Passenger Rail Usage:
Quality and Methodology Report

Release Date: June 2020
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Introduction

This is a report on the quality of the Passenger Rail Usage statistical release and data portal tables. It helps users to understand the quality of our statistics, and also ensures ORR is compliant with the three quality principles in the Code of Practice for Official Statistics\(^1\).

The quality report covers the following areas:

- **Methodology** – detail on the various data sources, methodology used to compile the statistics and changes to data previously published;
- **Historic background** – a background to each performance statistics and details of changes throughout the time series;
- **Relevance to users** – the users of the statistics, and our engagement;
- **Assured quality** – the accuracy, reliability and coherence of the statistics;
- **Orderly release** – our timescales for the production, quality assurance and publication of the statistics;
- **Accessibility and Clarity and insight** – the format of our statistics and where they can be found;
- **Data governance** – information security and data management

Rail usage data on passenger services are supplied by a number of different sources and are measured using a range of metrics: passenger kilometres, journeys and revenue, and passenger train kilometres. These are covered in detail in the methodology section.

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\(^1\) Suitable data sources: Statistics should be based on the most appropriate data to meet intended uses. The impact of any data limitations for use should be assessed, minimised and explained.

Sound methods: Producers of statistics and data should use the best available methods and recognised standards, and be open about their decisions.

Methodology

Passenger journeys

- **Passenger journeys** – the number of passenger journeys made on the network.

The data used to derive passenger journeys are sourced from the LENNON database and TOCs. A passenger journey is defined as the number of legs required to get from origin to destination. For example, if your ticket is valid between London and Halifax and you change trains at Leeds, this would be classed as two journeys, one for the London to Leeds leg and one for the Leeds to Halifax leg.

Passenger kilometres

- **Passenger kilometres** – the number of kilometres travelled by passengers on the network.

The data used to derive passenger kilometres are sourced from the LENNON (Latest Earnings Network Nationally Over Night) ticketing and revenue database and train operating companies (TOCs). Passenger kilometres are calculated by multiplying the number of passengers on a particular flow by the number of track kilometres between the two required stations. The track kilometres data are built into the LENNON system.

Passenger revenue

- **Passenger revenue** – the volume of passenger revenue includes all ticket revenue and miscellaneous charges associated with passenger travel on national railways, but not including government support or grants.

The data used to derive passenger revenue are sourced from the LENNON database. Passenger kilometres, journeys and revenue data are used to produce revenue per passenger kilometre and revenue per passenger journey data.

LENNON holds information on the vast majority of national rail tickets purchased in Great Britain and is used to allocate the revenue from ticket sales between TOCs. LENNON contains two datasets; pre-allocation (sales) and post-allocation (earnings). Passenger usage statistics in the statistical release are based on the post-allocation dataset so that kilometres, journeys and revenue data can be assigned to TOCs (for use in the NRT TOC key statistics). The pre-allocated dataset does not disaggregate data by TOCs. The pre-allocate dataset collects total kilometres, journeys and revenue by flow and then, based on pre-designated allocation factors, apportions the data to appropriate the TOCs. For example in the pre-allocated dataset, a passenger may purchase a ticket for “ANY PERMITTED” route between London Terminals and Birmingham BR.
LENNON then uses the allocation factors to split kilometres, journeys, and revenue between the relevant TOCs for which the journey could be made.

Allocations are created for each tickets group by ORCATS (Operational Research Computerised Allocation of Tickets to Services), dependent on sales levels. These allocations are principally used to apportion kilometres, journeys and revenue between TOCs.

ORCATS is a mathematical model which uses a similar logic to journey planning systems and identifies passenger ‘opportunities to travel’ from an origin station to a destination station using timetable information. It is used for real time reservation and revenue sharing on inter-available tickets between TOCs which divides ticket revenue in instances where a ticket or journey is on a flow that is operated by multiple TOCs.

In addition to the LENNON data, TOCs also provide data to ORR detailing the number of passenger kilometres and journeys that are, recorded outside of the LENNON system. These include kilometres and journeys on tickets such as operator specific tickets and PTE multi-modal tickets. These are referred to as non-LENNON data.

