

EMBARGOED UNTIL 12PM ON 28 AUGUST 2026

MEDIA FACT SHEET FOR BUS 4.0

Overview of Bus 4.0

Launched on 28 August 2026 at Gali Batu Bus Depot, Bus 4.0 is SMRT Buses' next-generation operating model that uses technology, data and AI to identify potential safety, reliability and operational issues, enabling real-time interventions on the roads and at the depot.

Bus 4.0 is built around four pillars: Intelligent Bus (iBUS), Intelligent Operations Control Centre (iOCC), Intelligent Depot (iDepot) and Intelligent Workforce (iWorkforce).

Together, these capabilities help SMRT Buses deliver safer and more reliable journeys for commuters.

The Four Pillars of Bus 4.0

1. iBus	2. iOCC	3. iDepot	4. iWorkforce
Enabling real-time collection of operational, safety and vehicle health data through fleet-wide installation of bus telematics system.	Providing Service Controllers a real-time overview of every bus and Bus Captain on the road for timely intervention at the command and control centre.	Advancing smarter depot operations and data-driven maintenance through automation and predictive monitoring capabilities.	Equipping Bus Captains, Service Controllers and Technicians with digital tools, training and incentives to build a future-ready workforce.
Key Initiatives: 1a. Bus Captain safety monitoring: fatigue, follow too close, harsh acceleration and braking alerts 1b. AI-powered bus bunching/headway detection 1c. Vehicle health monitoring 1d. Bus lane violation & road hazard detection 1e. Wheelchair or stroller users detection	Key Initiatives: 2a. Real-time monitoring and intervention by Service Controllers 2b. Quicker responses with co-location during rail disruption	Key Initiatives: 3a. Charging Station Management System (CSMS) 3b. Autonomous surveillance and cleaning robots 3c. IoT-enabled equipment monitoring	Key Initiatives: 4a. Safe driving incentive/gamification programme for Bus Captains 4b. Skills allowance for Service Controllers 4c. Virtual reality (VR) training for Bus Captains 4d. Assisted reality (AR) support for Technicians

1. iBUS

1a	Bus Captain Safety Monitoring for: - Signs of fatigue - Following too close behind a vehicle - Harsh acceleration & braking	<u>What is it?</u> SMRT Buses was the first public bus operator in Singapore to roll out the Bus Telematics System (BTS) across its entire fleet, completing the deployment in early 2024. The BTS continuously tracks operational and safety-related data from in-service buses. For example: • Fatigue monitoring – detecting Bus Captains’ signs of drowsiness or micro-sleep, such as prolonged eye closure, repeated yawning and head nodding. • Following too closely – detecting when the bus is too close to the vehicle ahead. • Harsh acceleration and braking – detecting sudden speed changes that may affect road safety and commuter comfort. <u>Before:</u> • Fatigue alerts were triggered only inside the bus, so that the Bus Captain can take note. • Unsafe driving behaviours were usually identified through commuter feedback or post-incident reviews. <u>After:</u> • When Bus Captain fatigue or unsafe driving behaviours are detected, real-time alerts are sent to the iOCC. Service Controllers then assess the situation and intervene based on the frequency and severity of the alerts. • Service Controllers follow a tiered intervention framework, from safety reminders and welfare checks to instructing Bus Captains to stop safely, move around or rest when needed. Persistent cases are escalated and Bus Captains may be asked to stop their driving duties for the day. <u>Benefits:</u> • More than 1,500 fatigue interventions since February 2025. • Fatigue alerts have fallen from hundreds a day when the system was introduced to about 10 to 20 notifications a day now, reflecting improved driving habits over time. Bus Captains take more personal ownership of their driving behaviours. There are also more opportunities for supervisors to talk to Bus Captains and understand why their driving is affected, and where necessary, alter their driving schedules. For example,
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		arrangements can be made for Bus Captains who are caring for their newborn babies to take on afternoon instead of early morning shifts. • The number of Bus Captains asked to stop service has also fallen, from about 10 to 20 a day to around three to four a week. • Helps identify and address issues before they develop into safety incidents. • Bus Captains have welcomed the interventions, which help them stay safe and return home safely after work.
1b	AI-powered bus bunching / headway detection	<u>What is it?</u> Bus bunching occurs when two or more buses on the same service route arrive at a bus stop together, causing longer gaps and waiting times between bus arrivals. To address this commuter pain point, SMRT Buses developed an in-house AI-powered bus bunching module that can detect bunching risks. <u>Before:</u> • The Service Controller uses a fleet management system (CFMS) that colour codes buses along a service route. • Buses running behind its schedule are flagged in red, while those ahead of schedule are shown in blue. • When Service Controllers spot both red and blue-coded buses on the same service, it may indicate irregular headways or bus bunching. They will then contact the respective Bus Captains to adjust the bus service intervals. <u>After:</u> • AI continuously monitors bus locations, speeds and dwell times using multiple data sources. • When the system detects potential bus bunching, it automatically alerts Service Controllers and recommends the most suitable intervention. • Service Controllers can then guide Bus Captains to adjust their speed and maintain more regular spacing between buses. <u>Benefits:</u> • Enables Service Controllers to spot bus bunching earlier and work with Bus Captains to reduce its occurrence. • Provides commuters with more regular and predictable waiting times.

