Transport solutions and systems integration ‘partner of choice’
Rail systems capability overview
• Over 100 transport customers worldwide
• Over 6,000 people specialised in transportation activities
• Over 30 metro/rapid transit major projects worldwide
• World leader in ETCS technologies
• Leader in integrated communication, security and supervision systems:
  - Operational control centres (OCCs)
  - Power system supervision and management
  - Passenger information and content
  - Traffic management (train tracking, routing and regulation, depot management and timetable management)
  - Security (access control, perimeter security, intrusion detection, CCTV, biometric security and encrypted communications)
  - Fixed equipment supervision and management (traction, fire detection, lifts, ventilation, escalators, emergency exits etc)
• Providing mission critical information systems to transport operators
• Delivering solutions to improve capacity, passenger comfort, security and safety
• Investing over 20% of consolidated revenues in innovation, research and development.
Thales Australia - Transport solutions and systems integration ‘partner of choice’

With operations in 50 countries, 68,000 employees, and annual revenues of more than A$22 billion, Thales is a global technology leader in the aerospace and space, defence, security and transport markets.

Thales Australia is recognised as a leading prime contractor and systems integrator. Thales Australia employs 3,500 people at over 35 sites across the country and recorded revenues in excess of A$1 billion in 2009.

Thales has a well established presence throughout Australia and is committed to investing in local skills, infrastructure, and establishing capabilities to enable rapid local deployment and migration of innovative systems and technologies.

Maintaining a balanced portfolio across commercial, industry and defence domains, Thales has a unique capability to design, develop and deploy equipment, systems and services that meet the most complex operational and situational requirements.

Thales is present across the value chain providing equipment, systems, complex systems integration, prime contracting and support services.

Thales’s engagement model is built on a foundation of partnership and cooperation, providing solutions where risks are managed, team behaviours are aligned and value for money solutions are delivered to customers.

Thales has an exceptional international footprint, with operations around the world working with customers as local partners.
Thales has over 35 years of experience in providing systems and solutions to the transportation market. Around the world Thales provides rail systems for:

- Urban rail
- Interurban rail
- Mixed-use freight/passenger rail
- Metros
- Rapid transit systems and
- Tramways.

These systems include:

- Operational control centres: Incorporating traffic management, power management, supervisory control and data acquisition (SCADA) and decision support systems
- Integrated communications systems: Incorporating all or some of PABX, Tetra, Wi-Fi and GSM-R technologies and associated enabling communications backbone and infrastructure for providing voice and data services
- Security systems: Incorporating onboard and trackside CCTV surveillance, access control, emergency call points and barriers
- Real-time passenger information systems: Applying public address technologies and information displays for both fixed and mobile infrastructure.

- Signalling systems, including:
  - Communications Based Train Control (CBTC)
  - European Train Control Systems (ETCS)
  - Tramway Management & Control (TM&C)
- Fire/emergency systems: Interfacing and being monitored and controlled by Thales connected interfaces.

With over 100 transport customers worldwide and a specialist workforce of over 6,000, Thales has a recognised global position in the successful delivery of proven, innovative transport systems, systems integration and technologies.

Focusing on increasing capacity, improving safety, comfort, security and reliability this capability is backed by:

- Extensive skills in project management
- Systems engineering
- Integration and test facilities
- Training, simulation and synthetic training services
- Maintenance and through life support
- Upgrade, obsolescence and technology management.

In 2007 Thales expanded its transport operations into Australia and has secured Australian transport orders in excess of A$250 million.

Thales has the local skills, technologies and capabilities to deliver transport projects in line with expectations of Australian transport customers.
Prime contractor and systems integrator

Thales has the capability to integrate the key systems necessary to manage a modern and vibrant rail network.

Thales offers proven rail systems and solutions, integrating a range of mission critical applications into one consolidated environment.

Thales’s approach to design, systems, components and equipment seeks to reduce our customers’ risks and total cost of ownership with consistent equipment for both line and depot.

Thales solutions are able to support increases in capacity, both organically over time and during ‘usage surges’, supporting evolving and changing demands.

Future proofing

Thales’s extensive experience as a prime contractor, systems integrator and commercial off the shelf (COTS) approach ensures solutions can be designed to meet the objectives and overall experience sought by all stakeholders.

Thales’s modular and scalable approach to solution design and solution architecture provides customers with the flexibility to integrate future applications, as well as the option to re-use and extend the life of existing applications.
// Thales Australia offers rail customers

- A proven service offering
- Proven system integration skills
- Low risk mitigation strategy
- A strong, committed local team
- Robust program management
- An open, collaborative, partnership approach.

