Smart City
Management
System

TST SmartCity
Management System

TST SmartCity Technology brings together the functionality of today's modern cities, segmented into 4 fundamental categories across one platform giving cities of today the necessary platform and sensors to use urban informatics and technology to improve the efficiency of services across all facilities, including:

- Saving Energy

- Reducing Carbon Emissions

- Protecting Environment

- Reducing Costs

TST is a secure, reliable and scalable platform to allow asset owners or service providers to integrate all assets into the world of IoT. The TST solution is a world where multiple devices are connected and interact with their environment and customers, allowing for new opportunities in management and decision making in asset management performance.

Connections – The TST Platform allows multiple communication technologies from LoRa and NBIoT allowing owners complete flexibility in sensors location, function and customer requirements.

Control – TST enables owners or users the ability to interact with connected assets, giving understanding and visibility of its real time status, performance and usage.

Customisable – Web and app based Interfaces can be fully customised to fulfill your requirements for operators or customers, giving simple and intuitive functions like mapping assets, current and historic alarms and bespoke data reports.

Data – With TST capturing and monitoring all your connected devices, you are able to use data to inform and transform traditional decision making processes, by using the data evidenced showing asset performance, trends and interventions.

TST Capabilities

Data Integration
Our platform is built for the future allowing for multiple open sourced connection types

Data Visualisation
Intuitive and simple user interfaces, allows data to be easily interpreted and actioned

Device Control
Connect to your devices and receive real time updates on performance and status

Data Access
Get Access to your data from any of your internet devices

Data Storage
Scalable storage solutions which allows the network to grow without limits

Data Analytics
Use real world data to make better decisions around performance, replacements and interventions

Data Security
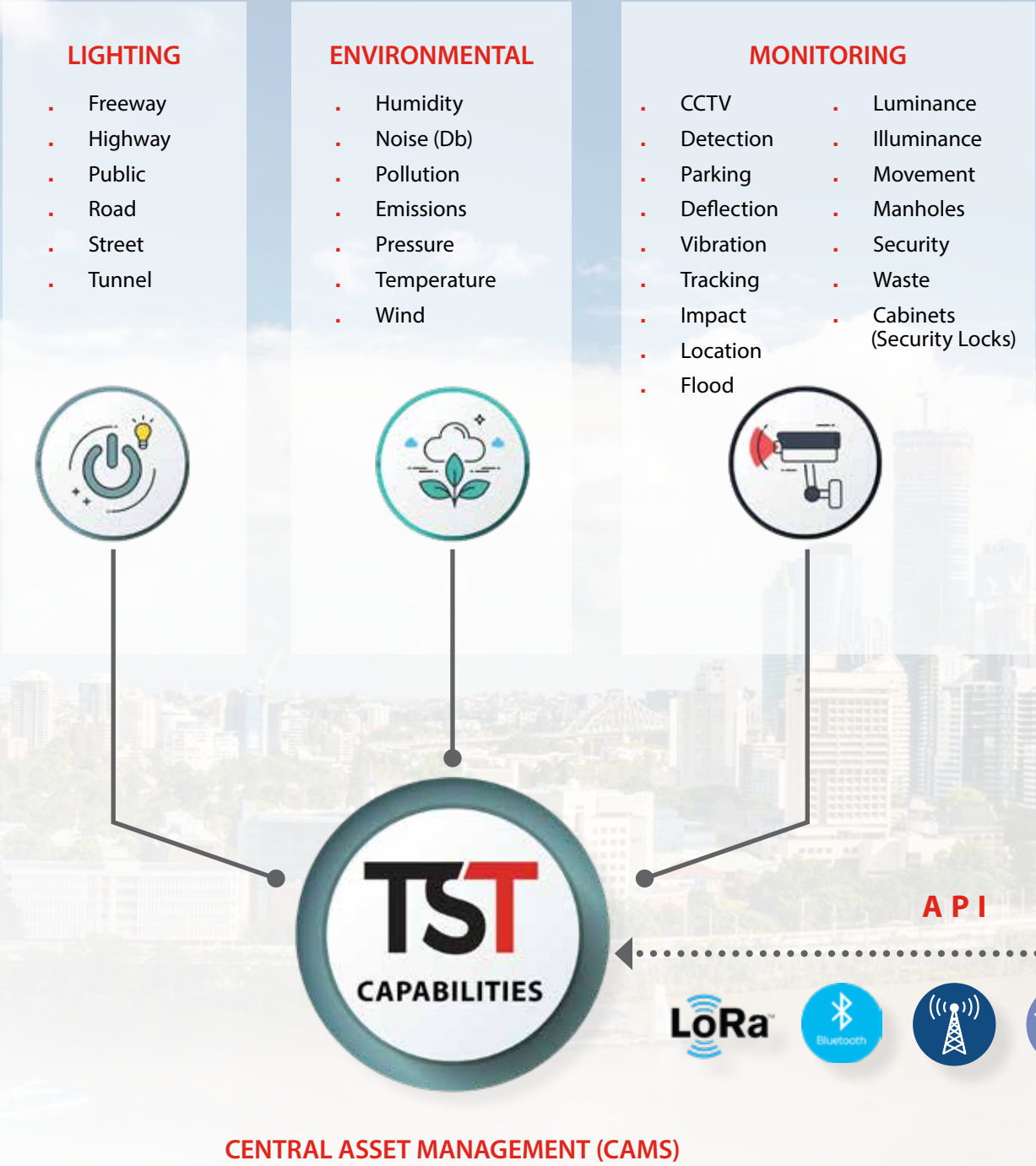Complete confidence is assured with encrypted connections for the entire data path

