AGREED FORM DOCUMENT "ERTMS"

Part 1

Authority's specification for the ERTMS Trial dated 15th May 2003

ERTMS Trial in Mid Wales

Introduction

1.1 Further to Section 7.2 of the document titled "Best and Final Offers Core Proposition relating to Wales & Borders Franchise" (BAFO CP 20th November 2002), we now provide additional information in relation to ERTMS trials and request prices for participation in the trial.

BACKGROUND AND CONTEXT

2.1 As outlined in greater detail in the BAFO CP the European Rail Traffic Management System (ERTMS) is an operating system for managing rail traffic. It will enable interoperability of trains across European borders and also provide automatic train protection (ATP). It has the potential for increasing both network capacity and efficient train control and allow for quicker disruption recovery.

2.2 As part of the testing and risk management process before national rollout, one or more Early Deployment Sites (EDS) will be implemented. The exact details of the location, timing and extent of trials on EDS sites have yet to be finalised, however, the Cambrian Coast has been identified as a likely site. Bidders are asked to submit a price for their participation in the trial as outlined below.

2.3 The implementation on the Cambrian will take place in several phases:

- Non invasive field trials NIFT (temporary fitment of equipment to a train)
- Phase 1 Test & Commissioning – out of hours testing using a fleet of trains 6 – 7 months in 2006/7 or 2007/8
- Phase 2 Driver Training / Early Deployment Site implementation – can be carried out concurrently with parts of Phase 1.
- Phase 3 Revenue Service – Early Deployment Site implementation. Initial operation of the system in revenue service may require increased driver supervision/ surveillance, and in the most extreme case may require double manning. This will lead on to trial commercial running in normal schedule operations which should last approximately one year. Because of the low service frequency on this line, full commercial operation would commence immediately along with monitoring of that operation. It is envisaged that normal staffing levels would suffice but as stated above the extreme case of problems would at worst require double manning.

THE PROPOSAL

3.1 The core proposal is that System 'D' ERTMS will be fitted between Machynlleth and Dovey Junction (approximately 4 miles). (Though see comments on Bigger Scheme below).

3.2 The train operator will be required to co-operate in the trial including the provision of the following services and facilities:

3.2.1 **Make 1 train available for non-invasive field trials (NIFT) fitment**. This will involve one 158 unit (i.e. two vehicles) for the NIFT with a fitment time maximum of 3 weeks some time between January 2004 and April 2004.

3.2.2 **Make 11 158 trains available for fitment and testing of On Board Assemblies** from mid 2004 to late 2006 prior to operational trial:

Vehicles to be fitted to ERTMS level 2

Following on from NIFT (completed by mid 2004) train fitment planned

1st of 2 car class 158, 9 weeks out of service for fitting, 40 weeks testing.

2nd 4 weeks for fitting

3rd and following to 11th set 2 weeks for fitting

(Set 2 will not be fitted until testing on 1 is complete.)

All 11 Cambrian Class 158 to be fitted and captive for use on this line. No unfitted vehicles to operate on the line during operational testing.

3.2.3 Note that it is anticipated that the operator will be expected **to procure the ERTMS equipment together with the fitting and maintenance** of that equipment to the trains. With this in mind Bidders must confirm that they will undertake this role and advise a cost for the supply, installation and maintenance of the ERTMS equipment to be fitted to trains, such cost and equipment to be in accordance with the following information.

3.2.4 For the purposes of this submission, bidders should assume that the equipment is to the latest UNISIG Class 1 specification (current Version 2.2.2). Bidders are advised to contact The Railway Industry Association (RIA) Tel: 0207 2010777 (http://riagb.org.uk) for a list of known suppliers of the equipment.

3.2.5 At this stage the costs provided will be treated as a Provisional Sum and accordingly, bidders must also advise which elements of the cost will attract further oncosts for management etc., and which elements will be provided net or are included already in the bid.

3.2.6 Bidders should state what they would expect those oncosts to be either as an absolute value (for example based on an amount various people's time to be allocated to the project) or related to another sum (e.g. % of value the equipment to be procured).

3.2.7 It is intended that the operator will be provided with a firm specification for the equipment required, including any adaptations etc., to manufacturers standard products if required, at the appropriate time. Firm costs for train fitment, operation and maintenance will be determined as a result of that exercise.

3.2.8 **Co-operation with operational trials** Phase 1 and 2 which will take place out of timetable operating hours in 2007 and 2008 or possibly 2006 and 2007. Prices to be quoted in terms of price per train hour (inclusive of driver) and per train mile working on the trial. This phase is expected to last 6 – 9 months. The scale and complexity of the testing will increase during the testing period. It is envisaged that the implementation team would wish to second a core team of two drivers from the operator for the period of this phase. The ERTMS implementation team will manage the day-to-day management and driver rostering. However the operator would still be required to ensure driver competence and welfare in accordance with their current standards. Given the unique nature of this work, highly experienced drivers will be required for the testing activities and may need to be supported by a Driver standards manager.

