TECHNICAL OVERVIEW – Macrocomm Capabilities

Intelligent Transport System Overview: Driving Efficiency, Security, and Passenger-Centric Innovation

Understanding the Vision

Public transport authorities around the world are embracing a bold, transformative vision which is to modernise transit systems, reduce operational inefficiencies, protect revenue streams, and enhance the passenger experience all through the adoption of technology that is future-proof, scalable, and data-driven.

This vision aligns with Macrocomm's mission: to empower public transport stakeholders with integrated, intelligent platforms that streamline operations, safeguard infrastructure, and deliver measurable impact both operationally and financially.

Our solution goes beyond system deployment. It serves as a strategic enablement platform that redefines how an entire transit ecosystem functions from passenger onboarding to fleet optimisation and regulatory compliance.

Integrated Operational Intelligence

Public transport systems often face deep operational challenges, especially when multiple operators are dispersed across wide geographic regions. Without a centralised approach, authorities struggle to manage services holistically. Disparate systems, manual dispatching, and the absence of real-time data create operational silos limiting coordination, delaying incident response, and undermining service accountability.

The lack of a unified view into fleet movements, route compliance, and driver performance leads to rising operational costs, inconsistent service delivery, and passenger dissatisfaction. Planning and scheduling are typically static and disconnected from live operations, while delayed or missing feedback from the field makes proactive decision-making nearly impossible.

Addressing these issues requires the adoption of modern, intelligent technologies that shift operations from reactive to real-time, data-driven management. This means consolidating all transport functions planning, dispatch, tracking, reporting into a single, integrated system that enables live coordination, predictive insights, and full visibility across the transport ecosystem.

Macrocomm has developed an Intelligent Transport System, that is designed precisely for this purpose. By combining Automated Fare Collection with a future-ready Public Transport Management System, it creates a dynamic, digital environment that responds to real-world conditions. Whether you're a control room operator, regional supervisor, driver, or analyst, the platform equips every role with the tools and dashboards needed to act confidently and effectively.

This solution introduces:

- A cloud-based ITS platform that integrates fare collection, schedule adherence, dispatching, and monitoring across all public transit vehicles.

- Centralised command capabilities supported by high-resolution control monitors across operational centres for unified situational awareness.
- Web and mobile dashboards tailored to administrative, operational, and supervisory roles, offering live tracking, alerts, and analytics.
- A scalable, standards-compliant digital infrastructure that unifies an entire transport operation into one responsive network.

The result is a transport system that can be measured, managed, and continuously improved — delivering faster response times, minimising cost leakage, enhancing commuter satisfaction, and enabling authorities to lead decisively rather than reactively.

Key Technical Highlights		
Component	**Description**	**Relevance**
Cloud-Based Scheduling	Central engine for route and trip planning	Enables real-time updates, transparent scheduling
Driver Console	Live route, fare, and alert interface	Keeps drivers aligned and accountable
Dispatch Module	View and control fleet movements	Improves service reliability and responsiveness
GIS Operations Dashboard	Visual monitoring for officials	Supports planning, intervention, and compliance tracking
Real-Time Alerts	Trip deviation or missed trip alerts	Ensures rapid resolution and audit readiness

How It Works: Operational Backbone of the ITS		
Digital Scheduling Engine (Route & Time Planning)	Operators submit weekly/monthly route schedules into the cloud-based control platform. • Each schedule includes route ID, stop sequence, expected dwell times, and assigned vehicle and driver. • Schedules are validated for overlaps, conflicts, and depot capacity constraints. The system pushes approved schedules to: • Driver consoles onboard each vehicle	Unifies planning between departments, operators, and passengers, reducing missed trips and over-serviced routes.

