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INTELLIGENT TRANSPORTATION AND TELEMATICS

seamless travel
innovative means
together, we bring progress

Contents

effective and efficient public transportation for economic growth **1**

our systems and solutions **2**

our company **8**

effective and efficient public transportation for economic growth

ST Electronics has equipped governments and organisations around the globe with comprehensive and integrated traffic and fleet management solutions, as well as Intelligent Transport Systems (ITS) that span road and rail.

The development of an effective and efficient public transportation system has direct impact on the economic growth and rate of urbanisation of a country. With expanding populations, the ability to move large numbers of people quickly and efficiently, both within and across cities, is pivotal for a country's economic development.

Singapore Technologies Electronics (ST Electronics) is a pioneer in public transportation solutions, with an impeccable track record of providing intelligent transport systems that constantly set the standards in technology, safety, efficiency and innovation.

Leveraging our engineering knowledge and project management expertise, ST Electronics has equipped governments and organisations around the globe with comprehensive and integrated traffic

and fleet management solutions, as well as Intelligent Transport Systems (ITS) that span road and rail. Our customers from Australia, China, Europe, Hong Kong, India, Italy, Kazakhstan, Malaysia, the Middle East, the Philippines, Singapore, Taiwan, Thailand, Turkey, the United Kingdom and the United States (US) testify to the reliability, innovation and cost effectiveness of our solutions.

ST Electronics' intelligent transportation and telematics solutions are provided through one of our core business groups, the Large-Scale Systems Group, and our subsidiary, ST Electronics (Info-Comm Systems) Pte Ltd.



Integrated Traffic Management System in Singapore

our systems and solutions

ST Electronics is one of the leading companies in the world with a full suite of rail electronics solutions, including command, control and communications, automatic fare collection and platform screen doors.

Rail Electronics Solutions

Rail transportation is one of the most revolutionary advancements in modern civilisation. In most developed countries, the railway, Mass Rapid Transit (MRT) and Light Rail Transit (LRT) systems are part and parcel of the country's infrastructure, enabling the mass movement of people at great speeds.

ST Electronics is one of the leading companies in the world with a full suite of rail electronics solutions, including command, control and communications, automatic fare collection and platform screen doors, with customers in Singapore, China, Dubai, the Philippines, Taiwan, Thailand and Turkey.

ST Electronics has played a central role in the development of Singapore's MRT and LRT systems since 1984 when Singapore's first MRT lines were built. In 1997, we were awarded a contract for a Singapore MRT Line with the world's first driverless heavy rail system. Today, ST Electronics is a dominant rail electronics solutions provider in Singapore's MRT/LRT projects, with more than 300 highly qualified MRT/LRT engineering professionals, a full suite of leading edge solutions and a track record that spans more than two decades.

Beyond Singapore, ST Electronics was awarded our first overseas MRT project in 1993 for Taipei's Blue Line. Since then, we have successfully delivered over 60 turnkey projects in the Asia Pacific region, providing solutions for more than 23 MRT/LRT lines in China, Taiwan,

the Philippines and Thailand. In Beijing, ST Electronics and our partners were appointed to provide the first centralised, network-based Integrated Traffic Command Centre (TCC) system. The system enables Beijing to manage the city's rapidly burgeoning passenger traffic and handle emergency incidents efficiently and safely.

Our global marketing footprint is rapidly growing, a highlight being the clinching of a Telecommunications, Supervisory Control and Data Acquisition (SCADA) and Automatic Fare Collection Systems contract for the Marmaray Commuter Rail CR1 project in Istanbul, Turkey. This marked our first MRT project in Europe and opens doors to other rail system projects in the European Union. Another breakthrough was the securing of a contract to supply an Intelligent Rail Information System for the Palm Jumeirah Monorail Project in Dubai.

The Command, Control and Communication System (C3) for railway operation draws from the extensive experience of ST Electronics and consultants in the engineering and implementation of Supervisory Control Systems and Communication Systems for major railway clients and operators. Unlike conventional railway Supervisory Control and Data Acquisition Systems, the C3 allows complete integrated operation and the effective use of a Decision Support System as an aid for the safe, efficient and effective management of railway operations, especially during emergency situations.

