

# Ecosystem Architecture for Intelligent Vehicle Subscription Platforms: Enhancing Customer Experiences on the Road

Hiren Sonaiya<sup>1</sup>, Shashwat Yadu<sup>2</sup>, Swapnil Shelke<sup>3</sup>

<sup>1</sup>Hiren Sonaiya, Project Manager, Tata Technologies, ERC, Chassis, Tata Motors

<sup>2</sup>Shashwat Yadu, Sr. Technical lead, Tata Technologies, ERC, Chassis, Tata Motors

<sup>3</sup>Swapnil Shelke, Team lead, Tata Technologies, ERC, Chassis, Tata Motors

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**Abstract** - With India's evolving road infrastructure, a growing number of travelers now prefer personal vehicles over traditional modes of transport for long-distance journeys. However, while automobile manufacturers have significantly improved in-vehicle technology, passengers often encounter critical limitations in the broader travel ecosystem. This paper proposes a subscription-based, OEM-integrated digital platform that connects drivers and passengers with essential roadside services and facilities, transforming the road travel experience. By leveraging real-time data, AI-driven personalization, and strategic partnerships, OEMs can improve customer satisfaction, enhance safety, and unlock new revenue streams.

**Key Words:** Vehicle subscription, digital platform, vehicle technology Artificial Intelligence and Machine Learning.

## 1. INTRODUCTION

India is undergoing a profound mobility transformation driven by rapid infrastructure expansion, evolving travel behaviour, and accelerating vehicle digitization. Over the past decade, the country has invested heavily in road development, resulting in one of the world's largest road networks—now exceeding 6.6 million kilometres and carrying nearly 85% of passenger traffic and over 70% of freight movement nationwide.

The expansion of national highways and access-controlled expressways has fundamentally reshaped intercity connectivity. The national highway network alone has grown by nearly 60% within a decade, while multi-lane highways now account for more than one-third of the total network, significantly improving travel speed, safety, and accessibility across regions.

This infrastructure acceleration is enabling a cultural and behavioral shift in how Indians travel. Long-distance road journeys—once considered time-intensive and unpredictable—are increasingly becoming the preferred mode of travel for families, professionals, and leisure travellers. Simultaneously, public transportation systems in many regions continue to struggle with capacity constraints, last-mile connectivity gaps, and fluctuating service reliability. Recent mobility trends show rising private vehicle

adoption as commuters seek flexibility, comfort, and control over travel schedules.

As a result, the private automobile is evolving beyond its traditional role as a transportation tool into a primary travel environment—a connected space where navigation, entertainment, safety, and personalization converge.

However, while vehicles themselves have undergone significant technological evolution—featuring connected infotainment systems, telematics, driver assistance technologies, and cloud connectivity—the broader travel ecosystem outside the vehicle has not evolved at the same pace. Highways are expanding rapidly, but the services supporting travellers along these corridors remain fragmented and inconsistent.

Car owners and passengers frequently encounter challenges such as:

- Difficulty locating reliable and hygienic roadside amenities
- Limited access to standardized rest and service infrastructure
- Delayed or poorly coordinated emergency assistance
- Lack of trusted real-time information about road, weather, or travel conditions
- Dependence on multiple disconnected mobile applications during journeys

In essence, modern vehicles operate within an analog travel environment. Infrastructure investments have prioritized roads and vehicles, yet the journey experience itself remains largely unsupported by an integrated digital ecosystem.

This gap presents both a mobility challenge and a significant innovation opportunity.

To address this unmet need, this whitepaper proposes the development of a connected, subscription-based travel ecosystem, seamlessly integrated into Original Equipment Manufacturer (OEM) platforms and in-vehicle infotainment systems. The proposed ecosystem introduces a unified digital layer that connects travellers with verified services, real-time intelligence, and emergency support throughout the entire journey lifecycle.

By transforming vehicles into gateways for connected travel services, the platform aims to deliver an end-to-end on-road experience—enhancing safety, convenience, and confidence for travellers while enabling new recurring digital revenue streams for OEMs and ecosystem partners.