How It Works: Operational Backbone of the ITS		
	• Dispatch management view in each district • Passenger-facing mobile apps	
Live Dispatch Module (Fleet Deployment & Oversight)	When buses depart from depots, their telematics units and driver consoles activate live tracking. • The control room sees vehicle locations in real-time overlaid with route adherence. • If a bus deviates or is delayed, alerts are triggered with the reason code (e.g., congestion, breakdown, operator delay). Controllers can issue reroutes or trip cancellations directly from the system	Enables real-time responses to service disruptions, improving reliability and passenger trust.
Driver Console Integration (Human-System Sync)	Each bus includes a driver console (tablet or embedded screen), connected to: • Assigned schedule and route map • Messages and alerts from the control centre • Fare validation summary (number of boardings, exceptions) • Incident reporting tools (e.g., traffic, passenger issues, breakdowns)	Keeps drivers informed and responsive, and gives the Department insight into trip-level disruptions.
Operations Dashboard (District + Centralised Oversight)	Department employees at HQ and in the various districts each have role-based access to monitor: • Vehicles in motion • Operator schedule adherence • Missed trips or service anomalies • Driver behaviour or vehicle faults impacting service delivery	Transforms departments from a passive monitor into an active orchestrator of public mobility.

How It Works: Operational Backbone of the ITS		
	The interface supports: • GIS-based views, filtering by operator, time, or status • Reporting of service disruptions or interventions • Downloadable route audit logs	

Improve Fare Collection & Eliminate Revenue Leakage

In a subsidised public transport environment, fare collection is more than a transactional process, it is the backbone of operational sustainability, financial accountability, and public trust. However, many transit systems still rely on outdated methods such as manual ticketing, cash-based transactions, and disjointed inspection practices.

These legacy systems open the door to serious challenges: revenue leakage, fare evasion, inflated subsidy claims, and fraud. Such issues compromise the authority's ability to budget effectively, verify service delivery, and ensure fair compensation for transport operators. The complexity is often compounded in multi-operator environments where control structures differ in maturity and data is fragmented, making real-time validation difficult.

To overcome these vulnerabilities, fare collection must shift from a loosely managed backend function to a secure, digital-first revenue assurance system. This system must embed identity verification, transaction transparency, and enforceable controls at every touchpoint.

Macrocomm's solution offers a comprehensive fare collection ecosystem built on biometric authentication, diverse digital payment options, and live inspection capabilities. At the heart of this system is facial recognition technology that confirms passenger identity at boarding, links fares to verified profiles, and syncs all transactions with a centralised fare engine. Complementary tools, such as handheld validators for inspectors and automated subsidy claim generators, ensure that every payment is traceable, every operator claim is auditable, and every disbursement is defensible.

In doing so, transit authorities gain far more than a modern payment platform, they gain a robust revenue assurance system that supports clean, compliant subsidy disbursement and strengthens financial governance across the public transport ecosystem.

Key Technical Highlights		
Component	**Description**	**Relevance**
Facial ID Matching	On-device + server-based validation	Reduces fare evasion, verifies ID without physical cards
Central Fare Database	Real-time sync with validators and app	Enables transparent reporting and reconciliation
Interoperable Validators	QR, EMV, MiFare, Face ID	Accommodates all user groups and tech maturity levels

Key Technical Highlights		
Component	**Description**	**Relevance**
Digital Form D Engine	Auto-generates claims and reports	Streamlines monthly payments, reduces disputes
Role-Based Access	Operators only access their data	Complies with POPIA, supports multi-vendor operations

