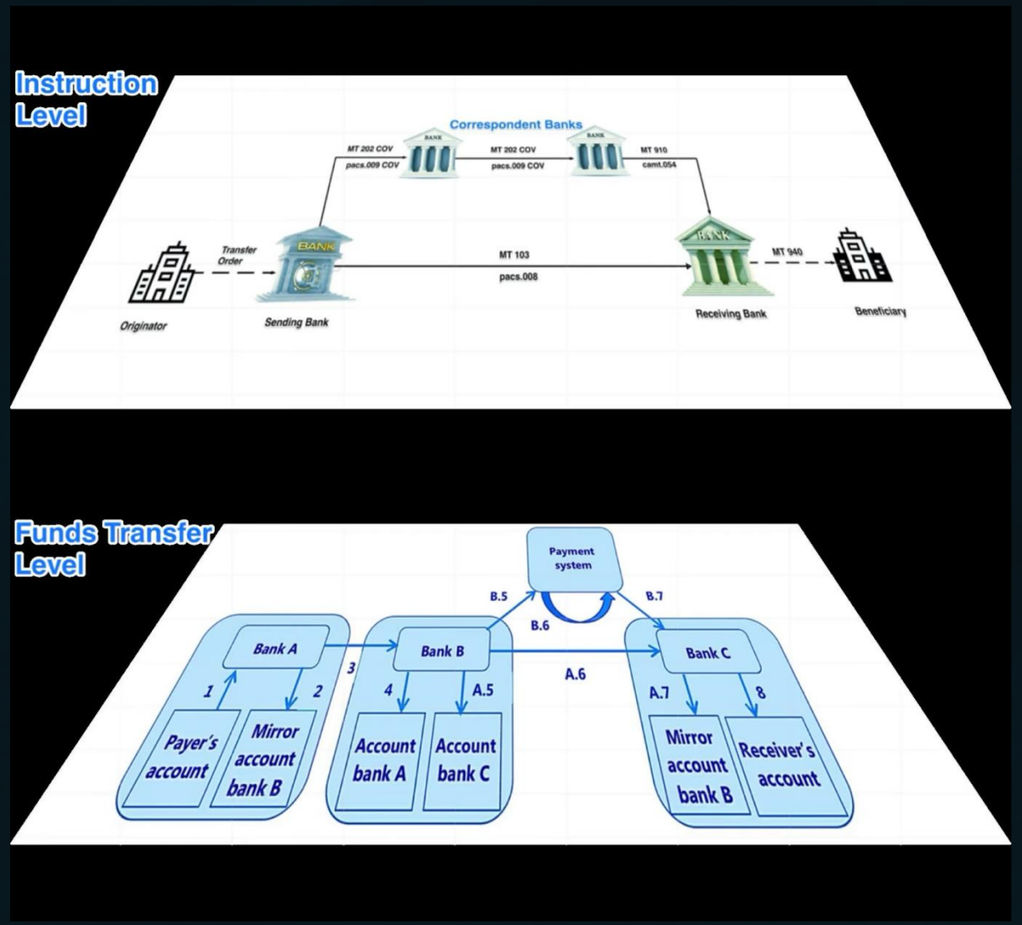
Interbank Value Transmission

An Expanded Exegesis of Instruction vs Funds-Transfer Layers across Correspondent, RTGS and RTP Paradigms

A comprehensive analysis of modern payment infrastructure systems and their interconnected operational frameworks.

by Michael Herzog

The Two-Layer Framework



Layer 1 – Instruction

Legal mandate, message-based, void of value displacement

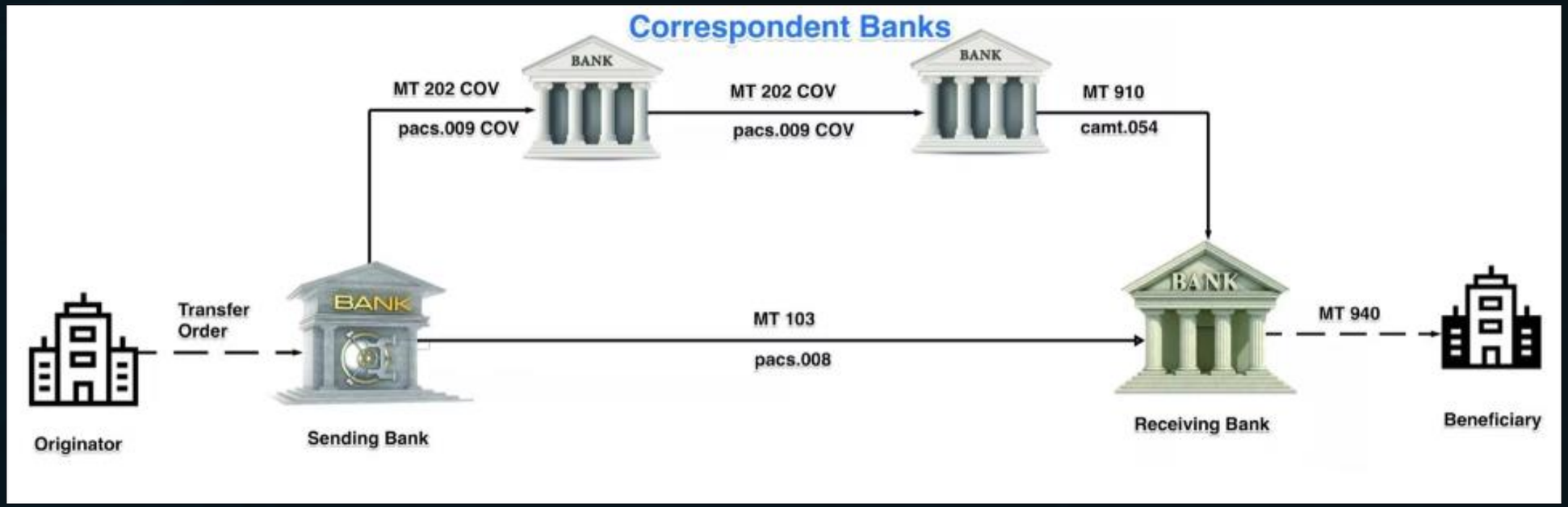
Layer 2 – Settlement

Irrevocable debit/credit in central-bank or correspondent accounts

Synchronisation

Mitigates principal risk and underpins auditability

Serial vs Cover Methodologies



Serial Method

MT 103 leaps sequentially through correspondents carrying principal

Slower and costlier transmission path

Cover Method

MT 103 sent directly to beneficiary bank

MT 202 COV moves liquidity through correspondent chain in parallel

Reduces disclosure of corridor

Mirror-Account Mechanics Detailed Ledger Movements

Step 1: Originating Bank

Debit payer's account, credit Bank B mirror (nostro) at Bank A

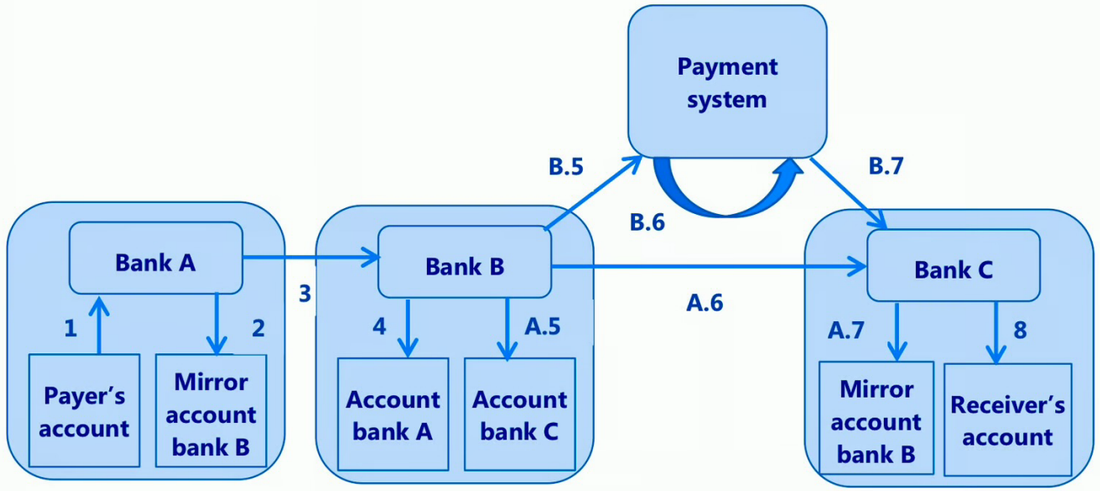
Step 2: Correspondent Action

Message to Bank B prompts debit of its nostro at Bank A, credit of Bank C account

Step 3: Beneficiary Credit

Bank C credits beneficiary; MT 910/940 advice completes cycle

Payments settled via correspondent banking



1. Debiting of payer's account with bank A
2. Crediting of bank B's mirror account with bank A, which is kept for accounting purposes
3. Payment message from bank A to bank B via telecommunication network
4. Debiting of bank A's account with bank B (loro account)

