Trapeze™
Here for the journey

sotra
Société des Transports Abidjanais

# Intelligent Transport Systems
# SOTRA Case Study


Powered By:
ebblo

# Case Study:
# Société des Transports Abidjanais (SOTRA)
# Abidjan, Ivory Coast

**From fragmented operations to a future-ready bus network: How SOTRA has utilised the Trapeze Intelligent Transport System suite of solutions to build a smart, scalable, and sustainable bus network.**

## Background

Société des Transports Abidjanais (SOTRA), the public transport operator of Abidjan, Côte d'Ivoire, operates one of West Africa's largest urban bus networks, serving over 1 million passengers daily across the country's five major cities.

In response to growing urban mobility demands and the need for modernised public transport infrastructure, SOTRA initiated a comprehensive transformation initiative. This was executed through the development and deployment of the Système d'Aide à l'Exploitation et Information Voyageur (Advanced Public Transport and Passenger Information System, SAEIV) programme.

For SOTRA, the project focused primarily on unifying and upgrading the mixed fleet of 1,950 buses that SOTRA manages, comprising 450 new Scania vehicles and 1,500 existing Iveco and Tata buses. Operating through a single Intelligent Transport System (ITS) framework, it addressed the following core objectives:


- Expand and Improve Service Reliability
- Provide Real Time Passenger Information
- Enable Real-time Operational Oversight
- Enhance Passenger Experience

To effectively deliver these goals across a multi-city network, SOTRA needed to work with a lead systems integrator capable of coordinating with multiple technology and system providers and integrating them into a unified framework. At the same time, the implementation had to avoid any disruption to daily operations.

To achieve this goal, a comprehensive transformation initiative was developed and launched through an extensively planned, phased implementation strategy. This ensured uninterrupted daily operations while integrating advanced scheduling, fare collection, and real-time passenger information (RTPI) systems across the fleet. Another major benefit of deploying the ITS was the significant improvement it brought to the operational capabilities of the central control centre. It also introduced up-skilling opportunities for bus drivers, enabling them to quickly learn how to operate the new systems and support this new technology landscape.

### Industry
Bus & Ferry

### Solution
Intelligent Transport System (ITS)

### Objective
Transform bus network monitoring and service reliability to enhance passenger experience

### Overview
- 1,950
- 1 million daily passengers
- Fixed Route Bus, BRT & Ferry
- System used across 5 cities & 11 depots

### Benefits
- ✔ Seamless integration across legacy and new fleets
- ✔ Implementation of an ITxPT interface for Automatic Vehicle Location and Control (AVLC) and Automatic Vehicle Management Systems (AVMS), Automatic Fare Collection (AFC), and passenger displays and counters
- ✔ Zero service disruption to bus operations during rollout


## Project Objectives and Goals

Public transport authorities face increasing pressure to modernise operations, improve service reliability, and meet the evolving expectations of urban commuters. While this is a global trend for public transportation networks, the approach to modernisation varies based on region and transit types. For bus networks in Africa, one of the key challenges is integrating existing equipment and platforms that, while still operational, are not designed to work seamlessly with modern ITS frameworks.

This was a defining factor for SOTRA as it embarked on its latest efforts to modernise the bus fleets it operates across five cities in Abidjan. Previously, this expansive public transport network operated in a fragmented environment and faced several persistent challenges, including:

- Limited real-time visibility across fleet operations
- Difficulty collecting comprehensive, real-time passenger data
- Outdated and siloed fare collection systems with limited integration

For SOTRA, the challenge was to transform this complex and extensive multi-city bus network into a unified intelligent transport management platform that addressed these issues. The intended outcomes included developing a more efficient scheduling system, improving oversight for route management, and providing real-time information for passengers, bus drivers, and system operators.

