HOUSE OF COMMONS

Transport Committee

Oral evidence: Rail technology: signalling and traffic management, HC 67

Monday 23 May 2016

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Written evidence from witnesses:

- Network Rail
- Rail Delivery Group

Watch the meeting

Members present: Mrs Louise Ellman (Chair); Robert Flello; Mary Glindon; Stewart Malcolm McDonald; Huw Merriman; Will Quince; Iain Stewart; Martin Vickers

Questions 1-48

Witnesses: **Mark Carne**, Chief Executive, Network Rail, **Andrew Simmons**, Chief Systems Engineer, Digital Railway Programme, Network Rail, and **Alistair Gordon**, Technology and Operations, Rail Delivery Group, gave evidence.

Q1 Chair: Good afternoon and welcome to the Transport Select Committee. Could you give us your names and positions, please?

Alistair Gordon: I am Alistair Gordon. I am chief executive of Keolis UK and I lead the technical and operations work stream for the Rail Delivery Group.

Mark Carne: I am Mark Carne, the chief executive of Network Rail.

Andrew Simmons: I am Andrew Simmons. I am the chief systems engineer for the digital railway programme.

Q2 Chair: We have not yet seen the business case for digital rail. It is likely to cost a great deal of money. Could you tell us what it is all about and what order of funding you are likely to need?

Mark Carne: The biggest challenge that our railway faces today is the challenge of success. The number of passengers who travel on our railway today is twice what it was just 20 years ago, and in the next 25 years we think it may double again. That is driven by a combination of population growth—the population in this country may increase by 10 million people—and the need for 200,000 more houses every year to cope with that.

People want those houses to be really well connected. They want them to be near motorway systems or, even better, nearer railways, so we are going to see incredible demand for rail travel over the next 25 years.

The problem we have is that a lot of our railway network is already full, so how are we best going to meet that demand? We think there are a number of choices. Of course we will have to build some new railways; HS2, Crossrail and Crossrail 2 are examples of the kinds of new railway systems that we are going to need. The digital railway is not about a new railway but about how we make the best of what we already have. How can we make sure that we can run more trains on the existing network? We believe that by transforming the way in which we control the trains on the track we can run many more trains on the existing network, and thus help to meet the increase in capacity. I am the first to say that digital railway is not a panacea for all the challenges that we face. We are still going to need to make major interventions on the network and build new facilities to cope with growth, not least in terms of stations and so on, but it is a way of maximising the benefit of the existing railway that we have. I would argue to you that, although I am sure it is going to cost a great deal of money, it is going to cost a great deal less than the alternative, which would be to build new railways and intervene on the existing network.

Q3 Chair: What is a great deal of money? How much is it?

Mark Carne: We do not know. That is why we are putting together a detailed business case. When the business case is finished, which I think will be towards the end of this year, we will set it out. The important point is that you have to set it out relative to the alternative. The alternative is not to do nothing; it is to build incremental physical facilities to carry the extra passengers that we need. You have to do both the digital case and the normal fixed infrastructure case in order to truly understand the economic benefits associated with digital railway.

Q4 Chair: Is it going to benefit freight or is it just for passengers?

Mark Carne: There is no question at all: it will benefit all users on the network. This is one of the great advantages of the digital railway programme. If we convert the whole of our network to digital train control, we will increase the capacity, speed, connectivity and reliability of the network as a whole. It will not just benefit passenger services but will significantly benefit freight users as well. It is an upgrading of the capability of the network as a whole.

It is important to stress that it is not just about capacity; it is also about speed. We will be able to run trains faster. The network will be significantly more reliable and more resilient. We will be able to recover from incidents on the network much quicker because of computerised traffic management and the ability to control trains differently on the track. This is a really significant transformation of the way in which our railway will run.

Q5 Will Quince: I would like to thank your team, Mark, because they gave me a presentation on this when I was at Network Rail head office. It is hugely interesting and quite exciting as well, but I want to challenge you on a few points. I have three sub-questions in one question. You said that demand has doubled and we do not dispute that. You say it is likely to double again; therefore, is 40% additional capacity enough? That is the first

question. Secondly, you said that we should make the best of what we already have, but, moving on from the Chair's point, at what cost? Thirdly, based on that capacity point, is this just a sticking plaster?

Mark Carne: As I said, digital railway is not the only thing we are going to have to do to meet the capacity demands in the future. We are still going to have to make physical interventions on the network. Nor have we claimed that 40% is universal; it certainly is not. We think you can get 40% more capacity in the dense urban settings that we have looked at, but on long-distance main lines it will not be so much of an increase. It is not the only thing we have to do, but we believe that, combined with improved connectivity, speed and reliability, it is a very compelling case to transform the reliability and performance of our railway as a whole.

I re-emphasise the point about cost. Today, we spend about £1 billion a year renewing signalling systems. Over the next 25 years, if we do nothing, we will still spend £25 billion just renewing worn-out signalling systems. We believe that that £25 billion can be better spent transforming the whole signalling and train control system. We have to net off the cost that we would otherwise incur if we were not to do the digital railway programme.

