechanisms for recovery and remediation, while preserving the finality of settled PayNow transactions. The framework would also need to distinguish between assistance with fund recovery, entitlement to reimbursement and allocation of liability among participants, as each involves different considerations. One approach would be to consider liability based on which party is best positioned to prevent, detect or mitigate the relevant risk, providing incentives for appropriate authentication, fraud controls, beneficiary-account controls and operational processes.

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[44] "Guidelines on Shared Responsibility Framework," Monetary Authority of Singapore and Infocomm Media Development Authority, effective December 16, 2024; Financial Industry Disputes Resolution Centre.

[45] "Harmonisation of Turn Around Time (TAT) and customer compensation for failed transactions using authorised Payment Systems," Reserve Bank of India, RBI/2019-20/67, September 20, 2019.

A related consideration is the treatment of FAST reversals following processing time-outs, particularly where merchants have already received payment confirmation and released goods. Beyond dispute-resolution procedures, this warrants examining the underlying FAST processing design, including payment confirmation and reversal arrangements, to strengthen payment certainty and clarify responsibility where reversals occur.

Common rules and processes provide a necessary foundation, but outcomes also depend on whether participants have the information and incentives to act on them, including where doing so may run against their immediate interests.

Recovery also depends on sufficient authority to give effect to outcomes once determined. Depending on the dispute type, this could include mechanisms to hold funds while a case is investigated and to trace, block, recall or return recoverable funds, subject to appropriate safeguards.

Common capabilities and safeguards

Common capabilities can improve consistency across participants. Digital case management, structured data exchange, status tracking and performance reporting could standardise how cases and evidence move between institutions, while access to authoritative transaction data and defined evidence requirements could reduce manual investigation[46]. Standardised case data could also help identify recurring dispute patterns, fraud and scam indicators and opportunities to improve recovery processes. AI-assisted tools could support case triage and evidence review, with human oversight retained for contested outcomes.

Prevention should also sit alongside resolution. Network-level fraud and scam intelligence can complement institution-level controls by identifying patterns that individual participants cannot see independently, while common expectations for authentication, risk controls and data sharing can strengthen the framework.

These capabilities also carry ongoing costs. Case management, investigation, data exchange, governance, escalation and recovery require sustained operational capacity. The framework would therefore need to consider how these capabilities are funded and how the associated responsibilities and incentives remain sustainable as P2M usage grows.

These arrangements would also need to coexist with the Shared Responsibility Framework, scam-response arrangements and FIDReC, with clear interfaces between scheme rules, participant processes and existing regulatory and redress mechanisms.

Overall, the emerging model for Singapore is a stronger scheme-level foundation rather than fully centralised dispute adjudication. The scheme can establish the common rules, governance and shared capabilities, while banks and PSPs retain responsibility for investigating and resolving individual cases and applying participant-level controls. This provides a basis for greater consistency as PayNow P2M use expands, while preserving the roles and responsibilities of existing participants.

Merchant economics and surcharging

PayNow's prohibition on merchant surcharging is broadly consistent with the international experience reviewed, where domestic instant-payment and QR rails are generally not surcharged, although the basis varies across jurisdictions[47]. The position for cards is different in Singapore: there is no statutory prohibition or ceiling on card surcharges, with practices governed through card-scheme rules and merchant-acquirer agreements, alongside applicable disclosure requirements.

[46] "The Future of Payment Connectivity: Cross-Border QR Interoperability and Next-Bound Payment Rails," BCS, NETS Solutions (Chapter 6.10 of this report).

[47] "Merchant surcharge prohibition FAQ," Association of Banks in Singapore.

The choice between surcharging and a surcharge-free approach involves a trade-off between merchant cost recovery and price transparency on the one hand, and simplicity and predictability for consumers on the other:

- Surcharging: Can make the cost of different payment methods more visible and allow merchants to recover acceptance costs from the customers who incur them, potentially encouraging use of lower-cost options. However, it can introduce additional charges and complexity for consumers and requires safeguards against excessive or poorly disclosed surcharges.
- Surcharge-free: Provides a simpler and more predictable payment experience for consumers, but merchants generally recover acceptance costs through broader pricing rather than from users of a specific payment method.

International approaches show different ways of balancing merchant cost recovery, payment choice and consumer simplicity, with the approach varying by payment instrument and the underlying market conditions:

- Australia: Card surcharges were capped at the merchant's cost of acceptance after evidence of charges above actual acceptance costs. The approach later shifted towards prohibition as the price-signalling benefits of surcharging became less effective[48].
- European Union: Prohibits surcharging on covered consumer cards and certain euro account-to-account payment instruments, alongside regulation of underlying interchange costs.
- Malaysia: Prohibits card surcharging through card-scheme rules, alongside regulation of interchange costs.
- Switzerland: Restricts card surcharging through card-scheme rules and merchant-acquirer conditions, without a statutory prohibition. For TWINT, the restriction is contractual.
- India: UPI has historically had zero merchant discount rate (MDR) across most categories. More recently, MDR was introduced for selected high-value P2M transactions, with merchants bearing the cost rather than passing it on to customers[49].

Singapore can continue to maintain a surcharge-free position for PayNow, preserving a lower-cost payment option for consumers. At the same time, merchant pricing remains relevant to the sustainability of the payment ecosystem. India's recent move to introduce merchant discount rate pricing for selected high-value UPI P2M transactions, while retaining zero MDR for most lower-value transactions, illustrates how pricing can be calibrated to protect smaller merchants and low-ticket use cases while creating a revenue mechanism to support the continued operation and development of the network.

4.6.4. Way forward

The next stage of PayNow's P2M dispute-resolution framework will focus on strengthening the common scheme-level foundation across participants, with the longer-term objective of a more consistent, digitally enabled framework in which the scheme sets common rules, standards and shared capabilities, while banks and PSPs retain responsibility for investigating and resolving individual cases. SPaN will provide the scheme governance and oversight for this work. This includes clearer rules on dispute scope and eligibility, common evidence and data requirements, service standards and timelines, and digital workflows that support case submission, information exchange and status visibility. A stronger common foundation does not require PayNow to replicate a card-style chargeback model, but can provide greater consistency in how disputes are handled across participants.

[48] "Payment surcharges: economics, regulation and enforcement," Reserve Bank of Australia, December 2018; "Review of Retail Payments Regulation: Conclusions Paper," Reserve Bank of Australia, March 2026.

[49] "FAQs: Merchant Discount Rate (MDR) on select UPI P2M transactions," National Payments Corporation of India; "UPI continues to remain free for peer to peer transactions and 96% of merchant transactions," Press Information Bureau, Ministry of Finance, India, September 15, 2026.

For customers and merchants, this would mean a more consistent dispute experience across participants, with clearer processes and, in certain cases such as technical disputes, the potential for faster resolution. Customers would also have an easier way to submit disputes, provide supporting information and track case status through to resolution.

The common rules and supporting capabilities can be developed progressively, with broader PayNow P2M scheme rules expected to be introduced in stages over 2028. Treatment can remain differentiated across consumer disputes over goods and services, fraud and scams, misdirected or erroneous payments, and technical failures, reflecting the different evidence, recovery and resolution requirements of each. Industry engagement also points to the importance of defining responsibilities across payer and receiving institutions, merchants and relevant payment service providers as the framework develops.

Several design choices remain open, including the scope of disputes covered at scheme level, the extent of scheme involvement in case handling, the recovery mechanisms available for different dispute types, the allocation of liability, and how the framework interfaces with the Shared Responsibility Framework, scam-response arrangements and FIDReC. These choices can be taken forward through further industry design as the common rules, governance arrangements and supporting capabilities are developed.

For merchant economics, Singapore will continue to maintain a surcharge-free position for PayNow, consistent with the treatment of domestic instant-payment rails in the markets reviewed and preserving a lower-cost payment option for consumers. International experience shows that merchant pricing can be structured in different ways while keeping the customer-facing payment experience simple. Across the markets reviewed, domestic instant-payment and QR rails are generally surcharge-free, although the underlying pricing arrangements differ. Some markets maintain zero or low merchant fees for smaller merchants and low-value transactions, while others apply different pricing to selected transaction types. For PayNow, this provides a reference point for considering whether merchant pricing could be differentiated for MSMEs and small-ticket transactions, while preserving the existing surcharge-free proposition for consumers.

4.7. Smarter business payments

4.7.1. Singapore context

PayNow provides businesses and government agencies with real-time payments, but the information carried with payments is not yet sufficiently structured to support automated reconciliation and more integrated business workflows. This would require capabilities that go beyond moving funds alone, including richer payment information and tokenised payment credentials for recurring and contactless payments, and offline payments during connectivity disruptions and bank payment system outages.

The information PayNow carries with each payment is therefore increasingly important. PayNow carries the core information needed to complete a transfer, including the sending and receiving accounts, proxy identifier, amount, transaction reference and timestamp. More structured business information, such as merchant identifiers, merchant category codes, invoice references and purpose codes, is not currently carried in the standard payment message. PayNow uses ISO 20022, providing an extensible foundation for richer data where needed[50].

4.7.2. Key gaps and opportunities

PayNow's business-payment capabilities will be advanced along two tracks at different levels of maturity: richer payment data, which is progressing towards implementation, and tokenised payment credentials for recurring and contactless payments, which remain exploratory.

- Richer payment data: Standard PayNow messages do not currently carry merchant identifiers, merchant category codes, invoice references or payment-purpose codes needed for automated business reconciliation. Enriching existing payment fields with this information would support invoicing, collections and more automated reconciliation.
- Tokenised payment credentials: There is an opportunity to explore tokenised payment credentials that allow customers to authorise recurring payments in advance or make contactless payments directly from their bank accounts, supporting use cases such as recurring bill payments, subscriptions and tap-to-pay transactions. Contactless payment coupled with secure smart chip technology could provide a good foundation for offline payments, allowing customers to continue making everyday payments during connectivity and payment system disruptions.

4.7.3. Key considerations

The two areas address different needs within the broader objective of enabling PayNow to support more sophisticated business and government payments. Both would require common standards, interoperability and appropriate controls.

Richer payment data: a common framework that can expand over time

A common structured-data framework could support multiple use cases, rather than adding fields separately as new needs emerge. ISO 20022 provides the underlying structure for carrying payment identifiers, purpose and remittance information in defined fields, while recent SWIFT requirements reinforce the broader move from free-format towards more structured data[51].

[50] "Messaging Standards," Fast Payments Toolkit, World Bank; "ISO 20022 payments deep dive," SWIFT, 2020.

[51] "ISO 20022: The removal of unstructured address," SWIFT.

Several considerations would shape the design of a common structured-data framework[52]:

- Interoperable by design: New data fields should align with ISO 20022 standards and relevant cross-border requirements, supporting consistent exchange of payment information across participating institutions.
- Structured for automated use: Defined fields should support reconciliation, screening, reporting and straight-through processing (STP).
- Data relevance and privacy: Additional information should serve a clear processing purpose, with appropriate data privacy and governance arrangements.
- End-to-end data consistency: Additional payment information should be preserved and made available consistently across participating banks and customer channels, including online banking portals, host-to-host connections, statement files, credit advice notifications, transaction reporting APIs and payment confirmation messages. Standardised payment status and confirmation information could further support automated reconciliation and business processing.
- Compatibility with existing payments: Existing ISO 20022 fields should be reused where possible, with extensions introduced as needed to support new requirements without disrupting existing payment processing.

The framework could be expanded progressively, beginning with merchant identifiers, merchant category codes, acquirer information, invoice references and payment purpose. Additional payer, payee and payment-intent information could be introduced as use cases mature. Where different processing priorities are introduced for bulk and time-critical payments, a standardised data field could identify each payment's priority so that participating banks process it consistently.

Realising the benefits of richer payment data will depend on adoption and integration across the business ecosystem. Common standards and integration with enterprise resource planning (ERP) systems and business workflows could support more automated reconciliation and downstream processing.

For Singapore, the key choices are which data fields to prioritise, where they should sit within payment messages, and how to ensure that the information remains available and usable across participating institutions and business systems, with appropriate data privacy and governance arrangements.

Tokenised payment credentials: enabling recurring and contactless payments

Tokenised payment credentials could enable new PayNow payment experiences without exposing customers' underlying account information to merchants. Phase 2 will explore two potential applications: pre-authorised recurring payments and contactless account-to-account payments.

A. Recurring payments through pre-authorised mandates: Customers could authorise recurring collections for a specific merchant through their banking app with strong authentication, specifying the maximum amount, frequency and validity period. A mandate token would allow the merchant to initiate subsequent collections within these agreed conditions without requiring the customer to approve each payment individually. The token service would validate each collection request against the mandate, after which the payer bank would perform its usual checks and execute a standard FAST credit transfer to the merchant. Customers would retain the ability to view, pause or revoke mandates through their banking app. This could provide a real-time alternative for recurring collections currently supported through GIRO, eGIRO and card-on-file arrangements, without changing the existing FAST credit-transfer model.

B. Contactless payments using near-field communication (NFC): Customers could enable contactless payments through their banking app, with a device token linking their mobile device to their bank account. At checkout, the customer would tap their mobile device on a contactless terminal, which would transmit the token and transaction authentication information through the acquirer to the token service for

[52] "The Future of Payment Connectivity: Cross-Border QR Interoperability and Next-Bound Payment Rails," BCS, NETS Solutions (Chapter 6.10 of this report).

validation and routing to the payer bank. The bank would authorise the transaction and execute the payment through FAST. This could provide a tap-to-pay experience similar to contactless debit cards while allowing customers to pay directly from their bank accounts.

Building on the same device tokens, NFC contactless payments that leverage secure smart chip technology could also provide a foundation for offline payment capability within Singapore's digital payment ecosystem. In situations where internet connectivity or the underlying payment system is unavailable at the point of payment, the customer's device and merchant's terminal could complete the transaction, with the transaction record stored securely on their respective devices and forwarded for backend settlement once connectivity or the system is restored, hence strengthening the resilience of Singapore's retail digital payment ecosystem.

Several considerations would shape the design and implementation of these capabilities:

- Customer consent and control: How customers authorise mandates and device tokens through their banking apps, set the amount, frequency and validity of recurring mandates, and manage or revoke permissions. The design would need to ensure that subsequent collections remain within the customer's authorised conditions.
- Security and data protection: How tokens are securely issued, validated and linked to customer accounts without exposing account details to merchants. The design would need to preserve bank-level authentication, fraud and scam checks, anti-money laundering and countering the financing of terrorism (AML/CFT) screening, customer limit verification and end-to-end auditability.
- Operating model and governance: How responsibilities are allocated across participating banks, merchants, acquirers and the central infrastructure operator. Banks would retain responsibility for customer authentication, fraud, scam and AML/CFT checks, and FAST execution, with the allocation of token-to-account mapping between banks and the common token service to be determined. This includes whether mapping should remain within individual banks, be centralised in the token service or follow a hybrid model, while preserving banks' responsibility for account-level controls. Merchants and acquirers would manage merchant onboarding, collection and tap requests, terminal enablement, refunds and first-level disputes. The governance and operating arrangements of a common token service would require further assessment, including whether it could draw on trusted registry capabilities being explored by industry or operate as a standalone component.
- Technical feasibility and interoperability: How mandate validation, token lifecycle management and revocation would operate consistently across participating institutions. For contactless payments, the design would need to assess terminal compatibility, NFC access on mobile platforms and whether end-to-end response times can meet contactless payment expectations. As the common token service could become a critical component of payment processing, its design would need to address system availability and resilience, including active-active architecture, disaster recovery, capacity to handle peak transaction volumes and arrangements to maintain or safely manage payment processing during disruptions.
- Commercial viability and adoption: Whether tokenised payments can offer sufficient benefits over existing arrangements, including GIRO, eGIRO and cards, to justify implementation and integration costs. This would include assessing merchant acceptance costs, payment reliability, customer convenience and the readiness of banks, merchants and payment providers to support these capabilities.

The initial scope could focus on domestic SGD payments to merchants onboarded to PayNow, with cross-border payments, person-to-person tap transfers and wearables excluded from initial consideration. Transaction and daily limits for contactless payments, including the potential for an industry-wide ceiling, would require further assessment alongside applicable scheme rules and participation arrangements.

4.7.4. Way forward

Implementation will proceed in two stages. Richer PayNow payment data will move into implementation from end-2027. Tokenised payment credentials will remain a separate exploratory workstream, with further testing from 2028 to assess their feasibility for recurring and contactless payment use cases.

For richer payment data, richer structured payment information will begin to be introduced into PayNow to support invoicing, payment matching, reconciliation and other business and government workflows. MAS will work with industry to establish the common data standards, implementation requirements and supporting governance arrangements. Services using these richer fields can begin to be offered from 2028.

For tokenised payment credentials, MAS and industry will assess tokenised payment credentials through targeted testing, covering customer consent and authentication, token issuance and lifecycle management, interoperability, terminal and mobile platform readiness, and the operating arrangements needed to support these capabilities. The results would inform decisions on their feasibility and potential implementation. These outcomes could also inform how offline capability for contactless payments could be supported, including the limits, safeguards and reconciliation arrangements required.

Delivery will require coordination across MAS, ABS, the central infrastructure operator and participating banks to establish responsibilities, implementation sequencing and the supporting standards, infrastructure and controls. The progression of each capability will depend on technical feasibility, commercial viability and industry readiness.

Taken together, richer payment data and tokenised payment credentials could extend PayNow's role beyond transferring funds. More structured payment information could support automated reconciliation and closer integration with business systems, while tokenisation could enable recurring collections and contactless payments directly from bank accounts. Realising these benefits will depend on adoption and integration across participating institutions, businesses and payment service providers.



Chapter 5

The next frontier of payments

5. The next frontier of payments

PayNow Gen2 represents an important step in Singapore's payments evolution, but it is not the end state. The ambition is to support the economy of tomorrow, not simply improve payments today. As the payments landscape advances rapidly, Singapore must build on PayNow Gen2 to prepare its payment rails and supporting infrastructure for an increasingly digital, connected and automated economy.

Emerging technologies are changing how money moves and how commerce is conducted. Autonomous software agents could undertake commercial decisions and settle transactions within established mandates, while machine-to-machine commerce may generate new patterns of high-frequency, low-value transactions. Emerging forms of digital money, including tokenised deposits, and programmable payment technologies could also enable payments to be executed automatically when agreed commercial conditions are met.

Domestic payment infrastructure plays an important role in preserving national payment sovereignty, resilience and continuity of essential payment services, particularly amid growing geopolitical fragmentation. At the same time, the global payments landscape is becoming more diverse, with instant payment systems, established payment networks and emerging forms of digital money developing alongside one another to serve different needs. For Singapore, this underscores the importance of maintaining resilient domestic instant payment infrastructure while enabling interoperability across different payment rails and forms of money, both domestically and across borders.

Greater automation will also introduce new fraud and scam risks and could increase the impact of errors. Supporting autonomous transactions will depend on establishing who is acting, under whose authority and how responsibility is assigned when something goes wrong, with fraud and scam prevention increasingly embedded within payment infrastructure itself. Sound risk management, compliance, clear institutional mandates and strong governance will remain essential to preserving the integrity, resilience and public trust on which the payments system depends.

MAS will lead the next phase of this work through the Future Payment Rails Blueprint, beginning in 2027. The Blueprint will set out how Singapore's payment rails and supporting infrastructure should evolve to meet the needs of the future economy, building on the foundations laid by PayNow Gen2 and the lessons from implementing its enhancements.

At the heart of the Blueprint is a multi-rail, multi-functional and multi-service payments architecture. Rather than relying on a single rail to meet every need, such an architecture would allow different payment rails to operate alongside one another, support a broader range of functions across the payments stack, and deliver a wider set of services to consumers, businesses and government through common foundations.

The Blueprint will be guided by four key objectives: lower operating costs, faster time-to-market for new products and features, greater resilience of the national payment rails and a faster pace of innovation. Together, these objectives reflect the need for payment infrastructure that is efficient to operate, quick to adapt as needs change, able to withstand disruption, and open to new ideas from across the ecosystem.

As Singapore moves into this next phase of its payments evolution, we welcome members of the public and ecosystem participants to share their views and feedback via email to banks@abs.org.sg[53].

[53] MAS, ABS and SPaN will jointly consider the feedback sent to the ABS mailbox.

6. Appendices

The appendices comprise thought leadership papers contributed by industry and ecosystem stakeholders. The views, analysis and recommendations expressed in the appendices are those of the respective authors and do not necessarily represent the views or future positions of MAS, ABS, SPaN or the PayNow scheme. Any eventual regulatory, scheme or industry decisions may differ from the perspectives presented.

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6.1. Inclusive QR Payments: QR Interoperability, Tourist App and NFC resiliency

Authored by NETS

6.1.1. Executive Summary

Singapore has established a strong foundation for digital payments through the Singapore Quick Response Code (SGQR), which consolidates participating payment schemes within a common payment messaging standard. However, the current QR payment landscape is fragmented with SGQR, SGQR+ and PayNow QR. This means merchants need to display multiple QR marks, which local consumers and inbound visitors are expected to recognise at checkout.

Deepening QR interoperability is the immediate next step in our payment landscape evolution. NETS supports this more interoperable model which is built on clear acceptance, routing, and issuer participation rules. This takes the existing SGQR model one step further – consumers no longer need to match payment apps to merchants' QR marks, as they are interoperable. To enable this interoperability, participating payment networks can be connected through a common switch, providing a common routing mechanism between the networks.

Under the new model, participating payment networks, rather than individual issuers and acquirers, connect to a common switch. Existing on-us transactions continue to be processed within the respective payment networks, while only eligible off-us transactions are routed through the switch. The model retains a merchant-funded MDR construct. For each eligible off-us transaction routed through the switch, a switching fee would be payable to the appointed switch operator by the sending payment network. Existing cross-border inbound arrangements should also be encouraged to connect through an existing participating local payment network, allowing inbound visitors to benefit from the broader merchant acceptance enabled by the switch.

NETS is a key enabler in this interoperable ecosystem with our 35,000 QR acceptance points (including hawkers)[54].

In addition, there is opportunity to broaden payment inclusivity in Singapore. While anyone with a local bank app or local wallet account is able to pay at a wide network of QR merchants, there are sub-segments who may not have this access – typically dependants who are children, elderly, foreign domestic workers. A similar theme of inclusivity gap exists for our inbound visitors from countries such as Europe, UK, USA, Australia and New Zealand. Currently, only inbound visitors from China, Malaysia, Indonesia, and Thailand are able to use their home QR payments apps easily in Singapore.

[54] Network for Electronic Transfers (Singapore) Pte Ltd, "NETS announces SGQR+ islandwide rollout, following the success of SGQR+ Proof of Concept", 7 November 2024. https://www.nets.com.sg/newsroom/nets-announces-sgqr-islandwide-rollout-following-the- success-of-sgqr-proof-of-concept

Broadening payment inclusivity is achievable via a payment app – one that supports stored-value capabilities, configurable spend controls, remote funding and account lock, and QR payments. Singapore residents and inbound tourists from countries outside of participating bilateral or cross-border QR payment connection will be able to access the interoperable QR network via this simple solution. NETS' suite of capabilities provides a practical foundation to offer these functionalities[55].

NETS therefore recommends a coordinated implementation programme comprising common technical and operating standards, a recognisable acceptance proposition, proportionate governance, and phased delivery of Interoperable QR and inclusive payment app capabilities. The programme should be demonstrated with participating institutions and merchants at the Singapore FinTech Festival (SFF), scheduled for 18–20 November 2026 at Singapore EXPO, while clearly distinguishing capabilities that are live today from those under pilot or future development[56].

6.1.2. QR Interoperability

Overview

SGQR has simplified merchant presentation by consolidating participating payment schemes within a common payment messaging standard. However, a common messaging standard and SGQR mark does not by itself ensure interoperability across all payment schemes, such as PayNow QR at merchants.

Today, a consumer's ability to pay may still depend on whether the consumer's chosen payment app is supported by the payment scheme enabled at the merchant (e.g. SGQR, PayNow QR). This can result in acceptance gaps, and more friction for both consumers and merchants.

The next step is therefore to deepen interoperability so that participating Payment Apps and merchant acquirers can connect through interoperable domestic arrangements, via the Domestic Interoperable Switch (DIS).

Current State: Fragmented QR landscape for consumers and merchants

Segment	Current State: Common pain points	Opportunity Target State: Interoperable and Inclusive
Local Consumers	Consumers may not always be able to use their preferred banking app or e-wallet at a merchant, as acceptance depends on the payment network and acquiring arrangement supported by the merchant.	Improve domestic interoperability so participating payment apps can reach a broader base of participating merchants, regardless of the merchant's acquirer.
Visitors from Connected Cross-Border Payment Markets	Visitors can use participating home banking apps or e-wallets at enabled Singapore merchants, but acceptance may vary depending on the merchant's acquiring arrangement.	Extend cross-border acceptance by connecting existing bilateral and multilateral payment corridors to the domestic interoperable infrastructure, giving visitors broader merchant reach without requiring a new app.

Local Consumers – Opportunity to improve Domestic Interoperability

Local consumers may have access to several banking Apps or wallets yet remain uncertain about which App is accepted at a particular merchant. This uncertainty can lengthen checkout, trigger unsuccessful scans or

[55] Network for Electronic Transfers (Singapore) Pte Ltd, "NETS launches NETS Prepaid Card: its first 'smart' stored-value card for retail and transit", 22 November 2022. https://www.nets.com.sg/newsroom/nets-launches-nets-prepaid-card-its-first-smart-stored-value-card-for-retail-and-transit

[56] Singapore FinTech Festival, "FAQ", https://www.fintechfestival.sg/faq

require a second payment method. There is opportunity to create a simpler and seamless payment experience for consumers.

Visitors from Connected Markets – Opportunity to Broaden Acceptance

Visitors from connected markets can use participating home banking Apps or e-wallets at enabled Singapore merchants. Currently, NETS, as an acquirer, enables inbound visitors from China, Indonesia, Malaysia and Thailand to make payments at NETS merchants[57]. However, they are unable to transact via PayNow QR. Hence, these inbound visitors will also benefit from enhanced interoperability across SGQR and PayNow QR.

Merchants – Opportunity to Broaden Customer Reach

For merchants, fragmented scheme participation can require multiple enablement decisions and can constrain access to customers on other payment networks. There is opportunity to simplify acceptance and checkout experience at merchants (e.g. single acquirer for broad range of local and inbound visitors). This is particularly material for smaller merchants such as hawkers, and other heartland merchants, for whom operational simplicity and broad customer reach are essential[58].

Future State: Seamless Interoperable QR payments

A Simple and Seamless Payment Experience for consumers

In the future state, local consumers should be able to use their preferred participating banking app or e-wallet across a broader network of participating merchants, without needing to understand the underlying scheme or acquiring arrangement. This experience also applies to visitors from connected markets.

They simply use their preferred app, scan the merchant's QR, verify and confirm the payment details, while routing is handled seamlessly between participating payment QR schemes (e.g. SGQR, PayNow QR). This is a seamless and effortless payment experience for local consumers, and visitors from connected markets.

Wider acceptance without higher complexity for merchants

In the future state, greater interoperability allows merchants to use a single QR acceptance mark across local schemes. Merchants will minimise checkout friction, as consumers are able to pay any QR mark.

Recommended Solutions

A Single, Recognisable Acceptance Mark

A single, recognisable acceptance mark should provide consumers with a clear and consistent indication of where participating QR payment apps can be used. The mark should be displayed consistently at participating merchants and, where relevant, within participating banking apps and e-wallets.

Local consumers and visitors from connected markets can pay at any merchant with this single acceptance mark – without having to understand the underlying payment scheme. Concurrently, merchants could simplify payment method presentment by displaying only this single QR acceptance mark. There is an invisible interoperability layer working in the background to route their payments to the right schemes, acquirers, and issuers.

To maintain consumer trust, use of the acceptance mark should be supported by clear participation and usage rules. The mark should only be displayed where the relevant payment options are enabled, so that it remains a reliable indication of acceptance.

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[57] Network for Electronic Transfers (Singapore) Pte Ltd, "Accept Overseas Wallets & Foreign Cards", https://www.nets.com.sg/nets/for-business/accept-overseas-wallets-foreign-cards

[58] Network for Electronic Transfers (Singapore) Pte Ltd, "Six ASEAN Payment Networks Lead Global Effort to Standardise Cross-Border Payments", 17 October 2025. https://www.nets.com.sg/newsroom/six-asean-payment-networks-lead-global-effort-to- standardise-cross-border-payments

Domestic Interoperable Switch (DIS)

A Domestic Interoperable Switch (DIS) can provide the common connectivity needed for participating payment networks and merchant acquirers to interoperate. Instead of requiring separate connections between every participating network and acquirer, the DIS can provide a common routing mechanism for eligible transactions. More details are covered in Appendix 6.10.

Existing on-us transactions can continue to be processed within the respective payment networks, while eligible off-us transactions can be routed through the DIS to the relevant participating acquirer. This allows existing payment networks and acquiring relationships to continue operating while enabling broader interoperability.

For consumers and merchants, this complexity should remain largely invisible. Consumers continue to use their participating banking app or e-wallet, while merchants can retain their existing acquiring relationship and SGQR setup wherever practicable.

Participation and Governance

A successful interoperable model requires clear and transparent participation rules that apply consistently across participating payment networks and acquirers. These should cover areas such as participant eligibility, technical certification, settlement, liability, refunds and disputes, fraud management, data protection and service levels. More details are covered in Appendix 6.7[59].

Scalability and Regional Pathway

The domestic interoperable infrastructure should be compatible with existing cross-border connectivity, which is already established via existing bilateral arrangements (e.g. NETS-PayNET, NETS-ITMX etc). This means visitors from these connected markets will continue to use their familiar home banking apps or e-wallets when paying at participating Singapore merchants. In fact, they benefit from an expanded merchant acceptance network (e.g. including previously PayNow QR acceptance points).

Future connections into new cross-border payment markets will benefit from this enhanced domestic interoperability as well. These potential payment partners could choose either direct connection to the DIS or indirect via local payment networks (e.g. NETS, PayNow).

Build on SGQR framework

The SGQR framework should continue to provide the foundation in the new interoperable construct. This is already a simple and familiar QR presentation at the merchant, while the interoperable infrastructure operates behind the scenes to enable broader connectivity between participating payment schemes and acquirers.

Implementation should therefore minimise changes for merchants and consumers wherever practicable. Merchants should not need to understand how a transaction is routed, while consumers should continue to scan and pay using their participating banking app or e-wallet.

More details are covered in Appendix 6.7 and Appendix 6.10.

[59] The governance framework should also clearly define the respective responsibilities of the DIS, participating payment networks, issuers and acquirers. This is important to preserve the existing responsibilities of each participant while establishing common rules for transactions that move across networks. Governance should be proportionate to risk and support consistent consumer and merchant outcomes across participating networks.

6.1.3. Inclusivity via NETS App/NETS Wallet

The Inclusion Opportunity

Interoperability improves the ability of participating payment apps and e-wallets to reach a broader merchant network. However, interoperability alone does not address consumers who do not have access to an eligible participating payment app.

This creates an opportunity to complement the interoperable QR ecosystem with an accessible payment option for selected consumer groups. The NETS App could provide this access by enabling eligible users to hold and use a funded digital wallet across participating merchants, subject to the applicable regulatory and identity-verification requirements.

Two Key Inclusion Opportunities

Dependants

There is an opportunity to extend these capabilities into a digital-first wallet for users who may require another person to fund or oversee their everyday expenditure. This could include younger family members and other eligible dependants.

The sponsor could fund the wallet, set appropriate spending limits, view transactions and apply relevant controls, while the dependant uses a separate wallet balance for everyday payments. This provides greater convenience and control without requiring access to the sponsor's principal bank account.

The dependant wallet could use the same participating interoperable QR acceptance network described in Section 6.1.2, avoiding the need for a separate merchant acceptance arrangement.

Visitor Wallet for Visitors without a Participating Home App

Visitors from connected payment markets should continue to use their participating home banking apps or e-wallets wherever possible. A separate NETS App wallet would therefore not be necessary for these visitors.

The remaining opportunity is visitors who do not have access to a participating cross-border QR payment app. For these visitors, an eligible visitor wallet within the NETS App could provide access to participating Singapore QR merchants without requiring a Singapore bank account.

Subject to regulatory and commercial requirements, the proposition could support appropriate identity verification, wallet funding, foreign-exchange transparency, stored-value safeguards and a simple mechanism for refunding or withdrawing any residual balance at the end of the visit.

Visitors without a Participating Cross-Border QR Wallet – Opportunity to Broaden Access

These visitors do not have a participating home banking app or e-wallet to transact at QR merchants in Singapore. While these visitors can generally rely on internationally issued cards or cash, these payment methods may not provide the same reach at QR-focused merchants (e.g. Hawkers). This presents an opportunity to enable them to pay like a local.

Payment Resilience and Convenience

As the proposition develops, the NETS App could also explore additional payment methods that improve accessibility and resilience. This may include NFC-based payments at merchant outlets. Such capabilities could provide an alternative payment path when QR scanning or mobile connectivity is temporarily unavailable, subject to appropriate transaction limits, security controls and risk management.

Future State: Trusted e-wallet to pay like a local; offline transaction is feasible

The future state is an inclusive digital payment ecosystem where consumers can access the same broad merchant acceptance network regardless of whether they have a local bank account or a participating cross-border payment app.

The NETS App could complement existing banking apps and cross-border wallets by providing an alternative payment access point for eligible users who may otherwise have limited access to Singapore's QR payment ecosystem. Users would be able to onboard digitally, fund a secure e-wallet and pay at participating merchants through the same interoperable acceptance network described in Section 2.

The experience should be simple, trusted and appropriate to the needs of different users. Sponsored users could have appropriate funding and spending controls, while eligible visitors without a participating home payment app could access local QR payments without opening a Singapore bank account.

Over time, additional payment methods such as NFC and controlled offline payment capabilities could further improve accessibility and resilience, subject to technical feasibility, appropriate risk controls and regulatory requirements.

Recommended solutions

Sponsored e-Wallet for Eligible Dependants

The NETS App could provide a sponsored e-wallet for eligible users who require another person to fund or oversee their everyday expenditure. An authorised sponsor, such as a parent or guardian, could fund the wallet, set spending limits, view transactions and apply appropriate controls.

The wallet balance should remain separate from the sponsor's principal bank account, limiting the sponsor's financial exposure while providing the user with a simple way to pay at participating merchants. Controls should be proportionate to the user's circumstances and applicable regulatory requirements.

Visitor e-Wallet – Pay Like a Local

Visitors from participating bilateral or cross-border QR payment connection into Singapore (e.g. Malaysia, Thailand, Indonesia and China) should continue to use their participating home banking apps or e-wallets to pay for their purchases. The NETS App could provide an alternative payment option for eligible visitors from markets where there is currently no participating bilateral or cross-border QR payment connection.

The visitor could onboard digitally, fund the wallet using an eligible funding source and use it to pay at participating Singapore merchants without requiring a local bank account. The proposition should provide transparent funding and foreign-exchange terms, appropriate identity verification and screening, clear wallet limits, and a straightforward mechanism for returning any residual balance where permitted.

Where Visa and Mastercard cards are used as funding sources, the viability of the proposition will also require appropriate card scheme support, including applicable scheme rules, transaction classification and a commercially sustainable funding model.

The objective is simple: enable more visitors to participate in Singapore's digital payment ecosystem and "pay like a local".

Alternative Payment Methods and Resilience

QR should remain the primary payment experience, while alternative payment methods can provide additional convenience and resilience. NFC could provide an additional tap-to-pay experience where supported, while controlled offline payment capability could provide continuity for selected use cases when connectivity is temporarily unavailable.

Offline payment should be treated as a separate resilience workstream rather than a prerequisite for the initial e-wallet proposition. Any implementation would require appropriate transaction limits, credential protection, fraud controls, prevention of replay or duplicate spending, and reconciliation when connectivity is restored.

These capabilities should therefore be introduced progressively, subject to technical feasibility, risk assessment, regulatory requirements and agreement with participating ecosystem partners.

6.1.4. Showcase at Singapore FinTech Festival 2026

Subject to regulatory, technical and partner readiness, the SFF demonstration could illustrate how interoperability and inclusion work together through three consumer journeys:

1. Local consumer: using NETS App dependent's sub-wallet and pay at a participating merchant.
2. Connected overseas visitor: uses their familiar participating home app or e-wallet at the same merchant.
3. Visitor without a connected home app: uses an eligible NETS App visitor wallet to access the same participating merchant acceptance network.

6.2. Deep-linking for Digital Payments: Bringing Government Services & E-Commerce Into the Mobile-Journey Age

Authored by Antom / 2C2P by Antom

6.2.1. Executive Summary

This paper examines a shared challenge in digital payments: completing a payment without disrupting the customer journey. With online QR payments, a resident paying a government fee or a shopper checking out on a mobile storefront still pays via manual steps outside of the checkout flow: they screenshot the QR code, switch to a banking app, locate and upload the screenshot, authorise the payment, and navigate back by hand. The payment rail has enabled instant payment but the interaction layer between checkout and payment application has not kept pace, creating a manual app-to-app handoff.

Deep-linking removes that handoff: The customer taps PayNow and is directed to their preferred banking app with payee, amount, and reference pre-populated, followed by a single biometric tap that authorises the payment, and the customer returns automatically to the confirmation page. The interaction becomes continuous, while the payment channel, verification, and settlement remain unchanged.

Across observed deployments by Ant International (Antom, 2C2P) on live Singapore payment flows, the change is measurable: payment success rate improved by ~9%, transaction completion time dropped by ~18% and the average payment journey was reduced from six or more manual steps down to a single step / tap.

Metric	Observed result	Change
Payment success rate	~85% → ~94%	Increase by 9%
Completion time	~62s→ ~51s	Reduced by 11s (or 17.7%)
Manual steps	6+ → 1	Single tap + biometric authorisation

The handoff gap is not simply a user experience improvement issue; it involves the final step of a government service payment or an ecommerce purchase, and decides conversion. Conversion losses from handoff friction are not reflected in payment-system statistics as the interaction layer is separate from rail performance. Nonetheless, improving the interaction layer for both offline and online QR payments would enhance user experience and therefore conversion rates, without impacting the rail.

This paper by Ant International (Antom, 2C2P) sets out the case for adopting deep-linking conventions by key ecosystem players such as banks, merchants, agencies, and platforms, to enable larger-scale benefits across the ecosystem.

6.2.2. The Problem: The Mobile Payment Handoff Gap

In a typical online, single-device mobile session involving QR payment in Singapore, the payment step moves the customer out of the purchase journey they were in, to the payment application, and then back to the purchase journey. This requires manual switching between two applications: the application they were transacting on (e.g. e-commerce app) and the payment application (e.g. digital banking application).

Domain	Typical payments	Where the flow breaks today
E-commerce	Mobile web and in-app checkouts on storefronts	Cart abandonment at the payment step; manual QR capture
Government services	Fees, fines, permits, and taxes on agency portals	Screenshot-and-upload detour; session timeouts; repeat visits
Shared	Any PayNow-collectible payment on a single device	The handoff between the page and the banking app

E-commerce checkout

For a shopper, payment is the final and most critical step of the purchase journey. While Singapore has established itself as a global leader in real-time payments through PayNow, the QR model continues to assume a QR code to scan and a separate camera or device, not a single-device shopping session.

In the PayNow context, a shopper paying via PayNow QR on a mobile storefront follows a flow that's still patterned after offline QR payments: the QR code renders on their own screen, they screenshot it, leave the storefront to open the banking app, locate the image in the photo album (if device permissions allow), confirm the transfer, and navigate back to the order manually.

Conversions from cart to sale risk being lost because of friction arising from payment actions being separate from the purchase journey, not because the payment method itself is undesirable. Globally, cart abandonment averages 70.22% (Baymard, 2025), and every extra manual step at the final stage exacerbates an already-leaky funnel.

Government service payments

The same structural gap can also be found in government services. Agencies have invested in digital government services by moving form-filling and applications online, and payment is often the last step of that journey. Today, a resident paying a fee, fine, or service charge via PayNow in a mobile browser follows a seven-step path: select PayNow QR, watch it render on their own screen, capture the code, leave the portal to open the banking app, locate the screenshot, confirm and authorise, then navigate back manually.

The cost appears at scale: a resident renewing a licence on a phone during a commute may spend longer on the payment step, the screenshot, the app switch, the album hunt, and the manual return, compared to the time spent on the renewal form itself. This can be further delayed by issues like session timeouts that can reset their entire journey.

Shared root cause

Both cases involve friction that stems from one root cause: the offline QR payment experience was not optimised for online uses. The offline experience assumes two devices: one owned by a merchant or agency that displays the QR code, and one owned by a customer using it to scan the code. When applied to the online experience, the customer's own screen must show the QR code, which forces the screenshot-and-upload app-to-app handoff.

Additionally, the handoff between the two applications results in:

- Context loss at every hop: Each app switch and manual re-entry is a chance to abandon the purchase or reach session timeout.
- Permission and discovery friction: Photo library access and hard-to-find album-scan entry points add failure modes.

The cost of the gap

In e-commerce, abandonment at the payment step becomes lost revenue. With cart abandonment averaging 70.22% globally, each additional manual step adds to cart abandonment risk. Merchants absorb the cost as unpaid carts, payment-related support contacts, and re-engagement spend.

In government services, the cost appears as failed or delayed transactions, repeat visits to service centres, and helpdesk load. These outcomes run counter to the frictionless-service standard that digitalised services seek to set in the first place.

As mentioned earlier, these costs are invisible in payment-system statistics, but surface as business- or agency-level costs which cannot be entirely mitigated by enterprises and organisations individually. A more coordinated ecosystem effort is needed, as seen in other markets.

6.2.3. Global Precedent: How Other Markets Solved It

Deep-linking is an increasingly common interaction pattern for mobile account-to-account payments worldwide. On mobile, the standard payment experience is a direct handoff to the customer's own banking app. The summary below lays out how four major markets achieve this experience through different governance models.

Market	Governance model	Who executes payments	Relevance to Singapore
Brazil	Central-bank rulebook (BCB); licensing and settlement	Providers connect directly to banks	QR rail and copy-string entry points pair naturally with app handoff
UK	Industry standard-setter (OBIE → Open Banking Limited)	PISP initiates directly with the bank; no intermediary routing	Most mature pay-by-bank market; app-to-app is the default experience
Europe	Regulation (PSD2, 2018)	Licensed PISPs initiate from customer accounts	Mandated access proves bank-level execution at scale
India	Centralised switch (NPCI)	Every transaction via NPCI infrastructure	Works at India scale; heavier than needed for Singapore today when considering the volume

Brazil: Pix

Pix demonstrates a central-bank-governed instant-payment model at national scale. The Central Bank of Brazil sets the rulebook, standards, licensing, and settlement. Participating providers connect directly to banks to initiate payments. The central bank certifies compliance but stays out of the transaction path.

Real-time by design, Pix clears 24/7 and funds arrive in seconds. It offers several entry points: static and dynamic QR codes and the "Copia e Cola" copy-string that banking apps auto-recognise. Open Finance Brasil layers cross-institution data sharing on top of the rail.

Key takeaway: a QR rail can carry a bank-app handoff and pre-populated payment data without changing the underlying payment experience.

UK: the most mature deep-linking market

The Open Banking Implementation Entity, now Open Banking Limited, set the standard and banks implemented it. Pay by Bank is offered by major UK merchants through two app-to-app flows, both initiated directly between the payment provider and the bank with no intermediary routing.

Cashier payment routes checkout through the customer's bank. Direct-debit handles recurring payments. Commercial Variable Recurring Payments extend the same infrastructure to variable recurring commercial use cases within agreed limits.

Key takeaway: Sustained, standards-led adoption turns app-to-app payment from a novelty into a default checkout experience, the model Singapore's bank-led ecosystem can replicate.

Europe: PSD2, the regulatory route

The revised Payment Services Directive (2018) mandated banks to open customer account access to licensed third parties. It is the regulatory route to the same principle of direct, bank-level execution.

Payment Initiation Service Providers initiate payments directly from customer accounts without cards. Account Information Service Providers aggregate account data across banks.

Key takeaway: Regulatory intent combined with industry standards, rather than heavy central infrastructure, can be a form of market intervention.

India: UPI, the heaviest governance model

NPCI owns the rules, operates the core switch, and runs clearing through a centralised national model. Every transaction passes through NPCI infrastructure. This works at India's scale, where volumes run into the billions per month, but it is the most resource-intensive model and may be more than Singapore needs at this stage.

Key takeaway: Third-party apps initiate payments on top of the switch, so customers pay from interfaces they already use. India demonstrates demand for app-initiated account-to-account payments at population scale. Singapore's bank-led model can reach the same customer experience with a lighter footprint.

Key insights for Singapore's deep-linking model

Regardless of governance model, every major market has converged on the same mobile experience: a direct handoff into the customer's banking app. In Singapore, the enabling conditions already exist domestically: PayNow provides the scheme, FAST provides the rail, SGQR the interoperable QR standard, and MAS the regulatory environment. The remaining gap sits at the interaction layer, not the infrastructure layer. Additionally, deep-linking complements cards and wallets; it does not displace them.

