

Rail Delivery Group

Submission

House of Commons Transport Select Committee

Rail Technology: Signalling and Traffic Management Inquiry

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Rail Delivery Group Submission: Parliamentary Transport Select Committee Inquiry on Rail Technology

Name: Gary Cooper

Organisation: Rail Delivery Group

Address: 200 Aldersgate Street, London EC1A 4HD

Business representative organisation

Introduction

1. The Rail Delivery Group (RDG) was established in May 2011. Its purpose is to enable train operators, freight operators, and Network Rail to succeed by delivering better services for their customers. This ultimately benefits taxpayers and the economy.
2. The RDG works across the railway on accelerating and supporting the delivery of the 2012 Rail Technical Strategy and on introducing innovation and new technology into the rail industry. As such, the RDG has a strong interest in the effective and prompt implementation of the Digital Railway programme and is committed to working across the rail industry to bring this programme forward. The RDG's Technology and Operations lead is Alistair Gordon, CEO of Keolis.

Overview

3. The RDG welcomes the opportunity to provide a submission to the Transport Select Committee's Inquiry on Rail Technology on behalf of our members, who include passenger and freight train operators and Network Rail.
4. The proposed Digital Railway is a key part of the railway's plans to modernise the network so we can meet the future needs of our passengers and freight customers, of taxpayers and the wider economy. Technology is changing rapidly, and the railway must modernise and digitise to compete with other transport modes and to support economic growth. Properly delivered, this programme will bring wide-ranging benefits, including faster, safer, more punctual and more frequent trains, and further improved information to customers. With many parts of the rail network at or nearing capacity, the implementation of the Digital Railway will be vital in helping to release extra capacity on the existing network to support future rail growth.
5. In order to deliver increased capacity the Digital Railway implementation may need to be planned in conjunction with other infrastructure solutions and each route will need to be reviewed individually to consider the best value for money overall solution to deliver increased capacity.
6. The current programme of work being undertaken by the rail industry is led by Network Rail through the Digital Railway Programme, with support from operators and the RDG, as various elements of the programme across track and train must be considered, funded and planned holistically.

7. The programme is still in its early stages, and significant work remains to be done to ensure the roll-out of Digital Rail technology is as timely, efficient and effective as possible. Such a programme has not been retrofitted extensively on such a complex rail network anywhere else in the world. This poses risks to the implementation of the programme, but also provides future opportunities for UK-based companies to sell skills and knowledge to other countries.
8. The introduction of the European Rail Traffic Management System (ERTMS) is a key component of the Digital Railway programme. We believe that this can deliver significant benefits in capacity, journey time and safety. To be most effective, ERTMS must be rolled out alongside a Traffic Management (TM) system and a Connected - Driver Advisory System (C-DAS). These technologies complement each other and can deliver the best outcomes from investment.
9. ERTMS consists of several parts, including:
 - **European Train Control System (ETCS):** the in-cab signalling system that drivers use, replacing current trackside signals;
 - **Global System for Mobile Communications – Railway (GSM-R):** a communications voice and data radio link between trains and track side vital for the operation of the system
 - **Traffic Management (TM) system** – automated and improved management of train flow on the network. There is no defined single technology across Europe for this, and the Digital Railway programme plans to use products developed for the GB network.
10. ERTMS is the globally recognised train control system and is mandated by the GB ERTMS deployment plan. It has successfully been delivered on the Cambrian line, where it has contributed to doubling of train service frequency and resilient punctuality. It is also being used to support the planned increase in capacity on the Thameslink programme, where it is currently in test phase. The RDG wants to build on this progress and extend these performance, frequency and speed benefits to the rest of the network.
11. The Digital Railway programme at present is based around implementation of ETCS at Level 2. The RDG believes that further development of ETCS to the next level of technology, ETCS Level 3, could provide additional benefits in respect of cost and capacity. To deliver this, we need a joined-up approach across the industry and a stable framework from Government. In particular, the rail industry needs strong engagement from the Department for Transport with European stakeholders to ensure that European specifications are in line with the requirements of the GB railway.
12. We face a number of challenges in rolling out the Digital Railway across the whole rail network in Great Britain.
13. First, the current implementation plan for ERTMS is based on a 50-year roll-out. This plan is based around renewing signalling assets at economic and/or reliability life expiry. There is an opportunity for this roll-out to happen significantly more quickly, to help tackle the capacity challenges across our network faster and bring customer benefits quicker. There are a number of impacts to consider when evaluating options for a route implementation plan; including:
 - The life expiry of existing signalling equipment;
 - The priority areas for increasing capacity;
 - The need to retrofit existing rolling stock, and opportunities provided by new rolling stock;

- Concentration of fitment in particular areas, to avoid train drivers frequently changing between different signalling systems on one journey.