Ultimately, the next phase of India's mobility evolution will not be defined solely by faster roads or smarter vehicles, but by smarter journeys—where infrastructure, services, and digital intelligence operate as a single coordinated system.

## 1.1 Problem Statement

Despite significant improvements in automotive comfort and safety features, external travel conditions remain unpredictable. The major issues include:

- Inability to locate reliable rest stops, EV charging stations, clean restrooms, or pet-friendly areas.
- Lack of real-time information on traffic, weather, road conditions, or emergencies.
- Dependence on multiple third-party applications with inconsistent data.
- Safety and convenience issues during long journeys.

These gaps present a business opportunity for OEMs to build a customer-centric travel ecosystem, enhancing both user experience and brand loyalty. Finally, complete content and organizational editing before formatting. Please take note of the following items when proofreading spelling and grammar:

## 1.2 Proposed Solution

The solution involves developing a subscription-based application that integrates with the car's infotainment system. This application will provide real-time insights, emergency support, and curated recommendations using AI/ML.

Key components of the solution:

- Real-time access to verified roadside services.
- Predictive and dynamic route planning.
- Tiered subscription for differentiated access and services.
- OEM and partner network collaboration for service fulfilment.

## 2. Real-Time Facility Locator

a) This is the "Discovery Layer" of the platform. In India, the challenge isn't just finding a station, but finding one that is functional and safe.

Dynamic Metadata: Beyond GPS coordinates, the system pulls live APIs for fuel/power availability and "Live Occupancy" for restrooms or food courts.

Contextual Filtering: Filters are localized for the Indian traveler, such as "Pure Veg," "High-Speed DC Charger (60kW+)," or "Female-Friendly Restrooms."

Visual Integration: Using the vehicle's infotainment screen, it can show 360-degree street views of the facility entrance to help drivers navigate complex highway turn-offs.

### b) Live Updates and Notifications

This acts as a Proactive Safety Co-pilot, moving from passive GPS to active telematics.

Hyper-Local Weather: Integration with IMD (Indian Meteorological Department) data to provide alerts for flash floods, heavy fog, or dust storms specific to the vehicle's 50km radius.

Infrastructure Pulse: Real-time updates on Fastag lane congestion or "Ghat" (mountain pass) closures, allowing the driver to divert before getting stuck in a bottleneck.

Vehicle Health Sync: Notifications are triggered by the car itself—e.g., "Tire pressure low; suggesting 3 nearby repair shops with air-filling stations."

### c) Personalized Recommendations

This leverages Machine Learning (ML) to turn a generic map into a curated travel concierge.

Behavioral Profiling: The system learns if the user prefers 20-minute quick bites or 1-hour sit-down meals and adjusts "Stop Suggestions" accordingly.

Brand Affinity: If a user frequently visits a specific coffee or hotel chain, the OEM platform prioritizes those partners, potentially offering in-car coupons or loyalty points.

Predictive Stops: Based on driving style (aggressive vs. eco), the AI predicts range anxiety or driver fatigue and suggests a "Revive Stop" exactly when needed.

### d) Emergency Support

This transforms Reactive Help into Managed Recovery.

The "Golden Hour" Response: In the event of an airbag deployment, the platform triggers an automatic SOS with Medical ID (blood group, allergies) shared directly with the nearest trauma center.

Digital RSA (Roadside Assistance): Instead of a phone call, the user raises a ticket via the dashboard. They see the Live Location of the tow truck and a pre-negotiated service cost, eliminating highway overcharging.

Geofenced Safety: For night travel, the system can "Check-in" with the driver periodically or share a live "Track Me" link with emergency contacts.

### e) Navigation and Route Planning

This is the Optimization Engine for long-distance logistics.

Multi-Modal Stops: It calculates the "Perfect Pitstop"—a location where the car can charge, the passengers can eat,

and the kids can play—all in one stop to maximize travel efficiency.

**Alternative Pathing:** In India, "shortest" isn't always "fastest." The system prioritizes 4-lane highways over village roads, even if longer, to ensure vehicle safety and suspension longevity.

