



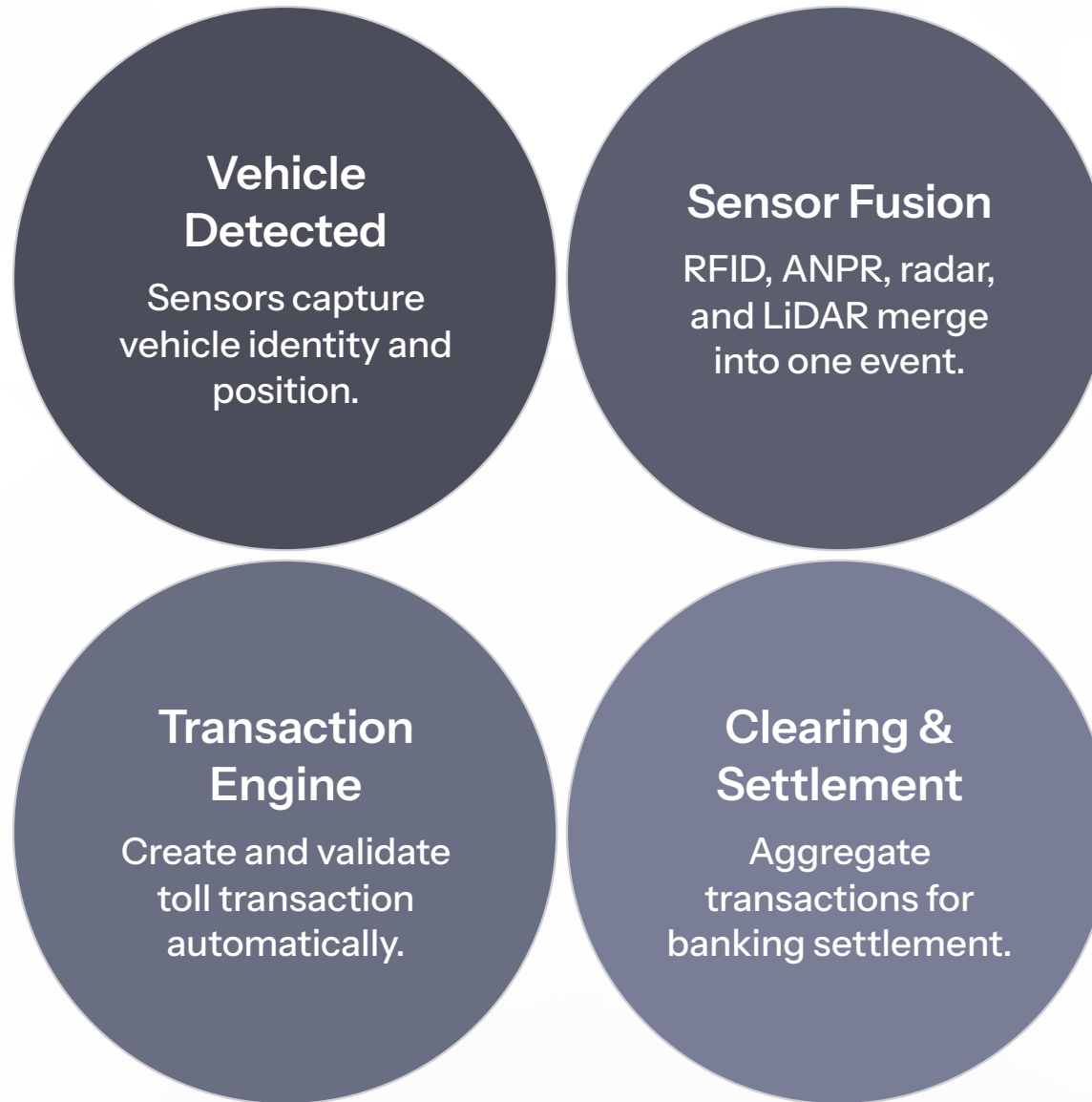
RITAIS Intelligent Transport Architecture

A unified platform for MLFF tolling, sensor fusion, and smart highway operations — engineered for India's next-generation road network.

