



CASE STUDY

London Oyster & Cubic's Fare Collection Technology

Cubic has been London's transport partner since the late 1970s, even before Transport for London (TfL) came into existence. The Oyster card system was created in 1998 via a Public Finance Initiative (PFI) contract with the TranSys consortium, of which Cubic was a member. The major objective of the contract included reduction of fare evasion, which was accomplished by gating a substantial portion of the London Underground network. Since then, Cubic has supplied TfL with an automated fare collection system, the card-based closed loop solutions (Oyster and ITSO), under a series of three major contracts in 1998, 2010 and 2015.

Oyster was introduced to users of the London transport network in 2003 and revolutionized the way people pay for travel in the capital. It made travel faster, eliminating the need to carry cash to purchase tickets, but also introduced a new level of convenience. Oyster cards simplify paying for travel on London's complex network for millions of commuters.

In 2008, TfL exercised a break clause in the contract until selecting Cubic Transportation Systems as sole provider of ticketing services, with a new contract coming into effect – the Future Ticketing Agreement (FTA).

In 2012, Cubic and TfL launched the contactless bankcard system on London Buses – a contactless capability for non-Oyster cards, which enabled the city's transport network to accept payments via contactless debit and credit cards.

The system was extended in 2014 to cover London's entire transit network – including Tube, rail, bus and tram services. This streamlined the travel experience for Londoners and tourists, giving everyone the flexibility to pay for all journeys

AT A GLANCE

City/Country: London, UK

Population: 9m (metro)

Daily Ridership: >6.1m

Problem: London's extensive public transport network accounts for 37% of all journeys in the city. Increased passenger growth put pressure on the busiest stations, leading to overcrowding at peak times. The need for travellers to pay using different tokens was also an issue.

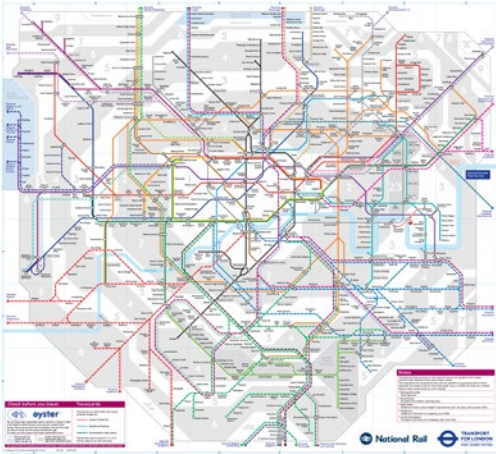
Solution: London relied on Cubic's expertise in delivering a reader to support account-based fare payment systems. The successful partnership with Cubic enabled TfL to make London the first major city in the world to introduce contactless payment on its network.

Project Details: USD \$1 billion across three major contracts for design, development and delivery of an automated fare collection system. Deliverables include card-based closed loop solutions (Oyster and ITSO), key back office open payments security and interface software, operations and maintenance, and system-wide field upgrades to readers.

Current Status: Today, Cubic supports the front office assets, field maintenance of devices, back office system and acts as systems integrator across the revenue collection system.

Benefits to Date: Since contactless capabilities were introduced, over five billion journeys have been made by 40 million unique credit and debit cards and contactless-enabled mobile devices from over 145 different countries. Through a series of incremental updates and system efficiencies, TfL was able to save a substantial amount with Cubic's fare collection system.

End Outcome: Through the introduction of Oyster and contactless payments, TfL increased the throughput of passengers at stations and buses across the network, improving the efficiency of its transport network and reducing fare evasion. The system also lowered the cost of revenue collection, including staffing costs, bankcard acquirer fees, cash handling and equipment supply and maintenance.