3.2.9 During this initial 6-9 months testing period a driver would be needed for the whole 8 hour shift every night and it is envisaged that they would be covering on average 50-70 miles a night (there is an assumption that running will not just be over the junction particularly if System E is in place)

3.2.10 **Maintenance of the On Board Assembly** during and following the operational trials on this early deployment site. This work can be incorporated in the normal unit maintenance cycle (apart from specific failures.)

3.2.11 **Provision of sufficient drivers** to operate the 11 158 trains on the Cambrian Coast.

In terms of training the bidders should assume:

- That appropriate training material and if necessary simulators are available to support training programmes free of charge to the operator
- That drivers will be made available for training by the operator as necessary for the project and that this may mean that additional driver resource has been made available to release other drivers for training.
- Initial timetable driving with ERTMS may involve double manning of drivers.
- On train training will take place out of normal operational hours.
- 18 working days will be required for driver training for level ‘D’ - predominantly classroom based. (This estimate is higher for the EDS than national roll out).
- Estimates of costs should be in line with your normal training arrangements

Estimates should give a per diem price indicating different elements of cost e.g. driver time, training facility and any accommodation cost plus any additional drivers required to enable the training to take place.

3.2.12 **Maintenance of On Board Assembly** assuming:

- that for EDS significant supplier support resources will be available.
- TOC maintenance of ERTMS equipment is kept simple.
- 1 day appreciation course for will be required for supervisors (training course free of charge to operator, but operator will need to price the cost of releasing the staff)

- 1 day appreciation and 2 day fault finding course for general fitter / electrician (training course free of charge to operator, but operator will need to price the cost of releasing the staff)
- Estimate for TOC train maintainer training at c10 days for specialists (training course free of charge to operator, but operator will need to price the cost of releasing the staff)
- the TOC will need 1 or 2 personnel trained at the specialist level. (1 person to be full-time)
- One lap-top (provided by the TOC but with software sourced from the On Board Assembly supplier) will be required to carry out maintenance work.

3.2.13 **System D junction work installation and testing** October 05 to December 06 will require a small number of abnormal possessions and the operator will be **required to co-operate including provision of alternative passenger transport services at minimum** cost when required.

3.2.14 **Data on ERTMS related faults** and issues to be communicated by the operator to the project team and held available for the industry. Trains to be made available for downloading of information in line with TOCs normal maintenance cycle. The on Board Assembly diagnostics will provide the information that can be downloaded with no disruption to TOC.

3.2.15 Existing operator configuration management and defect reporting systems will be able to support ERTMS trials and lifetime operation. **TOC will assist failure investigation** in a timely manner, including access to all trainborne data and equipment.

3.3 Bidders should respond on the basis of the base case outlined above taking into account the impacts this would have on them.

3.4 If there are operational or other issues that would lead a bidder to believe that they would take a different approach (e.g. different number of trains fitted, or level of maintenance equipment depending on the approach to fleet flexibility and location of elements of maintenance work etc.) this should be indicated separately with an estimate of the impact this difference would make to their response.

Separation of Estimates

4.1 It is likely that the specific details of the trial will change and therefore the costs may need to be varied. In order to provide a starting point for discussions on such a variation, bidders should provide a break-down of their costs so that the different elements can be changed in the light of emerging facts.

4.2 The costs should be set out as follows:

Costs associated with Rolling Stock Fitment

Cost of procuring On Board Assemblies (management costs if required).

NIFT – hire of replacement rolling stock
any other costs associated with fitment

Operational Trial	hire of replacement rolling stock any other costs associated with fitment

Costs of driver/train provision for trials

additional drivers hired and trained
driver training for ERTMS trials
staff wages during training
back filling to cover duties (not double counting additional drivers above)
accommodation or other training related costs
price per hour/shift for trial driving trial trains (not double counting additional drivers above)

Costs of maintenance for Trial and continued operation

Any additional maintenance staff
Supervisor training (broken down as appropriate)
Other training

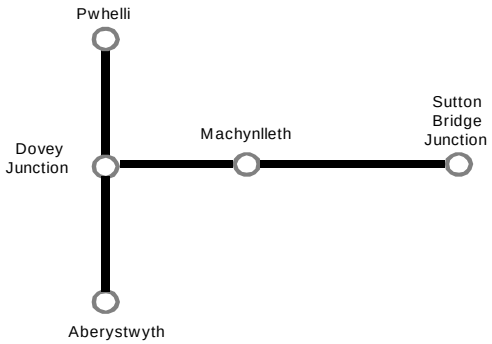
Any Other costs associated with the trial either fixed price or proposed pricing methodology.

