



Statement of Scope

Signalling Market Study

27 January 2020

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1. Introduction

- 1.1 This document sets out the purpose and scope of the Office of Rail and Road's ('**ORR's**') market study into signalling. It sets out the background to the market, the themes we propose to consider, and possible outcomes.
- 1.2 We invite submissions from interested parties on any of the issues raised within this document and the accompanying Market Study Notice: Signalling¹.

ORR's role

- 1.3 ORR is the independent economic and safety regulator for the railways in Great Britain ('**GB**'), and the monitor of performance and efficiency for England's motorways and trunk roads.
- 1.4 We keep the provision of railway services under review² and monitor the competitive situation in rail services markets³. ORR holds powers concurrently with the Competition and Markets Authority ('the **CMA**') to apply competition law in markets relating to the supply of services relating to railways⁴.
- 1.5 ORR has strategic objectives, which include ensuring: a safer railway; better customer service; and value for money for the railway⁵. ORR also has general statutory duties that it considered before taking the decision to launch a market study⁶.

¹ https://orr.gov.uk/data/assets/pdf_file/0017/42371/railway-signalling-market-study-notice.pdf

² Section 69(1) of the Railways Act 1993 ('**Railways Act**')

³ Regulation 34 of the Railways (Access, Management and Licensing of Railway Undertakings) Regulations 2016 ('**Access and Management Regulations**')

⁴ Under section 67 of the Railways Act, ORR has concurrent functions. The supply of services related to railways is defined under section 67(3ZA).

⁵ <http://orr.gov.uk/about-orr/what-we-do/our-strategy/our-strategic-objectives>

⁶ Under section 4 of the Railways Act, ORR has to consider which of the statutory duties listed are most relevant to a particular case. Where more than one duty applies, we must weigh and strike a balance between them. In this case ORR considers these duties to be particularly relevant:

- Promoting improvements in railway service performance;
- Protecting interests of users of railway services;
- Promoting the use of the railway network in GB for the carriage of passengers and goods, and the development of that railway network, to the greatest extent that it considers economically practicable;
- Contributing to the achievement of sustainable development;
- Contributing to the development of an integrated system of transport of passengers and goods;
- Promoting efficiency and economy on the part of persons providing railway services;
- Promoting competition in the provision of railway services for the benefit of users of railway services; and
- Enabling persons providing railway services to plan the future of their businesses with a reasonable degree of assurance.

1.6 In order to ensure the effective delivery of our statutory duties and strategic objectives we seek to promote and protect the existence of healthy, robust, and competitive supply chains for products and services relating to railways.

Market studies

1.7 Market studies are one of a number of tools at ORR's disposal to examine possible competition issues and address them if appropriate⁷. They are examinations into whether markets are working well, and possible causes of market failure. Market studies take into account regulatory and other economic drivers in a market, as well as patterns of consumer and business behaviour.

1.8 The purpose of a market study is to:

- consider the extent to which a matter in relation to services related to railways has, or may have, effects adverse to the interests of consumers; and
- assess the extent to which steps can and should be taken to remedy, mitigate or prevent any such adverse effects.

1.9 A market study begins with the publication of a Market Study Notice ('a **Notice**')⁸. We have published the Notice at the same time as this Statement of Scope; it includes details on the subject matter of this study and timing.

1.10 Market studies can lead to a range of outcomes. They may conclude that a market be given a clean bill of health. Where a market is not found to be working well however, we may consider several options including:

- taking enforcement action under the Competition Act 1998 or consumer law;
- dealing with matters which are capable of resolution under our sector specific powers, for example licence enforcement;
- engaging with industry to develop an industry-led solution, for example, a code of practice;
- asking the industry to review established industry mechanisms;
- making recommendations to government to change regulation or public policy;

⁷ The legal test for deciding whether to publish a market study notice, which initiates a market study, is that ORR must consider whether the issue is one where the use of formal information gathering powers (contained in section 174 of the Enterprise Act) is appropriate with a view to deciding whether to make a Market Investigation Reference to the CMA.

⁸ As required under 130A of the Enterprise Act 2002 and as given effect by section 67(2C) of the Railways Act.