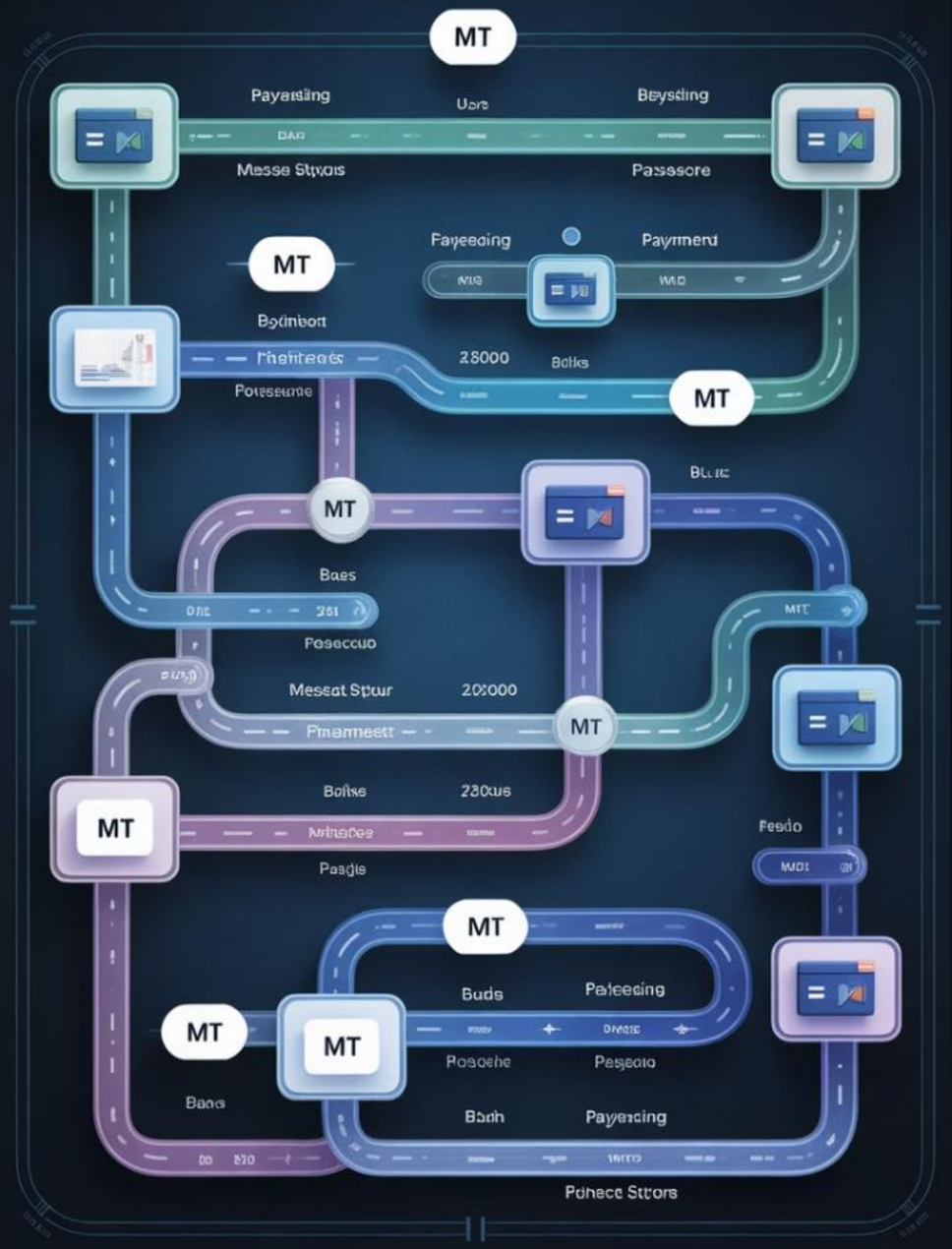
A. Use correspondent bank only

5. Crediting of bank C's account with bank B
6. Payment message from bank B to bank C via telecommunication network
7. Debiting of bank's B mirror account with bank C, which is kept for accounting purposes
8. Crediting of receiver's account with bank C

B. Involvement of payment system

5. Payment message from bank B to payment system
6. Settlement via payment system
7. Payment message from payment system to bank C
8. Crediting of receiver's account with bank C

Source: ECB, *Ninth survey on correspondent banking in euro,* 2015, adapted from Danmarks Nationalbank, *Payment systems in Denmark*, 2005.



Message Topography (SWIFT FIN)

Customer Credit Transfer

MT 103 (serial) | MT 202 COV (cover)

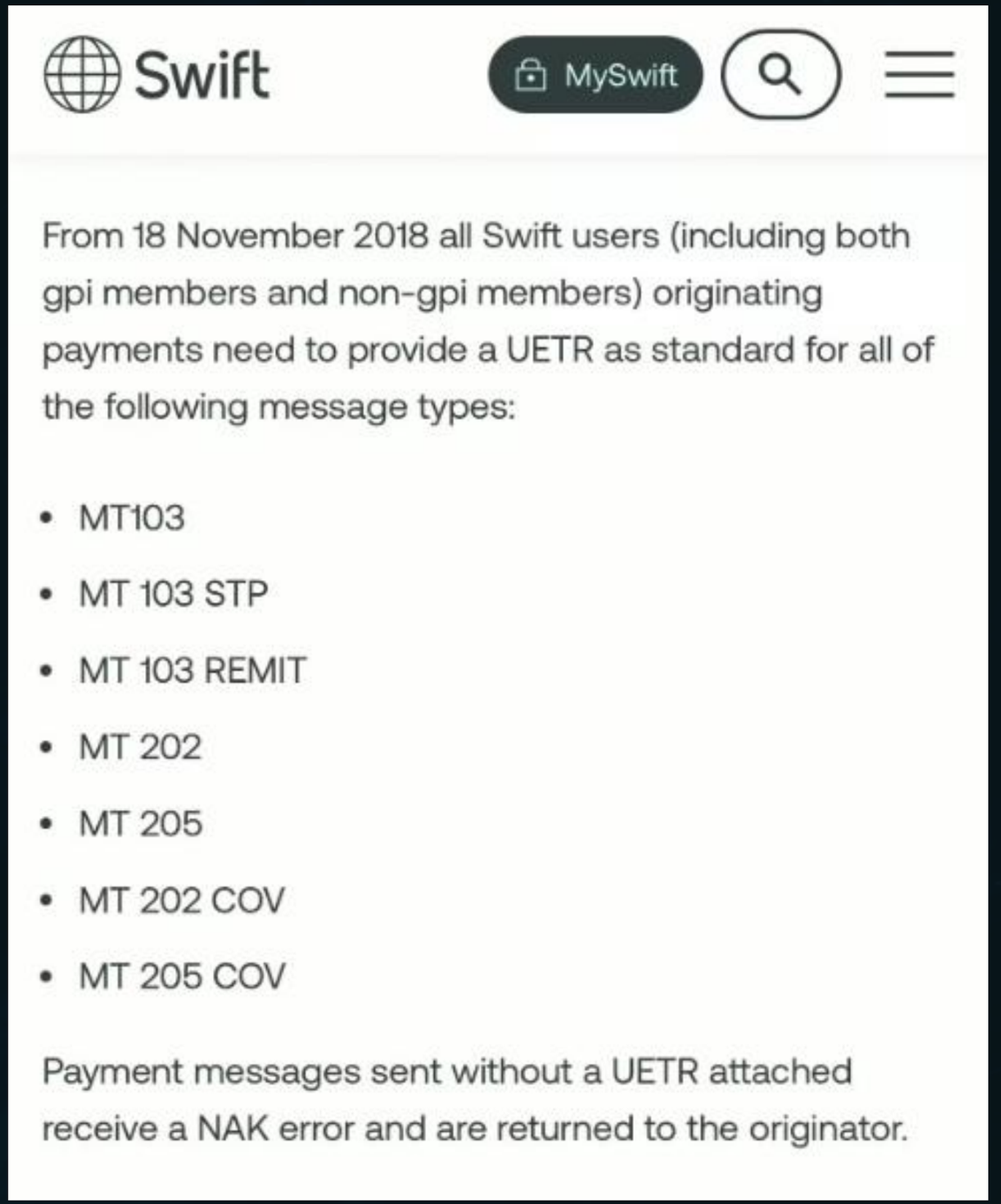
Bank-to-Bank Transfer

MT 202 (non-cover)

Acknowledgement/Error

MT 199/299; Bank-generated MT 900/910/940/950 advice

UETR Mandatory for the following SWIFT Message Types



Universal End-to-End Transaction Reference (UETR)