**Offline Resilience:** Essential route data and emergency contacts are cached locally in the vehicle's head unit to ensure functionality in network-shadow regions.

#### f) Feedback and Ratings

This creates a Self-Regulating Quality Ecosystem.

**Verified Reviews:** Only users who actually stopped at a facility (verified via GPS/Telematics) can leave a rating, preventing "bot" reviews and ensuring data integrity.

**Hygiene & Safety Index:** A specific score for "Night-time safety for solo travelers" or "Restroom cleanliness," which is critical for the growing demographic of women drivers in India.

**OEM Accountability:** If a recommended facility consistently falls below a 3-star rating, the OEM's AI automatically removes it from the "Recommended" list, forcing facility owners to maintain standards.

### 3. Subscription Model

Tiered Access Plans:

- Free Plan: Basic access to facility locator and traffic/weather alerts.
- Basic Plan: Early access to EV chargers, rest stop ratings, limited discounts.
- Premium Plan: Access to premium lounges, express bookings, concierge support.
- VIP Plan: All-inclusive services including entertainment bundles, route personalization, and customer support priority.

This model supports monetization through tier-based services, affiliate commissions, and upsell opportunities.

### 3. Data and Connectivity Architecture

#### a) Facility Database

- Constantly updated list of verified amenities (fuel pumps, hotels, EV chargers).
- Availability status, operating hours, and amenities provided.

#### b) API Integration

- Sync with Google Maps, EV charging platforms, and hotel booking APIs.
- Direct integration with OEM telematics and vehicle diagnostics.

### 7. OEM Integration & Partner Ecosystem

#### a) Infotainment Sync

- Live data displayed on car screens.
- Hands-free voice commands and driver-friendly interface.

#### b) Ecosystem Collaboration

- Partnerships with fuel providers, EV networks, hospitality brands, and emergency responders.
- Unified payment and booking gateway through app interface.

### 4. Benefits to Car Owners

Category	Benefit
Convenience	One centralized platform for all travel-related needs.
Safety	Real-time alerts, predictive maintenance, and emergency services.
Customization	Personalized travel experience based on driving history and preferences.
Comfort	Premium access to rest areas, food, entertainment, and accommodation.
Revenue Opportunities	Enable carpooling, peer-to-peer rentals, and parcel delivery features.
Trustworthy Feedback	Reviews by verified users with location and timestamp context.

### 5. Strategic Benefits to OEMs

The proposed connected travel ecosystem represents more than a customer convenience feature; it enables OEMs to transition from traditional product manufacturers to digital mobility service providers. By integrating a subscription-based travel platform within OEM ecosystems, automakers unlock multiple long-term strategic advantages across differentiation, revenue, customer lifecycle management, and innovation.

#### 5.1. Differentiation Through Premium User Experience

As vehicles increasingly converge in terms of hardware performance, safety features, and powertrain technology, differentiation is shifting toward digital experience and connected services.

Modern consumers increasingly evaluate vehicles based on connectivity capabilities rather than mechanical specifications alone. Studies indicate that a significant share of premium buyers consider connected navigation and real-time services essential purchasing factors, with connectivity expected to contribute up to 5–10% of OEM revenues by 2030.

A connected travel ecosystem enables OEMs to differentiate by offering:

- Seamless journey planning integrated into the vehicle interface
- Verified roadside services and real-time travel intelligence
- Personalized recommendations during trips
- Continuous feature evolution via software updates

Instead of selling only a vehicle, OEMs deliver a holistic mobility experience, positioning the brand as a travel companion rather than merely a manufacturer.

This experiential differentiation becomes particularly powerful in competitive mid- and premium-segment markets where purchase decisions are increasingly experience-driven.

### 5.2. Enhanced Brand Loyalty and Reduced Customer Churn

Connected ecosystems fundamentally change the OEM-customer relationship by enabling continuous engagement throughout vehicle ownership.

Traditionally, OEM interaction with customers occurred mainly at purchase and periodic servicing intervals. Connected platforms establish an ongoing digital relationship through daily usage, notifications, and personalized services.