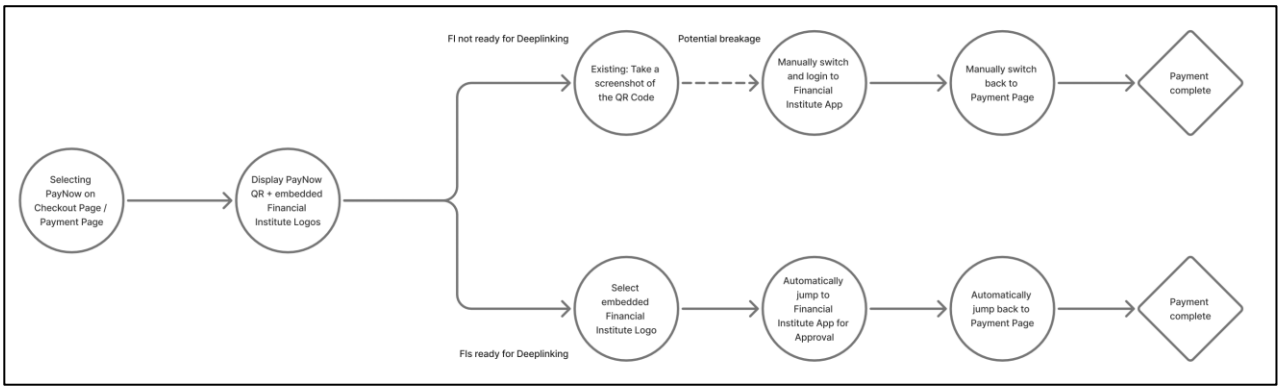
As Southeast Asia's QR rails (QRIS, DuitNow, PromptPay, QRPh, VietQR) expand and link, app-to-app handoff grows more relevant to mobile commerce. Singapore's combination of bank-led execution and QR ubiquity positions it to lead that shift.

6.2.4. The Solution: App-to-App Deep-Linking

Concept

App-to-app deep-linking allows two distinct mobile applications to communicate directly on a single device. Rather than opening a target app's home screen, it routes the user to a specific screen; in this case, the payment confirmation page of the customer's banking app. In the context of PayNow, deep-linking provides an interaction layer upgrade by replacing manual QR scanning with a single-tap transfer. The customer journey becomes continuous, while the underlying QR message, verification, and settlement are unchanged. The channel, trust model, and cost structure remain the same.

The user journey



From selection to confirmation, the flow involves six moments:

1. User action: The customer selects PayNow and taps Pay.
2. Secure handoff: The service page or storefront passes the payment context, the payee, amount, and reference, directly to the customer's banking app through a verified app-invocation mechanism.
3. Banking app opens on payment: The app launches straight to the confirmation screen, with no home-screen navigation or image upload.
4. Pre-populated confirmation: Merchant or agency name, exact amount, and a unique reference are already filled in.
5. One-tap authorisation: The customer verifies the details and confirms payment.
6. Automatic return: The customer is routed back to the order or service confirmation page with status visible.

The payment authorisation itself never leaves the banking app. The customer interacts only with the institution they already trust, and the page they started from is waiting for them at the end.

Design characteristics

Six characteristics define the pattern and make it verifiable for any institution evaluating it:

Characteristic	What it means in practice
Single-device continuity	The whole payment happens on the customer's own device, no second device, no screenshot.
Context preservation	Payee, amount, and reference travel with the handoff; nothing is re-typed or re-scanned.
Bank-grade authorisation	Confirmation happens inside the banking app with biometric authentication.
Automatic return	The customer lands back on the confirmation page with clear status, no manual wayfinding.
Existing-rail reuse	Same PayNow message, verification, and settlement; no new payment infrastructure.
Graceful fallback	Whenever the banking app cannot be invoked, the flow degrades to the standard QR display.

Security and trust

Deep-linking only changes where the customer taps, not how the money moves. As the handoff relies on platform-verified app invocation, only the legitimate banking application can receive the payment context. The customer's banking credentials never pass through the merchant page or government portal. Authorisation stays entirely inside the bank's own app, preserving the trust boundary that customers already know.

Deep-linking is	Deep-linking is not
An interaction upgrade on the existing PayNow rail	A new payment method or rail
A handoff into the customer's own banking app	A wallet, escrow, or intermediary holding funds
Bank-grade authorisation with biometrics	A sharing of banking credentials with merchants or agencies
A complement to cards and wallets in the checkout mix	A replacement for cards or wallets
A graceful experience that falls back to standard QR	A dead end when an app is unavailable

6.2.5. Early deep-linking success

The figures in this section come from proof-of-concept measurements on live Singapore payment flows by Ant International (Antom, 2C2P), taken before and after deep-linking was enabled. They cover payment success rate, completion time, and step counts. They are an observation of early success on live deployments, not a market-wide benchmark across all flows and issuers.

Metric	What it captures	Observed result	Change
Payment success rate	Share of initiated payments completed	85% → 94%	Increase by 9%
Completion time	Seconds from payment selection to confirmation	62s → 51s	Faster by 17.7% (or saved 11s)
Manual steps	User actions between selection and authorisation	6+ → 1	Single tap + biometric
Fallback integrity	Standard QR remains available whenever handoff is impossible	Retained	No dead ends

These outcomes reflect the moment where conversion is decided:

- a higher success rate means more transactions completed on the first attempt;
- a faster flow means fewer sessions expire mid-payment; and
- fewer steps mean fewer points of abandonment.

The sections that follow read the same observations through two lenses: e-commerce checkout, then government service payments.

6.2.6. Case Study: E-Commerce Payments

Deployment reference: Southeast Asia's major e-commerce platform serving millions of users.

For a shopper, the payment process is one of the most critical conversion touchpoints in the retail transaction flow. The conventional PayNow QR flow creates four friction points: screenshot hesitation, cart abandonment, hard-to-find bank-app entry, time and session loss.

Deep-linking safeguards conversion by removing friction points: One tap invokes the familiar banking app with details pre-populated; authorisation completes the transfer; the shopper returns to the order-confirmation page. This ensures the payment experience remains connected to the purchase journey, from intent to order payment.

What the numbers mean for e-commerce

Observed metric	What it means for e-commerce
PSR 85% → 94%	More paid orders from the same paid-intent traffic; fewer failed payments at the final step.

Observed metric	What it means for e-commerce
Checkout 62s → 51s	A faster final step, where speed directly correlates with completion.
6+ steps → 1 tap	Fewer interruption points where shoppers abandon their cart or sessions expire.

For a merchant, this is more than a UX improvement. A higher payment success rate means more confirmed orders from the same volume of paid-intent traffic and fewer unsuccessful-payment contacts to customer support.

Value across the purchase journey

- For shoppers: Authorise in the banking app they already trust, with merchant, amount, and reference pre-filled, and confirmation (e.g. Face ID or fingerprint).
- For merchants: Recover orders that would otherwise fail at the final step, reduce payment-related support contacts, and keep order status visible through the automatic return.
- For platforms: Reuse the existing PayNow QR message, acquiring relationship, and settlement flow while improving the mobile checkout interaction.
- For the payment players: Offers PayNow as another practical e-commerce option alongside cards and wallets, giving shoppers a consistent choice.

Web and in-app

By supporting both mobile web and native app environments, deep-linking unifies the mobile checkout experience. Deep-linking manages the transition between the storefront (browser or app) and the banking authorisation step without losing order data, eliminating the need for merchants to maintain fragmented checkout lanes by offering a single, high-conversion PayNow flow across all mobile platforms.

Post-payment redirects

After the payment is completed, the system automatically redirects the shopper to a confirmation page. This redirect has two key benefits:

- For shoppers: Instant proof of payment and in the scenario where payment fails, the issue is explained clearly so that shoppers can re-attempt the payment directly within the checkout flow instead of abandoning their cart.
- For merchants: Immediate payment status update and automatically matches the payment to the correct order using the pre-populated reference data, reducing customer support inquiries regarding payment status

6.2.7. Case Study: Government Service Payments

Deployment reference: A government system for secure digital payout disbursements.

As government service delivery increasingly shifts towards mobile-first channels, deep-linking serves as a vital bridge for government portals to communicate directly with banking applications and digital wallets. By embedding deep-linking across key touchpoints, governments can transform isolated payment transactions into connected digital user journeys, unlocking gains in transaction completion, operational efficiency and overall service delivery.

Value proposition for government

- Higher completion rates, fewer complaints: Every recovered payment is one fewer failed-service complaint and one fewer repeat visit.
- Lower support costs: Fewer payment-issue inquiries free up agency and helpdesk capacity.

- Better retention: A smoother payment experience makes residents more likely to complete and reuse digital services.
- Cost efficiency: QR payment operating costs are typically lower than card-intermediated transactions, improving margin without displacing cards.
- Public service delivery alignment: Frictionless payment supports national digital-service standards and reinforces PayNow's role in them.

Where it applies

The mobile handoff pattern is category-agnostic and maintains complete backend continuity. It optimises all mobile web PayNow transactions, from administrative fees and tax compliance to healthcare and education billing. By leveraging the existing payment rail, implementation requires zero modifications to established settlement protocols, reconciliation engines, or audit trails.

Adoption for agencies

For agencies, implementation requires operational alignment rather than structural engineering:

- No new settlement arrangements: Funds still arrive through the existing PayNow collection account and reconciliation process.
- Integration at the page level: The payment page initiates the handoff; no changes to back-office finance systems.
- Accessibility preserved: Residents without the banking app, or on shared devices, continue via the standard QR flow.
- Measurement built in: Before-and-after metrics, on success rate, completion time, and support contacts, make the impact verifiable.

6.2.8. Ecosystem Impact

A national QR standard that works online

PayNow and SGQR are established infrastructure built for an offline, camera-based interaction. When the last mile works on mobile, PayNow and SGQR become a practical online collection method for government services and online merchants alike, without the need to establish a new payment rail.

Journey dimension	QR-only mobile flow	Deep-linked flow
Payment initiation	QR display → screenshot → scan	Tap PayNow → banking app opens with payment details
Journey continuity	User returns manually; status may be unclear	Automatic return to confirmation with visible status
Operations	More incomplete payments and support follow-up	Higher completion visibility; fewer manual recovery steps
Payment choice	PayNow is available but operationally cumbersome	PayNow becomes a practical option beside cards and wallets

Benefits across the value chain

- Consumers and residents: A shorter, familiar, user authorised payment journey that preserves context, whether paying a government fee or an online order.
- Merchants, marketplaces, and agencies: Better completion from intent, clearer payment status, and lower service overhead.
- Banks: A direct digital engagement moment in which the primary banking app completes the payment.

- **Singapore as a hub.** A stronger last mile PayNow experience supports MAS's payments-connectivity vision and a more interoperable regional commerce environment.

As regional QR networks expand, the underlying interaction patterns can scale to cross-border transactions. In a cross-border scenario, a Singapore-based shopper can execute a payment to an overseas merchant by initiating an interoperable app-to-app handoff back to their home banking app. Concurrently, the international storefront preserves complete transaction context and a reliable post-payment return sequence. By embedding infrastructure interoperability directly into the checkout layout, deep-linking can optimise conversion metrics and lay the operational foundation for recurring billing models.

What it takes to scale: an ecosystem effort

Real-world deployments demonstrate that framework interoperability depends on standardised industry conventions and establishing this ecosystem requires alignment across four critical pillars:

- **Uniform handoff protocols** enable platforms to integrate once and operate predictably across all financial institutions;
- **Standardised completion signalling** ensures merchants and public agencies process transaction outcomes consistently;
- **Reusable checkout architectures** provide a reliable bank-selection and fallback framework adaptable to any digital storefront; and
- **Interoperable data referencing** preserves order and transaction metadata across the entire end-to-end payment journey.

Roles in the ecosystem

Four key roles each play a part in enabling deep-linking adoption:

Role	Responsibility
Banks	Maintain the banking app experience: pre-populated confirmation, biometric authorisation, payment execution.
Merchants and agencies	Offer PayNow at checkout and receive completion status through the return journey.
Platforms and gateways	Assemble the handoff consistently across issuers; preserve fallback and reference integrity.
Regulators and industry bodies	Set the standards and trust framework that keep the ecosystem interoperable.

The cumulative impact of an ecosystem effort drives long-term adoption. Each successful transaction deepens public trust in digital commerce, while every seamless handoff accelerates the behavioural shift towards account-to-account (A2A) payments as the primary consumer choice. Ultimately, this friction-free experience fulfils the foundational vision established during PayNow's national rollout.

6.2.9. Conclusion and Next Steps

Moving from manual QR scanning to app-to-app deep-linking is a necessary next phase for PayNow, in both e-commerce and government services. The screenshot-and-upload workflow breaks transaction momentum, prolongs completion times, and raises abandonment. Deep-linking bridges the gap between offline experience and the online mobile experience, replacing manual image imports with single-tap biometric authorisation. The result is higher completion, fewer errors, and stronger conversion.

Beyond individual institutional deployments, the case for deep-linking is an ecosystem case. Every completed payment strengthens trust in digital channels and every smooth handoff normalises account-to-account payment as an everyday choice. For that to scale, the industry should act together on three fronts:

- Wider issuer participation for deep-linking to work for every banking customer.
- Consistent conventions across issuers so that platforms integrate once and behave consistently.
- Extension into recurring and cross-border payments to allow consistent payment interaction experience domestically and internationally.

For Singapore, deep-linking bridges the gap between Singapore's advanced payment infrastructure and day-to-day transaction conversion. In the digital ecosystem, this optimisation translates directly into higher merchant revenues, lower operational support costs for public services, and an accelerated behavioural shift towards a cash-lite society.

6.3. Evaluating Embedded Payments and the Operating Models: Building the Next Evolution of PayNow Gen2

Authored by Mastercard

6.3.1. Introduction

Enhancing commerce through embedded payments as the next evolution for PayNow Gen2

Singapore's real-time payments ecosystem is among the most advanced in the world. PayNow has moved account-to-account (A2A) transfers into the mainstream of everyday life, establishing a foundation of instant, low-friction payments between individuals, businesses and government. As the ecosystem matures, attention is turning from the underlying payment rail to the experiences built upon it, and in particular, how those experiences perform at the point of checkout, where consumer expectations are highest and the commercial stakes for merchants are most immediate.

Improving the A2A checkout experience is an immediate priority for the next generation of PayNow, with seamless embedded payments serving as a key enabler. The outcomes being pursued are practical and commercial: higher checkout conversion, lower abandonment, faster merchant and participant onboarding, stronger consumer trust, greater merchant confidence and a reusable foundation for future A2A services. Embedded payments refer to an A2A payment experience that is initiated and completed within, or seamlessly from, the merchant or service provider's digital journey. The consumer is presented with a payment request in context, authenticates and authorises through their trusted banking or payment application where required, and is then returned to the original journey with confirmation and status information. The objective is to make A2A payment feel like a native part of checkout or service interaction, while preserving bank-grade authentication, consent and control. By reducing manual steps, context-switching and potential for error, embedded payments can help consumers complete transactions with greater confidence and give merchants a more dependable A2A checkout method that can scale beyond isolated use cases.

As adoption grows, an equally important consideration is how embedded payments are implemented across the ecosystem. It is straightforward to demonstrate between a single merchant and a single bank, but considerably more complex to deliver consistently across many participants, each with their own applications, standards and release cycles. The way these connections are established, governed and maintained determines whether consumers encounter a uniform, dependable experience across the ecosystem (centralised) or one that varies from participant to participant (decentralised). It also shapes the underlying economics, such as the effort to onboard new participants, the cost of ongoing maintenance and the ease with which security and fraud controls can be applied consistently.

Beyond the checkout journey, embedded payments can also establish the first reusable consent pattern for broader A2A payments. If the handover, authentication, consent capture and status-return flows are standardised from the outset, the same components can support future services such as request to pay, recurring payments, bill payments, government payments, subscriptions and potentially agentic commerce. International examples point in this direction: Brazil's Pix Automático allows users to authorise Pix recurring payments once and manage that authorisation in their own account app, while UK Variable Recurring Payments allow payments to be initiated within customer-agreed limits, with consent that can be reviewed or withdrawn. For PayNow Gen2, this suggests that embedded payments should be designed not only to improve checkout, but also to create a reusable user-consent foundation for future A2A services.

In Singapore, the decision is particularly important because PayNow Gen2 is not only about improving checkout, but also about laying the foundation for broader A2A payments. The operating model is therefore important, but it should be assessed by the outcomes it enables rather than treated as an end in itself. A decentralised approach can enable individual participants to innovate and move quickly, offering flexibility and local autonomy, particularly in the early stages of adoption.

A centralised approach, where participants connect once into a shared orchestration layer operated under common scheme governance, tends to offer greater consistency, interoperability and control as the ecosystem scales. The central orchestrator maintains common specifications for security requirements, participant endpoints, operating rules, exception handling, status enquiry and change management, so that embedded payments operate as a shared ecosystem capability rather than as a set of bilateral implementations in a decentralised model. Both models carry distinct benefits and trade-offs, and the appropriate choice depends on which model best supports Singapore's desired outcomes for user experience, merchant adoption, consumer trust, security, resilience and long-term growth.

These choices carry weight because they tend to become entrenched. Architectural decisions made to meet an immediate need are rarely revisited once participants have invested in them and built operations around them. The model adopted for embedded payments today therefore establishes patterns for connectivity, governance, standards and accountability that are likely to persist well beyond the initial use case as new services are added over time. Embedded payments are not simply a technical feature, but an early and formative step in the ecosystem's evolution.

What does it take for embedded payments to succeed at national scale?

National A2A systems have developed around local requirements, market structures and regulation, with each market determining its own approach to governance. Beneath this diversity, systems that scale successfully tend to satisfy the same underlying conditions. The six conditions below can significantly influence whether embedded payments succeed at national scale. Each condition is linked to the outcome it is intended to deliver, because a condition only matters if it creates a visible benefit for consumers, merchants and participants.

Consistency and reach: consumers experience a uniform, predictable journey across every participant, reinforced by a consistent scheme or trust mark that signals a governed, secure experience. Supported by customer education, this builds ecosystem-wide trust and familiarity rather than bank-by-bank recognition, giving merchants confidence that the option will work consistently for every customer, and thereby increasing the rate of adoption. Outcome sought: higher checkout conversion and lower abandonment, because consumers know what to expect wherever they pay, and merchant reach that extends to the whole customer base from launch.

Connectivity and data: common standards for how participants connect and exchange payment information avoid fragmentation, reduce duplicated integration effort and allow efficient onboarding of new participants and use cases. This includes addressing the integrity of handover, binding the payment instruction to the checkout session that generated it and ensuring the returned payment status can be trusted. Outcome sought: faster and more predictable onboarding, so a new merchant, participant or use case can go live in a known timeframe rather than at the pace of the slowest bilateral negotiation.

Fraud and scam controls: protection is specified as part of the design rather than retrofitted later. Embedded payments shorten the path between payment intent and payment authorisation, making consumer authentication, real-time risk signals and exception handling especially important. Outcome sought: consumer trust in A2A checkout as a method, with protection that does not vary by institution and incidents that can be contained across the ecosystem rather than one participant at a time.

Governance and accountability: strong operating rules covering participation, service levels, liability and exception handling are treated as part of the architecture, underpinning participation and confidence at scale.

Outcome sought: merchant confidence to offer A2A as a clear and consistent option, with the same predictable experience and reach across participating institutions.

Economics and speed to market: consumer habits will harden around alternatives if embedded A2A checkouts arrive too slowly, and merchants will build their flows around whatever is available today. While speed to market is important, it needs to be balanced with how durable and scalable a solution is in the long term. Ecosystem alignment is also key, where a shared view of the A2A checkout's value and commercial merit is required before adoption can scale.

Outcome sought: in the short term, build enough coverage and momentum for A2A checkout to become a consumer habit; over the long term, create a scalable commercial model that participants and merchants can continue to invest in.

Implementation cost: this is driven less by the first integration than by maintaining it through every application release, security requirement and participant that joins later.

Outcome sought: a more predictable cost for each additional participant and use case, so new services can be added without repeating the integration effort each time.

Considerations for centralised and decentralised operating models

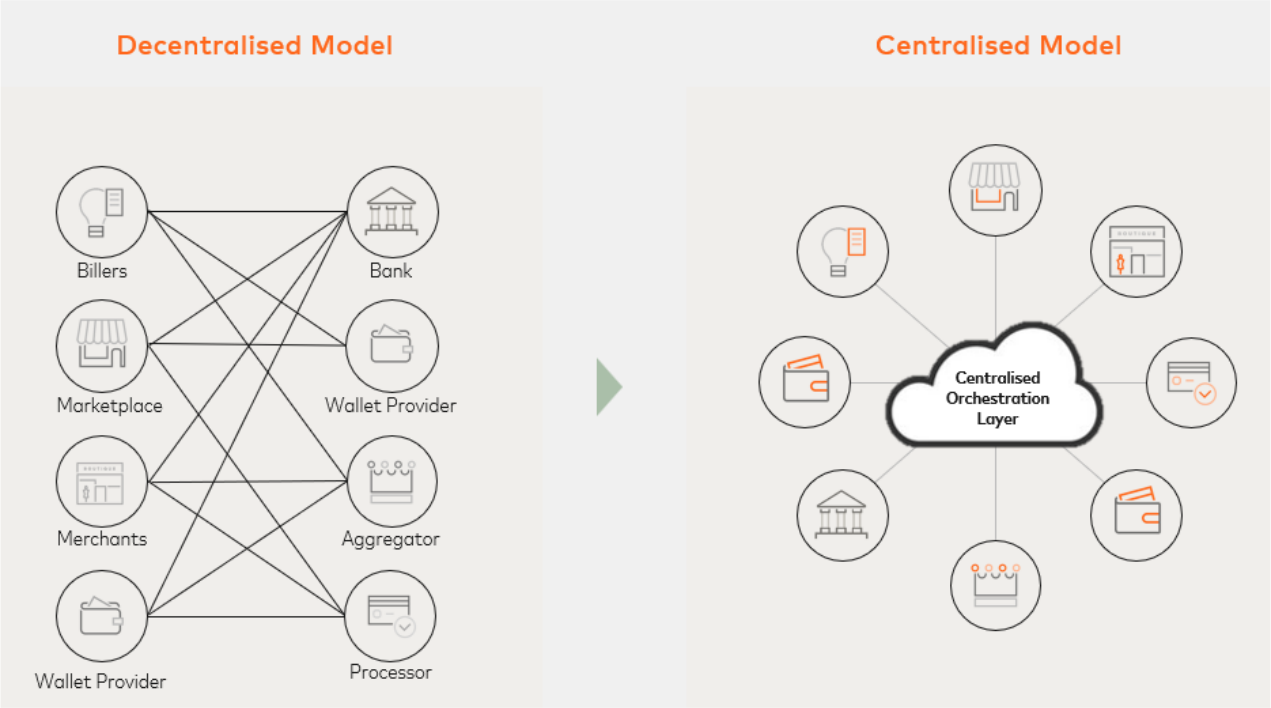
The operating model chosen for embedded payments can have consequences well beyond the first checkout use case. Once participants have built to a particular architecture, it can become difficult to change without rework, cost and disruption. For that reason, the model should be considered from the outset, with the decision assessed not only against speed to market but also against longer-term needs for interoperability, governance, fraud controls, onboarding and future overlay services.

In a centralised model, participants connect once into a single, standardised orchestration layer with common specifications for link construction, participant endpoints, security requirements, exception handling, status enquiry and change management. Combining shared governance with shared infrastructure means that each newly onboarded participant joins an established framework and expands the network effect, enabling scale.

In a decentralised model, participants integrate bilaterally, either against common standardised guidelines or through participant-by-participant arrangements1. An exclusively bilateral approach, with no central standards or controls, and each pair negotiating its own terms, may allow early implementations to move quickly, but it generally leads to higher costs over time, because it does not scale and will require rework. A federated model with centralised governance, a common rulebook and standards with execution distributed among participants, can allow participants to move at their own pace but on its own is less likely to deliver the consistent and predictable service that merchants and consumers need as the ecosystem grows.

Figure 1

Diagram of participant integration between centralised and decentralised embedded payments models



Singapore already has shared infrastructure. PayNow sits on top of Fast and Secure Transfers (FAST) as a proxy addressing service, allowing consumers and businesses to send and receive real-time payments using a simple proxy such as a mobile number, National Registration Identity Card (NRIC) or Unique Entity Number (UEN). By standardising addressing across participating banks and wallets, it delivers a single, consistent payment experience nationwide rather than a patchwork of bilateral connections. What needs to be considered for an embedded payments implementation is where the connectivity, standards and governance for this layer should sit. That choice matters because it determines whether embedded payments develop as a shared ecosystem capability, with common specifications, service levels, security expectations and change governance, or as a set of bilateral integrations that each need to be negotiated, tested and maintained separately. Table 1 compares the two models against the six conditions set out above and shows the outcome each is likely to produce for consumers, merchants and participants.

Table 1

Trade-offs between centralised and decentralised embedded payments models and their likely outcomes

Condition	Centralised model (connect once)	Decentralised model (exclusively bilateral)
Consistency and reach	Stronger national consistency and connect-once reach, reinforced by a common trust mark Outcome: consumers recognise the flow wherever they pay, so fewer drop out at checkout, and a merchant can offer A2A to its entire customer base from launch. Consistent user experience leads to greater adoption, trust and less fragmentation.	Greater scope for differentiated bank or acquirer journeys, but reach grows relationship by relationship. Outcome: consumers meet a different flow at each bank, so abandonment at checkout is higher, and a merchant can reach only the customers of the banks it has already integrated.

Condition	Centralised model (connect once)	Decentralised model (exclusively bilateral)
Connectivity and data	Orchestrated connectivity and protected data exchange through common specifications reduce the need for sensitive data to move across multiple bilateral connections **Outcome:** a new merchant or participant goes live against a published specification in a predictable timeframe, and account data crosses fewer connections, leading to better quality of service.	Faster bilateral tailoring where parties already have strong commercial relationships **Outcome:** every pairing needs its own negotiation, build and test cycle, so onboarding slows as the ecosystem grows and merchant time to live becomes unpredictable.
Fraud and scam controls	Ecosystem-level visibility, common definitions/rules and coordinated intervention **Outcome:** protection is the same wherever the consumer pays, so trust attaches to A2A payment as a method rather than to individual institutions.	Allows institutions to retain control over their own risk appetite and controls, but can create weak links **Outcome:** protection is only as strong as the weakest participant, and losses at one institution damage confidence in A2A checkout as a whole.
Governance and accountability	One rulebook, uniform service levels and consistent, predictable liability treatment for all participants **Outcome:** a merchant knows what it is getting regardless of which bank the customer uses, and participants can size their investment against known obligations.	Commercial terms, service levels and liability can be negotiated case by case **Outcome:** a merchant's protection depends on which bank the customer uses, so many will keep existing methods as the default rather than rely on A2A.
Economics and speed to market	Slower first implementation, faster scaling once established, with each subsequent participant joining without a new negotiation **Outcome:** the first launch takes longer, but national coverage, and the volume that depends on it, arrives sooner.	Fastest path to first market launch or proof of concept, without waiting for the ecosystem to move **Outcome:** the first launch arrives quickly, but coverage builds one relationship at a time, and consumer habits may settle around alternatives before A2A is available everywhere.
Implementation cost	Higher upfront shared investment, lower duplication over time, with greater reuse **Outcome:** each additional participant and use case costs less than the last, because the same connection, controls and consent patterns are reused. Allows network effects to materialise.	Lower initial coordination cost, but more duplicated integration and maintenance as coverage expands **Outcome:** cost rises with every new connection, application release and use case, so lifecycle cost grows as the ecosystem grows.

A federated model sits between the two: common rules and standards reduce fragmentation, but reach, onboarding and time to live still depend on each participant's own implementation.

Principal advantages

A centralised model supports consistency, reach and network effects: value to each participant increases as others join, and fragmentation is reduced.

A decentralised model delivers speed and autonomy; individual participants can move independently, tailor to their own needs and prove the concept quickly.

The practical effect is that, in a centralised model, merchant reach is determined by scheme participation: once a merchant is connected, it can offer A2A to customers of all participating institutions, rather than building separate integrations bank by bank. Network effects from centralised models promote scalability, create choice for merchants and consumers, and support greater adoption.

Principal costs

Upfront investment in shared infrastructure is required for a centralised model; resilience and ongoing service management of the central operator are needed, which must be treated as core architecture rather than as a project.

A decentralised model can have a lower initial implementation cost, but it generally carries higher lifecycle costs as participation and use cases expand.

The trade-off is higher upfront shared investment and a later first launch, in return for lower lifecycle cost and faster ecosystem-wide scaling once the shared model is in place.

Principal drawbacks

A centralised model requires early ecosystem agreement, shared investment and sustained operation of common infrastructure before the full benefits of consistency, reach and reuse are realised.

A decentralised model generally creates a higher risk of fragmented standards and inconsistent controls. Bilateral setups can be effective for quick, early proofs of concept, but domestic and scheme-level experience suggests that scaling merchant-facing A2A services requires common specifications, participation rules and operating standards. Without those, each additional participant or use case adds negotiation, integration, testing and maintenance effort, increasing lifecycle cost and making consistent ecosystem-wide delivery harder. Much of the cost is borne by merchants, who must either integrate repeatedly or accept partial customer coverage.

What international experiences of embedded payments show

Markets that have taken embedded A2A payment journeys to national scale have generally standardised the customer handover, authentication, consent and status-return experience rather than leaving these elements to bilateral negotiation. International experience indicates that banks tend to support shared models where commercial incentives, liability rules and implementation obligations are clear, but may prefer bilateral or federated approaches where the economics are uncertain, implementation budgets are constrained or participation obligations are not yet settled.

In Malaysia, DuitNow Online Banking/Wallets (DOBW) is the PayNet service that allows customers to make payments to DuitNow Pay using their preferred bank or wallet. From the merchant portal or mobile app, customers select their preferred payment method, are redirected to their bank or wallet to approve the transaction and then returned to the merchant site to complete the purchase. The implementation is centralised on the dimensions most relevant to embedded payments: orchestration, participant access, technical specifications and operating roles. Every merchant connects once through a PayNet-registered merchant acquirer, which submits a payment request to DuitNow Pay, the orchestration layer. PayNet publishes acquirer and issuer APIs for online banking/wallets at a common version, alongside the same role-split structure used for other DuitNow payment use cases.

In Brazil, Banco Central do Brasil defines the Pix rulebook, operates the core Pix infrastructure, including the Instant Payment System (SPI) settlement system and the Transaction Accounts Identifiers Directory (DICT) of Pix keys, and has extended the scheme into new capabilities such as Pix Automático. Brazil introduced common authorisation and consent patterns at national scale for Pix Automático and recurring use cases, rather than leaving this to be negotiated bank by bank. However, Pix is not a centralised orchestration model for the payment initiation layer. For QR-code payment, a single provider connection already gives merchants national reach, but embedded journeys work differently: payment initiators connect through standardised APIs with no shared orchestration layer, so the journey still depends on each account-holding institution's own implementation. This means Brazil is best understood as a federated model: centralised scheme governance and infrastructure, with participant-led execution.

In the European Union, the SEPA Payment Account Access (SPAA) scheme was designed to have a common rulebook, standardised terms and defined economics for premium account access services, including the

variable recurring payments capability that underpins A2A checkout. The rulebook has existed since 2022, but adoption has not followed. There was interest from providers of the service, but not from the institutions that would be making use of it. The initial pilot was delayed for this reason. A national payments association later withdrew from the working group citing limited domestic interest. The reluctance is in part linked to regulatory uncertainty, with individual European countries looking to their own legislative approach, and competition for constrained budgets. Attention is now shifting to a federated model, which leaves delivery to local schemes and providers while standardising the technical and functional components needed to make those solutions work together at European scale, with commercial terms settled locally rather than centrally.

Table 2

Embedded payments operating model in several countries

Market	Operating models	Lesson for Singapore
Malaysia DOBW	Centralised orchestration and shared access layer	A single acquirer integration gives a merchant reach to every participating bank and wallet, and consumers meet the same journey wherever they pay. Connect-once turns technical reach into usable merchant coverage and consumer familiarity.
Brazil Pix / Open Finance	Centralised scheme, settlement, directory and standards; federated execution	Common standards can support scale, but without shared orchestration the embedded journey still varies by institution.
Europe SPAA	Centralised rulebook/commercial framework; adoption still dependent on participants	A rulebook delivers outcomes only when paired with participation obligations and incentives to implement.

Taken together, the international examples point to a more nuanced lesson: common standards, central governance and clear participation obligations are necessary, but not always sufficient to deliver embedded A2A payments at national scale. In Malaysia's centralised orchestration model, merchants and participants connect through a shared layer. In Brazil, centralised scheme governance, settlement infrastructure, directories and API standards can create scale and consistency while execution remains federated. The consequence, however, is that the quality of embedded journeys still depends on each institution's own implementation. Europe further shows that a common rulebook and commercial framework alone do not guarantee adoption unless supported by clear participant incentives, participation obligations and practical implementation pathways.

The implication for Singapore is therefore not that every technical interaction must be centralised from day one. Rather, the functions that create ecosystem trust and scale should be centralised: standards, certification, security requirements, participant obligations, directory services, status and exception handling, fraud expectations, liability rules and change governance. The question is then whether these centralised capabilities are best delivered through a shared technical overlay or through federated participant execution under common rules.

For PayNow Gen2, a centralised overlay could offer the strongest path where Singapore needs consistent merchant reach, reusable consent flows, uniform security controls and scalable onboarding across multiple A2A use cases. Early bilateral or federated implementations can still play a role, but they should operate within commonly defined standards and be designed to converge towards a shared overlay as ecosystem participation and use cases expand. The underlying FAST and PayNow infrastructure can remain focused on real-time clearing, settlement and addressing, while the embedded payments overlay provides the common commercial and technical layer needed to scale A2A commerce nationally.

Considerations for implementation

Implementation of embedded payments checkout has been assigned to ecosystem participants, with participants aligning on common standards and the scheme sharing best practices. That is a reasonable starting point, and it is where the operating model question becomes concrete. Alignment and best practice are voluntary instruments: they establish what good looks like without establishing that every participant will do it, or that a merchant can rely on consistent delivery. For a bank or payment provider, the bilateral route also has the lower initial entry price and the more visible near-term return, since an integration with one or two large acquirers can be delivered quickly. The costs that favour a shared layer come later, in maintenance across every connection, in reach that determines whether a merchant can offer the option to all its customers, and in the capabilities that have to be built on top afterwards. Nevertheless, the economic reality is that participants' budgets are often constrained, and no institution has funding to pursue every desirable enhancement at once. The practical answer may therefore not be to build every shared component from day one, but to adopt a phased model in which early bilateral implementations are permitted only where they meet centrally defined standards.

Public and private interests support a shared model. The same features that advance public-policy objectives — consistent consumer protection, inclusion of smaller providers, resilience, competitive neutrality and policy implementation at ecosystem level — also strengthen the commercial case through standardisation, reach and shared cost. Singapore's 2024 Shared Responsibility Framework illustrates this in practice. Obligations such as fraud surveillance, payout expectations and compliance evidence are easier to define and audit when participants build to one common specification, rather than multiple bilateral variants.

Resilience, cyber risk, fraud and liability

Any move towards a shared overlay must also address the concentration risks that centralisation can create. A centralised or federated model should therefore be designed with resilience, cybersecurity, fraud controls and liability allocation as core operating-model requirements, not as downstream implementation details.

A shared overlay can improve consistency, monitoring and control, but it also becomes a critical ecosystem component. Its resilience requirements should therefore be treated as national payment infrastructure requirements, including high availability, active monitoring, incident response, participant fallback procedures, clear recovery-time objectives and regular industry-wide testing. The model should also define what happens if the overlay is unavailable, and whether participants can continue processing under agreed fallback arrangements without creating inconsistent customer or merchant outcomes.

Cyber risk should be designed into the model from the outset. Centralised or shared capabilities should not require unnecessary movement of sensitive account data. The overlay should exchange only the minimum information required to route, authenticate and confirm a payment request, while sensitive account credentials and customer authentication remain with the account-holding institution. Common encryption, certificate management, key rotation, API security and participant certification requirements should be set centrally so that weaker individual implementations do not become ecosystem vulnerabilities.

Fraud and scam controls are another reason to define common rules centrally. Embedded payments shorten the distance between payment intent and payment authorisation, which improves user experience but also increases the importance of real-time risk signals, consistent payee information, transaction limits, status confirmation and exception-handling rules. A central framework can set minimum expectations and enable coordinated ecosystem response, while still allowing individual institutions to apply additional controls according to their own risk appetite.

Liability must also be explicit. Participants will need clarity on who is accountable for failed handover, incorrect routing, delayed status return, unauthorised initiation, fraud losses, customer disputes and operational outages. Without a common liability model, participants may limit adoption or negotiate protections bilaterally, creating inconsistent outcomes for merchants and consumers. A centralised or federated model should therefore include clear liability allocation, evidence standards, audit rights and dispute timelines as part of the operating model, not as a later commercial negotiation.

National A2A payment systems have evolved in response to local market structures, regulatory priorities and user behaviours. There is therefore no single operating model that is right for every market or use case. The choice between a centralised, shared model and a decentralised, participant-led model typically involves five core trade-offs:

Speed to market versus scalability: Decentralised models enable faster launches and local innovation, but each new connection adds integration and maintenance. Centralised models may take longer to establish, but support faster onboarding, consistent delivery and greater reuse at scale.

Institution-level control versus ecosystem-level protection: Decentralised models let institutions apply their own risk controls but generally create inconsistent protection and fragmented visibility. Centralised models enable common fraud, dispute and reporting standards, but require participants to align with shared requirements.

Voluntary alignment versus mandatory governance: Voluntary guidance supports flexibility and early experimentation but cannot guarantee adoption or consistent outcomes. Mandatory scheme rules provide clear obligations, service levels and accountability, but require industry agreement and effective enforcement. In outcome terms, a merchant cannot build a checkout journey on a capability that only some banks will implement, so voluntary alignment tends to leave A2A as a less viable payment option.

Participant autonomy versus consistent capability delivery: Decentralised models allow participants to decide which capabilities to build, when to prioritise them and how to integrate them into their own customer journeys. This supports tailoring but can result in uneven availability of important ecosystem capabilities such as refunds, status enquiry, dispute handling, payee validation, consent management and transaction limits. Centralised models reduce that variation by defining common capabilities once and making them available consistently across participating institutions.

Lower initial commitment versus long-term reuse: A decentralised model can reduce the initial funding and coordination required because participants invest only in the connections and capabilities they need. However, integration and maintenance costs can accumulate as participation and the number of use cases grow. A centralised model requires greater upfront investment in shared infrastructure, resilience and ongoing service management, but can reduce duplication by allowing participants to reuse common connectivity, controls and capabilities over time.

Ultimately, the success of any payment model depends on mass adoption and scale. Adoption is not a by-product of technical availability; it must be engineered. Standardisation provides common technical and UX standards, reducing integration friction and shortening time to market for ecosystem participants. A common trust mark carries the assurance of a consistent experience into each payment, strengthening consumer trust. Coupled with consumer education to build trust, adoption and familiarity, a centralised orchestration layer can convert technical reach into actual adoption. Singapore's PayNow Gen1 itself demonstrates that centralisation of governance, addressing and brand can deliver national scale.

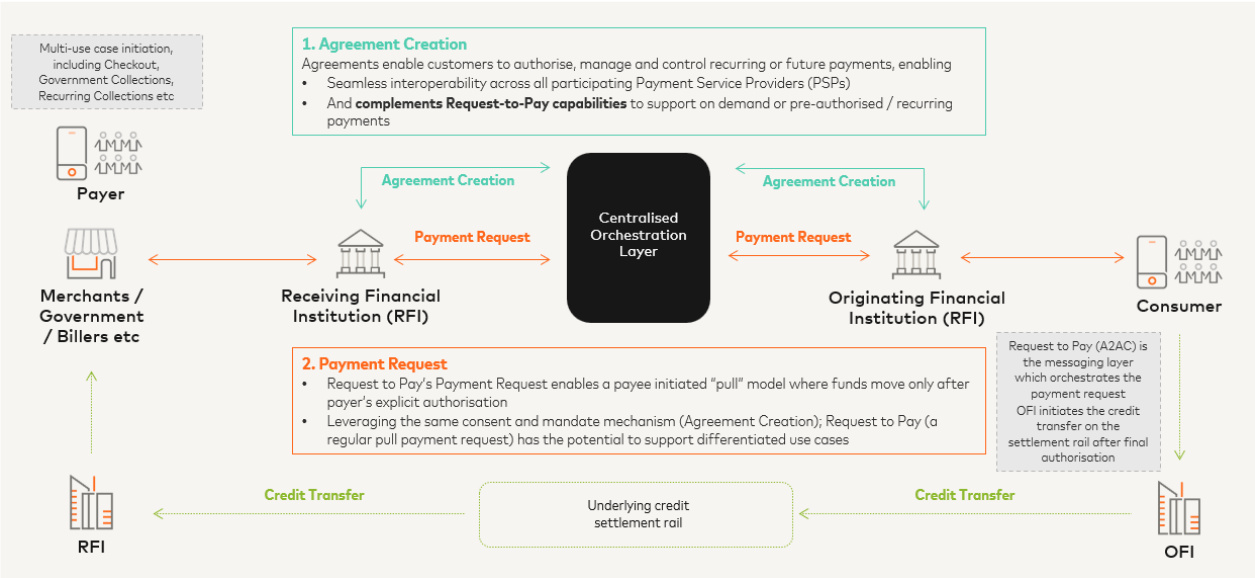
Building reusable account-to-account commerce capabilities above the rail

We are seeing a layered architecture emerge as a common pattern in mature real-time payment systems: a thin, highly resilient core for clearing, settlement and core governance, with access and overlay layers above it. These layers have different requirements. The core changes infrequently and is engineered for availability and finality, while the layers above change more often and are engineered for reach, functionality and market responsiveness. Separating them allows checkout functionality to evolve without being tied to the release cycle of national settlement infrastructure, and each capability can be governed in proportion to its own risk rather than the risk of the rail beneath it. The embedded payments journey begins in the access layer, while reusable capabilities sit in the overlay layer. Establishing the first as a shared layer is what makes the second more efficient. Request to pay is a useful example of this approach.

Mastercard Account-to-Account Commerce (A2AC) illustrates how a centralised overlay service can sit on top of existing real-time payment rails to deliver interoperable, programmable account-to-account commerce

without requiring each participant to rebuild core infrastructure. This aligns with the "thin core, rich overlay" model. The overlay is owned and governed centrally, for example by a scheme operator or designated service provider, while the underlying settlement continues to run over national or regional instant payment systems such as FAST. Leveraging request-to-pay functionality, A2AC illustrates how a standardised, connect-once platform can support multiple use cases, including linking, checkout, collections and recurring payments, on a shared consent and mandate framework while leaving clearing and settlement on existing rails.

Figure 2: Centralised overlay model above an existing real-time payment rail



A2AC acts as a shared messaging and consent layer between creditor and debtor service providers. The creditor, such as a merchant or biller, sends a payment request via the creditor service provider to the central A2AC service, which validates the message, routes it to the debtor's provider and coordinates the subsequent payment confirmation and status updates. The actual funds movement then occurs over the existing real-time rail, triggered by the debtor's provider after the payer authenticates and approves the request in their banking app. This separation of "request and consent" from "settlement" is the essence of an overlay: it adds new capabilities, such as presentment, negotiation, partial payment and reminders, without replacing the core clearing and settlement infrastructure.

As a centralised overlay, A2AC delivers network effects and standardisation that are difficult to achieve in a purely decentralised, bilateral model. Merchants and other payees connect once to the central A2AC service and can then reach any participating debtor institution that is onboarded to the scheme, rather than negotiating and maintaining separate integrations with each bank or wallet provider. The central operator enforces common message formats, API contracts and governance rules, ensuring that a payment request behaves consistently regardless of which institutions are involved. This reduces fragmentation, lowers the long-run cost of maintaining multiple point-to-point connections and creates a foundation for additional value-adding overlay services, such as variable recurring payments or dispute workflows, which can be built on the same central layer over time as needed.

From a security and data-protection perspective, A2AC also centralises sensitive controls while minimising the circulation of raw account data. Sensitive account details remain within the account-holding institution, the overlay exchanges non-sensitive references such as agreement IDs and transaction IDs, and uses strong authentication and encryption (for example, mutual TLS and message-level encryption) to protect payloads in transit and at rest. This design supports the principle that the overlay should be "secure by design, centrally," with the central service responsible for certificate management, key rotation, and compliance with scheme security standards.

As an overlay riding existing settlement rails, A2AC enables standardised governance, interoperability and scalability without requiring the ecosystem to build central infrastructure from scratch.

How outcomes would be measured

The outcomes set out above are only useful if they can be observed. Agreeing how they will be measured at the design stage, rather than after implementation, allows progress to be assessed against what the model was intended to achieve and gives participants a common basis for judging whether the phased approach is working. The measures below are indicative rather than prescriptive; the definitions, baselines and reporting arrangements would be for the scheme and its participants to settle.