The Bigger Scheme

5.1 Network Rail is currently investigating replacing the RETB system in use on the Cambrian Coast with an ERTMS System E. This would complement the System D trial. If this system goes ahead, the operator will be expected to co-operate in implementation and any reimbursement of costs will be based on the costs submitted in response to this note.

5.2 The implementation of ERTMS System E as described above will have no impact on the specification of equipment to be fitted on trains i.e. Trainborne equipment will be identical regardless of whether the infrastructure is fitted with System D or System E.

EDS – Cambrian Coast schematic



Infrastructure:
4 miles of System D from Machynlleth to Dovey Junction.
Trains – Eleven Wales & Borders Class 158's

Part 2

Franchisee's ERTMS Proposal dated 9th June 2003

1. Introduction

Further to its response dated 2 June 2003, Arriva has now evaluated the remaining item in the SRA's Note to Bidders for Wales & Borders dated 15 May 2003; that relating to a proposed trial of the European Rail Traffic Management System (ERTMS) on the Cambrian Lines. This document describes the method that Arriva will use to manage the rolling stock aspects of the ERTMS operational trials and Early Deployment Scheme (EDS), as set out in Annex 2 to that note.

Arriva is willing to commit to cooperate with these trials as set out in this document and subject to the conditions listed in Section 2 Conditions and Assumptions below. Arriva has evaluated this Option against its Baseline Proposal and, for the avoidance of doubt, support payments and changes in such payments quoted herein are in comparison to that Baseline (unless stated otherwise). However, Arriva does not consider that the *change* in support payment, as opposed to the absolute amount, for this Option would be materially different if the SRA selects other Options offered, except that if the SRA selects a service reduction Option it may be appropriate to review the number of units to be equipped with ERTMS. Conversely, if the SRA selects service increase Option(s) that use the class 158 unit released in the Baseline proposal in December 2004 then there may be an impact on the availability or cost of the extra unit referred to later in this proposal as required to provide cover for fitment and testing.

The incremental costs are itemised in Appendix A and summarised in Annex 1. The incremental net effect on nominal franchise payments, in NPV terms, is an increase of **£5.074 million**.

2. Arriva's approach

The ERTMS requirement has arisen from European Inter-Operability Regulations and the reports on the Southall and Ladbroke Grove crashes. The system is potentially available at various different levels and is still, both the infrastructure element and on-train equipment, in the course of development. Arriva recognises that the SRA is now sponsoring the UK development and deployment of ERTMS through the Single National ERTMS Project Team (SNEP). Arriva is pleased to assist this important project as part of the Wales & Borders Franchise.

Arriva's approach is that it will be responsible for clearly defined elements of the Cambrian ERTMS project, essentially modification of units and their subsequent operation in both trials and service, within an overall project managed and otherwise undertaken by other parties (presumed to be the SRA and/or Network Rail, or their agents). Hence infrastructure development is assumed to be managed by Network Rail and does not form part of this paper, except to the extent that there is a recognition that there needs to be compatibility between it and the on-train equipment.

Arriva has identified six potential suppliers of the on-train equipment but has based its proposal on the Bombardier equipment for the reasons listed next.

- It is a proven design that has been tested and used in a working environment on part of the Olten-Luzern line in Switzerland for the past two years.

- It comprises a series of discrete modules, which are more easily installed on an existing train, rather than a large cabinet that is the basis of all the other suppliers' designs. This should also avoid loss of seating, which is almost inevitable with the large cabinet systems.
- Despite some press reports to the contrary, the ERTMS equipment itself appears to be working well and is contributing towards a service performance of 98 per cent punctuality on the trial route in Switzerland, which carries both freight and passenger traffic. The reported early problems on the trial route appear to relate to GSM-R reception problems and not to the ERTMS itself.

By choosing Bombardier Arriva believes it will:

- lower the risk of the project failing at the first hurdle of installing the equipment into the restricted space of a class 158 unit:
- not lose passenger seats, which would otherwise be the case with the single large cabinet design from other suppliers: and
- reduce the equipment-related risks during the proposed trial, because of the more proven nature of the Bombardier product.

However it should be recognised that whichever equipment is chosen there still remains a high level of risk to the project arising from:

- the embryonic nature of the track/signalling infrastructure design:
- the existing on-train equipment is based on European specifications and will need to be customised for the UK environment and interfaced with both the train and the track/signalling infrastructure: and
- specification changes to ERTMS.

Arriva recognises that these issues exist and believes it is in a good position to manage the on-train part of the project and to link in with all the other key organisations that will be involved in the trial.

An itemised cost estimate for the proposed trial, based on the assumptions given in this document, is shown as Appendix A and the impact on support payments in Annex 1.

