

OPERATIONS REVIEW

SINGAPORE

PUBLIC TRANSPORT SERVICES

BASIC BUS SERVICES • EXPRESS BUS SERVICES • CITY DIRECT BUS SERVICES
• SHUTTLE BUS SERVICES • NORTH EAST LINE • DOWNTOWN LINE
• SENGKANG LIGHT RAIL TRANSIT • PUNGGOL LIGHT RAIL TRANSIT

\$1,470

REVENUE
(S\$'MILLION)

222

TOTAL BUS ROUTES
OPERATED

78

TOTAL STATIONS
OPERATED

9,936

TOTAL NUMBER OF
EMPLOYEES

3,572

TOTAL BUS FLEET

198

TOTAL TRAIN FLEET

BUS SERVICES

2023 marked 50 years since we started providing public bus services to our passengers. We continued to remain dedicated in keeping Singapore moving every day – rain or shine.

BUS CONTRACTS

In 2023, we entered our seventh year of operations under the Bus Contracting Model (BCM), where the Government retains the fare revenue and owns all infrastructure and operating assets such as depots and buses. Bus operators are contracted and paid to operate public bus services through a competitive tendering process.

SBS Transit operated a total of nine bus packages that covered 220 routes. Of these, two were tendered contracts – Bukit Merah and Seletar Bus Packages – which were awarded on a five-year term and seven came under negotiated contracts where SBS Transit is the incumbent operator.

In August 2023, we were awarded the Bukit Merah Bus Package for a second consecutive term, marking the third bus tender that we had won under the BCM. The Seletar Bus Package, which will expire in March 2025, was put up for competitive tendering that closed on 4 March 2024.

Among negotiated contracts, six have had their contracts extended while the Jurong West Bus Package will end in August 2024.

For the year under review, we remained as the biggest public bus operator with a market share of 62%. We averaged 30,258 bus trips a day – a marginal increase of 13 more trips than the previous year – and operated from 18 bus interchanges, 15 bus terminals, seven depots and a bus park.

BUS OPERATIONS

With the Land Transport Authority (LTA) as the central planner of bus routes, we rolled out two shuttle bus services to serve the Loyang Industrial Estate,





Changi Airfreight Centre and Airport Logistics Park of Singapore. Available during weekday peak hours, LCS1 operated from Tampines and LCS2 from Punggol.

Under the BCM, a new feeder service – Service 230 – was introduced in Toa Payoh to provide convenient access to the town centre for residents residing in Kim Keat Avenue.

Six short-trip bus services – 5A, 5B, 9B, 102A, 102B and 163B – were also added to better serve the travel needs of office workers in the Changi, Simei, Sengkang and Yio Chu Kang areas during weekday peak hours.

Changes to existing bus routes were also introduced for better connection enroute for passengers or to optimise finite bus resources. These included the route of Service 160M, which was extended to serve Bukit Batok Road and Bukit Batok West Avenue 8, and renumbered as Service 993. Seven bus services – Service 35, 92/92M, 100,

111, 117A, 298 and 993 – also called at additional bus stops along their regular routes while Service 162/162M ceased serving the Thomson Road and Central Business District segments of its route with the expansion of the rail network.

Adjustments were also made to the first and last bus operating hours and the scheduled frequency of several bus services to better serve passenger travel needs. For instance, the last bus timing of Service 248M was extended to 11.15pm daily to enhance accessibility for passengers commuting to the Tuas Port. The frequency of Service 92, which operated on weekdays and Saturdays, was increased during peak periods while the last bus timings for Service 92/92M were extended to operate later.

Catering to passengers' needs for late night services, the operational hours of selected bus routes were also extended on the eve of public holidays and major events such as the Formula One Singapore Grand Prix 2023.



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On festive occasions, a special bus service – Service 405 – was in operation to make it more convenient for families visiting the Choa Chu Kang Cemeteries and Columbarium to pay respects to their departed loved ones.

Forty-two temporary route diversions were also planned and conducted due to road closures for races and significant events. This ensured that our bus services could continue to operate reliably. Besides this, ad hoc route diversions in situations where roads were rendered impassable such as during floods and accidents were also carried out.

BUS FLEET

In 2023, our fleet of 3,572 buses was fully air-conditioned and wheelchair accessible. It comprised 57% single deck buses while close to 43% were double decks and 10 of them articulated ones, also commonly known as bendy buses. About 9 in 10 buses were rated Euro 5 and above which minimised environmental pollution. We also operated 57 green buses, comprising 32 fully electric and 25 diesel-hybrid ones.

As more electric buses come onstream, our bus technicians continued to attend training programmes to be better equipped in safely handling high



voltage vehicles. In 2023, 67 of our technicians were certified under the Workforce Skills Qualification (WSQ) National Electric Vehicle Specialist Safety (NESS) course. Offered by the Institute of Technical Education (ITE) College West, the course equipped our technicians with the skills and knowledge to work safely and independently when maintaining high voltage systems. They were also equipped to be competent in managing the vehicle's components, architecture, systems, battery, charging modes and overall maintenance.

BUS AND WORKPLACE SAFETY

We clocked 0.15 accident cases per 100,000 bus-km on the road, which was similar to 2022's rate. With paramount focus on safety in our operations, we continued to strategically invest in training, advanced systems, and innovative technology to empower our Bus Captains (BCs) to be safer and more competent drivers.

To enhance road safety by minimising blind-spot related incidents, we trialled the use of digital side mirrors on 31 buses that plied the routes of





Services 57 and 502. These advanced mirrors utilised high-definition digital cameras and internal displays that significantly expanded the BC's field of vision and enabled them to closely monitor their blind spots. Notably, the level of brightness of the mirrors were adjusted automatically to eliminate glare for optimal visibility during both daytime and nighttime operations. The trial will be expanded to include more buses in 2024.

