ON THE MOVE
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GROUND TRANSPORTATION

WHAT’S IN THIS ISSUE

ENVIRONMENT: Ticket to tomorrow ............ 02

FOCUS: Parking control ........................................ 06
Customer perspective

TRENDS: The road ahead .................................. 08
Customer perspective

INNOVATION: Train control goes wireless ... 13
IN THIS EDITION

Can train operators go green and still make money? We take a closer look at rail revenue management systems. Also in this edition: from centralised car park management systems to advanced electronic tolling, we explore the technologies transforming road transport. Plus: how wireless innovations are helping metro operators to harness the benefits of smarter signalling.
Revenue management technology is helping train operators to meet new economic, social and environmental challenges.

Finding ways to boost profitability. Cutting peak time congestion. Making better use of off-peak capacity. These are just some of the challenges facing today’s train operators. And they’re challenges that are being brought into ever-sharper focus by the uncertain economic outlook and the need to enhance energy efficiency.

Revenue Management (RM) is playing an increasingly important role in addressing issues like these. Based on sophisticated demand forecasting technology, it allows train operators to optimise ticket pricing for each market segment and for every seat on every train, and to steer demand to maximise overall profitability and improve capacity utilisation.

RM pays environmental dividends too. Getting people into trains takes cars off the road. And the ability to improve load factors through demand steering can help rail to enhance energy efficiency and reduce per-capita carbon emissions.

**REVENUE MANAGEMENT DELIVERED**

Thales’ revenue management offer for train operators includes:

- **Expert consultation** and customisation to create a solution tailored to operator needs
- **Integration** with existing ticketing and reservations applications
- **Through-life services** for the revenue management environment
- **Prime contractor** expertise backed by five decades serving the rail industry
Global solutions

RM is being adopted by a growing number of train operators. Working with its strategic partner, JDA Software, Thales is the prime contractor and service provider of the RM system for the international high-speed operator Eurostar, which provides services between London, Paris and Brussels. Thales also provides RM solutions for National Express East Anglia, which runs both mainline and local trains in eastern England, and for East Coast, which operates mainline services between London and Edinburgh.

Operators choosing RM can apply it to a single route, or to an entire network. And it’s a cost-effective solution, typically achieving payback in a year or less.

Like all good ideas, RM is based on simple principles. Data and market intelligence are captured to produce detailed day-by-day demand forecasts for each origin and destination pair using sophisticated computer technology. This information is then used to optimise ticket prices and to devise fare products.

Beyond pricing

Adopting RM improves profitability. Eurostar, for example, increased revenues on its Belgian leisure trains by almost 20% after adopting RM, with passenger volumes up by 27%. But as well as increasing revenue, it also allows operators to make better use of surplus capacity.

High-quality information is vital, says John Fuggles, senior account manager with revenue management specialists JDA Software. “Your booking engine gives you a good clue but it doesn’t guarantee who doesn’t show up or who buys on the day and just walks onto the train. Revenue protection schemes, such as gates, are an important source of on-the-day travel information. Load weigh, infrared passenger counting and passenger counts by train staff are also valuable.”

Demand steering

RM gives train operators an unprecedented ability to direct passenger demand to make the best use of capacity. As well as filling empty seats, it can help to reduce overcrowding, allowing operators to create ticketing products to drive demand into less busy shoulder-peak periods.

The ability to integrate competitive pricing data into RM calculations could be decisive in attracting non-traditional customers to rail. “Understanding where you are in a competitive marketplace is vital” emphasises Mr. Fuggles. “That means knowing how much it would cost to make a comparable journey by car or bus and setting rail prices accordingly.”
Environmental optimisation

Rail revenue management not only makes good commercial sense, it makes good environmental sense too, and it’s set to play an increasingly important part in reducing the carbon emissions associated with transportation.

Encouraging modal shift is one way of achieving this. RM makes it possible for train operators to stimulate demand for rail services by using competitive pricing, meaning fewer journeys taken using more carbon intensive modes of transport, such as cars, buses and planes.

RM can also deliver direct energy efficiency improvements. The ability to optimise load factors – to fill empty seats – is fast emerging as a new frontier in the quest to boost per-capita energy efficiency. Today, the picture varies considerably between operators, with average load factors ranging from as low as 20%, to 70% and above in some cases.

