Cost allocation pilot study

Update

26 May 2016

<u>Section 1</u>

Revised approach to allocating total costs

Background

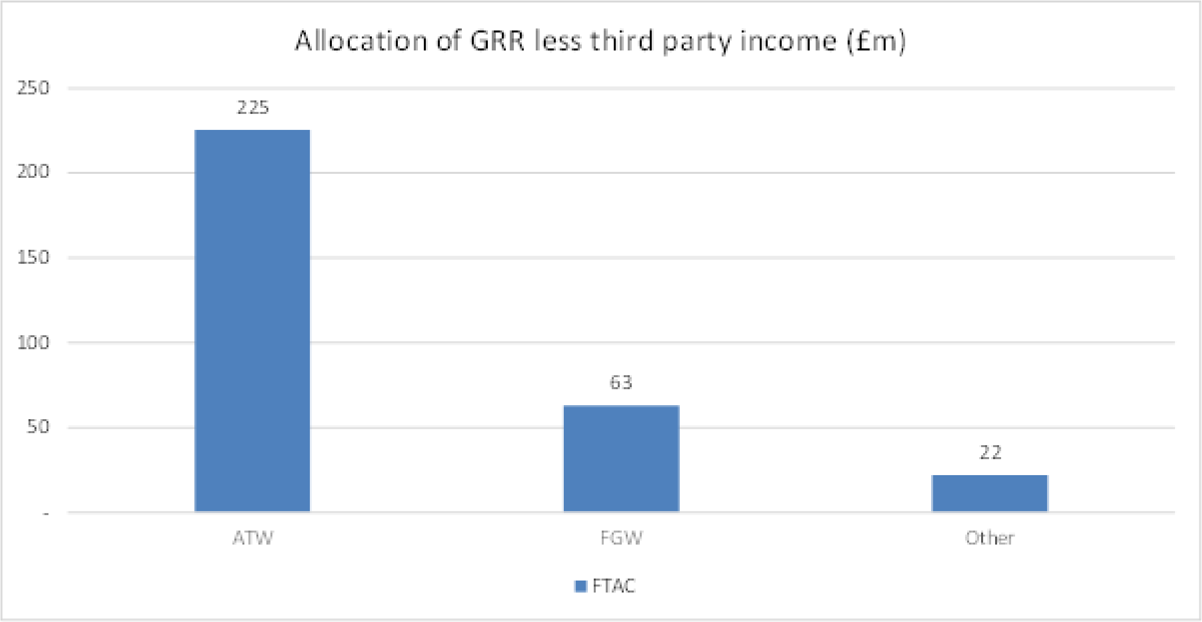
- Network Rail does not have an established method for allocating total costs to all train operators in a consistent way
- Improving cost allocations improves quality of information available for industry decision making processes
- Allocation of “variable costs” currently under review. Pilot study focuses on fixed costs
- A method for allocation of fixed costs between Franchised Passenger Operators (FPOs) exists for the purpose of calculating FTACs:
  - total costs allocated between operators
  - variable cost allocations subtracted to arrive at an allocation of fixed costs
  - adjustments to fixed cost allocations to reflect network grants etc to arrive at FTACs
- Pilot study considers revision of first step - allocation of total costs (“the FTAC cost allocation method”)
- Pilot study does not consider third step - that involves policy decisions on how, if at all, fixed cost allocations are reflected in charges. Because of this step, changes to cost allocations do not necessarily result in any changes in charges, and no changes in charges should be inferred from the pilot study.

Background

- Wales chosen as pilot study area to explore feasibility
- Cost base is ORR’s Final Determination (FD) for 2018/19, less third party income

Current FTAC cost allocation method

- Costs identified at operating route level, by asset category (e.g. track maintenance)
- Total cost of each asset category allocated between FPOs in line with each FPO's share of various traffic metrics, principally:
  - EMGTPA miles for track and civils
  - train miles for signalling, telecoms, support costs
- Leads to following allocations to ATW, FGW and other FPOs (Virgin and CrossCountry)



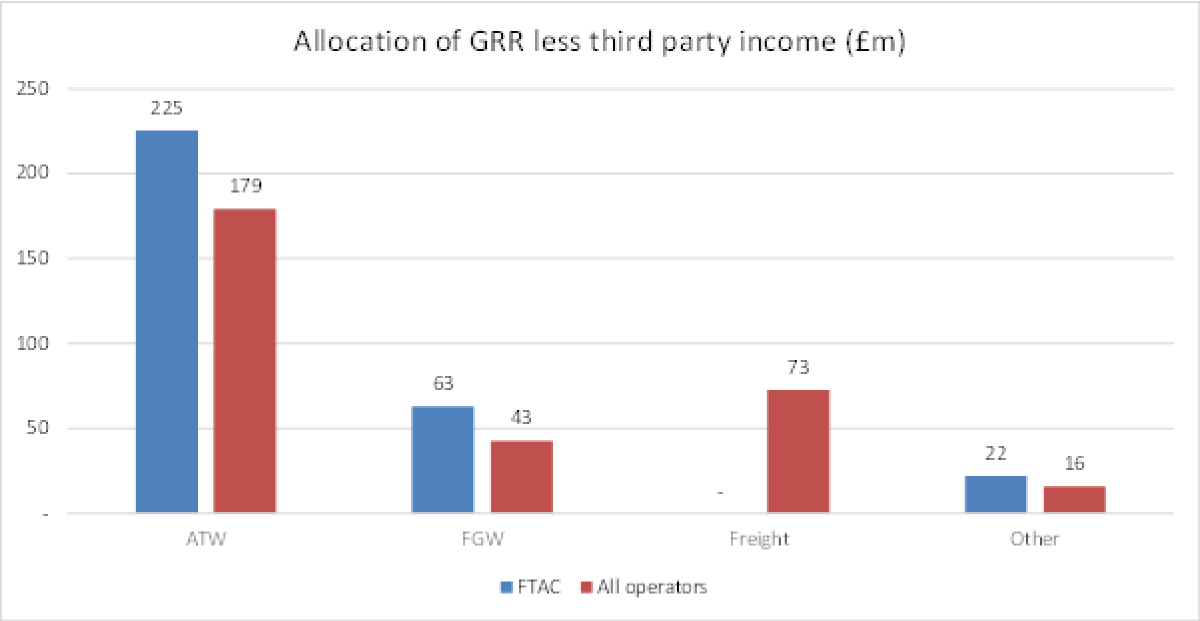
Potential revisions to FTAC cost allocation method