Meanwhile, we continued with the installation of Goldeneye – a fatigue monitoring system that was first trialled in 2019. As at end 2023, 7% of the fleet or 250 buses have been installed with the system, up from some 100 the previous year. Another 400 buses will be equipped in 2024. Through the use of machine vision technology, it is able to detect the first signs of fatigue and distraction and provide real-time feedback to the Bus Captain through audio, visual and haptic alerts.

Significantly, work on enhancing the Goldeneye system to incorporate stronger post-intervention capabilities to promote better safety habits was undertaken. A newly introduced dashboard was designed to enable Interchange Managers to access the

fatigue and distraction records of BCs under their care. With the information obtained, the managers can intervene and provide counselling to their BCs. Video footage from the system can also be retrieved for use during counselling. The additional enhancement features also provide trend analysis and valuable location insights as well as generate weekly event reports of those detected with high incidence of fatigue or distraction for management.

In 2023, we completed the fleetwide installation of the handbrake smart audio device which was aimed at avoiding incidents of runaway buses. First trialled in 2022, the device sounds an alarm if the handbrake is not engaged when the BC opens the bus cabin door, stands up from his/her seat, or switches off the engine.

Besides the implementation of advanced technologies and systems, we remained steadfast in our commitment to enhancing the safety of passenger and fellow road users. In March 2023, we collaborated with the Traffic Police and KK Women's & Children's Hospital to launch the "Be Safe, Be Seen" road safety campaign. This was aimed at raising awareness among pedestrians, cyclists, and



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motorists to stay clear of the bus' blind spots. A bicycle and a motorcycle were placed beside the bus in its blind spots to illustrate the challenges faced by BCs. Members of the public had the opportunity to sit in the BC's seat and see for themselves the danger spots that are not obvious when they are on the outside of the bus. Over a three-month period, 15 buses across six services, carried the "Be Safe, Be Seen" safety message to remind road users and pedestrians about the importance of being seen by our BCs.

We also continued to promote safer rides for our passengers with an ongoing "No-Falls-On-Board" campaign. In 2023, we organised safety roadshows at five bus interchanges – Ang Mo Kio, Boon Lay, Bukit Merah, Serangoon and Bedok – to encourage safe commuting habits. The importance of always holding onto support and remaining seated until the bus came to a complete stop were highlighted while vulnerable individuals, such as the elderly, pregnant women, and people with disabilities, were encouraged to remain on the lower deck for their own safety.

To reach out to our target audience, we also printed safety messages on flyers and tissue packets and distributed them at not only our bus interchanges but also at bus stops near polyclinics. This has proven to be effective in

heightening safety awareness among our target audience. Hence, more locations will be included in 2024.

PHYSICAL SECURITY

We also did not take for granted the security of our passengers, employees and the premises we managed. For this reason, we conducted 1,229 Red Teaming exercises to test the alertness of our staff and validate their responses in detecting and handling security threats. We also participated in an external security audit, as part of the requirements under the LTA's Code of Practice, with no non-compliance to procedures observed.

In response to evolving security threats, we continued to explore and trial innovative technological solutions to strengthen our security measures. In 2023, we explored the possibility of using robots to patrol our premises given the advantages they offer of optimised surveillance, enhanced security and reduced response time. A proof-of-concept trial will be conducted at the Seletar Depot in 2024, and if successful, it will be extended to other bus depots.

Meanwhile, we completed the full roll-out of the CCTV video analytics solution at the Ang Mo Kio and Bedok North Depots, following a successful trial in 2022. This intelligent system functions as an additional layer of security,

proficiently detecting unauthorised individuals, vehicles or bicycles. It also facilitates automated differentiation of authorised vehicles through licence plate recognition and ensures seamless operations by providing automated notifications to our security officers if their views are obstructed by incoming or outgoing buses. Given its effectiveness, this system will be extended to the Ulu Pandan and Hougang Bus Depots and is scheduled for completion by the end of 2024.

We embarked on the next phase of the Threat-Oriented Persons Screening Integrated System (TOPSIS) programme, which was developed by the Ministry of Home Affairs. Involving the wider non-security community at our bus interchanges, we reached out to shop tenants, canteen operators and cleaners to brief them on the importance of maintaining security and the role they can play. Trainers personally shared practical pointers, which were supplemented by cue cards and brochures. Red Teaming exercises were also conducted with their involvement to assess for understanding and thereafter, bridge their learning gaps.

In October 2023, we supported a joint ground deployment exercise organised by the Singapore Police Force and the Singapore Civil Defence Force, which involved a gunman in

a hostage situation on board one of our double deck buses, at the Joo Koon Interchange. A month later, we participated in a joint emergency exercise with the Clementi Police Division at the Ulu Pandan Bus Depot, which simulated a group of gunmen at the depot. These exercises provided us with learning opportunities to adapt and improve on our emergency management and response.

Besides physical security, we also invested efforts in data protection. In October 2023, we achieved the Data Protection Trustmark issued by the Infocomm Media Development Authority, which certified that our policies and procedures complied with the Personal Data Protection Act (PDPA).

Our committed efforts in safety and security were recognised by the LTA at its Public Transport Safety and Security Awards day. The enhancements we made to the TOPSIS Training Programme as well as our safety outreach efforts through our “No-Falls-On-Board” campaign and our familiarisation tours on safe travelling habits for students with special needs all received the Star Awards. In the Operational and Workplace Safety (Bus Operator) category, our Jurong West Bus Package clinched the Excellence Award, and the Sengkang-Hougang Bus Package the Merit Award. Eight Bus Captains and Interchange staff were presented with special commendation awards and another 55, who were Safety Champions, were also certified and recognised for their outstanding contributions in promoting workplace safety and security.