EXECUTIVE OVERVIEW

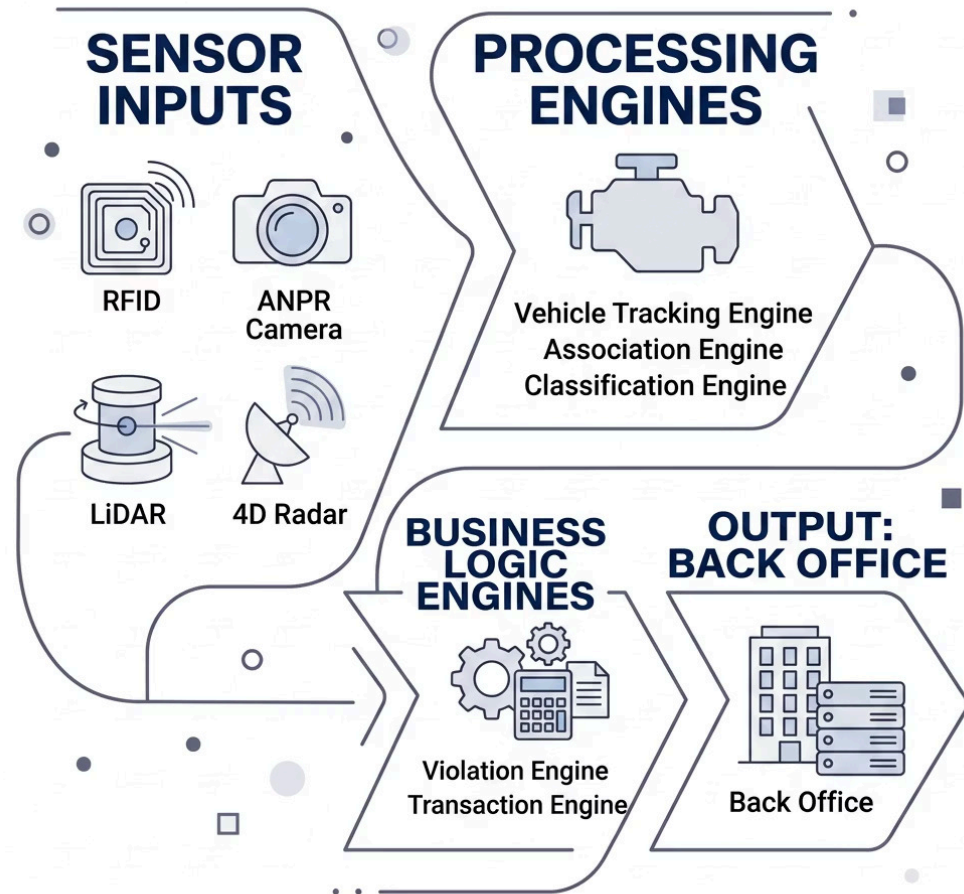
Understand the System in 30 Seconds

From vehicle detection to bank settlement — fully automated, zero stopping.



RFID, ANPR, 4D Radar, and LiDAR inputs converge into a single transaction event — no human intervention required.

Engineering Architecture: Sensor Fusion



Why Multi-Sensor Fusion?

Redundancy

No single sensor failure causes a missed transaction

Accuracy

Cross-validation across modalities eliminates false reads

Classification

Vehicle type resolved to axle count and toll category

Deployment Architecture

Field to national command — every node connected over OFC.



Field Sensors

Camera · Radar · LiDAR · VMS · Weather · RSU



Field Cabinet

Edge compute, OFC ring termination



Regional Control Center

Zone aggregation, local analytics



National Control Center

Central oversight, policy & reporting



MLFF Use Cases: Real-World Scenarios



High-Speed Free Flow

Vehicle at 120 km/h — RFID, ANPR, LiDAR, and 4D Radar capture simultaneously. Zero stopping. Higher throughput. Lower emissions.



Lane Change Under Gantry

Vehicle enters Lane 2, shifts to Lane 3 mid-transit. 4D Radar + LiDAR + ANPR maintain continuous identity — transaction intact.