We were very severely criticised last year—I believe quite rightly so—in the Public Accounts Committee and elsewhere for the fact that the project costs in this control period were significantly higher than we originally thought. As we said at the time, one of the reasons for that was that we committed to projects before we really knew what they were going to cost. I deeply understand that you would like to know what the costs are, but equally I do not want to give you a cost today until we have done the proper work. That is why we set up the digital railway programme. It is a two-year piece of work. We will work with industry and think it through very carefully before we actually declare what we think the business benefits are. I am convinced that the more we look at it, the better it looks, but it will be towards the end of the year before we can lay before you what we think is the compelling business case.

Q6 Will Quince: I like the fact that you said it is not a panacea. I totally agree with that. I think it is hugely exciting and something that we should be doing, but I have a concern. Take, for example, my line, which is the great eastern main line. We already have people sitting in toilets, broom cupboards and in the aisles on peak services because of the shortage of capacity. I am concerned that we will use this as a sticking plaster and say, "It's all right because we are going to bring in digital railway," when that is not going to address the underlying issues with capacity. Can I have an assurance from you that this is not going to be "the answer" but one of a package of answers to address the lines where we have the biggest capacity issues?

Mark Carne: Absolutely. I can categorically say that. The digital railway programme is just one of the tools that we will use to transform capacity on the network, but it is a really important one because it comes at a very low intervention cost. To build new railway systems, particularly in urban settings, is incredibly disruptive to existing users. Passengers around stations where we have been making those interventions will be the first to acknowledge that. That is one of the reasons why we also think this is such an important opportunity for us to grasp, but, yes, we will have to do a lot. We produce, together with the train operating companies as part of RDG—the Rail Delivery Group—a whole suite of options in our route studies for how to meet the burgeoning demand for

train travel. That can include more trains, better trains, new trains, faster trains and longer trains. Those are the traditional ways in which one meets demand. That is how we have largely met the demand increase over the last 20 years. The problem now is that we are running out of those options. You are absolutely right: we have far too many people—150,000 a day—standing on commuter trains. We have to do something, and we have to do it fast.

Q7 Chair: But it is not enough just to have the objective. You have to be able to implement it. You referred yourself, Mr Carne, to the criticism of Network Rail, particularly on the great western main line electrification and other schemes, that initial costs were found to be wanting—costs increased dramatically. What is different now?

Mark Carne: The whole funding mechanism for the railways is fundamentally different today from the time when those projects were inspired. Today, we have a fixed loan limit with the Treasury, and we are absolutely committed not to approve projects or commit to projects until we have done enough of the design to deeply understand what it is going to take to deliver them. That was not the way the railway worked before. Because we had the ability continuously to borrow money on our own private debt, it did not matter too much at the start of CP5 if you did not know exactly what it was going to cost; you could always go back at the end of the project and say, "Well, that is what it cost," and borrow more money. That is not the way it works today and I think it is very healthy that it does not work that way today. I have been very clear that I think the reclassification of Network Rail and the capital discipline that that brings is very positive.

Q8 Chair: But will that discipline be effective?

Mark Carne: Yes.

Q9 Chair: Has Network Rail changed? It is a project of the whole railway, isn't it?

Mark Carne: Yes, absolutely. That is why I am very glad that Alistair is with me today. It is not a Network Rail project. This is a rail industry transformation project. Together, we all have to study it very carefully to think through the right sequence of deployment and what benefits we are going to get. We do not want to over-promise and then under-deliver. We want to make sure that we have done enough trials, pilots and demonstrators to be very confident about this, so that when we roll it out we can do so with confidence.

Q10 Chair: Can you give us any idea of the nature of the funding you will be seeking for this?

Mark Carne: As I said, I really would rather wait until the business case is finished. I do not want to repeat the mistakes of the past and give you a number now that does not have enough substance to it. I would rather we do the work and then come back and give you a proper assessment.

Q11 Chair: When will that be?

Mark Carne: At the end of this year we will have the outline business case. That will be when we are really clear that there is a big enough economic prize to set us out clearly in this direction.

Q12 Martin Vickers: We have talked about the financial resources, although you are not prepared, understandably, to commit to a bottom-line figure. What about the human resources? Do we have sufficient expertise within the IT and engineering fields to be able to deliver this project?

Mark Carne: I will ask Alistair to say a few words on that from the train side, and maybe Andrew can comment on the technology side.

Alistair Gordon: On the people side, yes, I think we do. It is important to remember that the digital railway programme is an acceleration of a programme that the railway was committed to anyway. We were originally looking to do digital signalling of the whole network within 50 years. Now we are talking about doing it within 25 years. Any use of technology means that processes change and the roles that people take change. As Mark said, we have the industry in one group together all discussing the issues—suppliers, operators, the Department for Transport, ORR and Network Rail. We have quite a lot of technical work streams sitting underneath that look at what processes have to change in the industry for this to happen. We are not looking to do a science fiction programme. Any new railway that is built across Europe at the moment uses digital technology. The Victoria and Jubilee lines have already seen digital technology go into them, so it is not beyond the wit of man to change the processes that are needed for us to operate.