A plan showing the main activities and anticipated timescales for the rolling stock fitment and trials is attached as Appendix B. This project plan is indicative only and is based on what is thought to be the best achievable timescale at this point in time. The plan would need to be finalised once the final specification and time frame for the re-signalling works become available.

An alternative plan has also been developed to offer the SRA an opportunity to avoid the Non-Invasive Field Trial (NIFT), which would have the benefit of allowing more time at the beginning of the project for planning and to lower the risks associated with driver training and equipment/infrastructure interfaces. This is shown as Appendix C.

3. Conditions and Assumptions

Arriva's conditions and principal assumptions upon which this proposal is based are set out next.

- The track/signalling infrastructure and rolling stock fitment projects will be managed separately, with Network Rail having overall responsibility for systems integration.
- System D ERTMS, to UNISIG Class 1 Specification, will be fitted.
- Arriva will be permitted to procure compliant equipment of its choice and will not be required to participate in joint procurement with the infrastructure element of the project or have its choice constrained by other parties (including Angel Trains).
- Double manning will not be required at any time during phase 1 and 2 of the operational trials.
- Arriva will not be required to use a simulator to train its drivers or, if so required, the cost of such simulator will be met by the SRA.
- Driver Only Operation (Non-Passenger) (DOONP) will be authorised and used for all testing outside revenue service.
- The equipment fitted for the Non-Invasive Field Trials (NIFT) will not be reused for the operational trials.
- The unit fitted for NIFT is available for passenger service except during three weeks for equipment fitment.
- Arriva will not be required to modify or remove the equipment fitted for Phase 1 Testing, Phase 2 EDS Implementation and Phase 3 Revenue Service unless its additional costs of such modification or removal are met by the SRA.
- Arriva will use reasonable endeavours to obtain such consents of other parties (such as Angel Trains and the HSE) as are necessary to Arriva's part of the project, but, having exercised such reasonable endeavours, shall not be liable for any delays or costs to other parties in the project if such consents are refused or delayed.
- The performance regime (Schedule 8) of the Track Access Agreement shall be suspended in respect of the project such that no payments shall be made to or from Network Rail in respect of delays, cancellations or loss of access arising from ERTMS until such time at the conclusion of Phase 3 Revenue Service trials that Arriva, Network Rail and the SRA agree that the system is working at least as well as the current signalling and that it shall be made permanent.
- The performance, capacity and enforcement provisions of the Franchise Agreement shall not apply to any delays, cancellations, timetable change and/or reduction in capacity arising from any stage of the project, until such time at the conclusion of Phase 3 Revenue Service trials that Arriva, Network Rail and the SRA agree that the system is working at least as well as the current signalling and that it shall be made permanent.

4. Project Management

This section describes the project management that Arriva would adopt for the delivery of the ERTMS rolling stock project and operational trials. The timing and inter-relationship of the various tasks is illustrated by the project plan shown in Appendix B.

Arriva has considerable experience of project managing the introduction into service of complex systems and will bring this to bear on this project. A recent example of this is the fitment of TPWS equipment to the Arriva Trains Merseyside (ATM) and Arriva Trains Northern (ATN) fleets ahead of target completion dates and despite the existence at ATN of 10 different sub-fleets and a shortage of units.

Arriva will also use (and has included the cost of) certain key personnel from Bombardier and Angel Trains to manage some of the technical interfaces and safety case issues.

4.1 Non-Invasive Field Trials (NIFT)

This early phase of the project is due to start as soon as the new franchise is let. It is principally concerned with the procurement, approval and fitting of the on-train equipment, testing its compatibility with the UK infrastructure and preliminary testing of the track/signalling infrastructure.

On-train equipment

Arriva will procure the initial fitment of the temporary equipment for NIFT through Angel Trains. The emerging European-based Command and Control signalling standard (which is part of the suite of Technical Standards for Interoperability (TSI)) is expected to be available by the time the NIFT takes place. However, because the equipment will constitute a temporary installation, it is likely that the Notified Body (NoBo) will evaluate the fitment against a combination of the TSI and Railway Group Standards. It is therefore likely that approvals will be achieved for different aspects of the system via both routes. For the European standards the 'Contracting Entity' would be Angel Trains; for the normal UK-based approvals via the Rolling Stock Advisory Board (RSAB) and HMRI, the leading entity would be Arriva Trains Wales (ATW).

Arriva will reach an agreement with Angel Trains on the most appropriate location for the NIFT equipment fitment. Arriva's preference is for the work to take place at Machynlleth depot, so that lost availability due to transit movements is minimised.

Throughout the trial period Arriva will ensure close liaison between the infrastructure project team and the designers of the on-train equipment, so as to deliver compatibility of the two sub-systems. Arriva proposes that joint project meetings are held with the infrastructure designers and installers from the outset, which will maximise the chances of the NIFT being successful.