At the heart of the C3 is an integrated suite of modular software designed to meet international standards such as the EN50128. Versatile and featuring low life-cycle costs, the C3 integrates different subsystems in trains, tunnels, passenger stations, power substations and depots to enable fully automated, safe and efficient rail operations.

Complementing the C3 is a complete spectrum of system solutions for rail transportation which optimises the consumer and operator needs for convenience, safety, efficiency, automation, reliability and cost effectiveness. These include:

- Automatic Fare Collection (AFC) System: a contact-less smartcard-based end-to-end solution for fare collection and payment. Convenient and easy to use, the AFC system facilitates passenger flow in and out of stations while optimising revenue opportunities for transit operators.
- Platform Screen Door (PSD) System: a turnkey system designed to provide effective safety barrier for passengers. These meet the stringent requirements of the busiest MRT/LRT systems in the world. More than a mechanical door system, the highly reliable PSD system employs state-of-the-art controller technology and robust structure for maximum safety, efficiency and comfort within the platform environment.
- Intelligent Rail Information System (iRIS): a solution that delivers real-time updates and other value-added

information at stations and on board trains. Utilising a combination of text, graphic and video formats, iRIS provides travel and safety information, announcements, and commercial messages directly to passengers, enhancing the overall travel experience.

- Maintenance Management System (MMS): an automated maintenance system which integrates operations and organisational processes such as fault reporting to optimise operational and cost effectiveness.

Traffic Management Solutions

ST Electronics is a global leader in the development of systems and technologies for traffic management. We have garnered numerous awards and patents for our sophisticated solutions which have been implemented in the effective operation and management of Singapore's land transport system.

Our efforts at harnessing Intelligent Transport System (ITS) technologies in the areas of command, control and communications, fleet management, automated toll collection, sensors integration and telematics for traffic management and enforcement, have contributed significantly to the efficient operation of Singapore roads. Beyond Singapore, our ITS solutions are deployed internationally in Australia, China, Europe, Hong Kong, Indonesia, Malaysia, the Philippines, Taiwan, Thailand and the Middle East.

cetrac® Intelligent Traffic Management System (TMS)

Our in-house developed cetrac® suite of customisable, turnkey solutions enable the integration and enhancement of urban and inter-urban transportation systems, allowing users to manage their facilities more efficiently, reliably and safely.

Recognising the need to integrate disparate traffic sub-systems into a single platform for increased efficiency, Singapore's Land Transport Authority (LTA) commissioned ST Electronics to deliver the i-Transport system – a large-scale and advanced TMS that centralises the management of various systems including traffic signal control, junction traffic surveillance, tunnel and highway monitoring and advisory into a unified platform. Highly scalable, intelligent and autonomous, the system standardises and disseminates real-time traffic information from diverse sources enhancing traffic management for greater safety and efficiency of road usage. The i-Transport system also incorporates sub-systems such as automated decision support and traffic simulation to aid traffic controllers in the management of traffic incidents.

Among our many global customers are China's Suzhou City Public Security Bureau, the Kingdom of Saudi Arabia General Traffic Directorate/Ministry of Interior, the Oman Muscat Municipality and the Hong Kong Traffic Department.



Automatic Fare Collection System



Platform Screen Doors



Junction Traffic Surveillance System

ST Electronics is a key provider of rail electronics solutions in Singapore with projects in China, the Middle East, the Philippines, Taiwan, Thailand and Turkey

2
Boon Lay
Boon Lay



our systems and solutions

We offer an Integrated Security Management System (i-TranSec) that enhances command and control of mobile resources on the road.

cetrac® Intelligent Transport Security System

ST Electronics understands that disruption to transport assets and infrastructure can have disastrous implications. To help transport authorities, homeland security agencies and commercial fleet owners safeguard their assets, we offer an Integrated Security Management System (i-TranSec) that enhances command and control of mobile resources on the road.

i-TranSec provides a common platform to consolidate data from individual traffic and fleet management systems, monitor and control traffic junctions, automate detection and monitoring of traffic incidents, integrate communication, effective enforcement and mass notification, offering the ideal solution for full asset visibility.