INNOVATION AND TECHNOLOGY

To minimise bus breakdowns on the road, we invested in a bus condition monitoring system that enables our technicians to anticipate faults and undertake predictive maintenance. Powered by Artificial Intelligence (AI) and Machine Learning algorithms, this predictive maintenance solution from Portuguese Stratio provides real-time visibility over critical systems and components such as brakes, electric systems, and fluid levels, and can remotely monitor data from over 200 vehicle parameters. Installed on some 1,000 buses in a pilot phase in 2022, it

will be rolled out across the entire fleet by end of 2024 to minimise downtime, save costs and enhance passenger travel experience.

Concurrently, we also partnered Bridgestone to trial WheelRight’s tyre monitoring system that helps to measure tyre inflation pressure and tyre tread depth for better productivity and fuel efficiency.

To better support our BCs deployed to operate bridging bus services during MRT disruptions on Singapore’s rail network, we developed a mobile app that provides essential information such as the route to take from the point of deployment and the bridging routes to operate. A comprehensive guide, it enables our BCs to provide quick response to service demands to minimise further inconvenience to affected commuters. BCs are also able to refresh and familiarise themselves with bridging routes, which saves time and resources, without the need for on-site briefings.

RECRUITMENT OF BUS CAPTAINS

The tight labour market intensified our need for more BCs. Besides revising our salary package, which remained the most competitive in the industry, we extended the sign-on bonus to \$10,000 for local applicants to make the profession more attractive. Former BCs,

who were re-hired, additionally enjoyed a training offset incentive of up to \$4,800 while those with relevant driving experience were offered higher starting salaries. New staff referral schemes with tiered incentives were also introduced. Our recruitment process was also made more accessible through regular recruitment roadshows at bus interchanges, walk-in interviews at bus depots and career fairs with e2i, MINDEF and the Ministry of Home Affairs.

We highlighted career progression opportunities with a progressive wage model where applicants can enjoy a rewarding and meaningful career with the Company. In 2023, we had 5,863 BCs, of whom 13% or 758 were new hires.

CONTINGENCY PLANNING

In business continuity, we conducted four disruption exercises at the Boon Lay, Hougang Central and Bedok Bus Interchanges as well as the Bukit Batok Bus Depot. These were to review, validate and enhance our drawer plans where our bus services could continue to operate with minimal inconvenience to our passengers. Concurrently, these were also aimed at familiarising our employees with the established protocols and procedures to enable them to respond promptly and decisively in a crisis.



OPERATIONS REVIEW



RAIL SERVICES

SBS Transit marked 20 years of providing rail services to our passengers in 2023. Starting in January 2003 with the Sengkang Light Rail Transit system (LRT), we went on to operate the Punggol LRT system two years later. In between that time, in June 2003, we rolled out the 20-km North East Line (NEL), which was the world's first fully automated underground heavy metro system. A decade later in 2013, SBS Transit launched passenger service on Singapore's fifth MRT line, the 34-km Downtown Line (DTL).

RAIL OPERATIONS

We operated 78 stations during the year in review – 16 MRT stations on the NEL, 34 MRT stations on the DTL, and 28 LRT stations on the Sengkang-Punggol LRT (SPLRT) loops. All the stations on our rail networks were opened for passenger service except for Teck Lee on the Punggol LRT loop, which will open in tandem with developments in the area. Our total rail network of 83 km translated into a market share of 30.6%.

As Singapore returned to pre-pandemic normalcy, demand for rail services increased by 18.7% with 428.1 million passenger trips made compared to 360.7 million the previous year. This was 3.7% lower than the pre-pandemic ridership volume of 2019.

The average daily ridership on the NEL grew by 17.3% to 570,488 passenger trips. Average daily demand on the 42-km long DTL also increased by 21% to 443,214 passenger trips while the SPLRT registered a 17.4% increase to 159,223 passenger trips.

To cater to ridership demand, trains on the NEL arrived at a frequency of two minutes during morning peak hours, 2.5 minutes in the evening peak, and 5.5 minutes during off-peak periods, resulting in a total of 4,378 trips operated each week. On the DTL, train frequency during peak hours was 2.5 minutes during peak hours, and 5.5 minutes during off-peak periods with 3,915 weekly trips made. The Light Rail Vehicles (LRVs) on the SPLRT operated 18,116 trips a week with the LRVs arriving at a frequency of between

three and five minutes during morning peak hours and between four and five minutes during evening peak periods.

In 2023, NEL, DTL and SPLRT met all the Operating Performance Standards stipulated by the LTA.

RAIL RELIABILITY

In Mean Kilometre Between Failure (MKBF), which is the internationally used measure for railway reliability, the DTL clocked 8.12 million train-km in 2023, which doubled its achievement of 4.05 million train-km in the previous year. It surpassed the nationwide MRT network's average of 2.08 million train-km and, for the third year running, remained the most reliable MRT line globally. The NEL clocked in a steady 2.06 million train-km while the SPLRT hit a new high of 1.22 million car-km – the first in Singapore's LRT history. For its impressive performance, the SPLRT was presented with the "Most Improved System Award" at the prestigious Global Light Rail Awards 2023 in London. It also received high commendation for technical innovations employed in its rolling stock.

In 2023, all three rail lines operated by SBS Transit experienced no major disruptions.

MAINTAINING RAIL EXCELLENCE

Mid-life refurbishment works of our first generation NEL trains continued progressively with the aim of improving safety, enhancing service reliability, and providing better passenger experience. To date, seven trains have completed their mid-life upgrade with another two undergoing upgrading works. Equipped with condition monitoring systems, we will be alerted to impending train issues so that predictive maintenance can be undertaken to prevent train faults. Importantly, we can access a wider range of train parameters remotely to support decision making in train operations. Other enhancements to the upgraded trains include newly renovated interiors and new air-conditioning and ventilation systems. Works on all 25 trains are expected to be completed by 2026.

During the year under review, we completed installation of the award-winning Safety Interlock Relay Bypass Switch on all 43 NEL trains. With this, Customer Service Officers on board can handle the recovery of stalled trains in a more expeditious manner to minimise service delays.