Unit availability

Arriva would ideally wish to hire an additional unit to cover the installation of NIFT equipment and to act as a reserve during NIFT in case the test unit is not available for passenger service in the operating day. However, neither Angel Trains nor Porterbrook is able to supply an additional unit when required in early 2004. It is, in any case, difficult to make effective use of another unit unless it is fitted with RETB.

Arriva's proposal to deal with this situation is to withdraw diagram 646 in its Baseline Unit Diagrams (BAFO Appendix C) as necessary, covering its Cambrian workings with diagram 642. This would have the following effects on the Cambrian service.

> 09.27 Shrewsbury-Birmingham not strengthened
>
> 10.34 Birmingham-Aberystwyth/Pwllheli not strengthened between Birmingham and Machynlleth and the Pwllheli portion starts from Machynlleth as a connection
>
> 09.42 Pwllheli-Birmingham terminates at Machynlleth with connection onto 11.36 Aberystwyth-Birmingham, which would not be strengthened from Machynlleth to Birmingham

14.34 Birmingham-Aberystwyth/Pwllheli not strengthened between Birmingham and Machynlleth and the Pwllheli portion starts from Machynlleth as a connection.

In addition Arriva would plan to cover the other non-Cambrian workings of diagram 646 (06.14 Shrewsbury-Chester and 0825 Chester-Shrewsbury) with class 153 diagram 503, required later in the day in West Wales, but would reserve the right to substitute a bus if this does not prove to be practicable.

Arriva considers that the above temporary and contingency arrangements would be quite satisfactory for the proposed three-week NIFT fitment period, except during high Summer (July and August), and notes that NIFT fitment is programmed to be completed before Summer 2004.

Drivers

In parallel with equipment installation four drivers will be trained, so as to allow two drivers to be seconded to the test team, leaving two drivers to provide cover when the seconded drivers are on leave etc. Arriva understands from the SRA that the involvement of drivers in ERTMS equipment during NIFT will be minimal, as it will not be installed in the cab or interfaced with other train equipment and, therefore, training requirement will also be minimal at this stage.

The timescales proposed for NIFT do not allow sufficient time for new drivers to be recruited and trained at Machynlleth as cover for the two drivers working on the trial. However, as indicated in its BAFO and subsequently to the SRA, Arriva considers that there will be a surplus of drivers over establishment in the first year of the Franchise. This surplus will be largely at Cardiff and no surplus is anticipated at Machynlleth or Pwllheli. Arriva's proposal for NIFT is to seek volunteers to lodge temporarily at Machynlleth. The duration of this will have to be sufficient to permit route learning as well as the trials.

During NIFT full technical and maintenance support will be given by the equipment supplier therefore training of maintenance staff will not be required at this stage of the project.

The test paths for the trains will be planned by Network Rail, and the trains will be operated under their instructions in order to test the infrastructure-based equipment. As indicated earlier, it is assumed that test trains will operate DOONP and if this proves impossible, Arriva will have its reasonable costs of providing conductors reimbursed additionally.

Upon completion of NIFT, agreement will need to be reached on any design changes required as a result of the trials. Network Rail will have overall responsibility for resolving any system integration issues arising from the trials. It is expected that design changes required to the main equipment modules themselves will be minimal. However, in view of on-going development work to achieve compliance with the latest UNISIG Class 1 specification (current version 2.2.2), Arriva believes that all NIFT equipment would be removed and fresh equipment provided for EDS fitment.

Possible avoidance of NIFT

Although Arriva would be pleased to take part in the NIFT, and this proposal has been prepared on that basis, discussion with potential suppliers leads Arriva to question the benefits of NIFT as compared with making an earlier start on EDS Phase 1 fitment. Bombardier considers that its equipment is proven and reliable in

commercial service, so NIFT has no relevance in developing on-train equipment. The only real issues relating to the trains are the location of equipment, cable runs and, in particular, fitting the driver's display into the cab control panel. As none of these will be attempted as part of NIFT it is essentially a diversion compared with making a start on a comprehensive survey and design work for a permanent installation of ERTMS equipment into class 158 units.

Arriva appreciates that NIFT may have benefits in relation to the track and signalling systems, but notes that these have also been developed and used elsewhere. Furthermore, Arriva understands that current procurement by Network rail of GSM-R is for a voice-only capability. Avoidance of NIFT would allow more time for Network Rail to develop and provide a combined voice and data based GSM-R system for transmitting between the train and the control centre on the Cambrian Lines, initially in the EDS test area, but capable of expansion to the 'Bigger Scheme'.