Device Configuration
You choose what sensors you require and what information you need, TST system is completely configurable

D2D Data to Dashboard

LIGHTING

- Freeway
- Highway
- Public
- Road
- Street
- Tunnel

ENVIRONMENTAL

- Humidity
- Noise (Db)
- Pollution
- Emissions
- Pressure
- Temperature
- Wind

MONITORING

- CCTV
- Detection
- Parking
- Deflection
- Vibration
- Tracking
- Impact
- Location
- Flood
- Luminance
- Illuminance
- Movement
- Manholes
- Security
- Waste
- Cabinets (Security Locks)

TST CAPABILITIES

API

LoRa   Bluetooth

CENTRAL ASSET MANAGEMENT (CAMS)

Workflow Management

Alerts and Alarms

NB-IoT
Works with

zigbee

TST
MAX

MASTER ANALYTICAL XTENSION (MAX)

THE TST SMARTCITY PROCESS

The Cloud Asset Management System (CAMS) is a web-based solution with advanced communication and easy integration with new or existing installations, able to monitor single or multiple point sensors.

It facilitates reduction in power consumption, CO_2 emission and light pollution and moreover an optimized maintenance and security.

COMMUNICATION LoRa

LoRaWAN is a Low Power Wide Area Network (LPWAN) specification, that targets key requirements of the Internet of Things (IoT) such as secure bi-directional communication, mobility and localisation services. It Provides the ability to communicate between smart devices without any complex installations, giving functionality to the user, developer and business, allowing access to the Internet of Things (IoT).

COMMUNICATIONS NBIoT

NBIoT is a narrowband communication technology specially designed for the Internet of Things (IoT). It connects devices more easily and efficiently on already established mobile networks, and handles small amounts of infrequent 2-way data, securely and reliably. The special attention of this standard is on very low power consumption, excellent penetration coverage and lower components costs, deployed in GSM and LTE regulated frequencies.

COMMUNICATION RADIO FREQUENCY

Radio Frequency is a low power wide area technology standard published by 3GPP. It also supports Internet of Things (IoT) through lower device complexity and extended coverage, while allowing the reuse of the RF installed base. It is supported by all major mobile equipment , chipset and module manufacturers. RF is compatible with 2G, 3G and 4G mobile networks and benefits from all the security and privacy features of carrier-grade networks.

COMMUNICATION RS485

The RS485 is the most complete and technologically advanced system tailored to the needs and requirements of road tunnel lighting control. It captures the luminance at the tunnel portal to adjust the various zones according to Standards. Alignment monitoring of the photometer for more precise lumens reading. The RS485 also measures the level of illuminance within the tunnel bore to ensure the illumination levels are maintained between cleaning.

The network controller acts as a master unit that controls each lamp's local unit (LPC) according to their location, the required level, or commands from the operator.

The local product controller installed in the luminaires, the LPC and monitors the driver. Additionally to controlling on-off and dimming the lamps according to the required light level, the LPC computes the hours of use of each luminaire, and performs a diagnostic on each unit and renders systematic reports to the System.

