Smart ATM Cash Forecasting & Real-Time Refill System

Software Requirement Specification

Business Analyst Project Report
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SOFTWARE REQUIREMENT SPECIFICATION (SRS)

PROJECT NAME: SMART ATM CASH FORECASTING & REAL-TIME REFILL SYSTEM

1. Introduction:

1.1 Purpose

The purpose of this Software Requirement Specification (SRS) is to define the functional and non-functional software requirements for the Smart ATM Cash Forecasting & Real-Time Refill System. This document provides detailed system behavior to support developers, testers, designers, and business stakeholders.

1.2 Scope

The system will:

- Monitor ATM cash levels in real time
- Predict future cash usage using historical trends
- Trigger alerts when cash drops below thresholds
- Generate optimized routes for cash vans
- Provide dashboards and analytics
- Send notifications to operations teams

1.3 Intended Users

- ATM Operations Manager
- Cash Van Team
- Branch Manager
- System Administrator
- Forecasting Engine
- Notification System

1.4 References

- BRD v1.0
- FRD v1.0
- Bank ATM Switch API documentation
- Notification Gateway API

2. Overall Description:

2.1 Product Perspective

The Smart ATM Cash Forecasting System is an internal tool integrated with:

- ATM Switch
- Bank's Operations Dashboard
- SMS/Email Notification Gateway
- Traffic & Map API (for route optimization)

It is a standalone module and does not alter core banking systems.

2.2 Product Functions (Summary)

- Real-time ATM cash level monitoring
- Hourly and daily cash forecasting
- Denomination calculation
- Priority scoring
- Alerting based on threshold
- Route optimization for refills
- Dashboard visualization
- Daily/weekly reporting

2.3 User Characteristics

- Operations Manager: Medium technical knowledge
- Cash Van Team: Basic mobile app usage
- Branch Manager: Review and approve
- Admin: Advanced system management

2.4 Constraints

- Must rely on ATM Switch for accurate cash levels
- Network instability may delay real-time values
- Cash vans have capacity & geographical constraints

2.5 Assumptions

- Accurate 90-day cash withdrawal logs exist
- Historical data is accessible
- Notification system works with at least 95% success rate

3. Functional Requirements:

3.1 ATM Cash Monitoring

FR-01: Fetch Cash Level

System must fetch current cash available in each ATM every 5 minutes.

FR-02: Update ATM Status

System shall classify ATM status as:

- Normal (>50%)
- Warning (20% – 50%)
- Critical (<20%)

FR-03: Store Last Refill

System must store the timestamp of the most recent refill.

3.2 Forecasting Engine

FR-04: Process Historical Data

System must process the past 90 days of ATM withdrawal logs.

FR-05: Predict Hourly Usage

System must generate an hourly consumption model.

FR-06: Predict Daily Requirement

System must forecast total cash required for the next 24 hours.

FR-07: Event/Festival Adjustment

System must adjust predictions based on:

- Salary-credit cycles
- Public holidays
- Festivals
- Weekends

FR-08: Forecast Confidence Score

System shall calculate prediction accuracy using past results.

3.3 Denomination Calculation

FR-09: Calculate Required Notes

System must calculate the required denominations:

- 100
- 200
- 500
- 2000

FR-10: Usage-Based Ratio

System must adjust note distribution based on typical withdrawal patterns.

3.4 Alert and Notification Module

FR-11: Critical Alert

System must trigger alert when cash < 20%.

FR-12: Warning Alert

System must trigger alert when cash between 20–50%.

FR-13: Alert Delivery

System must send alert via:

- SMS
- Email
- App Notification

FR-14: Alert Content

Alert must include:

- ATM ID
- Current cash level
- Forecasted depletion time
- Required refill amount

3.5 Refill Priority & Route Optimization

FR-15: Priority Score

System must rank ATMs based on:

- Cash level
- Forecast depletion time
- Location category
- Footfall score

FR-16: Route Generation

System must generate optimized route for cash vans.

FR-17: Real-Time Re-optimization

System must update routes if:

- New critical ATM alert
- Traffic delays
- ATM outage

3.6 Dashboard Module

FR-18: ATM Overview Page

Dashboard must display:

- ATM ID
- Location
- Cash level
- Forecast
- Status
- Last refill

FR-19: Filters

User must filter by:

- Branch
- City
- Status
- Priority

FR-20: Graphs

Dashboard must show:

- Historical consumption graph
- Predicted usage graph
- Refill frequency graph

3.7 Reporting Module

FR-21: Daily Summary Report

System must generate daily ATM usage summary.

FR-22: Weekly Trend Report

System must generate weekly forecast and usage trends.

3.8 User Access Management

FR-23: Role-Based Access

System must restrict features based on roles:

- Manager: Full access
- Cash Van Team: Route access
- Branch Manager: Viewing access
- Admin: All access

4. Non-Functional Requirements:

4.1 Performance

- System must process cash updates within 2 seconds.
- Dashboards must load within 3 seconds.

4.2 Availability

- System must be available 99.5% uptime.

4.3 Security

- All data must be encrypted.
- Only authenticated users can log in.

4.4 Scalability

- System must support up to 10,000 ATMs.

4.5 Maintainability

- Code must support modular changes without system downtime.

5. System Architecture (High-Level):

The system will consist of the following components:

- ATM Data Ingestion Service
- Forecasting Engine
- Threshold Alerting Engine

- Route Optimization Engine
- Dashboard UI
- Notification Service
- Reporting Engine

6. Data Requirements:

ATM Data

- ATM ID
- Location
- Cash level
- Withdrawal logs
- Refill logs

Forecasting Data

- Historical data
- Event calendar
- Salary cycle schedule

Alerting Data

- Alert thresholds
- Alert history

7. External Interface Requirements:

ATM Switch API

- Provides real-time cash level
- Provides withdrawal data

Notification Gateway API

- Sends SMS
- Sends Email
- Push notifications

Map/Traffic API

- Provides route and real-time updates

Database

- SQL-based storage for logs, forecasts, alerts

8. Assumptions and Dependencies:

- Reliable ATM Switch data feed.
- Correct real-time location info.
- SMS/Email/Push API uptime.

9. Acceptance Criteria Summary:

- Forecast accuracy ≥ 90%
- No ATM cash-out incidents beyond 2%
- Alerts delivered within 5 seconds
- Dashboard loads within 3 seconds
- Route accuracy ≥ 95%

10. Approval

Role	Name	Signature	Date
Business Analyst			
Product Owner			
Operations Manager			
Tech Lead			