How it Works: Fare Collection & Eliminate Revenue Leakage		
Passenger Identity & Payment Linking (Biometric Wallet Creation)	• Facial recognition template (not full images) is stored for identification. • Linked to multiple payment methods: bank card (EMV), mobile wallet, or prepaid transport credits. If desired, account is also associated with demographic metadata (age, location, student/senior discounts) for reporting and subsidies.	During a one-time registration process, either at a smart kiosk, mobile app, or operator office, a passenger creates a secure, encrypted identity profile. This ensures that every fare is uniquely attributable to a person, preventing card cloning or identity abuse, while enabling subsidy tiering (e.g., learners or pensioners).
Fare Purchase via Kiosk or App (Multi-Channel Ticketing Engine)	• Use self-service kiosks with face scan or card tap to top up their transport wallet. • Purchase a digital ticket via the mobile app (linked to their facial ID). • Use NFC cards or QR codes for quick validation if not registered biometrically. All purchases are immediately written to the central fare database, including: • Trip ID • Time of purchase • Fare value and type • Payment method and passenger identity hash	This eliminates paper-based ticketing and reduces transaction time at stations and on buses, lowering boarding delays and human error.
Onboard Fare Validation (Bus	• A facial recognition camera at the bus door validates	Provides a frictionless boarding experience that reduces operator-passenger conflict,

How it Works: Fare Collection & Eliminate Revenue Leakage		
Entry Validation Loop) As passengers board:	the individual against the fare system in under 1 second. • Alternatively, passengers scan a QR or NFC card at the validator (equipped with barcode and contactless readers). The system immediately checks whether: • Fare was pre-purchased. • Identity and subsidy class match. • Bus route and boarding time are valid for this ticket. Validation outcomes are pushed in real time to the control centre and stored on the bus's local system (in case of signal loss), then synced.	enforces payment discipline, and ensures real-time fare confirmation.
Fare Enforcement (Field Inspection & Reconciliation)	• Portable handheld validators carried by inspectors can scan faces or QR/NFC cards on the bus or at stations. • The system checks central records for recent fare purchase and boarding validation. • Non-compliant passengers are flagged with geo-location and timestamp, and optional image evidence is captured for audit records. Enforcement rates, violations, and action outcomes are reported per operator and district.	Field teams are empowered with up-to-date fare data, no guesswork or paper forms and subsidy leakage through unvalidated trips is significantly reduced.

How it Works: Fare Collection & Eliminate Revenue Leakage		
Back-End Reconciliation (Digital Form D & Analytics Layer) *All fare and validation data flows into the central revenue engine, which generates:*	• Route-by-route revenue maps • Daily subsidy claim validation via Form D automation • Operator-level compliance scores and fare collection summaries Exception reports for missing validations or unusual patterns (e.g., many free rides, ghost boardings, etc.)	Gives full transparency into how every rand of fare revenue flows, is collected, and can be claimed; reducing fraud, improving accuracy, and enabling confident financial planning.

Enhancing Passenger Experience to Rebuild Public Trust in Mobility

A public transport system is only as effective as the confidence and willingness of its passengers to use it. Yet, in many regions, commuters face journeys that are unpredictable, inconvenient, and disconnected from their day-to-day needs. Whether it's rural communities with limited access to travel information or urban riders frustrated by long queues, poor communication, and complex payment methods, the passenger experience often remains a key barrier to adoption and satisfaction.

Macrocomm's approach puts the commuter at the heart of the system's design. Instead of outdated, provider-centric models, we implement a passenger-first ecosystem that integrates real-time information, seamless payment options, and reliable boarding into one connected experience. The goal is not only to modernise transport but to humanise it, ensuring it is inclusive, transparent, and efficient for people across all demographics.

We achieve this transformation through a twofold strategy:

- **Digital empowerment**, delivered through intuitive mobile applications and multilingual kiosks that make it easy to plan routes, purchase tickets, and board vehicles.
- **Predictive visibility**, allowing passengers to track vehicles live, receive service alerts, and make informed decisions about their commute in real time.

Whether it's a first time user in a remote location or a regular city commuter, the system offers a consistent and dignified experience, reducing wait times, removing uncertainty, and letting passengers focus on their journey, not the logistics of getting there.

By modernising the passenger experience in this way, transport authorities can grow ridership, reduce fare evasion, and build lasting trust in public transport as a safe, accessible, and dependable service.