Truck Occluding Car

Camera loses line of sight. Radar and LiDAR continue tracking. Transaction remains valid. No revenue leakage.

LiDAR: The Differentiator

Most ITS platforms underutilize LiDAR. RITAIS leverages it fully.



Vehicle Separation

Distinguishes truck, trailer, car, motorcycle at speed



Axle Estimation

Supports toll class determination beyond camera capability



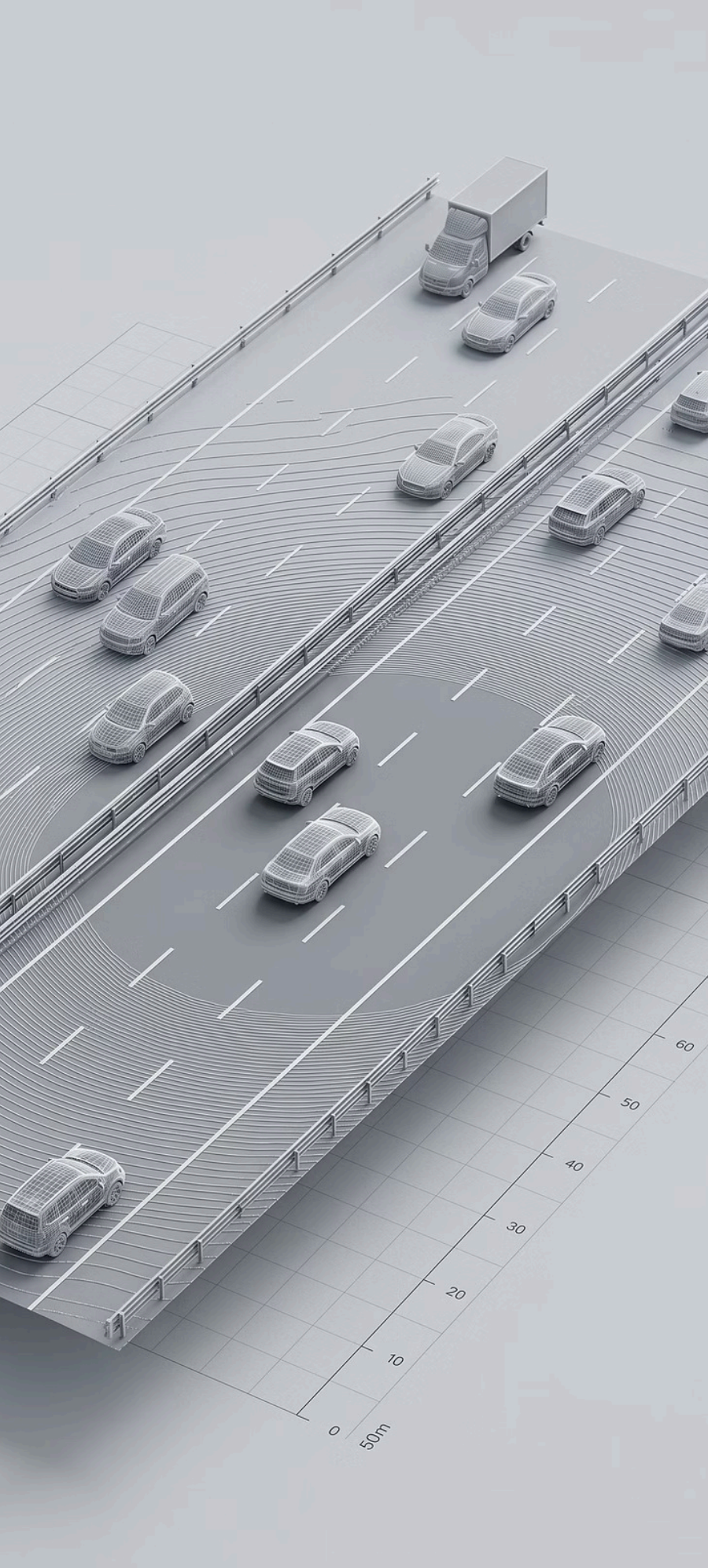
Height Measurement

Accurate vehicle height for category and oversize detection