A key goal of the SAEIV initiative was to ensure uninterrupted service delivery while enhancing operations, improving the passenger experience, and increasing system scalability. This included achieving full inter-operability between new and existing systems via open standard protocols, such as Information Technology for Public Transport (ITxPT), Verband Deutscher Verkehrsunternehmen (VDV, the German Association of Public Transport Companies), General Transit Feed Specifications (GTFS), and Service Interface for Real-time Information (SIRI). This also includes centralised management of data and digital assets.

As all these requirements needed to be addressed, the deployment of the new ITS solution would need a phased implementation strategy – one that specifically enabled rigorous testing, continuous rollout without disrupting operations, and direct and seamless skills transfer. The latter was critical for the SOTRA installation and deployment teams as they required dedicated training and structured operational onboarding.

Even more crucial was the need to execute implementation while minimising disruptions to daily operations. To address this, dedicated personnel were placed on-site to facilitate skill transfers and provide ongoing support for installation and maintenance. As for project implementation, all deployment phases were conducted during night hours, supported with multiple rounds of testing and commissioning to validate system performance, and various checks to ensure operational readiness. This also included continuous workforce onboarding and training.

By integrating advanced and heavily secured dispatch, scheduling, and passenger information systems, SOTRA laid a solid foundation for a future-ready transport network that can fully support ridership growth, meet rising demands for better experiences among its passengers, and address the broader mobility needs of Abidjan.

## Solution – Trapeze ITS

To modernise its public transport operations, SOTRA collaborated with Trapeze to deploy the Trapeze ITS framework as the foundation for core operations and to primarily drive the SAEIV initiative. This solution, an extensive suite of management functions and control systems, empowers public transport providers to effectively manage their operations and deliver a reliable, safe, and responsive passenger experience.

With the initiative fully implemented, SOTRA gained the ability to effectively manage and monitor its large bus fleet across the five cities that it serves. This enhanced oversight included real-time tracking, integrated scheduling and route management, and automated fare collection, all of which are managed in a unified operational environment. This is further enhanced through advanced communication functions and seamless data-sharing between new and existing systems.

This transformational approach enabled dispatchers, drivers, and systems controllers to respond dynamically towards various service demands, incidents, and passenger needs. The deployment also marked a significant shift for SOTRA, as it took proactive steps to become more data-driven, laying the groundwork for long-term scalability and service excellence.


*"Trapeze supports SOTRA in the digitalisation of its activities by implementing a complete ITS solution, including a passenger information system. This deployment has significantly improved service quality by providing real-time travel information, particularly for daily commuting. Furthermore, as part of Abidjan's broader multi-modal mobility strategy, Trapeze has strengthened SOTRA's readiness for integration into the wider transport ecosystem in preparation for major structural projects such as the Metro and the BRT. In summary, Trapeze has helped SOTRA significantly enhance urban mobility for the Ivorian population."*

Mr. Meité Bouake, Director General, SOTRA

As the SOTRA-managed bus fleet grew to support the wider network allocation, the ability to manage, process, and track real-time operational data across diverse vehicle types proved critical. These include ridership volumes, on-time adherence, and synchronisation across bus operations, such as fare collection and route management. The centralised control centre, powered by the Trapeze suite, enabled consistent and agile management across all five cities that SOTRA services.

Looking ahead, the growth potential that Trapeze ITS offers has positioned SOTRA as being ready to scale when future opportunities arise. This includes bringing additional cities online, supporting new modes, such as ferry, Bus Rapid Transit (BRT) capabilities, and integrating with new and modern services, such as metros.

This scalability ensures SOTRA is prepared to support future growth and lead the next phase of urban mobility transformation across Côte d'Ivoire.

## SOTRA Bus Fleet Integration and Expansion

The Trapeze ITS framework enabled SOTRA to unify its entire bus fleet, managing both existing and new vehicles through a single operational platform. This included upgrading bus equipment where necessary and integrating existing onboard hardware and solutions, ensuring that every vehicle was brought to the same standard. This process ensured that all buses were fully equipped and connected to the Trapeze LIO Control Centre. This is how SOTRA was able to make the best use of its existing equipment, saving capital equipment costs and future-proofing their operations.