Table 3

Indicative measures for the outcomes sought

Outcome	Indicative measure
Higher conversion	Completion rate at A2A checkout against other methods at the same merchant
Lower abandonment	Drop-off at handover and at return-to-merchant
Faster onboarding	Elapsed time from merchant or participant commitment to live
Consumer trust	Repeat usage rate; scam losses per million A2A checkout transactions

Most of these measures can be drawn from data that participants, acquirers and merchants already hold, which limits the additional reporting required. What matters more than the precise definitions is that they are agreed before implementation begins and that a baseline is captured early, since conversion and abandonment cannot be assessed retrospectively once a checkout journey has changed. Measured consistently across participants, they also give the ecosystem an evidence base for deciding when a phase has ended and when the move from conforming bilateral implementations to shared capabilities should be made.

Considerations for design outcomes

The following design considerations may help MAS, the scheme and market participants assess where a common direction could be useful, and what can be left to market-led implementation without compromising scale, consistency, resilience or trust.

Common technical specifications and rulebook: a common baseline for customer handover, authentication, consent, status return, exception handling and liability may be useful from the outset. It could give consumers a consistent journey and allow merchants to build once for the whole market. This could help prevent the first bilateral implementations from becoming the de facto standard, which could otherwise oblige later participants to build around designs that were never intended to serve the whole market. It could also avoid rework, migration cost and disruption when participation is widest and change is hardest.

Conformance of early implementations: speed to market and market learning can be preserved, while early implementations retain the option to converge later towards the shared layer, rather than creating variation that later has to be reconciled. Consumer familiarity and merchant confidence depend on the experience being the same wherever a payment is made. Conformance should help ensure early work counts towards the shared model rather than having to be unwound, and it keeps first-mover investment aligned with the future operating model.

Shared capabilities as participation broadens: onboarding needs to remain predictable as the ecosystem grows, giving consistent protection wherever the consumer pays, and a falling cost for each additional participant and use case. International experience suggests that inconsistent protection can create weak points across the ecosystem, and losses at one institution can damage confidence in A2A checkout more broadly. Shared capabilities also allow obligations such as those under the Shared Responsibility Framework to be defined and assessed consistently, rather than against multiple bilateral variants.

Liability, resilience and fraud expectations: obligations, service expectations and minimum controls are best defined and applied consistently, so that participants can size their commitment against known obligations and merchants know their recourse before they decide how prominently to offer A2A. Merchants are more likely to promote A2A where recourse is clear and consistent. Participants have more trouble making a business case for investment against obligations that have not been defined. Resilience and fraud expectations introduced after implementation are also harder and more costly to retrofit than to specify at the outset, particularly once the overlay has become a critical ecosystem component.

Outcome measurement and review: an evidence base, drawn from measures of the kind set out above, is useful for assessing when to move from conforming bilateral implementations to a shared overlay. Review points or criteria for reassessing the model, such as a participant coverage threshold or a defined review date, can support adjustment of the model before design choices become too difficult to change. The case for the operating model rests on the outcomes it delivers, and those outcomes can only be demonstrated to participants, merchants and the scheme if they are measured. Without agreed measures, decisions on any further shared investment rest on expectation rather than evidence.

Taken together, these five considerations can support the outcomes set out at the start of this paper: higher checkout conversion, lower abandonment, faster merchant and participant onboarding, stronger consumer trust, greater merchant confidence and a reusable foundation for future A2A services.

Conclusion

As PayNow Gen2 develops, the operating model will need to be considered in relation to the outcomes the ecosystem is seeking to achieve and the period over which those outcomes are expected. Decentralised execution offers autonomy and a faster first launch, and for a single merchant and a single bank it is the direct route. What is at risk is the ability to deliver a consistent consumer journey, predictable merchant onboarding, or fraud and resilience controls that hold across the market rather than institution by institution. Those are the outcomes that determine whether A2A becomes a ubiquitous way to pay at checkout or remains peripheral.

The international record is instructive and provides clarity on the challenges that models have faced. In Malaysia, a single acquirer integration into DOBW is what converted technical reach into merchant coverage. Brazil's central governance drove national adoption of Pix, but with execution left federated, embedded journeys still vary by institution, so the experience a merchant can offer depends on each customer's bank. SPAA has had a rulebook since 2022 and it delivered little, in part because participation was never obligatory and the incentives to implement were not there. The common thread is that sound design does not by itself ensure adoption; participation incentives, merchant reach and implementation pathways also matter.

Singapore is better placed than most markets to avoid these pitfalls. PayNow Gen1 already demonstrates that centralised governance, addressing and brand can deliver national scale, and the ecosystem has near-universal reach, an established scheme and clear longer-term ambitions for A2A. Growing concerns over authorised payment losses strengthen the case for a shared model: common standards, liability rules, monitoring and fraud expectations need to be defined once and applied consistently across the ecosystem. The market can decide how implementation should take place once everyone is on the same page. Singapore could still introduce this in phases, allowing early implementations to proceed where they conform to agreed standards rather than blocking market learning.

Timing remains relevant because early design choices can influence later interoperability, cost and the ability to introduce additional A2A services. Establishing the common foundations early, while allowing market flexibility in how they are implemented, would support the transition to a shared model, without constraining near-term experimentation. Whatever model is settled upon, the specifications, the obligations and the measures need to be agreed before implementation begins, if the result is to meet the needs of the Singapore economy beyond the first checkout use.

Google

6.4. Seamless Checkout: Real-Time A2A Payments and Deep-Linking for E-commerce

Authored by Google

6.4.1. Executive Summary

Digital commerce is undergoing a structural transition from legacy card interchange networks towards mobile-first, real-time Account-to-Account (A2A) and instant payment rails. Accelerated by national infrastructure modernisation across Asia-Pacific and Latin America, including Singapore's PayNow, India's Unified Payments Interface (UPI), Brazil's Pix, Thailand's PromptPay, and Malaysia's DuitNow, sovereign A2A rails offer lower transaction costs for merchants, immediate T+0 settlement liquidity, and superior security backed by native biometric authentication.

Despite these benefits, a major user experience bottleneck persists in web and mobile e-commerce: the online QR checkout friction. While QR codes digitised physical point-of-sale (POS) environments effectively, translating them to mobile web checkout introduced the cumbersome 'scan-and-save' workaround. Users must take a screenshot of a QR code on their device, exit the shopping browser, open a mobile banking app, upload the screenshot from their photo gallery, authenticate, and manually navigate back to the merchant site. This multi-step friction causes substantial checkout latency and high cart abandonment rates across Southeast Asian digital storefronts.

This whitepaper provides a unified technical and policy blueprint to solve online A2A checkout friction through two core architectural models and a forward-looking horizon:

1. Pillar 1: Universal OS Deep-Linking and Intent Handshakes (Immediate Ecosystem Scale): Standardised protocol-level handovers from mobile web browsers and merchant apps directly into installed banking applications, eliminating file system and gallery interaction.
2. Pillar 2: Direct Account Linking and Embedded Tokenised A2A (High-Conversion Parity): Secure one-time account binding within trusted digital wallets (such as Google Wallet) via regulated payment initiation frameworks, enabling single-tap checkout directly within the merchant flow.
3. Pillar 3: Future Horizons (Cross-Border Nexus and Agentic AI): Harmonising deep-linking specifications with BIS Project Nexus for instant cross-border settlement, and preparing A2A rails for delegated agentic AI transactions (Model Context Protocol / Agent Payments Protocol AP2).

6.4.2. Introduction: The Global Shift to Account-to-Account (A2A) Payments

The Paradigm Shift in Digital Commerce

For over four decades, digital commerce has relied on four-party card network architectures (Visa, Mastercard, American Express). While these networks provided security and cross-border reach, they introduced inherent structural overheads: multi-layered interchange fees, complex settlement chains spanning T+1 to T+3 days, high dispute and chargeback operational costs, and static credential vulnerability.

The emergence of sovereign real-time payment (RTP) rails operates on a direct Account-to-Account (A2A) architecture. By linking consumer bank accounts directly to central bank settlement engine nodes, A2A payments execute credit transfers instantaneously, 24/7/365, with immediate settlement finality.

A2A's Strategic & Economic Edge: The economics of A2A payments fundamentally rebalance merchant margin structures and consumer security models:

- Merchant Cost Reduction: A2A payments replace variable card interchange fees with fixed nominal transaction fees or zero-fee mandates for micro-transactions, reducing acceptance costs by up to 80%.
- Instant Liquidity & Settlement Finality: Real-time push-payments eliminate credit card settlement lag, providing merchants with immediate working capital and mitigating chargeback risk through irrevocable central bank-backed settlement.
- Bank-Grade Authentication: Rather than relying on static 16-digit Primary Account Numbers (PANs) or CVVs subject to database breaches, A2A transactions rely on dynamic, strong customer authentication (SCA) natively executed inside bank or licensed wallet apps via biometrics (FIDO2, Face ID, Fingerprint).

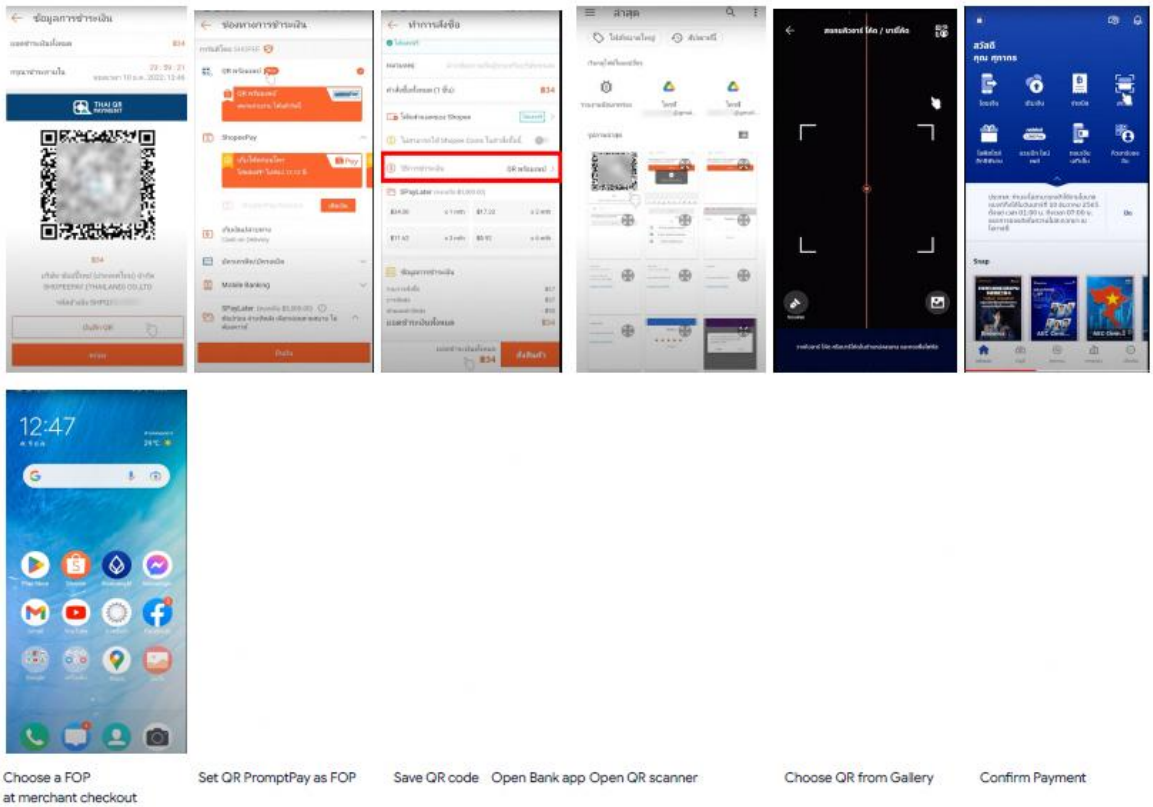
The E-Commerce Challenge

Despite overwhelming adoption in physical point-of-sale (POS) environments—where presenting a static or dynamic QR code to a smartphone camera is fast—the transition of A2A rails to web and mobile browser e-commerce checkout introduced friction. Converting desktop and mobile web checkouts into frictionless flows requires moving beyond physical QR representations to native OS and browser-level software integration.

6.4.3. Overcoming "App-Switching" Friction: From QR Scans to Seamless Payment Experiences

The Legacy Friction: The "Scan-and-Save" Problem

When early A2A payment options were integrated into mobile web browsers, platforms rendered a desktop-centric QR code on the mobile device screen. This forced mobile consumers into a multi-step user experience, often referred to as the "scan-and-save" or "gallery upload" problem:



This multi-step journey introduced significant friction, leading to transaction drop-offs and high cart abandonment rates.

Reducing the friction:

To achieve parity with card-on-file checkout flows, A2A architecture must eliminate manual image manipulation and context switching. Modern payment platforms use two primary architectural solutions:

1. One-click checkout:

To remove app switching entirely, modern frameworks utilise backend integrations. During a one-time setup, the consumer delegates payment authorisation to a trusted issuer (bank account or e-wallet). Subsequent purchases execute directly via server-to-server API calls using securely stored access tokens, delivering a one-click checkout experience without leaving the merchant flow.

2. Universal OS/Browser Standards:

Mobile operating systems (Android, iOS) utilise custom URI schemes (e.g. upi://pay, paynow://) and Universal Links/App Links (https://pay.domain.gov/paynow). When a user clicks "Pay with A2A" on a mobile browser:

- The browser issues an OS intent invocation carrying transaction parameters (merchant ID, transaction reference, amount, currency).
- The OS intercepts the link and presents a native bottom-sheet app selector or opens the user's default banking application.
- The banking application reads the payload, prompts for biometric authentication, processes the push-payment via the RTP network, and triggers a deep-link callback returning the user directly back to the browser success page.

Comparative Architecture & UX Matrix

The table below contrasts the technical characteristics, security vectors, and conversion performance across payment modes.

Architectural Attribute	Legacy QR (Scan-and-Save)	Deep-Linked A2A (Payment App Redirection)	Direct Linked Account (No-Redirection)
User Interaction Steps	7–9 steps (Screenshot, App Switch, Upload)	2–3 steps (Click Link, Biometrics, Auto-Return)	1 step (Click Pay, Embedded Biometrics)
App Redirection Requirement	Manual user navigation required	Programmatic OS intent invocation	None (Server-to-server tokenised push)
Average Checkout Duration	High	Medium	Low
Authentication process	Banking App PIN/Biometrics inside bank app	OS/Bank Native Biometrics (FIDO2)	Delegated Tokenised Auth / FIDO
Architectural Attribute Legacy QR (Scan-and-Save) Deep-Linked A2A (Payment App Redirection) Direct Linked Account (No-Redirection) Primary Failure Modes	Image compression errors, gallery upload failures, drop-off during app switch	Uninstalled bank app, broken URI link fallback	Expired OAuth token, insufficient account balance

6.4.4. Global Case Studies: Google Real-World Implementation examples

Brazil Pix: Replacing the copy-paste of Pix code

Market Context & Regulatory Framework

Launched by the Banco Central do Brasil (BCB) in November 2020, Pix has become the primary payment method in Brazil. The baseline implementation for e-commerce checkouts initially relied on Pix Code from a website or App, opened their financial institution's app, navigated to the Pix section, pasted the code, authenticated, and returned to the merchant.

Technical Architectural Evolution & Google Implementations

To reduce friction across web and mobile, Google introduced these technical innovations in Brazil:

- Pix for Apps and Website (Keyboard-Level Integration)
    - Recognising that users frequently switch apps during checkout, Google integrated Pix string recognition directly into Gboard (Android Keyboard). When a user copies a Pix code, Gboard automatically recognises the Pix Code and enables one-click payment through a connected bank account.
- Pix code detection (Browser integration)
    - Google Chrome on Android integrated Pix code detection into its payment engine. When a merchant checkout page displays a Pix string, Chrome automatically recognises the Pix Code and enables one-click payment through a connected bank account.

Thailand PromptPay: A2A Redirection and Deep-Linking

Market Context & Legacy Friction

Thailand's PromptPay, managed by ITMX and the Bank of Thailand, achieved wide adoption through Thai QR standard codes. However, online e-commerce was burdened by screenshot-and-save workflows. Users were forced to capture an image of the PromptPay QR on their mobile screen, launch their mobile banking application (e.g. K PLUS, SCB EASY), navigate to the photo gallery import tool, select the screenshot, verify, and complete payment.

Modern Deep-Linking Architecture with Gateways & Major Banks

Google worked alongside major payment gateways (2C2P, Xendit) and financial institutions (KrungSri Bank, Bangkok Bank) to implement PromptPay Deep-Linking (A2A Mobile redirect).

- Dynamic Paylink Generation: When a user selects PromptPay on an e-commerce checkout, the payment gateway generates a dynamic Paylink that encapsulates the PromptPay ID, transaction ID, and exact amount.
- OS Intent Dispatch: Chrome converts this Paylink into a Universal Link corresponding to the consumer's installed banking app
- App Handshake & Callback: The banking application handles authentication natively. The user then confirms the payment details and the transaction is completed through the existing PromptPay merchant payment flow. Upon completion of the transaction, the app uses an OS deep-link callback parameter to return the user immediately back to Chrome.

Malaysia DuitNow: eWallets one-click checkout

Market Context & Regulatory Framework

Malaysia's national real-time payment network, DuitNow (operated by PayNet), underpins both bank transfers and eWallet transactions through a unified QR standard (DuitNow QR). Historically, web checkouts required manual entry of DuitNow ID credentials or scanning static codes.

Technical Architecture: eWallet Integration via Chrome Paylinks

PayNet, Google, and Malaysian fintech operators (including ShopeePay and Touch 'n Go eWallet) engineered a unified eWallet orchestration model powered by Chrome Paylinks and DuitNow A2A APIs.

- Paylink Abstraction Layer: Instead of displaying a static DuitNow QR, the merchant web checkout invokes PayNet's Paylink API. This returns a set of structured URI endpoints corresponding to licensed DuitNow eWallet providers (Touch 'n Go, ShopeePay) and banking apps.
- Chrome Native Paylink Selection: Chrome renders these payment targets directly inside the web browser payment sheet. Selecting an option launches the corresponding eWallet app directly via deep-linking.
- Seamless Account Binding: Users can securely bind their preferred eWallet or DuitNow bank account to Chrome Paylinks for recurring single-click checkouts without external app redirection.

6.4.5. Recommendations for PayNow

To position Singapore's PayNow as a model for frictionless online A2A payments and support regional integration through initiatives like Project Nexus, MAS and ecosystem partners should consider the following implementation roadmap:

Strategic Action Items:

1. Standardise Universal Deep-Linking (PayNow Intent Standard): Establish a mandatory standard URI and Universal Link specification (paynow://pay and https://paynow.sg/pay) across all Participating Financial Institutions (PFIs) in Singapore. This ensures that any mobile browser executing a PayNow transaction invokes the user's default payment application directly, removing manual QR image saving. This will enable consumers to securely bind their bank accounts directly to trusted digital wallets and web browsers, allowing single-tap WebAuthn/FIDO biometric payments directly on merchant websites without app redirection.
2. In the future, consider cross-border integration via Project Nexus: Ensure Singapore's PayNow deep-linking standards align with the Bank for International Settlements (BIS) Project Nexus framework. Harmonising A2A deep-link payloads across ASEAN real-time payment networks will allow a tourist or cross-border e-commerce consumer to click a PayNow paylink in Singapore and deep-link directly into their native home bank app (e.g. PromptPay or DuitNow) for instant cross-border settlement.

Role of the various ecosystem participants:

Ecosystem Actor	Architectural Responsibility	Role in the Payment Ecosystem Flow
Google *(Platform & Browser)*	Intent Interception, Showing Forms of Payment	• Detect the paylink and surface the forms of payment available for the user. Google is an ecosystem participant and platform enabler that builds on top of national rails
PSPs & Acquirers *(NETS, 2C2P, Stripe, Xendit, Airwallex)*	Dynamic Paylink Generation & Cryptographic Payloads	• Deprecate Static Web QR: Replace image rendering on mobile browsers with dynamic Paylink URIs (paynow://pay or HTTPS App Links). • Asynchronous Webhooks: Handle real-time FAST/PayNow clearing push notifications to confirm merchant order states instantly.

Ecosystem Actor	Architectural Responsibility	Role in the Payment Ecosystem Flow
Merchants *(E-Commerce Storefronts & Platforms)*	Lightweight Checkout Integration & Context Preservation	• W3C Standard Integration: Embed lightweight Paylink scripts or W3C Payment Request APIs (pay.js), eliminating user instructions to screenshot QR codes. • Seamless App-to-Browser Return: Maintain stateful shopping carts and support automated callback hooks (merchant://callback) when the banking app completes execution.
Issuers (PayNow Participating Organisation)	Universal Link Handling, Native SCA & Status Telemetry	• Manifest App Links: Register standard PayNow domain-verified HTTPS endpoints (https://paynow.singapore.sg/pay) in application manifests to prevent URI spoofing. • In-App Intent Parsing: Parse incoming intent payloads on launch, pre-populating merchant name, UEN, and amount without requiring camera or gallery access.

Governance Consideration Recommendations

Governance Domain	Regulatory Imperative	System / Process to Establish
1. Universal Scheme Standardisation	Eliminate proprietary fragmentation across participant banks	• Mandate Open Intent Standards: Formally mandate a universal PayNow URI / App Link specification across all participant banks, mirroring Central Bank of Brazil's Pix mandates. • Data Dictionary: Enforce structured, enriched transaction fields (merchant category, invoice ID) for automated enterprise reconciliation.
2. Security & Trust Registry	Mitigate phishing, intent interception, and app spoofing	• National App Trust Registry: Establish an MAS-endorsed public key directory of authorised banking apps and licensed Payment Initiators to prevent rogue app hijacking. • Cryptographic Payload Integrity: Mandate end-to-end payload signing using JSON Web Signatures (JWS) to ensure transaction parameters cannot be tampered with in transit.
3. Clearing Switch Telemetry & Abandonment Protocols	Prevent "paid-but-missing" transaction ambiguity	• Real-Time Settlement Telemetry: Upgrade (if not available already) the central FAST/PayNow switch to broadcast immediate clearing callbacks to verified payment initiators. • Deterministic Abandonment Rules: Codify handling for abandoned sessions: i. *Path A (Pre-Login Drop-off):* User exits before authentication; resolve via timeout rules (marked ABANDONED) without requiring complex bank builds. ii. *Path B (Post-Login Exit):* If a user authenticates but connection drops, bank backends must deterministically push the terminal status to protect consumer funds. • Transaction Limits: Re-evaluate transaction limits based on risk levels

Governance Domain	Regulatory Imperative	System / Process to Establish
4. Dispute Management & Consumer Safeguards	Provide recourse on instant, irrevocable clearing rails	• **Automated Dispute & Recall Portal:** Establish a standardised, fast-track interbank dispute resolution protocol for misdirected or fraudulent A2A transfers, complementing the Shared Responsibility Framework (SRF). • **Centralised Scam Scoring:** Integrate real-time fraud telemetry across clearing nodes to flag high-risk mule accounts or suspicious UENs prior to biometric sign-off.
5. Future-Ready Expansion	Extend national rails to subscriptions and autonomous AI	• **Variable Recurring Payments (VRP):** Introduce scheme rules for recurring mandates (Mandate Reference Numbers - MRN) with customisable spending caps for subscriptions and utility billing. • **Agentic AI Compatibility:** Align PayNow Gen2 with emerging autonomous commerce standards (Model Context Protocol / Agent Payments Protocol AP2) to allow verified AI agents to settle micro-transactions within user-delegated policies.

Conclusion

The transition from physical QR codes to native online A2A payment flows represents a major shift in digital commerce infrastructure. By addressing the friction of the legacy "scan-and-save" experience through OS-level deep-linking, browser autofill integrations, and non-redirect Open Finance architecture, financial ecosystems can achieve higher conversion rates, stronger bank-grade security, and lower merchant acceptance costs.

Global implementations—including UPI in India, Pix in Brazil, PromptPay in Thailand, and DuitNow in Malaysia—demonstrate that eliminating app-switching friction accelerates digital commerce growth. As MAS and regional central banks continue to advance PayNow and cross-border payment networks, adopting deep-linked and tokenised A2A architectures will be essential to supporting future commerce, including recurring subscription models and autonomous agentic transactions.

amazon

6.5. Instant Payments for Retail and E-Commerce: Capabilities, Merchant Value and the Agentic Frontier

Authored by Amazon

Instant payment rails - real-time, account-to-account settlement systems - have evolved from peer-to-peer transfer infrastructure into credible retail and e-commerce settlement layers. Across Europe, the United Kingdom, Brazil, and Mexico, regulators and market operators have introduced features that address the core needs of merchants: speed of settlement, certainty of funds, lower costs, broader customer reach, and programmable payment logic. These developments create structural preconditions that can make instant rails commercially viable for retail at scale and the foundation upon which the next generation of commerce, including AI agent-delegated purchasing, will be built. Taken together, they constitute a globally benchmarked evidence base directly relevant to the four enhancement pillars of Singapore's PayNow Gen2 study.

6.5.1. Context: Singapore's PayNow Gen2

On 25 June 2026, the Monetary Authority of Singapore (MAS) and the Association of Banks in Singapore (ABS) announced the PayNow Gen2 study - a strategic initiative to evolve Singapore's instant payment infrastructure beyond peer-to-peer transfers into a programmable, extensible commerce platform. Following consultations with 37 organisations and benchmarking against 11 jurisdictions, MAS and ABS identified four priority enhancement areas spanning customer experience, business payments, network coverage, and scheme-level enablers: (i) QR interoperability between PayNow and NETS QR; (ii) smoother online checkout through deep-linking within PayNow QR codes; (iii) support for recurring and higher-value payment flows; and (iv) wider business use cases, including cross-border settlement.

Amazon offers the insights in this paper from the standpoint of a global retail merchant with direct operational experience integrating, scaling, and transacting on instant payment rails across multiple jurisdictions. The observations that follow are grounded in that first-hand experience of what works, what creates friction, and what drives or inhibits merchant and consumer adoption. From a merchant-operator lens, we offer insight into capabilities we rely on daily to serve hundreds of millions of customers.

These four pillars describe an ambition that instant payment systems in other jurisdictions have already begun to realise, and in some cases, have moved beyond. 6.5.2 of this paper surveys those features as a contribution to the Gen2 design process, organised not by jurisdiction but by the merchant and customer needs that drive adoption, because adoption is ultimately what determines whether an instant payment system remains relevant. 6.5.3 looks further ahead, identifying the agentic-commerce capabilities that PayNow will need as AI-delegated purchasing matures, informed by our own live prototype development under the UK FCA Supercharged
Sandbox II.

6.5.2. Why These Features Matter: The Merchant and Customer Case

The features below have been proven at scale across Europe, the UK, Brazil, and Mexico. Each is presented here not as a jurisdictional curiosity but as an answer to a specific merchant or customer need that PayNow Gen2 may consider if it is to fulfil MAS's goals for broad adoption and sustained commercial relevance in Singapore.

1. Settlement Speed and Fund Certainty for Merchants

The first obstacle merchants encounter on any instant payment rail is the question of finality. A merchant dispatching a physical order or releasing a digital entitlement needs to know, at the moment of confirmation, that the funds are real and irrevocably received, not merely that a payment has been initiated. When settlement is delayed or uncertain, the resulting strain on working capital hits SMEs hardest, as they lack the cash reserves to absorb days of float that larger retailers can tolerate.

Europe resolved this at the regulatory level: the EU's Instant Payments Regulation transformed the Single Euro Payments Area (SEPA) Instant into a mandatory baseline, i.e. all eurozone payment service providers must send and receive instant credit transfers on a continuous 24/7 basis, throughout the year, at no additional cost, with funds credited in under ten seconds; the European Central Bank's (ECB) TARGET Instant Payment Settlement infrastructure settles 99% of transactions in under five seconds across 41 SEPA countries. Brazil's Pix payment system delivers equivalent certainty from the consumer's first tap, replacing multi-day card settlement cycles with instant confirmation, thereby improving merchant cash flow and eliminating the need to discount receivables to access working capital.

For PayNow Gen2, real-time finality would be a baseline expectation for merchants. Without it, merchants default to card rails regardless of cost. Gen2's Pillar ii (smoother online checkout) requires settlement certainty as its non-negotiable foundation: no checkout experience improvement is meaningful if the merchant is left waiting for funds.

2. Fraud Protection and Trust for Consumers and Merchants

Irrevocable payments create a structural consumer protection problem that any instant rail must solve before merchants and customers will trust it with commerce at scale. The authorised push payment fraud vector, in which a consumer is deceived into sending funds to a fraudulent account, is the single greatest barrier to adoption confidence on account-to-account rails. Without payee verification, instant payments would struggle with adoption confidence vis-à-vis card networks, which have established robust zero-liability consumer protections.

Europe addressed this with Verification of Payee (VoP), mandatory since October 2025, requiring payment service providers to verify that the payee's name matches the account before a transfer executes. The UK enacted the structurally equivalent Confirmation of Payee (CoP) framework. Brazil's Pix key directory (DICT) binds each Pix key to a verified account, enabling pre-payment identity confirmation at national scale. These fraud controls form the trust layer that makes account-to-account commerce viable for the full consumer population, not only the digitally sophisticated.

Trust is the precondition for adoption at scale. Consumers will not shift higher-value or routine transactions to PayNow unless they feel as protected as they do on card networks, and without that consumer confidence, businesses of all sizes, from hawker stalls to enterprise retailers, will see little reason to prioritise the instant rail. Payee verification is the minimum entry condition.

3. Programmable Recurring Payments

One-off transfers are insufficient for the economics of modern retail. Subscription commerce, automatic replenishment, and instalment billing all require a structured mandate framework - the consumer grants authority once, retains control, and does not re-authenticate for every subsequent debit. Without this, instant rails cannot serve the subscription economy and remain niche infrastructure.

The UK introduced Variable Recurring Payments (VRPs), allowing customers to authorise a third-party provider to initiate multiple payments within pre-agreed parameters, such as amount limits, frequency, duration, without re-authentication per transaction. Brazil moved equivalently with Pix Automático (June 2025): the customer authorises once; subsequent debits execute on schedule without further interaction, a central bank-regulated mandate framework bringing the subscription economy natively onto instant rails.

Gen2's Pillar iii (support for recurring and higher-value payment flows) cannot be realised without a mandate framework of this kind. The mandate is the structural feature that elevates PayNow from a transfer utility to a commerce platform.

4. Lower Cost and Disintermediation Drive Adoption via Flywheel Effects

Card interchange fees and multi-party settlement chains are a structural cost levied on every transaction. For large merchants these fees are a material operating line; for smaller merchants on thin margins, they are a genuine barrier — the reason many small Singapore businesses request cash or avoid card acceptance altogether.

Europe mandated that SEPA Instant transfers be offered at no additional cost relative to standard transfers. Pix eliminated card interchange entirely: zero-cost consumer transactions are a structural design feature of the BCB, not a promotional position. UK Open Banking payments settle directly between accounts via Faster Payments, bypassing card rails and their interchange entirely. Across all three markets, direct account-to-account settlement at zero or near-zero incremental cost is the rational economic default for any merchant with equivalent consumer reach and protection.

If Gen2 can offer Singaporean merchants a lower-cost settlement path without compromising consumer protection, it stands to become a popular default payment rail for Singapore commerce. The resulting flywheel, where merchant adoption drives consumer adoption and vice versa, is precisely the dynamic that enabled Pix to reach 80% of Brazil's population in under five years.

5. E-Commerce Wallet and Checkout Integration

Raw instant payment rails do not deliver a seamless and secure checkout experience. When a consumer is asked to type in an International Bank Account Number (IBAN) or scan a static QR code, they encounter friction that card wallets have spent a decade eliminating. Infrastructure without a commerce-ready user experience layer translates into a well-designed rail that nobody uses for e-commerce.

Europe's Wero, built on SEPA Instant Credit Transfer (SCT Inst) by the European Payments Initiative, expanded from person-to-person transfers into full e-commerce payments in late 2025, with a roadmap encompassing subscriptions, instalments, payments upon delivery, and BNPL - a full-spectrum commerce toolkit natively on instant rails. UK Open Banking's deep-linking architecture redirects consumers directly into their banking app with pre-populated payment details, reducing checkout steps materially. Brazil's dynamic QR codes embed order detail, amount, and merchant reference into the QR payload, making Pix the frictionless checkout at both physical and digital points of sale.

Gen2's Pillar ii (smoother online checkout via deep-linking) is a necessary first step for PayNow, but not the end goal. A full wallet and checkout ecosystem is what converts infrastructure capability into adoption at scale — particularly for Singapore's SME merchants, who need a checkout experience that is on par with card-present convenience without demanding integration investment they cannot sustain.

6.5.3. Why PayNow Must Be Built for What Comes Next: The Agentic Commerce Frontier

Commerce is increasingly moving towards AI agent delegation, with agents that can select, negotiate, and purchase autonomously on a consumer's behalf. Instant payment rails face a design frontier that no jurisdiction has yet fully addressed. If PayNow Gen2 does not accommodate this emerging architecture, there is a risk that merchants and platforms will route agentic transactions through card rails or proprietary systems — narrowing the opportunity to position PayNow as one of the preferred settlement layers for agentic commerce in Singapore.

The observations described below are not features we have built. They are capabilities we believe would be beneficial for any instant payment rail, including PayNow, to support agentic commerce, and are based on observations from the prototype we built under the UK FCA Supercharged Sandbox II programme (July–

November 2026), conducted in partnership with Ubyx. The prototype tests an AI shopping agent autonomously building and submitting weekly grocery baskets within consumer-defined parameters, on a rail-agnostic architecture capable of operating on any account-to-account instant payment system. Running this experiment has surfaced the structural questions that any payment infrastructure will need to answer as AI agents become standard participants in commerce. We offer the following observations as forward-looking contributions to the Gen2 design process, with a view towards a rapidly evolving agentic commerce landscape.

1. Machine-Readable Spending Mandates That Make Recurring, Higher-Value Agent-Initiated Flows Governable

The sandbox observed that a structured, versioned, immutable mandate would be a foundational capability for any agentic-ready instant payment system. Such a mandate would define the parameters within which an AI agent may transact, i.e. per-transaction limits, rolling spending caps, permitted merchant categories, and approved item classes, with each mandate version creating an auditable record of the authority the agent held at any point in time. This would allow instant rails to move beyond per-transaction human approval while maintaining regulatory compliance and consumer control. Without it, agentic commerce cannot operate safely at scale on any instant payment infrastructure including PayNow.

2. Conditional Hold-and-Release Settlement – Transaction certainty with built-in recourse

While instant payments are irrevocable by design, a feature that makes them valuable is settlement speed and merchant certainty. However, commerce requires recourse. A consumer who receives defective goods, or a merchant who discovers a fulfilment error, cannot be left with no remedy simply because the funds have already moved. The sandbox observed that a conditional hold-and-release model could serve as an appropriate settlement mechanism for recurring agentic transactions on instant rails. Rather than forwarding funds directly to the merchant on order, funds would be held conditionally against the consumer's account. The merchant receives confirmation that funds are committed, providing the certainty merchants require, but settlement would not be executed until delivery conditions are satisfied. A time-windowed post-delivery review period would allow the consumer to flag issues before settlement becomes final. This is the programmable consumer protection layer that irrevocable instant rails require to serve recurring, higher-value, agent-initiated commerce safely – transforming the online checkout process into a structured reviewable transaction with built-in recourse.

3. Agent Identity and Credential Binding – Making Autonomous Commerce Auditable and Permissible at Scale

When an AI agent initiates a payment on behalf of a consumer, there are two identities in play, i.e. the consumer's authority and the agent's. Without the ability to verify both, neither merchants nor regulators can trace or audit autonomous transactions, and the accountability that underpins financial system integrity breaks down. A consumer might delegate payment authority to multiple agents across multiple services; without credential binding, those delegations become untraceable and irrevocable by design.

The sandbox observed that agent identity and credential binding could be a critical component for any commercially and regulatorily permissible agentic payment architecture. The AI agent would carry its own distinct identity, separate from but cryptographically bound to the consumer's identity. A control service would issue credentials linking the agent to the consumer's account and to the participating merchant, enabling the payment system to verify not just the consumer's authority but the specific agent acting on their behalf.

4. Automated Dispute Resolution

Manual dispute processes are designed for occasional, high-value disagreements and are not designed for the volume and per-transaction economics of recurring agentic commerce. The sandbox observed that an automated, arithmetic-driven dispute resolution could be an option for an appropriate recourse model for agentic commerce on instant rails. Where a consumer flags a delivery issue, both the delivery confirmation and the consumer's report would be required before resolution executes; the refund would be calculated and applied automatically against the funds held - no dispute ticket, no manual chargeback, no waiting period beyond resolution of the factual question. This proportionality is the defining advantage over the card-era

chargeback model, and it is what makes recurring agentic commerce trustworthy for consumers and operationally sustainable for merchants on PayNow.

5. Multi-Stage Revocation Mechanics – Consumer Trust Infrastructure at Scale

The sandbox observed that mandate-plus-conditional-hold architecture would need to be authentication-method agnostic and settlement-rail agnostic to be viable for global commerce. Such a design would operate on the UK's Faster Payments, Europe's SCT Inst, Brazil's Pix, Singapore's FAST and PayNow, or any account-to-account instant payment system. This portability is essential for global merchants and for regulators seeking interoperable standards and is a prerequisite that would make Singapore's agentic commerce infrastructure relevant beyond its borders.

DBS

6.6. From Instant Payments to Integrated Commerce: DBS Perspective

Authored by DBS

Designing PayNow's next chapter around simplicity, interoperability and trust

6.6.1. Overall Payments Landscape and Consumer Expectations

Singapore's payments story has been characterised by deliberate, industry-wide progress. FAST was introduced shortly after the increased worldwide interest in near real-time account-to-account transfers. Later, the introduction of PayNow made FAST transactions more accessible by allowing people to transfer funds without a recipient's bank account number, using familiar proxies linked to account details. SGQR came into being to simplify what was becoming an increasingly crowded landscape of physical merchant QR payment displays. Together, these developments have helped normalise digital payments in everyday transactions and demonstrated what common infrastructure can achieve through industry-wide collaboration.

Yet the payments landscape does not stand still, because consumer habits are constantly evolving. Driven by rapid digitalisation, modern daily life runs on an on-demand ethos. Consumers have grown accustomed to convenient access to services, from ride-hailing and food delivery to same-day commerce. Naturally, this expectation extends to how people pay and transact. Increasingly, customers value two things: convenience at the point of need, and seamless journeys that flow from intent to completion with minimal friction.

Payment methods have evolved to meet these shifting demands across different domains:

- Peer-to-Peer (P2P): PayNow significantly transformed how we settle personal debts and split bills, making instantaneous transfers part of everyday life.
- In-Person (P2M) commerce: contactless tap-and-pay and QR scan-to-pay mechanisms pushed cash to the margins, from neighbourhood hawker centres to major retail chains.
- Online (P2M) e-commerce: checkout continues to rely significantly on traditional card payments and individual digital wallets. As digital commerce continues to grow, there is an opportunity for embedded account-to-account innovations—such as PayNow Generation 2 capabilities—to support more integrated and convenient online payment experiences.

PayNow Gen2 represents more than an incremental enhancement to existing payment infrastructure. It presents the opportunity to bring together customer experience, merchant enablement, interoperability, and trust within a common framework. The goal is not to make every payment invisible; people still need to understand and control what they are authorising. Rather, it is about stripping away the unnecessary friction of paying so commerce can flow naturally, while maintaining the essential security safeguards that underpin consumer confidence.

6.6.2. Lessons from PayLah! Express Checkout and Deep-Linking

To understand the potential of PayNow Gen2's deep-linking capabilities, existing experiences offer useful insights. DBS's experience in developing and supporting PayLah! Express Checkout with partners provides a practical perspective on the opportunities and considerations involved. While these proprietary models are not blueprints for PayNow Gen2, they provide lessons on the trade-offs and operational dynamics of delivering app-connected payments.

For a consumer shopping on a mobile phone today, standard online PayNow checkouts can be tedious, involving multiple steps. Users often need to save or screenshot a QR code, leave the merchant app, open the banking app, import the code, review the details, and then return to the merchant to confirm their order. While each step may appear relatively minor, cumulative friction can affect the overall checkout experience and potentially contribute to drop-offs. As MAS and BIRU consumer surveys show, app-switching, QR saving, and manual uploads are the main culprits behind cart abandonment.

Deep-linking mitigates this friction. Instead of a patchwork of manual workarounds, it enables a more direct hand-off from an e-commerce checkout or government payment page into an eligible banking or wallet app, with relevant payment details securely passed through for instant review and authorisation.

Through our work with PayLah! checkout journeys, we have observed the benefits of reducing operational steps. For customers, this enables a faster, more seamless checkout journey by reducing manual steps. It also provides an additional payment option for those who prefer not to enter their card details on merchant websites, whether for convenience or security reasons, with payments securely authenticated within the PayLah! app.

For merchants, the value proposition is just as compelling. Reducing manual data entry helps minimise payment errors and supports more timely payment confirmation. However, realising these benefits at an industry level will depend on broad merchant adoption. Drawing on our experience working with digital partners, we find that adoption is more likely when solutions are easy to integrate, operationally efficient, and offer a clear commercial value proposition. Beyond simplifying technical integration, merchants need reliable payment confirmation and reconciliation capabilities, alongside compelling reasons to adopt and promote the new payment experience.

Deploying these checkout flows yields three vital lessons for the broader PayNow Gen2 rollout:

- Convenience must coexist with trust. Automatically flipping a user from a merchant site into a payment app while adding convenience, must feel familiar and recognisable. Clear merchant identification and bank-side authentication act as vital anti-scam guardrails and cannot be traded off for a seamless journey.
- Status transparency is non-negotiable. Both parties need clear visibility of payment outcomes. Where network connectivity is interrupted, systems should be able to reliably report whether a payment is pending, confirmed, or failed, helping to minimise duplicate payments and avoid unnecessary customer anxiety and dissatisfaction.
- Control and choice remain essential. Express linking drives repeat usage, but customers must always retain the ability to review transaction amounts, choose alternative payment options where available, and to monitor recent transactions with ease.

Ultimately, our experience with app-connected checkout models suggests that deep-linking is much more than a technical shortcut. It offers a unique opportunity to better align payment initiation with the expectations and behaviours of consumers in an increasingly digital commerce environment.

6.6.3. Deep-Linking as an Enabler for PayNow Generation 2

DBS views the introduction of PayNow Generation 2 as a timely evolution for Singapore's payments ecosystem, with the potential to deliver benefits for consumers, merchants and participating financial institutions. While proprietary wallet integrations have demonstrated the potential of app-connected checkout, Gen2 elevates that convenience to a national scale through common industry standards, supporting greater interoperability and broader ecosystem participation.

By establishing a standardised framework, Gen2 transforms checkout through a few key mechanics: customers initiate payments seamlessly without disruptive redirection; payment details are prepopulated to eliminate manual input errors; users can pick their preferred participating banking or wallet app from a clearly viewable list of options; and they are automatically returned to the merchant upon authorisation with clear confirmation.

By anchoring deep-linking in shared standards, we give the broader market frictionless online checkouts, empowering merchants of all sizes to widen their reach while giving consumers a consistent, trusted way to pay across the digital ecosystem.

6.6.4. Making PayNow Gen2 Merchant-Friendly

For merchants, particularly small and medium-sized enterprises (SMEs), payments infrastructure introduces operational complexity. Today, accepting a mix of digital payment methods may require businesses to navigate and manage multiple payment providers, each bringing its own APIs, reconciliation formats, and onboarding arrangements.

Standardised deep-linking protocols and common APIs change that equation by simplifying the landscape. By establishing consistent approaches to payment initiation, status confirmation, and reconciliation, Gen2 can significantly reduce merchant integration complexity. Instead of building and maintaining custom connections for every bank or wallet, merchants plug into a single, consistent framework.

Drawing on our experience onboarding digital partners and merchants for DBS PayLah!, several operational considerations stand out. Merchants do not just care about getting paid; their day-to-day reality depends on what happens after the transaction button is clicked. Clear payment confirmations and consistent transaction references are important for matching incoming funds to the correct orders or invoices. Where reconciliation remains manual or payment status is unclear, merchants may face additional administrative effort, operational costs, and customer service enquiries.

For smaller merchants and SMEs, simplicity can be an important driver for adoption. If Gen2 can streamline integration, reduce technical overhead, and ensure that the payment status is reported with absolute consistency across all participating apps, it will lower the barrier to digital commerce.

Industry standardisation would mean merchants can spend less time managing multiple onboarding and payment plumbing and more time serving their customers.

6.6.5. Ensuring Trust and Reliability

In today's evolving fraud landscape, improvements to checkout convenience must be accompanied by strong security safeguards. Seamlessness and safety should not be treated as competing priorities; both need to be considered from the outset when designing payment journeys. When designing frictionless app-to-app payments, the risk of malicious redirection, phishing, and tampered payment requests naturally rises. That is precisely why consumer trust must be baked into every layer of the architecture. Users need instant visual reassurance: recognisable bank-side authentication, clear merchant identification, and absolute clarity on the amount being debited before they authorise a transaction.

DBS's digital banking ecosystem, comprising DBS digibank for all banking and wealth needs and DBS PayLah! for everyday lifestyle and payments, reflects our approach to balancing convenience and security. By providing a dedicated platform for daily payments, complete with appropriate transaction limits and safeguards, we aim to offer consumers a simple and convenient way to transact while effectively managing the risks associated with everyday digital payments.