- Pilot study aims to allocate costs in a way that better reflects cost causation on a more consistent basis
- Four potential revisions to the FTAC cost allocation method have been considered:
  - allocation of costs to all operators
  - allocation of Regulatory Asset Base (RAB) on the basis of asset costs
  - geographical disaggregation of the cost base
  - moving towards an avoidable cost approach
- Revisions are a potentially significant step forward, relative to current FTAC cost allocation method. But, like that method:
  - remain modelled simplifications of reality – bottom up data does not exist

Allocation of costs to all operators

- Current FTAC method allocates costs to FPOs only
  - on the grounds that freight and open access operators do not pay FTACs
- From a cost causation (rather than charging) perspective, no clear reason to limit allocations of costs to only a subset of operators
- Costs caused by a train are a function of the physical characteristics of the train's usage of the infrastructure, not
  - the contents of vehicles
  - nature of contracts with government and/or Network Rail
  - charges paid
- As a first step, pilot study modelling extends existing FTAC cost allocation method to freight and open access
- NB this is a cost allocation judgement only
  - there is no direct feed through from cost allocations to charges
  - split of the recovery of allocations between charges, network grants or other sources is a policy decision, beyond the scope of the pilot study

Allocation of costs to all operators

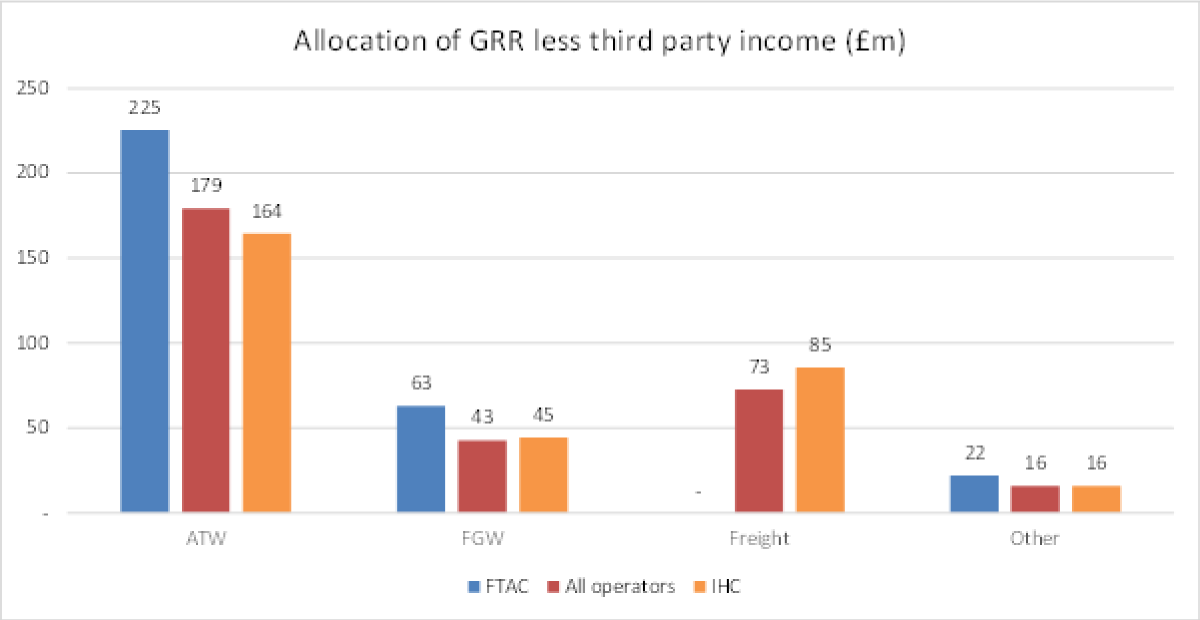


- £73m allocation to freight
- Open access very small in Wales so small impact
- Reduced allocations to ATW and FGW
- NB these figures based on current FTAC method
    - subject to change in following revisions, no judgement on reasonableness at the stage

Allocation of RAB on the basis of asset costs

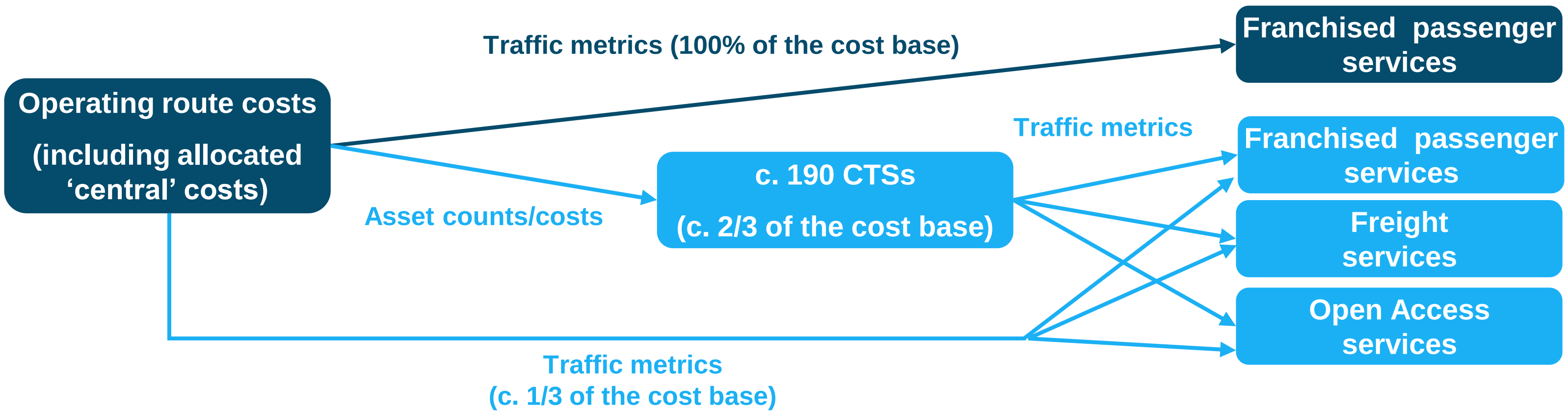
- The RAB's principal role is to fund renewal and enhancement expenditure
- FD regulatory cost base includes two components related to RAB:
  - RAB depreciation ("amortisation"): equal to long run rate of renewals
  - Interest ("return") on RAB: interest on past enhancement expenditure, indexed by inflation
- FD calculates a single indicative RAB for Wales, covering all asset categories
- Current FTAC method allocates both components in line with long run rate of renewals
  - Reasonable for RAB amortisation
  - Less reasonable for RAB return: no clear link between level of past enhancement expenditure and future rate of renewals
- Pilot study modelling allocates RAB return on basis of Indexed Historical Cost (IHC)
  - IHC data not available
  - existing data on Gross Replacement Cost (GRC) used as a proxy for IHC

