Cost allocation GB roll-out

Update and consultation

RDG route regulation, charges and incentives working group

14 November 2016

Agenda

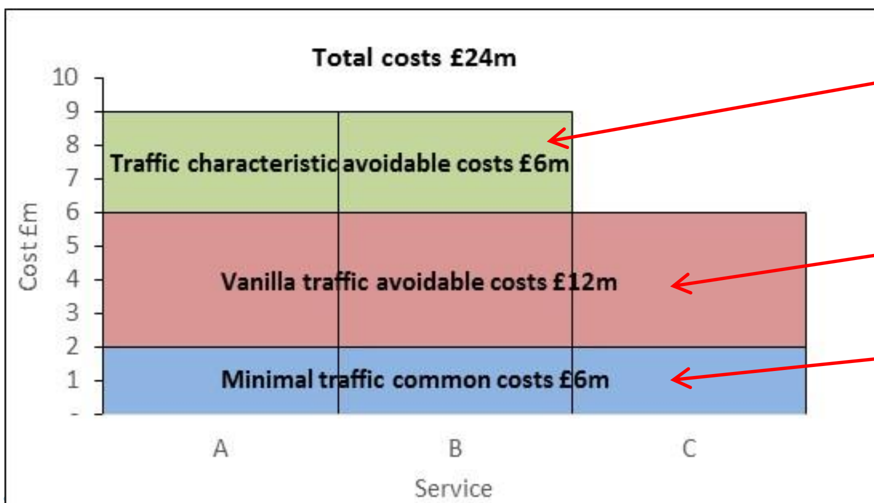
- Introduction / re-cap
  - purpose of project
  - Wales pilot study
  - GB roll-out
- Costs attributable to specific traffic characteristics
  - approach
  - frequency-related costs
  - other traffic characteristics

Purpose of project (re-cap)

- Improved allocation of “fixed” costs between
  - different parts of the network
  - different train services and operators
- Improved quality of information for industry decisions
- Looking only at allocation of total costs – following are outside project scope
  - allocation of variable costs: currently under separate review
    - fixed costs = total costs – variable costs
  - linkage, if any, between fixed cost allocations and charges: a policy decision
    - dependent on a range of considerations (ability to bear, accounting for government funding, etc)

Wales pilot study – approach (re-cap)

- Results presented to RDG in May 2016
- Detailed June 2016 report on Network Rail website
- Total cost allocation approach used as part of FTAC calculation revised to
  - cover all operators
  - disaggregate costs and traffic to CTS level
  - allocate long run avoidable costs to services that cause them
- Revised allocations better reflect where and how costs are caused