HUMIDITY
NOISE
POLLUTION
PRESSURE
TEMPERATURE
WIND

ENVIRONMENTAL

Temperature, Humidity, Wind, Pollution, Air Pressure, Noise

Temperature is measured by way of a highly accurate Air Chip 3000, while *Humidity* is measured using a capacitive humidity sensor (accuracy <0.8%/0.1K). These sensors are located in a ventilated housing with radiation protection. This allows more accurate measurements during high radiation conditions.

The *Wind* meter uses 4 ultrasound sensors which take cyclical measurements in all directions. The resulting wind speed and direction are calculated from the measured run-time sound differential.

Pollution is associated with ultra-fine particulate matter that can be solid or liquid suspended in the atmosphere. This product adopts the laser scattering method to collect the PM2.5 and Pm10 concentration in the environment.

Air Pressure is measured by way of built-in sensor (MEMS). It is calculated using the barometric formula with the aid of local altitude.

The accumulation of *Noise* present in a specified environment, can not only cause annoyance, but also increase significant health consequences such as elevated incidences of hearing loss and cardiovascular disease.

LIGHTING

**Freeway, Highway, Public,
Road, Street, Tunnel**

Intelligent Street Lighting reduces energy costs up to 35% through intelligent on/off switching, targeted progressive dimming, and efficient management of consumption.

To make sure that the system is flexible and adaptable to any customer and specific project conditions, the TST controllers can use several IoT communication routes and adapt to any local network coverage requirements.

The TST system guarantees a continuous, seamless and autonomous street lighting operation. It offers lamp-level management and feedback capabilities, reducing the overall grid management effort and increases it's performance. The TST system gives the flexibility of pre-programmed schedules. Plan a schedule of your own or manually manage every street lamp, according to your requirements. If the communication fails for any reason, the system is smart enough to continue operating the lamps autonomously, while trying to reestablish a live connection.

The TST system offers a detailed map view of all street lighting fixtures and lighting panels, with full information and electrical diagnostics. The system monitors a vast array of electrical parameters: (voltage, current, active power, reactive power, apparent power, active energy, reactive energy, power factor, frequency etc.) for the entire grid. An advanced analytic reports help to understand trends, reduce energy loss, improve lighting policies and increase street lighting overall satisfaction.

CABINETS
FLOOD
LUMINANCE
ILLUMINANCE
DETECTION
MOVEMENT
PARKING
WASTE

MONITORING - CABINETS (SECURITY LOCKS)

People have connected themselves to the Internet via computer and recently, mobile devices. But now technology has gone even further extending to objects, as well as people. Moreover, the 'Internet of People' has become the 'Internet of Things' (IoT), whereby virtually all objects around us can exchange information and work in synergy to significantly improve the efficiency of our business, the security of our assets and the quality of our lives.

The **TST SmartLock** system uses proprietary Shape Memory Alloy (SMA) actuation to drive locking mechanisms. SMA actuation is a lightweight, solid-state alternative to conventional actuators. The **TST SmartLock** technology comes from an embedded system that consists of a microprocessor, energy switching, and integrated sensors that monitor status.

MONITORING - FLOOD

The **TST iFlood** sensor, monitors levels of water in flood prone areas, pits or low level roads that are subject to flooding. **TST iFlood** is a wireless liquid level sensor that allows remote monitoring of status and control. The **TST iFlood** carries a communication interface, and is fitted with an external sensor. The communication is fully compatible with LoRaWAN protocol.

The Wireless Liquid Level Sensor has a range of 3m, 5m, 10m depending on the model and the accuracy estimated 0.25% FS typical.

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MONITORING - LUMINANCE

The **TST LU100** luminance photometer, monitors the average luminance of a tunnel entrance and its surroundings.

The **TST LU100** has a 4-20 mA output to export data to the **TST** tunnel lighting system. The sensor is housed in a rugged aluminium enclosure which has an IP66 rating, it has an internal thermostatically controlled heater for snow and ice conditions.

In accordance to CIE recommendations, luminance should be monitored as the luminance contained within in a conical field of view, subtending an angle of 200° and where the luminance photometer is mounted at the tunnel approach road approximately 100 - 200 metres from the portal, depending on the approach speed of the vehicles and their stopping distance.

The purpose of monitoring the luminance at the portal is to adjust the level of light intensity inside the road tunnel to the light intensity outside, so that drivers do not have to adjust their eyes quickly or become affected by the "black hole" effect, where they decelerate rapidly and become a hazard to other road users.