These considerations are consistent with the broader objectives of PayNow Gen2, including operational reliability and resilience, fraud prevention, effective dispute resolution, and continued ecosystem innovation. When deep-linking automates the hand-off between merchant websites and payment apps, the backend infrastructure must incorporate the appropriate safeguards to ensure users are protected, including secure link verification, reliable exception handling, and clear transaction status communication when connectivity or processing issues arise.

6.6.6. DBS's Vision and Recommendations

To realise the full potential of PayNow Generation 2 and support its adoption across Singapore, DBS sees value in industry alignment around several key priorities:

- Establish Common Deep-Linking Standards: Participating banks and wallets should work towards unified technical specifications. Standardising payment initiation, authorisation flows, app selection, and the return-to-merchant journey can help create a more seamless and predictable experience for consumers regardless of which payment app they use.
- Anchor Everything in Security: Security should remain the foundational consideration in the design and implementation of deep-linked payments. Frictionless convenience must never come at the expense of robust anti-scam checks, payload integrity, and strict controls around user consent and data privacy.
- Strengthen Exception and Status Handling: A checkout journey is only as strong as its fallback mechanisms. The ecosystem needs common and rigorous standards for handling failed, dropped, or interrupted transactions. Ensuring every party receives the same true status report reduces the risk of duplicate payments and minimises operational uncertainty for consumers and merchants.
- Simplify Merchant Integration via Common APIs: Broad merchant adoption will be important to realising PayNow Gen2's potential. By streamlining APIs and payment status standards, we can reduce integration complexity and barriers to entry, making it easier and thereby more attractive for businesses of all sizes to adopt deep-linking in a cost-effective and efficient manner.

With these foundational elements coming together, PayNow Gen2 has the potential to mark a new milestone in Singapore's payments journey. Realising this potential will require continued industry collaboration, with interoperability, simplicity and trust at the heart of how the next generation of payment experiences is designed, implemented and scaled across the nation's digital ecosystem.

Disclaimer: This article is intended for general informational and industry discussion purposes only and reflects our understanding and perspectives based on information available as at the date of publication. The observations are illustrative in nature and should not be construed as legal, regulatory, technical or other professional advice, or relied upon for any particular purpose. References to technologies, capabilities, practices or approaches should not be taken as descriptions of specific systems, capabilities or controls currently implemented by DBS, nor as commitments regarding future implementation. The views and observations may evolve as technology, industry practices and regulatory expectations develop.

6.7. PayNow Global: SGQR+ and PayNow QR Interoperability

Authored by Liquid Group

6.7.1. Executive Summary

Singapore's payment ecosystem has strong foundations for merchant QR interoperability. PayNow provides a trusted domestic account-to-account payment infrastructure with broad participation across 23 participant banks and six major payment institutions, while SGQR has established a common QR standard that supports multiple payment schemes at the point of acceptance.

NETS and Liquid RoamQR have developed merchant acquiring capabilities and cross-border linkages that extend Singapore's reach into regional markets. These capabilities have evolved separately and do not yet operate as a single interoperable merchant acceptance fabric. This paper reviews the current state of Singapore's merchant QR ecosystem, documents observations from industry on where interoperability remains incomplete to inform the path forward for Singapore.

6.7.2. Current Landscape on Interoperability Models

Singapore's merchant QR environment comprises complementary but separately developed models, each addressing different aspects of merchant acceptance. However, full domestic and cross-border interoperability across issuers, acquirers and overseas networks remains a work in progress.

Model	Current Role	Strengths	Limitations
PayNow	PayNow provides Singapore's national account-to-account payment infrastructure, supporting person-to-person (P2P), business-to-business (B2B), government disbursements and collections, domestic person-to-merchant (P2M) and customer-to-business (C2B) payments.	Trusted domestic infrastructure with broad bank and financial institution participation.	• P2M/C2B-specific rules for refunds, voids, disputes and reconciliation remain limited. • Cross-border merchant use would require additional data, compliance, reporting and operating capabilities, including clearer separation between personal and merchant payments for transaction-purpose and merchant identification purposes.
NETS QR	NETS operates a substantial domestic QR merchant acceptance network and has established selected bilateral cross-border QR linkages.	Large merchant footprint and established merchant operating capabilities.	• NETS does not connect its issuer applications to PayNow directly or through a sponsor and the issuer applications cannot transact on PayNow QR. • Cross-border connectivity is operator-specific and is not automatically shared with other Singapore acquirers. • Interoperability with Liquid RoamQR is asymmetric: while Liquid RoamQR issuers can access NETS QR merchants, NETS issuers cannot access merchants acquired through Liquid RoamQR acquirers.

Model	Current Role	Strengths	Limitations
Liquid RoamQR	Liquid supports domestic issuers and acquirers while sponsoring PayNow acquirer access and offers cross-border interoperability with overseas national QR networks.	Network-of-national-networks model supporting domestic and cross-border merchant interoperability.	• Liquid provides sponsored participation into PayNow merchant acceptance for selected participants, meaning coverage is dependent on which acquiring participants Liquid has onboarded rather than extending automatically across the full PayNow network. • PayNow issuer access to Liquid/RoamQR merchants is achieved through front-end common QR recognition rather than switch-level routing, which is less consistent and operationally less efficient even if the consumer experience appears seamless.

6.7.3. Industry Observations

Singapore's merchant QR ecosystem has developed through a series of complementary domestic and cross-border arrangements, each serving distinct purposes and participant needs. While PayNow, NETS QR and Liquid RoamQR collectively provide broad payment coverage, no single model today delivers full interoperability across all issuers, acquirers and overseas networks.

Liquid identified five structural gaps across domestic interoperability, merchant operating rules, transaction economics, cross-border connectivity and consumer experience.

Asymmetric domestic interoperability. The current ecosystem operates with uneven two-way reach. The practical consequence of this asymmetry is that not all issuers can reach all merchant domains, and where access does exist, it is not always achieved through the most efficient means. Addressing these gaps is a prerequisite for establishing a truly interoperable domestic merchant acceptance fabric.

Issuer	PayNow QR merchants	NETS QR merchants	Liquid RoamQR merchants
PayNow Issuers	Yes	Yes (via PayNow-to-NETS QR initiative)	Partial (via front-end QR recognition, not switch-level routing)
NETS Issuers (not on PayNow)	No (unless connected via approved sponsor)	Yes	No
Liquid-supported Issuers	Partial (not universal across all PayNow acquirers)	Yes (via Liquid's link to NETS)	Yes

Absence of a harmonised merchant rulebook

PayNow has yet to establish a comprehensive scheme-level rulebook governing person-to-merchant (P2M) and customer-to-business (C2B) payments. Core operational rules covering refunds, voids, disputes, transaction reversals, and merchant reconciliation remain undefined at the national scheme level. While NETS and Liquid have each independently developed such capabilities within their respective domains, these frameworks are not harmonised across the ecosystem. This creates inconsistent consumer and merchant outcomes depending on which operator or acquirer is involved in each transaction.

Pricing misalignment with low-ticket merchant use cases

Person-to-merchant payments carry different economics from the peer-to-peer and business-to-business transfers PayNow was originally built for, which do not carry an issuer interchange fee. Micro-payment sectors have distinct commercial requirements, including low per-transaction costs, efficient exception-handling processes, and operational models scaled to retail transaction volumes; industry benchmarking under PayNow Gen2 has similarly found that processing costs render small-value transactions commercially unviable under current cost structures. Applying a uniform pricing structure across all merchant payment types risks rendering certain merchant categories commercially unviable on the national payments infrastructure and may impede broader adoption in segments where PayNow could otherwise serve as a viable alternative to card-based payments.

Duplicated and fragmented cross-border connectivity

ASEAN markets have made significant progress in bilateral QR and instant-payment linkages. These linkages have proven demand, supported tourism and created useful payment corridors. However, they also demonstrated a scaling challenge whereby each new bilateral corridor must be negotiated, integrated, tested, governed and supported separately. NETS and Liquid have independently established cross-border QR linkages, and these are not presently shared across domestic operators. As the number of regional linkages grows, this model risks producing fragmented acceptance islands rather than a unified national cross-border capability.

Unclear acceptance identity

Singapore lacks a single, universally recognised merchant acceptance mark for inbound international users comparable to neighbouring markets. The PayNow QR standard does not inherently distinguish between personal, merchant, and corporate accounts, leaving overseas users without a reliable means of identifying whether a given QR code represents a merchant payment or a personal transfer. This ambiguity carries material regulatory consequences: a cross-border payment directed to a personal PayNow proxy may constitute a remittance rather than a merchant transaction, attracting different obligations under AML frameworks, cross-border money transfer (CBMT) reporting requirements, and consumer protection regulations. Expanding cross-border PayNow acceptance without first resolving this distinction would heighten the risk of payment disputes, erroneous transfers, and regulatory misclassification with potential compliance implications for both payment service providers and their merchant clients.

Architectural Models for Consideration

Liquid evaluated three broad architectural models for enabling cross-border and merchant payment capabilities on Singapore's national payments infrastructure.

Model A — Full PayNow Evolution

This model upgrades PayNow to support both domestic and cross-border merchant payments within a single national architecture. While it offers the strongest long-term alignment with PayNow as the primary standard, Liquid assessed it as multi-year in implementation and costly in the near term. Every PayNow participant would need to support cross-border data requirements, sanctions and AML screening, CBMT reporting, foreign exchange handling, and merchant-specific rules regardless of whether they have any cross-border business need. This imposes significant change across the entire participant base to serve a subset of use cases.

Model B — Independent Operator Networks

Each operator builds its own overseas connections and competes on corridor reach. This allows faster early deployment but creates problems at scale. As more operators and overseas schemes connect, integration complexity multiplies. Operators that establish early dominance in key corridors have little incentive to interoperate, risking the emergence of proprietary gateways that concentrate market power and fragment the merchant and consumer experience.

Model C — Layered, Interoperable Transition (Recommended)

This model keeps PayNow intact as the domestic core and introduces a separate layer, SGQR+, to handle the additional requirements of cross-border and merchant payments. Operators only take on cross-border obligations if they have a business need, and all certified operators must interoperate under common rules, preventing any single operator from becoming a dominant gateway. Liquid assessed this as the most practical near-term path, with Model A remaining the long-term destination once the industry is ready for full integration.

Establishing PayNow as the primary interoperable QR standard

Singapore has a distinctive combination of assets: a trusted domestic payment core, a mature merchant acquiring environment, existing operator capabilities, and strong regulatory oversight. Singapore's approach has also been to encourage operators to compete on service quality within a shared interoperable infrastructure rather than through proprietary lock-in. An open merchant acceptance framework would allow Singapore to consolidate these assets, reduce fragmentation from bilateral arrangements, and position itself as a reference model for regional merchant QR interoperability.

Liquid proposes a two-phase architecture to achieve this. Phase 1 is carried out across two parallel tracks.

Track 1 — Strengthen PayNow's Domestic Participation Base

This track focuses on broadening who can participate in PayNow, principally to deepen reach for peer-to-peer (P2P) and business-to-business (B2B) transfers — PayNow's core strength today. Liquid recommends formalising a symmetric sponsor model allowing approved issuers and acquirers to participate in PayNow without becoming direct participants, and handling routing for recognised merchant QR formats at the national switch level so that issuers integrate once into PayNow rather than separately into each merchant network. Where sponsored participation extends to person-to-merchant (P2M) or customer-to-business (C2B) flows on PayNow itself, these are governed by the same rulebook developed under Track 2, rather than a separate PayNow-specific rulebook, so that one consistent set of merchant-payment rules applies regardless of which rail a transaction crosses.

Track 2 — Establish SGQR+ as the Interoperable P2M/C2B Framework

This track is scoped specifically to person-to-merchant and customer-to-business payments — the use cases PayNow was not originally designed to carry, and where cross-border and merchant-commerce requirements differ structurally from P2P/B2B transfers. SGQR+ would be established as an open, operator-neutral interoperability framework, with a scheme owner empowered to certify operators against objective criteria: domestic and cross-border connectivity, secure routing and settlement, regulatory compliance, and willingness to interoperate. Interoperability between certified operators would be mandatory, ensuring reach is shared across the ecosystem rather than siloed within individual operator domains. As additional operators demonstrate the required capabilities, they would be evaluated for certification on the same basis, extending the network progressively rather than fixing its membership at launch. SGQR+ would establish the person-to-merchant and customer-to-business rulebook — covering low-cost transaction handling, refunds, voids, disputes, reconciliation, and fraud controls — which Track 1 also references, so a single merchant-payment rulebook applies across the ecosystem.

Given that agreeing common certification criteria and scheme rules across multiple operators will take time, Liquid recommends that existing, already-capable bilateral interoperability arrangements between operators be permitted to continue operating as early, non-exclusive bridges while SGQR+ certification and scheme rules are finalised — provided such arrangements remain open to extension to other operators as they become certified, and are formally brought within the SGQR+ framework once it is established. This allows near-term consumer and merchant benefit to continue without waiting for full certification, while avoiding the risk of bilateral links persisting indefinitely outside a governed framework. The PayNow Gen2 Phase 2 proof-of-concept piloting interoperability between PayNow and NETS QR, targeted for end-2026, is an early demonstration of the kind of point-to-point interoperability SGQR+ is designed to generalise across participating operators, rather than leaving it to isolated bilateral pilots.

Phase 2 — PayNow Convergence Review. Liquid recommends a structured review beginning 18 to 24 months after the SGQR+ framework becomes operational and a critical mass of operators is certified — independent of Track 1's own timeline — to assess which SGQR+ capabilities should be brought into PayNow directly, with a working presumption towards convergence unless a documented case is made for continued separation.

Singapore is well placed to lead on merchant QR interoperability precisely because its foundations — a trusted domestic rail, a mature acquiring ecosystem, and capable operators already active in the market — are already in place. What remains is coordination: an agreed framework that lets these capabilities interoperate under common rules rather than through bilateral arrangements alone. Liquid looks forward to continuing to work with MAS, ABS, and industry partners through PayNow Gen2 Phase 2 to bring this framework to life.

6.8. Building Trust in Real-Time Payments: A Principles-Based Dispute Resolution Framework for Account-to-Account (A2A) Payments

Authored by Mastercard

6.8.1. Introduction

Real-time account-to-account payments are fast becoming the core payment infrastructure in many countries; they are near instant, always on, and increasingly embedded into the consumer's everyday life. But the same transaction finality that makes real-time payments (RTP) efficient also makes managing disputes for real-time payments challenging to resolve compared to other payment types, such as cards. Unlike card payments, which benefit from mature chargeback frameworks, established scheme rules, and defined recovery mechanisms, A2A payments are typically irrevocable once authorised and processed. This limits the ability to reverse transactions or recover funds after a dispute has been raised. PayNow Gen2 therefore needs a dispute resolution capability that is not treated as a compliance expense, but as a core capability for building trust, accountability, and sustainable growth.

6.8.2. Why this matters now

Unlike card or Interbank GIRO (IBG) transactions, most A2A real-time payments achieve immediate finality. Funds are typically made available to the beneficiary within seconds, and the payment becomes difficult, or impossible, to reverse once completed. This creates several challenges:

- Fraud losses become harder to recover
- Scam proceeds can be dispersed quickly
- Investigations often require cooperation between multiple institutions
- Card-like chargeback mechanisms are not possible
- Liability usually sits with the originating account holder
- Participating institutions often have conflicting interests

The need for dispute resolution increases as real-time payments (RTP) move beyond person-to-person (P2P) transfers into person-to-merchant (P2M), e-commerce, bill payments, recurring payments, and cross-border use cases. Expectations are shaped by the protections and safeguards experienced elsewhere in the payment ecosystem. While RTP and cards operate differently and require different dispute models, consumers expect confidence that payments can be challenged when things go wrong, and that fair outcomes will be available in case of fraud, error, merchant disputes or operational failures. Merchants require clarity, consistency, and confidence in how disputes will be handled and liabilities will be allocated. Providing comparable levels of trust and protection, while preserving the speed and finality of real-time payments will be essential to driving trust, adoption and sustainable ecosystem growth. If disputes are not resolved in a consistent and enforceable way, confidence in the payment network will be limited even if the underlying payment rail is fast and efficient. Account holders have come to expect some level of protection when issues arise, such as payments sent to the wrong recipient, incorrect amounts, or technical errors. Meeting these expectations, particularly as real-time payments expand into person-to-merchant (P2M) use cases, will require participating institutions to assume greater financial liability than they typically carry today. This shift is often underestimated when dispute

resolution frameworks are designed. As real-time payment ecosystems continue to evolve, markets are exploring different approaches to support fraud recovery, dispute resolution and ecosystem trust. Examples include the UK Authorised Push Payment (APP) scam reimbursement regulation, Brazil's Pix Special Return Mechanism (MED 2.0) capabilities and UPI's dispute management. While these initiatives differ in design, maturity and effectiveness, they reflect a broader recognition that real-time payment ecosystems require clear governance, participant responsibilities and defined mechanisms to address payment issues when they occur. To date, many of these efforts have focused on fraud and scam-related disputes, but the same foundations can be extended to support a broader range of P2M dispute use cases as RTP adoption continues to grow. The key question is not whether RTP systems need dispute resolution mechanisms, but how those mechanisms can be designed to be operationally sustainable, economically viable, and contractually or legally enforceable. The diagram below outlines the relationship between the operational, economic, and legal considerations that underpin effective dispute resolution mechanisms.

Figure 1: Effective dispute resolution mechanisms



6.8.3. Not all disputes are the same

Many industry discussions focus immediately on the dispute resolution processes:

- How to raise a case
- Required evidence and documentation
- Reason codes
- Investigation timelines
- Resolution SLAs

These are important operational considerations, but they are just a small part of the overall dispute resolution framework. The more fundamental questions are:

- How can we prevent disputes from occurring?
- What rights, capabilities and data does the ecosystem orchestrator have to address a dispute?
- Why would a participating institution comply with an unfavourable dispute outcome?

In many cases, compliance may not align with the participating institution's immediate interests. Examples include:

- Returning fraud proceeds already credited to an account holder
- Accepting liability for a scam
- Being held liable for non-fraud related disputes
- Reimbursing another participating institution
- Freezing an account holder's funds
- Sharing sensitive investigative data

If the framework holds receiving parties accountable but does not systematically prevent disputes, adoption will be discouraged. If the framework does not address first-party fraud, merchants will not tolerate the risks. If the framework relies solely on goodwill and voluntary cooperation, disputes will become inconsistent, prolonged, and ineffective. Another common oversight is to treat all disputes as the same and apply the same requirement across all dispute types when trying to resolve them. In practice, disputes arise from different causes, and the right outcome depends on the nature of the failure, the party best positioned to prevent it, and the evidence available to establish what happened.

These can be categorised as follows:

- Scam payments authorised by the account holder, where the payer is deceived into initiating the payment
- Fraudulent payments not authorised by the account holder, where authentication or account security controls may have failed
- Misdirected or erroneous payments, such as wrong recipient or wrong amount
- Merchant or goods-and-services disputes, where the payment was made but the underlying service is contested
- Operational or technical failures, where the payment network or a participating institution caused an error
- First-party fraud, where a legitimate account holder misuses dispute rights

Each dispute category raises different questions of evidence required, liability allocation, recovery mechanism, and participant behaviours. A scam case may depend on beneficiary-account controls and mule-account detection. An unauthorised payment may depend on the strength of authentication. A merchant dispute may require rules for services not rendered, non-delivery, or misrepresentation. A technical error may require liability to be defined and/or enforced. PayNow Gen2 needs dispute categories and processes that have clear definition, transparent evidence requirements, and connect each outcome to the underlying risk accountability principle. It also requires governance, incentives, and enforcement mechanisms to operate effectively.

6.8.4. The dispute resolution framework as part of holistic ecosystem protections

Dispute resolution should not be viewed as a standalone capability, but as one component of broader ecosystem protection. Effective dispute resolution starts with preventing disputed transactions from occurring in the first place. Before focusing on reimbursement and recovery, a payment scheme should establish strong controls to ensure payments are authenticated, authorised and proactively monitored for fraud across the ecosystem. Participating institutions play a critical role in implementing robust customer authentication and controls. These capabilities may include:

- Strong customer authentication
- Device binding
- Behavioural analytics
- Cryptographic credentials
- Dynamic risk scoring

For authorised fraud, the strength and consistency of authentication should directly influence liability apportionment. Institutions that fail to implement required authentication controls should bear greater responsibility for resulting losses, whilst the party that authorised the payments should also remain accountable. This aligns incentives towards improving preventative controls and reducing fraud before it occurs. Fraud prevention is a shared responsibility that extends beyond individual participants. When fraud signals, risk indicators and threat intelligence are shared across the ecosystem, participating institutions can identify and respond to emerging threats more effectively, reducing losses and the volume of disputes that require resolution. The collective approach helps prevent fraudsters from exploiting gaps between participating institutions and enables identification of patterns and risks that no single participant could detect independently. At the payment network level, shared fraud prevention capabilities are equally important, including:

- Mule-account detection
- Network fraud intelligence
- Shared watchlists/blacklists
- Scam signal sharing
- Real-time transaction monitoring
- Beneficiary account risk scoring

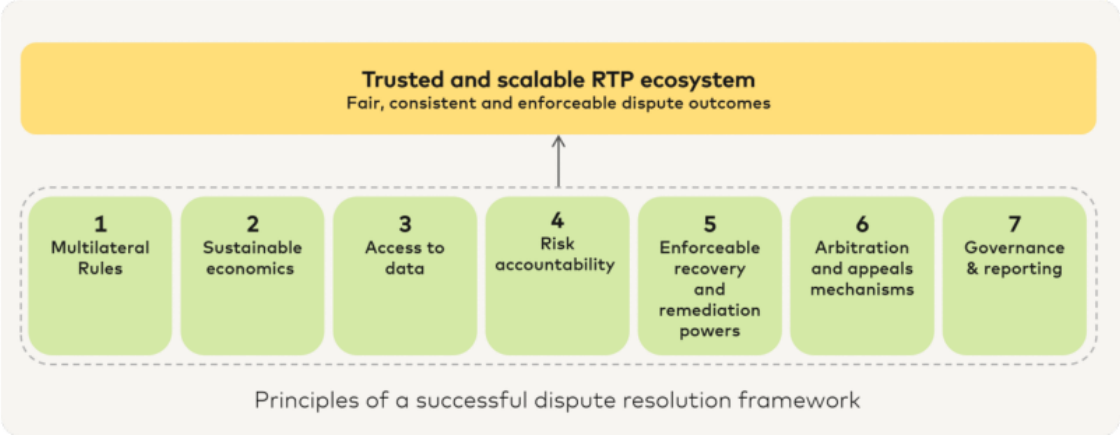
The dispute resolution framework should be designed as part of a broader ecosystem protection model with strong participant controls, fraud prevention and effective intelligence sharing. While prevention remains the first line of defence, the dispute resolution framework provides a structured mechanism to manage losses and maintain trust in the system when disputes do occur.

6.8.5. Principles for a successful dispute resolution framework

A successful dispute resolution framework is built on principles that create trust and allow an ecosystem to scale safely, consistently, and predictably. Participants must align on common rules, sustainable economics, clear accountability, and access to the information and data required to investigate claims. These principles establish trust between participants, inform decision-making, and provide the governance structure needed to support scalable, consistent, and enforceable dispute outcomes.

The diagram below depicts the foundational principles of a sustainable dispute resolution framework.

Figure 2: Principles of a successful dispute resolution framework



Whilst there are several principles, there are differences in how complex they are to implement and the strategic value they deliver.

1. Multilateral rules

An important principle of an effective dispute resolution framework is a robust set of multilateral rules that are adopted and applied consistently across all participating institutions. When dispute resolution depends on bilateral arrangements between participating institutions, differences in rules, processes and liability models can lead to inconsistent outcomes for similar disputes. Instead, all participants should operate under a common set of rules and processes that provide clear responsibilities, standardised procedures and predictable outcomes regardless of which participants are involved. International examples point in this direction with India's Unified Payments Interface (UPI) which relies on common operating rules and centrally governed disputes processes. A comprehensive multilateral rulebook should cover:

- Common dispute definitions
- Standardised reason codes
- Required evidence and documentation
- Dispute lifecycle and investigation timelines
- Participating institutions' roles and responsibilities
- Liability allocation rules
- Escalation mechanisms
- Enforcement powers
- Appeals processes

Multilateral rules create predictability and consistency. More importantly, they transform dispute resolution outcomes from bilateral commercial negotiations into obligations shared across participating institutions in a payment scheme. Without multilateral rules, participating institutions can simply choose not to cooperate. With multilateral rules, compliance becomes a condition for remaining in the payment scheme. This same principle is what enabled Mastercard's dispute resolution framework to scale effectively across the globe.

2. Sustainable economics

Effective dispute management requires sustained investment across technology, operations, governance and recovery capabilities. A mature dispute resolution framework requires capabilities such as:

- Case management systems
- Investigation teams
- Data exchange capabilities
- Governance and compliance functions
- Arbitration mechanisms
- Recovery infrastructure
- Operational support functions

Disputes introduce additional financial exposure for participating institutions, including fraud losses, recovery obligations, operational costs, and liability allocations. Financial exposure becomes increasingly relevant with P2M where transaction volumes and values are higher, dispute scenarios become more diverse, and financial liability may be shared across multiple parties. These costs and exposures must be reflected in the economic model and value exchange across the ecosystem to ensure responsibilities, incentives and investments remain aligned and sustainable over the long term. Unlike card ecosystems, which have a value exchange model that helps support fraud management, dispute resolution and recovery activities, many RTP schemes currently operate on significantly lower economic margins. As a result, the resources available to fund dispute resolution capabilities may be more limited. These costs and exposures should be considered in the ecosystem's economic model. Unless there is a sustainable economic model, trust can be undermined, impacting upon the overall

adoption of higher-risk use cases such as P2M and e-commerce payments. The objective is not to generate profit from dispute management, but to ensure the ecosystem invests appropriately in trust, consumer protection and network integrity. A sustainable funding model should enable the capabilities, controls and operational processes required to maintain confidence in the payment system as adoption grows.

3. Access to data

Effective dispute resolution depends on access to accurate, authoritative, and verifiable data. The framework should not rely primarily on participating institutions manually re-keying information, submitting screenshots, or self-reporting what occurred. Wherever possible, the process should be anchored in original transaction data as the source of truth. Direct access to authoritative data sources reduce operational friction, limits factual disputes, improves ruling consistency, and lowers the risk that participants withhold, selectively present, or misinterpret information. Equally important is the quality and consistency of information submitted by participant institutions during the dispute resolution process. The framework should define a standardised set of structured datasets that must accompany each dispute case. In addition, clear documentation and evidence requirements should be established for every dispute category, specifying what information is mandatory, optional, and admissible for decision-making. Standardised evidence requirements reduce ambiguity, minimise back-and-forth requests for additional information, accelerate investigations, and improve consistency across participating institutions. By combining authoritative network data with structured participant-submitted evidence, the framework creates a common factual foundation upon which fair, transparent, and scalable dispute decisions can be made. Access to this shared data enables evidence-based decisions and allows dispute resolution to scale efficiently across the ecosystem. A framework built on shared, trusted data is more likely to deliver fair and predictable outcomes than one dependent on manual evidence gathering and participant declarations. Furthermore, the shared dispute data should not be used solely to resolve individual cases; it should serve as a continuous feedback loop to strengthen the ecosystem. Information collected through the dispute resolution process, including fraud typologies, scam indicators, mule-account intelligence, control failures, and recovery outcomes, can be analysed to enhance fraud and scam detection, improve risk models, and identify emerging threats. Likewise, insights from successful and unsuccessful recovery attempts can be used to refine fund tracing, freezing, and recovery processes. By systematically feeding dispute intelligence back into ecosystem controls, every dispute contributes to making the ecosystem safer and improving future recovery outcomes.

4. Risk accountability

When designing a dispute resolution framework, a key focus should be on risk accountability rather than focusing on loss allocation.

Liability should reside with the party best positioned to prevent, detect, or mitigate the relevant risk, which will help to incentivise a sustainable payment ecosystem.

Examples include:

Table 1: Illustrative example of where liability should reside

Scenario	Illustrative Liability Principle
Authentication failure	Institution responsible for authentication
Fraud monitoring failure	Institution responsible for fraud controls
Account being used as mule account	Institution managing the beneficiary account
Technical processing error	Institution causing the error
Scheme rule violation	Non-compliant participant
Invalid payment mandate	Institution responsible for mandate validation
First-party fraud	Institution responsible for the payer

Scenario	Illustrative Liability Principle
Authorised Push Payment	Institution responsible for the payer (though shared liability may be regulated in some markets)

A liability-based dispute framework is a critical driver of ecosystem health, creating clear accountability for participant actions and outcomes. By assigning liability to the party best positioned to prevent or mitigate risk, the framework incentivises participants to invest in customer protection measures, operational controls, and fraud prevention. In the UK, the APP scam reimbursement regulation demonstrates the importance of clear liability and cost allocation across participants, establishing a transparent framework for shared responsibility when fraud occurs. This direct linkage between accountability and financial consequences encourages proactive risk management and contributes to a safer, more trusted payments ecosystem.

5. Enforceable recovery and remediation powers

Dispute decisions risk being ineffective if the scheme operator cannot financially enforce the final outcome. A successful dispute resolution framework therefore requires clear enforcement levers backed by regulation.

Potential capabilities include:

Table 2: Enforcement levers for a successful dispute resolution framework

Category	Capability
Fund Protection	Real-time fund freezing
	Temporary account restrictions
	Beneficiary notification
	Recovery holds
Fund Movement Authority	Recall funds
	Recover misdirected payments
	Transfer recovered amounts
	Execute dispute rulings

In Brazil, the enhancement of Pix MED 2.0 enables participant institutions to temporarily hold or restrict access to suspected fraudulent funds across the whole downstream transaction chain while investigations are underway. This recognises that effective dispute resolution in real-time payments requires more than defined liability rules and processes; it also requires practical measures to prevent the rapid dispersion of funds and improve the likelihood of recovery. The right to move funds following a binding decision is often overlooked. Without it, dispute outcomes become recommendations rather than enforceable recourse. Participating institutions may simply refuse to comply when compliance conflicts with their own interests. A dispute resolution framework should therefore establish legal, operational, and contractual authority to execute rulings.

6. Arbitration and appeals mechanisms

Not all disputes can be resolved bilaterally; a mature dispute resolution framework requires structured escalation paths. Participating institutions must have confidence that decisions can be reviewed. Arbitration provides a critical safeguard against inconsistent outcomes and increases confidence in the scheme governance. It also reduces pressure on regulators and redress bodies to intervene in operational disputes unless absolutely necessary.

Figure 3: Appeals and arbitration mechanisms



7. Operational dispute resolution processes

When the other principles are in place, the dispute resolution framework can operate through a structured, enforceable process.

A typical dispute resolution process consists of:

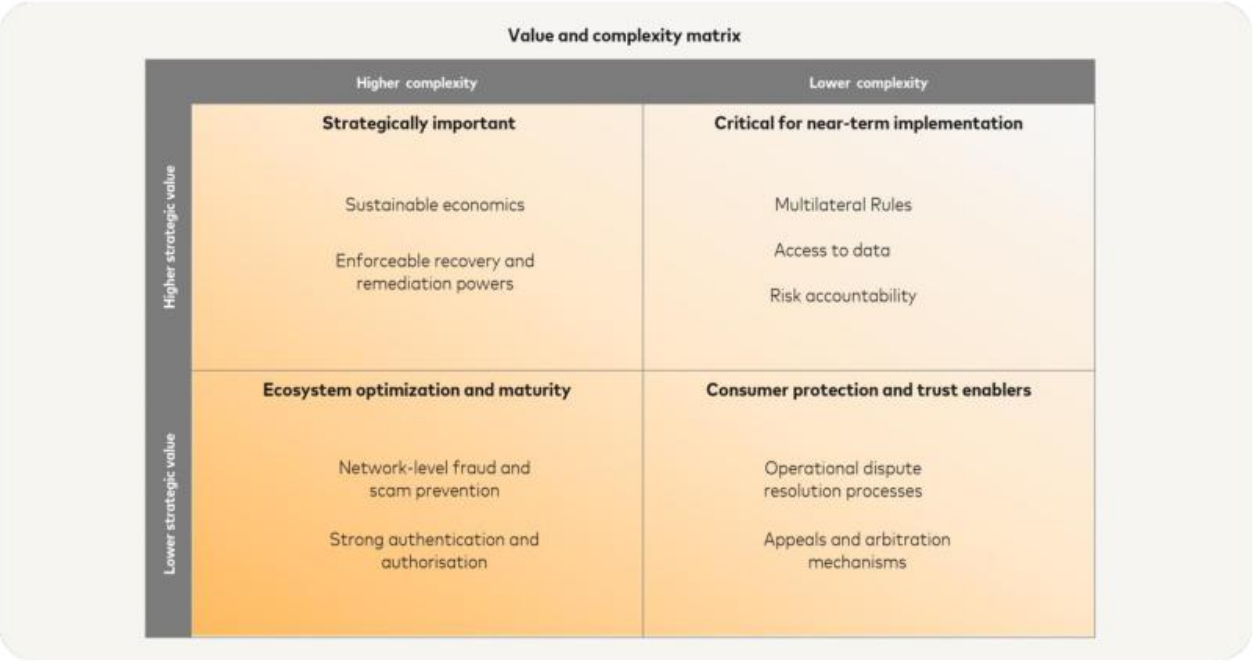
Figure 4: Typical dispute resolution process



The process should be transparent, standardised, digital, and measurable across the payment network.

The diagram below depicts implementation complexity and strategic value of key dispute resolution principles.

Figure 5: Implementation complexity and strategic value of key dispute resolution principles



6.8.6. What is at stake

The cost of getting dispute resolution design wrong is significant. If the framework relies only on voluntary cooperation, outcomes will be inconsistent and slow. If it imposes mandatory reimbursement without accountability, losses will be redistributed without reducing the underlying fraud, scam, or operational risks. If it lacks enforceable recovery powers, dispute resolution decisions will become recommendations rather than enforceable remedies.

The broader risk is that users, but also merchants, participating institutions, and regulators lose confidence in the ability of the RTP network to govern the payments on their network fairly. Trust must therefore be viewed as a scheme capability. It requires investment, rules, data, accountability, and enforcement. Without those foundations, the speed of real-time payments can amplify harm faster than the ecosystem can respond.

6.8.7. Principles for PayNow Gen2

For PayNow Gen2, the practical implication is that consideration should be given to designing dispute resolution as an integrated capability. The framework should establish clear dispute categories, common scheme rules, documented evidence requirements, participant obligations, liability principles, recovery powers, escalation paths, and network-level feedback loops.

The design principle should be that liability follows risk control. The party best positioned to prevent, detect, or mitigate a failure should carry the corresponding accountability. This creates incentives for stronger authentication, better fraud monitoring, better beneficiary-account controls, more reliable mandate validation, and more disciplined operational behaviour across the ecosystem.

PayNow Gen2 should also treat data as a strategic asset. Structured case data, authoritative transaction records, fraud typologies, scam indicators, mule-account intelligence, and recovery outcomes should feed back into the network controls so that each dispute will improve future prevention, detection, and recovery. The goal is not simply to decide who pays after something goes wrong. The goal is to create a payment ecosystem in which participants have the capability and incentive to prevent harm, cooperate in investigations, comply with outcomes, and strengthen the network over time.

6.8.8. Conclusion

The challenge in creating an effective dispute resolution framework is how to create an ecosystem in which participating institutions have both the capability and incentive to prevent fraud, cooperate during investigations and comply with dispute outcomes.

When these conditions do not exist, mandatory reimbursement models or simplistic loss-sharing arrangements are used to provide consumer protection or recourse to participating institutions.

A successful dispute resolution framework should not merely decide who pays after a failure. It should improve behaviour before the failure occurs. The ultimate goal is therefore not dispute resolution itself, but trust in the payment system.

Trust is really only possible when participating institutions operate under common scheme rules, possess effective fraud control tools, face accountability for the risks they take, and are subject to enforceable and impartial dispute governance when disputes arise. When these foundations exist, dispute resolution becomes a powerful mechanism for strengthening the RTP ecosystem, increasing trust and accelerating adoption.

6.9. Dispute Resolution for PayNow Generation 2: A PayPal Perspective

Authored by PayPal

Approach to Dispute Resolution Frameworks: Global Learnings from Cross-Border Transactions, Responsible AI Deployment, and the Emergence of Agentic Commerce

6.9.1. Executive Summary

On 25 June 2026, MAS and ABS published the Phase 1 report of the PayNow Generation 2 (Gen2) study, identifying five global trends shaping the future of payments — including the rise of agentic commerce and a sharpened focus on trust and security. Within the study's "expanded payment capabilities" theme, MAS and ABS named enhanced fraud prevention and dispute resolution, alongside new functionality to facilitate agentic commerce, as priority areas for Phase 2 scoping and the implementation roadmap due by end-2026.

This thought leadership paper offers PayPal's perspective on both. Drawing on PayPal's own dispute resolution infrastructure, its cross-border network model, and its early and evolving thinking on agentic commerce, we consider where PayNow's current scenario-based dispute P2M model creates friction — and how global learnings on governance, AI-assisted resolution, and agentic-transaction evidence could inform Gen2's next phase.

We offer these views in the spirit of contribution: many of the questions raised here, particularly those concerning AI and agentic commerce, remain open and are the subject of active international exploration across industry, regulators, and academia. Industry is applying lessons learned from existing frameworks such as consumer financial protection, privacy, security and operational resilience to design the future of agentic payment experiences.

6.9.2. Key principles for developing robust dispute resolution frameworks

The analysis in this paper points towards key principles that policymakers and industry may wish to consider.

1. A single accountable case owner under scenario-agnostic rules

A scenario-agnostic governance layer, operating within scheme-set rules, reason codes, evidence requirements and timelines, applying the same rules to any dispute type allows a single accountable case owner to see each case through to an outcome. Consumers are likely better served when handoffs are built into that process rather than left to them.

2. Liability as an incentive structure

A well-designed regime could reward demonstrated investment in safeguards and penalise its absence, treating liability less as blame and more as an incentive to build stronger controls.

3. AI with meaningful human oversight

AI-assisted tools may help compress resolution time, provided they support rather than replace human judgement, with people remaining meaningfully in charge of contested outcomes.

4. A familiar standard for agentic payments

As agent-initiated payments emerge, leveraging familiar adjudicative approaches and incorporating relevant elements of the current paradigm may be preferable to creating overlapping or duplicative requirements, while recognising that this area continues to evolve and industry will be continually refining its approach to meet customer expectations.

The paper is organised into four parts:

- Dispute Frameworks — how PayPal's single adjudicated process compares with PayNow's three disconnected resolution tracks
- Global Learnings — what Singapore's Shared Responsibility Framework and PayPal's cross-border network governance suggest for a PayNow rulebook
- Responsible AI Deployment — how AI-assisted triage can compress resolution time without removing human oversight
- The Rise of Agentic Commerce — how dispute assessment might adapt as AI agents initiate payments, and how this is evolving today

It closes with five concrete recommendations mapped to Gen2's four enhancement themes, timed to inform Phase 2 pilot design and the roadmap MAS and ABS will publish by the end of the year.

6.9.3. Dispute Frameworks: One Funnel vs. Three Tracks

PayPal resolves every dispute — regardless of the reason — through a single adjudicated process: Dispute → Claim → Chargeback, with fixed deadlines at each stage. PayNow, by contrast, routes disputes down one of three disconnected tracks depending on the scenario, each with a different responsible party and no single owner of the outcome. This structural difference, not the specific rules at each stage, is the central difference this paper addresses.

	PayPal Checkout Disputes	PayNow Transfers
Structure	One funnel for all dispute types (INR, SNAD, unauthorised)	Three separate tracks selected by scenario
Stage 1	Dispute — informal buyer/seller messaging, ~20 days	Mistaken transfer — sending bank recovery request, recipient consent required
Stage 2	Claim — PayPal adjudicates; seller has ~10 days to respond	Scam/unauthorised/technical failure — bank freeze/trace, police report, ScamShield, internal investigations
Stage 3	Chargeback — buyer's card issuer, 180-day window	Merchant dispute — resolved directly with the seller; limited bank role
Who decides	PayPal, within a published deadline at every stage	Bank, police, or seller — depending on which track applies

Why this matters for Gen2

A consumer can follow every step correctly under the PayNow model and still have no party accountable for a final outcome. PayPal's model shows that a fixed-deadline, single-owner process is achievable at scale across multiple dispute reasons — the design question for Gen2 is whether an equivalent owner can be assigned within a bank-transfer rail rather than a closed-loop wallet.

6.9.4. Global Learnings from Cross-Border Transactions

This section draws on two reference points, Singapore's SRF and PayPal's dispute framework, to inform PayNow Gen2's design, first domestically and then across borders.

Learnings from Singapore's SRF

Singapore's Shared Responsibility Framework (SRF), live since December 2024, is evidence that liability can be assigned by design rather than leaving it to bilateral bank arrangements - banks and telcos now carry defined accountability for losses from phishing-type scams.

It is a strong precedent and a natural foundation to build on in two directions:

1. extending it to cover all dispute types, including mistaken transfers and merchant goods-and-services disputes, two of the three tracks covered by PayNow as described in Section 6.9.3;

2. connecting it with the platform obligations under the Online Criminal Harms Act, so the full scam chain is covered through one coherent process.

A Governance Analogy for PayNow Gen2

The SRF and PayPal's dispute resolution framework aim to solve the same problem: assigning accountability across independent participants. But they differ in scope. The SRF is scenario-specific, built for phishing scams only. PayPal's dispute resolution framework is scenario-agnostic, applying the same governance layer to any dispute type that arises within the PayPal ecosystem.

For PayNow Gen2, PayPal's model offers a governance analogy: a cross-participant rulebook, formalised in the way MAS did for scams, but extended to cover all scenarios so that every dispute type follows the same, predictable process - rather than leaving those to be handled bilaterally between the parties involved (banks, sellers, consumers, or authorities).

What PayPal's Model Can Show the SRF

PayPal's dispute resolution model demonstrates that trust in a resolution system comes less from the specific rules at each stage than from having a single owner seeing a case through to a guaranteed outcome. Whatever the dispute type - item not received, not as described, unauthorised fraud - the buyer enters one funnel: Dispute, then Claim, then Chargeback, each bound by a transparent process and published deadlines. The consumer never has to diagnose which process applies before filing; that triage happens inside the system. It works because PayPal, not the buyer, holds the visibility to diagnose the case - the buyer just describes the symptom.

Singapore's SRF is a significant step, and still in its infancy. Live for just under two years, it already sets defined duties for responsible financial institutions and telcos – including PayPal, as a responsible payment service provider. The SRF's "waterfall" allocates liability sequentially between the bank and the telco based on which duty was breached, with MAS and IMDA setting duties for their respective industries. This design gives Singapore three opportunities to build on, each paired with a learning drawn from PayPal's own dispute resolution funnel:

- Case ownership: each institution assesses compliance against its own rules, so a shared case-management layer would give the victim one intake point and one case, rather than separate tracks.
- Platforms: obligations for social media, messaging apps and e-commerce platforms sit under the Online Criminal Harms Act, not the SRF. Connecting the two regimes would cover the full scam chain, offer better protection to consumers and make it harder for criminals to exploit gaps, since fraud moves to whichever party holds the weakest control.
- Backstop: where neither the bank nor the telco is found in breach, the loss currently rests with the consumer. A backstop that rewards demonstrated investment in prevention would close that gap.

This matters more in scams, because the victim's information gap is not incidental: it is the mechanism of the harm. In a commerce dispute, the consumer knows the basic shape of what went wrong: they paid, and the item never arrived. A scam is different: the question is no longer only who paid, but who was paid - and whether that recipient was legitimate, impersonated, or part of a coordinated criminal enterprise. Victims typically do not know which layer was involved, because the deception was designed to hide it - a spoofed message, a fake ad or a fake storefront, often several in sequence, with the victim groomed or pressured well before any transfer occurs. The lure, the spoofed call and the transfer each sit with a different party, so no single entity sees the whole chain. That is why a shared case layer adds the most value here: it lets the victim describe the symptom once and leaves diagnosis to the system, at the moment shame and panic make navigation hardest. And it is urgent: scammed funds clear or launder within hours, unlike a parcel that is not moving.

Coordinating duties across financial institutions, telcos, and platforms is an essential foundation. The next step is a shared governance structure with built-in handoffs between the different firms in the chain. PayPal's own model is instructive here because it is not single-entity either: the Chargeback stage hands the case to a different accountable party altogether - the card issuer - outside PayPal's authority. What makes this work is that the handoff is engineered into the funnel, triggered automatically on a fixed 180-day window, rather than left for the victim to initiate as a separate claim with another institution.

For the SRF, that means three mechanisms working together: one intake point backed by a shared investigative and case-management layer; common deadlines that hold across the handoffs between bank, telco and, through the Online Criminal Harms Act, platforms; and a backstop for cases where no duty-holder is found in breach. The backstop should be designed to reward demonstrated investment in prevention and to recognise its absence. Liability works best as an incentive structure, not as blame.