PROJECT STATS

VEHICLE & STATION QUANTITIES

Tube, Rail and Light Rail Stations:	491
National Rail Locations:	270
Trams:	34
Buses:	9,000 (approximate)
River Bus Vessels:	13

PASSENGER JOURNEYS (avg. monthly pre-pandemic)

Underground:	111 M
Rail:	15.58 M
Bus:	176 M
Light Rail:	9.73 M
Tram:	2.1 M
Cycle Hire:	361,000
River Bus:	62,000
Cable Car:	103,000

TRANSACTIONS

Annual Transaction Volume:	£4.8 B
Rail:	£2.8 B
Bus:	£0.5 B
Light Rail:	£1.4 B
Other:	£0.1 B
Monthly Transactions:	36 M
Daily Contactless Transactions:	2.8 M

DEVICES

Gates:	2,808
Oyster Retail Devices:	3,919
Platform Validators:	689
Bus Validators (standalone):	195
Bus Driver Consoles (with validators included):	10,366
Advanced Fare Machine (cards and coin):	576
Ticket Vending Machine (cards and cash):	163
Ticket Information Center Machines:	29
Station Accounting Devices:	283
Revenue Inspection Devices:	2,015
Oyster Readers: c. 10,000 (roughly 5,000 in national rail stations and 5,000 in TfL owned stations) :	10,000
Cycle Hire On-Street Docking Points:	103,000
Other TVMs:	861

OPERATORS

- London Underground
- London Buses
- London Overground
- Docklands Light Railway
- London Trams
- London Cycle Hire
- Emirates Airline
- London River Services
- Elizabeth Line

OPERATIONS & MAINTENANCE

OPERATIONAL SERVICES

- Dispatch and Technical Support
- Engineering Support
- Field Services
- IT Infrastructure Services
- Performance Management
- KPI & Reporting Services
- Business Continuity Services

ASSET MAINTENANCE SERVICES

- Inventory Management
- First-line Corrective Maintenance
- Preventative Maintenance
- Field Service Management

BUSINESS SUPPORT SERVICES

- Sales Channel Management
- Service Desk

FINANCIAL SERVICES

- Liability Tracking
- Payment Rejection Processing
- Compliance with Payment Card Industry/International Standards Association
- Merchant Acquirer Services



on TfL's network with an existing payment card and removing the need to keep a separate travel card in their wallet.

After a series of incremental improvements and pricing policy changes, the level of cash collection on London Buses continued to decrease to a point where, in July 2014, London Buses stopped accepting cash, further speeding up the adoption of contactless. In addition to reducing boarding times, this move allowed TfL to remove all cash-related infrastructure from its 80+ garages, resulting in an associated cost savings. TfL Trams followed suit in July 2018 and, also eliminated cash payments. The transition was accomplished with unparalleled success, with contactless acceptance increasing rapidly among commuters. As of 2021, over 50% of payments on the network were paid with contactless payment cards.

In 2015, upon expiration of the FTA, TfL awarded Cubic the Revenue Collection Contract (RCC) for the maintenance and availability of ticketing and fare collection equipment on 9,000 buses, 1,900 ticket gates at London Underground and London Overground stations, 1,800 stand-alone validators including the Docklands Light Railway (DLR), 1,600 ticket machines, and at the 250 National Rail stations where card readers are located. The RCC runs until 2025. In 2016, TfL and Cubic agreed on a license that allows Cubic to adapt TfL's contactless ticketing system to other cities worldwide, including New York, Boston and Brisbane, and offer commuters elsewhere in the world the same level of convenience and ease when paying for travel.

“We're delighted to have agreed on this licensing deal with Cubic Transportation Systems to introduce our contactless payment system to other world cities. Contactless payments have completely transformed the way people pay for travel in London, and this deal will allow other world cities to benefit from the hard work we put into making the system work for our customers.