- making a Market Investigation Reference ('an **MIR**')⁹; and/or
- accepting undertakings in lieu of making an MIR¹⁰.

1.11 The above is an illustrative list of possible outcomes and it is not exhaustive. ORR retains an open mind as to which outcomes, or combination of outcomes, may be appropriate to address any concerns that it may identify during the course of this market study.

1.12 Further information on market studies can be found in our guidance '*ORR's approach to monitoring and reviewing markets*'¹¹.

Evidence gathering

1.13 In addition to considering responses from interested parties to this statement of scope, we expect to gather evidence through the following methods:

- issuing information requests to industry participants, including current and prospective signalling suppliers and infrastructure managers;
- conducting original qualitative and/or quantitative research;
- analysing existing data sets and research; and
- meeting key interested parties.

1.14 As the study progresses, we may choose to use other means of seeking additional information. Information and updates about this study will be added to the signalling webpage on a regular basis.

Invitation to comment

1.15 ORR welcomes submissions on this statement of scope from interested parties by no later than 24 February 2020. In addition to general submissions, we particularly welcome responses on the questions throughout this document, and the proposed focus on the themes set out in chapter 3. To respond to this invitation to comment, please email or post your submission to:

⁹ ORR may make a MIR under section 131 of the Enterprise Act 2002 where the findings of a market study give rise to reasonable grounds for suspecting that any feature, or combination of features of a market relating to the supply of services relating to railways, prevents restricts or distorts competition, and a market investigation appears to be an appropriate and proportionate response. In taking any decision to make a MIR ORR would also considered its General Duties under section 4 of the Railways Act.

¹⁰ Section 154 of the Enterprise Act 2002.

¹¹ http://orr.gov.uk/_data/assets/pdf_file/0007/23974/orr-approach-to-monitoring-and-reviewing-markets.pdf

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1.16 We may publish responses to this statement of scope in full or in summary as appropriate. In providing responses:

- please supply a brief summary of the interests or organisations you represent, where appropriate;
- please indicate whether you are providing any material that you consider to be confidential, and explain why this is the case. Please provide both a confidential and non-confidential redacted version of your response; and
- if you are responding in an individual capacity (i.e. you are not representing a business), please indicate whether you wish for your response to be attributed to you by name or published anonymously.

1.17 Annex A sets out how the ORR may use information provided to it during the course of this market study.

1.18 Information and updates about this study will be added to the signalling market study webpage¹² on a regular basis.

¹² <http://www.orr.gov.uk/rail/promoting-competition/market-monitoring/market-study-into-the-supply-of-signalling-systems>

2. Background

Introduction

2.1 This chapter provides an overview of the signalling market, the history of how the technology in GB has developed to date, and its continued development through the digital railway. It also sets out the key players in the market.

Significance of signalling

- 2.2 The purpose of a signalling system is to determine the position of trains on the network, control their direction and signal to the driver when it is safe to proceed to the next section of track. Signalling systems are essential to keeping trains safe distances apart across a large and busy network.
- 2.3 Signalling systems also have a role to play in freeing up capacity on the network, which is already constrained, by allowing more trains to run on the network safely. One of the key objectives of the roll out of the digital railway (see below) is to increase the efficiency of systems so that trains can run safely, closer together.¹³
- 2.4 The value of signalling to the rail industry is significant. The chart, below, shows the proportion of Network Rail's expenditure on signalling in its last control period¹⁴ (CP5, 2014 - 2019) and the forecast for the next period (CP6, 2019 – 2024). In CP6, spend on signalling systems is forecast to remain significant. The volume of conventional signalling renewals planned for CP6 will increase by 8%, which rises to 32% when digital railway programme work is included.¹⁵ As the rollout of the digital railway programme continues in future control periods, the spend on signalling is likely to remain at a significant level.
- 2.5 The ability of infrastructure managers, notably Network Rail, to drive value when purchasing signalling systems is crucial to its ability to deliver an efficient and reliable railway. Ultimately excess cost and quality failings are felt by passengers and freight customers. Given the projected spend and the rollout of the digital railway over CP6 and beyond, we consider now is the right time to carry out a market study. It will give us the opportunity to identify issues in the conventional market that could be preventing Network Rail from obtaining value for money, and assess whether such