SWIFT gpi Foundation

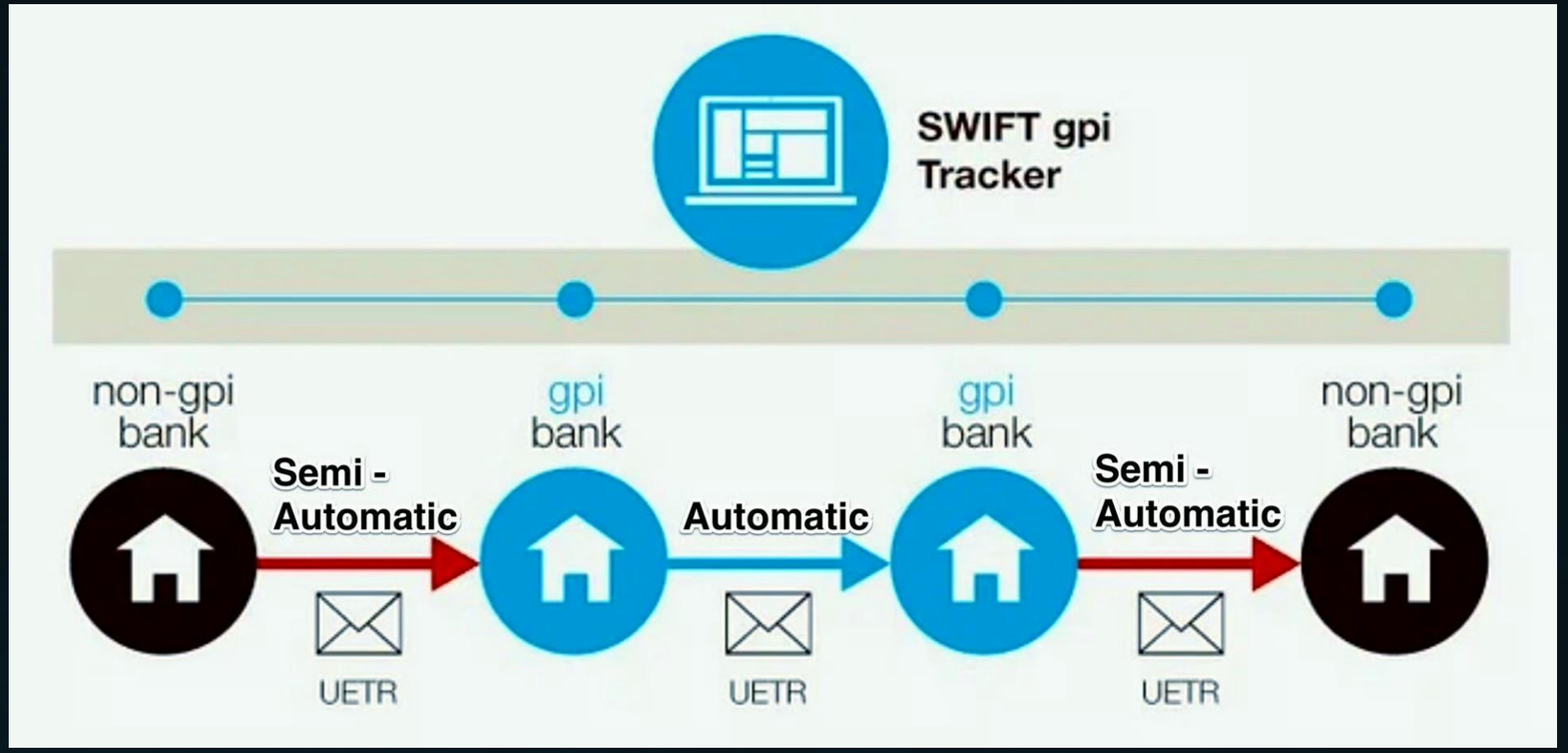
Foundation of SWIFT gpi tracker; immutable across amendments

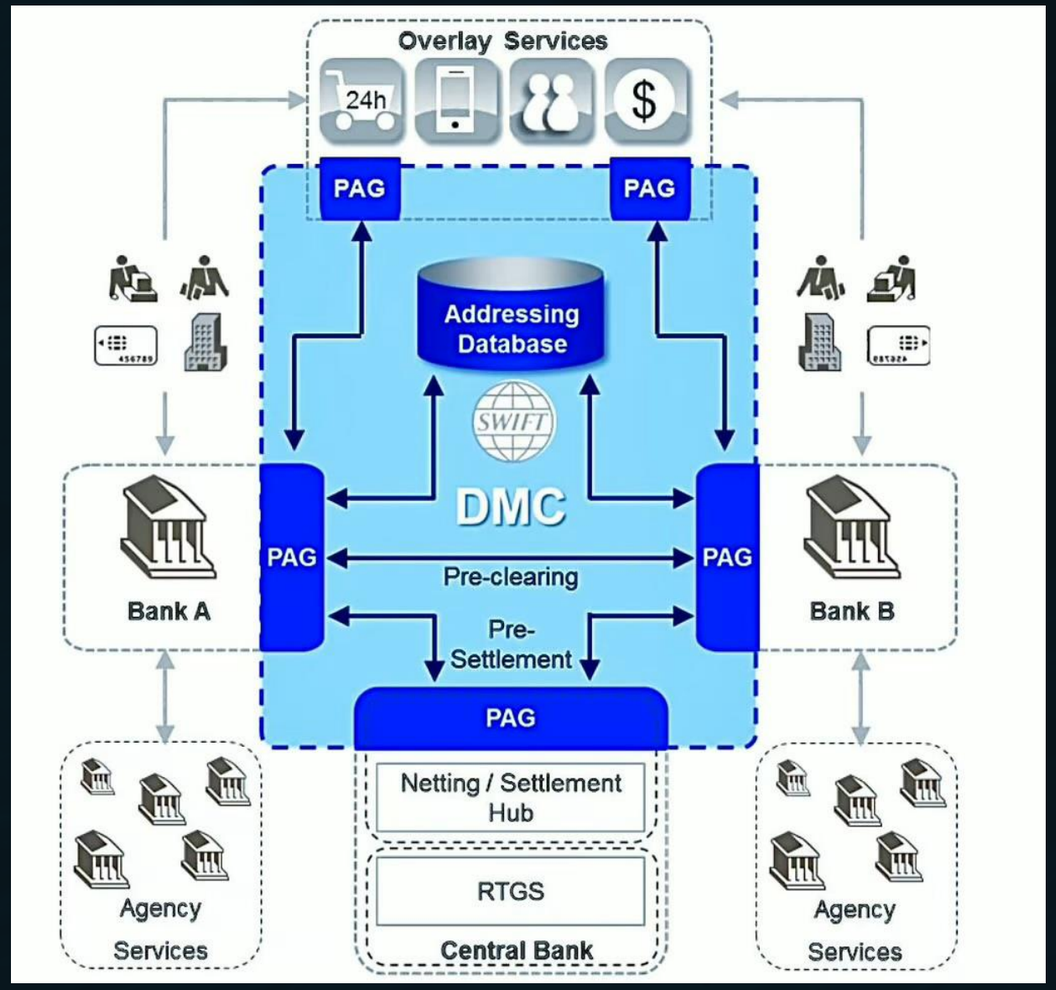
UUID Implementation

32-character UUID imbued in every pacs and MT since Nov-2018

Compliance Benefits

Compliance probability to identify orphaned funds or duplicates > 99%





Role of Intermediary (Cover) Banks

Corridor Connectivity

Provide connectivity in absence of direct account relationships

Revenue Generation

Earn fee income (25–40 bps) and utilise nostro balances

Fintech Evolution

Emergent fintech correspondents leverage virtual IBANs and API-based routing

ISO 20022 Evolution

1

Message Equivalence

pacs.008 ≈ MT 103; pacs.009 ≈ MT 202 COV; camt.054 ≈ MT 910

2

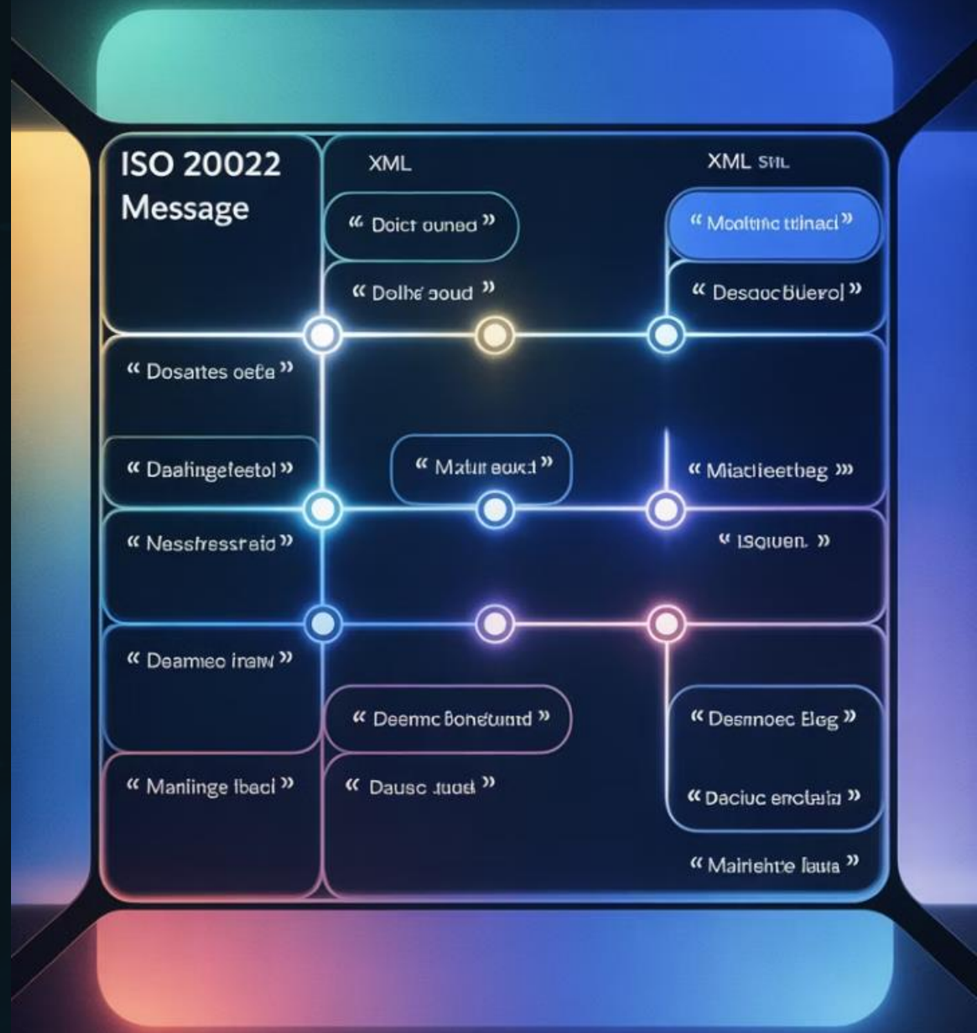
Enhanced Processing

Structured remittance and rich compliance data augment straight-through processing probability ~ +15 pp