Andrew Simmons: On the resources front, from an engineering and technical perspective, there are challenges even with the existing market today. On the conventional system we still have bottlenecks in our processes. One of the aims of digital railway, of course, is the ability to productionise a lot of that engineering, changing it from the bespoke designs that we normally do today with the existing technology through to a more production line process, where we can automate a lot of the processes. We are looking at it from the point of view of growing resources, but also looking at the processes we use and trying to automate wherever possible to address those concerns.

Mark Carne: It is really important when we set out the programme that we are able to set it out as a clear 25-year programme and give the supply chain real confidence that we are going to be investing over that sort of period of time, and of course they will then have the confidence to recruit and develop the skills that are needed. If they are not quite sure whether we are committed or not—"Are they going to invest or not?"—that is when the supply chain will falter. We need to be able to give them real confidence that, yes, we are going to do this, and then they will get behind it.

It is a massively exciting opportunity from the supply chain perspective. We will be the first really big network in the world to deploy this kind of technology on the scale that we are talking about. We think that the supply chain will therefore develop a real capability to export that technology and skill to other countries when they hit the kind of bottlenecks that we are hitting now. That is a hugely exciting opportunity for the supply chain in the longer term.

Q13 Martin Vickers: Would you anticipate that private investment can play a part?

Mark Carne: Very much; absolutely. Part of the reform of Network Rail—the transformation of Network Rail, as we talk about it now—is that we absolutely have to find different ways of getting investment into the railway. I certainly see digital railway as being one of the quite exciting ways of doing that. There will be many investors who have

the technology and will be prepared to invest in that technology on our railway, and earn a return based on the incremental capacity that that technology generates. That is quite a novel way for us to work, but quite an exciting way. You really bring in the people who have the skills, and they take some of the risk, because they are the people best able to manage that risk. They bring money and expertise.

Q14 Martin Vickers: Would you anticipate being able to share research costs and so on with other networks throughout the world?

Mark Carne: We will be using the European train control system, so it is a European-wide capability. We are very much pushing the development of that to the next level, but we want to try to keep it as a European standard system, because then the costs are shared and are lower. Critically, the more standardised you make the technology, the lower the deployment costs are. Our being a leader of this in Europe and pushing it as fast as we can is very important.

Q15 Chair: You referred to the confidence of the supply industry. Alstom said that the cancellation of the national traffic management systems programme in 2014 reduced that confidence and caused a massive problem. Do you think you can put that right?

Mark Carne: I think it was the right decision to cancel it, because the cost of the programme as tendered was very high and it was not economic. It was the right thing to cancel it, but it was also the right thing to cancel it in the context of where we were in our thinking around digital railway. As Alistair said, we have changed tack on this. Two years ago it was a 50-year programme, and it was seen as a signalling replacement programme. What we are now saying is that there are so many other benefits associated with it that we need to do it much faster. That led us to rethink the positioning of traffic management in our overall upgrade plan and reintegrate traffic management in the broader digital railway programme. Yes, it was a bit of a change in tack, but I think it was absolutely the right thing to do rather than go off at half cock on something and then follow up with a broader digital railway programme. It is better to fold it in as an integrated part of digital railway.

Q16 Iain Stewart: That leads on very neatly to the questions I would like to ask. I absolutely agree with the objective of digital railway and the advantages it can deliver. The term covers a variety of different systems, which you have just alluded to. We have ETCS at its different levels; we have traffic management systems; we have driver advice systems. You mentioned the resequencing of the traffic management system. I have reviewed the written evidence that we have received. Some people have said that by going for ETCS as level 2 it is fairly old technology, in the sense that it is going to be superseded by level 3 reasonably soon. Level 2 involves quite high capital expenditure in line-side interventions that level 3 does not. In addition, a TMS system could be introduced more quickly and deliver the same sort of capacity gains. Would it not be better to do that first and then divert the investment into level 3 of ETCS longer term, which will have a lower capital requirement? I am sorry; it is quite a complex question.

Mark Carne: It's fine, but I will let Andrew address the critical issues. We are at the forefront of pushing to get a standard version of level 3 because it is not available off the shelf at the moment. However, we also believe that level 2 as it stands is a compelling case, so we should not wait for level 3; we should get on with level 2 and then upgrade it

when level 3 comes. Basically, the technology is interchangeable. You do not have to bin it and then start again. You can just upgrade to level 3. We need to push ahead with it as quickly as we can, but simultaneously—you are absolutely right—we want to go to level 3 as quickly as possible because it is much cheaper to install. There is no trackside equipment as such, and it is more reliable, safer and so on. I completely agree with you, except that I would say that the case for level 2 closely followed by level 3 when it is available is probably the best way to go.