Meanwhile, the six new trains, which were manufactured and assembled by Alstom in Barcelona Spain and shipped to Singapore in April 2021, commenced passenger service on the NEL in August 2023, after completing testing and commissioning works. With the new additions, NEL has a fleet of 49 trains. The new trains are equipped with features that allow for more effective maintenance. Besides condition monitoring systems, two of them are installed with an Automatic Track Inspection (ATI) system with sensors on the trains' underframes to monitor track conditions. This means that defects like rail cracks, rail corrugation, and missing rail fasteners can be detected while the trains are in operation.

Our Multi-Function Track Trolley (MFTT), which is the first of its kind in the world, was also upgraded with enhancements to its monitoring and early detection capabilities. Named

RailRover MFTT, this second-generation MFTT has the capabilities to detect physical defects such as cracks in railway tracks and water seepages in the tunnel. This is expected to boost efficiency by an additional 20% in our inspection and measurement tasks and is slated to be deployed for use in early 2024.

Concurrently, we also developed a Permanent Way Defect Management and Analysis System in-house for enhanced track and tunnel monitoring. This system digitises the defect record process and automatically produces data trends on an accessible dashboard. As a result, staff are empowered to make data-driven decisions to strategically schedule timely maintenance interventions and ensure optimal track and tunnel conditions for train operations.

To align and improve processes for better efficiency and effectiveness, a Rail Operations Support Department was set up to centralise all scheduling activities across the three lines. Primarily, it works with the various stakeholders to develop and optimise train and crew schedules under different operating conditions.

WORKPLACE SAFETY AND SECURITY

In 2023, our Workplace Injury Rate improved by 5.46% to 181.35 accidents per 100,000 employed persons, compared to 191.83 the previous year. With safety as a key priority, we continued with our efforts to improve safety standards by raising awareness of workplace safety and in placing greater emphasis on fostering a strong safety culture in our operations.

As a multi-modal public transport operator, we initiated cross-learning opportunities between our bus and rail divisions. Management and supervisors also conducted walkabouts and engagement sessions and encouraged staff to surface safety concerns, and report safety risks and near misses to their supervisors. As an on-going effort, staff were also encouraged to emphasise the importance of workplace safety and health to their colleagues and contractors while risk assessments and safe work procedures were reviewed.



DTL clocked 8.12 million train-km in 2023, which doubled its achievement of 4.05 million train-km in the previous year. It surpassed the nationwide MRT network's average of 2.08 million train-km and, for the third year running, remained the most reliable MRT line globally.





In the NEL workshop, we trialled an autonomous AI robot dog to assist technicians in their maintenance activities. Conducting visual inspections of the trains from different angles including the underside, it checked the different components for faults such as missing screws and panels that were not apparent to the naked eye.



We collaborated with the National Trades Union Congress (NTUC) to launch the “Spot, Stop, and Report” campaign to empower our employees to report safety hazards before accidents or near-misses can take place. Promoting an open culture, we encouraged them to proactively take charge of their safety, emphasising their right to call for a “stop-work order” should any work activity be deemed

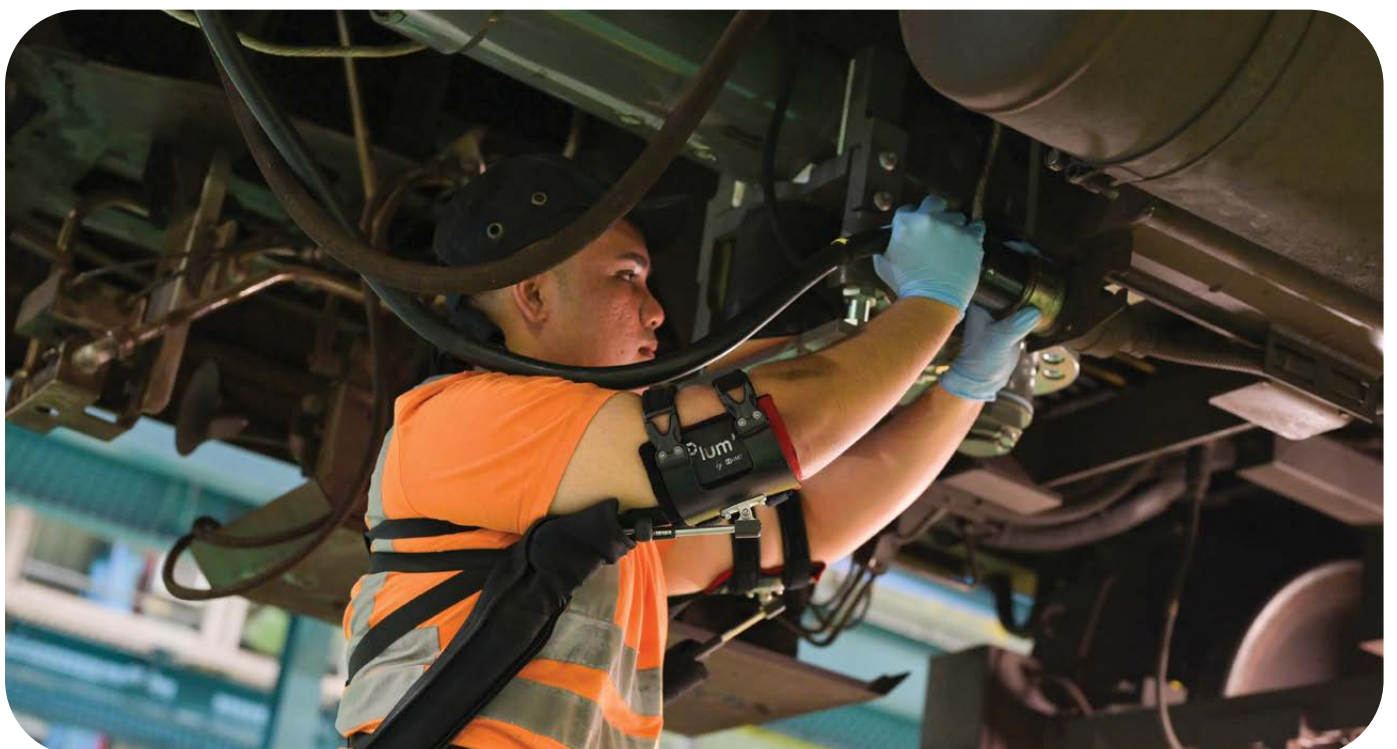
unsafe. The campaign also highlighted common workplace hazards to watch out for as well as reiterated the use of reporting channels within the Company to prevent accidents at the workplace.