Network Rail is currently considering options for route deployment taking into account all these factors.

14. Second, a Traffic Management system is about to be implemented on parts of the network. Progress on this has been slower than desired, because of the need for Traffic Management products to be adapted to best suit the GB railway. This has delayed the network-wide roll-out of Traffic Management, but is providing valuable lessons about how this network-wide roll-out can best be delivered.
15. Third, the current funding mechanism that underpins the deployment of the Digital Railway is fragmented. Each of the three technologies – ETCS, GSM-R and TM – receives funding through different Government sources, rather than being considered together. This introduces risks in deploying these technologies, which should be planned to complement each other rather than as separate programmes. A single funding source, which the industry as a whole can use to develop and deploy technologies together in a more efficient manner, would be better.
16. Fourth, the GSM-R technology, which has already been rolled out across the system, needs protection from interference from 3G and 4G mobile networks.
17. Furthermore, rolling out this programme across the GB railway involves a higher degree of retrofitting of existing rolling stock and other systems than in other European countries, and a retrofitting programme of this scale has not been completed anywhere else. For example, as freight operators run trains nationally and across varying routes, there will be a need to retrofit all freight locomotives at an early stage in the programme. Failure to do this could exclude rail freight from certain routes, with a risk of modal shift to road and loss of the £1.6bn annual benefit of rail freight to the UK economy.
18. We are working together as an industry to address these challenges by re-planning the Digital Railway programme to ensure faster deployment of both ERTMS and Traffic Management. In the best-case scenario, with effective joined-up working across the railway and support and a stable framework from Government, we can roll out this programme in 25 years – half the originally-planned timescale.
19. The RDG is supporting Network Rail's Digital Railway team in developing the business case for the deployment of Digital Railway technology. This programme is not simply implementation of new technology. It represents a significant cultural, operational and business change for the railway and its staff. For example, the reviewing and rewriting of operational rules and processes to recognise changes to signalling, which is already underway, is a significant task for the railway. Over the course of the programme, we estimate that around 50,000 rail staff and contractors will require training at some level.

Key issues;

20. In this section we have responded to the specific issues which the Committee has raised. We have considered the base statement raised by the Committee, that you are

“looking at the plans for deploying new digital technologies and how they will impact the use of the network by passenger and freight services. The Committee also examines how traffic management technology can improve how timetables are planned by bringing in real-time traffic management and how the ongoing centralisation of signalling responsibilities to large Rail Operating Centres is achieving this.”

Issue 1 - The efficiency of Network Rail's planned roll-out of ERTMS and ETCS across the rail network.

- 21. We believe that the original 50-year ETCS national deployment, which was based on renewing signalling assets as they reach the end of their working lives, was a cost-efficient option. However, this does not take due account of the benefits that ERTMS will bring to the wider industry, nor of operational challenges, the impacts of retrofitting rolling stock or the benefit of concentration of a consistent signalling system in one area. The new approach, as proposed in the revised business plan, is based on maximising the holistic benefits to the UK economy and to the railway. Government should ensure that there is a mechanism to incentivise all parties to roll out ERTMS more quickly, thus realising benefits faster.**
22. Further detail on the issues with the original 50 year ETCS national deployment plan is set out in the addendum, along with the revised combined ERTMS (ETCS and TM) 25 year plan.

Issue 2 – How the state of current GSM-Railway technology (a standard for wireless technology used for railway communication and applications) impacts rail infrastructure.