1c	Vehicle Health Monitoring	<u>What is it?</u> An AI-powered condition monitoring system reads live fleet data around the clock, tracking more than 200 vehicle parameters such as braking, electrical systems, oil pressure and temperature in the bus. The system continuously checks vehicle performance data against defined thresholds and alerts the iOCC when deviations are detected. By identifying early signs of wear or abnormal performance, buses can be proactively recalled for inspection and repairs before breakdowns occur. This capability has also been extended to SMRT Buses' electric bus fleet, enabling the monitoring of critical components such as battery health. Currently deployed on 80 electric buses, it will be expanded to cover the entire fleet of 217 electric buses by end-October 2026. <u>Benefits:</u> • 20% reduction in bus breakdowns since November 2024 supporting more reliable bus journeys. • Supports more targeted and effective maintenance planning.
1d	Bus lane violation & road hazard detection  <i>Photo of automatic reporting of bus lane violation</i>	<u>What is it?</u> AI-enabled cameras and video analytics on buses automatically detect vehicles entering bus lanes, which can delay services and affect journey times, especially during peak periods. The system captures key details such as the vehicle licence plate number, location, timestamp and supporting visual evidence. The cameras can also detect road hazards, such as objects on the road that may endanger other road users. <u>Before:</u> • Bus lane violations and road hazards were largely identified through manual observation and reporting by Bus Captains. Staff then had to retrieve and review footage before filing a report. <u>After:</u> • The system automatically detects suspected bus lane violations. • Road hazards can also be automatically detected, enabling faster removal.

		<u>Benefits:</u> • Helps keep bus lanes clear, and reduces abrupt braking by buses when vehicles intrude suddenly. This helps ensure safer and smoother rides for passengers, as well as reduce the incidence of road conflicts. • Turns every SMRT bus into an additional set of eyes on Singapore's roads, helping to spot hazards and improve safety for all road users. • Reduces the reporting burden on Bus Captains, allowing them to focus on driving safely.
1e	Securing wheelchairs onboard	<u>What is it?</u> AI-enabled onboard sensors detect when wheelchair users board the bus. Each time a wheelchair user is detected, the system sends a video clip to iOCC, where the Service Controller can check if the wheelchair is parked and secured properly. If not, the Bus Captain will be alerted to help the wheelchair user. Eventually, the system can be used to detect passengers with prams as well. <u>Before:</u> • Bus Captains relied on visual checks to ensure wheelchair users and passengers with strollers were properly secured before moving off. <u>After:</u> • When a wheelchair user or passenger with a stroller boards the bus, Service Controllers can check that they are properly secured before the bus moves off. <u>Benefit:</u> • Provides an additional layer of assurance for wheelchair users and passengers with strollers. • Reduces the risk of wheelchairs or strollers toppling over when the bus turns.

2. iOCC

2a Real-time monitoring and intervention by Service Controllers



Photo of new iOCC in Gali Batu Bus Depot

What is it?

Operating 24/7 at Gali Batu Bus Depot, the Intelligent Operations Control Centre (iOCC) gives Service Controllers a single, consolidated view of bus operations.

It brings together real-time information on fleet deployment, bus health, electric bus charging, road traffic conditions and safe driving alerts to support monitoring and timely intervention.

Before:

- During each shift, about 20 Service Controllers oversaw more than 1,200 buses across the network, with each controller monitoring around 60 buses.
- Service Controllers had to track CCTV feeds, compare bus locations against timetables, monitor fleet deployment and respond to road incidents all at once.
- They also relied heavily on updates from Bus Captains to understand ground conditions while guiding them through road accidents.
- With their attention spread across multiple systems and information sources, maintaining network-wide situational awareness was more challenging, and emerging issues could be missed.