Andrew Simmons: The systems are compatible, as Mark mentioned. Therefore, if the case for level 2 is still made, the case for level 3 should be better. It is not available at the moment, as you have probably been advised, so we are working and pushing ahead within the European context to get the technology ready. We hope to have it ready by the end of 2024 and to be able to roll it out, but in the meantime we need to push ahead with level 2 to get the benefits. You also have to remember that we have to go through this people change process. You cannot necessarily jump straight to level 3. You have to get the drivers trained, and so on. You have to go through an intermediate stage, which can involve level 2. We need to push ahead with that and get those benefits.

In relation to the comparator with traffic management and ETCS, the sum of the parts is much better than any individual system on its own. In certain areas there will obviously be a case to do traffic management on its own, and we are looking at that as part of the overall roll-out plan. We are not discounting it; we are just looking at it on a benefits realisation basis.

Q17 Iain Stewart: I have a couple of supplementary questions. The written evidence from Thales said that the UK was very suitable for a decoupling of ETCS and traffic management systems. Is that something that is being actively looked at? I appreciate that in the ideal world it would all be part of the same package. My second question is this. I am a little concerned that by introducing level 2 straightaway we will commit to quite a bit of capital expenditure that will not really be necessary for level 3. Are you trying to quantify that cost?

Mark Carne: This will all be integrated into the business case. First, we are installing traffic management at Romford and Cardiff today as part of something broader—I would not call it a pilot. We want to see what the benefits of traffic management are on the existing network and how effective it is. We are already pursuing that strategy. Going back to what the Chair referred to earlier on, we have not had a network-wide roll-out of traffic management. Let us first of all see how it goes in those areas, and then it is our intent that it would come in behind the broader digital railway programme. We will see what the benefits are from Cardiff and Romford.

On ETCS level 2, I would argue that we should get on with it now in the areas where we are already capacity constrained, because it will unlock capacity and enable us to deliver capacity without having to make very expensive physical interventions. Yes, of course it would be nice if we had level 3, but we do not have it. That does not mean to say that we should not get on with level 2 because it is certainly better. Level 2 is still better than creating capacity through the kind of physical interventions that one would otherwise have to make.

Q18 Iain Stewart: One of the bits of written evidence we had was a concern that the supply industry was dragging its feet on developing level 3 because it wanted a better return on the investment it had made in level 2. Is that a fair criticism?

Andrew Simmons: Let's put it another way. Level 2 has been quite a long while in its gestation. It has not been the easiest ride to get to level 2. A lot of the technical development has been to get a stable level 2, which has been achieved, and, hopefully, version 3.6.0, understood to be the next intra-operable version, should become law this year. After that the supply chain, through other developments, such as Shift2Rail, will be focused on the next phase, which is level 3. Up to now it has been natural evolution. They have been trying to firm up level 2 first and make sure that is a good baseline before moving on to the next development. That is where the supply chain will be.

Q19 Mary Glindon: What will be the successor to GSM-R in the UK?

Andrew Simmons: At the moment it is not quite clear. Just this last week the UIC issued a requirement specification for the future rail mobile communication system. There will be discussions over the next two to three years on what that turns out to be. The good news is that we now have a requirement specification released, and it is for the industry to take that conversation further.

We have to upgrade GSM-R anyway in terms of obsolescence and a few other issues. We are looking at ways we can migrate our existing GSM-R system to be future proof in whatever comes out of the work that is being carried out by the UIC and the ERA. At the present moment I cannot really say what it is going to be, but we are in the process with our European and worldwide partners of seeing where we go with communications systems in the future.

Q20 Mary Glindon: Would it be done with European partners? The UK would not introduce the possibility of GPRS on its own.

Andrew Simmons: GPRS is happening anyway as part of the standard that will be released this year on ERTMS. We will be able to introduce that, and indeed we need to do so because we have areas where the existing GSM-R network does not have sufficient capacity to run the number of trains we currently estimate we would need in those areas. We are doing that anyway, and, as I said earlier, we are looking at future requirements—the stage after GPRS.

Q21 Mary Glindon: Are you planning to wait until there is 5G technology to replace GSM-R?

Andrew Simmons: It is similar to ERTMS level 3. That technology has not yet been adapted for railway operations. We will be working towards it, and when it is ready we will be able to upgrade on top of our existing GSM-R. It is very similar to what Mark mentioned with level 3; it is best to get on with it now and have a form of migration plan so that we can get the benefits of existing systems and move to a new one, whether 5G or whatever, in the future.

Q22 Robert Flello: The ETCS has been 20 years in development and yet it still struggles on mixed lines. The evidence we have heard today and previously has been based

on possible improvements on simple lines. What evidence is there at the moment on use on mixed speed lines? Where could you point me to in the world that this works on mixed lines?

Andrew Simmons: Last year, the Swiss introduced on the St Gotthard route, before their base tunnel, about 20 kilometres of railway with mixed traffic. It is on the heavily utilised St Gotthard pass. There are multiple train operators and multiple types of trains—freight and passenger trains. They achieved that quite successfully.