Key Technical Highlights		
Component	**Description**	**Relevance**
Smart Kiosks	Biometric registration + ticketing	Onboards users without smartphones

Passenger App	Ticket purchase + bus tracking	Supports convenience, planning, and accountability
Smart Boarding	Face/QR-based validation	Cuts boarding time, increases auditability
Live Journey Info	Real-time alerts & ETA updates	Improves commuter satisfaction and service perception

How It Works: Seamless End-to-End Journey Support		
Self-Service Kiosks (Inclusive Registration & Purchase)	Located at high-volume bus terminals, our kiosks allow passengers to: • Register their facial identity once • Link payment methods (bank card, mobile wallet, prepaid) • Top up their travel balance or buy tickets • Review past trips and transaction history Designed with multilingual support, large-touch interfaces, and accessibility in mind.	Ensures inclusivity for elderly, rural, and low-literacy users.
Mobile Application (Real-Time Journey Companion)	For mobile-enabled users, our app offers: • Live bus tracking by route, vehicle, or stop • Ticket purchase via mobile money, card, or credits • QR code-based boarding • Trip history, alerts, and contact centre support	Empowers urban and younger commuters to travel smarter, reducing confusion and uncertainty.
Smart Boarding (Frictionless Passenger Entry)	At the bus door: • Facial recognition automatically validates identity and fare payment • Or passenger scans their app-generated QR code • Boarding time and GPS location are captured for reporting	Reduces congestion at boarding points, increases service speed, and verifies passengers in real time.

How It Works: Seamless End-to-End Journey Support		
	This process takes <1 second per passenger, even during peak hours.	
Dynamic Journey Updates (Trust-Building Communication)	Passengers receive: • Service alerts for delays, cancellations, or detours • Arrival time estimates at nearby stops • Notifications if their ticket or registration is invalid These are pushed via mobile app, kiosk display, and control room SMS broadcasts.	Keeps passengers informed, reduces anxiety, and enables proactive decision-making.

Optimising Fleet and Yard Management for Safer, More Reliable Transport

Behind every dependable public transport service is a well-managed fleet and overseeing a large, multi-operator network is no small task. Many transport authorities face significant visibility gaps when it comes to how vehicles are maintained, dispatched, and operated. Unplanned breakdowns, undocumented servicing, and limited oversight of driver behaviour can lead to cascading failures: missed schedules, inflated operating costs, and compromised passenger safety.

The problem is often worsened by paper-based recordkeeping, fragmented operator data, and reactive maintenance practices. Without centralised, real-time oversight, it becomes difficult to predict issues, enforce standards, or make timely operational decisions.

To solve this, authorities must shift from basic fleet oversight to a model of fleet intelligence, where every vehicle, trip, and component is monitored, analysed, and optimised in real time. This evolution goes beyond tracking location data; it's about understanding each vehicle's condition, anticipating mechanical failures, and ensuring every driver and bus is compliant before leaving the depot.

Macrocomm's Smart Fleet platform enables this transformation. It integrates vehicle diagnostics, driver behaviour analytics, digital maintenance logs, and compliance workflows into a unified, cloud-based control system giving transport departments full operational visibility, from the head office to every depot floor.

Key capabilities include:

- Predictive maintenance that reduces breakdowns and extends vehicle lifespan.
- Real-time monitoring of driver performance to improve safety and fuel efficiency.
- Digital service planning that ensures licenses, permits, and inspections are always up to date.
- Cross-operator fleet visibility, empowering authorities to measure performance, reduce waste, and enforce yard discipline.

By digitising and interconnecting the entire vehicle lifecycle, public transport operations can move from reactive fixes to proactive optimisation cutting downtime, boosting commuter confidence, and achieving sustainable cost savings through smarter fleet management.