The costing of this proposal assumes that the NIFT is carried out from January 2004, as specified. There would be significant savings if NIFT is avoided, as most of the costs to Arriva would be of no benefit to the later EDS trial. This is because a permanent design is not developed, all equipment is removed and all training would have to be repeated later due to the time interval. Arriva would be pleased to discuss this further with the SRA if required.

4.2 EDS Phase 1 testing and commissioning

On-train equipment

Arriva will provide access to Angel Trains and their design agency for vehicle condition surveys on the class 158 units during routine maintenance to initiate the installation design. Bombardier will use the resulting engineering drawings, specifications and procedures to install its equipment. Arriva understands that the equipment available now is not fully compliant with the latest UNISIG Class 1 specification (current version 2.2.2), however, there is close conformity to this specification and further development is currently underway to ensure the equipment comes fully into line with this latest specification. Arriva will seek the highest level of compliance commensurate with the desired timescales.

At least 6 weeks will be required following NIFT for design changes to be made before EDS Phase 1 Testing and Commissioning commences. Angel Trains and Bombardier will revise the ERTMS design to production standard. The changes to the design would be managed through their engineering change control processes.

Amendments will be made to the Railway Safety Case prior to the commencement of testing to allow operation of the ERTMS for both operational testing and revenue service. The amendment to the Railway Safety Case will be submitted to HMRI for approval, as they would be a material change.

It is assumed that all the equipment used for the NIFT will be removed from the unit and new equipment to production standard will be fitted. The lead-time for the material for the first unit would be approximately 12 weeks.

By involving the NoBo and Route Acceptance Panel from early in the project, in parallel with NIFT, Arriva considers that the approvals process can be effectively managed so that delay is not introduced into the EDS. As with NIFT the management of the procurement, fitment, test train planning and testing of train-

borne equipment during the EDS phase 1 will be managed by Arriva via Angel Trains and Bombardier.

After commissioning and initial testing of the first unit the design will be reviewed, in conjunction with Bombardier, Angel Trains and their design agency, to identify any final design changes. Once the design has been reviewed a design freeze will be declared, which it is assumed will be approximately two months after the completion of the first unit.

The final design changes will be managed through the Angel Trains design control process, and verification/re-approval will be obtained from the NoBo and Route Acceptance Panel as required.

Once the design freeze is in force the material will be ordered for the further 10 units. It is assumed that the lead-time for this material will be a further 12 weeks. The proposed fitment plan for the 10 further units is included in Appendix B. At this stage the two weeks down time suggested for units 3 to 11 appears to Arriva to be optimistic. This view is based on the extent of the modifications to the vehicles and the time required for movement costs should the contractor require units to be moved to their own site. Arriva considers a downtime of three weeks per unit to be more realistic and has planned on this basis.

Unit availability

Arriva believes that fitment of the first unit for EDS trails could commence at any time from September 2004 (the end of peak Summer loadings), using the temporary service alterations described earlier under NIFT. From the Winter Timetable in December 2004, an extra class 158 unit would be available in the fleet as a result of more efficient diagramming and improved availability (as described in Arriva's BAFO). As this unit would otherwise be released, its retention would be a cost against the EDS trial, but it would provide the required additional unit to retain normal services whilst the EDS fitment and trials proceed, avoiding the requirement for the temporary service alterations to be made over a prolonged period.

Commencement of fitment of the first unit in September 2004 (as shown in Appendix B) would enable testing to commence as soon as early 2005. It may be, however, that the infrastructure will not be available by early 2005, in which case Arriva's fitment programme can be slipped by the appropriate amount. If fitment is not until after December 2004, then the additional unit described above will be available and temporary service changes will not be necessary.

Arriva has assumed that at any stage in EDS no more than one unit is unavailable for daytime passenger service (with ERTMS isolated if fitted).

Drivers

The SRA requirement contained in Annex 2 of its Note to Bidders requires two drivers to be seconded to the ERTMS test team. To achieve this on a robust basis Arriva will train four drivers to give cover for leave, sickness etc and also to avoid excessive periods of permanent night work during the proposed 40 weeks of non-service testing. By the time the Phase 1 EDS trials take place, the surplus of drivers over establishment at the start of the Franchise will no longer exist. Two additional drivers will therefore be recruited and trained and then based at Machynlleth. These will initially cover secondment to the night trials and, at a later date, cover release for ERTMS training of all Cambrian traincrew.

If it is intended that the test train will be in operation for a full 8-hour shift then both the seconded drivers will need to be on the train for each nights testing, so that Personal Needs Breaks (PNB) can be provided. Rostering arrangements will limit the number of nights of testing that can be performed if both drivers are required on duty at the same time. Alternatively, if the shift is arranged to allow PNBs, then only one driver would be required at a time and more nights of testing would be possible.

As under NIFT, it is assumed that test trains will operate DOONP and if this proves impossible, Arriva will have its reasonable costs of providing conductors reimbursed additionally.