Allocation of RAB on the basis of asset costs



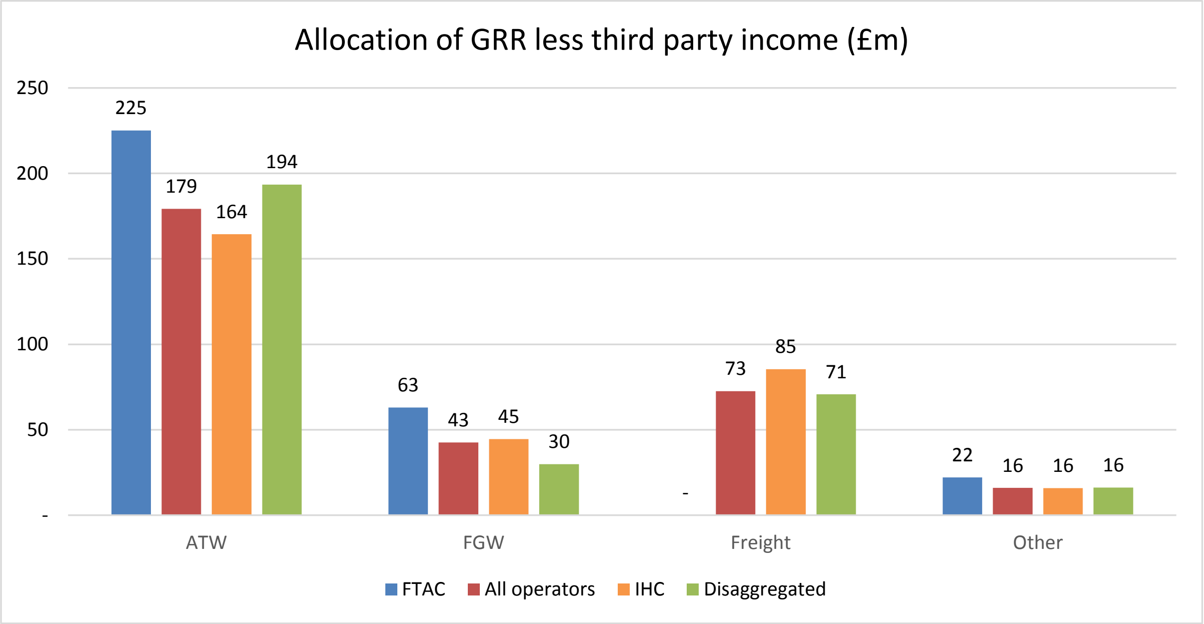
- Modelled impact assumes implementation of previous revision
- Cost base shifts towards civils, which the FTAC method allocates using EMGTPA miles
- Increased allocation for heavier trains, including freight
- NB these figures subject to change in following revisions

Geographical disaggregation of the cost base



- Current FTAC method does not reflect cost variations within an operating route
- Wales 'chopped up' into 194 constant traffic sections (CTSs)
- Mapped assets (e.g. track, bridges) to CTSs
  - 2/3 of the FD cost base disaggregated to CTS level (can rise in future)
  - allocated M&R costs to these assets based on their Asset Lifecycle Profiles (c. 10,000 network wide)
  - allocated RAB return to CTSs based on IHC of assets in each CTS (using GRC as a proxy)
- Allocated costs using existing FTAC metrics (EMGTPA for track, train miles for signalling)
  - 2/3 of costs at level of each individual CTS; remaining 1/3 of costs still at operating route level

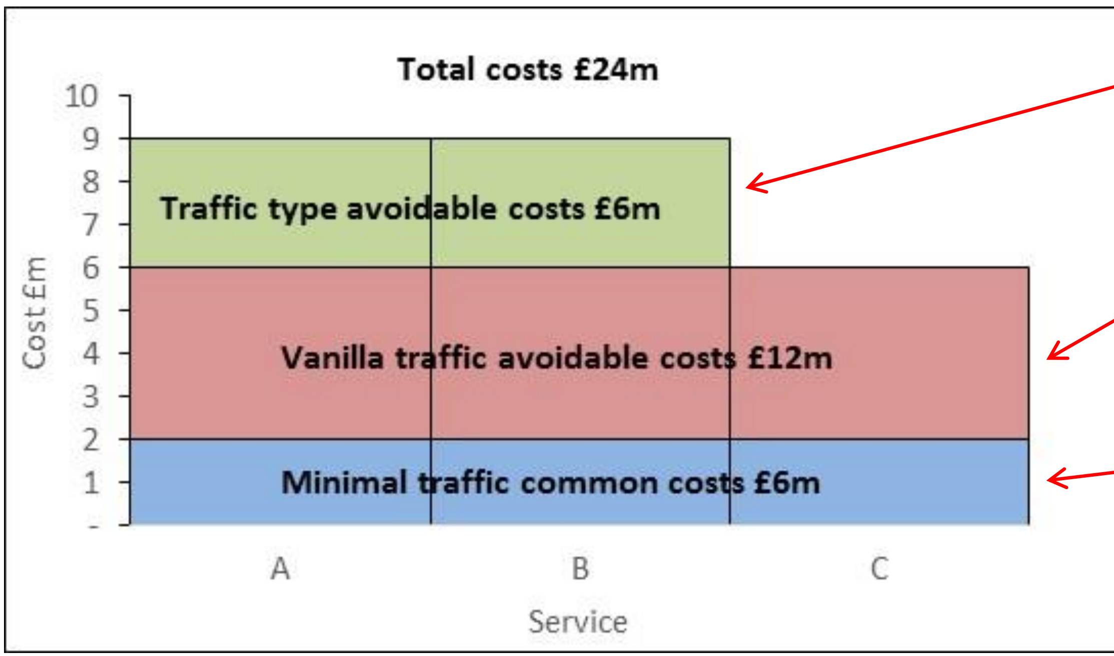
Geographical disaggregation of the cost base