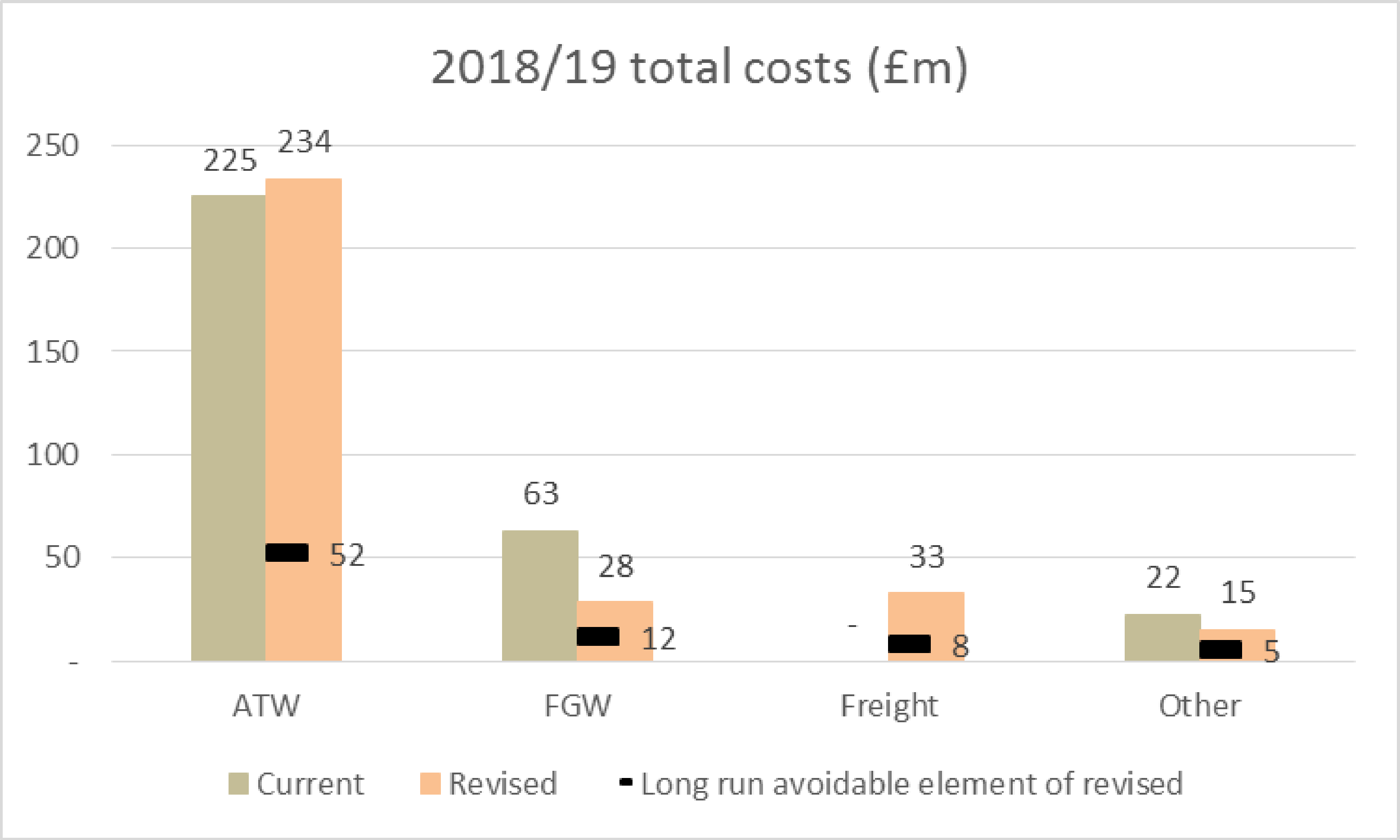


costs avoidable by the loss of characteristics that are specific to only a subset of traffic (e.g. fast traffic)

costs avoidable by the loss of traffic generally – all traffic treated equally

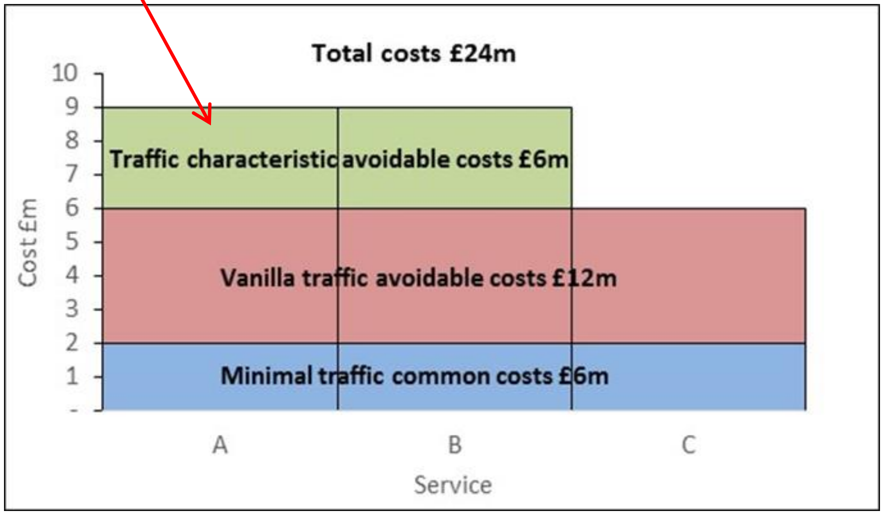
costs not avoidable at any level of traffic as long as connectivity is maintained

Wales pilot study – results (re-cap)



GB roll-out

- Rolling out Wales pilot study approach to the whole of GB
- Some refinements in selected areas where reasonable and proportionate
  - in particular, traffic characteristics avoidable costs
    - refine analysis of fast and heavy characteristics to capture non-linearity
    - consider a small number of additional traffic characteristics
    - our focus for today – your views before we start modelling
- Continued stakeholder consultation
  - today
  - presentation of emerging results
  - presentation of draft final results
  - sharing of detailed report
- Timescales
  - emerging results - January 2017
  - draft final results - March 2017