Key Technical Highlights		
Component	**Description**	**Relevance**
Yard Departure Workflow	Checklist + driver login + route sync	Ensures compliance and traceability from first mile
Telematics Integration	Real-time engine data and health alerts	Reduces downtime, prevents costly breakdowns
Driver Scoring Engine	AI-driven behaviour analytics	Supports performance-based operator contracts
Lifecycle Cost Tracking	TCO per vehicle with predictive maintenance	Informs budgeting, procurement, and policy decisions
Multi-Operator Visibility	Fleet data per operator with department oversight	Aligns incentives while protecting operator autonomy

How It Works: Digitised Fleet Oversight Platform		
Smart Yard Deployment (Daily Start-of-Service Control)	• As buses leave the depot, driver logs into the console and authenticates via PIN or biometric. • Vehicle checklist and license/permit compliance verified (e.g. PDP, roadworthy, service history). • Dispatch data (planned route, expected trip count) is synced to the IPTMS and control centre.	Prevents non-compliant vehicles from entering service and ensures every trip is traceable.
CANBUS & Telematics Integration (Real-Time Health Monitoring)	• Data from onboard telematics (engine load, braking, coolant temp, fuel use) is continuously streamed to the cloud. • Maintenance thresholds are set for each metric (e.g. oil change, excessive idling). • Automated alerts are sent to fleet managers and the ICC when thresholds are breached.	Enables predictive maintenance before failure, reduces breakdowns, and improves uptime.
Driver Behaviour Analytics	• AI-driven algorithms assess acceleration, braking, speeding, harsh cornering, and idle time.	Reduces fuel waste, improves passenger safety, and supports performance-based management.

How It Works: Digitised Fleet Oversight Platform		
(Operational Efficiency & Safety)	• Driver profiles are built over time, scoring risk, fuel efficiency, and safety. • Reports are shared with both the operator and Department for coaching and compliance.	
Service Scheduling & Lifecycle Tracking (TCO Management)	• Each vehicle has a digital maintenance log, capturing service intervals, parts used, downtime, and costs. • Lifecycle reports estimate remaining useful life (RUL) and guide procurement planning. • Dashboard gives centralised visibility into entire fleet's current service status.	Eliminates manual logs, prevents redundant service, and improves budgeting accuracy.

Enhancing Transport Safety and Compliance Through Intelligent Oversight

Safety and compliance form the moral and operational foundation of any public transport system, essential not only for protecting passengers and operators, but for maintaining public confidence in the institutions that deliver these services. In environments where thousands of commuters rely on public transport daily, even isolated incidents of misconduct, fraud, or mechanical failure can lead to devastating consequences both in terms of human cost and reputational harm.

Yet in many transport systems, the current oversight mechanisms fall short. Manual inspections, paper-based logs, and inconsistent accountability across operators lead to a reactive model, where risks are only addressed after incidents occur, instead of being proactively prevented.

To truly modernise public transport, safety and compliance must be embedded into the daily fabric of operations. These principles need to be visible, automated, and enforceable transforming transport culture into one where standards are followed not out of obligation, but because the systems demand it, and non-compliance becomes the exception.

Macrocomm's solution delivers this through a multi-layered safety architecture that integrates:

- AI-driven surveillance
- Real-time driver authentication
- Environmental risk monitoring (e.g. alcohol detection)
- Centralised compliance tracking

With this approach, every vehicle becomes a mobile compliance unit, and every trip a fully auditable journey.

This enables authorities to:

- Monitor buses live via a control centre, with real-time video feeds and alerts for safety breaches
- Enforce sobriety protocols using integrated alcohol detection systems that prevent ignition if limits are exceeded
- Authenticate driver identity and validate documentation before a shift begins
- Digitally track and audit service compliance, automatically flagging policy violations, route deviations, or missed service levels

This is not just surveillance but preventative governance. It empowers transport authorities to protect lives, enforce accountability, and foster a culture of respect, safety, and operational discipline throughout the public mobility ecosystem.