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MONITORING - ILLUMINANCE

The **TST LU602** illuminance photometer monitors the average illuminance within a tunnel. In accordance to CIE recommendations the photometer monitors the average illuminance over a range of 0-20,000 lux. The detector is a metal/glass encased silicon diode photocell, which is filtered to give a response that mimics the performance of the human eye.

The **LU602** Illuminance photometer has a 4-20mA output to export data to the **TST** tunnel lighting system. The sensor is housed in a rugged, glass reinforced polyester enclosure, which has an IP65 rating and an internal thermostatically controlled heater.

The purpose of monitoring the illuminance in a road tunnel is to ensure the light intensity inside the road tunnel portal is regulated to the correct level so that drivers do not have to adjust their eyes quickly or become affected by the "black hole" effect where they decelerate rapidly and become a hazard to other road users. This is accomplished in conjunction with the **LU100** Luminance monitor.

MONITORING - DETECTION

The **Wireless Vibration Sensor,** is equipped with an external rolling ball type vibration sensor. It can detect vibration or moving signals and send alerts to data center through LoRaWAN.

The **Wireless Activity Sensor** is to detect sudden movement or vibration alert but also is to do event counting such as detecting the motor running times per day. It can detect movement or vibration through LoRaWAN, the communication is fully compatible.

MONITORING - MOVEMENT

The **TST** platform helps to measure street traffic, store visits, and people behavior around the city, parks, inside specifics spaces, such as parks and festivals, stores, restaurants or public transport.

This sensor analyses large volumes of data in real time, in non -intrusive way and guarantees customer privacy.

Collect
Through the passive listening of the Wi-Fi signals, we collect anonymized data which is processed through our algorithms and converted into valuable customer-behavior or valuable business KPI.

Connect
We connect the offline data with the identified purchase thus obtaining an omnichannel customer journey that will let you define personalized messages according to the behavior and relationship with the brand.

Activate
Using the Wi-Fi channel enabled by our technology, opens a communication channel between the brand and your customers. With the ability to adapt the content to a specific profile of each of customer visit.

CABINETS

FLOOD

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MONITORING - PARKING

As a result of people's use of private motor vehicles, urban parking, especially on-street parking, is a key component of urban mobility. Providing relevant information about both on-street parking and alternative means of transport, allows drivers to make informed decisions about their use of private motor vehicles.

The **TST** platform enables the management of on-street parking due to advanced technologies and devices. The **TST** platform provides a state-of-the-art solution for cities, parking operators and drivers.

The **TST** platform provides drivers with a set of applications which turn urban mobility into a pleasant experience, allowing a much broader approach to the management of parking space and parking fees, based on real-time information.

MONITORING - WASTE

The **TST** platform enables cities and businesses to manage waste cost-efficiently, be more environmentally responsible, and improve the wellbeing of people.

The **TST** solution combines unique ultrasonic Smart Sensors that monitor waste in real-time with sophisticated software, providing cities and businesses with data-driven decision making.

The **TST** sensors are flexible and can monitor any type of waste: mixed waste, paper, plastics, glass, clothing, bio waste, liquids, electronics, metal of various types and sizes.

D2D Data to Dashboard

TST

320 Darebin Road
Fairfield, VIC 3078

www.trafficltd.com.au

NSW
P: +61 2 9736 3677
F: +61 2 9736 3391
e: info@trafficltd.com.au

VIC
P: +61 3 9430 0222
F: +61 3 9430 0244
e: info@trafficltd.com.au

SA
P: +61 8 8362 2385

e: info@trafficltd.com.au

NT
P: +61 8 8947 0733
F: +61 8 8947 0713
e: info@trafficltd.com.au

ACT
P: +61 2 6299 7922
F: +61 2 6299 7977
e: info@trafficltd.com.au

WA
P: +61 8 9248 1002
F: +61 8 9209 2288
e: info@trafficltd.com.au

QLD
P: +61 7 3184 2000
F: +61 7 3266 2244
e: info@trafficltd.com.au

TAS
P: +61 3 6273 1177
F: +61 3 6273 1759
e: info@trafficltd.com.au

UNITED KINGDOM
P: +44 (0) 1159 223 797
F: +44 (0) 1159 223 836
e: info@aldridgetraffic.co.uk