

# Payment Rails and SWIFT

## Module 4: Traditional Digital Finance — Lesson 39

Digital Finance

December 11, 2025

- Understand global payment infrastructure: SWIFT, SEPA, ACH, real-time systems
- Analyze SWIFT messaging protocols and correspondent banking networks
- Evaluate alternatives to SWIFT: instant payment systems, blockchain
- Comprehend cross-border payment challenges and emerging solutions

## Domestic Systems

- ACH (US)
- SEPA (Europe)
- BACS/Faster Payments (UK)
- CHIPS (US large value)
- Fedwire (US real-time)

## International Systems

- SWIFT
- Correspondent banking
- TARGET2 (EU)
- CIPS (China)
- CLS (FX settlement)

**Global Volume:** 700B+ non-cash transactions annually, \$2 quadrillion value

## Real-Time Gross Settlement (RTGS)

- Immediate finality
- High value payments
- Central bank operated
- Fedwire, TARGET2, CHAPS

## Deferred Net Settlement (DNS)

- Batch processing
- Netting efficiency
- Lower cost
- ACH, BACS, SEPA (some)

**Instant Payments:** Real-time retail, 24/7/365 availability, irrevocable

**Coverage:** 36 countries, 500M+ citizens, euro-denominated payments

## SEPA Instruments

- SEPA Credit Transfer (SCT)
- SEPA Instant Credit Transfer (SCT Inst)
- SEPA Direct Debit (SDD)
- SEPA Card Framework

## Key Features

- Uniform pricing (domestic = cross-border)
- IBAN/BIC identifiers
- ISO 20022 messaging
- T+1 settlement (SCT)
- 10 seconds (SCT Inst)

**Volume:** 46B SEPA transactions (2023), 80% SCT, 20% SDD

**Use Cases:** Salaries, invoices, person-to-person, e-commerce

## Process Flow

- ① Originator submits to bank
- ② Bank validates IBAN
- ③ Routing via clearing house
- ④ Settlement in T+1
- ⑤ Beneficiary notification

## Technical Details

- Maximum 999,999,999.99 EUR
- pain.001 XML message
- EPC Rulebook compliance
- IBAN validation (checksum)
- BIC optional (since 2016)

**Infrastructure:** EBA Clearing (RT1, STEP2), TARGET2, local CSMs

# SEPA Instant Credit Transfer (SCT Inst)

**Launch:** November 2017, adoption accelerating (2024: 80% coverage)

## Specifications

- 10-second processing
- 24/7/365 availability
- 100,000 EUR limit
- Irrevocable settlement
- ISO 20022 pacs.008

## Use Cases

- P2P transfers
- E-commerce checkout
- Bill payments
- Request-to-pay
- Digital wallets

**Adoption:** 11B SCT Inst (2023), growing 70% YoY, mandatory for EU banks (2025)

**Purpose:** Recurring payments (subscriptions, utilities, insurance)

## **SDD Core (B2C)**

- Consumer protection
- 8-week refund right
- Pre-notification required
- D-1 submission

## **SDD B2B (Business)**

- No refund right
- Bank verification
- D-1 submission
- Mandate management

**Mandate:** Signed authorization, unique mandate reference (UMR), IBAN, creditor ID



**Operator:** Nacha (National Automated Clearing House Association)

## ACH Transaction Types

- ACH Credit (push)
- ACH Debit (pull)
- Same-Day ACH
- International ACH (IAT)

## Use Cases

- Direct deposit payroll
- Bill payments
- Business-to-business
- Tax refunds
- Government benefits

**Volume:** 31B transactions (2023), \$76 trillion value

## Standard ACH

- T+1 settlement (Next Day)
- Batch processing (4x daily)
- Cut-off times
- Lower cost (\$0.20-0.50)

## Same-Day ACH

- Same-day settlement
- Two windows (10:30, 15:00 ET)
- \$1M limit per transaction
- Higher fee (\$0.50-1.00)

**2024 Enhancements:** Same-Day ACH \$1M limit (up from \$100k), third window added

**Founded:** 1973 (Brussels), 11,500+ institutions, 200+ countries

## Functions

- Secure messaging network
- Standardized formats
- No funds transfer (messaging only)
- Member-owned cooperative

## Message Types

- Payments (MT103, MT202)
- Securities (MT54x)
- Treasury (MT300, MT320)
- Trade finance (MT700)

**Volume:** 45M messages/day (2024), 11B annually

**Use:** Customer credit transfer (cross-border wire)

## Key Fields

- Sender/Receiver BIC
- Transaction reference
- Value date
- Currency and amount
- Ordering customer
- Beneficiary