An inaugural Rail Safety Symposium was also organised and graced by Dr Amy Khor, Senior Minister of State for Transport. Stakeholders and experts from within and outside of the rail

industry gathered to share insights, best practices and use of technologies while innovations such as the exoskeleton system to improve safety standards were put on showcase.

A Virtual Reality simulator was also introduced for staff training to instil safety awareness and safety habits on the tracks. Through simulated track environment scenarios, staff are trained on their responses to safety incidents, such as hazard identification and managing unsafe behaviour. This training tool is also equipped with visual tracking and voice recognition capabilities to provide an immersive and interactive learning environment. Viewing from a screen, trainers can observe the trainees’ focus areas and assess their ability to scan for hazards to offer timely and targeted feedback. Trainees can also independently practise radio communication protocols under various scenarios.

We also explored the development of a portable handheld device to enhance safety when trains are driven in manual mode at the workshops. Mounted on the driving console and fitted with front and rear cameras, this smart device employs advanced AI algorithms and



video analytics to monitor trackside conditions, the train speed as well as the driver's attentiveness to avert accidents.

In the NEL workshop, we trialled an autonomous AI robot dog to assist technicians in their maintenance activities. Conducting visual inspections of the trains from different angles including the underside, it checked the different components for faults such as missing screws and panels that were not apparent to the naked eye. This empowered our technicians to take steps to address the issues to avoid them from developing into major faults. An innovative solution, this technology not only enhanced workplace safety and productivity but also minimised risks for our technicians working in warm weather conditions.



To enhance safety and security at our LRT stations, we pilot tested a track intrusion detection system known as VAnGuard at our Sengkang LRT Station. Employing video analytics to analyse surveillance footage, it promptly alerts our Operations Control Centre when a person or object is detected on the track. This alerts our staff to intervene by stopping traction power to bring the train to a stop, investigate the situation, and undertake the necessary measures. The test was successful, and VAnGuard is set to be installed at all 28 stations on the SPLRT network by mid-2024.

Meanwhile, a system to streamline the laborious manual processes of booking, planning, and allocating track access for technicians to carry out maintenance works in the tunnel was developed. This Track Access Management System (TAMS) not only provides a unified digital platform but also enhances productivity and safety standards with its built-in safety rules to avoid conflicts in track work access. In 2023, TAMS was implemented on the DTL while the NEL conducted a parallel run. The system will be expanded to manage the depot track access of all three lines as well as to the mainline of the SPLRT.

TAMS was recognised with the Star Awards at the LTA's Public Transport Safety and Security Award 2023 (PTSSA)

ceremony as did two other rail safety initiatives – Design and Creation of Train Door Maintenance Platform and Design of Transportation Stand for Tread Brake Unit. The NEL also received the Merit Award in the Operational and Workplace Safety (Rail Operator) category.

We were certified with a bizSAFE Star by the Workplace Safety and Health Council, and notably recognised as a bizSAFE Partner Award 2023 – the only public transport operator to receive this award.

CYBERSECURITY

As a Critical Information Infrastructure (CII) owner, the importance we place on cybersecurity cannot be overstated. As cyber threats evolve constantly, we regularly review and strengthen our cybersecurity processes and control measures to protect our operations against cyber threats and risks and ensure our passenger safety.

In compliance with the requirements of the Cybersecurity Act, we delinked our rail operations technology system from our Information Technology (IT) network among the other measures undertaken.

Business Continuity Plan exercises continued to be conducted as part of our annual regime while

cybersecurity enhancements were implemented to continually fortify our defence measures. This included the strengthening of our malware protection through the deployment of an Endpoint Detection and Response (EDR) security tool. The implementation of the EDR has been completed, and its agent is scheduled for mass deployment in 2024.

We also looked at opportunities to hone our cyber defence skills by participating in the national Critical Infrastructure Defence Exercise 2023. This was an important forum that provided us with hands-on experience in responding to CII cyberattacks.

Meanwhile, staff education remained a key focus. We invested efforts in educating our employees on the risk of ransomware threats and promoted cybersecurity hygiene through our annual "Cybersecurity Awareness for Everyone" (CAFE) training. While CAFE training was made mandatory for all staff with corporate network access, we did not let up in our efforts to constantly remind them of the importance of cybersecurity and the measures to adopt to keep safe through emails and electronic posters. To assess for vigilance, four phishing exercises were conducted throughout the year, which involved more than 4,000 staff.

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TRAINING AND DEVELOPMENT

To enhance our employees' skillsets and competencies, we continued to invest in their development, as well as reviewed and improved our training roadmap to enhance their competency.

In 2023, we had more than 50 Rail Chartered Engineers and Rail Chartered Technologists who were accredited by the Institution of Engineers, Singapore (IES).

A Mixed Reality simulator tailored for LRV operations training was rolled out during the year in review. This simulator replaced the traditional mode of training using actual trains, where scheduling was a constant challenge as it competed with operations for availability. Designed for a realistic training environment with tactile controls to simulate the actual environment, it provides a high-fidelity immersive experience crucial for comprehensive training and is particularly effective in training for quick responses to handle train faults and ensuring the safe operations of the LRV using manual controls.