Due to the type of testing being undertaken Arriva considers that a Driver Team Manager will be required to ensure safe operation of the train, in particular to manage the communication between the driver operating the train and the test personnel.

Arriva's proposal in respect of traincrew therefore includes the recruitment and training of two new drivers able to work from Machynlleth during EDS trials, the training of four drivers in the use of ERTMS and the provision of two drivers and one Driver Team Manager for the night trials. Subsequently all traincrew working on the Cambrian Lines would be trained in the use of ERTMS for the full service trials.

Maintenance

Training for maintenance supervisors, artisan staff and specialists will be provided at EDS Phase 1 fitment stage. It is proposed that ERTMS maintenance is concentrated at Machynlleth and the maintenance workforce of eight people will be trained to look after the ERTMS equipment.

It is assumed that there will be no additional requirements for ERTMS A exam testing although a functional test during B exams will be carried out. For costing purposes it is assumed the B exam test will take one man-hour per exam. Also for costing purposes it has been assumed that on average 10 man hours per month will be required for fault finding and rectification.

In addition to this Arriva will make provision with Bombardier for a 24-hour helpline to assist in the investigation and rectification of faults. Instruction manuals will be obtained from Bombardier and made available for the trained staff.

Arriva will ensure that sufficient warranty spares are made available at Machynlleth depot. The longer term spares strategy will also be agreed at the fitment phase in order to fix the price for future spares. At this stage it has only been possible to obtain prices for a complete set of equipment, rather than individual spares. The price for spares has, therefore, been estimated based on one complete set being used for spares each year.

Maintenance documentation will be amended, based on the equipment supplier's recommendations. The revised documents will be re-certificated and controlled out for use by the artisan staff.

Some additional equipment may need to be procured for use at Machynlleth during maintenance equipment, for example a lifting table will be required for changing the antenna, which weighs 15kg. This has been included in the costs.

4.3 Phase 2 – driver training for Early Deployment Site Implementation

New or revised operating instructions, including Rule Book amendments, will be produced by Network Rail and agreed with Arriva Trains before driver training commences.

The two additional drivers recruited to cover the Phase 1 trials will help to cover the release of Cambrian Line drivers for training. In addition drivers from other depots may be lodged at Machynlleth from time to time. The maximum number of drivers per course will be four. There will be approximately 30 drivers to be trained. The classroom-based course will be for approximately four weeks but an extra week has been allowed for the trainee drivers to operate the trains out of hours.

Driver training will start immediately the second unit has been modified. The driver training programme will run in parallel with testing and commissioning. Arriva will seek suitable training equipment from the equipment suppliers, but recognises that the small size of the project makes it unlikely that a simulator can be justified and has not included the cost of such a facility.

4.4 Phase 3 – Revenue Service

Once all the units have been modified the implementation date will be agreed with Network Rail. It is proposed that ERTMS will be made operational on all 11 units over a short period of time (eg over a weekend). Arriva will ensure that Bombardier provides on site support for an appropriate period at the start of operation in revenue service.

Arriva will reach an agreement with Network Rail on the monitoring process to be used for the ERTMS on-train equipment faults and failures, including a process for dealing with reported defects where no fault can be found with the train or infrastructure based equipment.

Arriva will agree a rigorous specification with the Angel Trains and the equipment supplier for post incident testing of the equipment.

5. Risks

Arriva considers that the risks of the project are in four key areas.

- Strategic Risk - There are a number of areas where the development of ERTMS in mainland Europe may impact upon ERTMS developments in the UK (as described in sections 6.9 and 8.4 of the EPT Year 1 Progress Report).
- Development Schedule Risk - The risks identified through the Development Schedule Risk Analysis, as described in section 6.10 of the EPT Year 1 Progress Report, are un-mitigated at present.
- Technical Risk – In particular finding sufficient space to dual fit the equipment in the cab and saloon of the unit and interfacing it with existing train systems. Arriva considers that this risk is much reduced by selection of Bombardier as the supplier.
- Specification creep - There are a number of working groups as defined in section 2.7 of the EPT Year 1 Progress Report. The authority of these groups to request specification or operational rule changes needs to be fully understood and controlled.

There are risks associated with the timing and scope of the infrastructure works to support ERTMS operation. Arriva would need confirmation that the scope of the Cambrian coast re-signalling will be sufficient to support reliable operation of an ERTMS system. In particular it is understood that the currently proposed spacing of the GSM-R base stations on the route will allow voice transmission but may not be able to support data transmission, which will be required for ERTMS operation.

Although ERTMS equipment has been successfully trialled by other rail administrations there are some significant technical issues to be resolved before the equipment can be installed on a class 158 unit.