**Passenger train kilometres**

- **Passenger train kilometres** - the actual mileage in kilometres travelled by revenue earning passenger trains on the Network Rail infrastructure.

The passenger train kilometres are derived from Network Rail’s Track Access Billing System (TABS), which Network Rail use to bill train operators. TABS captures the actual train distance operated on Network Rail’s infrastructure. Kilometres travelled on other infrastructure, such as London Underground, are not included in the data.

Passenger train kilometres for Heathrow Express have been estimated between 2013-14 Quarter 1 to 2017-18 Quarter 4, as they were not billed through TABS. Since 2018-19 Heathrow Express have been billed through TABS for their electricity usage.

Through its data portal ORR publishes quarterly and annual the passenger train kilometres data for both franchised and non franchised operators.

*Note: From 2015-16 Q3 we have replaced timetabled train kilometres (TTKM) with passenger train kilometres.*
Season tickets

Whereas single and return tickets translate into one and two journeys respectively, assumptions are made about the number of journeys made using season tickets. The journey factors used for the main season tickets are as follows:

<table>
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<th>Journey factor</th>
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<tbody>
<tr>
<td>Weekly</td>
<td>10.3</td>
</tr>
<tr>
<td>Monthly</td>
<td>45</td>
</tr>
<tr>
<td>3 monthly</td>
<td>135</td>
</tr>
<tr>
<td>6 monthly</td>
<td>270</td>
</tr>
<tr>
<td>Annual</td>
<td>480</td>
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Usage for weekly season tickets is counted at the date of purchase. When a monthly or annual season ticket is purchased, the estimated usage is distributed over the period for which the ticket is valid. This has consequences at times of significant change. For example, season tickets still valid at the end of 2019-20 Q4 contributed to estimates of usage throughout the quarter despite the impact of the coronavirus (COVID-19) pandemic.

Refunds

Refunds are accounted for by negative values in the other category of tickets. The usage estimated from the original ticket remains in the dataset.
Sector definitions

The data presented in this release are for mainline operators in Great Britain. Eurostar services are not included. The rail network is subdivided into three sectors – Long Distance, London and South East and Regional. At the time of privatization these three sectors were based on the franchise map and how the franchises fitted within the three British Rail sectors.

- **Long distance** – based on the British Rail InterCity services which were long-haul express services;
- **London and South East sector** – based on the British Rail Network South East services which principally operated commuter trains in the London area and the inter-urban services in South East England, although the network reached as far west as Exeter;
- **Regional sector** – based on the British Rail Regional services which were all other services not included in the other two sectors. In some cases, for example in the Network Rail monitor, services in Scotland (ScotRail only and not cross border services) are treated separately from regional services. For the statistics published in the themed statistical releases services in Scotland are defined as regional services.

Following the refranchising of some services in 2006 and 2007 a number of train operating companies operate services in more than one of the sectors. The measures of rail usage are assigned to sectors based on the service code of a train. For example all passenger journeys and kilometres on a long distance service from London to Scotland are assigned to the long distance sector, regardless of whether passengers embark or disembark from the train at an intermediate station. The current mapping of services to within each sector is listed below.

*Long distance*

- Avanti West Coast
- CrossCountry;
- East Midlands Trains (services to and from London St Pancras);
- Great Western Railway (High speed services);
- London North Eastern Railway;

London and South East

- Greater Anglia;
- c2c;
- Chiltern Railways;
- Great Western Railway (London and Thames Valley commuter services);
- Govia Thameslink Railway;
- London Overground;
- Southeastern;
- South Western Railway;
- TfL Rail;
- West Midlands Trains (Euston, St Albans and Bletchley services).