KEY PARTNERSHIPS

To provide better passenger experience, we collaborated with Siemens Mobility to trial a software based on AI technology to predict passenger demand for train services. Known as Controlguide AIRO, it has the capability to modify train timetables by analysing crowd levels on trains and at stations, as well as the passengers' average waiting times at the platforms. Trials are ongoing and if successful, this solution will be the first of its kind to be implemented in the Asia Pacific.

We also explored the use of AI to drive sustainability in rail operations and maintenance. With French Alstom, we worked on saving energy by synchronising train timings such that one train arrives at the station exactly when another is departing. This would result in the regenerative energy from the arriving train to be captured and converted for use to power up the departing train. Potentially, it can reduce energy consumption of the entire fleet by up to 3,000 megawatt-hours, enough to power 750 four-room

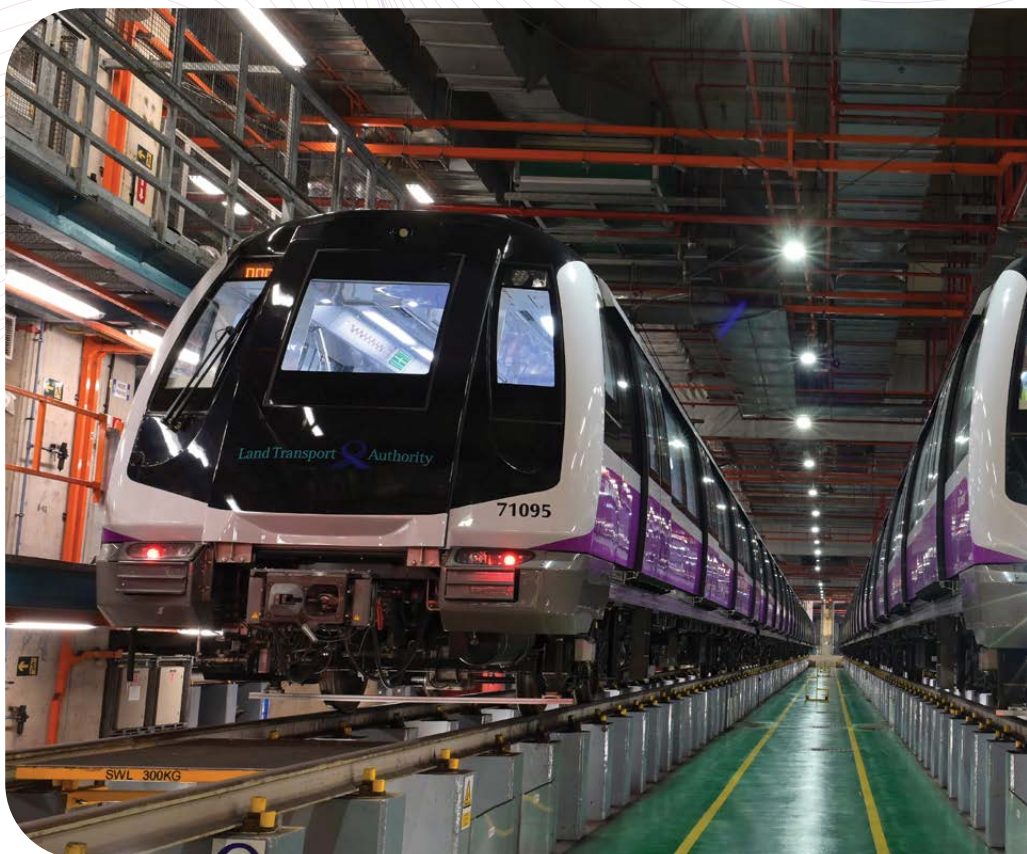
HDB flats for a year. Trials are expected to take place in the second quarter of 2024.

Besides this, we also collaborated with Alstom to employ three-dimensional (3D) printing of train parts. Instead of procuring them from overseas, in particular parts that are not frequently used and can take an inordinate amount of time to arrive, locally printed 3D parts offer the advantages of reducing inventory storage, as well as doing away with the transportation cost. Significantly, it reduces our carbon footprint without any impact to our train service reliability.

Our partnership with Taipei Rapid Transit Corporation (TRTC) and Metro Consulting Service Ltd (MCS) took a further stride forward in 2023 as we expanded our collaboration to new areas that included emerging technologies, safety and sustainability initiatives, customer experience and operations. Our earlier partnership forged in 2018 had contributed to significant improvements in our rail reliability.

We also signed a Memorandum of Understanding with Enterprise Singapore to establish a Mobility Innovation Centre known as MINNOVA that will open in 2024. As a hub for learning, networking and collaboration amongst government agencies, industry experts, academia, Small and Medium-sized Enterprises, start-ups, and other key stakeholders, it will drive the co-creation of innovative mobility solutions that will address challenges faced by the transport sector in Singapore and abroad.

Meanwhile, our continual effort to grow a robust talent pipeline and elevate training competencies for the land transport industry was boosted by a partnership with the Technical University of Munich (TUM) Asia. This will allow us to jointly develop certification courses with TUM Asia that are aligned with the industry's accreditation needs in transport operations and engineering. Covering best industry practices and methodologies, they will also include the latest technologies to equip both local and international public transport operators and those working in the



industry. Under the collaboration, we will also offer internships to TUM Asia's students and facilitate thesis research opportunities while job attachments for its staff and students will be made available to enable them to keep abreast of industry developments.

CONTINGENCY PLANNING

Regular training sessions and exercises continued to be conducted to review and validate our emergency response and preparedness plans. For train service disruption, seven ground exercises were organised with varied scenarios – "Exercise Harmony" which simulated a train evacuation in a flooded tunnel, "Exercise Endeavour" was focussed on a rescue operation following a train derailment in the tunnel and "Exercise Unicorn" was staged at the NEL depot under explosive and chemical threats while "Exercise Phoenix" was held at the DTL depot under similar circumstances. We also organised "Exercise Escape Shaft" with two of the sessions involving teachers and students from Nan Hua Secondary School and Hwa Chong Institution who were evacuated from the train and



exited the tunnel via an escape shaft. It also marked the first time that an exercise involving the tunnel's escape shaft was opened to the public.