- Increases cost allocations in parts of the network which are
  - inherently costly per mile (e.g. hilly terrain)
  - low traffic (fixed costs allocated between less traffic)
- Allocations rise for ATW; fall for freight and FGW
- NB not all asset categories disaggregated yet (e.g. tunnels)
- NB these figures subject to change in following revisions

Moving towards an avoidable cost approach

- Results above use existing FTAC approach (with disaggregated cost base)
  - allocations based on train miles and EMGTPA - no clear link to long run avoidable costs
- Moving towards an avoidable cost approach - impact of traffic on long run costs
  - pilot study explores first steps



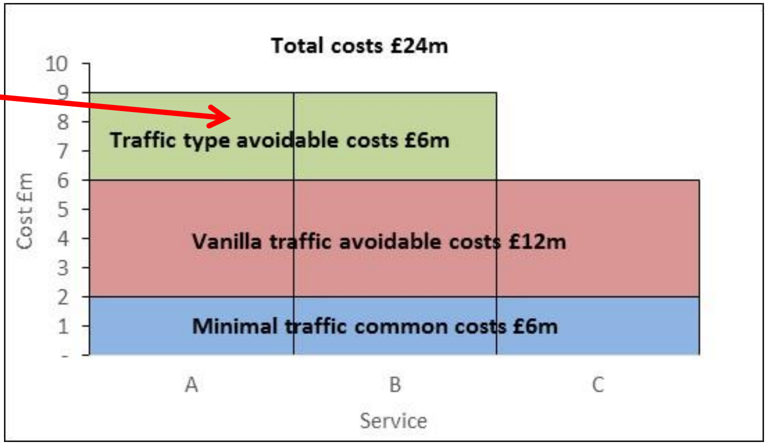
costs incremental to specific subsets of traffic

costs incremental to all traffic equally

costs not avoided at any level of traffic

Traffic type avoidable costs

- Are some costs incremental to specific subsets of traffic?
  - modelling quickly becomes very complex
  - have focused on proof of concept in pilot study
- Two of the potentially most significant areas identified for analysis at this stage
  - impact of traffic types on track costs
  - impact of peak traffic
- Approach can in principle be extended to other areas
  - not yet clear how material an effect this would have
    - for non-track costs, indications are that avoidable costs are small compared to track from a whole life perspective
  - data requirements may be challenging in some cases



Traffic type avoidable costs - track

- Whole life track costs clearly influenced by
  - line speed
  - axle load
- Line speed
  - Asset Lifecycle Profile calculations re-run for each CTS, at 25mph line speed
  - this “low speed” scenario would avoid £3.5m per year (6% of track costs)
    - average across Wales
    - on high speed lines, speed avoidable costs are up to 19% of track costs
  - assume linear relationship between line speed and cost (simplification)
  - £3.5m allocated to each Service Group in line with speed of each SG
  - e.g. if £3.5m is cost avoided from (say) 95mph to 25mph line speed
    - assume £0.5m avoided for every 10mph reduction
    - allocate £0.5m across all traffic above 85mph
    - allocate £0.5m across all traffic above 75mph (including a second allocation to 90mph traffic)
    - etc

Traffic type avoidable costs – track (contd)

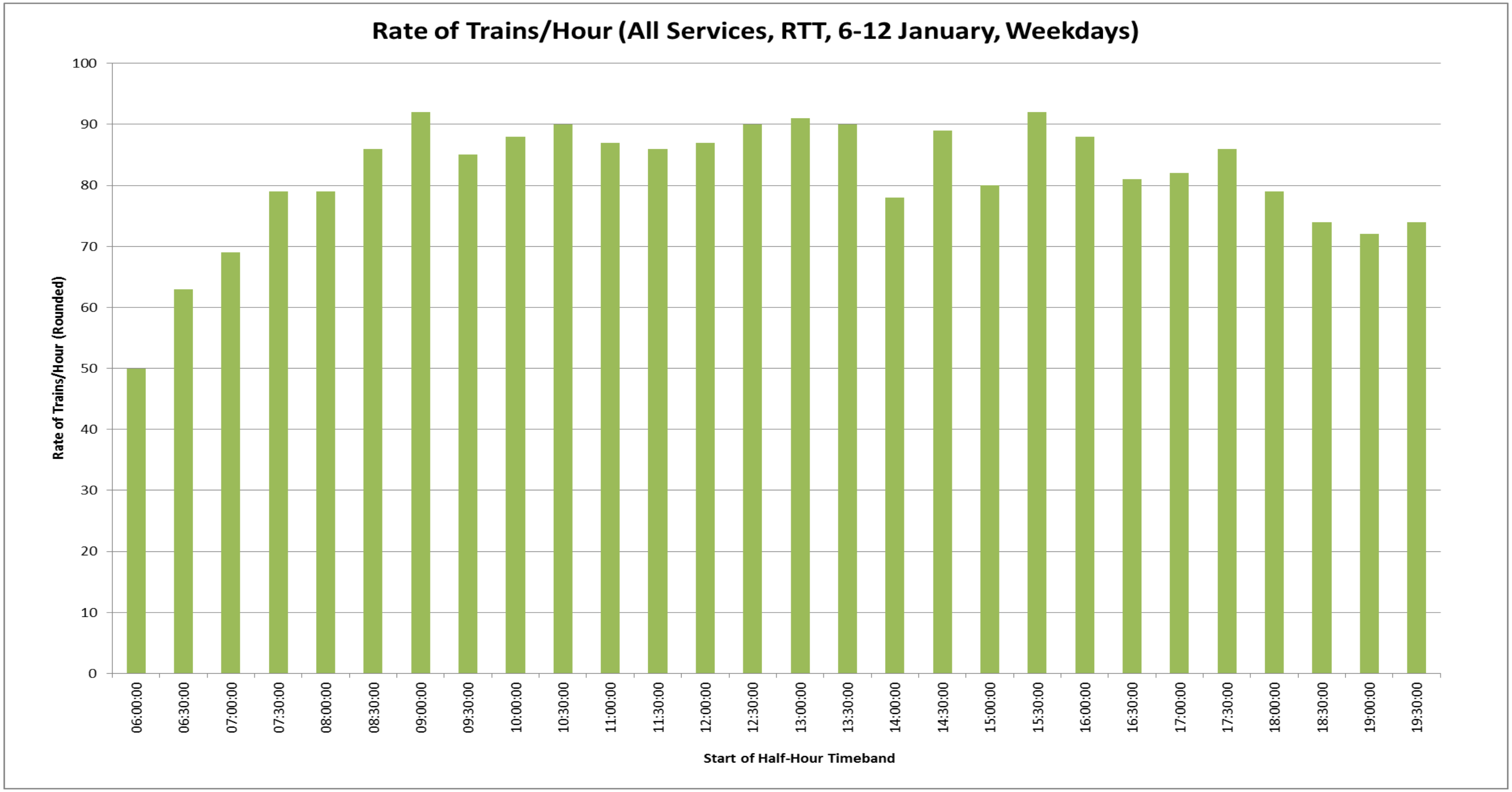
- Axle load
  - ALP calculations re-run for each CTS, at 5 tonnes per axle
  - this “low load” scenario would avoid £3.0m per year (5% of track costs)
    - average across Wales
    - on lines with heavy traffic, axle load avoidable costs are up to 30% of track costs
  - £3.0m allocated to each Service Group in line with axle load of each SG
- Allocations scaled to fit total avoidable costs of £6.1m in low speed low load scenario
  - combinatorial effects between speed and axle load
- Results
  - an increased emphasis on speed rather than weight compared with EMGTPA
  - effects relatively modest – 10% of track costs