Expressway Monitoring and Advisory System

ST Electronics' Expressway Monitoring and Advisory System (EMAS) is an electronic traffic management solution that integrates the detection, surveillance, traffic information and emergency rescue sub-systems to facilitate the management of traffic incidents along the expressways. Its ability to display real-time traffic information, generate response plans for relevant agencies, and monitor the operational status of all on-site and tunnel equipment has led to enhanced road safety, traffic fluidity and a reduction of traffic accidents. Besides Singapore, these solutions have also been implemented in Australia and Malaysia.

Congestion Management System

Our ITS solutions include the design and implementation of Congestion Management Systems. These solutions are part of road management schemes that many progressive cities are looking to implement. On the cards is a next generation gantryless Congestion Management System which utilises Global Positioning System (GPS) and an IP-based communication network to enable a new phase in traffic management. Known as the "Telematics Service Hub", this system integrates with advanced vehicular telematics solutions to provide a vast range of useful and convenient services that benefits both motorists and transport authorities.

LED Traffic Signal Light System

Singapore is the first country in the world to implement countrywide Light Emitting Diodes (LED) traffic signal lights. This pioneering project was undertaken in 2001 by ST Electronics and saw some 69,000 traffic signal lights at over 1,500 traffic junctions in Singapore retrofitted with LED signals. With their improved visibility and good colour contrast compared to traditional filament-lamp based counterparts, the LED signal lights were launched to highly positive response from members of the public. ST Electronics holds two patents on fault detection and impedance matching of the traffic light systems.



Expressway Monitoring & Advisory System

our systems and solutions

ST Electronics has enhanced our offerings by integrating telematics applications as part of our solutions, further strengthening our position as a complete ITS provider.

Unified Maintenance Hub

The Unified Maintenance Hub developed for the LTA serves as a common platform to manage the maintenance of all traffic systems in Singapore. Its capabilities include the generation and notification of work orders, preventive maintenance planning and routing, and the management of feedback and status reports, among other features.

Fleet Management & Telematics Solutions

ST Electronics' ability to integrate telecommunications, sensors, computing technology and intelligent software into effective fleet management systems has reaped rewards for our customers. Transport authorities, homeland security agencies and commercial fleet owners can now automatically locate their vehicles and despatch vital real-time information to their fleets via GPS tracking, GPRS-enabled vehicle devices and navigation applications. They can also optimise vehicle booking and despatch, and efficiently manage multiple fleets via a bureau service provided by our cetrac® suite of Fleet Management Solutions (FMS).

Our award-winning FMS include:

- cetrac® iCab: a bureau service taxi booking and despatch system that harnesses wireless technology, automated booking and intelligent data mining to despatch the most appropriate available taxi to customers in the shortest possible time.

- cetrac® iTrack: a movement tracking and management system that enables real-time monitoring and control management of vehicles, ideal for logistics and transportation businesses, delivery/courier services, security/safety operations and the management of multiple vehicles.

These solutions are installed in over 30,000 vehicles and vessels worldwide, including those of ComfortDelGro – one of the world's largest taxi fleet owners, and Taiwan Taxi Company. The system has also enabled ComfortDelGro's Call Centre to experience improved call response rates and significantly reduce time taken to process a call.

In Singapore, our systems have been used by the Ministry of Defence, Automobile Association of Singapore, LTA, Singapore PowerGrid and Maritime Port Authority. Other global customers include China's Shanghai and Hangzhou Municipality, Municipal Corporation of Greater Mumbai in India and Sharjah Public Transport Corporation in the United Arab Emirates (UAE).