Designed around seamless interoperability, Trapeze ITS natively supports open architecture standards, such as ITxPT, VDV, and GTFS. This allowed all buses, regardless of age or manufacturer, to operate within a cohesive ITS-managed environment. Using this approach has helped eliminate the need for parallel systems and enabled consistent data exchange across the SOTRA-managed fleet.

The integration extended beyond vehicle tracking, as it includes engaging with a wide range of sub-systems that the ITS needed to communicate with. These include:

- Passenger information displays
- Fare collection systems
- Display controllers on bus
- Automatic Passenger Counters
- Scheduling systems


Each component was configured to communicate with the central control centre and with each other, enabling the real-time transmission of operational and navigation data, route management, updates on mileage tracking, schedule adherence, and direct command execution from the central Control Centre.

The system also introduced a key feature – the single log-on function. This enabled drivers to authenticate once only via the onboard driver display unit. Upon login, the system automatically synchronised with fare validators, duty schedules, RTPI management platforms, and automatic vehicle location and controls (AVLC) modules. This streamlined the start-of-day process and reduced the risk of manual errors.

With this integrated approach, SOTRA achieved complete visibility and control over its mixed bus fleet, enabling consistent service delivery, simplified maintenance, and a scalable foundation for future expansion and consistent technology updates.

## Multi-City Management

Day-to-day operations for a multi-city bus fleet management system can be complex. By deploying the Trapeze suite, SOTRA not only streamlined and optimised the management of nearly 2,000 buses with real-time oversight, it also enhanced the passenger experiences across the five cities in which these buses operate.

With dynamic dispatching, urgent updates from the RTPI system being shared without delay, as well as on-time and accurate scheduling, the complexities of this massive public transportation network have become significantly more manageable.

The Trapeze ITS deployment has empowered SOTRA's central control centre to quickly address service disruptions, manage sudden and unavoidable traffic issues and diversions, and respond towards constantly evolving passenger needs. This operational readiness ensures SOTRA can consistently provide high-quality passenger experiences across its bus network.

While the ITS deployment for SOTRA focused primarily on operational efficiency for bus operations, it also elevated the service quality for passengers and their overall satisfaction.

Key achievements for SOTRA since it deployed the Trapeze ITS suite of solutions include:

- **Higher reliability** through management of route diversions and traffic conditions
- **Enhanced on-time performance**, resulting in a better experience for passengers
- **Real-time operations visibility**, ensuring effective management of the bus fleet
- **Optimised communication** between drivers and the control centre

## Optimised Deployment for Multi-Vendor Integration

The success of the ITS transformation undertaken by SOTRA hinged on its ability to integrate with a wide range of third-party and bring them into a single, cohesive operational environment. This included bus scheduling and route tracking, fare collection, passenger information management, and seamless integration with existing equipment supplied by various vendors.