Key Technical Highlights		
Component	**Description**	**Relevance**
HD Cameras	Minimum two per bus with ICC access	Improves passenger and driver safety
Driver Alcohol Test	Engine immobilisation upon fail	Prevents accidents, enforces compliance
PDP & License Capture	Document scanning at login	Ensures only legal drivers operate subsidized buses
Live Alerts & Review Tools	Real-time surveillance feeds and event logs	Enhances Department's supervision and responsiveness

How It Works: Safety-First & Driver Monitoring System		
Surveillance Cameras on Buses (Visual Monitoring & Evidence)	• Each bus is equipped with two or more HD surveillance cameras, recording both passenger area and driver cabin. • Video is continuously recorded, with real-time streaming during incidents. • Data is stored locally and synced to the ICC for incident review.	Enables evidence-backed incident resolution and deters unsafe or abusive behaviour.
Alcohol Detection and Vehicle Immobilisation	• A built-in Breathalyzer is required to be used by the driver at start of shift. • If alcohol is detected above a set threshold, the vehicle will not start. • Alerts are triggered and sent to the operator and ICC with timestamp and location.	Enforces driver sobriety, reduces accident risk, and introduces accountability.

How It Works: Safety-First & Driver Monitoring System		
Driver ID Verification & Compliance Check	• At log-in, drivers must present a PDP, license disk, and proof of service. • The system scans or captures this data and links it to trip ID and driver performance metrics. • If documents are expired or missing, trip is flagged as non-compliant.	Ensures only licensed, eligible drivers are operating buses.
Live Incident Monitoring & Alerts at Control Centre	ICC receives automatic alerts for: • SOS button activation • Route deviation with passenger onboard • Overload detection • Sudden fuel loss or critical fault Operators can pull live video feeds or review pre/post-incident clips.	Enables swift responses, accountability, and rapid investigations.

Turning Transport Data into Actionable Intelligence and Transparent Oversight

As public transport systems grow in scale and complexity, the ability to make timely, evidence-based decisions becomes essential and not optional. Transport authorities have been hamstrung by fragmented data sources, delayed reporting, and a lack of consistent, real-time visibility across operators, routes, and service levels. Without a unified lens on operations, even well-intentioned policies struggle to deliver their full impact.

To meet its strategic transport goals, transport departments need more than systems that collect data and it needs a platform that interprets it, validates it, and turns it into decisive action. From auditing subsidy claims to designing better routes, every decision the Department makes must be anchored in transparent, auditable, and timely information.

Macrocomm's analytics suite transforms Intelligent Transport Systems into an active intelligence framework, where every touchpoint whether a fare transaction, boarding scan, or route deviation

feeds a central data engine capable of generating high-resolution insights. These insights empower the Department to:

- Monitor revenue, ridership patterns, and operator performance in real time.
- Validate contractor claims through fully digitised and automatically reconciled Form D and Form 1 processes.
- Benchmark service delivery across districts with consistent performance scoring.
- Plan smarter services by understanding demographics, peak-hour usage, and fleet utilisation.

Dashboards and reports will become governance tools. Our platform supports PDF, Excel, and CSV exports for audit readiness and policy briefings, while offering live dashboards that reduce decision lag from weeks to minutes.

This level of insight gives transport departments total visibility, financial accountability, and operational control ensuring not only compliance today but smart, proactive transport development for the future.

Key Technical Highlights		
Component	**Description**	**Relevance**
Central Analytics Engine	Normalised multi-source data layer	Informs policy and improves transparency
Custom Dashboards	Real-time KPIs and alerts	Supports proactive governance
Automated Form D	System-driven subsidy reconciliation	Reduces disputes, delays, and manual effort
Digital Forms & Inspections	Mobile-based audits and reviews	Increases accuracy and oversight
Predictive Reporting	Pattern recognition and forecasting	Enables future-oriented planning

How It Works: Unified Intelligence and Reporting Layer		
Central Data Lake Architecture	• Data from AFC, IPTMS, cameras, driver consoles, and apps flow into a structured analytics layer. • Data is normalised, timestamped, geotagged, and linked to operator and trip ID. • Access is role-based for Departments, operators, and inspectors.	Creates a single source of truth for operational, financial, and service data.

