

# Modern Digital & Instant Payments: Liquidity and Security Essentials

## DAY 1 - Global FinTech & Digital Payments Foundations

### 1. FinTech & Digital Financial Services

- Evolution of financial technology
- FinTech ecosystem: Banks, PSPs, Aggregators, Regulators
- Key enablers: APIs, AI/ML, Cloud, Blockchain
- Overview of cyber risks in FinTech

### 2. Retail Digital Payments Overview

- Cards, wallets, QR payments, tokenization
- UPI, IMPS, AEPS (conceptual)
- PSPs & payment aggregators

### 3. Digital Transaction Flow

- Authorization → Authentication → Switching → Settlement
- Payment fraud overview

### 4. National Payments Overview

- NPCI (UPI, NEFT, RTGS, IMPS) – high-level
- Global national systems (Fedwire, SWIFT, SEPA, PayNow, FAST)

## DAY 2 — National Payments Architecture & Financial Market Infrastructure

### 1. National Payment System Architecture

- Clearing vs settlement
- ACH, RTGS, NEFT
- Payment switches and operator roles

### 2. Securities Settlement Architecture

- Execution → Clearing → Settlement

- CCPs, custodians, central depositories
- T+1, T+0 settlement models
- DvP models 1–3

### 3. Risk Management in Payment Systems

- Credit, liquidity, operational, settlement risks
- Netting, collateralization
- Basel PFMI relevant principles

### 4. Regulatory Oversight

- RBI (PSS Act), SEBI, BIS, IOSCO
- KYC/AML, FATF
- Data privacy: GDPR, DPDP Bill

## DAY 3 — ISO 20022

### 1. ISO 20022 Fundamentals

- Why global migration to ISO 20022
- ISO 20022 dictionary, business components, message structure
- Role of XML schemas (XSD), validation, pain vs pacs vs camt families

### 2. Payment Messages (Deep Dive)

- PACS messages:
  - **pacs.008** (FI-to-FI Credit Transfer)
  - **pacs.002** (Payment Status)
  - **pacs.009** (Financial Institution Transfer)
- CAMT messages:
  - **camt.052/053/054** (Reporting & statements)
  - **camt.029** (Resolution of investigation)

### 3. Real-World Message Mapping

- Field-by-field breakdown
- Mandatory vs optional elements
- Common validation errors
- Data quality considerations

#### **4. ISO 20022 Interoperability & Compliance**

- Mapping MT to MX
- Coexistence approach
- CBPR+ (SWIFT) and HVPS+
- Schema evolution, release cycles

#### **5. Application in Retail, HVPS, and Cross-Border**

- How ISO enables compliance, AML/CFT, rich data
- Cross-border flows and structured remittance data

### **DAY 4 — Instant Payment Architecture**

#### **1. Evolution from Batch → Real-Time**

- Drivers for instant payments
- 24/7/365 availability and instant settlement requirements
- Comparison: UPI, FedNow, RTP, PIX, TIPS, FPS

#### **2. Instant Payment System Architecture**

- Real-time processing engine
- Payment hubs & orchestrators
- API gateways & open banking integration
- Switch architecture and routing models
- Message acknowledgements & synchronous/asynchronous flows

#### **3. Operational Architecture Requirements**

- Low latency design (<300 ms)
- Scalability & throughput
- 24/7 uptime: redundancy, failover, DR
- Real-time monitoring & event-driven alerts

#### **4. Security & Fraud Architecture**

- Instant fraud detection mechanisms
- Behavioural analytics & ML integration
- AML in real-time environments
- API security; token-based auth

## 5. Case Studies

- UPI real-time architecture
- PIX (Brazil) design
- SCT Inst (Europe)

## Day 5 – Liquidity Management and Security in Banking Operations

### 1. Liquidity Management Fundamentals

- Funding, reserves, intraday liquidity basics
  - Cash positions, settlement accounts, central bank interfaces
  - Liquidity tools: buffers, credit lines, scheduled sweeps
  - Basel III: simplified LCR & NSFR impact on daily liquidity
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### 2. Liquidity for Instant Payments (24/7/365)

- Continuous settlement vs. batch liquidity
  - Pre-funding and pre-positioning of liquidity
  - Real-time liquidity dashboards
  - Automated top-ups and alerts
  - Handling unpredictable volume spikes
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### 3. Liquidity Risks & Controls

- Credit risk, settlement risk
- Real-time fraud draining liquidity
- Queueing, throttling, and circuit-breaker controls
- FX risk & cross-border liquidity volatility

### 4. Future Trends in Settlement & Liquidity

- CBDCs & tokenized deposits
- Programmable money & smart contracts
- BIS Nexus & cross-border instant payment corridors
- ISO 20022 + RTP + APIs convergence

## **5. Security in Banking operations**

### **Threats to Payment & Settlement Systems**

- Real-time fraud attacks (authorized push payment scams)
- Account takeover (ATO) & identity compromise
- Synthetic identity fraud
- Malware targeting SWIFT/RTGS/instant payment platforms
- Insider threats within treasury/operations

### **B. Cyber Risks That Impact Liquidity**

- Payment flooding attacks that drain pre-funded accounts
- API exploitation leading to fraudulent transfers
- Real-time fraud that must be stopped before liquidity depletion
- Compromised treasury terminals (SWIFT-style fraud incidents)

### **C. Cybersecurity Controls for Banking Operations**

- Zero Trust for payment channels
- Strong authentication for treasury operations
- Transaction-level risk scoring and behavioral analytics
- ML-driven fraud models in instant payments
- Secure API lifecycle (client banks ↔ PSPs ↔ payment switch)