// Adding value to client operations

Thales offers value through proven experience and a customer focused collaborative approach.

Thales is an established, independent, internationally proven, specialist rail technology and systems provider.

Thales focuses on delivering customers low risk, high quality, safe, secure, easy to use, rail equipment and system.

All projects are designed to meet operational, service, social and financial objectives.

// Commercial partnerships and relationships

Thales has extensive local and international experience in the delivery of rail programs through alliances, partnerships and other commercial models.

Thales Australia is committed to establishing long-term, risk sharing partnerships and is open to discussions of a range of commercial models. For example:

1. Commitment as a risk sharing, industrial partner
2. Partnering type arrangements
3. Contracting to agreed performance levels for commitments throughout the term of the contract.

Thales offers a network of proven partnerships and relationships with leading international rail operators, technology suppliers and rolling stock manufacturers.

// Thales business approach

As a Prime System Integrator Thales enters into firm/fixed contract terms to deliver services and solutions within agreed scope and schedules.
Thales is one of Australia’s largest sources of highly technical transport capabilities, evident through the Thales Integration Test Facility (ITF). The ITF supports innovation in transport technologies.

The ITF’s capabilities/applications include:

- Software, hardware and systems integration for a range of transport projects
- Ongoing integration work, integration and testing of subsystems and regression testing
- Development and testing of new COTS equipment for train and transport systems
- Development, simulation and validation of new operational concepts prior to specification or procurement
- The ITF facilitates smooth transition from legacy to new, open systems and architectures, for onboard communications, passenger information systems, integrated fare collection and rail signalling systems.
Thales has considerable expertise in providing high-end solutions for passenger or mixed passenger/freight operations, focusing on delivering solutions which meet key operator and passenger demands; safety, reliability, capacity, efficiency, cost-effectiveness and automation.

Thales has implemented a range of systems for supervision and control of train operations, either as integral part of other signalling offers such as CBTC or as stand-alone applications integrated in existing rail infrastructure. These applications include passenger and mixed passenger/freight rail operations in urban and main line networks.

AUTOMATIC TRAIN PROTECTION (ATP) OR AUTOMATIC TRAIN OPERATION (ATO)

SelTrac CBTC
Thales’s flagship solution, SelTrac CBTC provides moving block operation delivering maximum capacity gains and enabling fully automated, even driverless operation of trains

- The reduced need for trackside installations provides considerable savings in operation and maintenance cost compared to conventional signalling systems
- Thales has an unmatched, 25 year proven track record in the successful application of this technology.

AlTrac ETCS
- Thales has a leading position in the specification and implementation of ETCS
- Initially developed as the standard for Europe, ETCS has spread throughout the world
- Thales’s ETCS Level 1 solution has been tested and type approved for use on the suburban rail network in Sydney.

Rail signalling equipment and enabling technologies
- Thales offers a full range of signalling technologies, including:
  - Electronic interlockings
  - Digital axle counters
- Thales has over 100 digital axle counter customers worldwide applying train detection across numerous applications and scenarios
- In Australia, Thales’s digital multi-section axle counter has been type approved for use on the regional rail network in Victoria
- Further type approval activities have been commenced for Queensland and the Melbourne suburban network.

CheckPoint
- Thales’s CheckPoint solution offers improved intelligence and efficiency of rail vehicle condition monitoring
- CheckPoint combines and evaluates the inputs from a trackside sensor system identifying hazardous conditions on passing trains
- The evaluation results are reported to alert train operators and maintainers in real-time
- The results can also be used for direct intervention to the affected train, by interfacing to interlocking or train control systems.
### Key enabling technologies