3

Migration Timeline

By Nov-2025 CBPR+ mandates full migration for major currencies



Liquidity Consumption Analytics

1

Immobilization

Each correspondent hop immobilises principal until settlement confirmation

1.8x

Trapped Liquidity

Average trapped liquidity for G10 corridor payment

40%

Reduction

CLS or bilateral offsetting reduces trapped liquidity

Settlement & Counterparty Risk

Herstatt Risk

Manifests when FX legs settle in disparate time-zones

Daylight Overdraft Exposure

Mitigated via credit limits and real-time nostro monitoring

Loss Given Default

Probability diminishes exponentially with central-bank settlement

Compliance & Sanctions Screening

Enrichment Fields	50/59/70/77 for name, address, purpose
False-Positive Rate	Typically 0.5–1.2%
Investigation Time	Pre-gpi: D+5
Investigation Time	Post-gpi: H+2

Foreign-Exchange Settlement – CLS Model

Risk Elimination

Eliminates principal risk via PvP mechanism

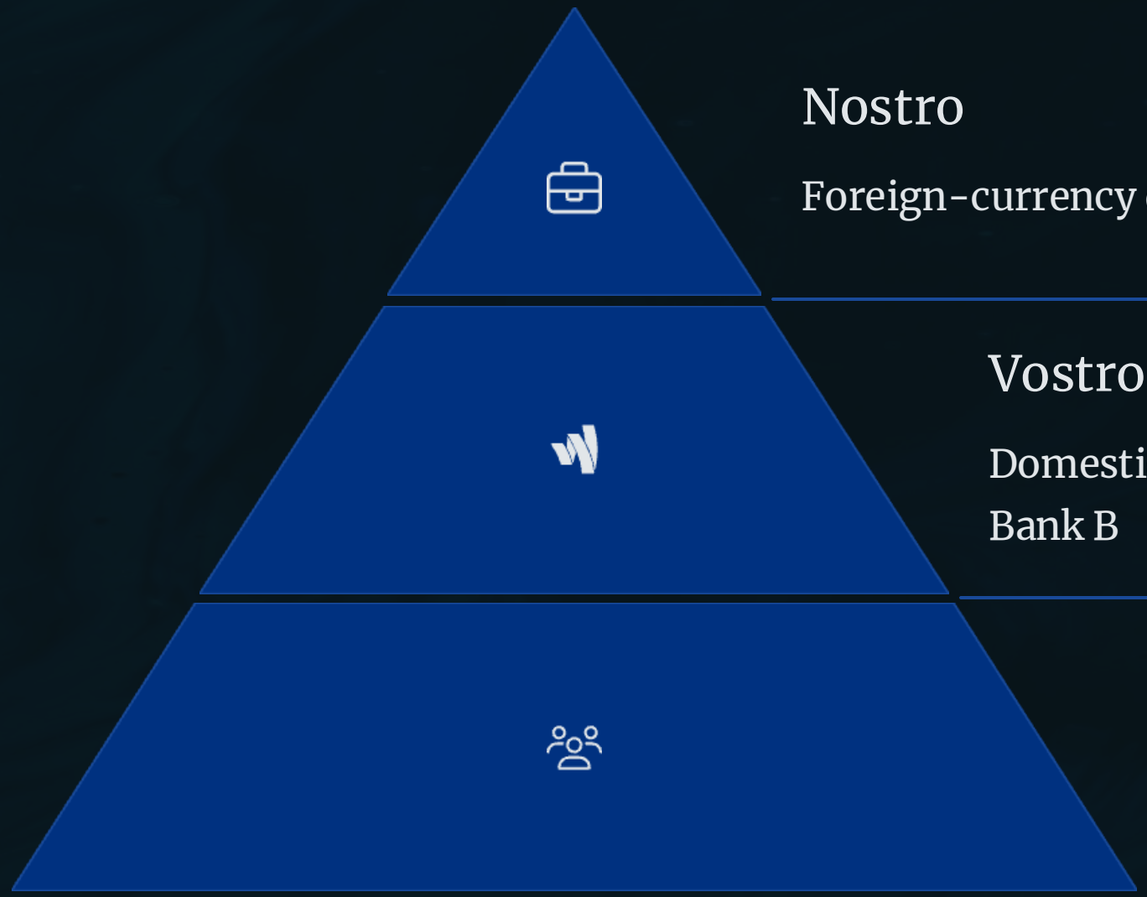
Multi-Currency Funding

Funding in 18 currencies through timed pay-ins

Volume

> $6 trillion daily

Account Taxonomy in Correspondent Banking



Nostro

Foreign-currency deposit held by Bank A with Bank B

Vostro ('mirror')

Domestic-currency account of Bank A recorded as a liability by Bank B

Loro

Third-party account; rarely explicit but germane in message semantics

Understanding Real-Time Gross Settlement (RTGS) Systems

RTGS systems represent the backbone of modern financial infrastructure, enabling instantaneous transfers of money and securities between financial institutions. Unlike traditional payment systems, RTGS processes each transaction individually and in real-time, without waiting for end-of-day settlement periods.

Once completed, these transactions are final and irrevocable, providing certainty and stability to high-value payments. Central banks worldwide manage these critical systems, ensuring the continuous flow of funds through the economy while maintaining robust security and operational protocols.

Global RTGS Infrastructure

Fedwire (United States)

Pioneer RTGS implementation operated by the Federal Reserve, processing over $3 trillion daily

CHAPS (United Kingdom)

Bank of England's high-value payment system handling approximately £330 billion daily

TARGET2 (Eurozone)

Trans-European system processing €1.7 trillion daily across 19 member states

RTGS systems have become ubiquitous worldwide, with both developed and developing economies recognizing their importance for financial stability. These systems form the critical backbone of national payment infrastructures, enabling efficient monetary policy implementation and supporting broader economic growth.

Most central banks now operate their own RTGS systems, though significant differences exist in technical specifications, operating hours, and participation requirements across jurisdictions.

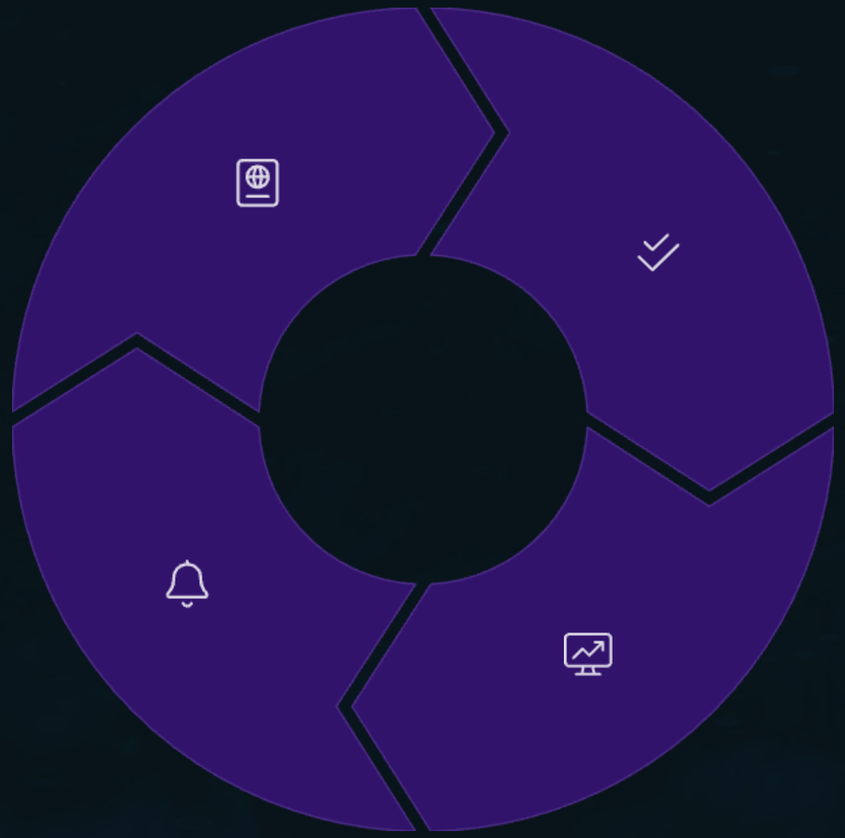
Technical Operations

Payment Initiation

Participating institution submits payment instruction to the RTGS system

Validation

System verifies authenticity, format compliance, and sufficient funds



Confirmation

All parties receive settlement notification with transaction details

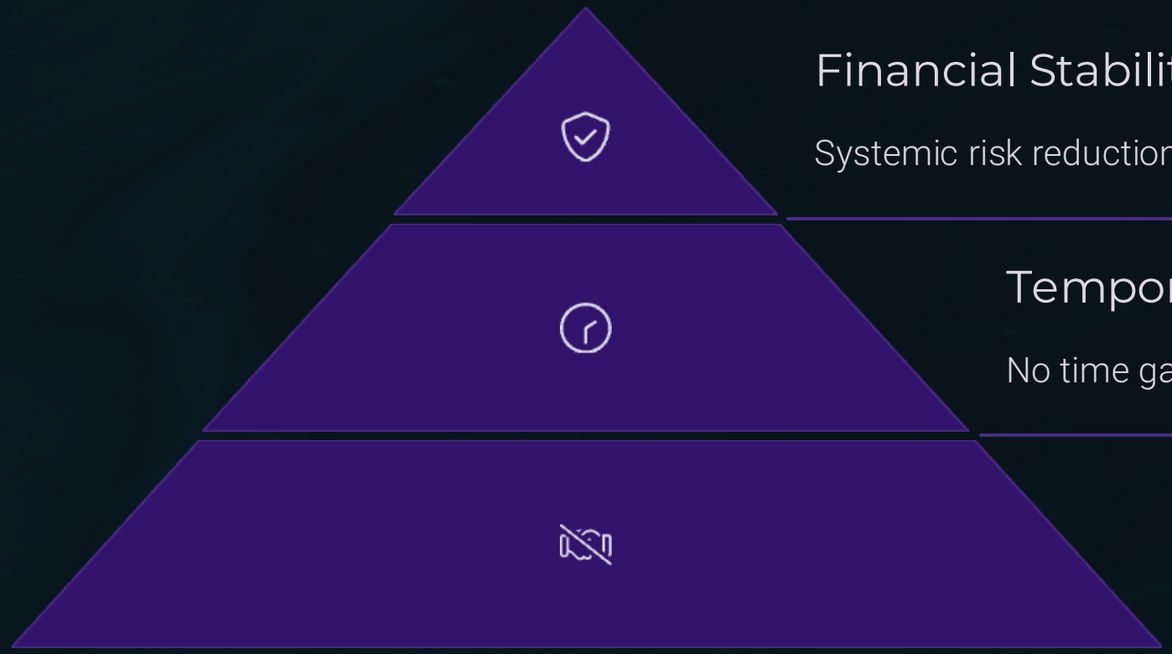
Settlement

Central bank transfers funds between accounts with immediate finality

RTGS operates on a one-to-one transfer basis across central bank books, utilizing specialized funds transfer protocols that ensure secure, authenticated transactions. Unlike net settlement systems, RTGS does not offset debits with credits, instead processing each payment independently.