Train loading has a significant impact on per-capita carbon emissions. A train operating at a load factor of less than 10% might produce around 200g of carbon dioxide per person per kilometre, which is about the same as an energy-guzzling short-haul flight. But with a 70% loading, rail emissions drop to around 20g – ten times more efficient than flying and five times better than driving.

A better deal for passengers

Encouraging people to use trains makes environmental sense. But in market economies, no one can be compelled to use rail. Innovative free-market ticket pricing and targeted subsidies through a range of concessionary fare products will continue to play a critical role in promoting modal shift.

RM implementations are already proving that this is possible. And future refinements of the technology will extend the ability of train operators to attract new passengers, as well as building stronger relationships with existing ones.

“We want to get to customer choice modelling, where your price isn’t just dictated by available capacity and booking time, but also by who you are” says Mr. Fuggles. “We’re starting to use competitive data – from other rail companies, coach companies, airlines and even the costs of car use – and we see that becoming more important over the next five years.”

HEARTS AND MINDS

Building a closer relationship with passengers is vital in the quest to win and retain business. In an age characterised by instant access to information, the ability to provide high-quality, easy-to-access train service data wherever and whenever it’s needed is critical.

Thales’ recent contract wins with UK passenger rail operator Southeastern, which operates services in Kent, Sussex and south-east London, underlines the group’s leading position in the growing global market for real-time train service information.

The project, to upgrade Southeastern’s customer information system (CIS), includes integration and management of the system from a single central location. Thales’ CIS solution harvests data from signalling systems and scheduled timetables to generate real-time information for passengers, delivered via visual displays and public address. Central control means information can be dynamically updated.

Southeastern handles 156 million passenger journeys each year and around 2,000 train services every day. These include the UK’s first high-speed domestic rail services, linking central London and Kent with trains operating at 140mph (225kmh).
Thales’ interoperable car park management solution for Monaco highlights the benefits of centralised control

Parking plays a critical role in urban mobility and today’s car park operators face wide-ranging challenges. There’s a need to manage revenue collection securely, as well as a growing requirement to handle complex subscription products, such as season tickets and special tariffs across multiple car parks.

Operators also need to be able to manage incentives for different classes of users and for different types of vehicles. They need systems that provide access to real-time information and the option to integrate any payment or authentication media, from contactless smartcards, to mobile devices enabled with NFC – Near Field Communication technology.

In tandem with this, operators need systems that are cost-effective, scalable and future proof, with the capacity to deliver interoperability in the wider context of urban mobility.
transportation. That means back-office functionality that can be integrated securely with other modes of transport – metros, buses, trams and rail – and their respective operators.

Open solution

Thales’ open architecture for car parks – WiLiX – addresses all these needs and more. WiLiX is a market-leading centralised management system that’s built on more than 30 year’s experience in car park payment collection. WiLiX allows operators to supervise multiple car parks, offering everything from equipment status reporting to subscriptions management.

The flexibility and scalability of the WiLiX solution is underlined by Thales’ implementation for Monaco’s public parking service, which operates more than 40 car parks throughout Monaco. Thales’ system supports operations in three-quarters of the Principality’s public car parks.

The WiLiX advantage

Centralised control offer a number of key benefits for Monaco’s public parking service. “One of the first is that it is possible to pull out all the statistics for financial reporting, maintenance reporting, incident reporting – everything from one central point” says Pierre Langle, Parking Product Manager, Thales.

WiLiX offers important productivity improvements. For example, season ticket applications are managed from a central point, reducing the number of employees needed to handle routine administrative tasks and increasing the proportion of staff available to perform front-line activities, such as security and customer care management.

Thales’ centralised system can also manage complex interdependencies; for example, cardholder discounts based on which car park the customer chooses. “Interoperability is one of the major benefits” stresses Mr. Langle. “That includes interoperability across multiple car parks.” And it offers security for users: lost or stolen cards can be centrally de-activated, in real time, to prevent fraudulent use in any car park linked to the system.

Real-time information

A centralised management system delivers better customer information too. “We know exactly when cars are entering and exiting car parks” explains Mr. Langle. “That means we can provide information about available spaces in real time.”