Q23 Robert Flello: The Swiss managed to do what others have struggled for many years to achieve.

Andrew Simmons: Yes. Perhaps one of their biggest successes was that they were able to achieve that within an eight-hour blockade of the railway. It was quite a phenomenal task and it set a benchmark for us.

Q24 Robert Flello: It certainly has. Was it on existing track or new track that they laid?

Andrew Simmons: Existing track. They turned the whole signalling system off.

Mark Carne: The eight hours was a switchover from the old to the new.

Q25 Robert Flello: Indeed. The Swiss have managed to do it, but so far nobody else that you are aware of has been successful with mixed tracks.

Andrew Simmons: They are the most successful of all of them, yes.

Mark Carne: It is important to highlight that 40% of Europe's congested railways are in Britain.

Robert Flello: That leads me nicely into my second question. Carry on.

Mark Carne: I think that is the problem. We are hitting the capacity buffer quicker than anybody else, which is why we are now having to grasp this opportunity that others, frankly, have not. For them, it was a signalling replacement project rather than all the other benefits that we are now seeking to gain.

Q26 Robert Flello: Given that we have this fairly unique bottleneck problem—I accept it is not totally unique, but pretty unique—would other countries need this technology in time, or are we just so unique that nobody else is realistically going to need this technology?

Mark Carne: We have the fastest growing railway in Europe by some considerable margin. Railway investment across the world is growing enormously. Countries right across the world are investing more and more in railways and mass transit systems.

Q27 Robert Flello: But doesn't that tend to be more for new track?

Mark Carne: Yes, it is, but you will find that, with this growth in the railway industry, existing networks will also become more and more congested. When they become congested, people will face exactly the same challenges that we have. That is why I believe this is an opportunity for us to get ahead of the game and create a new market, if

you like, in our capability to unlock capacity in complex urban traditional networks. Other people with population growth and transit demands will hit that buffer as well.

Q28 Robert Flello: Does the evidence not suggest that all they are doing is building more track, whereas we are going down this route rather than building more track?

Mark Carne: Building new track in our complex urban settings is just so disruptive. It is almost untenable really. In the route that we looked at into Waterloo—the South West Trains route—the alternative is to lay a fifth track from Surbiton to Waterloo. Can you imagine the disruption and the cost of doing that? You would have to buy all the land, extend all the bridges and widen all the stations, and do all of that at the same time as trying to run the existing trains. It is massively disruptive and that is what we want to avoid by maximising the capability of the existing network.

Q29 Robert Flello: Is there not a risk that all you are doing is delaying that, because when this technology comes in you will have squeezed everything out of the existing track and capacity is still growing, or the need for capacity is still growing?

Mark Carne: Maybe we will still need to do that, but if we can put it off for 20, 30 or 40 years, it is probably a pretty good thing to do. My team will not thank me for saying this, but I do not think we have yet plumbed the full capability of running the network in a fundamentally different way with digital train control. Let me give you one example. At the moment, a lot of our tracks are essentially one-way streets. You can only drive the trains one way because that is the way the signalling system is set up. As soon as we move to digital train control, all those tracks become two-way streets. We can really run the network in a much more flexible way and a completely different kind of way. We have not yet really thought through all the different ways in which we can therefore use that capacity to create even more journeys. Alistair, you are a train operator so you will probably know more about this than me.

Q30 Chair: This is a rail sector project, isn't it? It is not just Network Rail. Aren't you going to have to increase capacity at terminal stations as well?

Mark Carne: Absolutely. In fact, that is one of the biggest issues we will have: how do we handle the passengers at stations? That leads to the whole question as to what the bottlenecks at stations are. A lot of it is about ticket barriers. How do you remove ticket barriers and how do you get away from tickets altogether?

Q31 Chair: Mr Gordon, can you explain to us how the rail sector is going to work together to achieve the objectives?

Alistair Gordon: We have already set up a digital railway board that involves all the members of the rail sector. In London, TfL are involved as well. One of the big congestions we will move to is that, with 40% more demand on our trains, the terminal stations are going to be used far more. Already, access to and egress from the underground is fairly congested. One of the things we will have to do is think about how we can put in and expand the London orbital railway, which has meant that people can get off suburban services at places like Clapham Junction rather than go all the way into central London to come out.

On the point about capacity, I do not think this is the only solution. We have projects like Thameslink and Crossrail at the moment. I can compare London to Paris, where Paris has RER lines and they are building new lines under Paris. They have managed to put double-deckers in because they do not have the same constraints that we have with our bridges and our track. In 10 or 15 years, the capacity that is being put into Paris will require new trains or new services. They will not just continue building infrastructure. They will do exactly what we are doing, which is to digitalise the systems and the signalling so that they can run more trains. What Mark is trying to say is that a lot of British companies will then be in a position to consult and sell to other European countries.