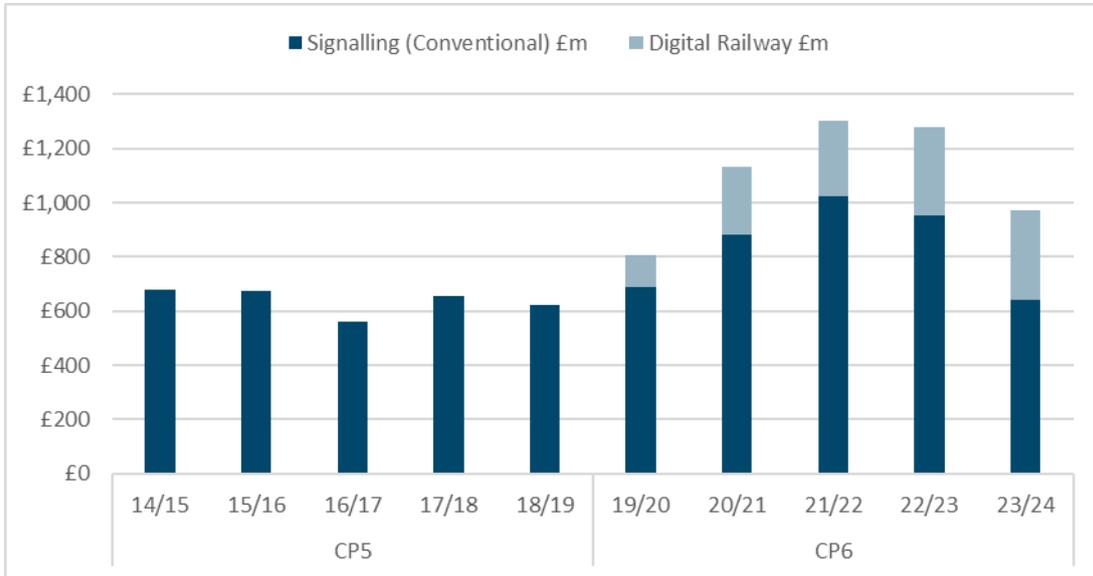
¹³ <https://digitalrailway.co.uk/>

¹⁴ Network Rail's funding and outputs are controlled and reviewed by ORR in price control period lasting 5 years. See <https://orr.gov.uk/rail/economic-regulation/regulation-of-network-rail/price-controls>

¹⁵ https://orr.gov.uk/data/assets/pdf_file/0018/39312/pr18-final-determination-review-of-network-rails-proposed-costs.pdf

issues have the potential to hinder the efficient delivery of the digital railway programme.

Figure 2.1: Profile of Network Rail’s signalling portfolio (by expenditure)



History

- 2.6 In the early days of the railway, there was no fixed signalling system and drivers controlled trains by sight. As trains have long stopping distances, there was a need to control the movement of trains to prevent collisions. The earliest form of signalling was to separate trains by set intervals (usually 10 minutes). However, this had a number of problems and resulted in a number of rear-end collisions. It also limited capacity on the network.
- 2.7 Mechanical signalling appeared in the UK in the 19th century. The basic principle is that the route is broken up into ‘blocks’. Only one train is able to occupy one block at a time. The blocks are long enough to take into account long train stopping distances. Trackside visual signals (traffic lights) are used to tell the driver when it is safe to proceed into the next block.
- 2.8 In the late 20th century British Rail developed Solid State Interlocking (‘**SSI**’) which is a safety critical system that prevents conflicting movements through an arrangement of tracks such as junctions or crossings. The interlocking component only allows trains to proceed to the next part of the route, when routes have been set, locked and detected in safe combinations.
- 2.9 When the railway was privatised in 1994, British Rail set up a tripartite agreement with two companies, Westinghouse and General Electric Signals (‘**GEC**’), to develop

and deploy the SSI technology. GEC and Westinghouse developed this technology and introduced Computer Based Interlocking (“**CBI**”) which implements signalling programmes through computers rather than older technologies. The use of this technology is still prevalent across the GB network.