## Optional Fields

- Intermediary banks
- Charges (OUR/SHA/BEN)
- Purpose of payment
- Regulatory reporting
- Remittance information

**Example:** :20:TRN12345 :32A:241207USD10000,00 :50K:Sender Name :59:Beneficiary

**Launch:** 2017, modernization initiative, 4,000+ banks

## Features

- End-to-end tracking
- Same-day use of funds
- Transparent fees
- Rich remittance data
- Status updates

## Performance

- 50% complete ;30 min
- 90% complete ;24 hours
- 100% tracking coverage
- Reduced inquiries 60%

**Technology:** SWIFT gpi Tracker database, Unique End-to-End Transaction Reference (UETR)

**Timeline:** March 2023 coexistence, November 2025 full migration

## MT (Legacy)

- Fixed field format
- Limited data capacity
- 78 characters/line
- Cryptic structure
- Established since 1970s

## ISO 20022 (XML)

- Rich structured data
- pacs.008, pain.001 messages
- Extended remittance
- Regulatory data
- Future-proof

**Benefits:** Better STP (80% to 95%+), compliance automation, fraud detection

**Purpose:** Enable cross-border payments without direct relationships

## **Nostro/Vostro Accounts**

- Nostro: Our account with you
- Vostro: Your account with us
- Pre-funded balances
- Currency settlement

## **Payment Flow**

- ① Customer instructs Bank A
- ② Bank A debits customer
- ③ Bank A sends MT103 via SWIFT
- ④ Intermediary banks relay
- ⑤ Bank Z credits beneficiary

**Challenges:** 3-5 days settlement, opaque fees, multiple intermediaries

**Trend:** Banks exiting correspondent relationships (30% reduction 2011-2021)

## Drivers

- AML/CFT compliance costs
- Sanctions screening
- Regulatory penalties risk
- Low profitability corridors
- KYC burden

## Impact

- Reduced access (developing markets)
- Higher costs for SMEs
- Longer processing times
- Financial exclusion risk

**Solutions:** Utility models (SWIFT KYC Registry), shared infrastructure, fintechs



## Global Systems

- UK Faster Payments (2008)
- SEPA SCT Inst (2017)
- US FedNow (2023)
- US RTP (TCH, 2017)
- India UPI (2016)
- Brazil PIX (2020)

## Characteristics

- 10-second settlement
- 24/7/365 availability
- Irrevocable
- Low/zero cost
- Mobile-first UX

**Adoption:** 118B instant payments globally (2023), 64% in Asia-Pacific

**Launch:** 2016, operated by NPCI (National Payments Corporation of India)

## Features

- Virtual Payment Address (VPA)
- QR code payments
- Request-to-pay
- Interoperable apps
- Free for consumers

## Scale

- 12B transactions/month
- 500M+ users
- 300+ banks
- 50M+ merchants
- \$200B+ monthly value

**Success Factors:** Government push, mobile penetration, zero MDR, interoperability

**Launch:** July 2023, operated by Federal Reserve

## Capabilities

- Instant payments 24/7
- \$500k transaction limit
- ISO 20022 messaging
- Request for payment
- Fraud monitoring tools

## Adoption Status

- 700+ institutions (2024)
- Competing with RTP (TCH)
- Slow initial uptake
- Focus on billers, payroll

**Challenge:** Dual infrastructure (FedNow + RTP), consumer awareness, use case development

## CIPS (China)

- Cross-Border Interbank Payment System
- RMB internationalization
- 1,400+ participants
- 80 trillion RMB (2023)

## SPFS (Russia)

- System for Transfer of Financial Messages
- Sanctions mitigation
- 500+ Russian banks
- Limited international use

**Geopolitical Context:** Russia excluded from SWIFT (2022), Iran, North Korea restrictions

## Ripple (XRP)

- On-Demand Liquidity (ODL)
- 3-5 second settlement
- Low cost (\$0.0002)
- 70+ corridors
- Regulatory challenges (US)

## Stablecoins

- USDC, USDT cross-border
- 24/7 settlement
- Blockchain rails (Ethereum, Solana)
- Programmability
- Regulatory uncertainty

**Pilot Projects:** JPM Coin (JPMorgan), Utility Settlement Coin (Fnlity), mBridge (BIS)

- Payment rails enable domestic and cross-border value transfer
- SEPA unifies euro payments across 36 countries with instant settlement (SCT Inst)
- ACH processes 31B US transactions annually with same-day options
- SWIFT provides secure messaging for 11,500+ institutions, 45M messages/day
- Correspondent banking enables cross-border payments via nostro/vostro accounts
- Instant payment systems (UPI, FedNow, PIX) offer real-time, low-cost transfers
- Alternatives emerging: CIPS, blockchain, stablecoins challenge SWIFT dominance

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