- 23. The new rail radio communication system, GSM-R, has been implemented successfully. The voice system is however affected by interference from 3G and 4G public networks and needs investment to update the on-train radios to avoid this. It is planned to update the GSM-R system to carry data alongside voice communications, which will require extra capacity. As technology continues to develop at speed in this area, the ETCS system will need to be compatible with GSM-R and with other technologies that become available in future.**
24. GSM-R has been successfully rolled out to the GB rail system, faster than in many other European countries. The network has proved to be more robust and has better functionality than the previous analogue systems. The system is presently set up for voice communications, but is planned to be updated to transmit ERTMS data also. This will require investment in packet-switching technology, whereby a message is broken into parts or ‘packets’ sent independently and reassembled on receipt, and some enhancements to the core system to provide the higher reliability required by ERTMS data than by voice communications.
25. We are concerned about interference between the GSM-R system and the public Mobile Network Operators’ (MNOs) 3G and 4G mobile telephone networks. This is related to the allocation of frequency spectrum and inadequate levels of cross-system interference protection across Europe. This is an issue facing the railway in many European countries; in the UK we have seen over 200 cases of interference and over 300 cases have been reported in Germany so far. We are managing this in the short term through close co-operation with mobile phone companies - for example, in Cardiff a MNO 3G transmitter is turned off presently to prevent blocking the railway’s GSM-R system. However, this is not sustainable in the longer term for mobile operators, who themselves have contractual coverage commitments imposed under their spectrum licences.

26. In the long-term, we believe that the solution to this is the provision of a re-engineered Mobile Railway Module (MRM) on each train but specific funding for this, which is likely to cost around £45m, has not yet been identified. This is a substantial long-term risk to the Digital Railway programme if not addressed shortly.
27. ERTMS needs to be future-proofed with the ability to use other radio systems as technologies are developing quickly. New rolling stock and track-side equipment that is purchased over the coming years should be able to switch between GSM and other new technologies as they develop, to avoid having to replace expensive equipment.

Issue 3 – How realistic the timings proposed in Network Rail's "Digital Railway" programme are and how these will be achieved.

- 28. The RDG believes that current 50-year roll out plan for ERTMS needs to be faster. Network Rail in collaboration with the cross-industry programme has proposed a combined ETCS and Traffic Management system roll out plan over a 25-year timescale. This will be challenging to achieve within current funding arrangements but the RDG believe this will be more beneficial for passenger and freight customers, taxpayers and the economy. To achieve this 25-year target, both the roll-out plan and the Digital Railway programme need to be stable and to have long-term Government support. There also needs to be a stable, holistic funding mechanism, which is supported by operator incentives to meet the Digital Railway plan.**
29. The current 50-year roll out plan for ERTMS will result in benefits being achieved more slowly than we would like. A faster implementation programme would bring forward the benefits more quickly, and could potentially be more cost-effective in the long term, although it would require more upfront investment. Both Network Rail, which is leading on deployment of ERTMS, and the wider industry needs to be proactive in ensuring that the roll-out plan is joined-up and flexible enough to encompass local needs.
30. Network Rail, in its new Digital Railway business plan, has proposed to implement ETCS and Traffic Management together over a 25-year timeframe. The RDG considers this timeframe ambitious but achievable.
31. The RDG regards the following factors as essential in meeting the 25-year target:
 - A realistic rollout plan, involving Network Rail routes, passenger and freight train operators and local stakeholders;
 - Simplification, consistency and automation of the infrastructure design process;
 - Alignment of industry funding and incentives, to ensure that technologies are rolled out to complement each other and the full benefits of the whole system are achieved;
 - A national and stable cross-industry programme to support the implementation of the Digital Railway, with fully transparent governance;
 - Funding for the Digital Railway Programme within the current Control Period (CP5; 2014-19) to ensure that the programme is developed to allow individual projects to start delivering early in CP6 (2019-2024).

- A plan that gives the rail supply chain confidence.
32. RDG will bring together our members – train operators, freight operators and Network Rail - to ensure cross-industry buy-in and support for the Digital Railway. A natural progression of the programme would be to shift the implementation of Digital Railway to a joint group of industry stakeholders. This group should be focused on delivering the benefits that this programme will bring as quickly and efficiently as possible.
 33. One outcome of the programme is the transfer of much of the signalling equipment from trackside to train, moving the cost and risk profile away from Network Rail and towards train operators. This creates challenges, including how to fund the cost of retrofitting passenger and freight locomotives. How best to manage the changing cost and risk profile is being considered by the Digital Railway programme and the Department for Transport.