This approach is particularly suited for high-value interbank funds transfers where timing and certainty are critical. The complete electronic settlement mechanism includes sophisticated queuing algorithms, prioritization rules, and liquidity-saving mechanisms to optimize system efficiency.

Risk Mitigation Benefits



Financial Stability

Systemic risk reduction across the entire financial ecosystem

Temporal Risk Elimination

No time gaps between payment execution and settlement

Settlement Risk Removal

Elimination of principal risk in high-value transactions

RTGS systems fundamentally transform risk profiles in interbank payments by eliminating settlement and delivery risk—the possibility that one party might default after receiving but before delivering payment. This immediate finality ensures that large-value settlements are protected from counterparty default.

The removal of time lags between transaction initiation and completion significantly reduces systemic risk within financial systems. This enhanced stability creates a more resilient interbank payment ecosystem, providing central banks with greater control over monetary operations and liquidity provision.

Implementation Challenges

Cost Considerations

Higher transaction costs compared to bundled settlement systems require economic justification, particularly for smaller financial institutions. Advanced system features and redundancy requirements further increase implementation expenses.

Technical Requirements

Sophisticated infrastructure demands including high-performance computing systems, redundant network connectivity, and advanced security protocols. Integration with legacy banking systems presents additional complexity.

Liquidity Management

Participating institutions must maintain sufficient liquidity throughout the operating day, requiring sophisticated forecasting tools and potentially higher reserve requirements than in deferred settlement systems.

Beyond these primary challenges, RTGS implementations must address operational resilience requirements through redundant systems, geographic distribution, and comprehensive disaster recovery capabilities. Advanced queue management algorithms help optimize liquidity usage while ensuring critical payments are prioritized.

System capacity planning must accommodate peak volume periods that can exceed average daily transaction counts by orders of magnitude, particularly during market stress events or quarter/year-end settlement periods.

RTGS in the Modern Financial Ecosystem

Payment System Integration

RTGS systems increasingly interface with retail payment mechanisms, securities settlement platforms, and cross-border payment infrastructures, creating a comprehensive financial plumbing system.

This integration enables straight-through processing across previously siloed systems, reducing manual intervention and associated operational risks.

Monetary Policy Implementation

Central banks leverage RTGS infrastructure to execute monetary policy operations, including open market operations, standing facilities, and emergency liquidity assistance.

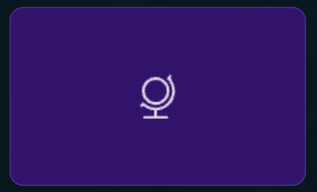
The granular control over settlement timing and conditions provides monetary authorities with precision tools for managing system-wide liquidity conditions.

Financial Stability Support

By eliminating settlement risk and providing real-time visibility into payment flows, RTGS systems enhance regulatory monitoring capabilities and reduce contagion risk during financial stress events.

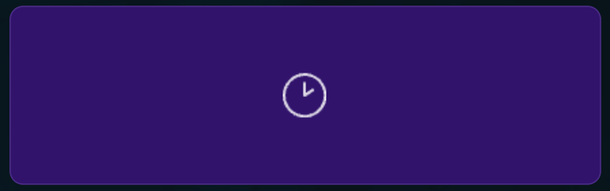
The certainty of settlement supports complex financial market transactions that underpin economic activity.

Future Directions and Implications



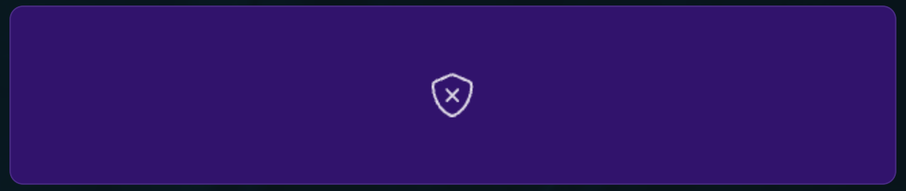
Cross-Border Integration

Interconnected national RTGS systems enabling seamless international transfers



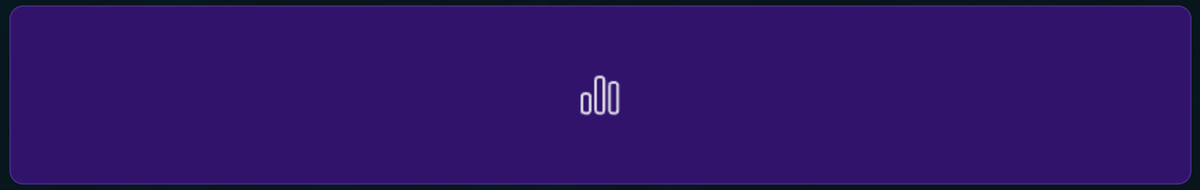
24/7 Operations

Continuous availability supporting global financial markets across time zones



Enhanced Resilience

Advanced cybersecurity and operational redundancy protecting critical infrastructure



Data Enrichment

ISO 20022 implementation providing richer contextual information with payments

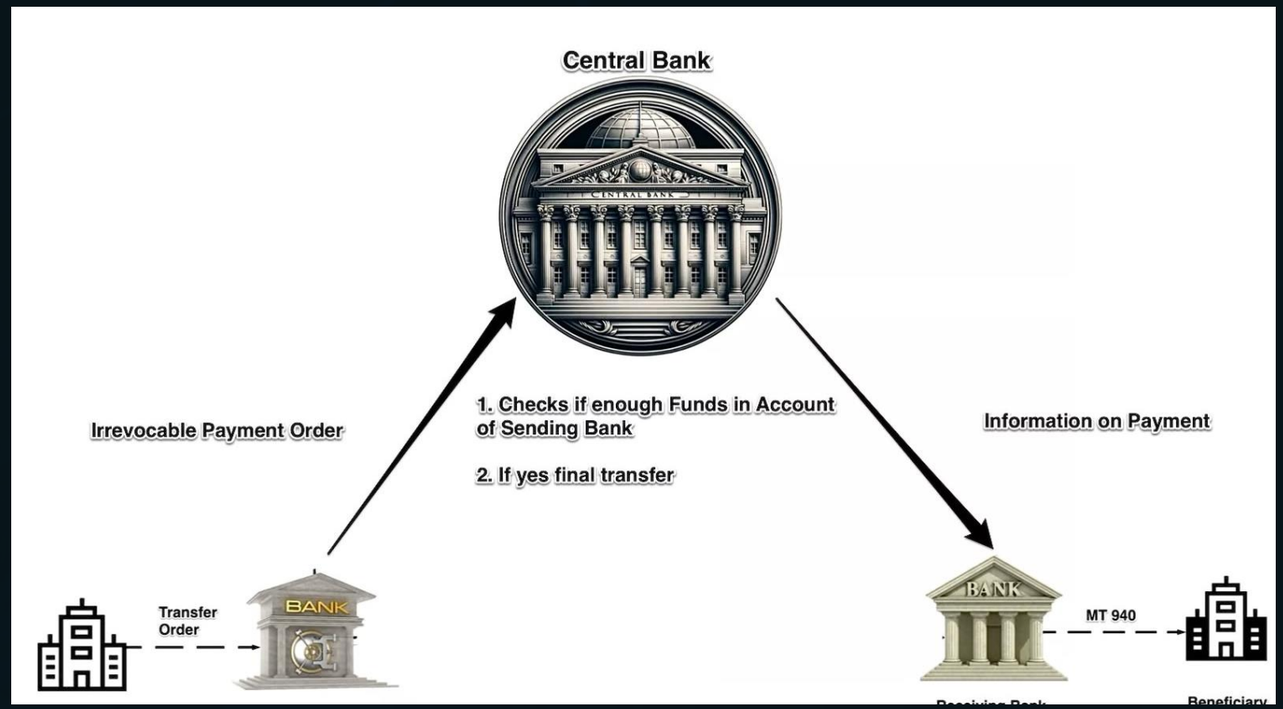
The evolution of RTGS systems continues with emerging technologies potentially transforming their operation. Distributed ledger technology offers potential new architectures, while artificial intelligence applications could enhance fraud detection and liquidity optimization algorithms.

Central bank digital currencies (CBDCs) may eventually leverage RTGS infrastructure for settlement, creating hybrid systems that combine traditional and tokenized payment methods. These developments will require careful regulatory consideration and international coordination to maintain the stability and efficiency that RTGS systems have provided to global financial markets.

RTGS Systems

Major RTGS systems serve as the backbone of high-value payment processing in their respective currency zones.