- The spare capacity of auxiliary power supplies on class 158 units and the quality of these power supplies.
- Location of the cab equipment and the ergonomics of the cab layout, this is a particular issue as the ERTMS/GSM-R equipment is being fitted in addition to the existing equipment rather than as a replacement. The conventional cab and RETB equipment will need to be retained for the foreseeable future.
- The location of the non-cab equipment.
- Heat dissipation from the equipment located in the saloon may be an issue, particularly if a reduction in air conditioning efficiency is to be avoided.

APPENDIX A – Outline Costs

SRA Requirement	Cost Headings	Cost	Comments / Assumptions
Costs Associated with Rolling Stock Fitment.			
Cost of procuring On Board Assemblies (management cost if required).	• Arriva Trains Project management cost (including safety case amendments, and TOC input to approvals process driver rostering and unit diagrams etc).	£171,000	One project engineer for 4 years at £30k per annum.
NIFT – cost of temporary fleet arrangements.	• Traincrew and mileage costs	£20,000	Provide diagram cover by de-strengthening, fleet redeployment or bus substitution.
NIFT – any other costs associated with fitment.	• Vehicle condition surveys • Design • Material • Labour • Static testing • Certification and route acceptance	£285,000	Angel estimate for project management and vehicle installation design. Other costs contained within Bombardier estimate.
Operational Trials - hire of replacement rolling stock.	• Retention of additional class 158 unit from December 2004 until December 2007	£800,000	Provide cover for one unit to be unavailable at any time until end of trials.
Operational Trials – any other costs associated with fitment.	• Design • Material • Labour • Commissioning • Certification and route acceptance	£3,220,000 PROVISION-AL SUM	Estimate from Bombardier based on £1.75m for design, certification, up front spares and 1st unit fitment plus technical support, £165k for 2nd unit and £145k each for units 3 to 16. It may be prudent to fit all the class 158 units that will remain from 2006 in order to minimise

	• Rectification of faults caused 'by others'	£32,500	problems of trying to operate two small sub-fleets and to permit the additional unit to be released. This would increase costs by £725k but would reduce cost of retaining the hired class 158 unit. Based on 1 incident per period at £1k per repair/overhaul of a module x 2.5 years
SRA Requirement	**Cost Headings**	**Cost**	**Comments / Assumptions**
Cost of driver / train provision for trials. Additional drivers hired and trained.	• Wages for 2 drivers for 9 months to cover the seconded drivers. • Lodging and travel costs for 2 drivers • Additional DTM to cover test train working.	£147,000	Includes trainee drivers to provide resource for drivers and DTM.
Driver training for ERTMS trials. Staff wages during training. Back filling to cover duties (not double counting additional drivers above). Accommodation or other training related costs.	 • Classroom facilities. • Course material etc.	 £190,000 £99,000	 Assume 5 weeks training per driver Resource will continue until natural wastage allows surplus to disappear (assumed December 2007) No additional cost Assume that a simulator is available at no cost to Arriva Trains.

Price per hour / shift for trial driving trial trains (not double counting additional drivers above).			No additional cost
Other Costs	Vehicle running costs 50– 70 miles per night.	£14,000	Fuel and variable track access Roughly one litre per mile for traction gas oil
Cost of Maintenance for Trial and continued operation.			
Any additional maintenance staff	• Routine labour requirement • Out of course repair requirement	£3,000	Based on 10 B exams per unit per annum x 11 units x 1 hour per B exam the routine labour content = 110 man-hours per annum.
Supervisor Training (broken down as appropriate.		£3,000	1 day training course for supervisors.

SRA Requirement	Cost Headings	Cost	Comments / Assumptions
Other training		£2,000	3 day training course for 8 artisan staff (3.2.13).
		£44,000	Specialist
		£2,000	10 day course for 2 specialists, assume 4 technicians to be trained (3.2.13)
			One week refresher course per year for technical updates and loss of maintenance staff included above
Any other costs associated with the trial either fixed price or proposed pricing methodology.	• Warranty administration		Included in specialist duties
	• Non-warranty spares (in the event of vandalism etc)	£276,000 PROVISIONAL SUM	Based on using one complete kit of parts per year.
	• On site accommodation for supplier support (3.2.13)		Included above
	• Laptop (with free-issue software installed).	£1,000	
	• Fault reporting (3.2.16)		
	• Certification of maintenance documents	£3,000	Assume 1 man day per month
		£3,000	Arriva estimate
	• Technical help desk facility	£33,000	£1k per period x 2.5 years
	• Expenses, accommodation for technical assistance	£6,000	Say £200 per visit x 30 visits per annum
	• Contingency	£260,000	Assessed at 5% of cost

ANNEX 1 - Impact on Franchise Payments

APPENDIX B - Project Plan

APPENDIX C – Alternative Project Plan without NIFT