Q32 Robert Flello: To go back to my little list of questions, this was the last one. As important as getting passengers in and out of London is, some of us represent areas other than London and have interests in addition to passengers. There seems to be a perception that rail freight is the poor relation. What incentive is there for a rail freight operator to install ETCS? Is there any incentive? Why would they bother?

Mark Carne: I will deal with rail freight in a moment, but let me just pick up on the first point. Last week I met with Midlands Connect in Birmingham to talk about the challenges they have getting more services into Birmingham, and how to create more connectivity to Birmingham by having more commuter lines coming in. They are hugely excited about the opportunity of digital railway. On Friday I met with Transport for Greater Manchester. They see digital railway as being absolutely key to improving links in the north. Indeed, the upgrade from Manchester to Leeds is going to be a digital railway. It needs to be a digital railway in order to achieve the journey times that we want. Make no mistake: this is not a London project; it is a network project, and there will be benefits for people right across the country.

Alistair Gordon: My experience is as an operator. I used to be part of the consortium that ran the TransPennine Express. Some of the trains between Liverpool and Manchester, Leeds and York were the busiest trains on the whole of the network. Creating more capacity in those networks is essential and they will benefit from the digital railway.

In terms of freight, for the last 15 years freight has also seen the benefits of growth. It has grown at more than 2% a year. The growth in freight is in similar areas as for passenger growth, so they are getting the same capacity constraints that we are seeing within the passenger market, and they are fully supportive of digital railway. There is investment and we will have to see how the investment is done so that there is a business case for them. Part of the reason why there is a digital steering group and a digital board is to make sure that the industry looks at an industry business case rather than just at individual companies.

Q33 Robert Flello: Are the freight operators represented on that board?

Alistair Gordon: They are. The freight operators are part of the Rail Delivery Group. They are part of the digital steering group as well.

Q34 Chair: Could you bring us up to date on progress in procuring, designing and fitment of ETCS equipment on passenger trains?

Andrew Simmons: In this control period of funding for 2014 to 2019, we had some money put aside to do a first in class, which is to make sure that for every unit we wanted to run

with ETCS we had installed the equipment, understood what was required to install it and had some indicative costs that we could use in contracts. We had a number of those set aside to do in this control period. We also had some funding to fit a number of trains, mainly freight, to assist in the east coast main line renewal. That was the funding we had available. We anticipated that passenger trains would be funded through the franchise arrangements that DFT had let with Virgin East Coast and GTR. That funding was originally £194 million. It was reduced in the Hendy review, but the funding was sufficient to allow us to make our revised CP5 commitments. However, if we are to accelerate in CP6, to bring back east coast, trans-Pennine and some of the other routes we are looking at, we will need some additional funding in CP5 to be able to achieve that programme. We are working through at the moment what those costs will be, and, as Mark mentioned earlier, we will be in a better position to know that towards the end of the year.

Q35 Chair: What is the impact of the reduction in funding, as you look at it now?

Andrew Simmons: The reduction in funding at the moment on our committed schemes in CP5 is zero, but it will impact on the roll-out in CP6, from 2019 onwards.

Q36 Iain Stewart: The one line that has already been developed and is using ETCS is the Cambrian coast line. I am aware that there have been various problems with it, as you would expect from a trial line, but what lessons have you taken away from its operation that might influence the programme going forward?

Andrew Simmons: We learned a great deal from Cambrian. First of all, Cambrian was originally specified more as a technical programme. A lot of the operational issues were only addressed late in the programme. Part of the roll-out programme that we are looking at is all based around how we make the change and how we get staff training in the new capability to use a digital railway. Although it is a technology-enabled programme, it is really all about how we migrate. That is the challenge. It is how to make sure that our operations colleagues have a system fit for purpose on day one, without having to learn on the job. We are looking at ways of changing the programme to make sure that we can deliver the railway and sustain that railway through the migration period.

At the time, for instance, Network Rail was at the forefront of fitting the rolling stock with ETCS. We are now obviously looking at whether the risks are best managed in the railway industry. Is it better for the train operating companies to look after those train fitment programmes rather than Network Rail directly? There are quite a lot of lessons we have learned in that area. The biggest one is that we have to acknowledge that business change is a major factor that we need to consider.

Mark Carne: When I first joined the railway, in the space of 24 hours I went from literally a Victorian signal box—we still have around 400 or so of those with the old lever frames—to a 1980s modern signalling centre, and then to a ride on the Welsh Cambrian line from Machynlleth. When you see the difference in technology, it just leaps out at you that you have to grasp this and take it. What really impressed me was the enthusiasm of the driver. Talking to the driver about driving one of the digitally controlled trains, he said, "I'd never go back." He was just so much happier knowing that he had all the signalling information that he needed on his desktop in front of him. It was really interesting. Transforming people in the industry to think in very different ways, exactly as Andrew

said, is one of the big challenges. Alistair and the train operating companies and the freight operating companies are the first to acknowledge that that is going to be one of the issues we are going to have to manage.