Real-Time Gross Settlement (RTGS) Fundamentals



1 **Settlement Characteristics**

Single, irrevocable, gross settlement in central-bank money

2 **Risk Management**

Eliminates inter-participant credit risk; liquidity managed via intraday credit

3 **Scale of Operations**

Fedwire peaks at 1.2 million payments/day exceeding $5 trn

RTGS Queue-Management Algorithms

Algorithm Types

FIFO, EDFO, and gridlock resolution algorithms optimize liquidity utilization

Liquidity-Saving Mechanisms

LSM nets offsetting payments while preserving RTGS finality

Efficiency Gains

Empirical reduction in required liquidity buffer: 25–30%

RTGS via Correspondent Scenario

Non-Member Access

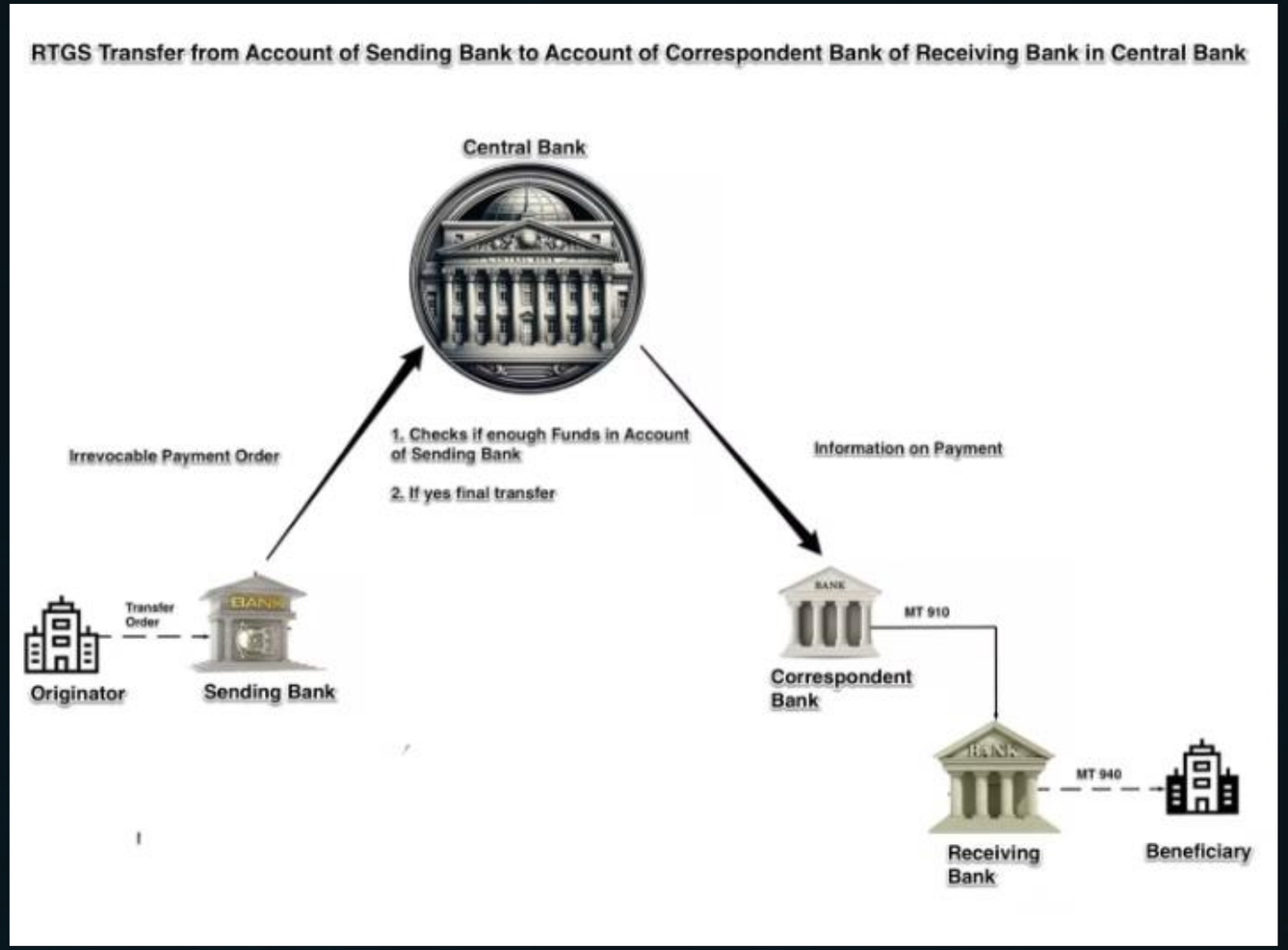
Non-member bank leverages correspondent's settlement account

Still achieves real-time finality at central-bank tier

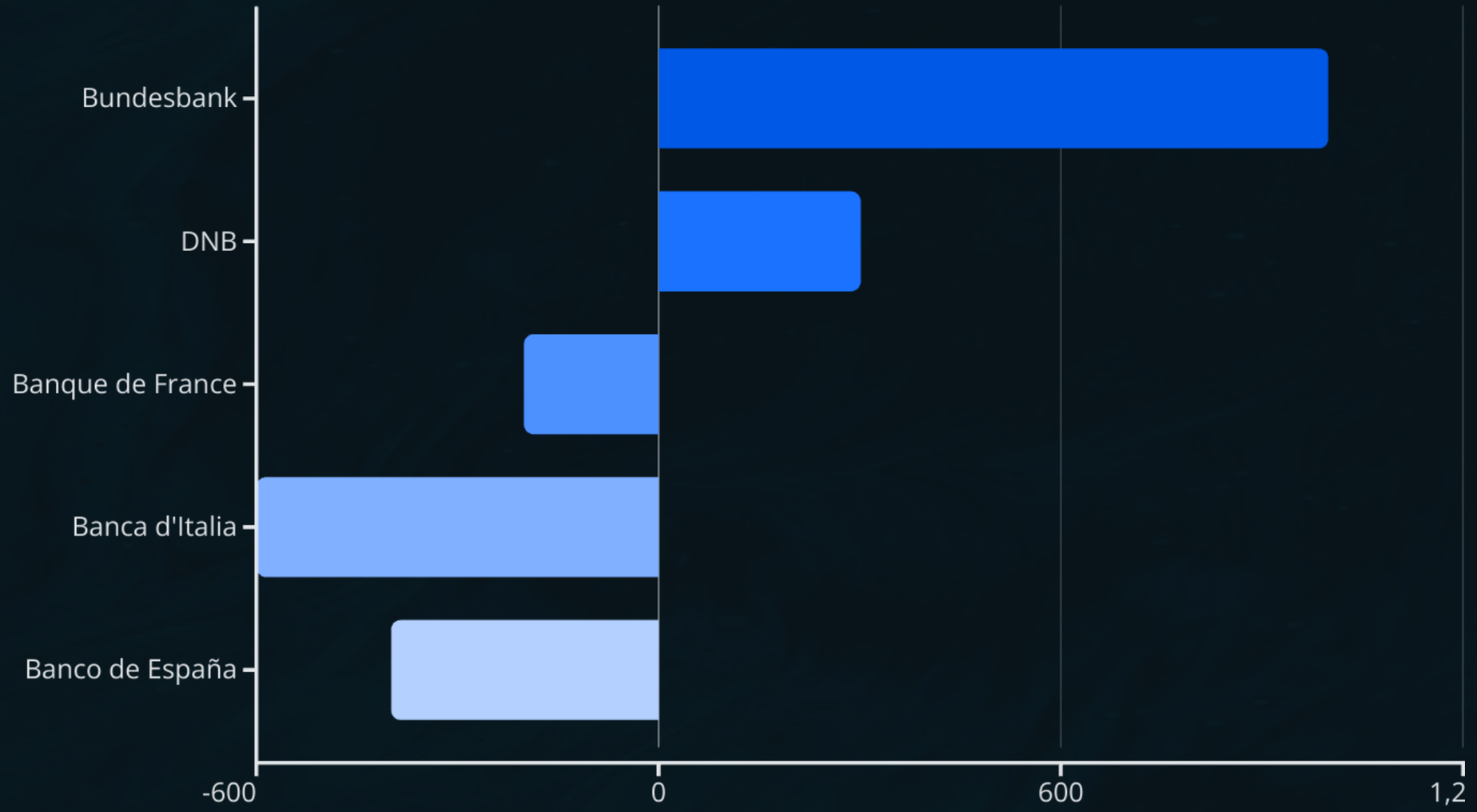
Layered Architecture

Introduces 'layer-two' hop post-settlement to reach beneficiary bank

Creates tiered access structure to central bank systems



T2/TARGET2 Imbalances



Persistent asymmetry reflects capital flight, current-account imbalance and QE asset purchases.

Real-Time Payment (RTP) Systems: An Overview

The landscape of electronic payments is undergoing a profound transformation with Real-Time Payment systems at the forefront of this revolution. With an estimated 8.2 billion real-time payments processed in the US alone in 2024, RTP represents one of the fastest-growing segments in financial technology.

Financial institutions, businesses, and consumers are rapidly embracing these instant payment capabilities, fundamentally changing expectations around transaction speed, transparency, and availability. This acceleration in adoption is reshaping both banking infrastructure and commerce experiences across all sectors.

Defining RTP: What Are Real-Time Payment Systems?

Immediate Settlement

RTP enables the transfer of funds between financial institutions in seconds, providing instant availability to recipients 24 hours a day, 7 days a week, 365 days a year.

Irrevocable Transactions

Once initiated, RTP transactions cannot be reversed, making them credit-only payments that provide certainty for both parties involved in the transaction.

Institutional Framework

In the United States, The Clearing House operates the RTP network, establishing the rules, standards, and infrastructure that enable participating financial institutions to offer real-time payments.