Ultimately, the SRF's success should be measured by more than how accurately it allocates a given loss. The real test is whether the framework as a whole shortens the lifespan of the scam: the time between the first lure and the last laundered dollar. With one intake point, built-in handoffs and shared deadlines, the SRF's strong foundation can extend from allocating losses to preventing them.

6.9.5. What Changes When Transactions Cross Borders

These learnings apply first to domestic scams and disputes. They matter more as PayNow Gen2 extends across borders.

The SRF operates within one jurisdiction, under rules set by MAS and IMDA. PayPal's funnel runs across jurisdictions under a common set of rules. Phase 2 of PayNow Gen2 introduces a new complexity: SGQR+ switch (cross-border QR acceptance targeted from 2028) and bilateral linkages will carry transactions across scheme and country boundaries. Dispute resolution, refunds, reconciliation and liability will need to follow rules that no single regulator sets. Three distinctions from domestic payments shape what those rules must cover:

- Liability and legal frameworks: Domestic liability can be set by a single regulator and rulebook. Across borders, multiple jurisdictions apply, so allocation depends on regional, bilateral or multilateral arrangements (for example, ASEAN) or on a network's own rules, which operate within applicable laws. Jurisdictions also interpret and adjudicate disputes differently, and cross-border flows add sanctions screening, AML/KYC, tax and VAT, data residency and reporting obligations. Fraud and dispute rates also tend to be higher, and resolution is harder.
- Financial complexity: Cross-border transactions involve currency conversion, FX spreads and exposure to rate movements between authorisation and settlement. Consideration must therefore be given as to who bears any FX difference on a refund, and how reconciliation works across currencies. Extra fees (network assessment fees, correspondent and intermediary charges) and longer settlement through more parties and time zones add to the cost. Domestic rails typically stay in one currency and settle faster and cheaper.

- Governance layer: Where participants sit under different legal regimes, a common set of rules offers a consistent dispute experience across them. Domestic schemes can rely on regulation and scheme rules. As a shared connectivity layer, PayPal shows how common rules can run across jurisdictions, which is the experience most relevant to SGQR+ and linkages.

As SGQR+ switch and linkages are designed, we would recommend setting a common cross-border dispute rulebook alongside them. It should cover one intake point in the consumer's home market, shared deadlines across schemes, refund and FX treatment, reconciliation, and a backstop where liability cannot be assigned between schemes.

6.9.6. Responsible AI Deployment for More Efficient Dispute Resolution

Current PayPal benchmark

AI-assisted PayPal claims resolve in 10–15 days, against a standard 14–30 day ruling window for cases handled without AI support. This demonstrates that AI can help compress adjudication time meaningfully without removing the human backstop — AI assists triage and evidence review; a human still makes or reviews the final call on contested cases.

Applicability to PayNow

The lowest-friction entry point for PayNow is not the liability question at all — it is the informal buyer-and-seller messaging stage that already exists today for merchant disputes. Agentic or AI-assisted support could be introduced there with limited changes to bank operational processes or liability rules: it might simply help buyers and sellers reach a resolution faster, the same role AI already plays in PayPal's own informal Dispute stage. This makes it a seemingly natural first pilot for Gen2's Phase 2, ahead of any change to the liability framework itself.

Case-tracker example: a cheap trust-building lever

PayPal gives the consumer a visible, running clock at every stage — day count against a published deadline. PayNow's MAS-mandated timelines (2 business days for the sending bank to notify, 5 for the recipient bank to respond) are real, but they are bank-to-bank commitments invisible to the consumer making the claim. An AI-enabled, consumer-facing status view ("day 3 of 7 — awaiting recipient response") would help translate an existing commitment into visible reassurance, at a fraction of the cost of new liability rules.

6.9.7. The Rise of Agentic Commerce: Next-Generation Dispute Approaches

As AI agents begin to initiate purchases and transfers on a person's behalf, disputes cannot turn on "AI intent" alone. The questions that matter remain the same ones that matter today: was the payment authorised, were the agreed conditions met, and is there reliable evidence of the customer's actual instructions?

On consent and authentication

Existing frameworks — including MAS's principles-based approach to payments regulation and the Payment Services Act 2019 — provide a sound starting point and industry will be able to build on this foundation to create trusted agentic experiences that afford the same needed protections that exist in the e-commerce paradigm. Authentication for agentic payments should be understood as attaching to the grant or material modification of a consumer's delegated mandate, not to every subsequent transaction executed within its agreed scope. A bounded, revocable, cryptographically recorded delegation could constitute a valid consent to agent-initiated transactions within those parameters, with risk-based re-authentication as a supplementary control. Operational specifics might be determined between firms and users under outcomes-based MAS guidance rather than prescribed through detailed technical standards — consistent with Singapore's established principles-based supervisory philosophy and the IMDA Model AI Governance Framework for Agentic AI's emphasis on proportionate, risk-calibrated controls throughout the agent lifecycle.

On liability

There is a robust global conversation underway and there are several possible paths forward. Industry is collaborating to explore these paths informed by lessons learned from the development of e-commerce to imbue this new digital experience with trusted characteristics that will promote adoption and secure transactions. One possible focal point in these explorations might turn on where an agent exceeds its authority or is compromised and whether the transaction fell within the consumer's agreed mandate — with consumer protections fully preserved throughout. Regulated payment service providers will be well-placed to supply the identity verification, fraud prevention, dispute resolution, and redress infrastructure that trusted agentic commerce will require. Transactions will likely be auditable so that the acting agent, the authorising consumer, and the applicable parameters can all be established. Autonomous payment execution remains nascent, and industry is actively converging on approaches to these questions; premature prescription risks foreclosing better solutions that emerge through industry-led collaboration — analogous to how digital security and e-commerce standards developed before regulatory frameworks ratified them.

On agent identity

A "Know Your Agent" capability — verifying that an AI agent is acting on behalf of an authenticated user, within defined parameters, and distinguishable from unauthorised actors — is an active cross-industry focal point reflecting the IMDA framework's guidance on agent identification and authorisation. Industry groups are hard at work addressing these questions because these are critical determinants of agentic commerce adoption going forward. For example, the FIDO Alliance[60] is already developing interoperable standards for trusted AI agent interactions, and the Emerging Payments Association Asia (EPAA)[61] has recently announced a working group to help define common standards and infrastructure for agent identity; MAS and IMDA are well-positioned to support this international work rather than establishing a Singapore-specific registry. A jurisdiction-neutral, interoperable approach to agent identity seeks to avoid fragmenting the cross-border ecosystem that global payment service providers depend on, and aligns with Singapore's broader ambition as an open, internationally connected financial centre.

PayPal's current position

Currently, PayPal treats agentic commerce as subject to its ordinary Seller Protection and dispute process. Claims are assessed on transaction outcomes, eligibility, authorisation, and delivery evidence — not on whether a human or an AI agent initiated the transaction. This preserves a single, familiar adjudication standard rather than creating a parallel regime for agent-initiated payments.

Aligning with IMDA's agentic-AI framework

IMDA's emerging agentic-AI framework calls for bounding an agent's authority upfront, maintaining human and institutional accountability, embedding technical controls and audit trails, and giving users clear visibility and revocation rights. These principles complement PayPal's outcome-based dispute assessment directly — they describe how to constrain and evidence an agent's actions, while PayPal's existing process still decides what happens when something goes wrong.

[60] "FIDO Alliance to Develop Standards for Trusted AI Agent Interactions," FIDO Alliance, April 28, 2026

[61] "Asia Pacific's Payments Industry Moves to Write Global Rulebook on AI Agent Liability," Emerging Payments Association Asia, July 20, 2026

An emerging evidence model: the Agent Payments Protocol (AP2)

Though we are in the early days of agentic commerce, we can see the direction of travel as it pertains to the creation of digital records that could serve as a source of truth for the ecosystem participants in the future agentic commerce transaction. Industry collaboration is being informed by current laws and the lessons learned from e-commerce to promote consumer control, transparency, and auditability. The Agent Payments Protocol (AP2) is but one example of numerous protocols that industry has developed to address risks in the future agentic commerce transaction. AP2, an open protocol PayPal has contributed to, defines signed Cart, Intent and Payment Mandates as tamper-resistant records that could, in principle, provide dispute-grade proof of consent, authorisation, and accountability for agent-initiated transactions. This is a forward-looking protocol direction, not a separate or universally deployed dispute regime today — but it points towards the kind of evidence PayNow disputes involving agentic transfers will eventually need.

Controls around the transaction

PayPal links agentic payments to a broader set of controls: tokenisation, secure orchestration, authentication, identity verification, participant vetting and onboarding, and compliance frameworks spanning AML/KYC, privacy, PSD2, and regional payment requirements. None of these controls are unique to agentic commerce — but agentic commerce raises the stakes for having them in place before dispute volumes from agent-initiated payments materialise.

6.9.8. Recommendations Mapped to PayNow Gen2

The following five recommendations translate the analysis above into concrete input for Phase 2 scoping, mapped against the Gen2 study's own themes and enhancement buckets.

#	Recommendation	Gen2 theme / bucket	Suggested phasing
1	Assign a single case-owner per dispute	Scheme-level enablers	Phase 2 scoping — governance design
2	Add a short mandatory hold on disputed transfers	Expanded capabilities — fraud prevention & dispute resolution	Phase 2 pilot
3	Publish a consumer-facing case tracker	Customer experience	Early pilot — low build cost
4	Extend shared accountability beyond phishing scams	Expanded capabilities — fraud prevention & dispute resolution	Roadmap (end-2026) — policy design
5	Give merchant disputes a structured route, not a dead end	Network coverage	Phase 2 scoping — partner with CASE

6.9.9. Closing

The Phase 1 feedback window closed on 15 August 2026, but Phase 2 scoping and pilot design are now the live work — which is precisely where input like this is most useful. Recommendation 3 (case tracker) and the AI-assisted triage pilot in Section 6.9.6 require no change to liability rules and could be piloted alongside the QR interoperability and checkout workstreams already underway. Recommendations 1, 2, and 4 are better suited to the implementation roadmap MAS and ABS will publish by the end of 2026, where governance and liability design are already on the agenda.

PayPal welcomes the opportunity to contribute further detail on any of the sections above — including worked examples from its own claims data, the PayPal World Network Rules, and its AP2 evidence model — as Phase 2 scoping progresses.

6.10. The Future of Payment Connectivity: Cross-Border QR Interoperability and Next-Bound Payment Rails

Authored by BCS, NETS Solutions

6.10.1.SGQR+ and National Switch

Introduction

Singapore has established a robust digital payment infrastructure through FAST, PayNow, SGQR, NETS, digital wallets and various cross-border payment linkages. The introduction of SGQR has simplified merchant acceptance by allowing multiple payment schemes to be represented through a single QR label.

While QR presentation has been standardised, payment acceptance remains fragmented as transaction processing continues to be scheme-specific.

Today, Singapore's QR payment landscape comprises multiple schemes, including PayNow QR, NETS QR, and proprietary QR solutions offered by merchant acquirers. Under the current model, customers are generally able to pay merchants only through payment applications that support the specific QR scheme accepted by the merchant. As a result, merchants often need to maintain multiple acquiring relationships to support different payment schemes, while financial institutions and payment service providers are required to establish and maintain separate integrations with each individual scheme. In addition, cross-border QR payment acceptance remains dependent on bilateral arrangements between domestic QR schemes and overseas payment providers, limiting interoperability and increasing operational complexity across the ecosystem. As QR adoption continues to grow, the next phase of industry development should focus on achieving interoperability across payment networks rather than introducing additional QR schemes.

To achieve this, Banking Computer Services proposes the development of an SGQR+ National Switch, a common interoperability layer that enables any participating payment application to pay any participating merchant through a single QR code, regardless of the underlying payment network.

The objective is straightforward: any app should be able to pay any merchant.

6.10.2.Recommended Solution: SGQR+ National Switch

The proposed SGQR+ National Switch is a neutral interoperability utility that connects participating payment networks such as PayNow, NETS and future domestic QR schemes.

The National Switch does not replace existing payment schemes, nor does it function as a central issuer, central acquirer, or merchant aggregator. Instead, it serves as a common interoperability layer that enables seamless interaction across payment ecosystems through capabilities such as QR routing and switching, merchant resolution across schemes, cross-network transaction messaging, and the implementation of consistent security and operational controls. The National Switch also facilitates interoperability between domestic and cross-border payment ecosystems, allowing participating schemes and providers to connect through a common infrastructure while retaining their existing roles and customer relationships.

Participating schemes continue to retain ownership of their customers, merchants, operating rules and commercial arrangements.

The design is guided by three objectives:

- Preserve existing investments
- Enable interoperability across networks
- Minimise changes to existing operating models

Design Principles

The proposed solution is guided by the following principles.

- Universal Acceptance - Every participating payment application should be able to pay every participating merchant regardless of the underlying payment scheme, wallet provider, or acquiring institution.
- Network-to-Network Operating Model - The SGQR+ National Switch should operate strictly as a scheme-to-scheme interoperability utility. Connections should be established between the National Switch and participating payment networks rather than individual issuers, acquirers, merchants or wallets. Participating networks remain responsible for managing their own ecosystem participants, operating rules, onboarding arrangements and commercial models.
- Preserve Existing Scheme Responsibilities - The National Switch should complement rather than replace existing schemes. Merchant onboarding, KYC and due diligence, pricing, settlement arrangements, customer servicing, fraud management and risk controls should remain with the merchant's chosen acquiring network. This preserves competition and avoids duplicating functions that are already being performed effectively within participating schemes.
- Focus on off-us transactions - The National Switch is intended primarily to facilitate off-us transactions, where the payer and merchant belong to different payment networks. On-us transactions should continue to be processed directly within the respective payment network without passing through the National Switch. This preserves performance, resilience, cost efficiency and existing scheme economics.
- Structured Data First - The solution should leverage standardised and structured data wherever possible to support automated processing, straight-through reconciliation, exception handling and future interoperability requirements.
- Merchant-Funded Commercial Model - The merchant-funded acceptance model should remain unchanged. Merchants continue to compensate their acquiring network through Merchant Discount Rate (MDR) arrangements in return for payment acceptance services. Participating schemes may establish transparent interchange arrangements to compensate issuer networks for providing customer access, authentication and payment origination services.
- Usage-Based Switching Fee - Transactions routed through the SGQR+ National Switch should attract a switching fee to support the operation and enhancement of the interoperability infrastructure. As issuer networks benefit directly from broader merchant acceptance and greater customer utility enabled by interoperability, the switch fee should be payable by the issuer network for off-us transactions.
- Cross-Border Network Enablement - The SGQR+ National Switch should support inbound cross-border QR payments through participating domestic payment networks. Overseas wallets and foreign payment networks should not connect directly to the National Switch. Instead, they participate through a domestic payment network that is already connected to the SGQR+ ecosystem. Under this model, domestic schemes can extend interoperability services to their overseas partners, allowing inbound transactions originating from foreign wallets to reach merchants across different schemes through a common interoperability framework. This approach leverages existing cross-border relationships, simplifies onboarding and governance, and avoids the need for individual overseas participants to establish direct connectivity with the National Switch.

Universal SGQR+ Label

The SGQR+ model builds on the existing SGQR framework.

Rather than creating a new QR standard, the SGQR+ label serves as a common container capable of supporting multiple participating payment schemes. The QR contains the identifiers and payment payloads required by participating networks, allowing existing merchant registration and onboarding processes to remain unchanged.

Merchant information continues to reside within the respective payment schemes. There is therefore no requirement to establish a central merchant registry.

This approach maximises reuse of existing industry investments while delivering a consistent consumer experience.

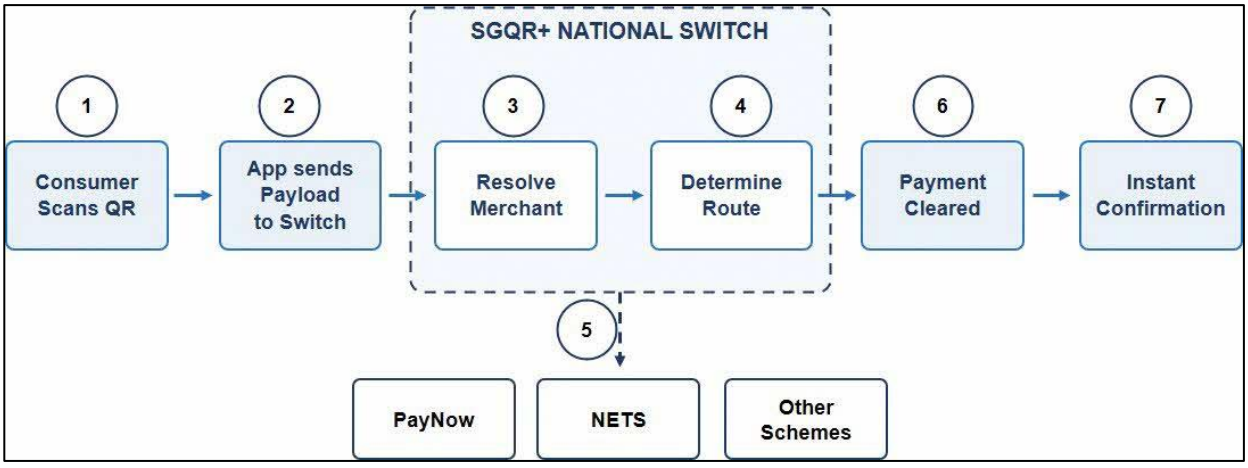
Scheme-Owned Merchant Registries

Merchant onboarding and merchant records remain the responsibility of the respective payment schemes. Each participating scheme continues to manage its own merchant relationships, including merchant onboarding, the issuance and maintenance of merchant identifiers, settlement account information, merchant lifecycle management, and the acceptance capabilities available to its merchants. This ensures that schemes retain control over their merchants and existing operating models, while leveraging the National Switch solely for interoperability and transaction routing across payment ecosystems.

The SGQR+ National Switch maintains only the routing information required to identify the appropriate payment network and facilitate transaction routing. This approach preserves existing governance arrangements while avoiding the need for a central merchant database.

QR Resolution and Routing Hub

The SGQR+ National Switch functions as the central routing hub:



- Step 1 – Consumer scans the merchant's SGQR+ QR.
- Step 2 – For off-us transactions, the payment application submits the QR payload to the SGQR+ National Switch.
- Step 3 & 4 – The National Switch identifies the relevant merchant scheme and routes the request accordingly.
- Step 5 – The merchant scheme performs merchant resolution and returns the payment destination details.
- Step 6 – The payment instruction is generated and routed for execution.
- Step 7 – Real-time payment confirmation is returned to both customer and merchant.

6.10.3.FAST as the payment Rail

A key design principle of the National Switch is to leverage Singapore's existing FAST infrastructure rather than introduce a new payment rail. FAST already provides a robust, proven, and widely adopted real-time payment infrastructure with 24×7×365 availability, real-time fund transfers, immediate payment confirmation, and high levels of resilience and reliability. As a payment network that is already connected across the banking sector, FAST provides the foundational settlement and funds movement capability required to support interoperable QR payments. By building on existing infrastructure, the National Switch can enable greater interoperability and reach while minimising implementation complexity, reducing duplication of infrastructure, and accelerating ecosystem adoption.

Under the proposed model, SGQR+ serves as the interoperability and routing layer, enabling transactions to be seamlessly routed across participating payment schemes. Participating schemes continue to own and maintain their respective merchant records, including merchant onboarding, merchant identifiers, settlement account information, and merchant lifecycle management. FAST is leveraged for payment execution and payment messaging, providing the underlying real-time funds transfer capability required for interoperable QR payments. Importantly, existing FAST clearing and settlement arrangements remain unchanged, allowing the ecosystem to benefit from enhanced interoperability while building on established infrastructure, operating models, and settlement processes.

This minimises implementation complexity and allows the industry to leverage existing infrastructure investments.

6.10.4.Cross-border QR Enablement

The same framework can be extended to support inbound cross-border QR payments.

Rather than connecting directly to the National Switch, overseas wallets and foreign payment networks participate through domestic payment schemes that are already connected to the SGQR+ ecosystem. For example, an overseas wallet connected to a participating domestic scheme can leverage that scheme's connectivity to access merchants reachable through the SGQR+ ecosystem. The domestic scheme remains responsible for managing its overseas partnerships, operating rules, commercial arrangements and settlement obligations.

The SGQR+ National Switch provides interoperability between participating domestic schemes, allowing inbound payment transactions originating from overseas wallets to reach merchants across different payment networks without requiring separate bilateral integrations.

FAST continues to support the domestic SGD payment leg, while foreign exchange conversion, cross-border clearing and settlement remain the responsibility of participating schemes and financial institutions.

This approach enables wider international acceptance while preserving existing cross-border relationships and minimising integration complexity.

6.10.5.Strategic Benefits

For Consumers

- Pay any participating merchant using their preferred payment app
- Consistent payment experience across schemes
- Real-time payment confirmation
- Seamless domestic and overseas payments

For Merchants

- Single QR acceptance point
- Access to a broader customer base
- Reduced onboarding complexity
- Simplified reconciliation

For Financial Institutions

- Reduced integration complexity
- Faster onboarding of new payment schemes
- Larger merchant acceptance footprint
- Preservation of existing investments and commercial models

6.10.6.Conclusion and Next Step

Singapore has successfully standardised QR presentation through SGQR. The next logical step is to enable transaction interoperability across participating schemes.

The proposed SGQR+ National Switch provides a practical and evolutionary approach by introducing a neutral scheme-to-scheme interoperability utility while preserving existing network investments, merchant ownership models and operating arrangements.

By leveraging SGQR for presentation and FAST for payment execution, the industry can deliver universal QR acceptance without introducing a new payment scheme, central merchant registry or standalone payment rail.

The result is a simpler and more interoperable payment ecosystem where any participating application can pay any participating merchant, creating greater value for consumers, merchants, financial institutions and payment networks while strengthening Singapore's position as a leading digital payments hub.

As a next step, an industry workgroup should be formed to evaluate the feasibility, implementation approach, governance structure and industry readiness. Areas of assessment may include:

- Business value proposition and industry-wide benefits.
- Operating model options, including governance of the SGQR+ QR label, routing logic, and clearing & settlement approach.
- Migration strategy and priority, including a defined path for merchants and issuers currently outside the SGQR+ routing layer.

6.10.7.Large Value Transactions

Introduction

Singapore's Fast and Secure Transfers (FAST) service provides 24×7 real-time fund transfers between participating financial institutions and currently supports payments of up to S$200,000 per transaction. While this limit is sufficient for most retail and corporate payments, certain transactions involving government agencies may exceed this threshold, including regulatory deposits, tax obligations, pension contributions, property-related payments, and other government collections.

Today, customers requiring payments above S$200,000 must either split the payment into multiple FAST transactions or use alternative channels such as IBG or MEPS+. These approaches create operational inefficiencies, increase reconciliation complexity, and may not deliver the real-time, always-on experience provided by FAST.

Banking Computer Services proposes a targeted enhancement to the existing PayNow and FAST ecosystem to support single-payment transactions of up to S$500,000 for approved government agencies. The proposal does not increase the standard FAST limit. The existing S$200,000 cap remains unchanged for all other PayNow and FAST transactions.

The solution is guided by four principles:

1. Controlled Expansion: Higher limits are only available to approved Government agencies.
2. Centralised Source of Truth: A single governed registry manages eligibility, rules, and lifecycle status.
3. Infrastructure Reuse: Existing FAST and PayNow infrastructure is leveraged instead of creating a new payment rail.
4. Strong Auditability: All approvals, validations, transactions, changes, and exceptions are traceable and auditable.

Proposed Enhancement: PayGuard

The proposal introduces PayGuard, a centralised registry and policy-enforcement service operated by the clearing operator.

PayGuard serves as a trusted industry layer that validates whether a beneficiary is eligible to receive a PayNow payment exceeding S$200,000. Rather than functioning as a simple whitelist, PayGuard acts as a reusable governance and validation platform capable of supporting future payment ecosystem initiatives.

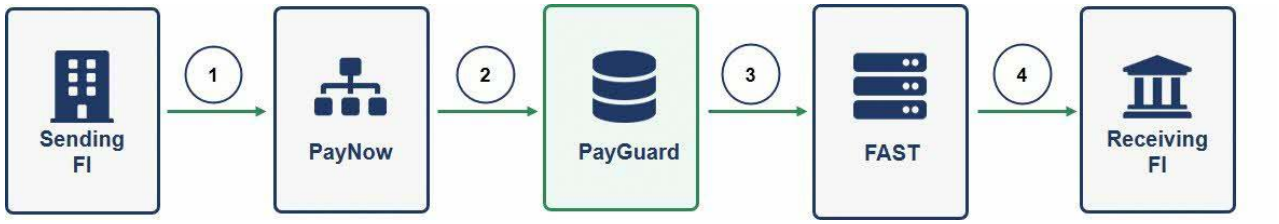
The PayGuard registry maintains:

- Government agency legal and display names
- Approved PayNow proxies (e.g. UEN) and bank accounts
- Maximum transaction limits
- Purpose of payments eligible for receiving high-value payments
- Status (Active, Suspended, Expired)
- Effective and expiry dates
- Review and audit information

All changes must be supported by defined ownership, independent verification, dual approval, and immutable audit records. The clearing operator may suspend or revoke records in response to fraud, compromise, operational incidents, or governance breaches.

Importantly, PayGuard complements rather than replaces existing bank controls. Financial Institutions (FIs) remain responsible for customer authentication, scam and fraud detection, AML/CFT controls, sanctions screening, and customer-specific limits.

Payment Flow



Step 1: PayNow Lookup

Payer initiates a PayNow payment and enters the Government agency's PayNow identifier. The sending Financial Institution performs a standard PayNow lookup. During this process, PayNow queries PayGuard to determine whether the beneficiary is eligible to receive a payment exceeding S$200,000.

Step 2: Eligibility Validation

PayGuard will determine whether the beneficiary is a whitelisted entity that is eligible to receive high-value FAST payments. For transactions that meet the eligibility criteria, PayGuard may also return additional validation information, including a validation identifier, the decision timestamp, the specific purpose of payment or other qualifying conditions under which the high-value payment is permitted, and the applicable validity period. The approval provided by PayGuard is transaction-specific and serves only as validation for the particular payment being assessed; it does not constitute a standing entitlement or permanent approval for the beneficiary to receive future high-value FAST payments.

Step 3: Bank Authorisation

Before authorising a transaction, the sending Financial Institution must present key information to the payer, including the official name of the Government agency receiving the funds, and prominently alert the payer that he or she is initiating a high-value payment. The sending Financial Institution must also verify that the payment purpose specified by the payer corresponds to an eligible purpose for high-value payments, based on the validation information returned by PayGuard. In addition, the sending Financial Institution remains responsible for performing all existing payment authorisation and risk management controls, including customer authentication, scam and fraud checks, AML/CFT screening, sanctions screening, and validation of customer-specific transaction limits. These controls continue to apply irrespective of the PayGuard validation outcome and form part of the institution's overall obligation to ensure the transaction is properly authorised and compliant with applicable regulatory requirements.

Step 4: FAST Processing

The payment instruction is submitted through FAST together with the corresponding PayGuard validation information. Before the transaction is processed, the clearing operator performs a second independent verification with PayGuard to confirm that the beneficiary remains active and eligible to receive the payment, the transaction amount remains within the approved limits, the validation token is valid and has not expired, and all applicable policy conditions continue to be satisfied. This independent validation provides an additional control layer to ensure that the eligibility assessment remains valid at the point of processing. Only when all verification checks are successfully completed will the payment proceed through the existing FAST clearing and settlement process.

The transaction is processed only if all validations succeed. If a record has been suspended, policy conditions have changed, validation has expired, or eligibility cannot be confirmed, the transaction is rejected with an appropriate reason code. This second validation acts as an independent control to mitigate timing gaps between PayNow lookup and payment submission.

Scope, Controls, and Governance

The initial implementation should focus on a limited set of Government collection use cases where immediate payment confirmation and accurate reconciliation are critical. To ensure a controlled and manageable rollout, the scope should be restricted to registered Government beneficiaries with clear operational requirements for high-value collections. Consequently, private-sector beneficiaries, unregistered Government accounts, and cross-border payments should remain out of scope for the initial phase.

Under the proposed model, standard FAST transactions will continue to be subject to the existing transaction limit of S$200,000, while high-value FAST transactions may support payments of up to S$500,000. In addition to this overarching limit, further controls may be applied based on factors such as the Government agency receiving the payment, the customer's profile, the account being used, the payment channel, the device through which the transaction is initiated, and the overall risk category assigned to the transaction. Notwithstanding PayGuard validation and eligibility confirmation, participating Financial Institutions retain full discretion to reject, hold, delay, or escalate transactions in accordance with their internal risk management, fraud prevention, compliance, and operational policies. This ensures that existing risk controls remain effective while enabling eligible high-value Government payments to be processed through the FAST infrastructure.

Roles and Responsibilities

Sending Financial Institutions remain responsible for all customer-facing and transaction initiation controls, including customer authentication, fraud and scam monitoring, AML/CFT and sanctions screening, and the provision of customer support relating to payment transactions. These institutions are responsible for ensuring that payments are appropriately authorised, compliant with regulatory requirements, and subject to their internal risk management frameworks.

Government Agencies are responsible for obtaining the necessary approvals and enrolling to receive high-value FAST payments through the PayGuard framework. They also remain accountable for managing their collection accounts, performing timely reconciliation of incoming payments, handling refunds where required, and reporting incidents in accordance with established operational and governance requirements.

The Clearing Operator is responsible for operating PayGuard, managing the governance of the beneficiary registry, performing validation checks, enforcing industry rules, maintaining audit records, and coordinating the response to industry-wide incidents. In carrying out these functions, the Clearing Operator provides the central validation and governance framework required to support high-value FAST payments.

Liability should be allocated based on the principles of control, causation, and fault, such that each participant remains accountable for the functions and decisions within its area of responsibility. Accordingly, a PayGuard approval serves only as a validation that the payment meets the relevant eligibility criteria at the point of assessment and does not transfer responsibility or liability away from participating institutions for the controls they are required to perform.

Strategic Benefits

To Customers, the proposed solution enables a more seamless payment experience by allowing a single payment to be made for obligations exceeding the current FAST transaction limit of S$200,000. Customers benefit from real-time payment confirmation, a simplified payment journey, and 24×7 availability, providing greater convenience and certainty when making time-sensitive or high-value payments to government agencies.

To government agencies, the solution facilitates faster collections through immediate receipt and confirmation of funds, improving cash flow visibility and operational efficiency. The use of structured validation and payment information supports simplified reconciliation processes, reduces manual operational workload, and enhances the overall delivery of digital government services by providing a more efficient and user-friendly payment experience.

To the Payment Industry, the proposed model leverages existing FAST and PayNow infrastructure, minimising implementation complexity and ecosystem disruption while preserving established clearing and settlement arrangements. The framework provides strong governance, auditability, and policy enforcement through PayGuard, without requiring transaction limit increases across the broader market. In addition, the trusted beneficiary registry and validation capabilities established under PayGuard can serve as a foundation for future trusted registry services and other high-assurance payment use cases across the digital payments ecosystem.

Future Evolution of PayGuard

PayGuard is designed as a reusable whitelisting and trust platform that can support a broader range of industry use cases beyond high-value Government payments. By establishing a trusted registry and validation framework, PayGuard can provide a common foundation for verifying the eligibility, status, and trustworthiness of participants across different payment and digital ecosystem services.

Potential future applications may include an AI Agent Registry to support the identification and validation of trusted autonomous agents, a DLT Node Registry to facilitate the governance and verification of approved distributed ledger technology participants, and a Direct Debit Mandate Registry to enhance the management and validation of customer authorisations for recurring payment arrangements. These use cases leverage the same core capabilities of registry management, participant verification, policy enforcement, and auditability that underpin the PayGuard framework.

Notwithstanding its potential extensibility, any future expansion of PayGuard should be subject to separate governance approval, legal and regulatory review, security assessment, and industry consultation. This ensures that new use cases are appropriately evaluated for policy, operational, risk, and ecosystem implications before implementation and adoption.

Conclusion and Next Step

The proposed enhancement provides a controlled and proportionate mechanism to support high-value Government collections through existing PayNow and FAST infrastructure. By introducing PayGuard as a centralised registry and policy-validation service, the industry can enable payments of up to S$500,000 for approved government agencies while preserving the current S$200,000 limit for all other transactions. This approach improves customer experience, simplifies Government collections, strengthens governance, and establishes a reusable trust framework that can support future payment ecosystem innovations.

A cross-industry workgroup is proposed to perform sandbox testing and verify:

- the end-to-end payment processing and customer experience.
- Registry administration.
- Validation logic – should FAST perform a secondary verification to ensure the beneficiary is a whitelisted entity eligible to receive higher value payments.
- Performance – whether the additional checking may introduce latency to PayNow and FAST processing and whether a locally cached whitelist in FAST and PayNow should be considered.

Successful completion of the sandbox will provide evidence for production deployment.

6.10.8.PayNow P2M Dispute Management

Introduction

Singapore's real-time payment infrastructure has created a strong foundation for simple, immediate account-to-account transfers. Today, PayNow supports multiple payment use cases, including P2P, P2M, B2B and B2C transactions.

While PayNow already supports merchant payments through UEN and SGQR, it was originally designed as an account-to-account transfer service rather than a comprehensive merchant payment ecosystem. As merchant adoption continues to expand across retail and e-commerce, additional merchant-focused capabilities are increasingly required, including enhanced merchant identification, merchant acquiring participation, richer transaction data, refund services, dispute handling and consumer protection mechanisms.

Rather than introducing a new payment network, Banking Computer Services proposes enhancing the existing PayNow framework to support a more mature P2M operating model while preserving the speed, simplicity and low-cost characteristics of FAST and PayNow.

A key component of the proposal includes the development of a Centralised Dispute Management Portal that enables issuers and acquirers to manage disputes, refunds and investigations through a common industry platform.

Why PayNow Should Evolve to P2M

P2P transfers and merchant payments have different requirements and should therefore be supported through distinct operating models. P2P payments are generally transfers between individuals and are considered complete once funds have been successfully transferred to the recipient. Merchant payments, however, involve an underlying commercial transaction where customers typically expect additional capabilities such as verification of the merchant's identity, the inclusion of order or invoice references, refund mechanisms, a formal dispute resolution process, and appropriate consumer protection measures. As PayNow becomes increasingly used for commerce and merchant payments, these capabilities become necessary to support consumer confidence, facilitate dispute management, and encourage broader merchant adoption.

At the same time, the existing PayNow P2P experience should remain unchanged. Additional merchant capabilities should apply only where payments are made to merchants and should not introduce additional complexity for person-to-person transfers. Under the proposed model, PayNow differentiates between P2P and P2M payments based on how the receiving party is registered within the PayNow ecosystem.

Where the receiving party is registered as an individual or other non-merchant participant, the transaction will be treated as a P2P payment, and existing PayNow rules, operating processes, and customer journeys will continue to apply without change. Where the receiving party is registered as a merchant, the transaction will be treated as a P2M payment, and merchant-specific operating rules will apply. This includes the provision of additional merchant information to customers, support for refund and dispute management processes, and the ability to support merchant acquiring arrangements and other commerce-related payment capabilities.

For the purposes of this framework, a merchant refers to a business entity that has been onboarded by a participating acquirer and registered within the PayNow ecosystem as a merchant participant. This approach leverages the existing PayNow registration framework to distinguish between P2P and P2M transactions, enabling enhanced merchant payment capabilities while preserving the simplicity and familiarity of the existing customer payment experience.

Proposed PayNow P2M Framework

Merchant Registration and Acquiring Model

The existing PayNow registration records should be enhanced to support merchant payment use cases through the inclusion of additional merchant-specific attributes. These attributes may include the merchant identifier, Merchant Category Code (MCC), merchant type, acquirer identifier, merchant status, and settlement account information. The inclusion of such information enables PayNow to support a more comprehensive merchant payment framework while maintaining compatibility with the existing registration infrastructure.

In particular, the introduction of Merchant Category Codes (MCCs) provides a number of important benefits across the payment ecosystem. MCCs enable category-based transaction controls, allowing financial institutions to apply differentiated risk policies based on merchant activity. They also support enhanced fraud and scam monitoring by providing greater context regarding the merchant and transaction type. In addition,

MCCs facilitate improved merchant analytics, support regulatory and supervisory reporting requirements, and provide flexibility for future pricing, incentive, or service models that may vary by merchant category.

To complement these enhancements, a formal merchant acquiring model should be introduced within the PayNow ecosystem. Under this model, participating acquirers would be responsible for merchant onboarding, conducting KYC and due diligence checks, merchant servicing, refund management, dispute handling, and merchant reporting. This establishes a clear servicing and accountability framework, consistent with established card and merchant acquiring models, while allowing merchants to maintain a single relationship for payment acceptance and operational support.

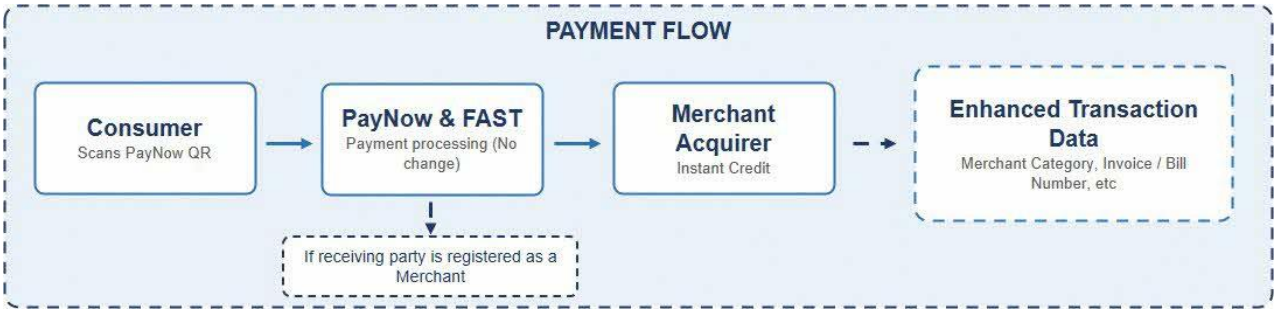
Funds would continue to be transferred and settled through the existing FAST infrastructure. However, payments would be credited into accounts maintained by the merchant's acquiring institution or a nominated settlement bank, as determined by the merchant's acquiring arrangement. This approach preserves the efficiency and real-time settlement benefits of FAST while introducing clearer responsibilities for merchant management, risk oversight, dispute resolution, and operational support. The result is a scalable merchant payment framework that strengthens accountability, enhances consumer protection, and supports the continued growth of PayNow as a trusted payment method for commerce without impacting the existing P2P payment experience.

Enhanced Transaction Data

PayNow P2M transactions should support richer transaction information than standard account transfers. Recommended data elements include:

- Merchant ID
- Acquirer ID
- Merchant Category Code
- Invoice/Bill Number
- Customer Reference

FAST as the Settlement Rail



A key design principle is to continue leveraging FAST as the common payment rail. FAST already provides:

- 24×7×365 availability
- Real-time fund transfer
- Immediate payment confirmation
- High resilience
- Industry-wide connectivity

PayNow provides the payment experience while FAST remains the common clearing and settlement infrastructure. Importantly, all FAST payments remain final and irrevocable upon successful settlement.

The proposed dispute framework does not reverse or unwind completed FAST transactions. Instead, any remediation is performed through a separate refund transaction linked to the original payment. This preserves settlement finality while still providing consumers and merchants with a structured dispute resolution framework.

Centralised Dispute Management Framework

As PayNow P2M adoption grows, disputes and transaction exceptions will inevitably arise from commercial transactions. Common scenarios include goods not received, services not rendered, duplicate payments, incorrect payment amounts, and processing errors. To support the efficient and consistent handling of such cases, a Centralised Dispute Management Portal should be introduced as shared industry infrastructure.

The platform would provide a common mechanism for issuers and acquirers to create, track, and manage disputes throughout their lifecycle, including case creation, evidence exchange, workflow management, escalation handling, refund processing, audit trail maintenance, and management reporting. By enabling participants to manage disputes through a single industry platform rather than bilateral processes, the framework promotes operational efficiency, transparency, consistency, and improved customer outcomes across the PayNow merchant payment ecosystem.

Dispute Management Principles

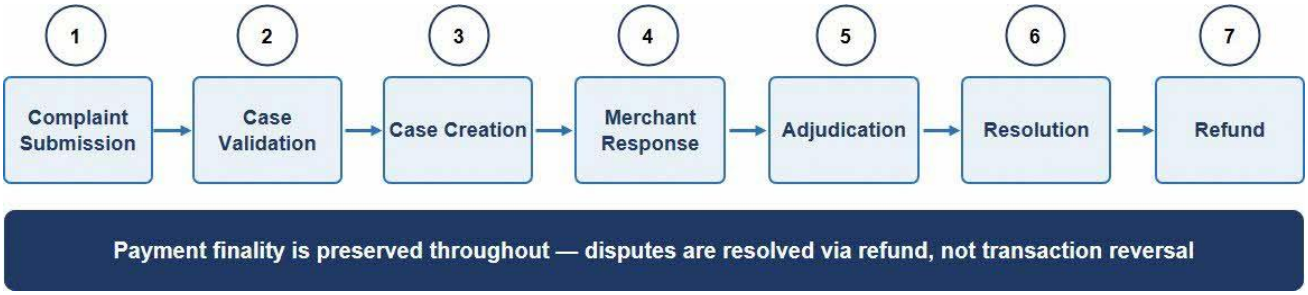
The dispute framework should be guided by the following principles:

- FAST settlement remains final and irrevocable
- Disputes do not reverse settled transactions
- Customer remediation is performed through linked refunds
- Liability should sit with the participant best able to manage the risk
- Disputes should be resolved within defined timelines
- Evidence requirements should be standardised across all participants

Dispute Categories

- Consumer Disputes – Goods not received, Services not rendered, Incorrect amount charged
- Merchant Disputes – Service already delivered, Refund already provided, Duplicate claims
- Operational Disputes – Duplicate transactions, Technical failures, Processing errors

Standard Dispute Workflow



- Stage 1: Complaint Submission - Consumer submits a dispute through the issuing bank.
- Stage 2: Case Validation - Issuer validates transaction eligibility and supporting information.
- Stage 3: Case Creation - A dispute case is created in the Centralised Dispute Management Portal.
- Stage 4: Merchant Response - The acquirer and merchant provide supporting evidence.

- Stage 5: Adjudication - Evidence is assessed against predefined scheme rules and liability principles.
- Stage 6: Resolution - Resolution may include "Case close", "Full refund", "Partial Refund".
- Stage 7: Refund - Where a refund is required, the Centralised Dispute Management Portal can generate and track the associated refund transaction.

Liability and Refund Framework

A common liability framework should be established across PayNow P2M participants. The scheme should support "Full refunds", "Partial refunds", etc.

Rather than reversing settled FAST payments, remediation should be carried out through a linked refund referencing the original Unique Transaction Reference number of the payment instruction.

Where liability has been established, the Central Dispute Management Portal should be able to initiate and monitor refund transactions electronically.

Strategic Benefits

The proposed framework strengthens PayNow's merchant payment capabilities while preserving the simplicity, speed, and ubiquity that have contributed to its success. By introducing structured merchant onboarding, enhanced transaction data, merchant acquiring arrangements, and a formal dispute management framework, the ecosystem can better support commercial payment use cases without impacting the existing PayNow P2P experience.

For Consumers, the framework provides greater confidence when making merchant payments through verified merchant information, a formal dispute resolution process, and faster, more transparent refund handling. These enhancements improve trust and provide consumers with stronger safeguards when using PayNow for everyday commerce.

For Merchants, the framework offers a cost-effective digital payment acceptance model, supported by improved merchant servicing, clearer accountability through acquiring institutions, and standardised processes for managing refunds and disputes. This reduces operational complexity while enhancing the overall merchant experience.

For Financial Institutions, the introduction of a formal merchant acquiring model creates new business opportunities while reducing reliance on manual exception handling and fragmented dispute processes. A common industry framework also promotes greater consistency in merchant servicing and dispute management across participants.

For the Industry, the proposed model strengthens Singapore's national payment infrastructure by enabling PayNow to better support retail and e-commerce transactions. It encourages broader merchant adoption, enhances consumer trust in account-based payments, and provides a scalable and sustainable alternative to traditional card-based payment models while continuing to leverage the existing FAST infrastructure.

Conclusion and Next Step

PayNow has successfully transformed account-to-account payments in Singapore. The next stage of evolution is to enhance PayNow to better support merchant payments while preserving its existing customer experience and settlement model.

By leveraging merchant registration within PayNow to distinguish P2M from P2P transactions, introducing richer merchant information, establishing merchant acquiring participation, enhancing transaction data, and implementing a Centralised Dispute Management Portal, PayNow can evolve into a trusted and scalable merchant payment platform.

Importantly, this approach preserves the core principle of FAST settlement finality while providing consumers and merchants with a structured framework for dispute resolution and refunds. The result is a practical and

low-cost enhancement of PayNow that supports continued growth in retail, e-commerce and digital payments across Singapore.