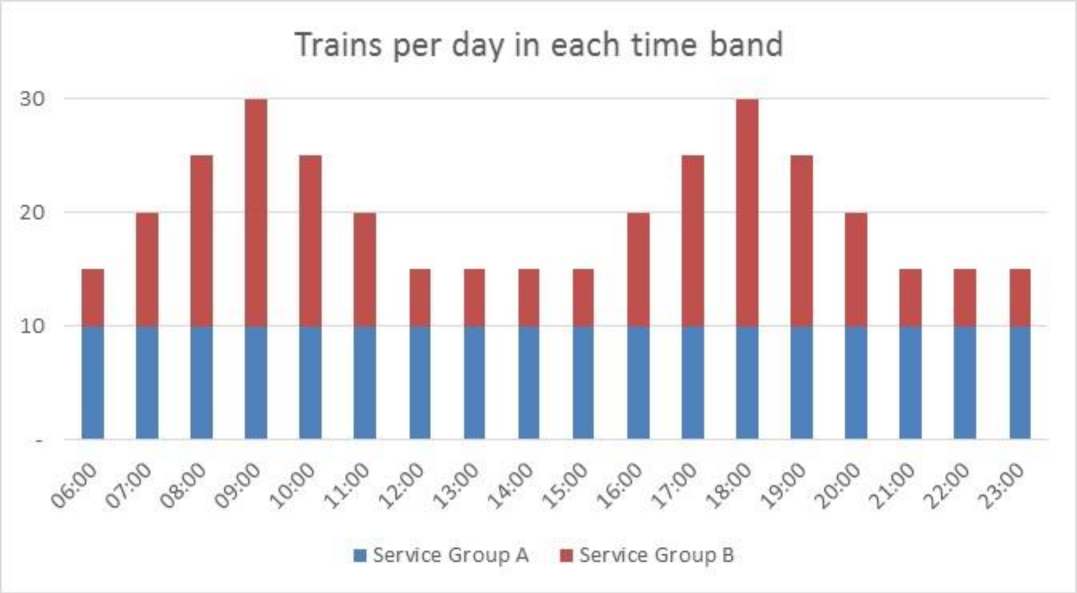


Frequency-related avoidable costs

- High frequency traffic drives the need for capacity-related costs
  - e.g. multi-track lines
- Such costs would be avoidable in the long run at lower frequencies
  - consider allocating frequency-related costs to high frequency traffic
- Not modelled in Wales pilot study as frequency variations quite limited
- Attempting to model in GB roll-out
  - non-trivial exercise (systems revision, modelling load)
  - ability to implement not yet proven
  - proposed approach set out in following slides
  - scale and pattern of results will need review