After:

- The iOCC brings fleet deployment, live bus movements, bus health, electric bus charging status, CCTV feeds and operational alerts into one integrated view.
- AI automatically flags potential issues such as fatigue, unsafe driving behaviours and bus bunching, so Service Controllers can focus on assessing situations, coordinating responses and supporting Bus Captains on the ground.
- Each alert is tied to predefined intervention thresholds, guiding Service Controllers on when to step in and what action to take.

		Benefits: • Detects operational, safety and vehicle-related issues earlier. • Enables faster intervention before issues escalate and affect commuters. • Supports more informed decision-making. • Promotes more consistent interventions across Service Controllers. • Allows Service Controllers to focus on managing alerts and supporting Bus Captains, instead of manually monitoring multiple systems.
2b	Quicker responses with co-location during rail disruption  <i>Photo of bus operations control centre (BOCC) in Woodlands Bus Depot</i>	What is it? Operational since mid-June 2026, the Intelligent Operations Control Centre (iOCC) serves as the central command centre for SMRT Buses' operations. It brings Service Controllers previously based at Woodlands and Soon Lee depots into one location, providing a unified view of more than 65 bus services currently operated by SMRT Buses. When the Serangoon-Eunos Bus Package is handed over to SMRT Buses in June 2027, Service Controllers overseeing its 26 services will join the team at iOCC. The iOCC also co-locates teams from STRIDES Digital, which manage SMRT's digital advertising panels at bus stops, as well as its taxi and private-hire vehicle (PHV) operations. During train service disruptions, this gives the teams a more coordinated view of available resources, for faster deployment. Before: • Public buses, taxis and PHVs were previously managed across different locations. • During major train incidents, deploying bridging buses, and other transport options, while updating commuter information channels, required coordination across multiple sites. After: • During disruptions, the iOCC serves as a single command centre, coordinating buses, taxis and information dissemination from one location.

		- During a train service disruption, STRIDES Premier taxis, limousines and PHVs can be activated to supplement bridging bus services where demand is high. - Stellar Ace's digital bus stop panels can switch from advertisements to disruption updates, wayfinding directions and alternative travel options. Benefits: - Enables faster deployment of buses, taxis and other transport options where demand is highest. - Provides commuters with timely travel updates and alternative route information. - Reduces inconvenience to commuters during service disruptions.
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3. iDepot

3a	Charging Station Management System (CSMS)	What is it? The LTA-developed Charging Station Management System (CSMS) monitors charging operations for 217 electric buses at Gali Batu Bus Depot. It gives teams real-time visibility of charging status, charger availability and equipment faults. Benefits: - Flags charging anomalies earlier so teams can respond more quickly. - Improves visibility of depot-wide charging operations. - Helps ensure electric buses are adequately charged before deployment.
3b	Autonomous surveillance and cleaning robots  <i>Autonomous surveillance robot dog</i>	What is it? The autonomous surveillance robot dog patrols Gali Batu Bus Depot, using infrared sensors to monitor buses and charging areas for abnormal heat. This provides early warning of potential overheating so depot teams can intervene promptly and strengthen fire safety. The robot can also automatically identify and record bus registration numbers across the multi-storey depot. This



Autonomous cleaning and security robot

data supports the Bus Locator System, helping Bus Captains locate their assigned buses more efficiently at the start of their shifts while reducing repetitive manual recording by depot parking assistants.

Meanwhile, a second autonomous robot performs routine cleaning while patrolling the depot for security anomalies, improving surveillance coverage, response capability and manpower productivity.

Benefits:

- Strengthens fire safety and surveillance within the depot.
- Saves time by helping Bus Captains locate their buses faster.
- Reduces repetitive manual recording, patrol and cleaning tasks, allowing depot staff and security officers to focus on higher-value operational and safety work.

3c IoT-enabled equipment monitoring

What is it?

IoT sensors installed on critical depot equipment, such as chiller plant systems, continuously monitor equipment health by capturing data such as vibration and temperature. Combined with artificial intelligence, the system analyses equipment behaviour to provide early warning of abnormal operating conditions and signs of equipment deterioration before faults occur.

Benefits:

- Enables earlier maintenance before faults lead to equipment downtime.
- Improves equipment reliability and maintenance efficiency.