Q37 Iain Stewart: Following on from that, I understand that the next line that will be migrated to the new system is the Norfolk line towards Lowestoft. What steps are you taking to make this a whole industry approach, as several of our evidence submitters have suggested, rather than its just being a Network Rail project?

Mark Carne: It is not a Network Rail project. It is an industry-wide project, because the trains obviously have to be fitted and the train drivers have to be trained. Route control and everything has to change. One of the reasons why we want to do the Norwich-Yarmouth-Lowestoft demonstrator is that it will have traffic management, driver advisory and digital train control. It will have all the technology, as well as the human change, in one integrated railway, and a mixed use railway as well. That is the reason for doing it, and I think it is a very important demonstrator of the benefits that we will then get.

Q38 Chair: The Institution of Railway Systems Engineers says that freight operators see little benefit in installing ETCS in their fleet. Is that right?

Mark Carne: Certainly all the freight companies that I have spoken to can see significant benefits associated with digital train control. We want to see freight grow on our network. We want to see more containers taken off the road and put on to rail. Road congestion is a massive problem in our country and the railway needs to play its part. It becomes increasingly difficult to fit very long freight trains into a very crowded network, so the better we can manage the distance and separation of trains, the more capability we deliver to enable us to run freight trains. This is not anti-freight; it is very much pro-freight, just as we are in RDG and Network Rail.

Q39 Chair: I want to ask you about timetable planning. What can you do to improve that now, without waiting for the new technology?

Mark Carne: Timetabling is one of the most complex aspects of our business. It is a very time-consuming part of our business. Alistair is probably more expert at it than I am, but it is a complex part of our business, and changing the timetable is a very long process. It can take 18 months or so to make a significant change to the timetable—or even longer.

One of the advantages of digital train control is that we will have much more flexibility and capability to manage the timetable and potentially to make it quicker, but it is not just about technology and planning. It is about making sure that all the interests of all the people who use the network are being properly represented in that timetable change. The more complicated and the more congested our railway becomes, the more a single change to the timetable has an impact on multiple users. That is the difficulty we have today. You cannot just change the timetable to benefit one person without having a knock-on effect on others. It is that whole consultation process that really takes the time. The more we can create more capacity, the less impact you have on other users, and in principle it should become quicker to enable timetable change to occur.

Q40 Chair: Is there a goal of implementing flexible timetabling?

Alistair Gordon: One of the advantages we will get from digital railway, which we probably have not emphasised enough, is that we should be able to change or adapt timetables better from information that we will get from the trains. At the moment we spend 18 months timetable planning and then we implement it on a day in December. It takes us months and months and months to learn whether that timetable works and, if it does not work, what exactly is the problem with the timetable. Once the trains are all digitised and we know exactly where they all are and how they are moving, we will be able to go to what we call root cause analysis. We will be able to say, "What is actually causing the problem in the timetable?" and fix it quicker. There is that advantage. You may use the word "flexible", but we should be able to adapt timetables a lot quicker.

Q41 Chair: What would that mean? Would it mean less certainty for users of the railway?

Alistair Gordon: No. We would still publish a timetable. What it should mean is more punctual services. Where there are conflicts between two trains crossing at a signal or a junction, and one causes delay to the other, we should be able to adapt that. As Mark said, at the moment the timetabling system is very complex and will remain complex because trains are interacting and crossing each other. Trains are coming into London where there are terminal stations and platform constraints. The building up of the network and layering of the timetable is very complicated.

Q42 Chair: What do you need the Government to do to enable this system to go ahead, apart from funding it? What do you need to happen, in relation to, say, franchise holders or rolling stock companies?

Mark Carne: Because it is an integrated railway transformation programme, we will have to integrate the requirements of the train fitment and the change in the operation of the trains in the franchises, and then map those to the changes in the fixed infrastructure. We need to work hand in glove with RDG, the Rail Supply Group and the DFT to move forward in a planned, sequential way. At the moment we are trying to map out what the journey might look like over the next 25 years and what sequence of events would take place so that we can align the investment in the infrastructure with the changes in the franchise that would then occur.

Q43 Chair: Should the Government compel rolling stock providers to install ETCS or C-DAS? Do you think the Government should have that role?

Mark Carne: They will need to as part of the franchise when that franchise is going to run over a network that has ETCS installed on it. Ultimately, I want to remove the physical signals so that the only trains that are able to run on that particular part of the network are those fitted with ETCS capability. I do not want to run two systems in parallel. It makes no sense to me to have an ETCS-enabled railway and still have the lights fitted. Yes, people will be compelled to have it fitted if they want to use their trains on that part of the network.

Q44 Chair: What is the impact of C-DAS on South West Trains?

Alistair Gordon: I am not sure I understand the question.