As a next step, a cross-industry workgroup should be formed to assess:

- Merchant attribute enhancements
- Merchant registration requirements
- Merchant acquiring model
- Transaction data standards
- Dispute categories and scheme rules
- Liability and refund framework
- Central Dispute Management Portal operating model
- Industry implementation roadmap

6.10.9.Data Field Enhancement

Introduction

Singapore's FAST and PayNow services are built on the ISO 20022 messaging standard, providing a robust, scalable, and extensible foundation for real-time payments. The proposed enhancements, including the SGQR+ National Switch, PayGuard for high-value Government payments, and the PayNow P2M Dispute Management Portal, do not require the introduction of a new messaging standard. Instead, the new business requirements can be largely accommodated through targeted enhancements to existing ISO 20022 message structures. These enhancements may include the introduction of additional business data elements, richer structured remittance information, the use of Supplementary Data extensions, new industry-specific code sets, and enhanced usage guidelines to support emerging payment use cases.

By leveraging the existing ISO 20022 framework, the industry can preserve interoperability with current FAST and PayNow participants while minimising implementation complexity and avoiding the need for significant infrastructure changes. This approach enables the payment ecosystem to support new capabilities and business models in a consistent and scalable manner, while maintaining alignment with established industry standards and providing a strong foundation for future payment innovation.

Existing FAST and PayNow ISO 20022 Foundation

FAST and PayNow already leverage ISO 20022, which was designed to support evolving payment use cases through a flexible and extensible data model. As a result, many future requirements can be addressed without introducing new payment message standards or fundamentally redesigning existing payment flows.

The proposed data enhancements should be guided by the following principles:

- Backward Compatibility - Existing participants should continue processing current message formats without system redesign.
- Reuse Before Extension - Existing ISO 20022 elements should be leveraged wherever possible.
- Structured Data First - Wherever possible, new business information should be captured using structured ISO 20022 data elements rather than free-text fields. A structured-data-first approach enables automated reconciliation, straight-through processing, improved analytics, reduced operational exceptions and greater interoperability across participants.
- Extensibility - The framework should support future requirements such as "AI Agents", "Digital Identity", etc.

- Minimal Core Changes - New capabilities should be introduced through extensions instead of modifying core payment processing fields.

Key Data Enhancement Requirements

- Merchant and Acquirer Information
- SGQR+ Routing and Interoperability
- PayGuard and High-Value Payments
- Structured Commerce and Remittance Data
- P2M Dispute and Refund Management

Conclusion

The proposed enhancements across SGQR+, PayGuard, and PayNow P2M Dispute Management do not require a redesign of Singapore's payment messaging infrastructure. Because FAST and PayNow already adopt ISO 20022, most future requirements can be supported through a structured extension strategy built around existing ISO 20022 capabilities, structured remittance data, industry code sets and Supplementary Data extensions.

A key design objective of the proposed ISO 20022 Extension Framework is to maximise the use of structured and machine-readable data wherever possible. Standardised payment information enables automated reconciliation, straight-through processing, enhanced fraud monitoring, improved reporting and analytics, more efficient dispute handling and lower operational costs across the ecosystem.

This approach delivers several key benefits:

1. Preserves backward compatibility across the existing FAST and PayNow ecosystem.
2. Minimises implementation cost, operational complexity and ecosystem disruption.
3. Accelerates delivery of new payment capabilities by leveraging existing payment infrastructure.
4. Enables automated reconciliation and straight-through processing across corporates, merchants, government agencies and financial institutions.

By establishing a common ISO 20022 Extension Framework, Singapore can continue to evolve its real-time payment ecosystem while maintaining interoperability, scalability and operational resilience. The framework can support future requirements spanning merchant payments, QR interoperability, Government collections, dispute management, AI-enabled commerce, and next-generation digital payment ecosystems without requiring repeated message redesign or industry-wide migration programmes.

6.10.10. Tokenised PayNow

Overview

PayNow has become the most preferred method for person-to-person transfers in Singapore and is increasingly used for merchant payments through SGQR. Despite its widespread adoption, PayNow remains fundamentally a customer-initiated, push-payment service. Every transaction requires the customer to access a banking application, scan a QR code or enter a proxy identifier, and explicitly authorise the payment.

As a result, two important payment use cases continue to rely on alternative payment instruments:

- Recurring payments such as utility bills, insurance premiums, subscriptions, telco charges, and instalment payments are largely supported through GIRO or eGIRO direct debit arrangements, which operate on batch-based processing, or through card-on-file solutions that incur card scheme fees.

- In-store contactless payments continue to be dominated by contactless cards and mobile wallets. While PayNow QR offers a convenient alternative, scanning a QR code is generally slower than tapping and is less suitable for high-throughput environments such as unattended terminals, vending machines, and transit gates.

To address these gaps, Banking Computer Services proposes Tokenised PayNow, an enhancement to the PayNow ecosystem that introduces two token-based payment capabilities:

- Recurring Pull Payments - enabling merchants and billers to initiate customer-authorised payments under a mandate framework, similar to eGIRO, but through the payer's registered proxy with real-time processing and confirmation.
- PayNow NFC - enabling customers to make payments through a tap-and-pay experience comparable to a debit card, while leveraging their existing PayNow-linked bank account.

The proposed solution is guided by four key design principles:

- Token, Not Account - Merchants, acquirers, and payment terminals interact only with tokenised identifiers. Underlying account numbers and PayNow proxies remain securely within the customer's bank environment.
- Customer Consent Through the Banking App - Every recurring payment mandate and NFC device token must be explicitly authorised by the customer through their own banking application, ensuring strong customer control and trust.
- Real-Time Control and Transparency - Customers can view, suspend, resume, or revoke mandates and device tokens at any time through their banking app, providing greater visibility and control than traditional direct debit arrangements.
- End-to-End Auditability - All token issuance, validation requests, payment instructions, mandate updates, and token status changes are recorded and traceable, providing a comprehensive audit trail for participants, regulators, and customers.

This approach allows PayNow to evolve from a pure push-payment service into a comprehensive account-to-account payment platform capable of supporting recurring payments, contactless acceptance, and future token-based payment innovations, while preserving customer control, bank ownership of accounts, and Singapore's existing real-time payment infrastructure.

Proposed Enhancement: PayNow Token Service

The proposal introduces a PayNow Token Service, operated by the clearing operator, to issue, manage, validate and route payment tokens on behalf of participating banks. The service acts as a token orchestration layer, enabling secure payment initiation without exposing customer account details to merchants or payment acceptance channels.

Two token types are supported:

- Mandate Token - represents a customer's standing authorisation for a specific merchant or biller, including agreed parameters such as maximum transaction amount, payment frequency, and validity period. The token can be used to support recurring pull payments while ensuring that merchant access remains within the customer-approved mandate conditions.
- Device Token - represents a customer's bank account on a registered mobile device and is used to facilitate PayNow NFC transactions. The token enables a tap-to-pay experience without revealing underlying account information to merchants, acquirers, or payment terminals.

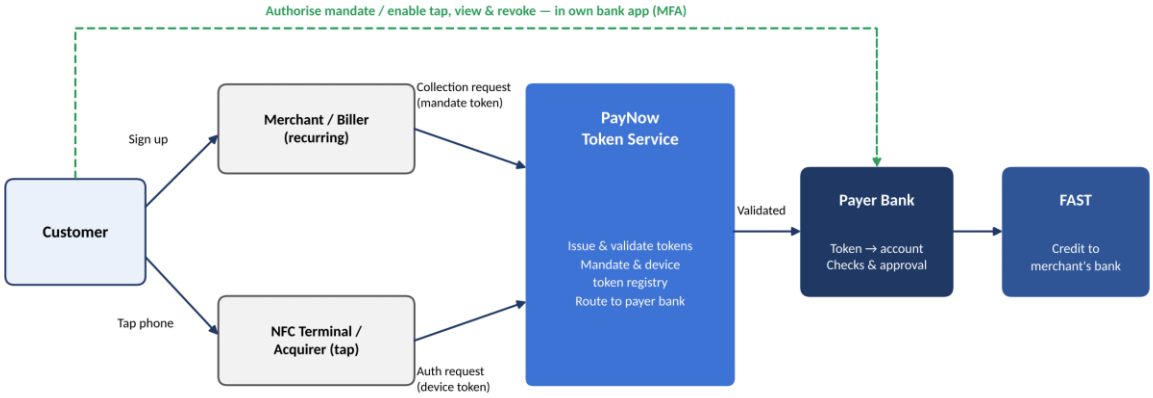
The token itself contains no account or proxy information and serves solely as a reference identifier. Mapping between a token and the customer's underlying account remains exclusively within the payer bank. Participating banks continue to retain responsibility for customer authentication, fraud and scam detection,

AML/CFT screening, sanctions checking, transaction risk assessment, and enforcement of customer and regulatory limits.

This model preserves the existing allocation of responsibilities within the ecosystem, allowing banks to maintain control over customer relationships, risk management and regulatory compliance, while providing a common tokenisation framework that supports recurring payments, contactless payments and future token-based payment use cases.

Token type	Use case	Bound to	Lifetime Parameter
Mandate Token	Recurring pull payment	Merchant + payer bank + mandate terms	Until expiry or revocation
Device Token	PayNow NFC	Device + payer bank	Until device change or revocation

Figure 7.1 – Tokenised PayNow: high-level view



Use Case 1: Recurring Pull Payment

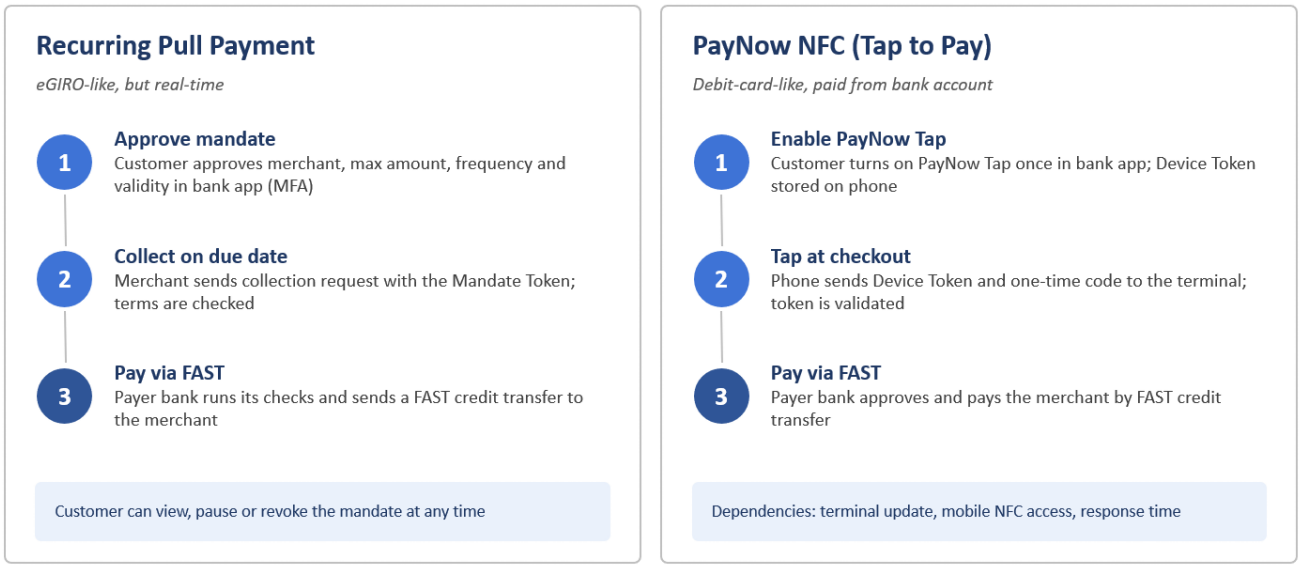
When a customer signs up for a recurring service such as utilities, insurance, subscriptions, or instalment payments, they approve the mandate terms, including the merchant, maximum amount, collection frequency, and validity period, through their banking app using multi-factor authentication. Upon approval, a Mandate Token is issued to the merchant in place of the customer's account details.

On each due date, the merchant submits a collection request referencing the Mandate Token. The PayNow Token Service validates that the request falls within the authorised mandate terms and routes it to the payer bank. The payer bank performs its existing fraud, scam, AML/CFT, and account checks before executing a standard FAST credit transfer to the merchant. As payments continue to be processed over the existing FAST infrastructure, no changes to the FAST credit-transfer model are required. Customers can view, pause, or revoke mandates at any time through their banking app.

Use Case 2: PayNow NFC (Near Field Communication) - (Tap to Pay)

When a customer enables PayNow NFC through their banking app, a Device Token is provisioned to their mobile device and securely linked to their selected bank account. At checkout, the customer simply taps their phone on a contactless payment terminal. The terminal transmits the Device Token together with a one-time payment cryptogram through the acquirer to the PayNow Token Service. The Token Service validates the token, routes the transaction to the payer bank, and the bank performs its existing authentication, risk, fraud, and account checks before approving the payment. Funds are then transferred to the merchant via a standard FAST credit transfer, providing a seamless debit-card-like experience while debiting the customer's bank account directly.

Key implementation considerations include payment terminal software enhancements, NFC access on mobile platforms, and achieving response times that meet consumer expectations for contactless payments.



Scope, Controls, and Governance

Tokenised PayNow inherits the following PayGuard security controls:

- Trusted Token Issuance - A unique, digitally signed token is issued only after the merchant or bank is authenticated. Each token is restricted to its bound merchant or device.
- Authorised App Protection - iOS Apple App Site Association (AASA) and Android Asset Links ensure that only registered bank apps can open mandate links.
- Data Minimisation - Links and taps carry only the transaction ID, token, nonce or cryptogram, and signature. No account number, NRIC or mobile number is exposed.
- End-to-End Traceability - A full audit trail supports reconciliation, disputes (through the 6.10.8 dispute portal) and regulatory reporting across merchant, PayGuard and banks.

The initial scope should cover domestic SGD payments to merchants onboarded to PayNow. The following should remain out of scope: cross-border payments, offline NFC transactions, P2P tap transfers and wearables. Mandate ceilings are set by the customer at setup. NFC transaction and daily limits will be determined by individual banks, subject to an industry-wide ceiling agreed by the industry workgroup.

Roles and Responsibilities

Party	Key responsibilities
Payer Bank	Customer authentication; token-to-account mapping; fraud, scam and AML/CFT checks; FAST execution; mandate and token management in the banking app
Merchant / Acquirer	Merchant onboarding; submitting collection and tap requests; terminal enablement; refunds and first-level disputes
Clearing Operator	Operate the PayNow Token Service; validate and route tokens; enforce industry rules; maintain audit records

Strategic Benefits

To Customers	To Merchants and Billers	To the Payment Industry
Tap-to-pay directly from a bank account	Real-time collection with immediate confirmation	Reuses FAST, PayNow and existing terminals
Manage recurring payments with full visibility and one-click revocation	Lower acceptance cost than card-on-file	A domestic, account-based alternative to cards
No account details are shared with merchants	Fewer failed or late recurring payments	Establishes PayGuard as a reusable trust platform

Conclusion and Next Step

Tokenised PayNow extends PayNow from a customer-initiated push payment service into a broader payment platform capable of supporting both recurring pull payments and contactless tap payments, while continuing to leverage FAST as the underlying payment rail. By using tokenisation, the solution enables secure payment initiation without exposing customer account details, while preserving bank ownership of customer authentication, risk management, and regulatory compliance responsibilities.

To validate the concept and implementation approach, a cross-industry workgroup should be established to conduct sandbox testing across participating banks, merchants, acquirers, and technology providers. The sandbox should assess:

- Customer journeys for mandate creation, recurring payment collection, and PayNow NFC transactions.
- Mandate and token lifecycle management, including issuance, suspension, revocation, expiry, and status propagation.
- End-to-end performance, including whether NFC-based authorisation, token validation, and FAST processing can meet contactless payment response-time expectations.
- The operating model, governance framework, and participant responsibilities for the PayNow Token Service.
- Payment terminal, acquirer, and mobile platform readiness to support PayNow NFC.

Successful completion of the sandbox will provide the operational, technical, and governance evidence required to determine the feasibility of production deployment and establish a roadmap for industry-wide implementation.

6.10.11.FAST-Lite (Option 1 – Cloud)

Overview

Singapore's payment infrastructure has been highly successful in supporting retail and business payments through FAST and PayNow. However, a new category of payment use cases is emerging where individual transaction values may be only a few cents, or even fractions of a cent, while transaction volumes could be significantly higher than those processed today. Examples include beverage container return schemes, automated rewards and incentive payouts, AI agent-to-agent payments, Internet of Things (IoT) transactions, and smart city services. Many of these use cases are expected to be machine-initiated and executed continuously, resulting in a substantial increase in transaction frequency.

While FAST can technically support such payments, its operational and processing model was designed primarily for general-purpose retail and business transactions. As transaction values decrease, the cost of processing each payment becomes increasingly significant relative to the value of the transaction itself, creating efficiency challenges for high-volume micropayment scenarios.

To address this emerging need, Banking Computer Services (BCS) proposes FAST-Lite, a new payment rail designed specifically to support high-volume, low-value micropayments while retaining the key benefits of Singapore's existing payment infrastructure. FAST-Lite would provide 24×7 availability, a real-time payment experience, immediate confirmation, open participation, and interoperability with the existing FAST and PayNow ecosystems. By optimising the processing model for micropayments, FAST-Lite can enable new machine-to-machine and digital economy use cases that may not be economically viable on traditional payment rails.

FAST-Lite is intended for low-value transactions and should complement, rather than replace, the existing FAST service. Higher-value retail and business payments would continue to be processed through FAST, while FAST-Lite would provide a purpose-built infrastructure for emerging micropayment use cases that require high transaction volumes, lower processing costs, and seamless integration with Singapore's broader payments ecosystem.

Why Is FAST-Lite Needed?

FAST was designed to support a broad range of payment use cases, including consumer transfers, bill payments and corporate transactions.

For these use cases, the transaction value is typically large enough that the processing overhead is not a significant concern.

Micropayments are different. For a payment worth S$0.10 or S$0.20, the cost of "Authentication", "Payment processing", "Messaging", "Fraud controls", "Reconciliation", "Liquidity management", "Settlement", etc. can become a material proportion of the transaction value. This challenge becomes more pronounced when transaction volumes increase significantly.

A future where AI agents, connected devices and autonomous systems perform thousands of transactions daily will require payment infrastructure that is optimised for high volume and low transaction values.

Without a dedicated micropayment rail, many of these use cases may migrate towards proprietary wallets or closed-loop payment arrangements.

Proposed FAST-Lite Model

The objective of FAST-Lite is straightforward: to provide a low-cost payment rail that can efficiently support high-volume, low-value transactions that are not optimally served by traditional payment infrastructures. Target use cases include sub-dollar transactions, with configurable transaction limits, as well as machine-to-machine payments, agentic commerce, usage-based charging models, Internet of Things (IoT) ecosystems, micro-content payments, and high-frequency merchant collections. These emerging use cases are characterised by extremely high transaction volumes and low individual transaction values, requiring a payment infrastructure that can process payments economically while maintaining a seamless user experience.

The design should prioritise cost efficiency over feature richness. FAST-Lite does not need to replicate all FAST capabilities. Instead, it should focus on the minimum set of functionalities necessary to support micropayments at scale. Key design principles include:

A. API-Only Connectivity

Participant connectivity should be standardised through APIs only. Today, FAST supports multiple connectivity options, including both message queue (MQ)-based connectivity and API connectivity, providing flexibility for different participant integration models. While this approach has served the industry well, supporting multiple connectivity standards increases the complexity of operating and maintaining the payment infrastructure over time.

FAST-Lite is designed specifically for high-volume micropayments and emerging digital ecosystems. As such, it should standardise on a single API-based connectivity model for all participant interactions. This allows the operator to maintain a leaner technology stack while improving consistency across all participants.

B. Cloud-Native Infrastructure

FAST-Lite should be built using cloud-native technologies to provide a highly scalable and cost-efficient operating model. Unlike traditional payment systems that require infrastructure to be sized for peak demand, cloud-native platforms can dynamically scale computing resources based on actual transaction volumes.

This enables the platform to accommodate significant fluctuations in payment traffic, including future scenarios where millions of machine-initiated transactions are processed throughout the day. Computing resources can automatically scale up during periods of high activity and scale down during quieter periods, ensuring infrastructure capacity remains aligned with transaction volumes while optimising operating costs.

Key benefits include:

- On-demand scalability to support sudden spikes in transaction volumes without service degradation
- Elastic processing capacity that grows with industry adoption without requiring large upfront infrastructure investments
- Lower operating costs through shared and consumption-based infrastructure models
- Faster deployment of new capabilities through automated provisioning and continuous delivery practices
- Improved resilience and availability through distributed architecture and automated recovery mechanisms
- Greater infrastructure efficiency by avoiding over-provisioning for peak workloads

A cloud-native architecture is particularly well suited for micropayments, where transaction volumes may increase exponentially while transaction values remain very small. The ability to scale on demand allows FAST-Lite to support future use cases such as AI agent commerce, IoT ecosystems and machine-to-machine payments without materially increasing processing costs per transaction.

C. Microservices as opposed to Monolithic Application Architecture

FAST-Lite can be designed using a modular, service-oriented architecture rather than as a single monolithic platform. Under this approach, core capabilities are separated into independent services, such as a Payment Processing Service, Participant Management Service, Reconciliation Service, Settlement Service, and API Gateway Service. Each service performs a specific function and can be developed, deployed, maintained, and scaled independently, providing greater flexibility as transaction volumes and business requirements evolve.

This architectural approach offers several advantages. By keeping each service focused on a well-defined domain, the overall codebase becomes smaller and easier to manage, reducing development complexity and improving maintainability. Enhancements and upgrades can be delivered more rapidly as changes can be isolated to specific services without impacting the broader platform. The risk and effort associated with regression testing are also reduced, as testing can be targeted to the affected components. In addition, individual services can be scaled independently based on demand patterns, allowing resources to be allocated more efficiently and cost-effectively. Collectively, these benefits support the primary FAST-Lite design objective of delivering a scalable, resilient, and low-cost payment rail capable of supporting high-volume micropayment use cases.

D. Modern Event Streaming Instead of Traditional Messaging Architecture

Instead of relying predominantly on traditional point-to-point messaging architectures, FAST-Lite could adopt a modern event-driven architecture built on technologies such as Apache Kafka and event sourcing principles. Under this model, payment events are published to a shared event stream and consumed by the relevant platform services, enabling a decoupled and highly scalable processing environment. Core services such as payment processing, settlement, reconciliation, participant management, and analytics can operate independently while maintaining a consistent view of transaction events across the ecosystem.

This approach offers several advantages. Event streaming platforms provide massive horizontal scalability and can support significantly higher transaction volumes than traditional request-response architectures. The event-driven model also enhances resilience by allowing services to continue operating independently and

recover from failures without disrupting the broader platform. Near real-time processing enables rapid payment confirmation and operational visibility, while the event stream provides a natural integration point for analytics, monitoring, fraud detection, and machine learning applications. In addition, the architecture aligns well with emerging machine-driven payment ecosystems, including AI agents, IoT devices, smart city services, and automated commerce platforms.

Should future demand grow to hundreds of thousands or even millions of transactions per second, an event-driven architecture would provide the scalability and flexibility necessary to support such volumes in a cost-efficient manner. By leveraging modern streaming technologies and event sourcing patterns, FAST-Lite can establish a future-ready foundation capable of supporting the next generation of micropayment and machine-to-machine payment use cases while maintaining operational resilience and interoperability with Singapore's broader payments infrastructure.

E. Automated DevSecOps

Instead of relying on extensive manual operations, FAST-Lite should be designed with a high degree of automation across the software development and operational lifecycle, enabling the platform to operate efficiently at scale while minimising ongoing support overheads. Key automation capabilities may include the use of Continuous Integration and Continuous Deployment (CI/CD) pipelines, automated testing, automated security and vulnerability scanning, automated deployment processes, and automated rollback mechanisms to rapidly recover from failed releases or operational incidents.

By embedding automation into the platform's operating model, FAST-Lite can significantly reduce manual intervention, improve service reliability, and accelerate the delivery of enhancements and fixes. Automated testing and security validation help identify issues earlier in the development lifecycle, while automated deployment and rollback capabilities reduce operational risk during production releases. Collectively, these capabilities enable smaller support and operations teams, faster implementation of changes, fewer production incidents, and lower release and maintenance costs. This aligns with the overarching FAST-Lite objective of providing a highly scalable, cost-efficient payment rail capable of supporting high-volume micropayment use cases without a corresponding increase in operational complexity or resource requirements.

F. Deferred Settlement

FAST-Lite should continue to adopt a deferred settlement model, consistent with the current FAST operating framework.

Today, FAST provides real-time clearing and payment confirmation, while participating institutions settle accumulated interbank obligations through two settlement cycles during the business day. This approach has proven effective in balancing customer experience, liquidity efficiency and settlement risk management.

For FAST-Lite, further cost efficiencies can be achieved by reducing the settlement frequency. Given the low-value nature of FAST-Lite transactions and the use of a prefunded participant model, participant obligations can be settled at most once per business day.

Conclusion and Next Step

FAST has successfully supported Singapore's real-time payment needs for retail and business transactions. However, emerging payment use cases such as AI agents, IoT devices and usage-based services require a different cost model and operating approach.

FAST-Lite provides a practical way to address this requirement. By combining API-based connectivity, cloud-native infrastructure, deferred net settlement and automated risk controls, FAST-Lite can support high-volume micropayments while maintaining interoperability with FAST and PayNow.

The proposal is not intended to replace existing payment rails. Instead, it introduces a low-cost payment tier that can support the growing demand for machine-driven and micropayment transactions while preserving the reliability and trust associated with Singapore's national payment infrastructure.

As a next step, a cross-industry workgroup should be formed to assess the FAST-Lite proposition. It is recommended to set up a sandbox environment to assess the following:

- The end-to-end user journeys
- Throughput and scale
- Settlement model
- Risk controls
- API standards
- Liquidity management

6.10.12. FAST-Lite (Option 2 – with DLT)

Overview

This chapter recommends that Singapore develop FAST Lite DLT: a shared programmable settlement layer for tokenised Singapore dollar deposits. It would operate alongside FAST, PayNow, GIRO and MEPS+, rather than replace them. An initial proof-of-concept in agentic commerce is recommended.

Three developments make the case for acting now. First, growing demand from AI agents and machine-driven commerce requires capabilities that existing payment rails were not designed to provide. Second, tokenised-deposit networks overseas are progressing from pilots towards production deployment, with launches targeted through 2027; jurisdictions that move first are likely to shape emerging standards. Third, Singapore is well placed, with PayNow's reach, a favourable regulatory perimeter, growing commercial momentum in agentic payments and significant national investment in AI. However, these capabilities are not yet connected through a common programmable settlement layer. The window of opportunity is open, but it will not remain open indefinitely. The proposed solution extends infrastructure Singapore already operates today.

The previous chapter outlined the cloud-native approach adopted for payment infrastructure modernisation. This chapter sets out the evidence and design case for FAST Lite DLT: demand and current limitations, the case for tokenised deposits and the timing for action, the proposed end state, design principles and proposed architecture, and an initial proof-of-concept.

Emerging business models are creating demand for programmable payments, automated settlement and high-volume sub-cent micropayments that existing payment infrastructure was not designed to support efficiently. FAST Lite DLT is proposed as a shared programmable settlement layer for tokenised deposits to address these emerging requirements.

Key Findings and Observations

Emerging Demand Drivers for Programmable Payments and Micro-payments

Demand for programmable payments is emerging across both business-to-business (B2B) and business-to-consumer (B2C) ecosystems. While some use cases involve low-value or high-frequency transactions, the more fundamental requirement is the ability to embed business rules, conditions and automation directly into payment execution. This enables payments to be triggered, withheld, split or released automatically when predefined conditions are met, improving efficiency, reducing reconciliation effort and supporting new digital business models.

B2B Use Cases

- Agentic commerce (B2B procurement and services): Software agents acting on behalf of organisations can source suppliers, negotiate terms, procure goods and services, consume APIs and execute payments autonomously. This creates demand for delegated payment authority, machine-readable mandates,

spending controls and automated settlement mechanisms that enable organisations to maintain oversight while supporting autonomous transactions.

- Machine-to-machine and usage-based commerce: Payments are increasingly linked to the consumption of digital and physical resources, including AI services, cloud computing, APIs, data services and IoT devices. Charges may be calculated at highly granular levels, creating demand for payment infrastructure capable of supporting high-volume, low-value and sub-cent transactions efficiently.
- Programmable business settlement: Corporates increasingly require payments that can be executed according to predefined business rules. Examples include treasury and liquidity management, supply-chain finance, tokenised asset settlement and revenue sharing. These use cases require conditional payments, coordinated settlement and automated allocation of funds across multiple parties.

B2C Use Cases

- AI-assisted and machine-initiated payments: Consumers are increasingly expected to delegate purchasing decisions and payment execution to AI assistants. In parallel, connected vehicles, smart-home devices and IoT equipment may autonomously initiate payments for services such as EV charging, tolls, parking, utilities and digital content consumption.
- Programmable disbursements and incentives: Governments and organisations are exploring digital disbursement models that embed eligibility criteria, spending restrictions and expiry rules directly into subsidies, grants, vouchers, incentives and loyalty programmes, improving efficiency and policy effectiveness.
- Conditional payments and automated distribution: Consumers increasingly require payment arrangements that support escrow, milestone-based fund release and automated revenue distribution. These capabilities can reduce counterparty risk, strengthen trust between participants and simplify administration across digital platforms and creator ecosystems.

Taken together, these developments demonstrate that future demand extends beyond simple value transfer. The convergence of AI, machine-driven commerce, tokenisation and digital automation is creating demand for payment infrastructure that supports programmable execution, coordinated settlement and interoperability. More fundamentally, organisations and consumers increasingly require payment mechanisms that can automate transactions, enforce business rules and provide greater certainty over how and when funds are released.

Current State: Limitations of Existing Payment Infrastructure

Singapore starts from a position of strength. FAST, PayNow, GIRO and MEPS+ provide efficient, reliable and widely adopted payment infrastructure supporting retail, corporate and wholesale payment needs.

However, these systems were designed primarily for the transfer of funds rather than the execution of business rules and programmable transactions. Functions such as approvals, eligibility checks, conditional payment release and fulfilment verification are typically implemented separately by individual institutions or applications.

As digital commerce evolves, this creates limitations. Multi-party transactions, conditional payments, escrow arrangements and milestone-based settlement often require additional intermediaries, manual coordination and reconciliation processes. Similarly, the settlement of digital assets and payments is frequently managed in separate systems, increasing operational complexity and settlement risk.

The emergence of tokenised deposits and other digital financial assets also introduces interoperability challenges. Without common standards and settlement frameworks, institutions may develop proprietary solutions that increase fragmentation, duplicate integration effort and limit network benefits.

The opportunity is therefore to extend Singapore's existing payment infrastructure with a shared framework for programmable execution, coordinated settlement and interoperability. This would reduce operational

friction, strengthen ecosystem connectivity and support emerging use cases such as agentic commerce, machine-to-machine payments and high-volume micropayments.

Why Tokenised Deposits and Why Now

Tokenised commercial bank deposits enable programmable payments without changing the nature of money. As digital representations of existing bank deposit liabilities, they remain within established banking, prudential and deposit-protection frameworks while introducing programmability and automation. Unlike stablecoin-based models, they can leverage Singapore's existing banking infrastructure and widespread PayNow adoption, reducing implementation complexity and enabling programmable payments within the regulated banking perimeter.

Unlike stablecoin-based approaches, tokenised deposits can be implemented within the existing banking framework, avoiding the additional custody, conversion and safeguarding arrangements associated with alternative digital-money models.

The case for tokenised deposits is no longer hypothetical. Across major jurisdictions, central banks, financial market infrastructures and banking consortia are converging on a common model: permissioned networks settling tokenised commercial bank deposits while preserving the existing two-tier monetary system.

Notable implementations in the public sector include:

- BIS Project Agorá (2026): Developed a shared-ledger prototype involving seven central banks and 40+ financial institutions, combining tokenised deposits and wholesale central bank reserves with enhanced privacy and payment workflow features.
- HKMA Project Ensemble: Evolved from sandbox testing (2024) to a live pilot (2025), enabling tokenised deposits backed by tokenised money market funds, with plans for 24/7 settlement using tokenised central bank reserves.
- Bank of Korea Project Hangang: Tested tokenised deposits and wholesale CBDC with banks, users and merchants in 2025, and expanded in 2026 to support government subsidy disbursements.

Notable implementations in the private sector include:

- The Clearing House (US): An 18-bank consortium is developing an on-chain clearing and settlement platform for treasury, liquidity management, cross-border payments and agentic commerce, targeting launch in 2027.
- Commercial Bank Money Token (CBMT, Germany): A live multi-bank tokenised deposit platform tested with corporate users, now expanding across Europe after being classified as a bank deposit by BaFin.
- DCJPY (Japan): A tokenised deposit platform operated by DeCurret DCP, supporting digital payments and settlement through a two-zone architecture and currently testing on-chain interbank settlement models.

While implementation approaches differ, common design themes are emerging, including interoperability, coexistence with existing payment infrastructure and support for programmable transactions. These initiatives are progressing from pilot testing towards production deployment, signalling growing confidence in tokenised deposits as a foundation for digital commerce and settlement. As production deployments emerge, early movers are likely to shape technical, operational and interoperability standards for future cross-border connectivity.

Singapore is well positioned to act. PayNow, the Common Payment Gateway, a favourable regulatory environment and growing commercial interest in agentic commerce provide strong foundations. Singapore has also made significant investments in AI capability, governance and digital innovation. Recent industry initiatives in agentic payments and AI further demonstrate growing commercial and policy momentum in this area. However, these assets do not yet connect to a common programmable settlement layer capable of supporting agent-initiated and machine-driven payments at industry scale.

FAST Lite DLT is proposed as a shared settlement and interoperability layer for tokenised deposits that complements existing payment infrastructure. The proposed architecture and operating model are described below.

Future End State: Interoperable Programmable Payment Ecosystem

The target end state is an interoperable programmable payment ecosystem in which tokenised Singapore dollar deposits issued by different financial institutions can be used seamlessly across common clearing, settlement and payment workflows.

The future-state architecture supports programmable payment execution across participating institutions while maintaining alignment with Singapore's existing banking and payment infrastructure. By providing a common settlement and interoperability layer, FAST Lite DLT can enable programmable transactions to be executed consistently across financial institutions while preserving trust, efficiency and operational resilience.

More importantly, it introduces a common framework for coordinating payment execution across institutions, enabling capabilities that are currently difficult to support consistently at an industry level, including:

- Conditional and multi-party payment execution
- Automated escrow and milestone-based payment release
- Integrated settlement of money and digital assets
- Shared and auditable transaction records
- Interoperability across tokenised deposit issuers
- Support for agentic, machine-readable and automated payment interactions
- Simultaneous execution of multiple settlement obligations within a single workflow

By embedding business rules into payment execution and providing a common interoperability framework, FAST Lite DLT can reduce fragmentation, simplify integration, strengthen trust and support both programmable payments and economically viable micropayments.

These capabilities are intended as shared infrastructure rather than solutions for any single use case. By enabling automation, coordinated settlement and interoperability, the ecosystem can support evolving digital commerce models while preserving the resilience, familiarity and strengths of Singapore's existing payment rails.

Recommendations

Design Principles

The following design principles aim to ensure that FAST Lite DLT supports emerging programmable payment use cases while preserving monetary stability, industry interoperability, operational resilience and public trust.

Permissioned Network and Settlement Asset

FAST Lite DLT operates as a permissioned DLT network with participation restricted to approved institutions. Tokenised commercial bank deposits serve as the settlement asset, supporting programmable payments within Singapore's existing banking and regulatory framework.

Layered Settlement Model

FAST Lite DLT adopts a layered settlement model that combines real-time transaction execution with periodic interbank settlement using central bank money. This approach preserves alignment with Singapore's existing wholesale payment infrastructure while supporting programmable transactions and high-volume payment activity.

Preservation of the Existing Monetary Framework

Tokenisation should preserve the existing regulatory and monetary treatment of commercial bank deposits. FAST Lite DLT should therefore support innovation without altering Singapore's two-tier monetary system.

Interoperability and Avoidance of Fragmentation

The infrastructure should enable seamless **interoperability** between tokenised deposits issued by different financial institutions through a **common industry framework**. This approach minimises fragmentation, reduces integration complexity and supports broad ecosystem participation.

Coexistence with Existing Payment Infrastructure

FAST Lite DLT should complement existing payment systems, including FAST, PayNow, GIRO and MEPS+, while enabling additional programmable-payment capabilities.

Support for Agentic and Machine-Driven Commerce

The architecture should support **delegated payment authority** and **autonomous transaction execution** by authorised software agents. **Runtime safeguards for agentic finance** should continuously govern delegated-payment activity through policy controls, monitoring and revocation mechanisms to ensure transactions remain within user-defined permissions and risk tolerances. These capabilities provide a foundation for **agentic commerce**, **machine-to-machine transactions** and **usage-based services**.

Precision and Transaction Value Flexibility

The platform should support a full spectrum of transaction values, including high-volume low-value and **sub-cent** transactions.

While customer balances remain recorded at cent-level precision in bank core systems, the platform can support higher transaction precision where required. **A gateway layer** manages conversion and reconciliation, ensuring alignment between tokenised deposits and underlying bank liabilities.

Open Standards and Ecosystem Compatibility

The platform should maximise reuse of **established standards** while remaining compatible with **emerging digital commerce ecosystems**. Open interfaces and standards-based integration should facilitate interoperability, ecosystem participation and future innovation.

Trust, Auditability and Transparency

The platform should provide a **shared and auditable record** of transaction execution and settlement events across participating institutions. Consistent visibility into transaction status, payment conditions and settlement outcomes can reduce disputes, improve operational transparency and strengthen trust among ecosystem participants.

Proposed Architecture

Platform Overview

FAST Lite DLT is a **neutral, industry-wide programmable settlement platform** operating alongside Singapore's existing payment infrastructure. Consistent with the design principles described above, it provides shared settlement, interoperability and coordination services for tokenised deposits while enabling programmable payment and digital commerce use cases.

Core Components

The architecture comprises:

- A permissioned shared-ledger network

- Wallet and identity services for customers, businesses and authorised agents
- Services for issuance, transfer and withdrawal of tokenised deposits
- Smart-contract services for payment automation
- Common clearing and settlement services
- Multi-Asset Settlement Bridge (MASB) for interbank settlement using central bank money
- Integration gateways connecting to bank systems
- Interoperability services for domestic and future cross-border connectivity
- Policy, governance and permissioning services

Tokenised Deposits as the Settlement Asset

FAST Lite DLT uses tokenised commercial bank deposits as its settlement asset. These digital representations of commercial bank deposits provide the foundation for programmable settlement capabilities including conditional payments, escrow, revenue sharing, Delivery-versus-Payment (DvP), atomic settlement and delegated payment authority.

Agentic Commerce and Digital Commerce Layer

FAST Lite DLT should be compatible with emerging digital-commerce and agent-payment protocols, including x402, AP2, ACP and UCP, where such protocols achieve sufficient industry adoption and demonstrate clear value in supporting digital-commerce and agentic-payment ecosystems. These protocols provide standardised mechanisms for payment discovery, delegated authorisation, machine-readable mandates and interactions among users, merchants and autonomous agents.

FAST Lite DLT remains protocol-agnostic, providing the programmable settlement layer while allowing commerce and interaction protocols to evolve independently.

Among these protocols, x402 is particularly relevant for machine-driven commerce because it enables software agents to discover chargeable resources and authorise payments through standard web interactions. Its support for payment-channel and batch-settlement models can improve the efficiency of large volumes of low-value transactions, making it suitable for usage-based services such as APIs, AI services and machine-to-machine interactions.

Combined with FAST Lite DLT's programmable settlement capabilities, these protocols can support interoperable digital-commerce ecosystems across consumers, businesses and autonomous agents.

Integration with Existing Banking Infrastructure

The existing Common Payment Gateway (CPG) used for FAST connectivity can be extended to connect bank core systems with FAST Lite DLT.

This enables participating institutions to leverage existing integration assets, operational processes and ISO 20022 standards, reducing implementation complexity while supporting interoperability between traditional accounts and tokenised deposits.

Wallet-to-Account Interoperability

To the extent that FAST Lite DLT and the current FAST system operate alongside each other, serving tokenised deposit wallets and traditional bank accounts respectively, payments between the two environments can be supported using either of the following models:

- Intermediating Bank Model: A participating bank acts as the bridge between the two environments, receiving funds in one system and making the corresponding payment in the other. This model is relatively simple to implement and can readily support future cross-border scenarios, but requires intermediary liquidity.

- **Coordinated Settlement Model:** For domestic SGD transactions, payments and settlement can be synchronised across both environments, reducing intermediary funding requirements and improving liquidity efficiency. This approach requires tighter operational coordination and is less suitable for cross-border use cases.

Future Ecosystem Connectivity

Over time, FAST Lite DLT can support connectivity across both traditional financial infrastructure and emerging digital-commerce ecosystems through standards-based integration and interoperability services. This provides a scalable foundation for **future domestic and cross-border expansion**.

First Step: Agentic-Commerce Proof-Of-Concept

We recommend an **agentic-commerce proof of concept (PoC)** in a controlled sandbox environment as the initial implementation of FAST Lite DLT before a broader interbank rollout. Among the use cases identified, agentic commerce is well suited as a starting point because it brings together several key capabilities required for next-generation digital commerce, including **delegated payments, automation, interoperability and micropayments**. A successful PoC would therefore validate the core design assumptions underpinning FAST Lite DLT. The proposed scope includes:

- Two participating banks issuing tokenised deposits
- Bank-issued wallet identifiers linked to existing customer identities
- An AP2 mandate layer for consent management and delegated payment authority
- Interoperable wallet, clearing and settlement workflows across participating banks

Representative use cases may include:

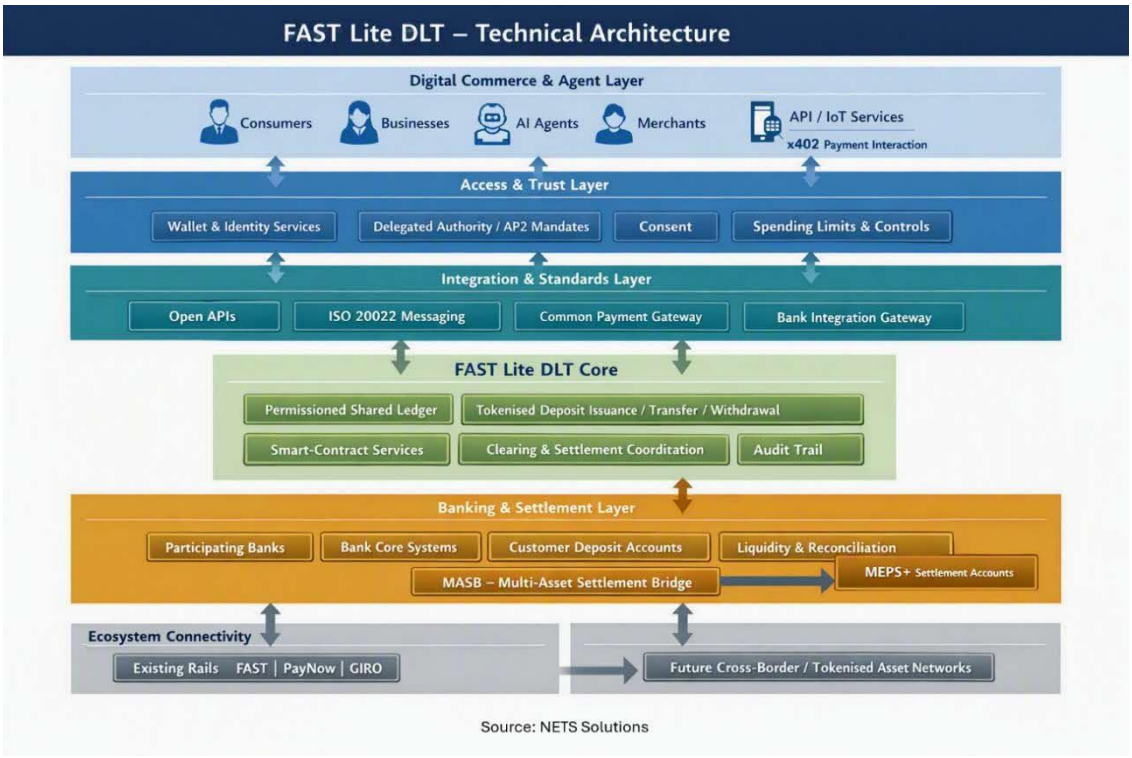
- Agent-initiated online goods purchase
- Per-API and usage-based settlement, including sub-cent micropayments

The PoC will evaluate two operating models:

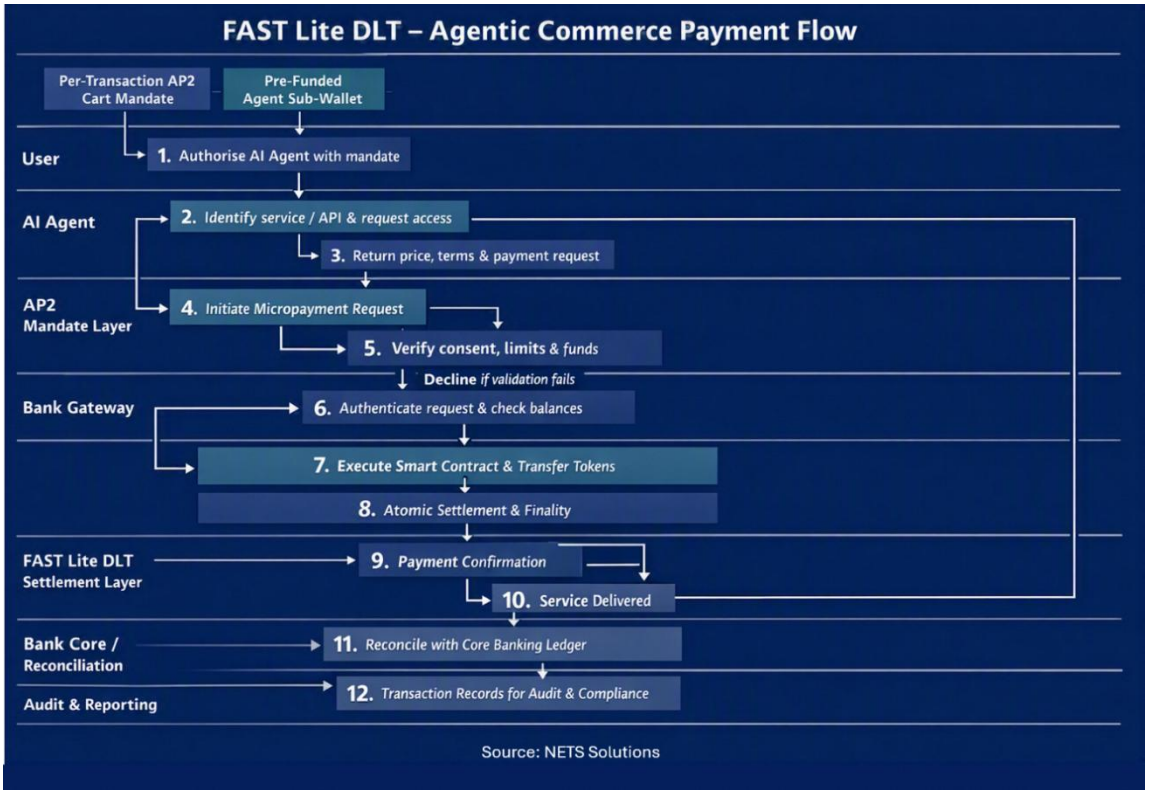
- **Per-transaction authorisation**, where users approve each payment individually through an AP2 mandate
- **Pre-funded agent wallet**, where users allocate funds to an agent wallet and define controls such as spending limits and transaction thresholds, allowing approved payments to be executed autonomously.