Regional

- Transport for Wales Rail;
- Caledonian Sleeper;
- East Midlands Trains (services in the East Midlands and in Central and Northern England);
- Great Western Railway (services in the west of England);
- Merseyrail;
- Northern Trains;
- ScotRail;
- TransPennine Express (rail usage statistics only);
- West Midlands Trains (Other services).
Franchised / Non-franchised operators

Franchised operators are those which operate under the terms of franchises let by Department for Transport. A franchised train operator is the successful winner of a competitive tender process that sets out the train services required to be operated (service level agreement). A franchised operator must operate within the parameters set out in their franchise and they have a fixed life (although this can be extended and a train operator can win successive terms).

- Greater Anglia
- Transport for Wales Rail;
- Caledonian Sleeper;
- c2c;
- Chiltern Railways;
- CrossCountry;
- East Midlands Trains;
- Govia Thameslink Railway;
- Great Western Railway;
- London Overground;
- Merseyrail;
- Northern;
- ScotRail;
- Southeastern;
- South Western Railway;
- TfL Rail;
- TransPennine Express ;
- London North Eastern Railway;
- Avanti West Coast;
West Midlands Trains.

Non-franchised operators hold licenses to provide supplementary services on chosen routes. A non-franchised operator operates because they choose to and the law allows them to have open access to the railway network, subject to the approval of the ORR. These operators are usually given approval by the ORR to operate for a definite period, though it can be renewed. The current non-franchised operators are:

- Hull Trains;
- Grand Central;
- Heathrow Express.

All freight operators are open access operators.

**Rail usage data**

Data within the LENNON ticketing and revenue database was changed following refranchising in 2006 and 2007 as the Rail Delivery Group (RDG) wished to keep a consistent time series. However, because ORR is able to extract data at a route level the data for multi-sector TOC’s can be assigned to the relevant sectors. There is a difference between the rail usage and performance data as TransPennine Express services are classed as regional services with rail usage data.

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2 Wrexham & Shropshire ceased operation during January 2011
**Historical background**

**Passenger train kilometres**

Network Rail bills train operators (both passenger and freight) for all train movements on their infrastructure. Billing was previously done by separate systems for passenger and freight operators (PABS & BIFS respectively). From 1 April 2009, billing has been done by a single system, known as TABS (Track Access Billing System).

**Passenger Kilometres, Passenger Journeys and Passenger Revenue**

Historically (1986/87 to 2002/03) passenger usage data was calculated from CAPRI (Computer Analysis of Passenger Revenue Information) which was the rail industry’s former central ticketing system. Data for this period can now be found in the ORR data portal as well as in the archived Strategic Rail Authority (SRA) National Rail Trends publications available from Archived National Rail Trends. CAPRI was, however, unable to correctly record sales of certain products, including some operator-specific tickets and Passenger Transport Executive (PTE) multi-modal tickets. Following a review by SRA and with significant assistance of TOCs robust estimates for these products were included in the passenger kilometres and journey data from the beginning of 2001-02, although they were backdated to the beginning of 1999-00. Passenger revenue data were not included in these estimates and as such the data remained unaffected.

Since 2003/04 the rail industry’s central ticketing and revenue system, LENNON, is the basis for passenger kilometres, journeys and revenue data.

Since 2010-11 Q1, non-LENNON data have been provided to ORR each quarter by each of the TOCs. Merseyrail provide their non-LENNON passenger kilometres and journeys data every 6 months during quarter 2 and quarter 4. Hence their passenger kilometres and journeys data for quarters 1 and 3 are estimated by applying the percentage change on the Regional kilometres and journeys data captured by LENNON between the current quarter and the same quarter in the previous year. For example, if the Regional journeys increased by 2.85% in 2015-16Q1 compared to 2014-15 Q1, non-Lennon journeys for Merseyrail in 2015-16 Q1 would be an additional 2.85% of non-Lennon journeys recorded for Merseyrail in 2014-15Q1. The same method is applied to estimate the passenger kilometres for Merseyrail in quarters 1 and 3. The data are hence provisional for quarters 1 and 3 and are updated in the following quarters when Merseyrail provide their data for the 6 months.

London Overground provide their quarters’ passenger kilometres and journeys data captured from the Train Load weight system, which is their total passenger kilometres and journeys data for the
quarter. Hence their non-Lennon usage data is derived by deducting their data captured by LENNON from the total passenger kilometres and journeys figures provided for the quarter.