SHASHI VERMA
CHIEF TECHNOLOGY OFFICER
AND DIRECTOR OF STRATEGY
TfL

In 2016, Cubic and TfL launched a new fare type: the Hopper fare for buses and trams. Many journeys on the complex TfL bus network require travelers to use more than one bus service. Previously, each “touch” on a bus was a new fare, but with the Hopper fare, as long as any further “touch” is made within 60 minutes of the first “tap”, then it is free – making transport easier to use and more accessible for Londoners. The Hopper fare also reduces the cost of travel for those who count on and use buses and trams frequently, enhancing equitable access for all users. The Hopper has proven popular with passengers. Within a day of the early September launch, over 200,000 “free” Hopper journeys had been made across London.



PHOTO CREDIT: Transport for London

In 2017, Cubic and TfL launched the TfL Oyster app. The app allows Oyster users to easily view journey history, top up their Oyster cards via their mobile devices (available for collection at gate lines across the system within

30 minutes after purchase), check their pay as you go balance and receive “low balance” alerts when their credit is too low to make another journey on the Underground.

In 2018, the app functionality was extended for customers using contactless bankcards for their journeys, allowing them to easily check payments and view journey history on any digital device. TfL has accepted Apple Pay for some time but in late 2019, gateline validators were upgraded to allow Apple Pay’s Express Transit, enabling users to tap in without having to first use authentication measures, further increasing the convenience and ease of travel on TfL’s network.

Building a Truly Multimodal Network



Encouraging multimodal use of the transit network, including a combination of walking, cycling and public transit, has long been on TfL’s agenda. In line with this commitment, in

2018, Cubic delivered an upgrade to the London cycle hire, extending contactless payment capability to London’s bikeshare system. The upgrade included updates to all 775 terminals, accepting all major UK and international cards in a move to make cycle hire easier, quicker and more convenient. In January 2021, TfL reported a rise of 157% in new cycle hire memberships over 2019, representing the largest increase in the scheme’s ten year history and marking 2020 as a record-breaking year.

Moving Beyond Fare Collection to Traffic Management

Although the public transit system accounts for a quarter of all journeys made in London, nearly 6.3 million trips are made every day on TfL’s network of 12 road tunnels. Effective management of the city’s tunnels is crucial to enable smooth traffic flow in, out and across the city and an important element in enabling a multimodal network.

Cubic is helping TfL turn those high-risk environments into true high-tech hubs where technology keeps all threats at bay. As part of the Tunnel Outstation Maintenance Services (TOMS) contract awarded in 2015, Cubic is responsible for the maintenance of critical ITS infrastructure within TfL’s network of road tunnels and corridors, as well as design, delivery and live operation of the Vehicle Accident Incident Detection (VAID) system. The VAID system is based on a visual



and thermal recognition technology that includes high-tech cameras supported by a back office system to help operators define the nature of the incidents detected, facilitating quick and appropriate action, both automatic and manual.



In addition to tunnel management, Cubic is also responsible for one of five traffic signals maintenance contracts, awarded by TfL in 2014. Under the contract, Cubic maintained and expanded the use of the city's intelligent traffic signals, as well as new crossings for pedestrians and cyclists at

prominent points across the city. Today, Cubic manages 1,000 traffic signals in South East of London, variable message signs and overhead gantries. Part of the project scope includes upgrading pedestrian crossings with countdown timers and audible alerts, efficient LED traffic lights, cycle improvement schemes with low-level cycle signals and the split cycle off-set optimization technique (SCOOT) technology, to change traffic signal timings based on traffic levels. In 2020, TfL awarded Cubic a contract to serve as its service delivery partner to maintain and manage all aspects of London's network of road tunnels and approach section for the next eight years.

“ Pay-as-you-go with Oyster and contactless has delivered greater convenience for our customers, and we are constantly trying to make further improvements. As smartphones become an increasingly essential part of our customers' lives, we are introducing this app to make the process of buying and checking travel products as quick and convenient as possible.

SHASHI VERMA
CHIEF TECHNOLOGY OFFICER
AND DIRECTOR OF STRATEGY
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PROJECT MILESTONES