Supporting Diagrams and Reference Materials

Technical Architecture Diagram



End-to-End Process Flow



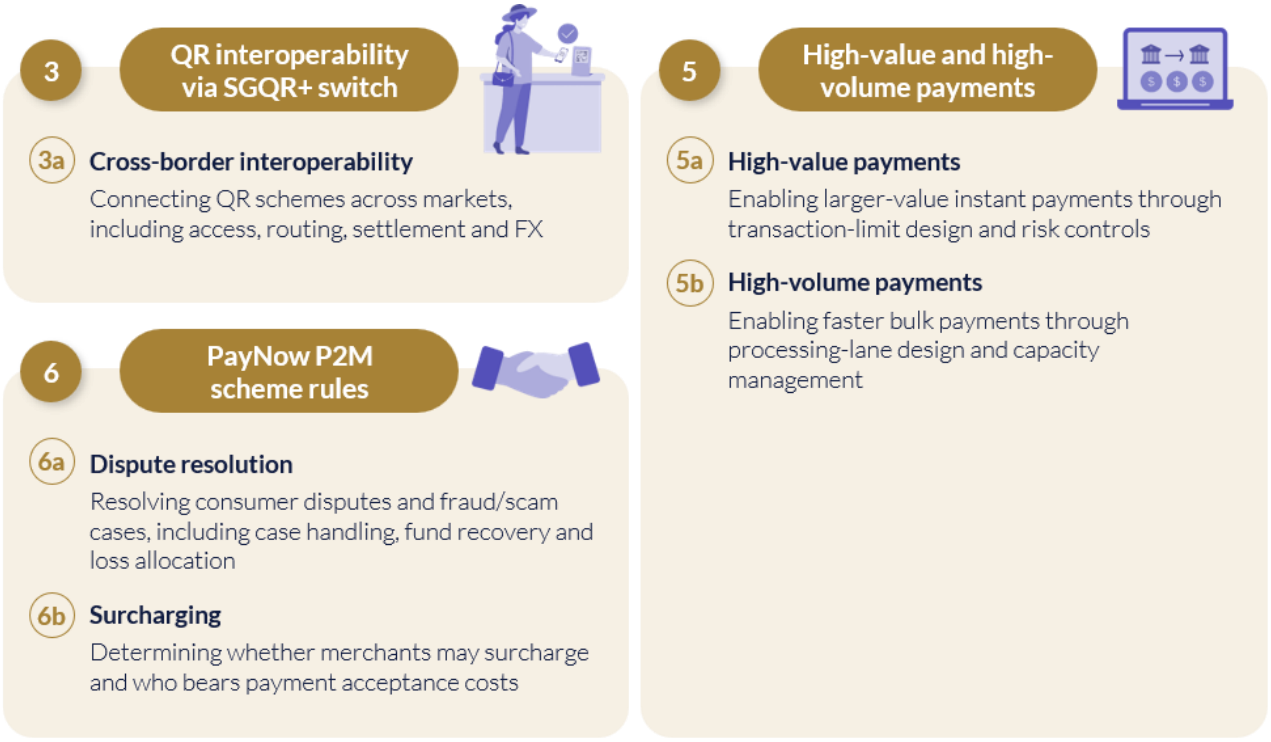
6.11. International benchmarking

6.11.1.Methodology

PayNow was assessed against international approaches across five priority benchmarking topics within the PayNow Gen2 enhancements, selected to provide deeper insight into areas where design choices differ across payment systems: dispute resolution and surcharging under PayNow P2M scheme rules, cross-border QR interoperability under QR interoperability via SGQR+ switch, and high-value and high-volume payments. The benchmarking covered 11 international jurisdictions: Australia, Brazil, Hong Kong SAR, India, Indonesia, Malaysia, Thailand, Vietnam, Switzerland, the United Kingdom, and the European Union, selected to provide relevant reference points for Singapore, including leading instant payment systems and jurisdictions with distinctive design approaches and architectures relevant to the topics assessed. The assessment drew on publicly available information, including central bank and payment-system operator publications, regulatory and scheme documentation, industry reports from organisations such as the Bank for International Settlements and the World Bank, and other public research. Examples were selected from relevant peer jurisdictions to illustrate how different payment systems have approached similar design choices, with emphasis on approaches that highlight meaningful differences in operating models, responsibilities and controls.

Exhibit 11

International benchmarking across five priority topics explores the key hypotheses being tested for PayNow's next evolution



Source: PayNow Gen2 international benchmarking across 11 jurisdictions

6.11.2.Summary of international experience

Across the five topics, peer instant payment schemes have taken different approaches to addressing similar needs as instant payments have evolved. These differences centre on the degree of standardisation, the allocation of responsibilities across schemes, participants and regulators, the design and governance of

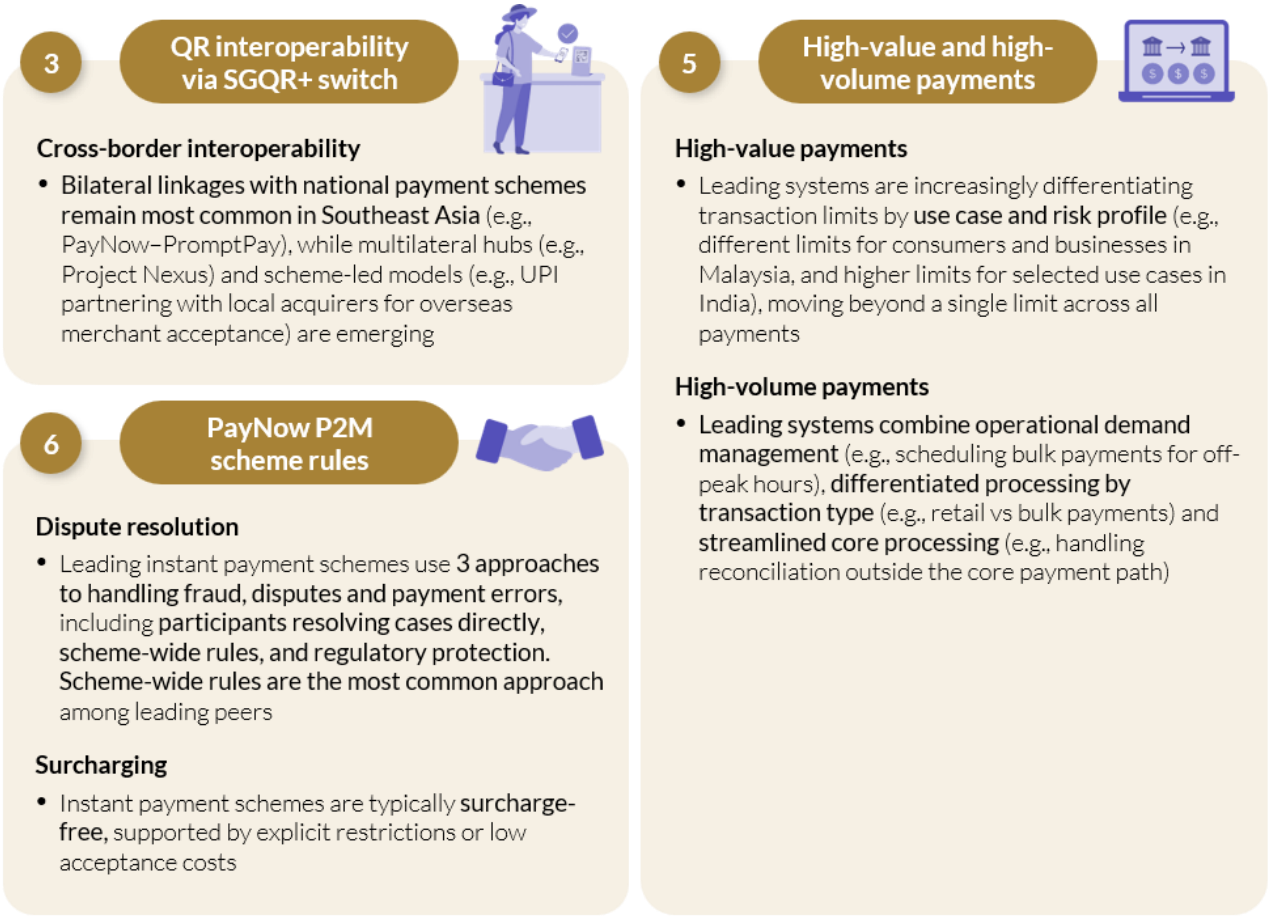
supporting infrastructure, and the way rules and controls are calibrated to different payment use cases. Some models place greater emphasis on common scheme-level arrangements, while others give participants more discretion to determine how capabilities are delivered. In practice, markets may also combine elements of different approaches rather than follow a single model.

A common theme is that the evolution of instant payments depends not only on the underlying payment rail, but also on the arrangements around it. Across the topics reviewed, peers have developed common rules and processes for disputes and recovery, different approaches to payment acceptance costs, bilateral and multilateral arrangements for cross-border connectivity, differentiated controls for high-value payments, and mechanisms to manage different types of payment traffic. Singapore's PayNow already offers broad consumer and merchant reach, low-cost acceptance relative to alternatives, and a simple, real-time payment experience.

The benchmarking provides practical reference points for the next stage of PayNow's evolution. For PayNow P2M scheme rules, QR interoperability via SGQR+ switch, and high-value and high-volume payments, it illustrates how different combinations of scheme rules, participant roles and infrastructure can extend the capabilities of an established payment rail. Across the topics, the experience of peers also highlights trade-offs between consistency, flexibility, scalability, risk management and operational complexity. Taken together, the experience of peers points to an evolution that can preserve the simplicity and trust of today's PayNow while enabling it to support a broader range of payment needs across consumers, merchants, businesses and government.

Exhibit 12

International benchmarking across 11 jurisdictions highlights different approaches and design choices relevant to PayNow's future evolution



Source: PayNow Gen2 international benchmarking across 11 jurisdictions; central bank, regulator and scheme publications

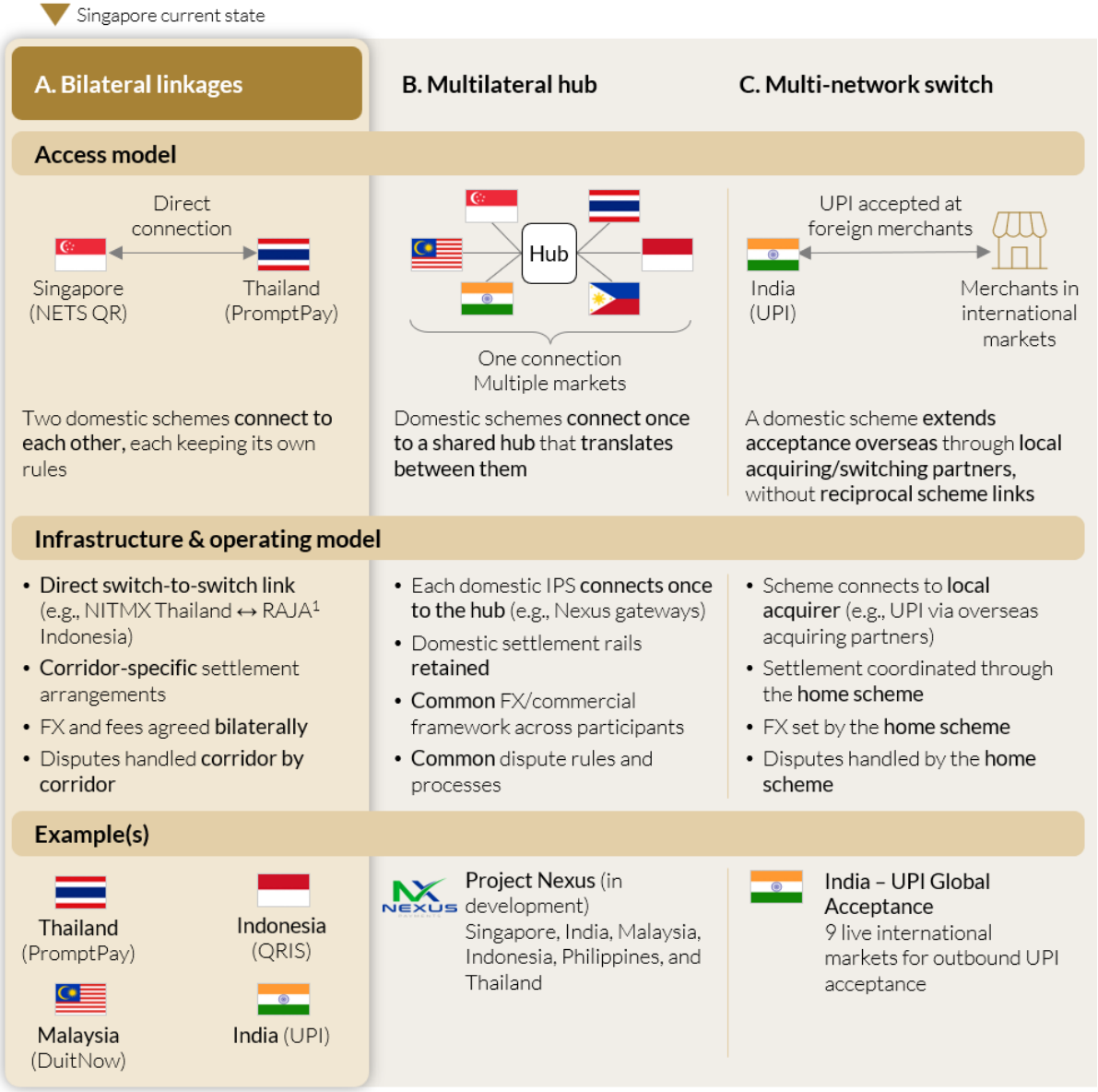
6.11.3.International benchmarking by topic

3a QR interoperability via SGQR+ switch: Cross-border QR interoperability

Singapore's cross-border QR acceptance has developed primarily through bilateral linkages, including links between NETS QR and QR schemes in Malaysia, Indonesia and Thailand. As cross-border QR networks expand, international experience shows three broad connectivity models: bilateral linkages, multilateral hubs and multi-network switches. The models are not mutually exclusive and can be used in combination depending on the corridors being connected, the level of integration required and how much control is retained over the payment experience and operating arrangements.

Exhibit 13

Three connectivity models are emerging for scaling cross-border QR acceptance, and Singapore has built its current reach through bilateral linkages



[1] RAJA refers to Indonesia's four domestic payment switching operators: Rintis, Artajasa, Jalin and ALTO

Source: Bank Indonesia; Bank of Thailand; BIS Innovation Hub (Project Nexus); Monetary Authority of Singapore; NPCI International Payments Limited; PayNet Malaysia

A. Bilateral linkages

Under bilateral linkages, two domestic payment schemes connect directly, with each retaining its own scheme and operating arrangements. Each new corridor therefore requires a separate integration and agreement covering routing, settlement, FX, transaction limits, fees and dispute handling. This remains the most common approach in Southeast Asia.

Thailand's PromptPay illustrates how bilateral linkages can build broad regional reach. PromptPay has live QR connections across 10 markets, including Singapore, Malaysia, Indonesia, Vietnam, Japan and Hong Kong SAR. The approach allows arrangements to be tailored to each corridor, including settlement, FX, fees and dispute handling. Malaysia's DuitNow has similarly expanded through bilateral connections, including with Singapore, Thailand, Indonesia and Cambodia.

The model provides greater corridor-specific flexibility, but that flexibility comes with a scaling cost: each additional market requires another technical integration and another set of operating and commercial arrangements.

B. Multilateral hubs

A multilateral hub provides a shared connection through which multiple domestic payment systems can connect, rather than requiring a separate bilateral integration between every pair of markets. Each participating system connects to the hub, which can provide common routing, technical standards and operating arrangements, while domestic payment and settlement infrastructure can be retained.

Project Nexus illustrates this model. It is being developed to connect Singapore, India, Malaysia, Indonesia, the Philippines and Thailand through a common hub. Rather than establishing separate point-to-point integrations between every participating system, each system connects to the common infrastructure. This can reduce repeated integration as the network grows and support common technical and operating arrangements across markets. At the same time, participating systems need to align on shared technical, legal, commercial and governance arrangements to operate through the hub.

Private-sector models demonstrate a similar concept at a different layer. PayPal World connects multiple payment systems and digital wallets through a common network, while Alipay+ connects a broad set of international payment applications to participating merchant networks. These models illustrate how a shared connectivity layer can allow multiple payment ecosystems to interoperate without requiring every pair of participants to establish its own direct connection.

C. Multi-network switch

Under a multi-network switch model, a domestic payment scheme extends acceptance overseas through local acquiring or switching partners, without requiring a reciprocal integration with the foreign payment scheme. The home scheme can retain greater control over the payer-side experience, while the overseas partner provides merchant acquisition and other local capabilities.

UPI illustrates this approach. UPI connects with network partners in overseas markets, with NIPL coordinating FX, clearing and settlement, while the international partner remains responsible for merchant acquisition, validation, reconciliation and merchant-facing dispute management. UPI is live for outbound acceptance in nine international markets, with plans to expand to 20+ countries by FY29.

This approach allows a domestic scheme to extend its acceptance footprint without requiring the foreign market's domestic scheme to establish a reciprocal connection. It can therefore provide a direct route to overseas acceptance, while placing merchant-facing activities with local partners.

Learnings from global players

Bilateral linkages remain the most established approach in Southeast Asia, while multilateral hubs and multi-network switches provide alternative ways to scale as cross-border QR networks expand. Bilateral arrangements allow routing, settlement, FX, fees and dispute handling to be tailored to individual corridors, but require repeated integration as new markets are added. Multilateral hubs can reduce this repeated integration through a common connection, but require participating systems to align on shared technical, legal, commercial and operating arrangements. A multi-network switch provides another route to international reach by using local partners rather than establishing reciprocal scheme links.

The experience also highlights trade-offs across directionality, participation and access, FX, transaction limits, and scheme rules and consumer protection. Bi-directional connectivity broadens use cases, while direct access provides greater control but requires more integration. Participant-set FX preserves provider-level competition but can create variation in rates, while coordinated arrangements can improve consistency. Common limits and rules provide greater consistency, while corridor-specific arrangements allow greater tailoring. Cross-border expansion also raises considerations around data governance, privacy, security and control over payment infrastructure.

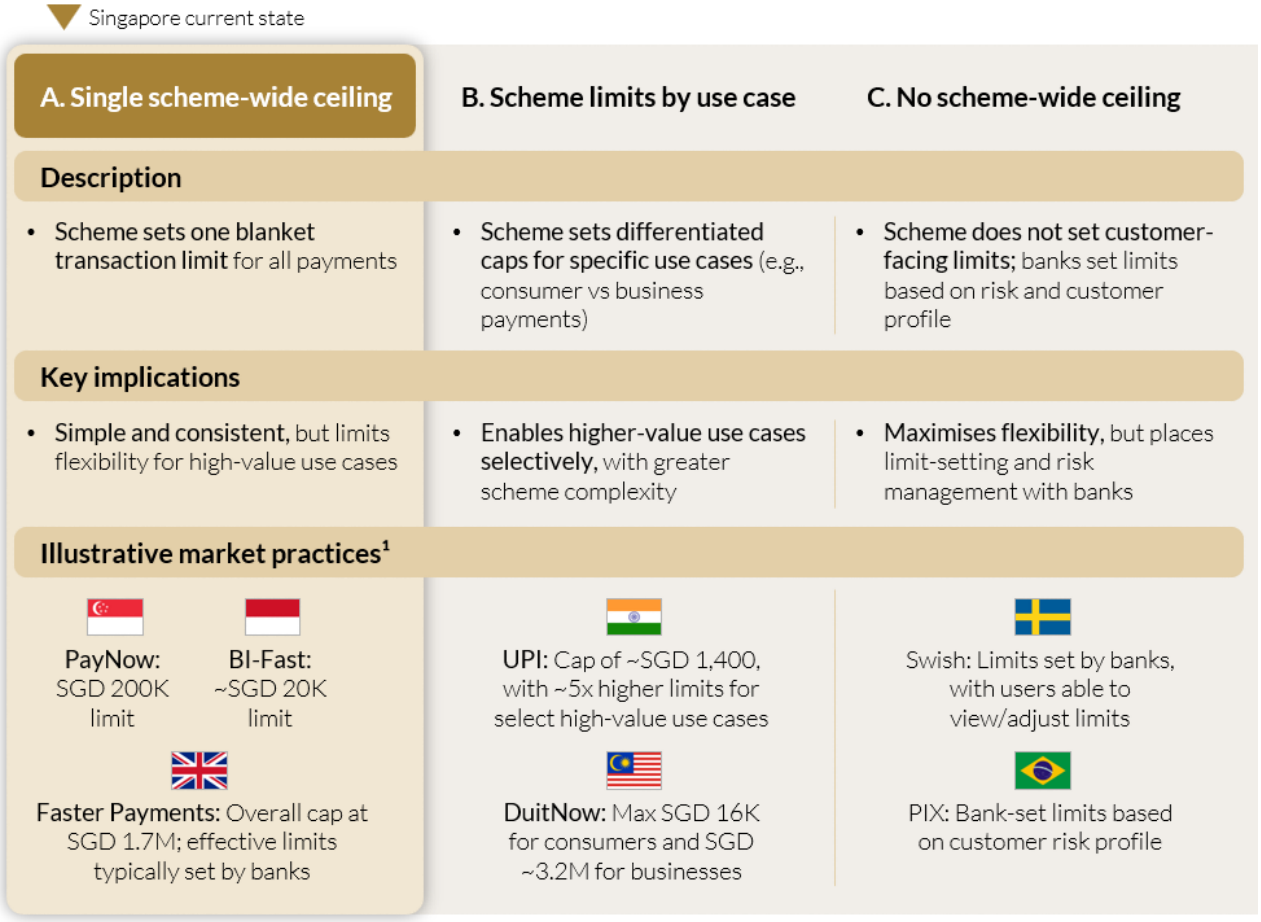
5a High-value payments

PayNow is widely used for consumer, business and government payments, but its current SGD 200,000 transaction limit constrains its use for some high-value payments, including certain property-related payments, taxes and duties. Some payments may therefore need to be split across multiple transactions. International experience shows that high-value payments can be supported through different approaches to setting limits, with the choice affecting how much flexibility is available to customers and participating banks and where risk is managed.

Three broad models are observed for setting high-value transaction limits: a single scheme-wide ceiling, scheme limits by use case and no scheme-wide ceiling. The key difference is how the scheme sets the outer transaction limit: a single ceiling across all payments, different ceilings for defined users or use cases, or no scheme-wide ceiling. Within any model, participating banks may set lower customer-level limits based on customer profile, applicable risk guardrails and liquidity constraints.

Exhibit 14

Markets balance high-value access and risk through three limit-setting models



[1] Examples illustrate distinctive elements of each model; markets typically combine participant-, scheme- and regulatory-level mechanisms

Source: Association of Banks in Singapore; Banco Central do Brasil; Bank Indonesia; Getswish AB; National Payments Corporation of India (NPCI); Pay.UK; PayNet Malaysia

A. Single scheme-wide ceiling

Under a single scheme-wide limit, **the payment system sets one maximum transaction value across participants and use cases**. This provides a simple and predictable framework, but any increase in the ceiling applies across the scheme, including payments that may not require higher limits.

United Kingdom: Faster Payments has progressively expanded its scheme ceiling

The United Kingdom illustrates how a common ceiling can be increased over time as demand for high-value instant payments grows. The Faster Payments limit increased from GBP 10,000 (SGD 17,200) before 2010 to GBP 100,000 (SGD 172,000) in 2010, GBP 250,000 (SGD 430,000) in 2015 and GBP 1 Mn (SGD 1.7 Mn) in 2022. The 2022 increase was intended in part to respond to demand from corporate customers and give providers greater scope to offer high-value payments through a 24/7 real-time rail[62]. The scheme ceiling sets the outer boundary, but individual banks and building societies continue to determine the limits available to their customers, meaning the GBP 1 Mn ceiling does not translate into a GBP 1 Mn customer limit for every user.

The higher ceiling has also **evolved alongside measures intended to maintain confidence in real-time payments**. Confirmation of Payee (CoP), introduced in 2020, checks the name of a new payee against the account details before a payment is made and is designed to reduce misdirected payments and certain types of fraud. The service was subsequently expanded across the Faster Payments ecosystem, with the Payment Systems Regulator directing wider adoption[63].

The UK experience therefore illustrates that increasing the scheme ceiling is not simply a question of raising the maximum amount. High-value access has been accompanied by measures intended to strengthen payment security and customer protection, including identity and payee checking and, for eligible APP scams, a reimbursement framework. Under the reimbursement requirement, in-scope PSPs reimburse eligible victims within 5 business days, with the cost of the reimbursement generally shared equally between the sending and receiving PSPs, subject to the applicable rules and cap[64].

B. Scheme limits by use case

Under scheme-differentiated limits, **the scheme sets different ceilings for defined users, payment types or use cases**. This allows high-value payments to be supported selectively, while retaining lower limits for other transactions. The approach can reduce exposure across the wider scheme, but requires clear eligibility criteria and scheme-level governance.

Malaysia: DuitNow differentiates limits between consumers and businesses

DuitNow illustrates how limits can reflect different payment needs across customer segments. Consumers may transfer up to Malaysian ringgit (MYR) 50,000 (SGD 16,000) per day through banks, while businesses may transfer up to MYR 10 Mn (SGD 3.2 Mn) per transaction, although the applicable limit can vary by bank or e-money provider. The large difference between the two ceilings reflects the different value and operating requirements of consumer and business payments, while still allowing participating providers to apply their own limits.

India: UPI uses higher limits for selected use cases

UPI provides a further example of differentiation by use case. Its standard transaction limit is lower, while higher limits have been made available for selected categories such as capital markets, insurance, Government e-Marketplace earnest-money deposits, travel, collections and certain business or merchant payments. Under NPCI's enhanced limits, several of these categories can transact up to INR 500,000 (SGD 6,900) per transaction, with higher cumulative limits in some cases. This allows specific payment flows with a

[62] "£1 million Faster Payments now possible," Pay.UK, February 10, 2022; "Transaction limits," Pay.UK.

[63] "Confirmation of Payee," Payment Systems Regulator.

[64] "Fighting authorised push payment fraud: a new reimbursement requirement (PS23/3)," Payment Systems Regulator.

demonstrated need for higher values to use the instant-payment rail without applying the same ceiling to all UPI transactions.

C. No scheme-wide ceiling

Under this model, the scheme does not set a common customer-facing ceiling, with participating banks determining effective limits based on customer and transaction risk within the wider regulatory framework. This provides greater flexibility for banks to calibrate limits to their customers and risk appetite, but can result in greater variation in the limits and controls applied across participants.

Brazil: Pix gives participating banks greater discretion over customer limits

Brazil's Pix provides an example of this approach. Pix does not impose a uniform scheme-level transaction ceiling for authorised participants, with banks setting customer limits based on customer and transaction risk. This discretion is complemented by controls designed to manage the risk of changes to payment limits. For example, customer-requested increases are subject to a 24- to 48-hour delay, alongside mechanisms to block, trace and recover funds where fraud is suspected.

Learnings from global players

The international experience shows that high-value access does not necessarily require a single blanket increase in transaction limits. The UK has progressively increased the scheme ceiling while leaving customer-level limits to banks; Malaysia differentiates limits between consumers and businesses; and India applies higher ceilings to selected use cases. The common theme is to create additional headroom where there is a demonstrated need, while calibrating controls to the level and type of exposure created.

The examples also show that higher limits need to be considered alongside payment security and customer protection. The UK's experience combines high-value Faster Payments with payee verification, customer-level controls and reimbursement for eligible APP scams, while Brazil uses controls around customer-requested limit increases and fraud-related fund recovery. For PayNow, the relevant design questions are therefore not only how high the limit should be, but whether higher limits should apply across the scheme or to defined use cases or customer groups, how customer-level limits should be determined, and which risk and protection measures should accompany the additional payment headroom.

5b High-volume payments

As PayNow is used more extensively for business and government payments, large-scale disbursements create a different requirement from individual real-time payments. Government payouts, payroll and other bulk payments may involve very large numbers of transactions that need to be completed within a defined payment window. In Singapore, FAST processes individual payments in real time, but participants stagger the release of large payout files to remain within an industry throughput limit designed to maintain system stability. As a result, recipients may be credited at different times of the day. Alternative batch payment arrangements operate on different settlement and crediting schedules, which can further affect payment timing. These constraints present an opportunity to improve the predictability and reliability of large-scale disbursements, ensuring that payments are completed within the required payment window while managing processing capacity and minimising the risk of payment reversals.

Three approaches are observed internationally for managing high-volume payments: operational demand management, differentiated processing lanes and streamlined payment processing. The approaches address different points in the flow: when traffic enters the system, which traffic is processed first, and how much activity needs to remain on the core payment path. They can be used together rather than as alternatives.

Exhibit 15

Three approaches to manage high-volume payment flows while protecting time-critical payments

▼ Singapore current state

	A. Operational demand management	B. Differentiated lanes	C. Streamlined payment processing
Description	• Participants **manage when and how high-volume traffic enters the rail** to smooth peaks and reduce congestion	• **Separate traffic by urgency / transaction type** so priority payments retain faster processing	• Keep the core payment path lean by **moving non-critical activity outside transaction processing**
How it works / features	• **Submission windows** shift non-urgent bulk payments to non-peak hours • **Volume controls pace** large submissions to avoid traffic spikes • **Use-case prioritisation** differentiates processing for urgent and non-urgent flows	• **Priority lane** ring-fences real-time and time-critical payments for faster processing • **General lane** handles standard payments under normal processing • **Bulk/deferred lane** handles high-volume, non-urgent payments separately	• **Core payment path** keeps only payment-critical activities in synchronous processing • **Separate post-processing** handles reconciliation and exception management outside the core payment path
Example	**Netherlands** Bulk payments split into 'buckets' and processed at night, with PSP-level smoothing to balance load across the infrastructure	**Hong Kong SAR (FPS)** C1 (real-time), C2 (general), C3 (bulk) **Brazil (PIX)** Primary channel (instant), secondary channel (non-priority)	**India (UPI)** UPI settlement cycles separated for Auth and dispute transactions

Source: Banco Central do Brasil; Dutch Payments Association; Hong Kong Interbank Clearing Limited; National Payments Corporation of India (NPCI)

A. Operational demand management

Operational demand management controls when large payment runs enter the system. Banks and other participants can schedule, split or pace predictable payment runs to spread traffic over a defined period and avoid concentrated peaks. This approach manages the timing and flow of submissions without requiring changes to the underlying payment infrastructure, making it particularly relevant for payment runs where there is some flexibility in when individual transactions are submitted.

B. Differentiated processing lanes

Differentiated processing lanes distinguish payments according to their urgency or processing requirements, allowing time-critical payments to receive a different service level from bulk or lower-priority traffic.

Hong Kong SAR: Faster Payment System separates payments by priority

Hong Kong SAR's Faster Payment System uses three processing tiers: C1 for high-priority, real-time payments where the payee needs to confirm receipt in a very short time, such as P2P payments; C2 for general-purpose payments handled "as soon as possible" where immediate confirmation is not essential; and C3 for low-priority, non-time-critical bulk payments, such as monthly salary payments.

Brazil: Pix separates priority and non-priority traffic

Brazil's Pix similarly distinguishes its primary channel for instant, priority payments from a secondary channel for non-priority and batch traffic. This allows large payment volumes to be handled differently from payments where immediate completion is the primary requirement.

C. Streamlined payment processing

Streamlined processing focuses on reducing the amount of non-critical activity carried out on the core payment path. Payment-critical processing remains within the real-time flow, while activities such as reconciliation, dispute processing and exception handling can be handled separately. The objective is to reduce processing load without changing the customer-facing requirement for immediate payment completion where it applies.

India: UPI separates settlement activity for payments and disputes

India's UPI provides an example of separating activities that do not need to compete with live payment processing. NPCI introduced 10 settlement cycles dedicated to authorisation transactions and two separate cycles for dispute transactions, effective December 2025. The separation keeps dispute-related settlement activity outside the processing flow for live payment transactions.

Learnings from global players

International experience shows that high-volume payment flows can be managed through a combination of timing, prioritisation and processing design, rather than through capacity expansion alone. Operational demand management smooths when large runs enter the system; differentiated lanes separate traffic by urgency; and streamlined processing removes non-critical activity from the core payment path. The approaches can therefore be combined to support large-scale disbursements while protecting the service levels required for time-critical payments.

The trade-offs are primarily between flexibility, predictability and implementation complexity. Scheduling or pacing is relatively simple where payment timing is flexible, differentiated lanes provide clearer priority but require rules to classify and process different traffic types, and streamlined processing can reduce the burden on the core path but requires supporting processes to operate reliably outside it. For PayNow, the relevant design questions are how predictable large payment runs can be scheduled or paced, whether different traffic types require differentiated processing, how receiving-bank capacity should be accounted for, and which activities can be separated from the core payment path while still meeting the required completion window.

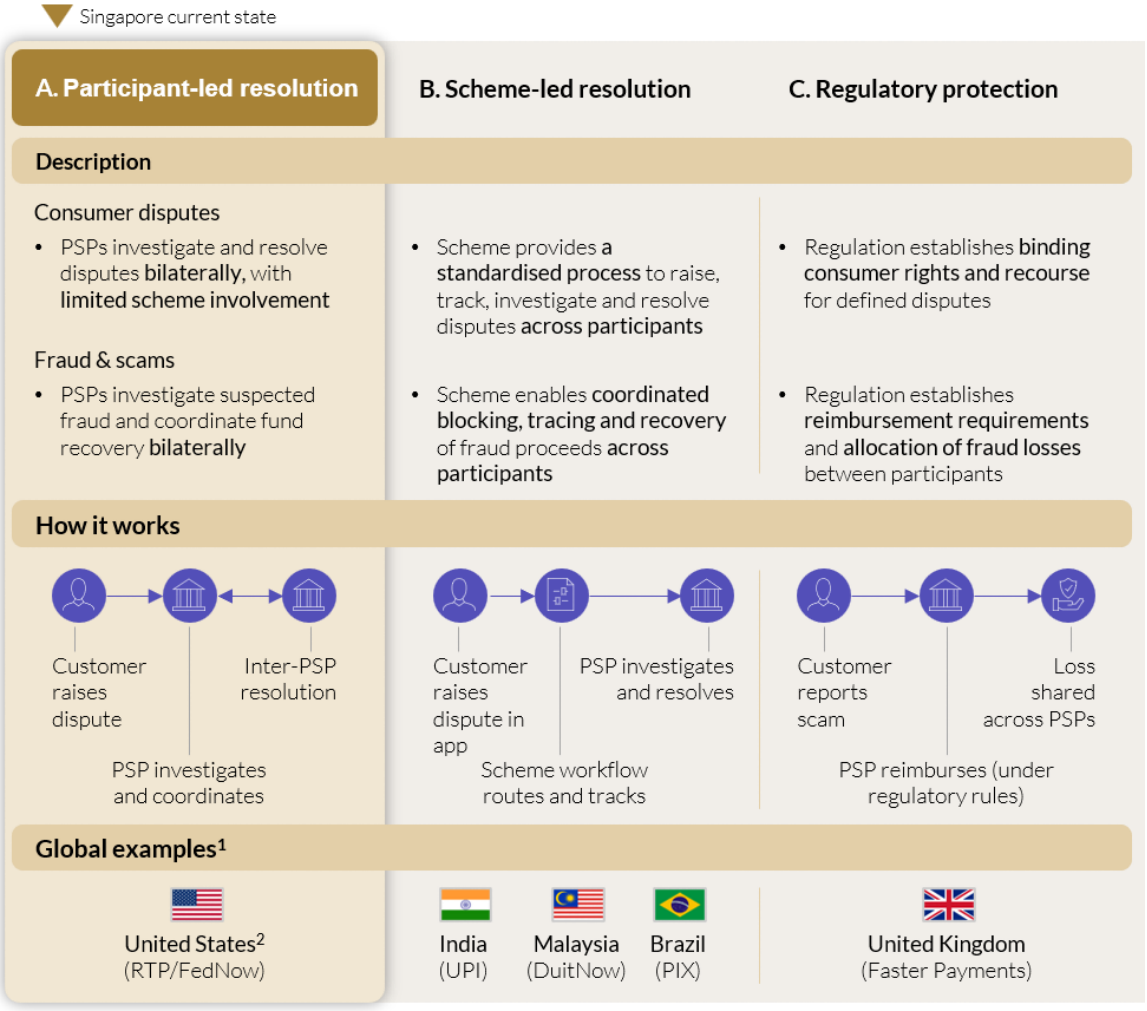
6a PayNow P2M scheme rules: Dispute resolution

PayNow has established a foundation for person-to-merchant (P2M) payments through existing scheme rules, participant processes and customer protection arrangements. As P2M payments expand, different types of disputes can arise, including consumer disputes over goods and services, fraud and scams, misdirected or erroneous payments, and technical failures, each of which may require a different resolution pathway. Consumer disputes may concern the underlying purchase, such as goods and services not being delivered or not being as described. Fraud and scam cases can require timely intervention and recovery across multiple institutions. Misdirected or erroneous payments arise where the customer intends to make a payment but sends it to the wrong recipient or enters the wrong amount. Technical failures can arise where a payment fails or times out, or where the customer is debited but the merchant does not receive the expected confirmation.

Leading instant payment schemes increasingly establish scheme-level rules for fraud, disputes and payment errors. Three non-mutually-exclusive levers are observed across peer systems: participant-led resolution, scheme-led resolution and regulatory protection. The distinction is principally in where responsibility for handling the case sits, how far the process is standardised across participants, and whether customer outcomes are established through scheme arrangements or regulation.

Exhibit 16

Three levers shape the dispute-resolution process for instant payments



[1] Examples illustrate distinctive elements of each model; markets typically combine participant, scheme and regulatory-level mechanisms

[2] Participant-led resolution via a scheme-provided shared case-management channel (ERS); FIs investigate and resolve disputes bilaterally; not covered in detailed benchmarking

Source: Banco Central do Brasil; Federal Reserve (FedNow); National Payments Corporation of India (NPCI); Pay.UK; Payment Systems Regulator (UK); PayNet Malaysia; The Clearing House (RTP)

A. Participant-led resolution

Under participant-led resolution, **the customer raises the issue with their bank or PSP, and participants investigate and resolve cases bilaterally under common scheme rules, with limited scheme-level workflow automation**. This keeps responsibility for case investigation and resolution largely with individual participants, while the scheme provides the underlying rules and process guidance. The approach allows participants greater control over their operating processes, but can lead to variation in how disputes are raised, investigated, tracked and resolved.

Singapore currently sits closer to this end of the spectrum. PayNow provides scheme rules and process-flow guidance, while participating institutions administer individual cases.

B. Scheme-led resolution

Under scheme-led resolution, **the scheme provides a common case-routing and status framework, standard reason codes and timelines, and participant response obligations, while participant banks continue to assess evidence and determine the outcome**. Scheme involvement can extend beyond case management to mechanisms to trace, block or return funds across participants for defined dispute types.

India: UDIR provides a common dispute workflow across UPI

India's Unified Dispute and Issue Resolution (UDIR) is a **UPI redressal mechanism and platform that standardises dispute handling across participating institutions**. Customers can raise a dispute through their UPI application, after which UDIR creates and routes the case between the relevant payer and beneficiary banks, applies the relevant reason code and turnaround requirement, and tracks the case. The receiving or acquiring bank remains responsible for reviewing the evidence and determining the outcome, rather than the scheme adjudicating the underlying dispute.

UDIR supports different processes for different dispute types. For **technical errors**, UDIR can identify a failed transaction and initiate automatic reversal, coordinating between the recipient bank to confirm non-receipt and the sender bank to reverse the debit. For defined UPI cases, the reversal process is subject to a 5-day turnaround, with RBI requirements providing compensation for delays beyond the prescribed period. This provides a rules-based route for technical errors that can be established from the payment record, reducing the need for manual investigation.

For **consumer or merchant disputes**, such as goods not being delivered, the customer raises the complaint through the UPI application and UDIR routes the resulting chargeback between the payer and acquiring banks. The acquiring bank must accept or reject the relevant P2M chargeback within 15 calendar days, based on merchant-side evidence. A claim can be rejected where the goods and services were provided or a refund has already been processed, while failure to respond can result in deemed acceptance.

For **fraud and scams**, UDIR provides a common route for reporting and handling the dispute between banks, but does not itself provide a central mechanism to trace and block funds across multiple subsequent accounts. Customer protection and liability for certain unauthorised transactions are governed separately under RBI requirements, with defined customer liability depending in part on how quickly the transaction is reported.

Brazil: MED uses scheme infrastructure to coordinate fraud recovery

Brazil's Pix Mechanism for Special Return (MED) illustrates a different form of scheme-led resolution, focused on fraud and specified operational failures rather than commercial disputes over the underlying purchase. When a customer reports fraud, the payer PSP opens an MED case, after which the Pix infrastructure maps where the funds have moved and sends notifications to relevant PSPs. PSPs holding suspected proceeds can block available balances and assess the case.

MED 2.0 extends tracing beyond the first recipient account, with the DICT building a transaction graph to identify subsequent movement of fraud proceeds and directing downstream PSPs towards suspected funds. A receiving PSP can also block a suspicious incoming Pix transaction for up to 72 hours where specified fraud

indicators are present while it investigates. PSPs assess the case within 7 days, and where fraud is confirmed, available funds are returned within 96 hours.

The arrangement places controls around intervention. A customer complaint alone does not automatically trigger a block; the receiving PSP must have a defined basis for suspecting fraud and remains accountable for the decision. This allows scheme-level coordination of recovery while retaining participant responsibility for assessing whether intervention is warranted.

Malaysia: national fraud infrastructure complements payment-scheme processes

Malaysia combines scheme-level dispute handling with national infrastructure for fraud and scam response. The National Fraud Portal (NFP) centralises scam reporting and supports coordinated fund tracing across financial institutions, alongside the National Scam Response Centre. This extends coordination beyond the individual participant and provides a dedicated pathway for time-critical fraud and scam cases.

The NFP therefore complements, rather than replaces, participant and scheme processes. Ordinary consumer or merchant disputes continue to be handled through relevant participant and scheme arrangements, while the NFP supports coordinated intervention and tracing where fraud or scam proceeds may have moved across institutions. The arrangement illustrates how dedicated national infrastructure can sit alongside scheme-level dispute handling to address a specific class of higher-risk cases.

C. Regulatory protection

Under regulatory protection, regulation sets the customer outcome and allocates loss between PSPs for eligible cases, while participating institutions execute the claim. This can operate alongside scheme-level case management and participant investigation, particularly where the customer outcome needs to be defined separately from recovery against the recipient.

