



Bus Intelligent Transport Systems and Multi-Operator Management

Singapore Land Transport Authority

Industry

Bus

Objective

Improve bus services

Solution

Trapeze's Intelligent Transport System

Overview



6,000 buses



4 bus operators



12 depots



700 km² geographical area serviced



4 million daily ridership

Results

- ✓ Increased service quality
- ✓ Bus operator incentives based on monitored KPIs
- ✓ More regular passenger wait times
- ✓ Cost control

The Singapore Land Transport Authority uses Trapeze's Intelligent Transport System solution to monitor and manage over 6,000 buses across multiple operators.

Background

The Land Transport Authority (LTA) manages various transport developments in Singapore, and are responsible for planning, designing, building, and maintaining Singapore's land transport infrastructure and systems. In 2016, LTA reorganised the way public bus service was funded and delivered throughout the country.



Previously, Singapore's bus services were divided into two 'concessions' that were managed and operated independently. Bus operators were remunerated from collected fares, using a revenue-based, service delivery model. As part of an initiative to increase bus service quality and reliability, LTA changed the concession arrangement to a bus contracting model. This meant that bus operators were contracted to the LTA to deliver services to a defined quality level, which included incentive-based Key Performance Indicators (KPIs).

This change known as the Bus Contracting Model (BCM), was fully implemented in 2016. The aim was to enhance connectivity and improve bus service standards for Singapore's 5.7 million residents and enable bus operators to respond to ridership and commuter needs more effectively.

Buses are the most used form of public transport in Singapore, with over four million passengers taking the bus daily - travelling across the island nation on more than 300 services, and over 6,000 buses.

Objective

Transport authorities face multiple challenges when managing increasingly complex networks and fleets to deliver more efficient and reliable services. One challenge for bus transport is that it shares the road with other users, and it can be difficult for buses to arrive on time – especially during peak hours.

LTA's BCM aimed to increase bus service reliability and to ensure regular waiting times for commuters by including quality measurements (as part of the Bus Service Reliability Framework) into bus operator contracts, which are issued in packages.



This creates an incentive for operators to achieve the agreed service quality. The BCM also aims to encourage competition which keeps costs down, but also rewards good operators, and penalises the underperforming ones. LTA studied multiple models before the BCM was developed, which included London, and Perth in Western Australia.

Under the BCM, LTA owns all public buses, and leases them to bus operators for set terms. This prevents barriers for operators who are considering entering the market. LTA is also in charge of planning bus routes and providing fair conditions for operators to achieve LTA goals.

However, for the BCM to work effectively at the scale LTA needed, sophisticated technology and systems were required to accurately measure how well bus operators deliver their services. The technology had to provide LTA with a centralised monitoring and control platform that monitors, collects, and analyses large swathes of data from every single bus. The system also needed to provide each bus operator with the tools to manage their operation to meet service levels while, at the same time, collecting performance information.



LTA was focused on delivering better bus services, with a strong emphasis on service regularity. The system needed to enable operators, and the bus captains themselves to regulate the interval or headway, helping to provide a regularly spaced service.

LTA also wanted to keep passengers constantly informed with accurate, real-time data across multiple sources, such as bus stop information displays, websites, apps, and within buses. Having this information readily available would enable passengers to plan any journey in Singapore easily.

LTA decided to let bus companies operate the routes, as they have significant expertise in managing large bus fleets and attracting the right staff to operate and maintain them.

It is up to each bus operator in Singapore to deliver services that meet the LTA contract requirements, which are matched with passenger needs. This allows the LTA to manage the network with the passenger as the focus - providing better bus services and a better passenger experience.

Solution

Since 2014, Trapeze has provided LTA's technology to help manage bus services in Singapore. The Trapeze Intelligent Transport System (ITS), otherwise known as the Common Fleet Management System (CFMS), is at the heart of this - providing a common bus quality management and monitoring platform across all operators.