Issue 4 – How changes to Network Rail's Enhancement Delivery Plan following the Hendy Review will impact the rollout of ETCS/ERTMS systems

- 34. The Hendy Review of Network Rail funding of the Enhancement Delivery Plan has slowed down the implementation of ETCS. Reduced funding for the cab fitment plan could cause further delays in Control Period 6 (CP6, 2019-24). In order to plan and create momentum to start rolling out the programme in the next control period, additional funding should be made available in the current control period, CP5 (2014-19)**
35. When plans for CP5 were drawn up, costs of ERTMS development, procurement and business change were less established than now. This is similar to other investment schemes and ultimately led to the Bowe, Hendy and Shaw Reviews.
36. The Hendy Review has posed challenges for ERTMS delivery. An impact has been a 30% overall cut to both funding for ERTMS First in Class and continued fitment on freight trains and First in Class ERTMS fitment on passenger trains. The passenger First in Class programme is designed to provide franchise bidders with a costed, verified design which helps them factor costs of the programme into franchise bids. This should remove risk for both bidders and the Department for Transport and help provide certainty to open access operators. The reduced train fitment funding for both freight and passenger trains will allow the programme for the south end of the East Coast to be delivered, but will delay and import risk to any subsequent roll-out.
37. These reductions in funding for both passenger and freight train fitment preclude any recovery from the two-year deferral of the full roll-out of ERTMS on the East Coast Mainline south. This is inefficient and an opportunity missed, as the majority of trains have already been funded via the franchise process and could be delivered for 2020, the current target.
38. The RDG wants to see momentum for the Digital Railway programme maintained. Where possible, additional funding should be allocated to the programme at an early stage to ensure that the benefits of the modernised network can be achieved earlier in Control Period 6 and risks in delivery are minimised.

Issue 5 – How the transfer of signalling responsibilities to Rail Operating Centres (ROCs) is proceeding, and what implications this transfer has for the overall rollout of new signalling and traffic management technology.

- 39. The transfer of traffic control personnel to Rail Operating Centres (ROCs) is nearing completion. The transferring of signalling control itself into ROCs is progressing at a slower pace than was planned. There has also been a pause in the network-wide roll-out of Traffic Management, due partly to the need to consider the ERTMS and Traffic Management roll-out plans together, rather than separately, and partly because of adapting technology.**
40. The Rail Operating Centres (ROCs) are largely in place and the transfer of traffic control staff is mostly complete. Signalling controls are transferring into the ROCs via the re-controlling of current signalling where appropriate, rather than waiting for the roll-out of new signalling. The elimination of mechanical signalling is progressing in line with replacement of the equipment.
41. Using Traffic Management to automate key signalling decisions is vital to ensuring that the new ROCs are effective. Traffic Management will also allow better data links between industry systems, which will give us more and better-quality information about rail use and help the railway further improve processes, operations and customer information.
42. The first planned deployments of Traffic Management are at Romford, Cardiff and Three Bridges ROCs. Progress is slower than planned, as the specific Traffic Management products were less developed than they needed to be and interfacing them with current systems has posed some challenges. However, these first deployments are providing useful lessons ahead of the network-wide roll-out.
43. The original Traffic Management roll-out plan, which was separate to the ERTMS roll-out plan, has been paused. It is now planned to go ahead as part of a combined ERTMS and Traffic Management 25-year business plan. This means that Traffic Management will be rolled out more slowly, but we believe that this is more efficient as optimised deployment of the two technologies will bring greater benefits to passenger and freight users, taxpayers and the economy.

Issue 6 – What legislative and other action the Government could take to support the rate of change in signalling and traffic management technology.

- 44. The RDG believes there is a clear role for Government in supporting the roll-out of combined signalling and traffic management technology. This role is to ensure stability and clarity for the industry.**
- 45. The RDG would like to see the following from Government:**
- **The application of the ETCS/TM system to be applied consistently via a system operator and technical authority;**
 - **A holistic funding mechanism as part of a long term plan to support the roll-out of ETCS and Traffic Management technology together.**
 - **A strong element within the funding mechanism to facilitate the development of technology, allowing new systems to be rolled out more quickly;**
 - **Protection of the current frequency spectrum for railways from interference from 3G and 4G mobile telephony, and future spectrum protection from other technologies;**