How It Works: Unified Intelligence and Reporting Layer		

Custom Dashboards & Reports	• Real-time dashboards show KPIs for:
	  • Trip adherence
	  • Fare revenue
	  • Passenger volumes
	  • Violations or exceptions
	• Reports are customisable by time, route, operator, or district.
		Empowers evidence-based management and budget accountability.

Automated Payment Certificates (Form D)	• System auto-generates Form D using fare validation data, trip records, and passenger count. • Includes digital signatures, approval routing, and archiving. • Eliminates delays in monthly subsidy payments and disputes.	Speeds up the subsidy process, reduces admin, and improves operator cash flow.
Digitalised Compliance Forms (Form 1 & DTCS Inspections)	• Inspectors capture Form 1 data and DTCS results via mobile tablets. • Submissions are validated automatically and linked to operator profile. • Real-time analytics show compliance trends and red flags.	Removes paperwork, increases compliance oversight, and builds audit trails.

Digital Command Centre Capabilities

With a large fleet spread across multiple regions and numerous independent operators, operational coordination cannot be achieved through fragmented systems or isolated oversight. The reality is that even the most advanced fare collection or fleet tracking tools are ineffective without a central, real-time coordination layer capable of transforming raw data into decisive action. Delays in responding to route deviations, fare disputes, or safety incidents don't just affect performance metrics, they directly impact passenger safety, public confidence, and the transport authority's ability to govern with authority.

That's why a fully integrated Internet Control Centre is not just a technical requirement, it is a strategic imperative. It serves as the digital command hub, where every route, vehicle, ticket, and compliance event converge into a unified view, giving authorities the power to monitor, manage, and optimise the system in real-time.

This is more than surveillance; it's strategic orchestration. The ICC acts as the central nervous system of the Intelligent Transport System, with capabilities that enable:

- Live visualisation of fleet movement across all operators and regions.
- Immediate incident detection and escalation, including safety breaches and route disruptions.
- Centralised compliance dashboards to monitor driver behaviour, licensing, and service adherence.
- Integrated live video feeds for passenger safety and enforcement coordination.
- Change and incident management tools to track, assign, and resolve system-wide issues with full traceability.

What transport authorities gain is a control room where they don't just observe what's happening on the ground but can predict risks, dispatch support, enforce rules, and verify claims with data-driven confidence.
This level of real-time situational awareness allows a shift from reactive oversight to proactive, strategic governance, setting a new standard for transport control and management.

Key Technical Highlights		
Component	**Description**	**Relevance**
ICC Infrastructure	Smart monitors and analytics feeds	Centralises supervision and escalation
Role-Based Access	Tiered system access and security	Ensures POPIA compliance and data integrity
Alerts & Interventions	Real-time incident response tools	Supports continuous service improvement
Audit Trails	Action logging and review history	Improves transparency and governance

How It Works: Integrated Nerve Centre for Public Transport		

High-Resolution Monitors and War Room Display	• 15 smart monitors (5 at HQ, 2 per district) show:
	  • Live bus tracking
	  • Fare compliance
	  • Incident flags
	  • Operator performance
		Enables central and decentralised oversight at once.

Live Alerts & Communication Portal	• Supervisors receive live alerts on missed trips, breakdowns, fare violations, and safety issues.
	• System enables SMS, app, or radio messages to be sent to:
	  • Drivers
	  • Inspectors
	  • Passengers
		Makes the ICC a proactive command centre, not a passive observer.

Role-Based Access Control & Audit Trail	• All ICC actions including intervention decisions, route edits, and approvals are logged. • Access is tiered based on job role, district, or operator.	Enables secure operations, accountability, and audit readiness.