This information is displayed on conventional roadside panels, but it’s also available online – customers can see how many spaces are available, live, by visiting the www.monaco-parkings.mc website. And parking data generated by WiLiX is fed into mobile-enabled web services such as oumegarer.com, which helps users to find parking spaces when they’re on the move.

Step-by-step migration

Thales’ intelligent centralised control is at the heart of integrating car parking into the wider urban transport picture. “One of the specificities of the Thales system is the ability to upgrade the system constantly. We started with a single car park in Monaco. Today, there is a centralised system for the whole country” says Mr. Langle.

Open architecture makes it possible to integrate upgrades as new needs emerge year by year. “So when the customer asks for new functionality – such as contactless cards, which we have already implemented and, in the future, NFC – we can add it quickly and easily” says Mr. Langle. “And we can do this without the need to change the whole installation. This ties in with our long-term strategy to develop parking activities through interoperability with other modes of transport.”
FOCUS

CUSTOMER PERSPECTIVE

Claude Boffa, General Manager of Monaco’s public parking service, outlines the challenges of running the Principality’s car park network – and explains how advanced technology is helping to guarantee smooth operations.

What role does the public parking service play in Monaco?
The public parking service is an administrative organisation that manages 41 car parks in the Principality of Monaco and these are spread across the entire monégasque territory. Our objectives are to satisfy demand for parking for occasional customers, as well as to offer a high level of service to our season ticket holders.

The parking service manages almost 20,000 parking spaces, with spots for more than 16,000 cars and 3,400 motorcycles. And as an important tourist destination, provision is also made for coaches and camper vans. Currently, more than 7,400 residents, 8,300 commuters and 2,400 motorcycle owners hold season tickets for Monaco’s public car park network.

To manage this, we installed a centralised management system covering all the car parks in 1991. This allows us to handle everything from multi-purpose season tickets to hourly credits.

What challenges do you face as an operator?
We have to meet the different needs of a wide range of customers, including residents and commuters. And we have to be able to welcome the many tourists who visit the Principality, without restricting their vehicular access. We also need to be able to welcome and meet the demand for parking by tourist coaches. At the same time, we are promoting the use of two-wheeled transport. We are able to do this thanks to our multi-purpose season ticket and a policy that encourages the parking of two-wheeled vehicles, rather than cars.

But whatever form of transport our customers use, it’s important for us to be able to provide them with real-time information about the availability of parking spaces throughout the Principality. This is achieved through visual displays at street level and also via the internet. Above all, we strive to provide a welcoming and high-quality service for every customer, with an emphasis on cleanliness, safety and security. This is expressed in our customer satisfaction surveys.

What role is Thales playing?
Thales has equipped 26 car parks to date and it is carrying out technological monitoring on behalf of the public parking service, allowing us to anticipate upgrades of our equipment with regard to new standards for electronic payment. This is currently the case with NFC.

Thales’ equipment is adapted and customised, particularly in terms of software, to our centralised management system. This was made possible by joint developments between Thales and our partner, Akis Ingénierie.

What future developments do you anticipate?
With regard to interoperability, the public parking service is currently conducting a research programme, which includes a shared card with the Principality’s bus operator, Compagnie des Autobus de Monaco. And regarding new technologies, such as NFC, trials have been conducted and our position is to be technically ready for the possibility of its arrival.

“We strive to provide a welcoming and high-quality service for every customer, with an emphasis on cleanliness, safety and security.”
Claude Boffa, General Manager of Monaco’s public parking service
Trends

The Road Ahead

Thales’ free-flow tolling transforms road travel in and around cities

Drivers in the Australian city of Brisbane are benefiting from quicker, safer journeys thanks to an advanced electronic tolling system that allows them to pay motorway tolls without stopping, or even slowing down. Introduced two years ahead of schedule, Thales’ free-flow tolling boosts road capacity and includes innovative single-gantry technology that’s unique in the marketplace.

Tolling trends

Free-flow tolling, or open road tolling, is playing an increasingly important part in the quest to combat congestion and pollution on crowded urban and inter-city highways around the world. Free-flow adds capacity to existing toll roads because it eliminates the stop-start cycles associated with conventional cash tolling.