Mark Carne: The connected driver advisory system is a mechanism that enables the driver to get constant updated information about how fast he should be driving and how well he is fitting to the timetable in real time. We believe it makes a significant difference to the reliability of the system as a whole. It is an advance on the previous system, which was just the driver advisory system, and was basically used very largely to help manage fuel consumption on trains. It enabled drivers to take their foot off the gas when they were a little bit ahead of the timetable and just coast for a bit. It made a significant difference in reducing fuel consumption on networks where it was installed.

C-DAS is connected in real time and gives the driver information. It is a very important part of the digital railway programme, but its real value is when it is integrated in the train control system and the traffic management system. An individual train can understand where it is relative to all the other trains on the network. That is the secret: we know where all the trains are and we can manage their criss-crossing paths in a dynamic and active way. It is going to be at its most valuable, in many respects, when we have disruption. What you see today when we have disruption on the network is that the knock-on effect gets worse and worse year by year because the railway is so congested. All the planning about how to get the railway back into order is done manually, with people sitting there and saying, "How do we get the railway back?" With traffic management, that will all be done on the computer. The computer will work out all the different permutations and the best way to bring the trains back into their pattern. We think we can dramatically reduce the amount of disruption to passengers. The moment the computer has worked out the best way to bring the train service back into pattern, you can then send that information directly to the trains and to passengers. Passengers will know much quicker how they are going to get home that night. The algorithms will have worked it out. They will send the information to the trains or directly to people's phones and they will say, "Okay, I know we are disrupted but I am still going to get home by 19:22 or whatever."

Q45 Chair: Your vision is very ambitious. You are talking about a 40% increase in capacity, more information about what is happening on the line and then being able to use that information as well as giving it to passengers. Is any of this likely to be achieved or is it a pipedream? Is it going to be a big scheme that just will not happen or won't deliver what has been promised?

Mark Carne: It is not a pipedream. All of this technology exists. I am not a railway person. I have spent my life in a different industry—the oil and gas industry. The oil and gas industry absolutely thrives on technology. Three times in my career the industry was utterly transformed by a technological revolution that completely changed the industry. I think this is an opportunity for the railway industry to be changed and to deliver a massively different and higher quality service for the benefit of pass1engers in this country. It is a fantastic opportunity. If we get behind it, we can make it work, but that is what we have to do. As an industry, we have to get behind this and say, "You know what: we are going to make it happen," because together we can make this happen.

Q46 Chair: Can the industry itself make it happen or will it need Government to be more involved?

Mark Carne: It is going to need Government funding. I want to be really clear that my belief is that the digital railway will be a lower cost option for delivering the capacity that this country needs. This is a way of saving money and delivering the benefits faster than the other alternatives. That is going to be the fundamental business case. It is going to be lower cost and you are going to get the benefits faster. That is what we want to prove to you when we bring the business case back at the end of the year.

Alistair Gordon: The technology that we are talking about—digital railway—is already on many parts of the railway. As I said, we have seen the Victoria line go from 28 trains per hour to 34 trains per hour purely because of the system changes. We are putting it into Thameslink at the moment. Thameslink runs 18 trains per hour. In two or three years' time, it will be 24 trains per hour. The capacity increase there is 30%. It will not be 40% across the network, but up to 40% capacity increase could be achieved. The incremental steps that are going on in the industry—the driver advisory systems—do not add capacity. All they do is, maybe, allow a little bit of punctuality and reliability improvement. If you think about it as if you are in your car driving along a set of traffic lights, all the driver advisory system does is to try to get you to control your speed so that you hit all the lights at green. Once we get into a new digital system—the ETCS—we will see the traffic lights move so that all the cars move at the same speed and we can get more cars on to the road, or, in our case, more trains on to the network.

Q47 Iain Stewart: You have partly answered my question. I wanted to ask one final question on how important digital railway is in the overall package of capacity improvements. It is a system that will run over several control periods, and no one can predict what Governments in the future will want to commit in resources. On a hypothetical basis, let us say that what has been spent in CP5 is the quantum for the next few control periods. Do you see digital railway taking away from some of the hard infrastructure improvements?

Mark Carne: Absolutely. We will need far fewer physical interventions. The example that we have is on the east coast main line, which is one of the first railways where we will install digital railway. There is a bottleneck at Welwyn where four tracks go to two tracks, there are tunnels, viaducts and so on. If we put in digital train control, we can get the trains through on two tracks. The alternative is to build more tracks. That is hugely expensive and very disruptive. Yes, this should absolutely be at the top of the pile of things we should be doing.

Alistair Gordon: There is an opportunity for private funding as well. The capacity benefits will bring huge new revenue from passengers and that can be captured through private investment.

Q48 Chair: Will we still need High Speed 2?

Mark Carne: Yes, absolutely. We are still going to need some new railway systems such as Crossrail 2 and High Speed 2. We have never claimed that digital railway is a panacea for all the ills of the railway—the capacity challenges we have; but it is a huge opportunity to increase not just the capacity but the reliability, the safety and the environmental footprint of our railway as a whole, as a network. That is what is really exciting about this. It is also at a lower cost.

Chair: That sounds like a good note to end on. Thank you very much.