Traffic type avoidable costs - peak

- Theory
  - higher train frequency causes extra costs (e.g. number of tracks, platforms)
  - incremental train frequency associated with peak services causes costs which would be avoided absent peak services
- Practice
  - evidence from pilot study suggests that additional train frequency is negligible in Wales
  - however, some parts of the wider network (e.g. London commuter stations) show clearer peaks

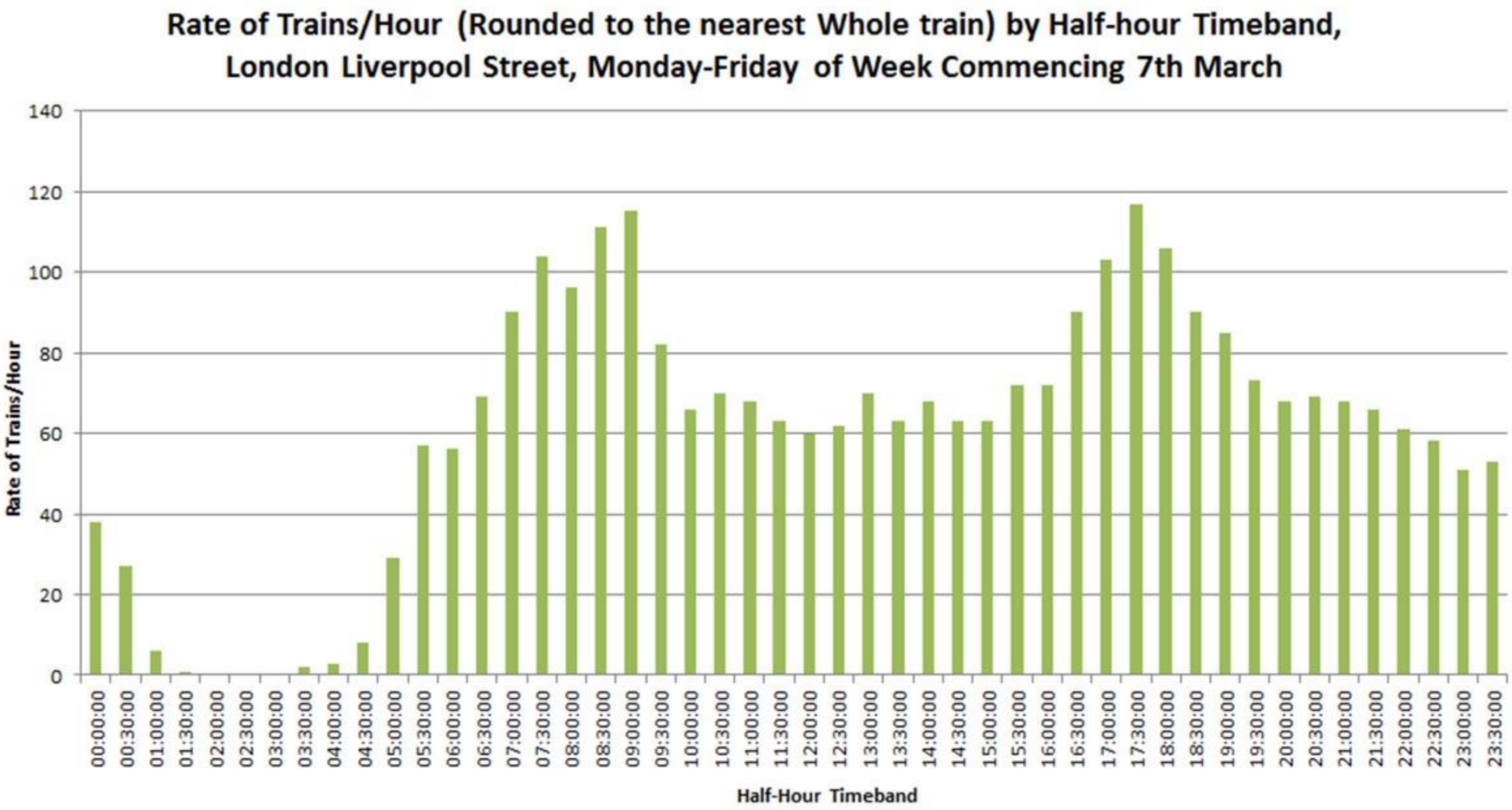
Traffic type avoidable costs - peak

- Detailed study of Cardiff Central - no discernible am and pm peaks



Traffic type avoidable costs - peak

- Detailed study of Liverpool Street - clear peaks



Traffic type avoidable costs - peak

Wales

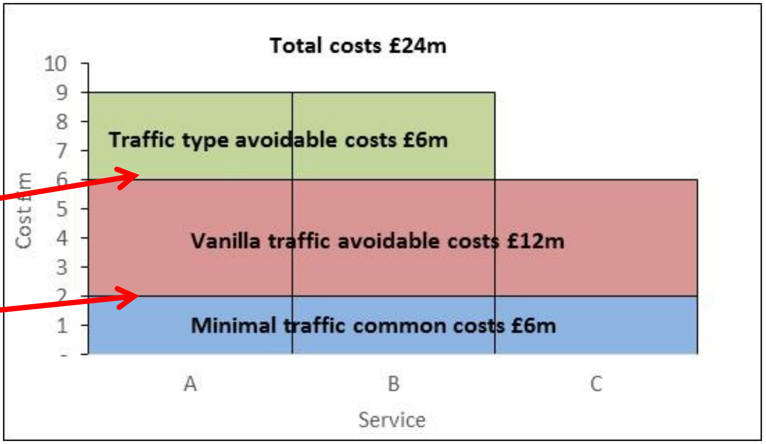
- Cardiff does have a peak in passengers, but not in trains
    - passenger peak absorbed by train loading
- Newport analysis also fails to show clear am and pm peaks
- Operating route management confirm lack of peaks in Wales
- Have not therefore attempted to model avoidable peak costs in pilot study