Increased throughput means potentially higher revenue for toll road operators. It also enhances safety, reduces emissions and cuts operating costs.

The Australian city of Brisbane
It’s for these reasons that the number of free-flow tolling implementations around the world continues to grow, with schemes now in operation in Australia, Brazil, Canada, Chile, Israel and the United States.

**Case study: Brisbane**

Launched in 2007, Brisbane’s Gateway Upgrade Project is one of a new generation of smart road schemes that combine improvements in both physical and electronic infrastructure to deliver enhanced capacity. Thales’ free-flow tolling is an integral part of the city’s AUD$1.88 billion motorway upgrade programme.

“The south-east corner of Queensland has seen double-digit growth for some time and that has led to a lot of congestion on the roadways” says Phil Mumford, Chief Executive of Queensland Motorways Ltd (QML), the company that owns and operates the city’s major toll roads and bridges. “We chose free-flow tolling because it is fully electronic and there are some really significant benefits: it eases congestion, enhances safety and improves travel time reliability.”

Brisbane’s innovative free-flow tolling solution is built on Thales’ global leadership in both conventional and electronic tolling technologies. Thales’ expertise provides road users with smoother, quicker journeys along more than 4,000 lanes on 30 motorways around the world, with major national electronic tolling implementations that include Liber-t in France and CAPUFE in Mexico.

**Tolling without tailbacks**

With free-flow, tolls are billed and deducted electronically as vehicles travel beneath toll gantries – without stopping or braking. It’s a seamless solution and the technologies deployed enhance customer choice: regular motorway users in Brisbane can choose to set up either a ‘tag’ or a ‘video’ tolling account.

Motorists taking the ‘tag’ option purchase a QML **go viatag** – a small electronic transponder that’s attached to the inside of the windscreen. Tolls are deducted automatically using DSRC (dedicated short-range communications) each time the vehicle passes a tolling point. The interoperable **go viatag** can be used on toll motorways throughout Australia.

Alternatively, motorists can opt for a ‘video’ account. No tag is necessary; vehicle identification for tolling purposes is carried out using video and laser scanning.
equipment mounted on each tolling gantry. The vehicle identification system also allows non-account holders to pay for toll motorway journeys using a pre-paid pass system. The classification and image processing subsystems also generate enforcement data.

**Digital tolling**

Free-flow tolling is a digital solution that reduces the operating costs associated with traditional roadside toll collection. Because the system is automatic, staffing requirements are reduced and productivity enhanced. There are no toll booths, no gates and no roadside cash handling equipment, so maintenance costs are reduced too.

Non-stop tolling means faster journeys and increased road capacity. “Free-flow eliminates tolling delays into the traffic stream at speed. Free-flow tolling eliminates these bottlenecks – and the accidents they cause.”

**State-of-the-art technology**

The key to free-flow tolling is the ability to accurately identify each vehicle as it passes a tolling point. To meet this need, Thales integrates a number of advanced sensor technologies. These include DSRC microwave communications to read tags and update vehicle data, an optical subsystem with fast-acting laser scanning to measure and classify vehicles, and an automatic number plate recognition (ANPR) video subsystem.

Real-time data from these gantry-mounted sensors is brought together in a unique gateway system. Developed by Thales in France and in Australia, this system incorporates video-analysis and classification algorithms. “It generates a passage report for each vehicle: this brings together all the data needed to invoice, or to enforce” explains Antoine Caput. “And this is all achieved using a single gantry.”

**Our single gantry solution reduces the amount of civil works required, limits environmental disturbance and keeps costs down.**

Antoine Caput, Thales Revenue Collection Systems.

and means the highway is able to accommodate an increased number of vehicles with the same number of lanes” says Antoine Caput, Director, Road Department, Thales Revenue Collection Systems. “This is a key benefit. Traffic flows on roads will continue to increase in the coming years and traditional toll gates restrict capacity.”

Free-flow also eliminates tolling plazas. That’s a key consideration for toll road operators: a tolling area may swallow up more than three hectares of prime city land. Free-flow allows operators to set up tolling points anywhere, with no additional land take and at greatly reduced cost. It’s for this reason that Thales’ free-flow technology package is also attractive for municipal authorities introducing or upgrading urban road-charging systems.