Prior to 2010-11, non-LENNON data were provided annually to ORR at the end of the financial year and were apportioned out to each financial quarter. The apportionment of the additional kilometres and journeys data to each quarter was based on the split of LENNON data. For example, if 26% of LENNON journeys were in Q1, 26% of the additional non-LENNON journeys would be assigned to Q1.

Data for non-franchised operators were not collected prior to 2008-09 Q3. Since this time LENNON data for non-franchised operators includes Hull Trains and Grand Central but not Heathrow Express who are not included within the LENNON database. Similarly Heathrow Express do not supply ORR with non-LENNON data. Between 2008-09 Q4 and 2010-11 Q4, the data also included Wrexham and Shropshire but they ceased trading on 28 January 2011.

Since 2012-13 Q2 passenger kilometres, journeys and revenue data by ticket type for ordinary fares have been disaggregated further based on Advance, Anytime (Peak), Off Peak (including Super Off Peak) and Other (non-LENNON tickets and promotional tickets). It is not possible to provide a time series prior to 2011-12 for this level of disaggregation because LENNON only maps the data back to 2011-12 Q1.
Relevance

*The degree to which the statistical product meets the user in both coverage and content*

Measures of rail usage are key indicators of the levels of rail use in Great Britain. They provide a clear indication of the number of passengers using and journeys made on the network, providing an indication of the levels of demand for rail travel. This can help in both short-term and long-term planning for the industry and wider stakeholders, both at a National level and within the rail sectors.

Passenger revenue data provides data an insight into revenue levels within the industry as well as the levels of revenue generated through each ticket type, which can provide an indication of changes in ticket purchasing trends.

Performance data published on our data portal is used by a range of individuals for planning, analysis, decision making and data validation.

More detailed information on users of ORR statistics and meeting the needs of users is available on our [user engagement webpage](#).
Assured quality

Producers of statistics and data should explain clearly how they assure themselves that statistics and data are accurate, reliable, coherent and timely.

Passenger kilometres, journeys and revenue

Passenger kilometre, journeys and revenue data are sourced directly from LENNON (LENNON data) and train operating companies (non-LENNON data). The LENNON system automatically records the majority of ticket sales with non-LENNON data capturing the tickets sold through outlets not linked to the LENNON database. Combining the two sets of data provides a best estimate of passenger ticket sales from which passenger kilometres, journeys and revenue can be derived. The LENNON database is primarily an accounting tool and therefore faces limitations when being used for statistical reporting. With all large data sources there may be input errors which are more likely to occur in the journeys, rather than revenue data. Due to the size and complexity of the dataset we are unable to validate each and every entry.

Known problems in the data capture include those relating to travelcards, return and single journey tickets, multiple tickets, rail staff passes, ticketless travel and other rail systems. Full details of these limitations can be found in the Regional Rail Usage Quality Report.

It must also be noted that revenue, in addition to ticket revenue, includes other miscellaneous charges associated with passenger travel on national railways, such as car parking charges. There may be differences between the actual values and published statistics resulting from tickets involving travel on London transport, the receipts for which are apportioned.

The passenger kilometres and journeys statistics, which are based on the LENNON data and non-LENNON data received from TOCs, may also differ from actual passenger kilometres and passenger journeys because the data does not make adjustment for unused tickets and passengers cutting journeys short (i.e. alighting a train before the destination station stipulated on their ticket).

Whilst the LENNON database is updated overnight there maybe circumstances in which passenger revenue figures would be revised and therefore change the revenue figures in LENNON. These are likely to occur within the first two weeks after the end of each period. Therefore to minimise the risk using incorrect data, ORR waits at least one month before extracting the data from LENNON.

It should also be noted that rail usage sector data do not align with rail performance sector data in some cases. This is because for rail usage, each TOC within LENNON is assigned to one
particular sector whilst in rail performance, sectors are assigned based on the route code and not TOC. This ensures a consistent time series with data prior to re-franchising.