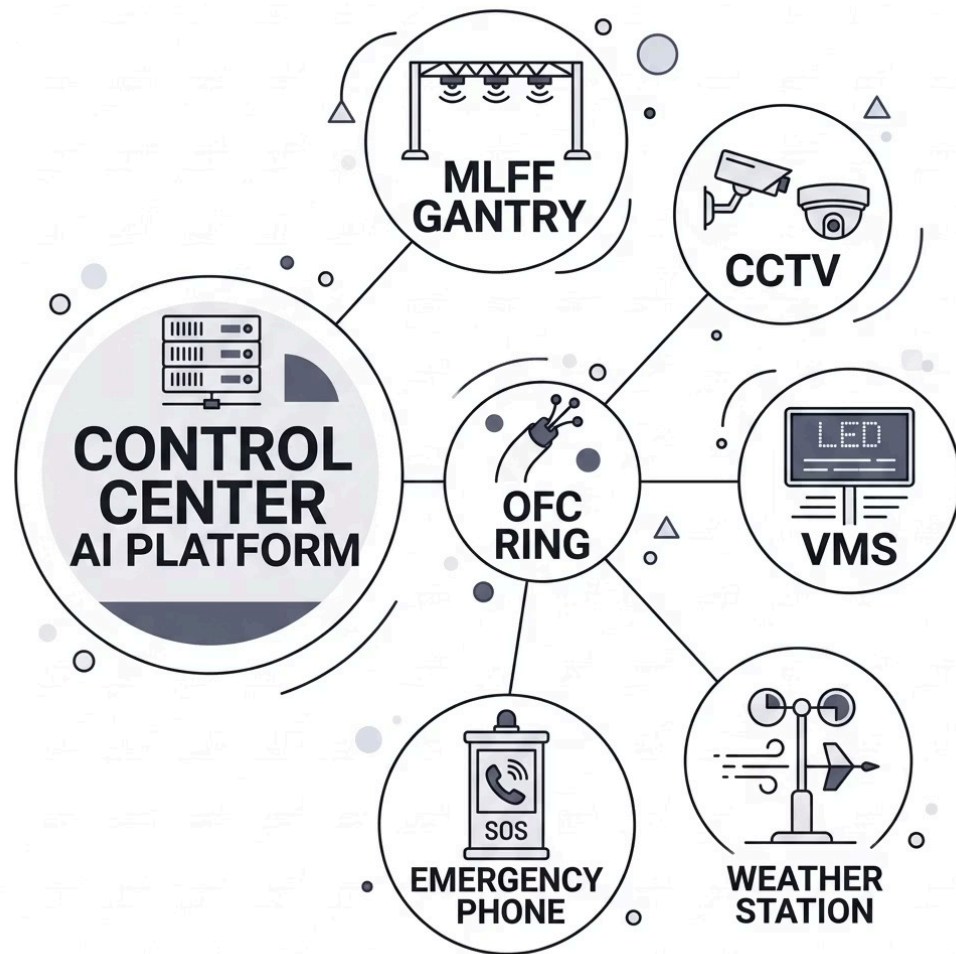


Point Cloud Analytics

Full digital representation of live traffic — millions of points per second



OFC Backbone: Smart Highway Communications



One Network. Every Device.

All roadside assets — tolling, surveillance, safety, and environment — share a single hardened OFC ring. Eliminating siloed networks reduces CAPEX, simplifies operations, and enables real-time AI at the edge.

- i OFC ring topology provides built-in redundancy — single fiber cut does not interrupt operations.