Wider network

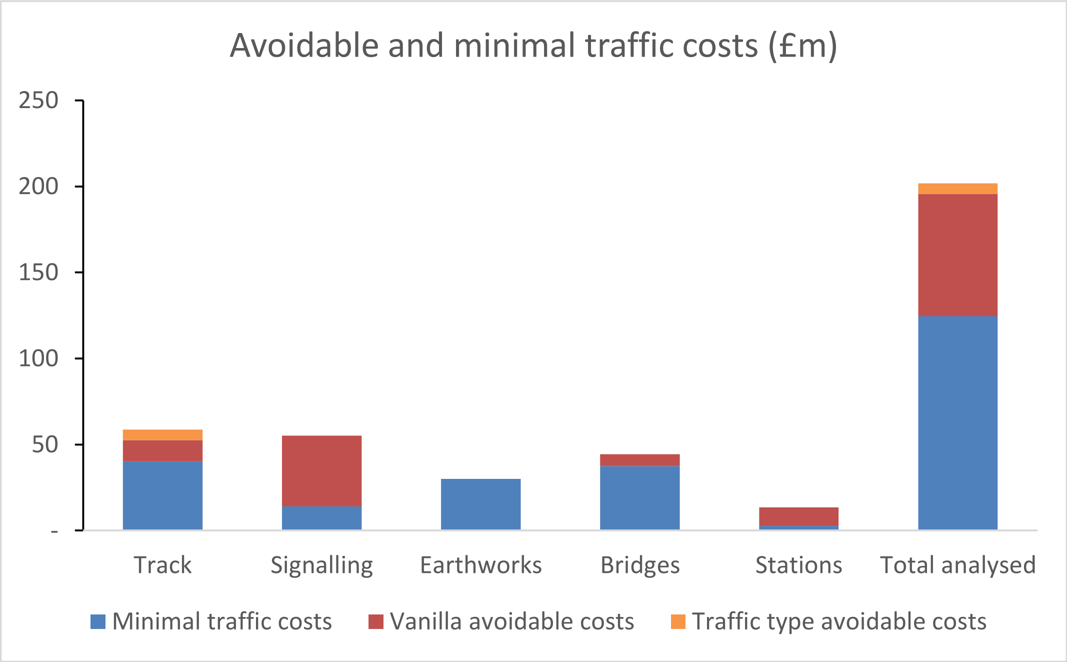
- Similar analysis for some London stations show clearer am and pm peaks
    - Euston c. 20% above off-peak level
    - Liverpool St. c. 80% above off-peak level
    - but, areas with marked peaks may be relatively isolated
- Effort required to estimate avoidable costs accurately would be prohibitive
- In theory could adopt a very simplified approach
    - not yet clear how material avoidable costs could be
    - would incorporate significant approximations (e.g. ignoring step fixed nature of costs)
    - practicality would need testing
- Could potentially increase the allocation of costs to peak services

Vanilla traffic avoidable costs

- What costs would always be required even at minimal traffic levels (one train per day)?
  - assuming existing connectivity unchanged
- Two track route between Cardiff and Bridgend
  - single track
  - that track less costly than either of the existing tracks
- Vanilla traffic avoidable costs
  - vanilla traffic costs
  - less minimal traffic costs
- Track, signalling, bridges, stations
  - parallel CTSs grouped together into 122 Route Sections (observations)
  - average cost of low traffic (max. 10 trains per day) single track Route Sections
- Earthworks
  - indications are that avoidable costs are small compared to track from a whole life perspective



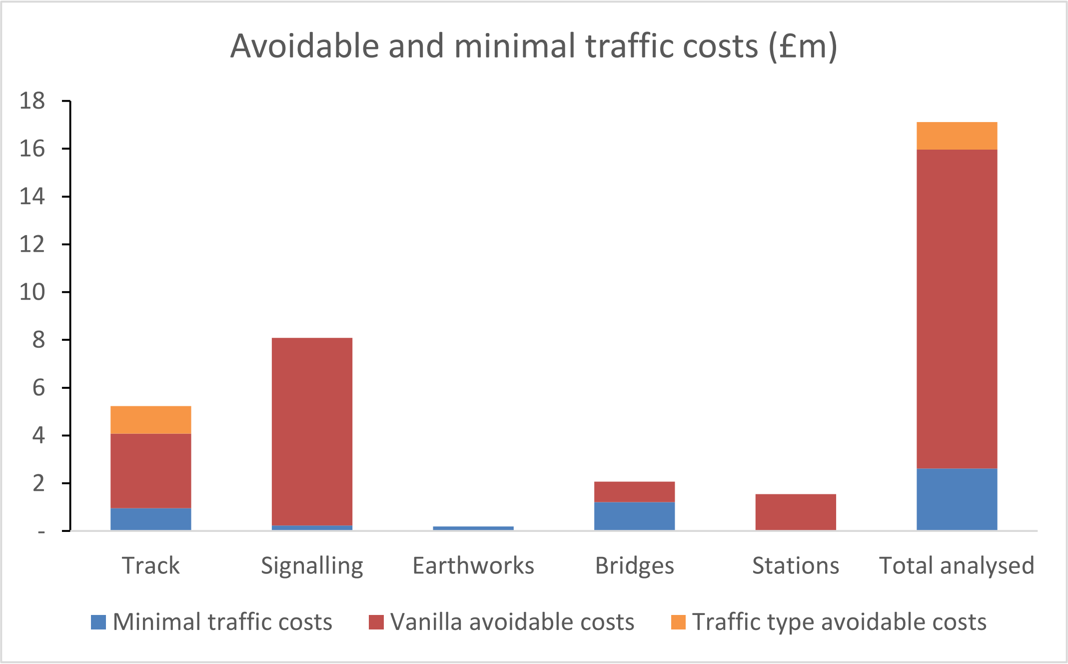
Avoidable costs - Wales average



	Track	Signalling	Earthw orks	Bridges	Stations	Total analysed
Traffic type avoidable costs	10%	-	-	-	-	3%
Vanilla avoidable costs	21%	75%	-	16%	80%	35%
Minimal traffic costs	69%	25%	100%	84%	20%	62%