- **Strong engagement from the DfT with European stakeholders to ensure that the European specification is stable and in line with GB requirements.**
46. The ETCS/Traffic Management system should be introduced consistently across the network, and we believe that this is best done by the relevant system operator and technical authority working with the rail industry.
 47. The natural progression is that the ownership of the Digital Railway programme needs to be shared across the rail industry, rather than being primarily a responsibility of Network Rail. This will ensure that both the burden and the benefits of implementation are shared.
 48. We strongly advocate that the Government reviews the structure of the funding mechanism. Two elements are currently causing problems for the implementation of Digital Railway: first, different technologies funded from different sources, and second, funding split between Control Periods. Long-term and consistent funding of the Digital Railway Programme would allow a smoother and more effective deployment of the technology. We would also expect that more long-term and consistent funding will allow the programme to become more and more efficient as it rolls out, learning lessons from early deployments, and enabling the supply industry to invest to support the programme.
 49. The present roll-out plan is based on the use of Level 2 ETCS, which is the technology currently being used across Europe. The development of Level 3 ETCS technology will remove the reliance on trackside train detection and should provide increased capacity at a lower cost than the current technology. Level 3 ETCS technology has been tested in the Netherlands and the UK, and further investment in developing this technology will lead to a stronger business case for bringing forward ETCS at a higher level than the current Level 2 plans. This should also create opportunities for the rail supply chain to sell UK skills and knowledge to other rail networks worldwide.
 50. The new rail ETCS/TM system is reliant on an effective radio link to share data. Safeguards are needed for the current spectrum of frequencies that the railway uses, and more investment is needed in upgrading Mobile Radio Modules, which block emissions from commercial mobile phone networks. For the future, we need to see continuing protection of the railway's frequency spectrum and future-proofing of technologies.
 51. The specification for ERTMS is set by the European Rail Agency. The development of the specification within the European arena will continue to require strong representation by the industry and DfT, working together to ensure that ERTMS is well-suited to the needs of the GB railway.

Issue 7 – Whether timetable planning is suitably optimised to meet demand for both passenger and freight rail, and how traffic management technology can be used to improve this.

52. **The current timetable planning system has helped the railway run 28% more trains than in 1997/98, which has helped us carry twice as many passengers and 70% more rail freight. However, the process is overly rigid and lengthy and will need updating in future to better respond to freight and passenger customer needs. The correct application of ETCS and Traffic Management should provide a step-change in capacity, subject to the physical constraints of the system. A balance must be struck between maximum utilisation of the network and punctuality and reliability of services.**

53. The present long-term timetable planning arrangements have played their part in facilitating the strong growth experienced on GB rail. The process is intended to balance the needs of different types of train services, but the lack of additional capacity on many parts of the network is making it difficult to further increase services. The present rigid process will need to change to be more responsive to future growth and enable optimisation of the capacity available to accommodate changing passenger and freight needs.
54. Clear, straightforward and appropriately flexible timetabling is key to maximising capacity. Passenger train operators need certainty around the train paths to which they have access, in order to run regular, consistent and punctual services for their passengers. Freight operators also need the ability to offer their customers flexibility as business requirements change. The allocation of railway capacity between franchised passenger services, open access services and freight services is also a challenge on a network increasingly reaching capacity. The RDG does not believe that the new Traffic Management system will, in itself, resolve these long-term train planning issues, but it will improve how we can plan more short-term changes.
55. The Digital Railway programme is undertaking work to update the timetable planning rules for ETCS. Modelling work on the detail of how this would affect capacity is being undertaken. The programme is also modelling braking curves for different types of rolling stock, which is key to ensuring that the system works to the highest safety levels and delivers expected capacity increases on our mixed-traffic railway.
56. The Digital Railway can provide additional capacity to satisfy the increasing demand for rail services through a combination of ETCS and Traffic Management. Connected – Driver Advisory Systems (C-DAS) will ensure trains travel at the most effective and efficient speed, reducing variability and increasing precision in train arrival times and thus helping to maximise the use of capacity and customer benefit.
57. ETCS needs the correct hardware to support extra capacity, for example, extra train detection sections and radio capacity. These enhancements allow trains to run closer together and increase consistency of paths via the Traffic Management system, reducing the number of times that trains cross or switch paths and consequent delays outside stations. Revising track layouts and redesigning some stations will be necessary to maximise the capability that this technology provides.
58. The application of the Traffic Management system will help provide better information to passengers and freight customers via digital links. The system will also help to re-plan services more quickly in response to problems on the network, such as inclement weather. This will allow us to run more trains and decrease customer delays.
59. Service improvements can be gained by:
- Running trains more closely together, thus increasing the number of trains that can run on the network;
 - Removal of signal sighting speed restrictions, allowing trains to run faster;
 - Automation providing more precise train times, allowing more trains to be timetabled closer together;
 - Faster, simpler and more effective re-planning of services in the event of delay or disruption;
 - Faster and more accurate information to passengers and freight customers;