Digital railway

- 2.10 Digital signalling will see the introduction of a range of new technology.¹⁶ Trackside signalling equipment will be reduced and supplemented with modern, in-cab computer displays and control centre systems. These additional features will place much more complexity on-board the train.
- 2.11 One element of the digital railway is to introduce European Train Control System (“**ETCS**”) which can provide continuous communication between the train and the trackside. This allows trains to run closer together and to travel at their best speeds while maintaining safe braking distances.
- 2.12 There are different methods of implementing ETCS. As an overlay system it is added to existing systems, effectively, interfacing with rather than replacing the current technology; in this method ETCS relies on the existing Interlocking component and the existing lineside signals and train detection trackside equipment.
- 2.13 ETCS can also be implemented as an integral part of a signalling system renewal project when the opportunity to reduce trackside signalling equipment can be realised providing that trains using the route are fitted with ETCS systems.
- 2.14 Digital signalling may result in significant changes to existing signalling markets that rely on conventional systems. However, conventional signalling will remain the most widely used signalling technology by Network Rail during CP6, up to March 2024.
- 2.15 Figure 2.1 above, shows that the planned expenditure by Network Rail on conventional and digital signalling during CP6. This is planned to be approximately one billion pounds per year in total.

¹⁶ in particular,

European Train Control System (ETCS): this allows trains to run closer together and to travel at their best speeds while maintaining safe braking distances.

Connected Driver Advisory Systems (CDAS) and Automatic Train Operation (ATO): these provide decision support to drivers in the cab so that they have the information they need at the right time to boost performance and safety.

Traffic Management (TM): maximises performance as trains flow across the network, maximising the throughput that existing track can support and adapting in real-time as network conditions change to aid rapid recovery.

Purchasers of signalling systems

- 2.16 Signalling systems are purchased by infrastructure managers, including Network Rail who purchases for the mainline network, HS1, HS2, and metro operators such as Transport for London. Network Rail is the largest purchaser of signalling systems in GB.
- 2.17 Metro systems are usually tendered as complete signalling systems, while mainline signalling are projects separated into multiple tenders for discreet sections of the network.
- 2.18 In CP5 Network Rail contracted its signalling expenditure through several framework contracts depending on the scale and type of the signalling work. A high proportion of the expenditure was procured through eight regional framework contracts for major signalling renewals works typically with higher contract values. Network Rail also procured lower value and specialist signalling works with other separate frameworks, typically with a different mix and type of suppliers to the major signalling frameworks.
- 2.19 Network Rail has recently procured a new set of framework contracts for CP6 works.

Suppliers of signalling systems

- 2.20 Significant or major signalling systems have safety critical complex computer based interlocking as core components or at least require interfacing with interlocking systems.
- 2.21 Suppliers for such systems are typically companies that have proven software capability and have developed interlocking components for supply and implementation for multiple customers across different countries, often globally. For the purpose of this study, we describe this type of supplier as Original Equipment Manufacturers ('**OEMs**').
- 2.22 Suppliers for significant signalling systems can also be companies that are not interlocking OEMs by obtaining access to existing technology from OEMs and taking responsibility to design and integrate them into a signalling renewal project. For the purposes of this study, we describe this type of supplier as '**Integrators**'.
- 2.23 OEMs and Integrators can enter a market for signalling systems by responding to tenders from infrastructure managers. The infrastructure managers determine their strategy, outcomes and conditions for signalling systems procurements.

2.24 In CP5 Network Rail procured signalling systems from both OEMs and Integrators as principal contractors. The principal contractor for a major signalling project can often contract and project manage smaller suppliers delivering more specialist equipment or pieces of work. Smaller suppliers of signalling products tend to specialise in hardware or software.

The Siemens-Alstom merger enquiry

2.25 In February 2017, Siemens AG and Alstom SA (the two largest signalling players in Europe) announced their intention to merge. Between July 2018 and February 2019, the European Commission ('the **Commission**') conducted an in depth review of the merger.

2.26 The Commission prohibited the merger in February 2019. The key concerns (in relation to the GB market) were:

- Siemens AG and Alstom SA are the two largest players in the GB market, and would obtain significant market power should the merger go ahead;
- Siemens and Alstom control access to the key interlocking technology and could potentially use this advantage to stifle and restrict competition from smaller niche providers of signalling products, and prevent new entry; and,
- Network Rail is not able to exercise sufficient buyer power to counter these concerns.