AI Platform & Digital Twin

Roadside Sensors

Data Lake

AI Engine

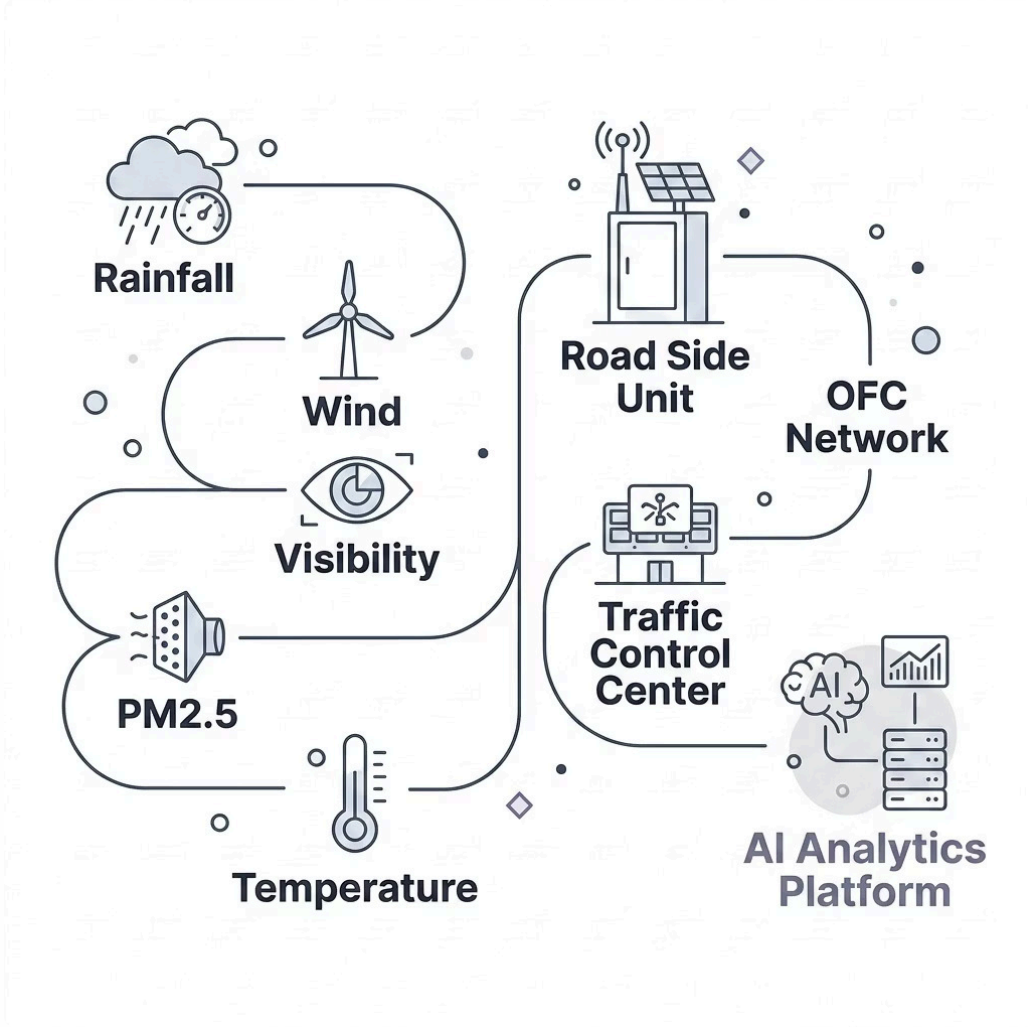
Command Center

Real-time sensor streams feed a living digital model of the highway — enabling predictive incident detection, adaptive traffic management, and executive dashboards.

Weather & Environmental Monitoring

RITAIS Micro Weather Station

Hyper-local environmental data fused with traffic analytics for proactive road safety management.



1

Rainfall
Intensity & accumulation sensing

2

Wind
Speed & direction for incident prediction

3

Visibility
Fog, haze, and low-light detection

4

PM2.5 & Temp
Air quality and road surface thermal monitoring



RITAIS: Built for India's Roads

Zero-Stop Tolling

MLFF at highway speed — no queues, no emissions

Full Sensor Fusion

RFID + ANPR + LiDAR + 4D Radar — every transaction verified

Connected Infrastructure

OFC backbone unifying tolling, safety, and environment

AI-Driven Operations

Digital twin, predictive analytics, national command visibility