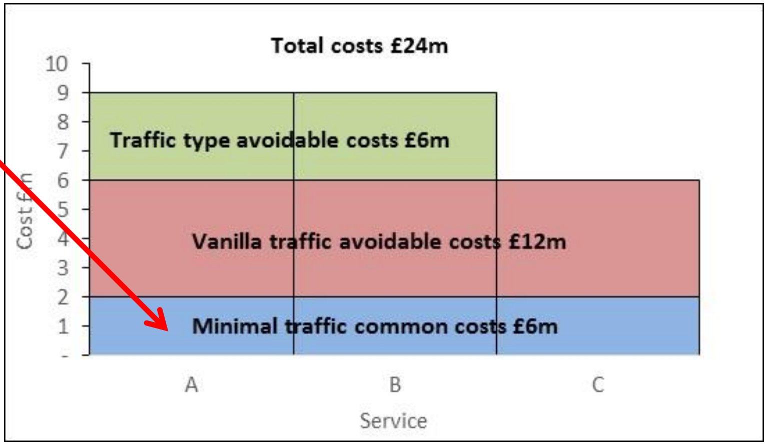
- Model produces specific figures each Route Section

Avoidable costs - Wales 4 track Route Sections



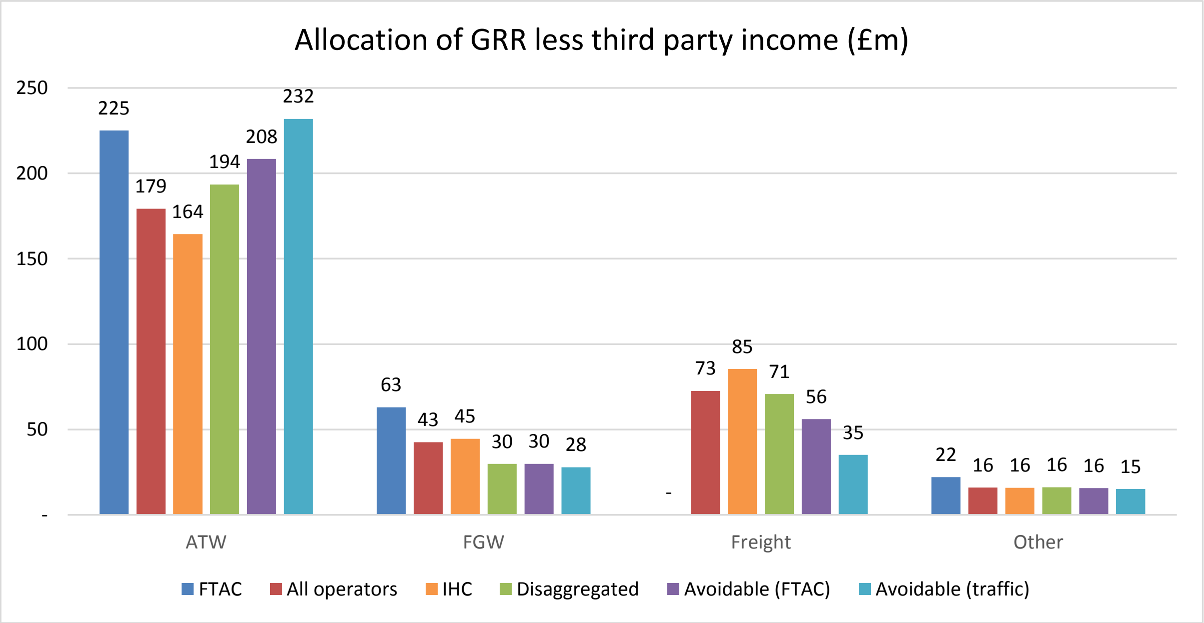
	Track	Signalling	Earthworks	Bridges	Stations	Total analysed
Traffic type avoidable costs	22%	-	-	-	-	7%
Vanilla avoidable costs	60%	97%	-	41%	99%	78%
Minimal traffic costs	18%	3%	100%	59%	1%	15%

Minimal traffic costs



- For each Route Section, minimal traffic cost
  - incremental to the complete set of traffic
  - not avoidable by any subset of traffic
- A common cost between traffic on that Route Section
  - but not between that traffic and traffic on other Route Sections
- No single correct way of allocating between Route Section traffic
- At present, have allocated using Equi Proportional Mark Up for assets and CTSs where avoidable costs identified
  - EPMU = common costs pro rata to identified avoidable costs
- EPMU results in more costs being allocated based on simple traffic (train miles / trains per annum) than under the FTAC method
  - could change if more traffic type costs (e.g. peak costs) are identified
- For assets where avoidable costs are not identified, have considered two approaches
  - current FTAC metrics (mainly EMGTPA and train miles)
  - since tonnage related (e.g. EMGTPA) avoidable costs appear very small, simple traffic (train miles / trains per annum)

Towards an avoidable cost approach



- Avoidable cost approach (FTAC method for common costs)
  - avoidable costs place greater emphasis on simple traffic than on tonnage
  - freight allocation falls (heavy), ATW allocation rises (light)
- Avoidable cost approach (simple traffic for common costs)
  - shift away from tonnage (and freight) and towards traffic and ATW) further increased
  - as big an impact on allocations as other revisions

Caveats

- Potentially a significant step forward. However:
  - Asset Lifecycle Profile costs/data are still being refined for CP6
  - Some assets not yet disaggregated (major structures, tunnels, coastal defences)
  - Whilst initial indications have been positive, we need to be cautious about over promising what is likely to be possible for CP6
  - This work is a potential step toward an improved set of cost allocations, not a perfect answer
- <u>We continue to emphasise that allocating costs and setting charges are separate decisions</u>