2.27 Particularly in relation to interlocking in the UK, the Commission concluded that the merger '*would cause a significant impediment to effective competition in the market for standalone interlocking projects in the UK*'¹⁷.

¹⁷ https://ec.europa.eu/competition/mergers/cases/decisions/m8677_9376_3.pdf, para 938

3. Scope of the market study

Introduction

3.1 This chapter summarises the products and services that are within the scope of this market study and its proposed geographical scope. We also set out the themes that we will focus on.

Products and services within scope

3.2 We intend to consider the supply of rail signalling systems from either signalling OEMs or turnkey integrators. We intend to look at both current conventional signalling systems and the digital railway.

- a conventional signalling system consists of various signalling products, including: signals; train detection; point machines¹⁸; power systems Automatic Warning System (AWS)/Train Protection and Warning System (TPWS); cables and line side equipment housings; interlockings; and control centres with train describer/automatic route setting/communications systems.
- digital signalling introduces a range of new technology, which will replace and supplement conventional trackside signalling products with modern in-cab technology. This includes European Train Control System (ETCS); Traffic Management (TM); Automatic Train Operation (ATO); and Driver Advisory Systems (DAS).

3.3 Signalling projects are often complex, involving various elements including some or all of: project specific engineering; design; development and project management; procurement of necessary signalling products; installation; testing; and maintenance. We understand fewer suppliers have the capability to supply larger signalling systems requiring a complex interlocking in GB.

3.4 We intend to focus on the supply of signalling systems (through projects) that are classified as 'major' or 'medium' sized that include some level of engineering or design element. Such projects will also require the installation of or a requirement to interface with existing or new interlocking technology. For clarity, we therefore will not be focussing on minor works, (which infrastructure managers often undertake in-house), involving routine maintenance and the like for like replacement of components.

¹⁸ Trackside devices for operating sets of railway points

- 3.5 Our focus will be on the supply of signalling systems tendered to Network Rail.
- 3.6 We understand the market dynamics, technical and operating context are different for other infrastructure managers (notably metro operators). Therefore, they take different approaches to the procurement of signalling. We do not intend to focus specifically on high-speed networks or metro operators but will consider their approaches for the purposes of comparison. That said, we are open to hearing issues from other infrastructure managers, and will consider the impact of wider competition issues on these infrastructure managers.

Question

1. Do you agree with our proposed focus on the supply of major signalling projects and products to Network Rail?

Geographic scope

- 3.7 Our market study will cover the supply of signalling systems in GB. Our market study will not cover Northern Ireland as our jurisdiction for carrying out a market study only relates to the supply of services relating to railways in GB¹⁹.

Themes we propose to consider

- 3.8 We intend to focus our work around the concerns that became apparent in the Siemens/Alstom merger review. We are particularly concerned about the ability of integrator suppliers to obtain access to interlocking technology, and the barriers to OEM suppliers entering with their own technology.
- 3.9 We will therefore focus our work across four interrelated themes:
- Theme 1: Access to interlocking technology;
 - Theme 2: Ability of suppliers to compete with alternative interlocking technology;
 - Theme 3: Outcomes; and,
 - Theme 4: Impact of roll out digital railway.

¹⁹ Section 69(1)(a) of the Railways Act

Question

2. Do you agree with the focus on the four themes?

Theme 1: Access to interlocking technology (integrator model)

- 3.10 The holders of the intellectual property of SSI technology have consistently been the key players in the supply of GB signalling systems. We have preliminary concerns that the issue of obtaining access to key technology, particularly interlocking, may be stifling competition in the wider signalling market.
- 3.11 We want to test whether control of access to GB approved interlocking technology is too concentrated and whether owners of such technology are able to distort competition for signalling systems and the wider signalling market.
- 3.12 We want to examine the extent to which a range of competitors have been able to obtain access to interlocking technology, and their ability to compete on this basis. We will obtain evidence on the terms and price on which access has been obtained, and analyse bidding data to assess whether bidders are resultantly able to place credible bids as a result, and the factors which impact on this.
- 3.13 We will take into account the need to balance encouraging investment in the railways against the need to promote competition through fair and commercially reasonable access to technology.