The passenger journey totals should not be compared with those published as part of ORR’s Regional Rail Usage release as they are calculated on a different basis. For example, a journey from London to Halifax, which may involve two trains (one from London to Leeds and another from Leeds to Halifax), would be treated as two journeys in the rail usage passenger journeys total as it would involve two different services. However, in Regional Rail Usage, it is treated as one journey reflecting the origin and destination shown on the ticket. Please see Passenger journeys in Great Britain which explains the differences in more detail.

Data extracted from the LENNON database is converted into a standard format and subject to a series of quality assurance checks before publication. Similarly all non-LENNON data that are received from TOCs are subject to a series of quality assurance checks before publication. We check the data is provided in the correct format, there are no inconsistencies in the data and trends over time are similar, to ensure accurate data is published.

**Passenger train kilometres**

Actual train distance operated is captured on Network Rail’s Track Access Billing System (TABS). Actual train distances are also published by Network rail as passenger mileage and freight in the Network Rail Annual Return.

Any arising issues are flagged with NR (for Passenger train kilometres) or the LENNON support helpdesk (for passenger kilometres, journeys and revenue) who must confirm the anomalies or correct the data and re-submit. Explanations from the data suppliers regarding data anomalies are included within our commentary to explain the data and trends.

These data are then prepared for publication. The process includes quality assuring the tables and charts produced and providing supporting commentary regarding the key trends, methodology and quality measures. These reports are subject to peer review.

The final stage of the quality assurance process is a sign off by the statistics Head of Profession confirming the data meets the quality standards and are fit for publication.
**Orderly release**

*Organisations should commit to releasing their statistics in an open and transparent manner that promotes confidence.*

The data contained within the passenger rail usage statistical release are published quarterly on the ORR data portal approximately 60 days after the end of the quarter.

ORR has memorandums of understanding (MoUs) with data suppliers detailing the scope and timeliness of each dataset supplied. This ensures consistent and timely data is received each period. The MoUs are reviewed on an annual basis.

The publication schedule available on the ORR website outlines the publication dates for National Statistics quarterly and annual statistical releases and other statistics up to 12 months in advance [https://dataportal.orr.gov.uk/publication-dates-for-statistics/](https://dataportal.orr.gov.uk/publication-dates-for-statistics/).
Accessibility and Clarity and insight

*Statistics and data should be equally available to all, not given to some people before others. They should be published at a sufficient level of detail and remain publicly available.*

*Statistics and data should be presented clearly, explained meaningfully and provide authoritative insights that serve the public good.*

All rail statistics data tables can be accessed free of charge on the [ORR Data Portal](#). Charts and commentary about the statistics and trends are provided in the theme pages such as [Passenger Rail Usage](#).

The Department for Transport (DfT) also publishes a range of rail statistics which can be found at [DfT Rail Statistics](#). This includes [Rail passenger numbers and crowding statistics](#) which provides information on the number of passengers travelling by rail into and out of major city centres in England and Wales. The statistics represent passengers on National Rail services on a ‘typical’ weekday.

Passenger rail usage data, particularly passenger revenue data, is viewed as commercially sensitive. Due to this commercial sensitivity, lower levels of disaggregation are not possible; however train operating companies and RDG do occasionally publish other comparable data on a one-off basis.
Data governance

Organisations should look after people’s information securely and manage data in ways that are consistent with relevant legislation and serve the public good.

Passenger kilometres, journeys and revenue data are based on a combination of data sources. The data used to derive passenger kilometres, journeys and revenue data are derived from a combination of LENNON data and data provided directly from train operating companies (non-LENNON data). The two sources of passenger kilometres and journey data are required to capture the full volume of passenger kilometres and journeys on the rail network as the LENNON database does not include all methods of and types of products sold.

Non-LENNON data are supplied directly by train operating companies who are coherent in use of the LENNON database and the products which it is able to capture. As a result, TOCs are fully aware of the types of product which are not captured and the resultant passenger kilometres and journeys which should be reported through the non-LENNON data submission to ORR. This product knowledge minimises the chances of double reporting occurring.