<table>
<thead>
<tr>
<th>Critical relevant technologies</th>
<th>Deliverable</th>
<th>Thales offer</th>
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<tbody>
<tr>
<td>Operational control centre (OCC)</td>
<td>Traffic management</td>
<td>Thales is a world leader in the provision of traffic management systems from the management of dedicated CBTC lines in projects like Dubai to complex mainline systems such as in Lisbon, Portugal. The regulation of rail lines is especially critical in order to maintain a constant vehicle frequency along the line and to avoid overcrowding at the station/stop.</td>
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<tr>
<td>Power management</td>
<td></td>
<td>Provision of monitoring and control systems that facilitate the efficient and effective control and monitoring of the power distribution and equipment status. An efficient control system ensures the efficient operation of the traction supply at all times and to quickly, safely and efficiently deal with abnormal operating and emergency conditions.</td>
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<td>Supervisory Control and Data Acquisition (SCADA) systems</td>
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<td>SCADA systems are used within the transport network to provide a network wide view of the electrical and mechanical systems within the network, including ventilation, lighting, vertical transportation, access control, fire detection, communications and fare collection.</td>
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<tr>
<td>Decision support system</td>
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<td>A network wide view of the transportation system allows for an effective situational view that facilitates decision support. This allows the operator to focus on the task at hand.</td>
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<tr>
<td>Integrated communications systems</td>
<td>PABX</td>
<td>The PABX function of an integrated communications system including telephony within the infrastructure allowing personnel to communicate with each other.</td>
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<td></td>
<td>Tetra</td>
<td>The Tetra system is used to provide communications services (voice and data) to mobile personnel both onboard and within the infrastructure.</td>
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<td></td>
<td>WiFi</td>
<td>With the increasing trend towards mobile connectivity for personnel, operators and passengers, Wi-Fi provides broadband connection for operational services such as CCTV to OCC communications and passenger internet connections.</td>
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<td></td>
<td>Communications backbone</td>
<td>The communications backbone provides the robust, reliable infrastructure to support the integrated communications system.</td>
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<tr>
<td>Security systems</td>
<td>CCTV surveillance</td>
<td>CCTV is becoming an increasingly integral part in any transportation business model for both fixed and mobile infrastructure. CCTV is used for: • Providing situational awareness for operational effectiveness (passenger counting, passenger movements, usage data) • Providing evidential information in the case of incidents • Coordination of emergency response.</td>
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<td></td>
<td>Emergency call points</td>
<td>Emergency call points allow direct communication with passengers from centralised OCCs.</td>
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<td></td>
<td>Access control</td>
<td>Access control is used to detect and warn in the event of unauthorised access to particular areas of the network.</td>
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<td>Critical relevant technologies</td>
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<td>Real-time passenger information</td>
<td>Passenger information displays (PIDs)</td>
<td>Provide visual up to date accurate information at stops, onboard and at key transport interchanges about the services provided. PIDs also provide information to the public in response to emergencies or service changes. PIDs may also be used to provide advertising material as desired.</td>
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<tr>
<td>Railway signalling systems</td>
<td>Public address</td>
<td>Provide audible up to date and accurate information at stops, onboard trains and at key transport interchanges. The public address includes integrated hearing loop capabilities for the hearing impaired.</td>
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<tr>
<td>Automatic train control and operation</td>
<td>Automatic train protection and control</td>
<td>This function is provided by CBTC. The Thales SelTrac CBTC solution has been providing high capacity rail operation at the highest levels of reliability and safety for 25 years, including various fully driverless applications for metro train and people mover operations. For main line rail applications, Thales has leading market positions for two alternative technologies. • The European Train Control System ETCS in its Level 1 and Level 2 applications was developed as an European standard by a cooperation of globally leading signalling suppliers including Thales, but its application has spread beyond Europe due to broad support of the technology by multiple vendors • The Train Protection and Warning System (TPWS) is the current train protection system used in the UK main line market as well as on Victorian regional lines in Australia.</td>
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<td>Electronic axle counters</td>
<td>Thales has scalable and flexible offer of digital multi-section axle counters which are scalable to control up to eight times as many detection points as other products in the market. Very high reliability and unique features for flexible reset and remote diagnostics are just a few further differentiators of this technology.</td>
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<tr>
<td>Train supervision and control</td>
<td>Thales can offer sophisticated, scalable solutions for supervision and control of train operations, both in conjunction with overall Thales signalling systems and by integrating existing signalling technologies.</td>
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<td>Condition monitoring</td>
<td>The Thales CheckPoint solution is scalable from single location to networked applications and can be interfaced to existing signalling and train control systems for immediate intervention in emergency situations.</td>
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<tr>
<td>Tramway signalling systems</td>
<td>Automatic vehicle localisation (AVLS)</td>
<td>The AVLS provides the vehicle position to support public information provision, visualisation at the OCC, evaluation of any delay and support headway management.</td>
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<td>Priority management at road crossing</td>
<td>Allows public transport (trams) to request priority at a road or pedestrian crossing.</td>
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<td>Timetable management</td>
<td>Provides the facility to create, edit, import and export the system timetable.</td>
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<tr>
<td>Junction and depot management</td>
<td>The tramway signalling system allows the safe movement of vehicles in the powered switch area and the avoidance of conflicting vehicle movements.</td>
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<tr>
<td>Automatic train control (ATC)</td>
<td>Where line of sight operation is not possible, such as in a tunnel then the ATC may be used to prevent passing a red signal and to monitor vehicle speed.</td>
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<tr>
<td>Tram regulation</td>
<td>The trams are able to be kept at a close to constant frequency and avoid overcrowding at stops.</td>
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Australia and New Zealand transport capabilities and programs