Industry research shows that approximately one-third of customers are willing to switch brands for better connectivity experiences, highlighting how digital services directly influence retention.

A subscription-based ecosystem strengthens loyalty through:

- Daily value delivery beyond driving
- Personalized journey assistance
- Predictive maintenance alerts
- Integrated safety and emergency services

As engagement increases, customers become embedded within the OEM's digital ecosystem, significantly reducing switching probability at the next vehicle purchase cycle.

### 5.3. After-Sales Monetization Beyond Traditional Services

Historically, OEM revenues relied heavily on one-time vehicle sales and dealership-based after-sales services. Connected ecosystems introduce recurring, high-margin digital revenue streams.

Connected services allow OEMs to monetize throughout the vehicle lifecycle via:

- Subscription-based travel services
- Feature upgrades through software activation
- In-vehicle commerce and partner integrations
- Usage-based insurance and mobility services

Software-driven services can achieve substantially higher margins compared to hardware sales, with connected services emerging as a major new profit center for automakers.

Additionally, over-the-air (OTA) capabilities allow OEMs to introduce new features post-sale, creating continuous monetization opportunities without dealership visits.

This transforms vehicles into long-term revenue platforms, extending profitability well beyond the initial transaction.

### 5.4. Insightful Customer Data for Future Product and Service Improvements

Connected ecosystems generate rich behavioral and operational data across the vehicle lifecycle. When responsibly managed, this data becomes a strategic asset for OEM innovation.

Vehicle and journey data provide insights into:

- Real-world usage patterns
- Travel behavior and route preferences
- Feature adoption rates
- Maintenance trends and component performance
- Customer experience pain points

OEMs possess a unique advantage due to direct access to customers throughout ownership, enabling data-driven product development and faster innovation cycles.

These insights enable:

- Better future vehicle design decisions
- Personalized services and targeted offerings
- Improved reliability through predictive analytics
- Optimized R&D investments

Connected vehicle data can also enhance service revenue and customer satisfaction by enabling proactive maintenance and tailored experiences.

Over time, accumulated data creates a powerful competitive moat, allowing OEMs to continuously refine both products and digital services.

Strategic Outcome for OEMs

- Collectively, these benefits shift OEM business models from:
- Product Manufacturer → Mobility Platform Provider

- The connected travel ecosystem enables OEMs to achieve:
- Sustainable recurring revenue streams
- Stronger customer lifetime value (CLV)
- Digital ecosystem ownership
- Higher brand stickiness
- Data-driven innovation advantage

In an industry transitioning toward software-defined vehicles, OEMs that successfully integrate connected travel services will move from competing on hardware specifications to competing on experience ecosystems — a far more defensible and scalable position.

## 6. Implementation Roadmap

### Phase 1: MVP Launch

- Facility locator, basic navigation, emergency integration.

### Phase 2: Partner Onboarding

- Fuel, EV, hospitality, insurance and logistics providers.

### Phase 3: Personalization & AI Layer

- Deploy behavior-driven recommendation engine.

### Phase 4: Monetization & Scaling

- Launch subscription tiers, enable revenue-generating features for users.

## 7. CONCLUSIONS

As India moves towards a connected mobility future, the next frontier lies beyond the vehicle. This proposed digital ecosystem integrates real-world amenities into a cohesive, intelligent, and scalable platform that elevates the journey experience. For OEMs, it is a pathway to deeper engagement, greater brand value, and sustainable monetization in the post-sale lifecycle. For customers, it redefines road travel from a fragmented necessity into a personalized, safe, and enjoyable journey.

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## BIOGRAPHIES



Hiren Sonaiya, Project Manager, Tata Technologies, ERC, Chassis, Tata Motors  
Email Id :-  
hs925008.ttl@tatamotors.com



Shashwat Yadu, Sr. Technical lead, Tata Technologies, ERC, Chassis, Tata Motors  
EmailId:-  
sy922715.ttl@tatamotors.com



Swapnil Shelke, Team lead, Tata Technologies, ERC, Chassis, Tata Motors  
EmailId:-  
sshelke.ttl@tatamotors.com