We also participated in a joint exercise, "Exercise Greyhound", led by the LTA. A combined exercise with the participation of the two rail operators, involved two MRT lines being disrupted concurrently with evacuation procedures and bus bridging services activated.

Meanwhile, 11 joint exercises were organised with the Singapore Civil Defence Force to review our staff response to emergency situations. "Exercise High Flame" involved managing fire incidents in the stations while "Exercise Highwaters" was to validate our processes in setting up flood barriers at the entrances of our MRT stations.

With cybersecurity threats on the rise, our annual "Exercise Galaxy" was held with the involvement of our CII stakeholders and management, the LTA as well as relevant parties including our Security Operation Centre service provider and Original Equipment Manufacturer vendors. The exercise scenario involved disruption to train services with supply chain attack on the NEL's ventilation system and ransomware attack on the DTL's power system. It reviewed our emergency response and preparedness plans in compliance with the LTA's Cybersecurity Code of Practice 2.0.



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OPERATIONS REVIEW

SERVING OUR PASSENGERS

To further enhance the commuting experience of our passengers, we introduced background music – composed by students from Methodist Girls' School – in our MRT stations. Catering to caregivers of young children, we outfitted the nursing room with better amenities such as a hot water dispenser, a cushioned diaper changing table and a secured area for nursing mothers set in soft hues to create a conducive environment at the DTL Tampines Station.

A campaign was also launched to encourage and remind passengers to look out for their buses and flag for them early to avoid missing their rides. An interactive mini-bot was put on trial at the Joo Koon and Tampines North Bus Interchanges to provide passengers with self-service assistance on enquiries. Besides this, six automated robots were deployed to some of our MRT stations to carry out cleaning duties more efficiently for the comfort of our passengers. We are assessing their effectiveness and feasibility before investing in more of them to support our efforts towards improving passenger experience.

TRAVEL WITH CONFIDENCE

Throughout 2023, we continued to engage Social Service Agencies (SSAs) such as Guide Dogs Singapore (GDS), Singapore Association for the Visually Handicapped (SAVH), Muscular Dystrophy Association Singapore (MDAS), St Andrew's Autism Centre and SPD to explore efforts and initiatives to do better in serving the needs of passengers with disabilities.

In collaboration with SAVH and GDS, we worked with Waymap, a British navigation technology app company, to introduce Waymap-SG, which is Asia-Pacific's very first free-to-use, audio-based wayfinding app. Uniquely, it functions without the need for GPS, Wi-Fi, or Bluetooth signals, and continually calibrates itself to match the user's walking gait and speed. This not only ensures a personalised experience but also a safe one. Piloted at the DTL Tampines Station and Tampines Bus Interchange to create a more inclusive and accessible public transportation

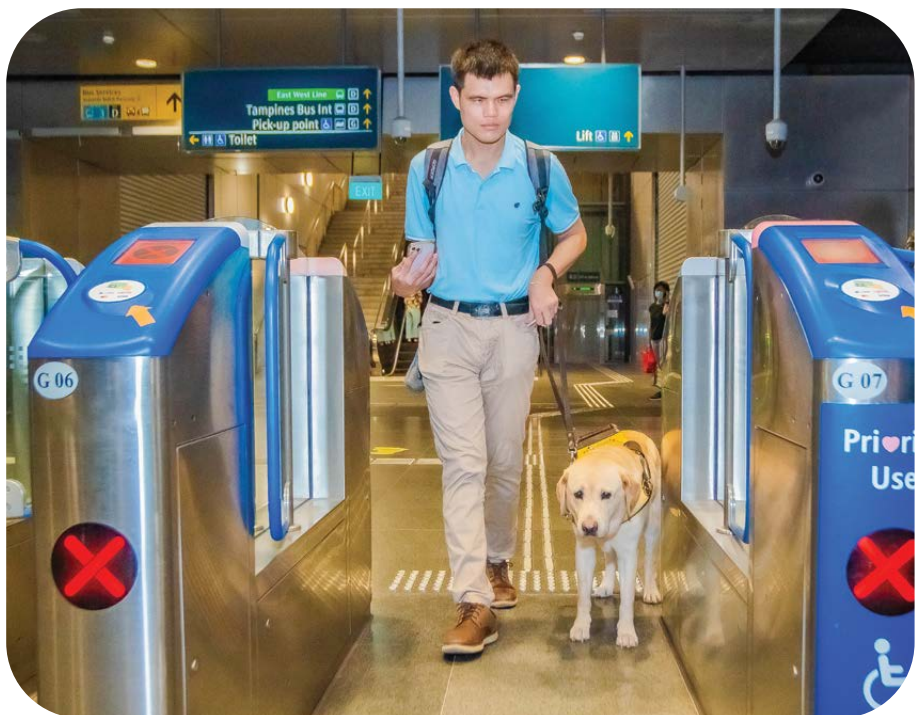
system, we also encouraged commercial and community partners to come onboard to extend this solution to their areas too.

Our "Find Your Way" initiative, which was implemented in partnership with Dementia Singapore, completed its roll-out at 9 bus interchanges and MRT stations during the pilot phase. These locations feature colour-coded murals depicting nostalgic items and are supported by directional floor stickers to assist people with dementia in navigating transport nodes safely and independently. Our ground surveys revealed that the murals and floor stickers were useful in helping not only those living with dementia but also the elderly. Phase 2 will continue in 2024 with another 18 premises.

MDAS and the Singapore National Stroke Association signed up for our Travel Buddy programme – an initiative where trained staff accompany persons with disabilities (PWDs) throughout their journey to familiarise them with their routes to instil independence and reduce travel-related anxieties. Our station guides, who are on wheelchairs, also serve as travel buddies to provide empathetic support and offer practical travel tips.



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Meanwhile, about 150 students from special education schools joined us on familiarisation tours to learn how to travel safely and independently.