- Improved consistency of delivery;
- Faster feedback and correction of timetabling issues.

Conclusion

60. The Rail Delivery Group strongly supports the implementation of the Digital Railway programme, which will increase capacity, performance and safety on the GB rail network. These improvements will directly benefit passengers and freight customers, and are expected to provide efficiencies for taxpayers. The rail industry and its supply chain already contribute £10.1 billion to the UK economy each year and employ 216,000 people, but a more efficient railway system can increase these benefits and support growth in the wider UK economy.
61. We believe that the development and implementation of a new business case for this programme is essential to deliver the programme effectively and within a shorter timeframe, maximising the benefits to the railway. Cross-industry co-operation will be vital in bringing forward the plan to halve the deployment timeframe to 25 years. The natural progression is for the implementation of the Digital Railway to shift to a joint group of industry stakeholders, working with the rail supply chain to help deliver this programme faster and more efficiently than originally planned. Network Rail must be given the stability and support it needs as the rail infrastructure provider.
62. The Digital Railway is also dependent on the stability and support that Government provides, and we recommend rationalising and bringing together funding for the programme to help us deliver it more effectively. A holistic funding mechanism from a single Government source would help ensure that the technologies are brought forward to work together, not as separate programmes, and would ensure funding consistency across Control Periods.
63. The Digital Railway has the potential to transform our railway for the 21st century. Strong support from the rail industry, our supply chain and Government will help to deliver this important programme to maximise benefits to passenger and freight customers, taxpayers and the UK economy.
64. For enquiries regarding this submission, please contact

Christine Quigley
Head of Public Affairs, Rail Delivery Group
Christine.quigley@raildeliverygroup.com
020 7841 8022
07795 290 893

Rail Delivery Group
2nd Floor, 200 Aldersgate Street
London EC1A 4HD

Addendum

This provides some additional detail on the technologies discussed in the document.

1. Potential benefits from the applications of Digital Railway Technologies:

Benefits	ETCS	TM	CDAS
Safety of providing Automatic Train Protection	√		
Faster train running with no signal sighting issues	√		
The removal of signal approach control restrictions	√		
Increased capacity through running trains closer together in ETCS level 2	√	√	√
Cost reduction in the infrastructure in ETCS Level 2	√		
Removal of train detection costs in level 3	√		
Further capacity increase through trains running closer together in ETCS level 3	√		√
Level crossing safety and performance improvements	√		√
Cost effective Bi-Directional operation to reduce delay and increase efficiency and flexibility	√		√
Increased automation of the rail system	√	√	√
Increased precision in the operation of the system	√	√	√
Simpler and more effective re-planning of services in the event of delay or disruption;		√	√
Faster feedback and correction of timetabling issues/errors		√	√
Improved links to the customer information systems		√	√
Improved ability to recover from service disruption		√	√
Use of Connected Driver Advisory System to save energy and hence deliver carbon benefits		√	√
Connected Driver Advisory System to provide precise running to save delay and more capacity		√	√
Linking the rail systems to improve performance and costs	√	√	√
More consistent train service performance	√	√	√
Ability to re-configure rail infrastructure to respond to customers quickly and at less cost	√	√	√

2. ERTMS consists of four elements:

- a. **ETCS** (European Train Control system) - the in-cab signalling system;
- b. **GSM-R** – the radio communications system, which uses Global System for Mobile Communications technology and dedicated frequency spectrum for Railways;
- c. **Standard European Operational Rules** – consistency of application of operational rules across Europe
- d. **Traffic Management** – The people, processes, control systems and decision support tools that help Rail Operating Centres manage their geographic responsibilities in real-time. Traffic Management introduces greater automation and consistency, enhanced prediction and resolution of conflicts to the network, and combines better

coordination during disruption and better just-in-time planning than previous systems.