Core Features and Workflow of RTP

Initiation

Payment initiated via online banking, mobile app, or QR code with full transaction details and purpose

Processing

Immediate validation, clearing and settlement through the central network

Completion

Funds instantly available to recipient with notification to both parties

Confirmation

Detailed receipt with transaction data and payment references

The RTP workflow enforces a push-payment model where all transactions are credit transfers initiated by the payer. This architecture eliminates the risk of returns or reversals, providing payment finality while delivering a seamless user experience through immediate confirmation and rich transaction data.

RTP Ecosystem and Architecture

Central Network

The Clearing House RTP system provides the core infrastructure for processing and settlement

Participating Banks

Financial institutions connect directly to the network through dedicated integration points

Real-Time Processing

Continuous operation without batch cycles, cutoffs, or holiday interruptions

ISO-20022 Messaging

Standardized data format enabling rich remittance information with each payment

The RTP architecture enables direct bank-to-bank transfers without intermediaries, eliminating the need for batch processing that causes delays in traditional payment systems. This direct connectivity, combined with standardized ISO-20022 messaging, creates a foundation for sophisticated payment capabilities beyond simple fund transfers.

RTP vs. Traditional Payment Rails

Feature	ACH	Wire	RTP
Settlement Time	1-3 business days	Same day	Seconds
Availability	Business days	Business hours	24/7/365
Reversibi-lity	Can be reversed	Difficult to recall	Irrevocable
Cost	Low	High	Medium
Bank Coverage	Nearly universal	Widespread	Growing

The comparison between RTP and traditional payment methods highlights the fundamental shift in payment capabilities. While ACH offers broad reach at low cost but with delays, and wires provide speed but at high cost with limited hours, RTP delivers a compelling combination of immediacy, finality, and enhanced data capabilities.

Business Benefits and Use Cases

Cash Flow Management

Immediate access to funds improves working capital efficiency and liquidity management. Companies can optimize treasury operations with precise payment timing and enhanced visibility.

Payment Experiences

Enhanced customer satisfaction through instant refunds, emergency disbursements, and just-in-time payments. Eliminates payment delays and uncertainty for both businesses and consumers.

Operational Efficiency

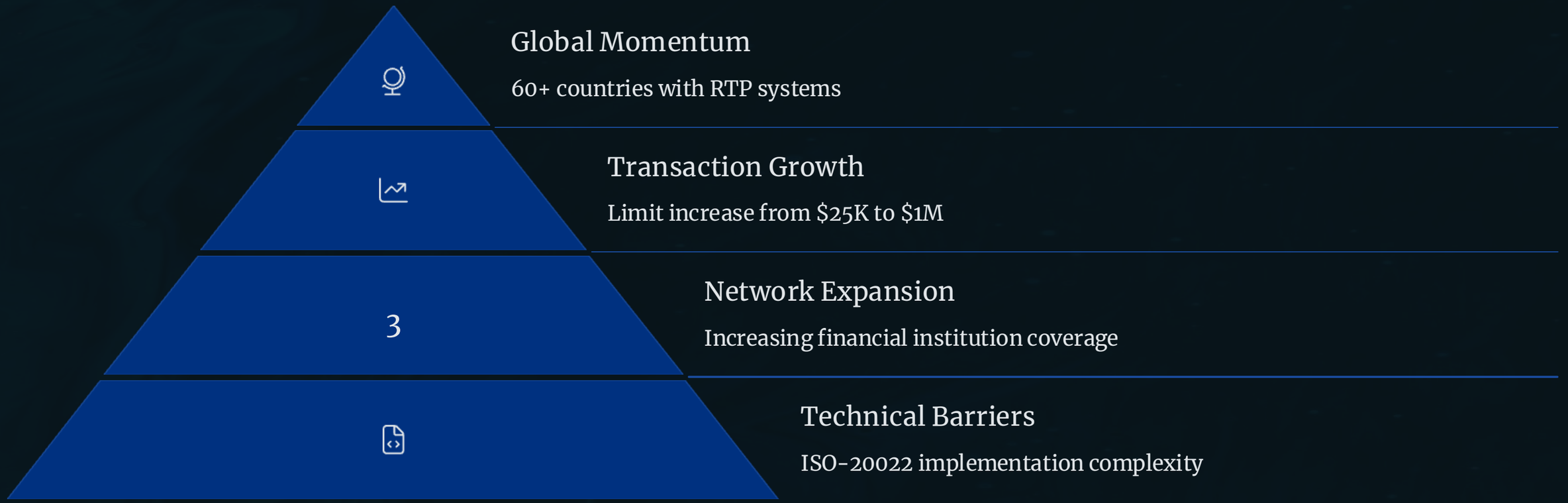
Rich remittance data enables automatic reconciliation. Reduces manual processing, errors, and exception handling while providing comprehensive payment information with each transaction.

Market Differentiation

Offering instant payment options provides competitive advantage in marketplace settlements, on-demand payroll, and insurance claim disbursements where speed creates significant value.

The transformative impact of RTP extends beyond simple fund transfers, enabling new business models and enhancing existing processes across industries. From marketplaces that can instantly settle with sellers to employers offering same-day wage access, RTP creates opportunities for innovation in payment experiences.

Adoption Challenges and Market Trends



Despite rapid growth, RTP adoption faces challenges including the technical complexity of implementing ISO-20022 standards and integrating with legacy banking systems. Financial institutions must navigate significant compliance requirements while upgrading infrastructure to support continuous real-time operations.

The global landscape shows accelerating momentum, with more than 60 countries now operating real-time payment systems. Recent increases in transaction limits from $25,000 to $1 million in the US signal growing confidence in the security and reliability of these systems for higher-value transactions.

Future Outlook and Industry Implications

Network Growth

Continued expansion of transaction limits and bank participation, driving universal access to real-time payments across all financial institutions.

API Ecosystem

Integration with open banking frameworks and standardized APIs, enabling embedded finance applications and contextual payment experiences.

Product Innovation

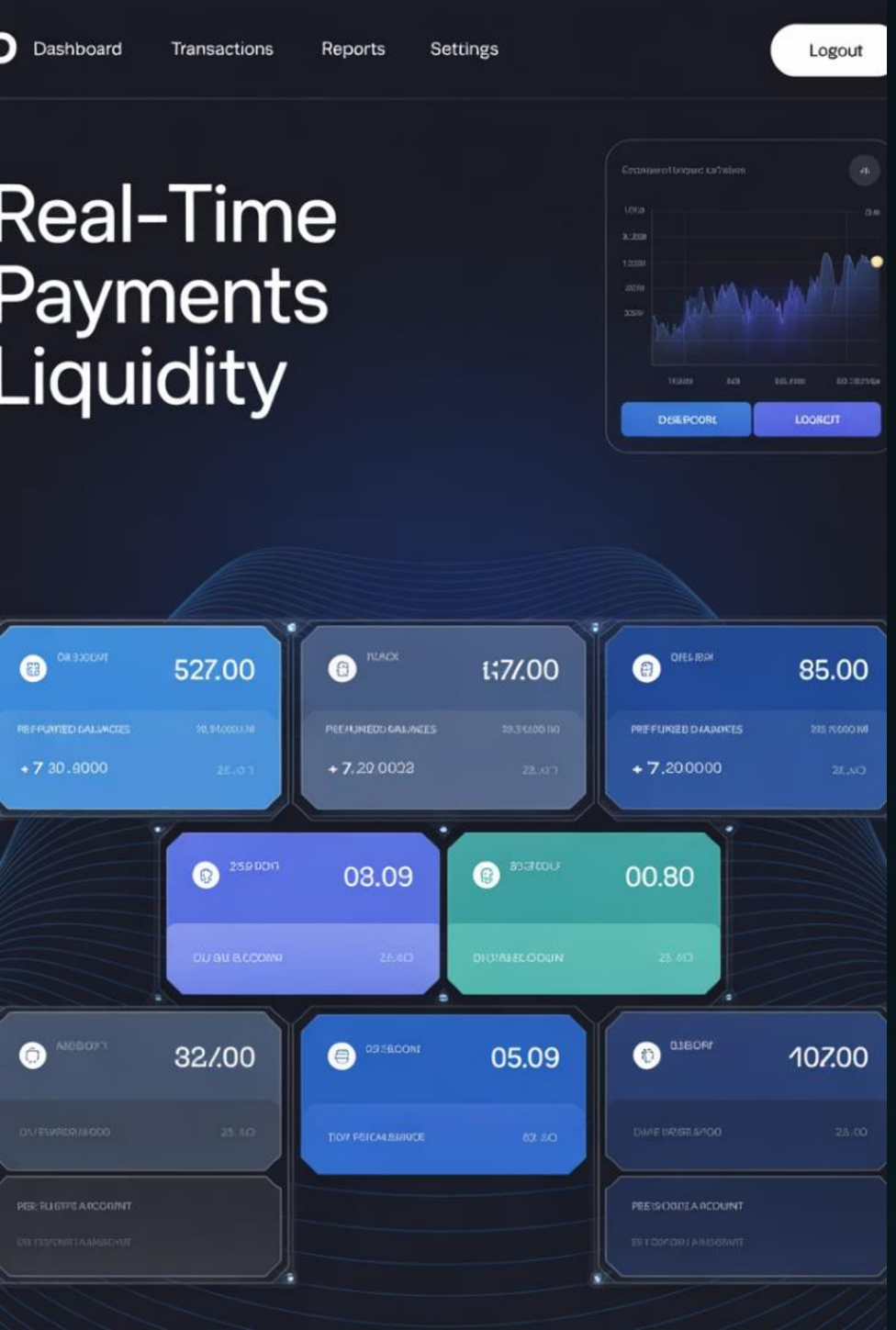
Development of next-generation financial products built on RTP capabilities, including advanced request-to-pay solutions and smart contract integrations.