Innovative Telematics Solutions

Telematics has become an invaluable part of intelligent transport and fleet management systems. Telematics is the integration of positioning (using satellites or terrestrial systems), informatics and wireless telecommunication technologies which is used to send, receive and store information over vast networks. It is commonly used in automobile

systems for a variety of emergency and navigational services to motorists. With telematics solutions, drivers can browse the Internet, send and receive e-mails and have access to live traffic updates, listen to satellite radio and perform various other activities. Telematics is also used in the management of emergency situations facilitating the despatch of emergency response units resulting in the enhancement of homeland security operations and transport management.

ST Electronics acquired Telematics Wireless Ltd in 2007 to take advantage of the growing role of telematics in transportation and FMS solutions. Telematics Wireless is a key player in the high growth Machine-to-Machine (M2M) industry in which machine assets are connected through wireless information infrastructures to allow wireless transmission of information for remote monitoring and control.

ST Electronics has enhanced our offerings by integrating telematics applications as part of our solutions, further strengthening our position as a complete ITS provider. The incorporation of telematics opens up new opportunities for extended services to motorists and transport authorities via intelligent access devices in vehicles, providing a full suite of telematics solutions while expanding our channels to enter the emerging high growth markets for M2M applications and wireless telemetry.

Our sophisticated telematics capabilities is reflected in the Automatic Vehicle Location solution which offers real-time positioning with two-way messaging, suited for commercial, emergency and security applications such as fleet management, asset tracking, remote data collection, stolen vehicle recovery, emergency and medical distress and roadside assistance. This system provides accurate positioning readings on the street as well as in buildings or even locations covered by foliage or blocked by tall buildings. Its terrestrial network of base stations effectively track and communicate with any mobile object. As a leading terrestrial location technology provider, we have over 600,000 installed units in major metropolitan centres such as Los Angeles, Buenos Aires, Beijing, Shanghai, Seoul, Sao Paulo, etc.

ST Electronics' core capabilities in telematics also include the provision of Radio Frequency Identification (RFID) and Wireless Telemetry products and applications for gantry/gantryless Congestion Management Systems. This complements our existing ITS solutions by providing cost-effective and fast communication between the in-vehicle RF transponder and the toll reader. Over 300,000 RFID transponders are in use for congestion management, security and commercial vehicle operation services.

We also offer the latest technology in wireless sensor network that is applicable to a plethora of commercial, transport, homeland security and military applications. This network enables sensors, actuators, programmable logic controllers or portable devices to be connected in an intelligent network configuration, providing bi-directional, reliable and efficient control of data, processes and assets, automatically and in real-time. It can be applied in vehicle-to-vehicle communication and vehicle-to-roadside infrastructure communication where drivers can receive advanced traffic warnings from roadside sensors.

Combining our in-depth experience with communication technologies and telematics solutions, ST Electronics offers an integrated solution for Automatic Meter Reading (AMR) suitable for remote reading of electricity, water and gas meters. With over 1.5 million AMR units sold in North America, these units are specifically adapted to operate in noisy radio environments, especially in dense urban areas.



Electronic Toll Collection Solution



Taxi Booking and Despatch System in the UAE



Telematics Solution

our company

Our solutions are strategically targeted at the e-Government, Satellite Communications, rail and highway intelligent transportation and Interactive Digital Media markets.

Headquartered in Singapore, ST Electronics has 40 years of experience in providing electronics, communications and Information Communications Technologies (ICT) solutions to governments and commercial enterprises worldwide.

Our strength lies in our ability to harness leading-edge technologies into products and solutions, which are both innovative and cost-effective. Our solutions are strategically targeted at the e-Government, Satellite Communications, rail and highway intelligent transportation and Interactive Digital Media markets.

A truly global company, ST Electronics has established an international presence in more than 30 cities in 20 countries. We have offices in Bangladesh, Botswana, China (including Hong Kong), Europe, India, Kazakhstan, Malaysia, Mexico, the Gulf States, South Africa, Taiwan, Thailand and the US, serving a customer base that spreads over more than 70 countries.