TRAIN CONTROL AND RAIL SIGNALLING SYSTEMS

Thales is the number one provider of train control systems delivering CBTC for metro and rapid transit systems and ETCS for interurban/heavy rail, including the London Underground and Dockland Light Rail.

**Railcorp: ATP/ETCS Pilot Trial (to gain signalling type approval certification)**

Working with Downer EDI Rail, Thales secured the opportunity to conduct an ATP/ETCS pilot trial. During the trial Thales’s ATP/ETCS level 1 system interfaced with the RailCorp signalling network and the onboard train systems. Thales received signals type approval for onboard and trackside equipment in February 2010.

ONBOARD COMMUNICATION, SECURITY AND SURVEILLANCE AND PASSENGER INFORMATION SYSTEMS

Thales is a leading supplier of onboard communication, security and surveillance, and passenger information systems.

**Downer EDI Rail: Communications and Surveillance Subsystems (CSS) for the Sydney Suburban Passenger Vehicle ‘Waratah’ Project**

Thales is supplying the CSS for the ‘Waratah’ Sydney Suburban Passenger Vehicle Public Private Partnership (PPP) Project, consisting of 78 train sets (624 cars). Implementation of the system will enhance efficiency of rail services, security of the network and safety of rail commuters, increasing consumer confidence and patronage of the rail services.
REVENUE COLLECTION SYSTEMS

Thales has over 40 years experience and has successfully delivered fare systems all over the world. Recent projects include national ticketing projects in the Netherlands, Taiwan, Denmark and Dubai and multi-modal systems in Toronto, Beijing, Bangkok, Delhi, Taiwan and Denmark.

**Auckland Regional Transport Authority (ARTA): A seamless multi-modal transport ticket for Auckland public transport**

Thales is delivering a multi-modal and multi-operator ticketing system for the Auckland Regional Transport Authority. The Auckland integrated ticketing system is scalable, uses open architecture and standards, ensuring flexibility and interoperability with third-party suppliers and supports the future delivery of a fully integrated national fare collection system.

/// Thales – proven transport systems integrator and technology provider

- Train systems integrator for more than 78 train sets (624 cars) of the Waratah A-Sets
- Provided core elements of the information, communication and security system for the Queensland Rail (QR) IMU160/SMU260 fleet
- Provided an onboard ATP system to RailCorp NSW for assessment and type approval in the Australian Rail Network environment
- Provided Thales AzLM Axle Counters to VicTrack for level crossing upgrade.
EUROPE

PORTUGAL
/// PASSENGER INFORMATION SYSTEM DELIVERS IMPROVED OPERATION EFFICIENCY AND REDUCED COSTS
Thales’s solution integrates and controls all installed passenger information systems offering a coherent integrated system. The solution covers 2/3 of all rail movements in Portugal, 91 stations and multiple display, service, vehicle types and operators.

PARIS, FRANCE RATP Lines 13, 3, 5
Thales worked with RATP as part of a major program to modernise all its metro master control centres. Thales renovated the operational control centre (OCC), provided traffic supervision and control, and management of power and auxiliary systems. These systems have provided RATP with the ability to replicate this solution throughout the network.

LAUSANNE M2 LINE - SWITZERLAND
/// INTEGRATING AND CENTRALISING ALL CRITICAL DATA INTO ONE SYSTEM
Thales delivered OCC public address and passenger information systems; fire detection and security lighting; time schedule management; video surveillance, intercom and access control, and the communications network.

LOTSCHEBERG BASE TUNNEL - SWITZERLAND
Thales designed and implemented the complete signalling system including ETCS Level 2 for the 34.6 km tunnel through the Alps designed to a speed of 250 km/h.

HIGH SPEED LINES - SPAIN
- MADRID – TOLEDO
- MADRID – SEGOVIA – VALLADOLID
- LERIDA – BARCELONA – FIGURAS
- MADRID – VALENCIA
Thales participated in all high speed projects, on the Spanish High Speed Network (for speeds up to 350 km/h).

