### 09 - Sync Enhancements & Future Roadmap

[...previous sections unchanged...]

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### 15 - Sync Logging & Monitoring Framework

[...previous sections unchanged...]

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### 16 - Shop Device Management & Security

[...previous sections unchanged...]

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### 17 - Sync Access Control & Role Permissions

[...previous sections unchanged...]

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### 18 - Real-Time Sync & WebSocket Architecture

[...previous sections unchanged...]

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### 19 - Multi-Tenant HQ Support

[...previous sections unchanged...]

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### 20 - Sync Failure Handling & Recovery Mechanisms

[...previous sections unchanged...]

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### 21 - Queue Design & Job Processing Model

[...previous sections unchanged...]

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### 22 - Data Compression & Payload Optimization

[...previous sections unchanged...]

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### 23 - Sync Scheduler & Cron Job Design

[...previous sections unchanged...]

---

### 24 - Sync Versioning & Schema Evolution

[...previous sections unchanged...]

---

### 25 - Sync Health Dashboard & Reporting

[...previous sections unchanged...]

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### 26 - Conflict Resolution UI & Sync Log Review

[...previous sections unchanged...]

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### 27 - Sync DevOps & Deployment Automation

[...previous sections unchanged...]

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### 28 - Sync API Gateway & Security Layer

[...previous sections unchanged...]

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### 29 - Final Summary & Implementation Roadmap

\*\*29.1 Phased Implementation Approach\*\*

- \*\*Phase 1\*\*: Core Sync Setup

- Webhook structure

- Basic queue & retry logic

- Inventory + Sales sync modules

- \*\*Phase 2\*\*: Reliability Enhancements

- Retry engine with backoff

- Sync health dashboard

- Shop conflict resolution interface

- \*\*Phase 3\*\*: Performance Optimization

- Delta sync & compression

- Real-time WebSocket layer

- Shop device & API gateway security

- \*\*Phase 4\*\*: Expansion & Analytics

- Multi-tenant support

- Full dashboard and logging

- Reports, usage tracking, and versioned schema evolution

\*\*29.2 Core Modules Checklist\*\*

- [x] Inventory Sync

- [x] Z-Report Sync

- [x] Loyalty Points Sync

- [x] Conflict Resolution System

- [x] Backup & Recovery Setup

- [x] WebSocket Architecture

\*\*29.3 Priority Deliverables\*\*

- Sync Preview Tool

- Queue Dashboard

- Retry & Failure Alerts

- Versioning Control Layer

- Role-based Access & Cron Control

\*\*29.4 Recommended Stack\*\*

- Backend: Frappe Framework (Python), Redis Queue, REST + WebSocket

- Frontend: Vue.js or React (Admin UI + Log Viewer)

- Monitoring: Grafana + Prometheus or Frappe Custom Dashboards

\*\*29.5 Post-Go-Live Checklist\*\*

- Load testing with production volume

- Conflict simulation drill

- Failover backup test

- Daily report review & metric benchmarks

\*\*29.6 Ongoing Improvements\*\*

- AI-based conflict detection

- Predictive sync failure alerts

- Offline-first rewrite for POS

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✅ \*\*Sync Architecture Documentation Completed\*\*