Question

3. Do you agree with the focus on access to interlocking technology?

4. Are there any other key technologies that could restrict competition that ORR should look at?

Theme 2: Ability of suppliers to compete with alternative signalling systems (OEM model)

- 3.14 We want to understand the extent to which suppliers can bring alternative interlocking technology to the GB market and effectively compete with the existing suppliers.
- 3.15 We understand that to date suppliers have had limited success in bringing alternative interlocking technology to the GB market. We will want to understand the factors

which hindered this, which involves assessing the extent of barriers to entry, including, but not limited to:

- (a) Whether accreditation/ approval processes are proportionate, or are unnecessarily making it more difficult for alternative technologies to be deployed;
- (b) Whether GB specific requirements are making it more difficult for alternative technologies to be deployed;
- (c) Interoperability with existing interlocking technology;
- (d) The behaviour of customers, including fluctuating demand and project delays;
- (e) The need for a physical presence in GB or GB expertise; and,
- (f) The time and cost of developing systems for the UK market.

3.16 We also want to understand whether suppliers of high-speed systems experience similar barriers to entry, and how the nature and extent of barriers to entry differs.

Question
5. Are we focusing on the key barriers to entry?
6. What other factors are relevant for suppliers entering the wider signalling market with alternative interlocking technology?

Theme 3: Outcomes

3.17 We want to assess the impact of competition on the outcomes that Network Rail is able to obtain. This will involve assessing the level of choice available to Network Rail, the prices it is able to obtain and the level of buyer power.

3.18 We will obtain evidence that will enable us to consider the level of choice customers have. We intend to gather bidding data, and carry out analysis which looks at the extent to which there is competition for tenders.

3.19 We want to understand which factors have an impact on price and in particular, the extent to which, competition for tenders and access to interlocking technology has an impact on price, including differences between projects procured through Network Rail's framework agreements for major signalling and where competitive tender has been used as an alternative.

3.20 We will consider whether there are metrics that we can use to assess the quality of service or value provided to Network Rail.

3.21 We will also explore the role played by Network Rail in this market. We intend to examine:

- (a) The impact of Network Rail's procurement strategy on competition in the market; and,
- (b) Whether Network Rail has, and is able to leverage, buyer power.

3.22 We also intend to examine (to a lesser extent) the impact of other infrastructure managers procurement approaches on competition to use as a comparison to Network Rail.

Question

7. What metrics could we use to measure outcomes in this market?

8. What factors have an impact on market outcomes?

Theme 4: impact of the digital railway

3.23 As noted above, digital signalling will see the introduction of a range of new technology. We want to understand the level of progress being made by the digital railway and any key challenges or barriers to preventing its rollout in GB.

3.24 We will consider the possible impacts of digital signalling on competition in the market. We are particularly interested in exploring the extent to which access to interlocking technology is required to enter the digital signalling market, and whether barriers identified in Theme 2 are still prevalent in the supply of digital technology.

Question

9. What factors should we consider when assessing the impact of digital signalling on the market?

Annex A - Use of information provided to ORR

1. This note sets out how ORR may use information provided to it during the course of this market study.

Why is ORR asking for information?

2. The information you provide will help us better understand how well the markets for the supply of major signalling systems.

What will ORR do with the information I provide?

3. Your information will inform our final market study report. The report will set out our findings and any proposed remedies to any problems we find.

4. Where appropriate, we may also use information you provide to take enforcement action, using our competition or consumer powers, or may share your information with another enforcement authority or with another regulator for them to consider whether any action is necessary.

5. We may only publish or share information in specific circumstances set out in legislation (principally in Part 9 of the Enterprise Act 2002). In particular, prior to publication or any such disclosure, we must have regard to (among other considerations) the need for excluding, so far as is practicable:

- any information relating to the private affairs of an individual which might, in our opinion, significantly harm the individual's interests; or
- any commercial information relating to a business which, if published or shared, might, in our opinion, significantly harm the legitimate business interests of that business.

6. We will redact, summarise or aggregate information in published reports where this is appropriate to ensure transparency whilst protecting legitimate consumer or business interests.



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