Strategic Imperative

RTP capabilities becoming essential competitive requirements for financial institutions and payment providers across all market segments.

The future of RTP systems extends far beyond basic payment functionality. As these systems become ubiquitous, they will serve as fundamental infrastructure enabling innovation across financial services. The combination of instant settlement, rich data, and 24/7 availability creates possibilities for reimagining everything from mortgage closings to investment settlements.

Financial institutions that fail to develop comprehensive RTP strategies risk significant competitive disadvantage as customer expectations permanently shift toward immediate, transparent payment experiences in both consumer and business contexts.



RTP Liquidity Mechanics

Collateral Positioning

Participants pre-position collateral in settlement account

Covered Liquidity Benefits

Obviates daylight credit and fosters immediate posting to beneficiaries

Risk Assessment

Limit exhaustion probability < 0.03% for retail schemes

RTP Message Flow – Example

Initiation

Payer sends payment initiation (pacs.008)

Validation

System validates & reserves liquidity

Settlement

Final settlement on prefunded account

Confirmation

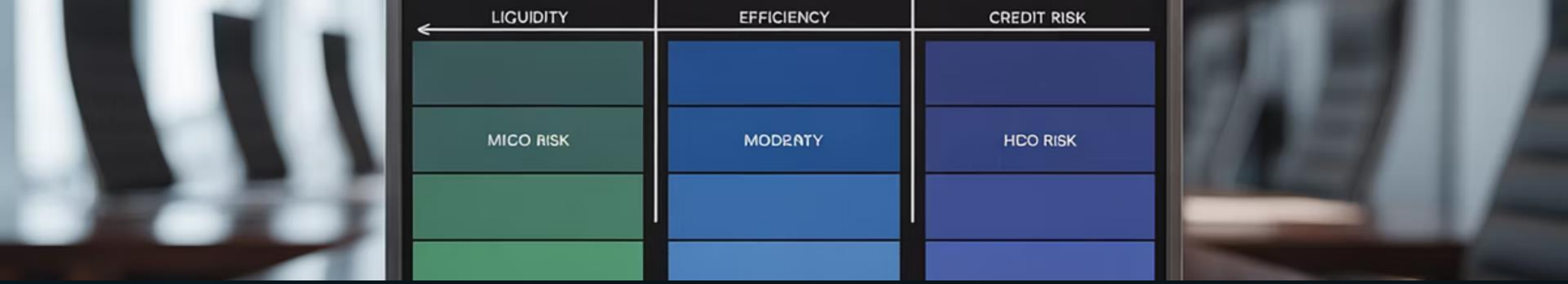
Confirmation (pacs.002) to both parties within 2 s

Cross-Border Instant Payment Initiatives

Nexus (BIS)
Hub-and-spoke linking instant systems; pilot S'pore-EU 2023

IXB (EBA/BAI)
Interconnect TIPS & RT1 for Europe

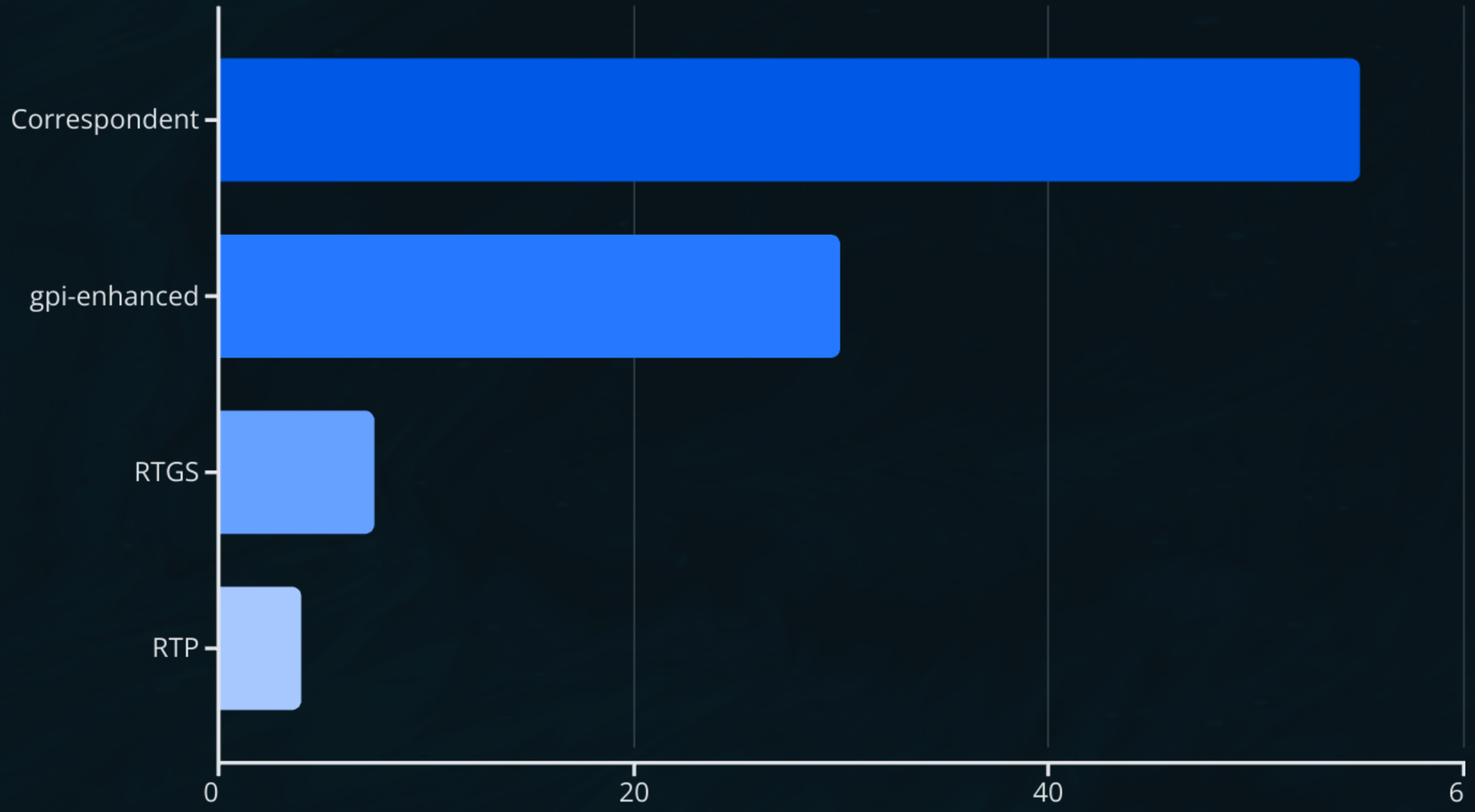
gpi Instant
Marries SWIFT gpi tracker with domestic RTP rails



Liquidity vs Credit-Risk Spectrum

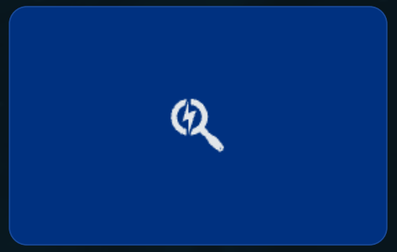
System Type	Liquidity Efficiency	Credit Risk
Correspondent (serial)	Low	Moderate
Cover	Medium	Moderate
RTGS	Low	Negligible
RTP	High for small values	Negligible

Cost Stack by Channel (Indicative)



Cost efficiency increases dramatically in newer, more integrated payment systems.

Future Trajectories – ISO 20022 Rich Data

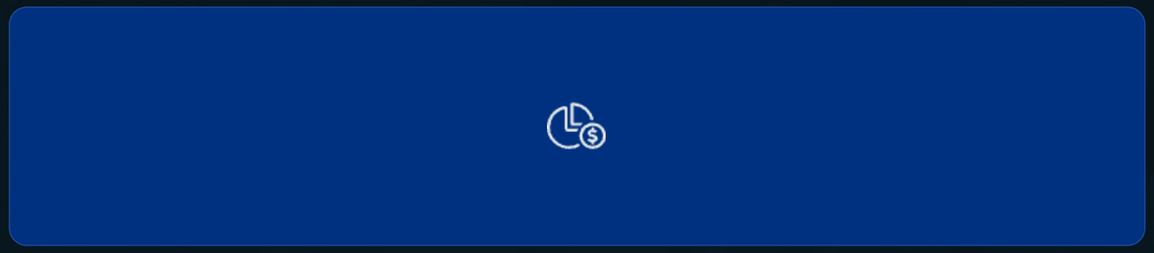


Enhanced Compliance

Structured ultimate debtor/creditor data eases AI-driven AML

Business Integration

Narrative fields enable e-invoicing and automatic reconciliation



Operational Efficiency

Potential to cut treasury back-office cost by 20%

DLT & CBDC Prospects

Layer Consolidation

Wholesale CBDC could collapse instruction and settlement layers into atomic DvP/PvP

Project mBridge

Demonstrates multi-CBDC corridor reducing settlement cycle to seconds

Adoption Probability

Near-term mass adoption (≤ 5 yrs) estimated at 30%

Key Takeaways

Layered Architecture

Two-layer model underpins global payment plumbing

Correspondent Evolution

Correspondent banking remains indispensable yet evolving under gpi and ISO 20022

Immediacy Trade-offs

RTGS and RTP schemes offer immediacy at liquidity or prefunding cost

Future Direction

Convergence may emerge via CBDC and instant cross-border networks

Questions & Discussion

Inquiries

Share your questions about payment systems architecture

Collaboration

Explore partnership opportunities in payment infrastructure

Scenarios

Present specific use cases for detailed analysis

Innovation

Discuss emerging trends in interbank value transmission