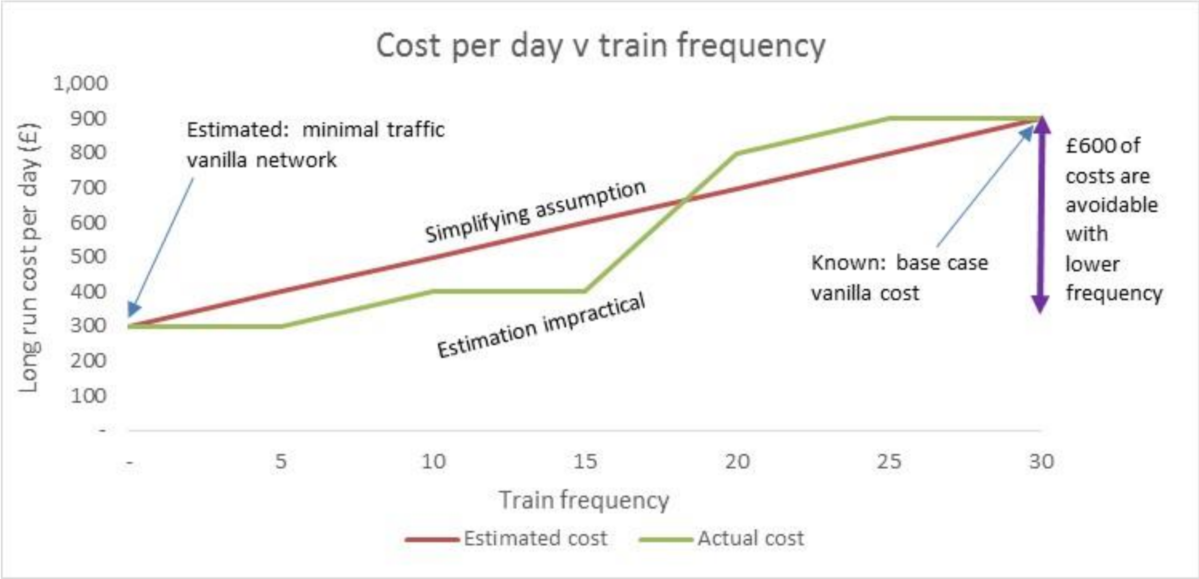
Service pattern

- Service pattern sourced from revised ACTRAFF (actual traffic count database)
  - current shape across the week (30 minute time bands)
  - applied to forecast 2018/19 base year traffic level by Service Group
- Worked example service pattern shown below
  - 2 Service Groups, A (flat) and B (peaky)
  - frequency within each time band (shown hourly for simplicity)

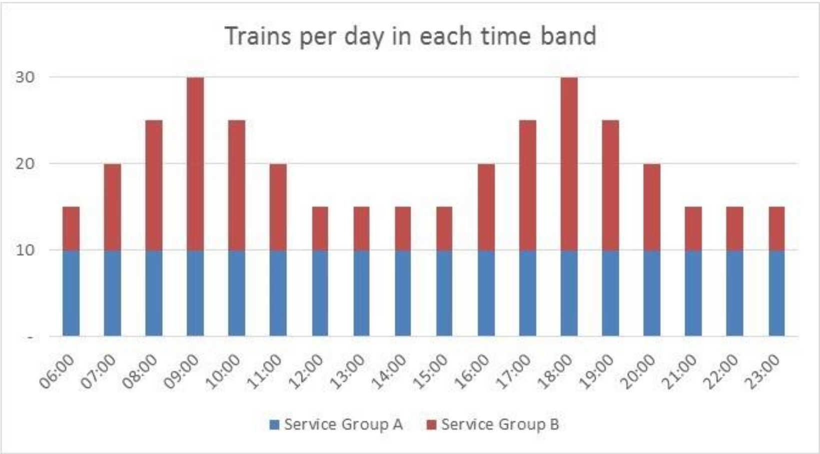


Costs avoidable from reducing frequency

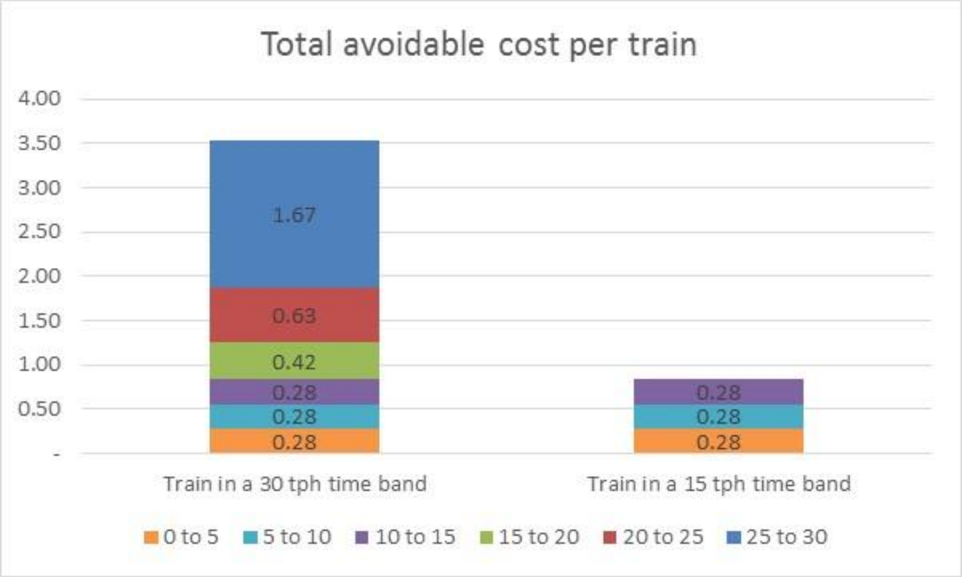
- Accurate avoidable cost estimation highly location specific
  - direct estimation prohibitively complex
  - generalisation does not appear feasible
- Propose a <u>highly simplified</u> approach
  - using cost data already captured by Wales approach
- Illustrative worked example shown below