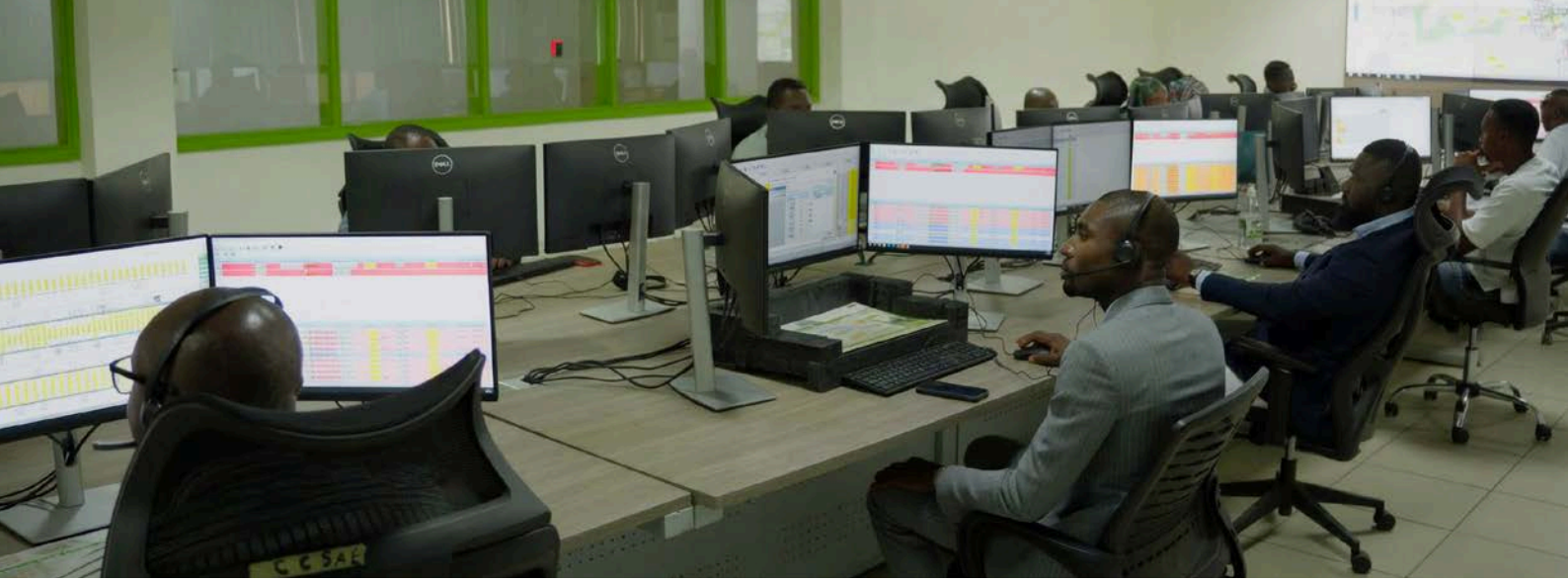
With Trapeze ITS, SOTRA can fully address these needs as it has an operational pathway that avoids vendor lock-in, reduces integration complexity, and lays the foundation for a scalable infrastructure that can adapt to all evolving mobility demands.

Data protection was also a top priority for SOTRA. To ensure passenger data, system integrity and all sensitive equipment are adequately protected, the Trapeze ITS deployment included end-to-end VPN encryption. This provides comprehensive data protection in real-time, securing passenger information, operational assets, and all transmissions between vehicles, third-party systems, and the control centre.

This comprehensive ITS deployment provides a centralised control structure that became the operational backbone for SOTRA, facilitating:

- Real-time data exchange between buses and back-end systems
- Automated updates to timetables, duty rosters, and fare validators
- Consistent communication across new and existing fleets
- Enhanced security for operational and passenger data

The new ITS framework also empowered SOTRA to address operational issues quickly, manage service performance pro-actively, and maintain



high levels of system availability. With the phased deployment approach, each rollout segment and component deployment was rigorously tested and validated before going live. This minimised the risk of failure and any potential impact on operational continuity.

By aligning technical integration with its operational goals, SOTRA has developed a scalable, vendor-agnostic platform that supports long-term growth and continuous innovation in bus fleet operations.

Feedback from various departments within SOTRA, its partners, and vendors has been overwhelmingly positive. One key highlight is the two-way communication between drivers and the control centre, which has significantly improved operational visibility and responsiveness.

As for user experience, the bus drivers appreciate the automatic login and work assignment features as they make it easier for them to start their shifts and stay focused on service delivery. Vendors, meanwhile, like how their systems can be integrated seamlessly ensuring there is no service disruption.

## Optimised for Better Passenger Experience

With over 1 million passengers commuting on buses daily, SOTRA's transformation was not only about operational efficiency; it had to focus on delivering a better experience for every commuter.