United Kingdom: mandated reimbursement establishes a defined outcome for eligible APP scams

The United Kingdom provides an example through its treatment of authorised push payment (APP) scams. The framework covers cases where customers are deceived into authorising Faster Payments, including impersonation, investment, purchase and romance scams. The sending PSP assesses the circumstances of the deception, including the information provided by the customer and evidence from the receiving PSP, to distinguish an eligible scam from a genuine civil or commercial dispute.

Eligible claims are reimbursed up to GBP 85,000 (SGD 146,000), generally within 5 business days, with reimbursement costs generally shared 50:50 between the sending and receiving PSPs. Reimbursement is separate from subsequent recovery against the recipient, establishing a defined customer outcome while leaving the underlying recovery process between participating institutions. SGD equivalents are approximate and are converted at average exchange rates for January to June 2026.

Learnings from global players

The international experience shows that dispute coverage and handling can vary by the nature of the dispute. Technical errors can, in defined cases, be resolved through automated reversal where the payment outcome can be established objectively. Consumer disputes over goods and services may require structured claim or chargeback processes involving merchant-side evidence and participant decision-making. Fraud and scams can require more extensive coordination where funds move across institutions, as illustrated by Brazil's MED and Malaysia's NFP, while the UK illustrates a model where regulation establishes a defined reimbursement outcome for eligible APP scams. The examples also show that greater scheme involvement does not necessarily require central adjudication of every case: common case-routing, evidence requirements, status tracking and service levels can coexist with participant-level investigation and decision-making.

Six design considerations shape how these arrangements are structured: dispute coverage, resolution process, fund recovery, loss allocation, timelines, and governance and mandate. These determine which consumer, merchant, technical, fraud and scam cases are covered, how claims are initiated and investigated, how funds

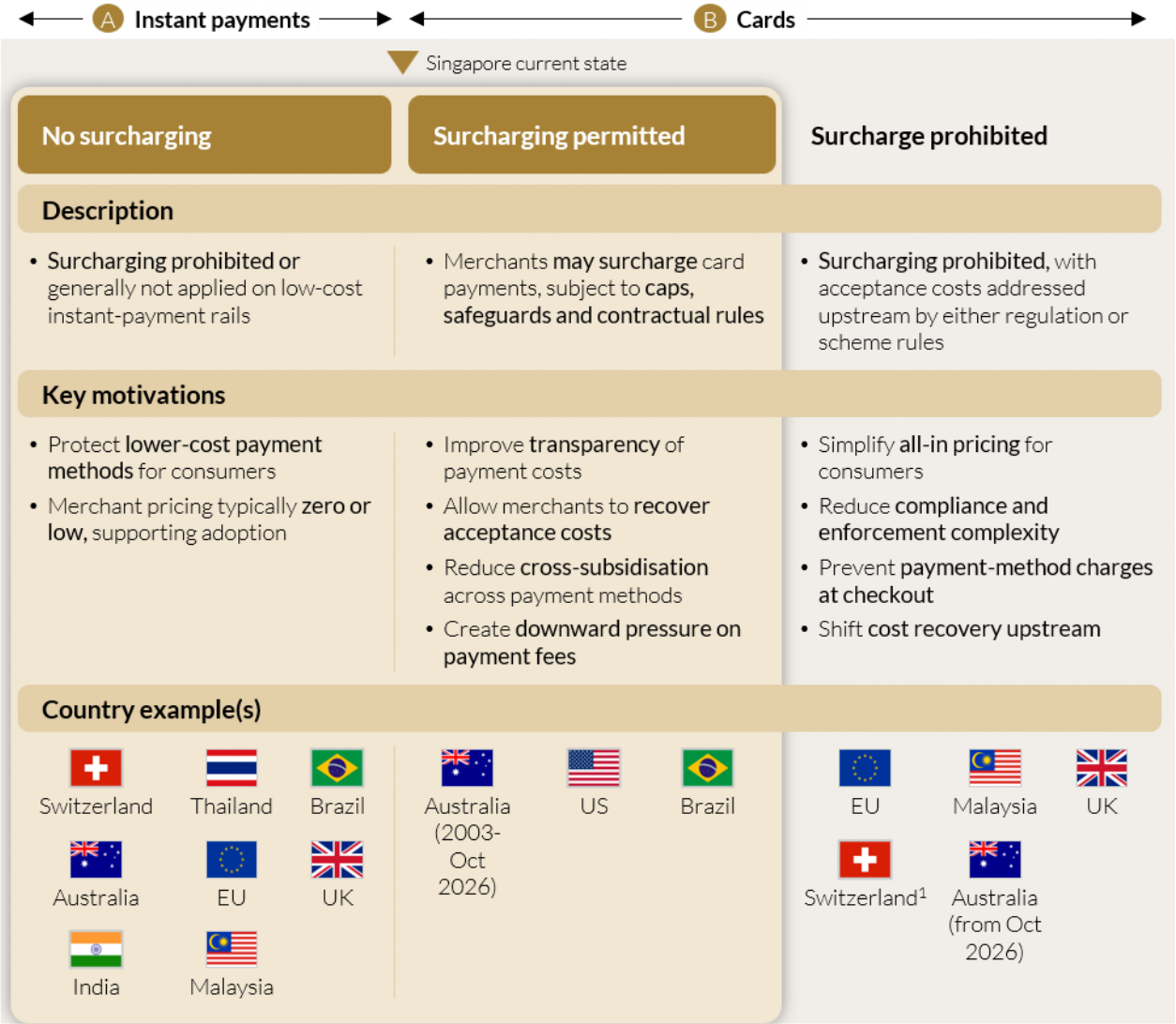
are recovered or reversed, who bears the loss, how quickly cases are handled, and how responsibilities are divided across the scheme, participants and regulation. Greater standardisation can improve consistency and case visibility, but requires common rules, data requirements, operating processes and supporting infrastructure. More coordinated recovery can support tracing and intervention across institutions, while mandated reimbursement can provide greater certainty for eligible customers but increase financial and operational exposure for PSPs. The examples therefore illustrate different combinations of these elements rather than a single model applied uniformly across dispute types.

6b PayNow P2M scheme rules: Surcharging

Across the jurisdictions reviewed, **instant payments are generally surcharge-free**, while approaches to card acceptance costs vary. On domestic instant-payment and QR rails such as PayNow, UPI, Pix, DuitNow and PromptPay, surcharging is prohibited or generally not applied, although merchant and provider fees may still exist. The basis for the surcharge-free treatment differs across markets, ranging from formal scheme rules to low or zero merchant acceptance costs.

Exhibit 17

Instant payments are generally surcharge-free, while card markets differ in how acceptance costs are addressed



[1] Not explicitly prohibited by Swiss law, but is generally restricted or forbidden by card network rules and payment processor contracts

Source: Central bank, regulator and legislative publications across benchmarked markets (Australia, Brazil, EU, India, Malaysia, Switzerland, Thailand, UK, US); card network rules

A. Instant payments: No surcharging

Domestic instant-payment and QR rails are generally not surcharged across the markets reviewed. The customer-facing outcome is similar, but the underlying arrangements differ. In Singapore, the PayNow Scheme Rules prohibit merchants from imposing a surcharge, special charge, finance charge or similar charge on consumers for payments made via PayNow. The prohibition took effect in 2024, following earlier arrangements under which transaction fees on payments received by merchants from end-consumers were generally waived by the major retail banks. Acquiring members are required to educate merchants, implement compliance measures and provide for the obligation in merchant agreements, with non-compliance potentially resulting in suspension or cancellation of PayNow services.

India provides a recent example of addressing merchant acceptance costs without introducing a customer-facing surcharge. From October 2026, selected UPI P2M transactions attract MDR, while transactions up to approximately INR 2,000 (approximately SGD 30) remain at zero MDR. Transactions between INR 2,000 and INR 75,000 (approximately SGD 1,000) attract 0.40% MDR, while transactions above INR 75,000 attract a fixed fee of INR 300 (approximately SGD 4). Selected sectors, including railways, telecom, insurance, fuel and agriculture, are subject to a flat fee of INR 5 (less than SGD 0.10) per eligible transaction. Banks have been strongly advised by the Reserve Bank of India (RBI) to ensure that merchants do not pass MDR charges on to customers, while UPI app providers are prohibited from imposing platform fees or hidden charges on customers. This introduces a merchant-funded pricing mechanism for selected transactions while keeping the customer-facing payment price unchanged.

Other markets use explicit restrictions or rely on underlying economics. In Switzerland, TWINT prohibits surcharging through merchant acceptance terms rather than through a general statutory prohibition. In several other markets, no surcharging is observed on the domestic rail without a formal rule expressly prohibiting it. The international experience therefore shows that a surcharge-free instant-payment proposition can arise either because surcharging is explicitly prohibited or because merchant acceptance costs are sufficiently low that a customer-facing surcharge is less material.

B. Cards: surcharging permitted or prohibited

Card markets provide a useful comparator because there are different views on how the costs of accepting cards should be recovered and who should bear them. Where surcharging is permitted, the surcharge makes the cost of using a payment method visible to the customer and allows merchants, particularly those with thin margins, to recover acceptance costs from the customers generating them. It can also reduce cross-subsidisation, where customers using cash or lower-cost payment methods contribute to the cost of card acceptance through prices. Where surcharging is prohibited, the focus shifts from recovering costs at the point of sale to addressing the underlying cost of acceptance upstream, for example through interchange regulation or scheme and contractual rules.

Australia illustrates how a permitted model can evolve as market conditions change. Surcharging was introduced in 2003 to expose card acceptance costs and reduce cross-subsidisation across payment methods. By 2012, the Reserve Bank of Australia had found that merchants commonly charged above their actual cost of acceptance and applied blended rates across card systems, and a cost-based cap took effect in 2013, limiting the surcharge to the merchant's actual cost of acceptance. Following a further review in March 2026, the Reserve Bank concluded that surcharging had become less effective as a price signal as blended pricing became more prevalent, the rules were difficult to enforce in relation to disclosure and calculation, and declining cash use reduced consumers' ability to avoid the charge. Surcharging on the designated card systems was prohibited from 1 October 2026, alongside measures to address underlying card costs.

Other markets have addressed the underlying cost of acceptance while restricting surcharging. The European Union prohibits surcharging on regulated consumer cards, alongside limits on interchange costs, while Malaysia combines interchange ceilings with a prohibition on card surcharging through scheme rules. Switzerland provides a different example: no-surcharge clauses were prohibited in 2005 to expose card acceptance costs and promote competition between payment instruments, but were permitted again in 2014 once interchange

had fallen to a level at which merchants were substantially indifferent between payment methods. Card surcharging is now restricted through scheme and contractual arrangements rather than legislation.

Learnings from global players

Instant payments are generally surcharge-free, with different approaches used to keep merchant acceptance affordable, particularly for smaller and more price-sensitive use cases. India, for example, applies MDR only above a defined transaction-value threshold, while Malaysia waives MDR for small merchants through participating acquirers. These approaches preserve a surcharge-free customer proposition while recognising differences in the economics of serving smaller merchants and lower-value transactions.

There is no single approach to card surcharging. Some markets have allowed merchants to recover acceptance costs through surcharges, while others have restricted surcharging and addressed costs through interchange regulation, scheme rules or contractual arrangements. Where surcharging is permitted, it has been used not only for cost recovery but also to make payment-cost differences visible and influence payment choice and merchant behaviour.

Surcharge regimes have evolved as the effectiveness of these approaches and underlying market conditions have changed. Australia illustrates this progression, moving from permission in 2003, to a cost-based cap in 2013, and ultimately to prohibition in 2026 as surcharging became a less effective price signal and more difficult to enforce. Other markets have taken different paths, reflecting differences in consumer behaviour, payment-market structure and acceptance-cost economics.

6.12. Focus group discussion findings

5 focus group sessions | 48 participants | September 2026

The Phase 2 focus groups tested user appetite, trust, safety and usability in relation to three targeted customer-facing enhancements: (1) Inclusive QR apps, comprising the tourist and dependant payment apps; (2) deep-linking; and (3) QR interoperability via SGQR+ switch. Overall, the findings were encouraging and provided useful direction on the conditions that would support adoption.

Inclusive QR apps. The tourist payment app addressed a clear use case for international visitors, particularly at hawker centres and smaller merchants where visitors may otherwise need to fall back to cash. Participants valued the convenience of being able to pay by QR "like a local". Interest was positive, with adoption depending on simple onboarding, broad merchant acceptance, transparent fees and exchange rates, and an easy way to recover any unused funds at the end of the trip. For the dependant payment app, participants recognised potential value in spending controls and family oversight, particularly for users who may benefit from additional support. However, appetite for a standalone app among the financially dependent participants tested was limited, with participants placing importance on maintaining privacy, autonomy and control. Further validation with caregivers and account holders would be valuable.

Deep-linking. There was clear appetite for a simpler e-commerce PayNow journey that removes manual steps such as saving a QR code, switching applications and importing the QR into a banking app. At the same time, participants placed importance on retaining familiar trust and safety cues. In particular, automatically opening a banking app prompted questions among some participants about security and control. Visible merchant identity, bank authentication and clear payment confirmation therefore remain important elements of a streamlined journey. Merchant views on implementation were mixed, reflecting differences in the incremental value the solution would provide across different business contexts, and the importance of customer education.

QR interoperability via SGQR+ switch. Participants responded positively to broader QR acceptance and the ability to pay without first determining whether a particular QR supports their bank or preferred payment application. The discussions also highlighted that many consumers do not currently distinguish between different QR schemes, suggesting that the value of interoperability lies less in educating users about QR types and more in making those distinctions less relevant to the payment experience. Merchants also welcomed the potential to accept a wider range of payment methods through a single QR, provided this did not introduce significant additional transaction fees.

Across the three enhancements, a consistent theme was that convenience is most valuable when accompanied by trust, control and clear confirmation. The findings therefore support continued development of simpler and more inclusive payment journeys, while highlighting specific design and implementation considerations to address as the solutions are further developed and tested.

Exhibit 18

Focus group discussions signal demand for PayNow Gen2 solutions

Features valued the most | Concerns raised

1 Inclusive QR apps



Separate apps for visitors and dependants to provide access to Singapore's QR ecosystem

Tourists

Excitement
Trust & Safety

- Tourists valued **the convenience** (avoiding cash and keeping travel spend in one place) and the **feeling of "spending like a local"**
- The proposition is most compelling where **cards are less convenient or not accepted,** rather than as a replacement for cards across all spend
- **Leftover funds** after the trip are a **bigger concern** than initial set-up. Transfer to home account/card should be **available with limited to no fee**

Dependants

Excitement
Trust & Safety

- Clearer use case is for vulnerable users, particularly children/teenagers and elderly dependants (vulnerable to scams)
- Limited appetite for senior and younger populations, as they value privacy and do not want to feel controlled
- Would only consider it if promotion/cashback are better, otherwise there is no value-add to existing propositions

2 Deep-linking



Mobile payment journey auto-directing customers from the merchant website/app to the banking/payment app

Customers

Excitement
Trust & Safety

- **Real appetite** to remove the manual process of saving a QR picture and uploading it to the banking app
- **Feeling safe from fraud is the primary concern** as automated bank app opening feels less secure (the **current friction brings a sense of security**)
- **Personalisation** (automatically detecting which apps are installed on the phone) raised **privacy concerns**

Merchants

Excitement
Business impact

- **Higher appeal for high-volume** merchants, **lower appeal for low-volume** merchants ("little value in saving a few seconds on higher ticket payments")
- Customer education on a new process is a concern (customers are **wary of new interfaces due to scams)**
- Benefits for merchants would **not be enough to justify an additional fee to pay**

3 QR interoperability via SGQR+ switch



Single QR code working with all banking and payment apps in Singapore

Customers

Excitement
Trust & Safety

- **Appetite for interoperable QR is high,** eliminating the need to ask whether their bank is supported
- **Most participants** were not aware of the differences in QR stickers and do not have a habit of checking which banks are supported
- **Limited appetite** to scan a QR code **directly from the phone camera app** instead of through the banking/payment app

Merchants

Excitement
Business impact

- **Broad excitement for universal** acceptance motivated by a real gap: SGQR does not cover every wallet, **costing tourist and local sales**
- Universal QR acceptance would **reduce exceptions,** but **it will not remove the need for cash entirely**
- **Unanimous demand** for **instant bank-side confirmation** of payment (e.g., removing the need to take a picture of customers' payment confirmation)

6.12.1.Research objective and scope

The Phase 2 focus groups were designed to explore the relevance, usability and trust considerations associated with three PayNow Gen2 enhancements: Inclusive QR apps (the dependant payment app and tourist payment app), deep-linking for mobile checkout, and QR interoperability via SGQR+ switch. Discussions examined current payment behaviours, participants' responses to the proposed concepts, and the conditions that could support adoption, including convenience, control, security, economics, onboarding and confirmation.

As qualitative research with small, purposively recruited groups, these findings are intended to provide directional insight into user reasoning, preferences and design conditions rather than population estimates.

6.12.2.Methodology and participant profile

Five moderated focus group sessions were conducted between 11 and 17 September 2026. The sessions combined qualitative discussion with structured rating, ranking and prioritisation exercises. Merchants were recruited as a single cohort of 12 participants and split across two sessions to maintain an effective discussion-group size.

Exhibit 19

User research with 48 participants across four cohorts to test key concepts

Cohort	N	Profile	Concepts tested
International visitors	12	Recent visitors from six priority markets without an existing cross-border QR payment linkage with Singapore (Australia, Mainland China, Japan, South Korea, the UK and the US); primarily used cards in Singapore and had used cash at least once	Inclusive QR apps (Tourist app)
E-commerce users	12	Singapore residents or long-term pass holders; active mobile shoppers across age bands	Deep-linking; QR interoperability
Financially dependant participants	12	Younger dependant subgroup: 6 participants aged 18-25 without salaried income; older dependant subgroup: 6 participants aged 65+; all had used PayNow QR in the prior three months	Inclusive QR (Dependant app); QR interoperability; Deep-linking
Merchants	12	Micro merchants with payment decision-making authority across F&B, retail and services; conducted across two sessions	QR interoperability; Deep-linking; Selected dependant payment app questions (from a caregiver lens)

Payment habits varied by context. International visitors generally defaulted to cards and used cash where cards or home-country apps were not accepted. E-commerce users moved between cards and PayNow depending on convenience, rewards and fees. Financially dependent participants were comfortable with digital payments, with tap-to-pay particularly familiar among the younger dependent subgroup. Merchants accepted PayNow across a range of business models, while their payment-verification practices varied according to transaction volume, channel and operating setup.

6.12.3.Findings by enhancement

Inclusive QR apps – Tourist payment app

The tourist payment app was positively received as an opportunity to widen access to Singapore's QR payment ecosystem for international visitors, particularly at hawker centres, food courts and smaller merchants where visitors may otherwise rely on cash. Participants valued the convenience of being able to pay by QR "like a local", while retaining a digital payment journey for everyday spend.

The proposition was most compelling as a complement to cards rather than a replacement for them. Cards already worked well for most participants across much of their spending in Singapore. The incremental value of the tourist payment app therefore lay in enabling digital payment where cards or visitors' home-country payment apps were less convenient or not accepted.

"I would consider it on my next trip to Singapore, particularly because it unlocks smaller hawker merchants with one convenient cashless tool." — International visitor

Participants generally favoured a simple setup linked to an existing home-country card and mobile number. This would reduce the need to obtain a Singapore SIM or maintain a separate preloaded balance. Transparent foreign-exchange rates and fees, broad merchant acceptance and a straightforward onboarding experience were also important conditions supporting adoption.

Where the app requires users to hold a balance, participants placed particular importance on being able to recover unused funds easily at the end of the trip.

"The bigger problem for me... would be leaving money in the app at the end of the trip." — International visitor

Participants were generally open to registration requirements where these were proportionate and clearly explained. Providing passport information prompted questions about the app operator, security, accountability and the treatment of personal information after the trip. Clear information on these areas would help reinforce confidence in the proposition.

Inclusive QR apps – Dependant payment app

The dependant payment app highlighted potential value in spending controls, payment notifications and family oversight, particularly where a family member may benefit from additional support in managing payments. Participants recognised the potential usefulness of configurable spending limits and notifications, while a separate account could also provide an additional layer of control over spending.

"Having that parental or caregiver oversight ensures that elderly family members do not get scammed." — Participant caring for an elderly parent

At the same time, financially dependent participants placed importance on privacy, autonomy and control over their own spending. This was particularly relevant for the older dependent subgroup, most of whom relied at least partially on their own savings and valued maintaining their financial independence.

"Useful but intrusive." — Participant from the older dependent subgroup

Appetite for the standalone app as tested was limited, with participants questioning whether a separate application offered sufficient incremental value over capabilities they already associated with established banks, linked accounts and existing banking tools. Trust in the provider was also important. Participants were more familiar with established banking relationships and less inclined to adopt a standalone proposition without a clear additional benefit.

"Banking apps already have these functions. There's no problem that needs solving here." — Participant

The discussions therefore suggest that the underlying use case and the standalone app proposition should be considered separately. Spending controls and oversight may offer useful value, but the proposition will need to demonstrate clear incremental benefit while preserving the autonomy of financially dependent users.

A supplementary perspective came from merchants considering the concept from a parent or caregiver lens. Some saw value in spending controls and oversight; however, this was not a dedicated caregiver sample. Further validation with caregivers and account holders who would fund the account and configure the controls would therefore be useful.

Deep-linking for online checkout

Participants saw clear value in simplifying the PayNow e-commerce journey by removing manual steps such as saving a QR code, leaving the checkout journey, opening a banking app and importing the QR code to complete payment.

"It really saves the hassle, when I want to buy something, you just want to get it done really quickly." — Participant

The opportunity was therefore clear: make PayNow checkout simpler and less manual, while retaining the familiar elements that help users feel confident when making a payment.

Participants placed particular importance on completing authentication within their trusted banking environment and seeing the official or legal merchant entity name before authorising payment. Several described the merchant name as an active recipient-verification and anti-scam check rather than simply useful information.

"To have the payment page be directly linked to my bank app can also be a bit worrisome. With this seamless movement… it kind of removes that disconnection which brings safety." — E-commerce participant

Automatically transitioning from a merchant website into a banking app was unfamiliar to some participants and prompted questions about trust and control. The current journey involves more steps, but those steps can also create a sense of separation between the merchant environment and the banking environment. This highlights an opportunity to make the deep-linked transition clearly recognisable, trusted and bank-authenticated.

Participants were generally more comfortable considering PayNow for smaller, everyday purchases, while cards remained attractive for higher-value purchases because of familiarity, rewards and perceived dispute or purchase-protection benefits.

"Whenever a payment interface changes, customers become hesitant and ask questions: 'Is this link legitimate? Will my bank account get hacked?'" — Merchant participant

Merchant perspectives varied with their operating context. Merchants serving faster-moving or repeat-customer flows saw greater value in a shorter payment journey, while those with lower transaction frequency saw less incremental benefit over existing processes. Across the cohort, the most tangible benefits were faster customer completion and reliable payment confirmation. Adoption would also depend on the solution's coverage across merchants' sales channels and on preserving PayNow's low-cost acceptance characteristics.

"In high-volume environments, cutting steps and eliminating manual data entry speeds up queues and reduces human error." — Merchant participant

QR interoperability via SGQR+ switch

Participants welcomed the prospect of broader QR acceptance and being able to pay without first determining whether a particular QR supports their bank or preferred payment application.

"I always have to ask first… 'Can I use [my] bank here?'" — Participant

Many participants did not distinguish between the different QR schemes they encountered or routinely check which payment applications were supported. Some initially assumed that different QR displays were functionally interchangeable. This suggests that the strongest value of interoperability is not necessarily to increase users' understanding of QR schemes, but to make those distinctions less relevant to the payment experience.

"Why are you showing three different QR codes? They all look identical to me." — E-commerce participant

Merchants also welcomed the opportunity to accept a wider range of payment methods through a single QR, including payment methods used by international visitors. Broader acceptance could reduce situations where customers need to switch payment methods because their preferred app is unsupported, while reducing the need for merchants to maintain separate acceptance arrangements. Merchant support remained linked to economics, with a preference for keeping additional transaction costs low.

"Anything that makes payments smoother and automated is a win-win for both sides." — Merchant participant

A related concept — beginning the payment journey through the phone's native camera rather than first opening a banking or payment app — received a more cautious response from financially dependent participants. They preferred retaining the familiar process of opening a trusted payment app themselves and authenticating within that environment.

"If I don't look at my phone, it opens… anyone can use my phone." — Financially dependent participant

Interoperability and camera-native payment initiation should therefore be treated as distinct design questions. Broader interoperability was positively received, while changes to how the payment journey is initiated require careful consideration of familiar authentication patterns.

6.12.4.Cross-cutting observations

Simpler journeys are most valuable when they preserve trust and control

Across the three enhancements, participants welcomed opportunities to make payment journeys simpler, broaden acceptance and reduce unnecessary manual steps. At the same time, they valued familiar cues that help them understand who they are paying, authenticate within a trusted environment and confirm that the transaction has been completed successfully. The opportunity is therefore not simply to remove steps, but to remove low-value friction while preserving the trust cues that users value.

Clear payment confirmation strengthens confidence for both consumers and merchants

Reliable confirmation emerged consistently across the discussions. Consumers wanted reassurance that the payment had left their account, reached the intended merchant and been recognised by the merchant journey. Merchants valued dependable confirmation that funds had been received, particularly where this could reduce reliance on customer screenshots, manual checks or later reconciliation. Automated, timely confirmation should therefore be considered a valuable capability in its own right.

New propositions are most compelling where they close a real gap against already-strong habits

Participants consistently measured each concept against payment methods they already find fast and familiar (cards, wallets, existing banking apps and PayNow), with some drawing direct parallels to saved-card checkout and app-based fuel payment. Appetite was strongest where a concept closed a specific, recognisable gap rather than offering a different way to do something that already worked: enabling international visitors to access local QR payments, removing manual steps from e-commerce checkout, broadening QR acceptance, or providing greater certainty that a payment had been completed. Where no such gap existed, participants saw less reason to switch.

Different user contexts call for different design choices

- E-commerce users generally preferred to see a full list of participating apps on the bank or wallet selection screen, while financially dependent participants preferred a shorter list showing only payment apps already installed on the phone.
- International visitors saw the tourist payment app primarily as a way to reduce reliance on cash at hawker centres and smaller merchants, complementing rather than replacing cards where cards already work well.
- Younger and older dependent subgroups differed in their familiarity and expectations around digital payment journeys, reinforcing the importance of simple journeys and familiar authentication patterns.

6.12.5.Enhancement opportunities and further validation

The findings highlight a focused set of opportunities to consider as the three enhancements are developed and tested further:

- Inclusive QR apps (Tourist payment app): prioritise wider access to local QR payments through a simple, card-linked proposition; support home-country mobile numbers; provide transparent FX and fee information; and make any unused balance easy to recover.
- Inclusive QR apps (Dependant payment app): further validate the value of spending controls, notifications and family oversight while preserving privacy and autonomy for financially dependent users; test the proposition directly with caregivers and account holders who would fund the account and configure controls.
- Deep-linking: focus on removing low-value manual steps while preserving trusted payment cues, including clear merchant identification, bank-side authentication and visible confirmation. Continue to test how the transition into the banking app can be made familiar and recognisable, and ensure the proposition delivers practical value for merchants without undermining PayNow's low-cost positioning.

- QR interoperability via SGQR+ switch: focus the proposition on making scheme and app differences less relevant to users, while treating camera-native payment initiation as a separate design question. For merchants, maximise the reach and simplicity of a single QR while keeping additional transaction costs low.

6.12.6.Limitations

This is qualitative research based on small, purposively recruited samples. Findings should be read as directional themes and behavioural reasoning rather than population-representative estimates.

The dependant payment app was tested primarily with financially dependent participants; the caregiver and account-holder side, including those who would fund the account and configure controls, requires further dedicated validation.

6.13. Industry perspectives and design considerations

6.13.1.Key findings from industry engagement

Industry engagement built on the priorities identified in Phase 1 and helped translate the PayNow Gen2 enhancements into practical design considerations. Workshops brought together banks, payment service providers, infrastructure operators, card networks, marketplaces and government agencies to test the opportunities, understand implementation considerations and identify areas where further ecosystem coordination would be required.

Three messages emerged consistently across the discussions:

- Participants see value in building on PayNow's existing strengths, with familiarity and trust important to preserve as new payment journeys are introduced
- Many of the opportunities lie in the capabilities around the payment itself, including easier access, simpler and more consistent payment journeys, clearer resolution when something goes wrong, broader interoperability, and processing models better matched to different payment needs
- Participants emphasised that common standards, rules, commercial arrangements and responsibilities need to be developed alongside the capabilities they support.

The workshops explored the enhancements as part of the broader evolution of PayNow across the Phase 1 priorities: making payments more seamless, safe and inclusive; extending interoperability across schemes and borders; and enabling new consumer, business and government use cases.

Seamless, safe and inclusive payments

Industry feedback highlighted opportunities to make PayNow more accessible and easier to use across a wider range of payment journeys. For visitors who may not have a local payment application, participants identified awareness, simple onboarding and broad merchant acceptance as important to making cashless payments more accessible during a short stay. For e-commerce, participants saw an opportunity to reduce the manual steps between checkout and payment by moving customers directly into their banking or payment application. For P2M disputes, participants highlighted the value of a more systematic and predictable process, with different approaches for consumer disputes, fraud and scams, and technical failures.

Across these opportunities, consistency and trust were recurring design considerations. Participants highlighted the need for recognisable and reliable journeys across institutions and devices, trusted verification for payment links, and clear visibility before customers authorise a payment. They also emphasised that common standards should sit alongside flexibility for participants, with roles and responsibilities across banks, merchants, PSPs and intermediaries defined as part of the operating model.

More connected QR payments in Singapore and overseas

Industry feedback reinforced the opportunity to make QR acceptance more consistent, recognisable and scalable across schemes and markets. Participants saw value in a common acceptance mark and in enabling customers to use participating payment applications more broadly, while preserving existing arrangements that work well today. For cross-border payments, the discussion considered how bilateral connectivity could coexist with more scalable shared infrastructure, including how new connections could avoid repeating integration and operating arrangements corridor by corridor.

The discussions also highlighted that interoperability extends beyond connectivity. Routing, participation, settlement, foreign exchange, commercial arrangements, dispute handling and scheme governance need to work together. Participants raised the importance of balancing a common operating model with participant choice, ensuring viable economics for both issuer and merchant sides, and aligning the emerging SGQR+ model with existing bilateral arrangements and other multilateral initiatives so that capabilities are built coherently rather than in parallel.

Enabling Singapore's future economy

As PayNow is used more extensively for business and government payments, participants highlighted opportunities to match payment capabilities more closely to the needs of the underlying use case. For higher-value payments, this includes exploring additional headroom for defined use cases such as government payments, supported by appropriate eligibility and risk controls. For large-scale disbursements, participants highlighted the value of completing payouts reliably within the required window rather than requiring every transaction to be processed in real time. Richer payment information can also support more automated reconciliation and downstream processing.

The design challenge is therefore not simply one of capacity. Participants highlighted the need to consider risk, liquidity and processing capacity across the wider ecosystem. Higher transaction limits need to be considered alongside safeguards and participant liquidity requirements, while high-volume processing needs to account for receiving-bank capacity as well as the central rail. The discussions also pointed to opportunities for more fit-for-purpose processing models, including differentiated treatment for different transaction types and processing requirements.

A common thread across the sessions

Across the workshops, a consistent message was that PayNow's next evolution will depend on capabilities and the common arrangements around them developing together. Participants supported building on existing infrastructure and relationships where these work well, while introducing shared capabilities where greater scale or consistency is needed. They emphasised that standards, governance, commercials, risk controls and participant responsibilities should be designed alongside each capability, rather than added later.

The discussions also demonstrated strong willingness across the ecosystem to contribute to the next stage of development. Participants offered views on alternative models, raised practical implementation considerations and identified interest in participating in early testing and subsequent design work. The workshops therefore provided not only input into the design of the enhancements, but also a basis for continued ecosystem collaboration as the proposals move from exploration into testing and implementation.

6.13.2.Key design considerations

As the enhancements progress from design and testing towards implementation and broader adoption, a number of practical questions will need to be resolved with the relevant stakeholders. These span five areas: user experience; rules, standards and safeguards; operating models and participation; commercial arrangements; and architecture and interoperability. The considerations below set out the principal questions to be addressed and will inform the next stages of design, testing and implementation.

User experience

Making the propositions simple, clear and useful in practice

- Trust and payment confirmation: whether industry-wide merchant authentication, supported by a merchant registry and common QR standards, can make payment journeys trusted by default, with only authenticated merchants able to generate valid payment instructions and clear merchant identity presented to customers.
- Customer education: how users can be made aware of new payment journeys and understand the relevant cues, safeguards and steps as the capabilities are introduced.
- Further validation: where additional user research could help refine specific propositions, including the caregiver and account-holder experience for financially dependent residents

Rules, standards and safeguards

Establishing common rules, standards and controls for safe, consistent and scalable operation

- Common standards: which technical and operating standards could be common across the local ecosystem and where participant flexibility should remain, including how common data requirements can accommodate specific business needs without compromising straight-through processing (STP)
- Governance: how common standards and rules could be maintained as the capabilities and ecosystem evolve, including how data privacy and governance should be addressed as richer payment data, such as invoice details, is introduced.
- P2M dispute resolution: how far scheme-level standardisation could extend within the local ecosystem, and how responsibility for individual case investigation, compensation and recovery could be allocated across banks, PSPs and other participants.
- Cross-border arrangements: how domestic arrangements could interface with foreign schemes and networks, recognising that arrangements may differ.
- Fraud and scams: what safeguards, authentication and monitoring arrangements could be needed for new payment journeys and evolving fraud and scam risks.
- High-value and high-volume payments: what liquidity, processing capacity and operational controls would be needed to support higher-value transactions and large-scale disbursements, including exception handling and contingency arrangements. For high-value payments, whether common guidance is needed on customer-requested limit increases, enhanced authentication, cooling-off periods and participant approvals. For high-volume payments, whether differentiated processing would require common rules on payment-priority classification, service levels and communication across participants.

Operating model and participation

Clarifying how shared capabilities are operated and how participation can broaden

- Centralised deep-linking facility: the potential role, scope and governance of a centralised facility, including which functions would sit with the facility and which would remain with participating banks and PSPs, and whether a common industry infrastructure, similar to the trust and authentication model used in Open Banking, could improve efficiency, consistency and trust across participants.
- Participation
  - Deep-linking: how participation could broaden beyond the initial group of participants to a broad range of banks, including foreign banks operating in Singapore, and non-bank providers.
  - QR interoperability via SGQR+ switch: which schemes and participants would need to be included for the interoperable QR proposition to provide broad acceptance, including the role of significant schemes.

Commercial model

Balancing accessibility with sustainable economics

- Shared infrastructure costs: how the costs of the switch and other shared capabilities could be funded and allocated across participants, and whether the model could remain commercially viable, including whether greater consolidation of QR infrastructure could reduce duplicated industry costs.
- Merchant economics: how fee-sensitive merchants could remain covered where interoperable acceptance introduces additional costs.
- User pricing: how pricing could differ between local and international users, including transparency on any foreign exchange (FX) mark-up and other fees, and choice where a fee applies.

- SGQR+ switch commercial approaches: options that could support the costs of the switch while preserving access for fee-sensitive merchants, including:
    - Transaction-value threshold: no MDR below a defined transaction value, with a fee applying above the threshold. UPI provides an example of differentiated pricing by transaction type and value.
    - Path-based MDR: whether MDR could vary depending on whether a transaction remains within one network (on-us) or is routed between networks through the SGQR+ switch (off-us).
    - International-user fee: whether international users could bear a fee while local users and merchants do not, with users able to choose another payment method. Considerations include transparency at the point of payment, how the fee is shared between the scheme and banks, and its interaction with PayNow's surcharge-free position for consumers.

Architecture and interoperability

Determining how the capabilities fit within the wider payment ecosystem

QR architecture and transition

- Single interoperable QR: whether Singapore should move towards a single interoperable QR.
- Transition: how existing QR labels and arrangements could transition, including whether existing labels could be converted automatically without requiring merchants to replace them, and how long existing arrangements could continue to be accepted.
- Scheme participation: whether participation by significant schemes would be needed to achieve broad interoperability.
- Proprietary labels: how proprietary QR labels that remain could coexist with the interoperable QR.
- Labels and terminology: how QR labels and terminology could be presented consistently.
- Merchant coverage: how fee-sensitive merchants could remain covered, including whether a free option should remain available.

SGQR+ switch and cross-border connectivity

The remaining design questions specific to the SGQR+ switch, including routing, settlement, the interaction with existing bilateral arrangements and cross-border connectivity, are set out in Section 4.3.

Future payment models

- Extensibility: whether the architecture being developed for PayNow can accommodate emerging payment models, including automated and agentic payment journeys, without requiring fundamental changes to the underlying payment rail.
- Trusted identification: whether capabilities developed for trusted merchant identification and deep-linking could provide useful building blocks for future automated payment journeys.

These considerations will be refined through further design, testing and industry engagement as the enhancements progress towards implementation and broader adoption.

7. Glossary

Term	Definition
Agentic commerce	A payment model where AI agents can shop, schedule, and pay on a user's behalf under pre-set rules
AML/CFT	Anti-money laundering and countering the financing of terrorism: measures to prevent and detect the use of financial services for money laundering and terrorist financing
API	Application programming interface: a set of technical rules that lets software systems exchange data and instructions. APIs allow payment functions to be embedded into apps, platforms, and business software
APP	Authorised push payment: a payment that the customer authorises, including where the customer has been deceived into authorising it (an APP scam)
Auto-reconciliation	The automatic matching of a payment to an invoice or accounting entry, which is enabled by structured payment data, such as invoice numbers and references
BIRU	Behavioural Insights and Research Unit at the Monetary Authority of Singapore (MAS)
BLOOM	Borderless, Liquid, Open, Online, Multi-currency is an MAS initiative, launched in October 2025, to enable settlement in tokenised bank liabilities and well-regulated stablecoins across currencies and borders
Bulk disbursement	A large batch of outgoing payments, such as payroll, grants, or payouts
Cross-border payment	A payment where the payer and payee are in different countries. These payments usually involve foreign exchange and compliance checks and often require interoperability between payment systems across jurisdictions
Deep-linked checkout	Seamless redirection from merchant checkout into banking or wallet apps, with pre-filled payment details and in-app payment approval
Deep-linking	Taking a customer directly from a merchant or government checkout into their banking or payment application, with payment details pre-filled for review and authorisation
Delegated payment	A payment made by one party, such as an AI agent, on behalf of another under agreed rules and controls
DICT	Brazil's central Pix directory that maps payment keys to account details
Dispute resolution framework	The scheme rules and processes used to handle contested, mistaken, or unauthorised payments
DLT	Distributed ledger technology, a shared, synchronised record of transactions maintained across multiple network nodes rather than in a single central database
DuitNow	Malaysia's national instant payment and QR scheme. This paper uses DuitNow as a benchmark for interoperable QR acceptance and cross-border linkage design
eGIRO	Electronic GIRO: the electronic set-up of GIRO direct debit arrangements used for recurring payments in Singapore
ERP	Enterprise resource planning: business software used to manage functions such as finance, procurement, and billing

Term	Definition
FAST	Fast and Secure Transfers: Singapore's real-time funds transfer rail
FAST-LITE	Proposed cost-optimised micropayments rail designed to support 24/7 availability, immediate confirmation and interoperability with FAST and PayNow at lower per-transaction cost
FIDReC	Financial Industry Disputes Resolution Centre: an external redress body for disputes between consumers and financial institutions
FIN	Foreign Identity Number: a Singapore identifier issued to eligible non-citizens
Future Payment Rails Blueprint	The blueprint that follows the PayNow Gen2 work and sets out the longer-term foundations of Singapore's payment infrastructure, as discussed in Chapter 5
FX	Foreign exchange: the conversion of one currency into another
Gen2	Short for PayNow Generation 2, the next phase of PayNow's development. This paper covers Phase 2 of that study
GIRO	Interbank GIRO: Singapore's batch payment system for direct credits and direct debits
High-value payment	Higher-value PayNow use cases; in this instance, payments above SGD 200,000 to government agencies
High-volume payment	Large-scale or bulk payment runs, such as government payouts and payroll, involving very large numbers of transactions that need to be completed within a defined payment window
Instant payment	A payment that is transferred and made available to the recipient almost immediately, typically within seconds, and is available 24/7
Interoperability	The ability of different payment systems, schemes, or providers to work together; in this paper, this includes domestic QR interoperability and cross-border linkages
MCC	Merchant category code: a standard numeric code assigned to a merchant that classifies its primary type of business or goods and services provided
MDR	Merchant discount rate: the fee a merchant pays for accepting a payment, usually expressed as a percentage of the transaction value
MED	Pix Mechanism for Special Return: Brazil's mechanism for returning funds in cases of suspected fraud or specified operational failures
MEPS+	MAS's real-time gross settlement (RTGS) system for Singapore dollar interbank funds transfers, using SWIFT message formats and incorporating automated intraday liquidity facilities and gridlock resolution. It settles the high-value layer of Singapore's domestic payments infrastructure
Micropayment	A small-value payment, potentially sub-cent, such as those arising from usage-based services, connected devices and automated transactions, which may require a low-cost processing model
MSME	Micro, small and medium-sized enterprise
NFC	Near-field communication: technology enabling short-range wireless communication between compatible devices, including mobile phones and contactless payment terminals

Term	Definition
NFP	National Fraud Portal: Malaysia's portal that centralises scam reporting and supports coordinated fund tracing across financial institutions
NIPL	NPCI International Payments Limited: the international arm and wholly owned subsidiary of the National Payments Corporation of India (NPCI), responsible for NPCI's international payment business
NRIC	National Registration Identity Card: Singapore's national identity number for citizens and permanent residents, which can be used as a PayNow proxy
Off-us transaction	A transaction in which the issuer and the merchant acquirer have no direct relationship, so that the payment has to be routed between them
P2M	Person-to-merchant: payments made by individuals to merchants
P2P	Peer-to-peer: payments between individuals. PayNow was launched first as a P2P funds transfer service
PayNow	Singapore's national proxy-based payment service that enables retail customers of participating banks and major payment institutions (MPI) to send and receive Singapore dollar funds from one bank or e-wallet account to another in Singapore by using just their mobile number, Singapore NRIC/FIN, or Virtual Payment Address (VPA)
Pix	Brazil's instant payment system operated by the Banco Central do Brasil
Programmable settlement layer	A proposed shared settlement capability using tokenised Singapore dollar bank deposits, under which payments can be released automatically when predefined conditions are met
PromptPay	Thailand's instant payment system, which is one of PayNow's live cross-border linkages mentioned in this paper
Proxy	A simple identifier linked to an account, such as a mobile number or UEN, used instead of bank account details
PSP	Payment service provider: a provider that enables payment services for consumers, merchants, or businesses. In this paper, PSPs include both bank and non-bank players
QR interoperability	The ability to use one QR payment method or app consistently across different QR acceptance points
RBI	Reserve Bank of India, India's central bank
Resilience	The ability of a payment system to continue operating reliably during disruption
Sandbox	A controlled environment in which capabilities are tested before wider implementation
Scheme	The rules, standards, governance, and operating arrangements that govern how a payment service functions
SGQR	Singapore's unified QR code standard for e-payments, which supports acceptance across participating payment schemes at the same merchant location
SGQR+	The service that extends SGQR by enabling merchants to accept payments from multiple participating schemes through a single acquirer

Term	Definition
SGQR+ switch	The proposed national routing switch that would connect existing payment schemes and merchant networks at the routing layer, while retaining their underlying infrastructure and operating arrangements
SME	Small and medium-sized enterprise
SPaN	Singapore Payments Network: provides scheme governance and oversight for PayNow person-to-merchant dispute resolution (see Section 4.6)
SPI	Brazil's instant payment settlement infrastructure for Pix. This paper refers to SPI as part of Pix's core infrastructure
Structured data	Standardised payment information carried with a transaction, such as invoice identifiers, references, or category codes
SWIFT	Society for Worldwide Interbank Financial Telecommunication: the provider of the messaging standards used for interbank payment messages
Throughput	The volume of transactions a system can process over a period of time
Tokenised deposit	A bank deposit represented as a digital token, as used in the proposed programmable settlement layer
Tokenised payment credentials	Digital tokens representing a customer's payment authorisation or linked bank account without exposing account details to merchants. They can support recurring payments through pre-authorised mandates and contactless payments using device tokens
TWINT	Switzerland's mobile payment scheme, referred to in this paper in the context of surcharging restrictions
UDIR	Unified Dispute and Issue Resolution: an online dispute resolution mechanism for handling UPI complaints and disputes
UEN	Unique Entity Number: the standard identification number for businesses and other entities in Singapore, which can be used to receive PayNow payments
UPI	Unified Payments Interface: India's instant payment system, operated by the National Payments Corporation of India (NPCI)
VPA	Virtual Payment Address: a PayNow proxy that allows individuals to link a mobile number to a major payment institution (MPI) e-wallet while keeping their existing PayNow registration, which is linked to a bank account

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Amazon

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