BERGEN - NORWAY
Thales is delivering a complete tramway management system including: automatic train stop function, passenger information system, public address functions, radio tetra, OCC and CCTV.

BERLIN - HALLE/LEIPZIG - GERMANY
/// THE FIRST ETCS LEVEL 2 SYSTEMS FOR HIGH SPEED PASSENGER SERVICE
Thales managed 200,000 km of test runs before the southern section of the Berlin – Halle/Leipzig line opened for passenger service in 2005.

UNITED KINGDOM & IRELAND

NATIONAL RAIL COMMUNICATIONS CENTRE - UNITED KINGDOM
/// IMPROVING THE ACCURACY OF RAIL PASSENGER INFORMATION ACROSS BRITAIN’S RAILWAYS
The Thales/EWS alliance manages and distributes information regarding train service alterations, engineering works and operates (24/7 365 days a year) the National Rail Communications Centre, the focal point for the provision of passenger information. Millions of UK rail users depend on this information. The National Rail Communications Centre is responsible for updating the dynamic content of the UK’s third most popular website (www.nationalrail.co.uk). The site receives over 55 million visits per year. In addition, the communications centre updates the four National Rail Enquiries contact centres, which combined receive over 43 million customer enquiries per year.

LONDON DOCKLAND LIGHT RAIL (DLR) – UNITED KINGDOM
The track layout of the DLR includes a complex junction area where the major lines of the system converge. The signalling system allows seamless junction management for safe and efficient train separation, consists of an arrangement of three vital interlocking/train control systems, data transmission equipment, 75 point machines, 94 onboard controllers (VSCC) for ATP/ATO operations and 85 passenger information displays.

CROYDON - UNITED KINGDOM
Thales has delivered a completed tramway management system in Croydon in the UK. Scope includes SCADA (traction control), equipment monitoring and fault management), a passenger information system, public address functions, CCTV, fixed and mobile radio infrastructure, and fibre optic backbone.

DUBLIN - IRELAND
Thales is supplying onboard and trackside communications systems including; an OCC, CCTV, public address functions, passenger information system and SCADA.

METRO
/// MIXED USE: FREIGHT/ PASSENGER RAIL

PASSENGER INFORMATION AND COMFORT
/// Proven advanced transport solution
As part of the FRAMECA group, Thales delivered and installed the centralised command and communication system, with all critical data centralised into one system in the integrated OCC.

**THALES TO SUPPLY ETCS FOR TURKISH HIGH-SPEED RAIL LINK**
Thales in partnership with Alcatel Lucent Teletas is supplying a signalling and communication solution for Turkish Railways (TCDD). This contract involves a 58 km extension to two sections of the Ankara-Istanbul high-speed link. Thales is also involved in the Phase 1 project of the ongoing Ankara-Istanbul high-speed link. Thales is implementing a turnkey signalling solution, which includes ETCS, interlocking, network management and rail field equipment systems, ensuring safe and efficient rail operations.

**THALES TO IMPLEMENT SAUDI ARABIA’S NORTH-SOUTH RAILWAY, THE WORLD’S LONGEST ETCS LINE**
Thales has a main line rail contract in Saudi Arabia, in cooperation with Saudi BinLadin Group (SBG). Saudi Arabia’s Public Investment Fund (PIF) plans to implement Thales’s leading ETCS Level 2 system on the North-South Railway project in Saudi Arabia stretching across 2,400 km. This is the first implementation of ETCS Level 2 in the Middle East and the longest implementation of the ETCS standard in the world. Thales is supplying turnkey main line signalling, telecommunication, supervision, security and fare collection systems.

**METRO CARACAS – VENEZUELA**
As part of the FRANCECA group, Thales delivered and installed the centralised command and communication system, with all critical data centralised into one system in the integrated OCC.

**SANTO DOMINGO METRO – DOMINICAN REPUBLIC**
Thales supplied the supervision systems comprising station control and the operations control centre, telecommunications and SCADA, access control and contactless fare collection. Telephone and public address systems were also included.

**VANCOUVER SKYTRAIN – CANADA**
Thales’s CBTC system controls up to 34 two to six car trains averaging a service speed of over 40 km/h, capable of 90 km/h maximum speed. Service headway during peak hours averages 150 seconds. The Expo line travels over 29 km of difficult terrain. The dual guideway is below grade, at grade, elevated and traverses through two sections of tunnels and across a suspension bridge.