4. iWorkforce

4a Safe driving incentive/gamification programme for Bus Captains

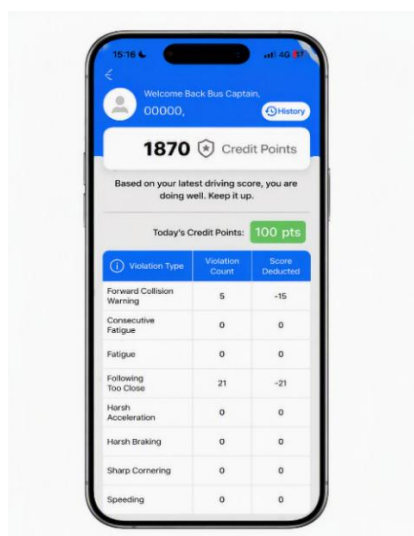


Photo showing an example of the point system in the BCMS app

What is it?

To encourage safer driving, SMRT Buses introduced a gamification programme that rewards good driving habits through incentives, rather than penalties.

Through the Bus Captain Management System (BCMS) app, Bus Captains can review their daily driving performance and gain greater awareness of their driving habits.

Every Bus Captain starts each duty day with 100 points. Points are deducted when safety-related alerts are triggered. The following day, Bus Captains can review their scores and any detected behaviours, such as harsh braking, harsh acceleration and fatigue alerts, helping them understand where improvements can be made.

To encourage participation, SMRT Buses launched a 30-day Safe Driving Challenge on 13 July 2026. The top 10 Bus Captains from each depot with the highest scores will each receive \$100 in grocery vouchers.

The programme will continue beyond the challenge period, allowing Bus Captains to accumulate points and redeem rewards throughout the year. Bus Captains can earn up to **\$600 in vouchers annually**.

Benefits:

- Since rollout, more than half of Bus Captains have achieved average scores above 90 points.
- Builds a stronger safety culture through friendly competition.
- Supports safer and smoother journeys for commuters.

4b Skills allowance for Service Controllers

What is it?

With real-time alerts now routed to the iOCC and new intervention protocols in place, Service Controllers play a larger role in assessing risks and preventing incidents.

Each Service Controller makes about 15 intervention calls per shift, on top of their existing duties. To recognise these

		expanded responsibilities, they will receive a monthly skills allowance of \$160. The additional monthly allowance is co-supported through the NTUC Company Training Committee (CTC) grants secured in partnership with the National Transport Workers' Union (NTWU). Benefits: • Recognises Service Controllers' expanded responsibilities. • Supports upskilling as Service Controllers take on more data-led interventions.
4c	Virtual reality (VR) training for Bus Captains  <i>Photo of a bus captain attending the VR training</i>	What is it? Developed fully in-house, the immersive Virtual Reality (VR) training curriculum allows Bus Captains to practise challenging driving scenarios in a safe, controlled environment. The platform simulates different road, traffic and weather conditions, including high-risk situations that are difficult to recreate during on the road training. It also helps trainers assess performance objectively and identify areas for improvement. Since its rollout in October 2025, about one-third of SMRT Bus Captains have completed VR training. Through the Singapore Bus Training and Evaluation Centre (SG BTEC), the VR training programme has also been used to train and benefit Bus Captains from other public transport operators. Benefits: • Gives Bus Captains hands-on practice in a safe, controlled environment. • Exposes Bus Captains to a wider range of challenging driving scenarios. • Accelerates learning through realistic practice and objective feedback. • Builds confidence and preparedness for real-world driving situations.

		• Supports safer and more comfortable journeys for commuters.
4d	Assisted reality (AR) support for Technicians  <i>Photo of technician wearing the AR glass while troubleshooting fault on the bus.</i>  <i>Photo of Master ATO providing remote support from the depot.</i>	<u>What is it?</u> Technicians deployed to troubleshoot bus faults on the road are now equipped with Assisted Reality (AR) glasses during recovery operations. With a built-in camera, speaker and microphone, the AR glasses allow Master Automotive Technical Officers (ATOs) at the depot to see what technicians see and provide real-time step-by-step remote guidance. Technicians can also use voice commands to access recovery procedures, wiring diagrams and technical documents while keeping their hands free. <u>Benefits:</u> • Enables hands-free collaboration between technicians on the ground and Master ATOs at the depot workshop. • Speeds up fault diagnosis and roadside troubleshooting, helping to reduce bus downtime.