**The responsible solution**

Non-stop tolling has a number of wider social benefits. Traditional tolling is inherently wasteful: slowing down, stopping and accelerating again all increase fuel consumption and add to carbon dioxide and particulate emissions. But in free-flow systems, vehicles travel at a constant speed, optimising per-kilometre energy efficiency and cutting CO2.

Free-flow roads are also safer. In conventional systems, drivers jockey for position as they approach toll queues; once they’ve paid tolls, vehicles have to merge back
In the battle to ease congestion and enhance capacity, the Queensland Government together with Queensland Motorways recently embarked on a major technology upgrade of its toll motorway network. Thales played an integral part in the transformation known as free-flow tolling as Phil Mumford, chief executive officer of Queensland Motorways Limited, explains.

What drove the need for free-flow tolling? Queensland is the fastest growing state in Australia. The south-east corner of Queensland has seen double-digit growth for some time and that has led to a lot of congestion on the roadways. There was a need for greater capacity. We chose free-flow tolling because it’s fully electronic and there are some really significant benefits: it eases congestion, enhances safety and improves travel time reliability.

What impact has free-flow had on journey times? Motorists are enjoying reduced travel times as they no longer need to slow down, queue, give the toll collector their money, get their change, then accelerate away and try to rejoin the motorway and get up to speed again.

Now they don’t actually slow down at all – they travel at speeds up to 100 km/h through the toll points. What we’ve seen since the introduction of free-flow tolling as well as the progressive delivery of completed sections of construction on the AUD1.88 billion Gateway Upgrade Project is a time saving of about ten minutes for people who are travelling over the length of our network. It’s a significant saving and the reduced travel time has been quite noticeable to motorists.

Improved safety is another benefit for road users. We used to have accidents at toll points, with vehicles slowing down or accelerating and trying to merge at speed. We’ve seen a significant reduction in accidents around the toll points since the introduction of free-flow tolling. That’s simply a factor of vehicles not actually trying to slow down and merge, they’re all going at the same speed.

What are the benefits for Queensland Motorways as a business? A major benefit is increased throughput. Our best toll collectors could manage around 350 vehicles per hour through each lane. The new electronic free-flow lanes can handle over 2,000 per hour. And from a safety perspective, it’s much better for our employees not to be out there. There’s also no doubt that free-flow is better for the environment. The fact that people no longer have to brake, stop and accelerate away at toll points reduces greenhouse gas emissions.

Free-flow tolling also creates other business opportunities associated with vehicle movements, because it allows us to identify and control vehicles. We’re exploring opportunities to leverage this technology in areas such as car parking and taxi marshalling at Brisbane Airport, for example.

So this is about vehicle management in a much wider sense? That’s right. One part of our new information system deals with tolling. But that system has a great capacity to do other things. So where, previously, we were a toll operator, we’re now an information business. In the future, this will give us the capacity to actually communicate with people on the roadway and provide them with enhanced travel information.
How quickly have road users adapted to free-flow tolling?

We were thrilled with the way that motorists adjusted to the new technology. We’ve been operating for 23 years in a cash environment and we handle up to 250,000 vehicles a day on our network – and we moved to full electronic tolling overnight. That was probably one of our biggest risks for the project. One day our customers were paying cash, the next day there was full electronic tolling.

The morning we cut over, 80% of motorists had already arranged how they were paying their toll prior to travelling which is an outstanding figure. The remaining 20% were able to make their arrangements after travelling via one of our many payment options and channels. We provide our customers with different payment methods.

How did you manage that transition?

We implemented a proactive widespread education campaign to ensure that we communicated effectively with motorists and customers. We developed a very detailed communications strategy which was implemented well over a year in advance of the transition to free-flow tolling. Keeping the customer informed about what was happening was critical, it’s a strategy that really paid off.

The morning we went live, the local press were hovering around waiting for there to be mayhem. But their interest in the free-flow project disappeared shortly after 6am when they realised our customers were well informed and they knew what to do. I’ve been very encouraged by the way they’ve adapted to the new technology.

To what extent does free-flow tolling support the creation of an intelligent transport system?