Allocating avoidable costs



Reducing frequency		Avoidable cost	Trains per day preventing costs being avoided			Avoidable cost per train
From	To		This frequency	Faster frequencies	Total	
30	25	100	60	-	60	1.67
25	20	100	100	60	160	0.63
20	15	100	80	160	240	0.42
15	10	100	120	240	360	0.28
10	5	100	-	360	360	0.28
5	-	100	-	360	360	0.28
		600				



Additional traffic characteristics

- We are allocating total costs
  - fixed cost allocations will be calculated as “total costs – variable costs”
  - total cost allocations should be broadly consistent with VUC for short run costs
    - leaving fixed costs without any short run costs
  - total cost allocations should also capture significant costs that are only avoidable in the long run
- Emphasis on characteristics that
  - cause significant costs relative to total costs <u>and</u>
  - can be modelled without disproportionate effort

Additional traffic characteristics

Draft prioritisation matrix

	Moderate modelling effort	Higher modelling effort
Larger avoidable costs (NB some of these are quite small relative to total cost base)	Speed Axle load Unsprung mass Bogie yaw stiffness/curving class Frequency	Early/late/weekend Speed and stopping variance
Smaller avoidable costs	Power at rail Suspension type	Bogie spacing Axle articulation Wheel profile Train length

- Any further characteristics to consider?
  - note, electrification avoidable costs already reflected in current cost allocation method

Larger avoidable costs, moderate effort

Char.	Description	Avoidable costs	Modelling effort
Speed (modelled in Wales study)	High speeds cause more wear and tear and high line speed track is more costly, due to track quality (ride comfort requirements) Some effect on civils degradation (mainly bridges)	Wales pilot analysis suggests c.£100m across GB (1.7% of total costs). About 5x that implied by VUC, which reflects train speed but not line speed. VUC imply around £10m	Revised queries of existing unit cost database May use implied VUC value if long run similar to short run
Axle load (modelled in Wales study)	High axle loads cause more wear and tear Some effect on civils degradation (bridges and embankments)	Wales pilot analysis suggests c.£90m across GB, very similar to that implied by VUC VUC imply around £20m	Revised queries of existing unit cost database May use implied VUC value if long run similar to short run
Unsprung mass	High unsprung mass causes more wear and tear	VUC imply around £10m (narrower range than axle load)	Use implied VUC value?
Bogie yaw stiffness / curving class	Stiff bogies cause more wear and tear	VUC imply around £50m	Use implied VUC value?
Frequency	Covered above – costs only avoidable in the long run		

Smaller avoidable costs, moderate effort

Char.	Description	Avoidable costs	Modelling effort
Power at rail	Additional track wear and tear, reflected in VUC Ct factor	VUC imply around £1m Important for locos, but they are a relatively small proportion of total traffic so not that important to total cost allocations	Do not propose to model
Freight suspension type	Effect on track wear and tear, reflected in VUC Suspension Factor	VUC imply less than £5m Important for vehicles with unfriendly suspensions, but they are a relatively small proportion of total traffic so not that important to total cost allocations	Do not propose to model

Larger avoidable costs, higher effort

Char.	Description	Avoidable costs	Modelling effort
Early/late/ weekend	Width of engineering track access windows a major driver of unit costs. Early/late/ weekend services narrow those access windows. But some challenges, e.g. - some traffic (mainly freight) encouraged to run early/late - non-linear relationship between accessible windows and access needs	Significant, but not easy to quantify and generalise	Not currently possible
Speed and stopping variance	Mixed use of network lowers track capacity and causes additional costs. Alignment of speed, acceleration capability and stopping patterns would allow some costs to be avoided (loops, parallel tracks, etc)	Significant but not yet quantified	Formidable: - how to achieve alignment (fast, slow, or both) - estimating avoidable costs

Smaller avoidable costs, higher effort

Char.	Description	Avoidable costs	Modelling effort
Bogie spacing	Known to drive costs for brick and masonry underbridges, due to the potential for resonance effects	Likely to be small relative to total costs	Effect is very complex, e.g. one bogie spacing may be unfriendly on one bridge at one speed, but friendly on a different bridge at a different speed
Axle articulation	Wheels that are steerable relative to bogie frame can improve track friendliness	Steerable wheels understood to be very rare in GB	Do not propose to model
Wheel profile	Some wheel profiles more track friendly	Likely to be small relative to total costs	Complex. Differences between wheel profiles are highly dependent on maintenance regime, since worn states can be very similar
Train length	Longer trains = longer platforms	Not yet clear – studying	Not yet clear - studying