From this point, the LTA could monitor and measure the performance of individual buses, and the operation as a whole. LTA was also able to provide every bus operator with common tools to help actively manage their operations. This meant that operators did not have to acquire their own CFMS, as this was provided by LTA.





LTA's Common Fleet Management System

The Trapeze solution that LTA uses connects multiple bus operations with a central system, collecting and communicating key information in real-time. The CFMS is used by LTA to monitor the performance of planned bus services across the whole of Singapore, which involves multiple routes and four operators.

With the CFMS, LTA gains valuable insights into the bus services delivered, while operators ensure they can meet LTA's service quality benchmarks. The system monitors every bus service in Singapore, which include 'Trunk Bus Services' that run along longer routes between neighbourhoods, and 'Feeder Bus Services' which offer transfers from Mass Rapid Transit (MRT) stations and bus interchanges to surrounding areas.

The four bus operators in Singapore are SBS Transit, SMRT Buses, Go-Ahead Singapore, and Tower Transit. Buses are equipped with the Trapeze Intelligent Data Router (IDR) onboard computer with a touch display (or Driver Display Unit – DDU) for the driver.

The IDR informs the control room about all services, while the DDU informs the bus driver about their individual service. Each bus communicates with the control centre, using 3G/4G communications with support for VoIP calling.



The CFMS includes a range of advanced security facilities and audit trails and is monitored 24/7. There is also a dedicated user acceptance testing feature for assessing new software enhancements and updates.

Operator Contract Monitoring

The CFMS provides the mechanism for calculating and recognising the actual bus service quality and comparing this with the agreed contract requirements. Within operator contracts, there is a provision for recognising circumstances that are outside of their control.

Increased Efficiencies and Cost Control

Since the BCM was introduced, other benefits have included increased efficiencies due to centralised communications, asset management and investment. The BCM provides control over bus public transport costs by the regular, competitive tender process.

The introduction of foreign operators (Tower Transit and Go-Ahead Singapore) has brought in new practices to Singapore. In 2016, LTA established a centralised Bus Operations Centre to facilitate bus communication with bus operators. This enables bus operators to respond to incident management, service performance issues, and unplanned diversions quickly.



The CFMS supports BCM efficiencies and effectiveness by providing visibility and control over core business processes. CFMS data is continuously analysed across routes and services. The system is capable of monitoring thousands of vehicles and is also scalable, which can account for future growth. The CFMS can also be configured for changing needs and requirements.

The CFMS also helps manage communications. Servers and on-board computers exchange and share data on timetables, announcements, statistics, logs, and device messages. The CFMS also actively informs control centre dispatchers when incidents occur, and enables communication with vehicles, providing an overview of all operations.



Increased Service Quality

Since the BCM was introduced, LTA has a better understanding of how the bus fleet operates across all of Singapore. LTA has implemented many improvements over time that have led to increased customer satisfaction. Now that Singapore has fully transitioned to the BCM, there has been more regular wait times, more services deployed, and more staff employed by bus operators ^[1].

In 2016, when the BCM was first introduced, the average daily bus ridership figure was 3.9 million. In 2019, this reached 4.1 million average daily trips – an increase of over 5% ^[2].

Additional wait times have also decreased by 15% since 2016, when the BCM was fully implemented ^[3].

“The LTA is absolutely thrilled by the results of the Bus Contracting Model. Bus customer satisfaction ratings are through the roof and are well over 90%. We have never looked back and have never regretted it. Because we took the revenue and asset risks away from the operators, all they need to do is turn up and operate their services well. We are now in full control of service decisions and what is best for Singaporeans.”

Jeremy Yap - Deputy Chief Executive of Public Transport, Policy and Planning, Singapore Land Transport Authority.

Singapore LTA - BCM and CFMS Success



Increased bus service quality



Increased bus ridership numbers - 3.9 million to 4.1 million average daily trips



Increased bus services and operator employees



Effective bus operator monitoring and KPI management



More regular passenger wait times



Cost control for bus services

References

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4. Public Transport Council, (2020). *Satisfaction With Public Transport Stays High In 2019*
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