It’s a key component of it. People can travel by car, bus and train. In Brisbane, they can travel by ferry as well. We’re aiming to integrate all those transportation modes and give the customer a choice of the best option. Information is the key to integration. If there’s a problem on the roads, it’s about being able to propose different ways to make the same journey using alternative means of transport. Or if there’s an accident, being able to divert traffic using smart controls over traffic signals and signage.

What sort of road-user data can you collect using free-flow?

We deliberately chose the Thales solution because of the high quality of the data it gathers. Thales has incorporated with Vitronic a vehicle identification system that can very accurately determine the characteristics of a vehicle through vehicle profiling. We’re the first in Australia to do that. We’ll be using this technology for future opportunities, so we can clearly identify the vehicle at speed and get a very good electronic description of the vehicle which we can use going forward.

So on one level, free-flow is about making sure people pay the right amount for the journeys they make. But that data can also be used for transport planning, because we now have an accurate picture of what sort of vehicles are using the network, and when they’re using it. It also allows us to develop tolling models with fairer charging regimes for different classes of vehicles.

Why did you choose Thales for this project?

We chose Thales because we liked their vehicle profiling technology and because they’re a large, multi-national organisation that has good system integration capabilities – so it was really about their ability to implement a system and their use of technology. Our project was originally supposed to go live in 2011. But the decision was made to have the project go live in 2009, two years earlier than originally expected. The project time was halved and we increased the scope as well. You don’t do that with lightweights. You need somebody who’s got the capability to do it. We were fighting a deadline and Thales met it.

What about the future?

Our vision for the future is one where transportation systems are integrated, customers are provided with information and provided with a choice. We want to be ahead of the curve here in Brisbane. We’ve delivered what we needed to do today. But our eyes are on the future.
Radio technology means smoother delivery of advanced signalling.

Thales’ SelTrac is the world’s most widely used communications-based train control system. And with Thales’ radio-based transmission system, it’s even easier for metro operators to harness the capacity benefits of SelTrac CBTC.

“There’s a large market shift towards radio-based CBTC” says Dr. Colin Bantin, Chief Engineer, Communications for Rail Signalling Solutions, Thales. “Radio offers higher bandwidth and much greater flexibility for expansion than conventional induction loop communications.”

The solution uses the 802.11 radio protocol, first deployed by Thales in the United States in 2004. It’s an open standard, so there’s no supplier lock-in and components can be purchased off the shelf.

Protecting operations

Security is at the heart of Thales’ offer. “We have implemented a unique solution to support open-standard radio” says Dr. Bantin. “By providing multiple links to each train, the risk of service interruption caused by interference is reduced to the absolute minimum.”

Thales’ radio incorporates authentication protocols to ensure that messages picked up by trains have come from a trusted source. “This goes beyond encryption” emphasises Dr. Bantin. “Thales’ authentication process uses the IPSec open standard with a dynamic key management system that provides maximum security from the train control computer right through to the train itself.”
Resilience and flexibility

As well as offering enhanced security, radio-based CBTC eliminates vulnerabilities associated with conventional train-to-wayside communications.

There’s less lineside equipment and no loop between the rails that can be damaged during maintenance. Thales’ solution is much less susceptible to vandalism and the risk of cable theft is cut, because copper cable is not used.

Radio is comparatively easy to install and maintain. “The system is also readily expandable to include additional lines and can be modified without service disruption, thanks to our overlapping coverage philosophy” adds Dr. Bantin.

The extra bandwidth provided by radio makes it possible to handle audio (voice), video (CCTV) and data (including alarms) while on the move. This opens up the prospect of new onboard services to enhance passenger comfort.

Thales advocates increased interoperability and works with rail industry partners, including the New York City Transit Authority in the United States, and the EU-backed MODURBAN research project in Europe to develop common standards for urban rail.

SERVICE PROVEN

Thales’ radio-based CBTC is trusted around the world and already covers more than 200 km of metro and urban rail routes with implementations in Beijing, Hong Kong, Las Vegas, Shanghai and Washington Dulles International Airport.

Upcoming implementations include Beijing’s new Daxing line and key projects in South Korea, with new lines in Seoul, Busan and Incheon. Thales’ radio solution is also being used in a major retrofit of Line 13 of the Paris Metro.
Thales

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