3. The implementation of ETCS can be categorised by the stage of deployment:
 - a. Level 0 – No train control system in operation
 - b. Level NTC – Trains fitted with current signalling system (National Train Control System) also known as level 0 in older applications;
 - c. Level 1 – In-cab signalling updated via trackside equipment, usually in addition to line side signals;
 - d. Level 2 – In-cab signalling updated via radio link usually without line side signals, working with track side detection;
 - e. Level 3 – In-cab signalling updated via radio link without line side signals or train detection.
4. The Cambrian Line between Shrewsbury and Aberystwyth / Pwllheli has trialled the use of ETCS on the GB network. This is one of the most comprehensive ‘no-signals’ application of ETCS in Europe. The system was rolled out in 2011 and acted as a pilot of ETCS technology for the rest of the network. The system has been popular with staff on the line and has facilitated a doubling of the service frequency. Additionally, a number of important lessons have been learnt which will be useful for future deployments.
5. Thameslink is being modernised to increase the capacity between Kings Cross/St Pancras and Blackfriars from 16 trains per hour to 24 trains. This increase will take effect from 2018, with new class 700 trains, ERTMS and more automation.
6. The new Traffic Management technology facilitates closer coordination between signalling systems. The new Traffic Management technology will provide the following benefits:
 - a. Improved automatic route setting;
 - b. The ability to re-plan the train services more effectively, including individual trains. This will allow the network to recover more quickly after disruption;
 - c. The connection of signalling systems, which facilitates more efficient decision making when service disruption occurs;
 - d. Information to train drivers via the Connected - Driver Advisory System (C-DAS).
7. The original CP5 Network Rail Business plan was based on the existing ETCS 50-year national roll-out plan. The aim of the original business plan was to optimise costs, rather than focus on the wider benefits to the industry. The Network Rail Business Plan assumed a cost-benefit ratio for the overall rail system purely based on efficiency savings from modernised signalling assets.
8. There are a number of challenges facing the current GB ETCS roll out plan:
 - a. Increases in both costs of conventional re-signalling and costs of ETCS fitment;
 - b. The train fitment via each franchise was intended to provide an efficient delivery mechanism, but faces difficulties without a stable long-term roll-out plan;
 - c. The roll-out plan failed to fully account for the risk of delay to other projects such as Great Western Mainline electrification;
 - d. The funding was based on a ‘like-for-like’ replacement which prevented the funding of simple requirements such as bidirectional signalling;

- e. The roll-out plan did not prioritise the locations where the overall business benefits could provide best value to the industry;
- f. The difficulties in managing a long term strategy in 5 year funding cycles (Control Periods) has led to a 'stop-start' approach;
- g. Avoiding the creation of a patchwork of ETCS 'islands', where ETCS was fitted rather than creating logical lines along routes;

These challenges mean that the present version of the roll-out plan is difficult to implement in the agreed timescale. Therefore, the Digital Railway programme has looked to concentrate on areas where the implementation is at a more advanced stage, such as the East Coast Mainline. On this section of the network, both recently refranchised TOCs have a commitment to ETCS train fitment and are involved in the purchase of new ETCS- fitted trains. However, even on these parts of the network, where deployment of ETCS is at an advanced stage, delays mean that timetable enhancements and the value to the DfT and TOCs will not be realised in the anticipated timescale.

The RDG believes that the approach being taken by the Digital Railway in maintaining a roll-out plan based on the benefits for the wider industry is the right approach for CP6. There is a pressing need for the present plan to be linked to CP6 – to ensure momentum is maintained.

The RDG would therefore recommend that:

- a. For CP6, the ETCS roll out plan is based on gaining total industry benefits with cost funding to match;
- b. The plans for CP5 and CP6 are linked together to ensure that momentum is not lost between funding periods;
- c. There is a coordinated national roll-out plan for all Digital Railway technologies;
- d. The roll-out plan should take into account routes and lines on the network where enhanced trains are already operating. As an example, the new class 700 trains for the Thameslink and the new Intercity Express Programme class 800/801 trains are now being delivered with ETCS fitted, so it may be rational for these lines to be prioritised.