ST Electronics is a wholly-owned subsidiary of Singapore Technologies Engineering Ltd – one of the largest public-listed companies on the Singapore Stock Exchange.

Awards and Patents

Our values and work attitude have earned us extensive industry approval and recognition, as demonstrated by some of our accolades. ST Electronics strives to build and strengthen our strong innovative spirit. We continually invest in research and development and have been granted numerous patents for our innovations.

Awards

- CIO Awards 2009 for ST Electronics' project for ComfortDelGro's Integrated Taxi Management System
- Land Transport Excellence Awards 2008 'Most Innovative Partner (Technology)' for i-Transport System
- Institution of Engineers, Singapore (IES) Prestigious Engineering Achievement Award 2007 for CityNet II – Next Generation Taxi Booking and Despatch System
- Infocomm Development Authority (IDA) National Infocomm Awards 2006 (Merit) 'Most Innovative Use of Infocomm Technology (Private Sector)' for CityNet II – Next Generation Taxi Booking and Despatch System
- iDA National Infocomm Awards 2006 (Merit) 'Most Innovative Infocomm Product/Service' for i-Transport System
- IES Prestigious Engineering Achievement Award 2004 for i-Transport System
- 7th ASEAN Outstanding Engineering Achievement Award 2000 for cetrac® Traffic Monitoring & Automatic Incident Detection System

Patents

- Method and System for Intelligent Traffic Incident Management (2008)
- Automated Taxi/Vehicle Booking and Despatching System – Singapore and Malaysia (2008) and UK (2007)
- Travel Information System (2006)
- Traffic Violation Method and System (2006)
- Apparatus and Method of Detecting and Counting Vehicles (2005)
- Fault Detection for Traffic Light Systems Using Electronics Lighting Elements – USA (2003)
- Image Processing Techniques for a Video Based Traffic Monitoring System and Methods Therefor (2001)
- Automatic Freeway Incident Detection System using Artificial Neural Networks and Genetic Algorithms (2001)

CONTACT US

Singapore Technologies
Electronics Limited (ST Electronics)
24 Ang Mo Kio Street 65
Singapore 569061
Tel: (65) 6481 8888
Fax: (65) 6482 1079
Email: mktg.elect@stengg.com
www.stee.stengg.com
(Regn. No.: 196900084E)

Large-Scale Systems Group
Tel: (65) 6481 8888
Fax: (65) 6483 2454
Email: lsg@stee.stengg.com

ST Electronics (Info-Comm Systems) Pte. Ltd.
100 Jurong East Street 21
ST Electronics Jurong East Building
Singapore 609602
Tel: (65) 6567 6769
Fax: (65) 6567 6300
Email: info_infocomm@stee.stengg.com
(Regn. No.: 198601460K)

ST Electronics (Info-Software Systems) Pte. Ltd.
24 Ang Mo Kio Street 65
5th Floor, Block D
Singapore 569061
Tel: (65) 6481 8888
Fax: (65) 6481 0693
Email: mktg_infosoft@stee.stengg.com
(Regn. No.: 198601030N)

ST Electronics (Satcom & Sensor Systems) Pte. Ltd.
29 New Industrial Road
ST Electronics Paya Lebar Building
Singapore 536213
Tel: (65) 6521 7888
Fax: (65) 6521 7333
Email: mktg_satcoms@stee.stengg.com
(Regn. No.: 199103901W)

ST Electronics (Training & Simulation Systems) Pte. Ltd.
24 Ang Mo Kio Street 65
4th Floor, Block D
Singapore 569061
Tel: (65) 6413 1307
Fax: (65) 6482 6162
Email: marketing_tss@stee.stengg.com
(Regn. No.: 199607423R)

STELOP Pte. Ltd.
(formerly Chartered Electro-Optics Pte Ltd)
24 Ang Mo Kio Street 65
Block D, 6th Floor, Singapore 569061
Tel: (65) 6481 1801
Fax: (65) 6481 1337
Email: marketing@stelop.com
(Regn. No.: 199405796C)