The ITS deployment introduced real-time data and information sharing to operators, drivers, and passengers; automated fare validation to ensure streamlined collection and improved scheduling accuracy across the network.

Passengers now benefit from:

- **Accurate real-time updates** on bus arrivals and changes to routes and services
- **Reduced wait times** through optimised scheduling and improved fleet efficiency
- **Enhanced service reliability** even during peak hours or when disruptions occur

Overall, passenger experience has improved as reliability and on-time performance has improved. With this foundational ITS deployment, SOTRA has developed and achieved a more intelligent, more intuitive, and commuter-friendly multi-city bus network. As it continues to scale, the system is designed to meet both existing requirements and the growing demands of urban mobility in Abidjan and the other four cities being serviced.

Following the deployment, SOTRA continued to evolve its ITS capabilities to meet new operational needs. These include:

- Extending support to ferry operations, enabling real-time tracking and coordination across water-based services
- Resolving integration issues between third-party scheduling systems and the Trapeze data system

Automated monitoring of the control centre server hardware was also implemented as part of the Trapeze maintenance programme. Ensuring that, should a fault be detected, all relevant parties are automatically alerted and the Trapeze team responds pro-actively to manage the issue. This continuous monitoring has reinforced system reliability and ensured a high level of system availability across all operational layers.

With Trapeze ITS, SOTRA is not only keeping pace with Abidjan's rapidly expanding city planning and its growing demand for better urban mobility. It is also setting new industry benchmarks for all to follow as it establishes itself as a role model for West African mobility.


## Phased Deployment Ensures Smooth, On-Time Rollout and Successful Adoption

A phased delivery approach was adopted for this greenfield installation. The first phase focused on deploying basic functionality, such as monitoring drivers on their routes. In the second phase, we introduced more advanced features, including on-board communication. This allowed drivers to become familiar with the core software functions before adding additional capabilities. The final phase incorporated business intelligence tools and on-board integration with the ticketing system.

SOTRA operates from nine depots, and the deployment was planned on a depot-by-depot basis. A pilot commenced in May 2023, with full operations beginning in January 2024. Following the pilot, the remaining depots were brought online over a twelve-month period. This phased approach also allowed SOTRA to complete the installation of equipment across the existing fleet to the planned timeline.

## SOTRA - ITS Achievements So Far

- Advanced bus fleet management and control across a multi-city network
- The first integrated AVLC, AFC, Passenger Information, and Automatic Passenger Counter installation in Africa
- Integration of existing and new bus equipment into a single management platform
- Integration of driver duties and automatic driver login and work assignment

*"Our real-time monitoring system, powered by Trapeze's ITS, is at the heart of our operations. It provides us with the real-time visibility we need to respond to traffic conditions, efficiently manage our fleet, and keep passengers informed at every stage.*

*This has significantly improved the reliability and punctuality of our bus fleet, enabling us to meet the transport needs of more than 1 million passengers. With this system, we are not simply operating buses — we are delivering smarter, safer, and more reliable public transport and a better passenger experience in Abidjan. Trapeze's ITS has enabled SOTRA to significantly improve mobility for the population."*

Mr. Jean Tano Nouman, Director of Information Systems, SOTRA

Trapeze™
Here for the journey

Trapeze works with public transport agencies and their communities to develop and deliver smarter, more effective public transport solutions. For more than 50 years we have been Here for the Journey, evolving with our customers around the world to help them move people from point A to Z and everywhere in between.


| | |
|---|---|
| **South Africa** | **+27 11 568 3096** |
| **Cote d'ivoire** | **+ 225 07 67 681 051** |
| **Morocco** | **+ 212 6 61 26 77 36** |

**TRAPEZE AFRICA**
HQ: St Andrews Office Park, Block C, Office 102 Meadowbrook Lane,
Epsom Downs, 2152 South Africa
Visit: trapezegroup.africa