NetworkRail

Section 2

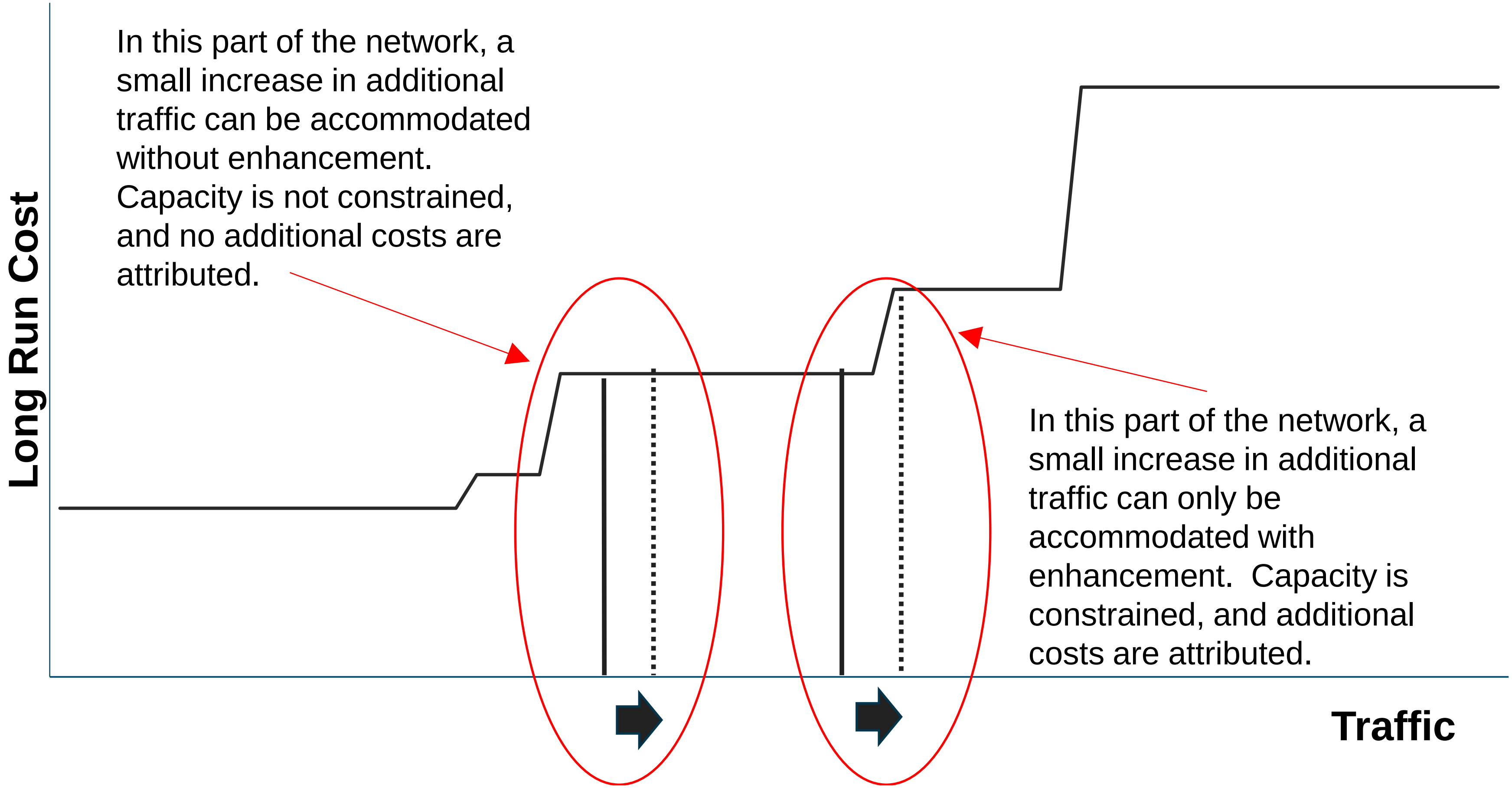
Cost of capacity constraints

Possible alternative approach

FIXED COSTS	VARIABLE COSTS	
Fixed costs Remaining costs which do not vary in response to small changes in traffic.	**Costs associated with capacity constraints** At some locations / times of day, operators want to run additional services, but cannot because the network is full. Two ways of reflecting the costs this causes: **Long Run Marginal Cost (LRMC)** Over time, Network Rail incurs enhancement costs to accommodate. **Lost Benefits (SRMC+)** Until enhancement, operators and passengers lose benefits from not being able to run.	**Short Run Marginal Costs** Wear and tear etc. caused by trains running on network. Currently recovered through: • VUC • EAUC • EC4T In addition to these “engineering based” costs, under the current performance regime the Capacity Charge reflects a cost on Network Rail caused by trains running on the network.

Focus is again on the allocation of costs associated with capacity constraints, not charges

Costs associated with capacity constraints



Approach to measuring costs

- Standard LRMC approach to estimating costs
  - apply standard small increase in traffic to every section of the network
  - estimate the height of the next “step” (i.e. enhancement costs) at each section
- Implementation challenges formidable
  - would require a great deal of bespoke analysis
  - not replicable
- As an alternative, consider use of existing analysis in Route Studies
  - capacity constraints identified for forecast increases in traffic
  - enhancement costs (height of next step)
  - “cost” of lost benefits (value lost until next step is climbed)
- Some limitations to Route Study based approach
  - not all routes have a study every 5 years
  - not all capacity constraints are fully costed
  - some appraisals look only at capital costs
  - enhancements often include non-capacity benefits
- Limitations are significant – run one scheme as an example to illustrate approach

SWML Relief Lines upgrade

- Additional traffic between Cardiff and Severn Tunnel Junction will displace services onto Relief Lines by 2023
  - these need to be upgraded to avoid significant journey time penalties
  - (fast) capacity is constrained
- Incremental costs of £37.2m (30 year PV, 2010 base year, capex only)
  - converted into an annuity at 2015 prices = £146,000 per year per mile
- Incremental benefits of £38.3m (excluding reduction in fuel tax)
  - converted into an annuity at 2015 prices = £130,000 per year per mile
- Incremental (fast) traffic
  - 2023: 23,500 trains per year
  - 2043: 50,000 trains per year
- Divide incremental costs / benefits by trains
  - LRMC and SRMC+ both around £3 to £6 per train per mile
- Current view is that rolling out this approach across the network would be very challenging

Next steps

- Looking at some minor modelling refinements
- Finalising report
- Expect to issue in early June