Proposal for RapidRide Ticketing System

A Modern, Secure, and Accessible Transit Ticketing Solution

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1 Executive Summary

RapidRide is a lightweight, secure, and extensible fare system for public transit. Designed for mid-sized municipalities such as Rapid City, South Dakota, it offers a cost-effective, open, and auditable alternative to commercial transit fare platforms.

Using digitally signed QR code tickets and a flexible mobile-friendly interface, RapidRide empowers riders and administrators with secure, modern infrastructure—without the costs or complexity of proprietary systems.

2 Project Scope

- Deploy a mobile- and kiosk-friendly digital fare platform
- Enable digital ticket purchase via Stripe integration
- Support secure QR-code-based validation
- Provide tools for fare enforcement, reporting, and expansion
- Ensure accessibility for all riders, including offline and low-tech options

3 System Overview

3.1 Frontend

The RapidRide client is a cross-platform application written in Qt/QML using PySide6, providing:

- A secure user wallet for ticket storage
- Stripe checkout integration for ticket purchasing
- QR code generation and display for scanned validation
- Offline ticket caching for intermittent connectivity

3.2 Backend

The backend is built in Python using FastAPI, supporting:

- Ticket generation using ED25519 digital signatures
- Ticket validation against cryptographic and database records
- User login, wallet synchronization, and Stripe session handling

4 Deployment Plan

1. **Phase 1: MVP (Proof of Concept)** 2–4 weeks
   - Core ticket generation, QR validation, and Stripe checkout
   - Basic enforcement scanner page
   - Pilot on a small number of devices or routes
2. **Phase 2: Fleet Rollout and Admin Features** 4–6 weeks
   - Wallet management dashboard (optional)
   - Driver/passenger usage analytics
   - Training and support for operators

5 Cost Estimate

Software Development

- Initial system deployment: $3,500-$6,000
- Optional expansion (reporting, dashboards): $1,200–$5,000

Hardware Requirements

One MiniPC running Debian Stable is recommended for backend infrastructure. Hardware costs for such a PC range from $200-$500. The frontend client can run on existing Android tablets, iPhones, or Linux laptops with cameras for validation.

6 Ongoing Support and Additional Development

After deployment of the core RapidRide system, ongoing support and additional development are available at the following rates:

Ongoing Support

- **Standard Support (Monthly)** $400/month
  - Covers small bug fixes, basic questions, user support, and monthly maintenance updates
  - Includes up to 4 hours/month of development time
- **On-Demand Support (Hourly)** $40/hour
  - For updates, troubleshooting, or deployment help beyond the base agreement

Additional Development

New features, expansions, or tooling requests are billed at:

- **$40/hour for planned development**
- Flat-rate feature pricing available upon request

All code remains GPL-licensed and open to the City of Rapid City, with no proprietary restrictions.

7 License and Code Ownership

The RapidRide ticketing system is developed and maintained by the author and is provided under the terms of the **GNU General Public License v3 (GPL-3.0)**.

This ensures:

- The source code remains free and open to the public
- Modifications and derivative works must also be licensed under GPL
- The City of Rapid City is granted full rights to use, deploy, and modify the system
- The developer retains ownership of the original codebase and its licensing terms

This licensing model ensures long-term transparency, prevents vendor lock-in, and aligns with the values of public digital infrastructure.

For reference, the full license text is available at: `https://www.gnu.org/licenses/gpl-3.0.html`

8 Conclusion

RapidRide provides a high-trust, low-friction fare system without vendor lock-in or heavy infrastructure costs. With a pilot-ready QR-based deployment and a path for secure digital operations, it is a strong foundation for the modernization of Rapid City public transit.

A Appendix: References

- ED25519 Cryptographic Signatures: `https://ed25519.cr.yp.to/`
- Qt + PySide6 Documentation: `https://doc.qt.io/qtforpython/`
- Stripe Payments: `https://stripe.com/docs`
- FastAPI Web Framework: `https://fastapi.tiangolo.com`