VOICE OF OUR PASSENGERS

In 2023, our efforts in improving our bus and rail services did not go unnoticed by our passengers. We received a total of 50,494 compliments and commendations, which was an increase of 17.1% compared to 43,105 in 2022. We also saw opportunities to improve from the valid complaints given, which increased by 48 or 1.0% to 4,872. Overall, we achieved 38.5 compliments and commendations and 3.71 valid complaints per million passenger trips.

PASSENGER SATISFACTION

In our Customer Satisfaction surveys, which were conducted by an independent research company, we continued to improve in our performance. Our overall customer satisfaction levels for bus services under the Seletar and Bukit Merah Bus Packages recorded increased ratings of 81% and 89% respectively and 88% of respondents considered us to be a reliable bus operator. Bus frequency and travel times were identified as areas for improvements. In rail services, we performed better with overall customer satisfaction ratings of 93% and 94% for NEL and DTL respectively and over 90% rated our train services as reliable. Crowding in trains and cleanliness of station toilets received the lowest scores which we will continue to work to improve.

We also rolled out quarterly online satisfaction surveys that focus on specific service attributes to enable us to track key areas for improvement. In 2023, we focussed on wayfinding, comfort factors in commuting and service standards of frontline staff.

SINGAPORE

OTHER COMMERCIAL SERVICES

BUS ADVERTISING • IN-TRAIN ADVERTISING • BUS HUB ADVERTISING
• TRAIN STATION ADVERTISING • SHOP SPACE • ROAD SHOW SPACE

\$57
REVENUE
(S\$'MILLION)

63
TOTAL NUMBER OF
EMPLOYEES

ADVERTISING

As Singapore returned to pre-pandemic normalcy and economic activities resumed, Moove Media, our sister company, was back in full swing, developing innovative advertising and marketing campaigns on our public transport network.

To generate top-of-mind awareness for advertisers' products and services, it launched a mega 54-metre long in-station digital wall, which is the longest in Southeast Asia, at the Outram Park Station on the North East Line (NEL).

Eye-catching and dramatic, it offered a spectacular visual treat for passengers on the move.

With large format digital screens gaining popularity, Moove Media launched the curved Serangoon Groove, which is its 11th digital wall, at the NEL Serangoon MRT station. Fully wrapped faregates at the MRT stations also made their debut to strategically capture the attention of passengers as they entered or exited the premises.

Meanwhile, the 40-metre long "Great Wall" at the NEL Dhoby Ghaut MRT station was hailed as iconic and presented with the Advertising Award at the Singapore Business Review National Business Awards. Decked out with high-definition visuals and audio, it was Moove Media's longest digital wall in 2021, which captivated passengers with its high-impact storytelling and engaging platform.

With the opening of the Mandai Bird Paradise, Moove Media's creativity hit a new high with an attention-grabbing campaign that featured three-dimensional (3D) giant birds perched atop eight buses and one nestled on top of a boarding berth at the Ang Mo Kio bus interchange. The digital walls at NEL Outram Park and Downtown Line (DTL) Bugis stations as well as the Great Wall were also deployed to achieve top-of-mind awareness for the bird paradise.

Moove Media also showcased its storytelling prowess at the NEL Dhoby Ghaut MRT station, where 10-metre high mega pillars were transformed into an interactive installation for Etiqua



Insurance Singapore. Passengers were excited by the unique photo-taking opportunity as they posed against 2D and 3D exhibits of waves with a surfboard and a spiral slide that scaled the mega pillars. The campaign gained traction on social media as many shared their photographs online.

To give advertisers an edge in maximising their advertising budget, an audience insights dashboard known as MooveSMART was introduced in collaboration with Starhub. Designed with the capability to identify key behavioural attributes at each location, it enabled advertisers to tailor more focussed and effective campaigns for their brands.

RENTAL OF COMMERCIAL SPACES

In 2023, with the lifting of pandemic restrictions, we leased more than 96% of our commercial spaces in our bus interchanges and train stations. Food and beverage outlets made up most of our diverse tenant mix, which also included retail and convenience stores as well as medical, education, and beauty and wellness services.

IJOZZ, the orange juice vending machine, made inroads into our bus interchanges and MRT stations. Starting with a machine each at three locations initially, it soon expanded to a total of 15 spots across our transport network.

An existing tenant, 7-Eleven, set up a vending machine concept store at the DTL Geylang Bahru Station. Their first in Singapore, it provided convenience on the go with its wide range of snacks and ready-to-eat meals such as salads and sandwiches as well as the popular Japanese onigiri. A 7Café+ was also launched as a takeaway concept store with options for piping hot meals besides desserts and juices. Located at DTL Bugis Station, it is also equipped with an oden and noodle station.

To support our tenants, we organised promotional activities during festive seasons to help boost sales at their outlets. Attractive premiums such as keychains and limited-edition enamel mugs were produced and handed

to customers at participating outlets subject to a minimum spend. For Christmas, a music group was invited to fill the air with well-loved Christmas carols at selected MRT stations and at the Ang Mo Kio Bus Interchange.

Recognising that doing business involves not only the mind but also



In collaboration with Food from the Heart, we brought together five of our bakery tenants – Moji Bakery, Woowfles, Sakura Bekari, Anas Bakery and Fuji Bakery – to donate their unsold bread instead of discarding them. With staff volunteers involved in the bread run, the items were delivered to the Ju Eng Home for Senior Citizens, Lee Ah Mooi Old Age Home and Moral Home for the Aged Sick.



the heart, we reached out to possibly the last of Singapore's kacang puteh man, Mr A Moorthy. He had to close down his business when the building where he did his trade at would be shuttered for development. To preserve a vanishing heritage trade, we invited him to ply his trade at our Toa Payoh Bus Interchange rent-free and provided him with a specially designed pushcart. Doing so not only allowed the community to continue to savour the traditional treat, but also added vibrancy to the interchange.

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