Network Rail Telecom Strategic Plan

March 2019
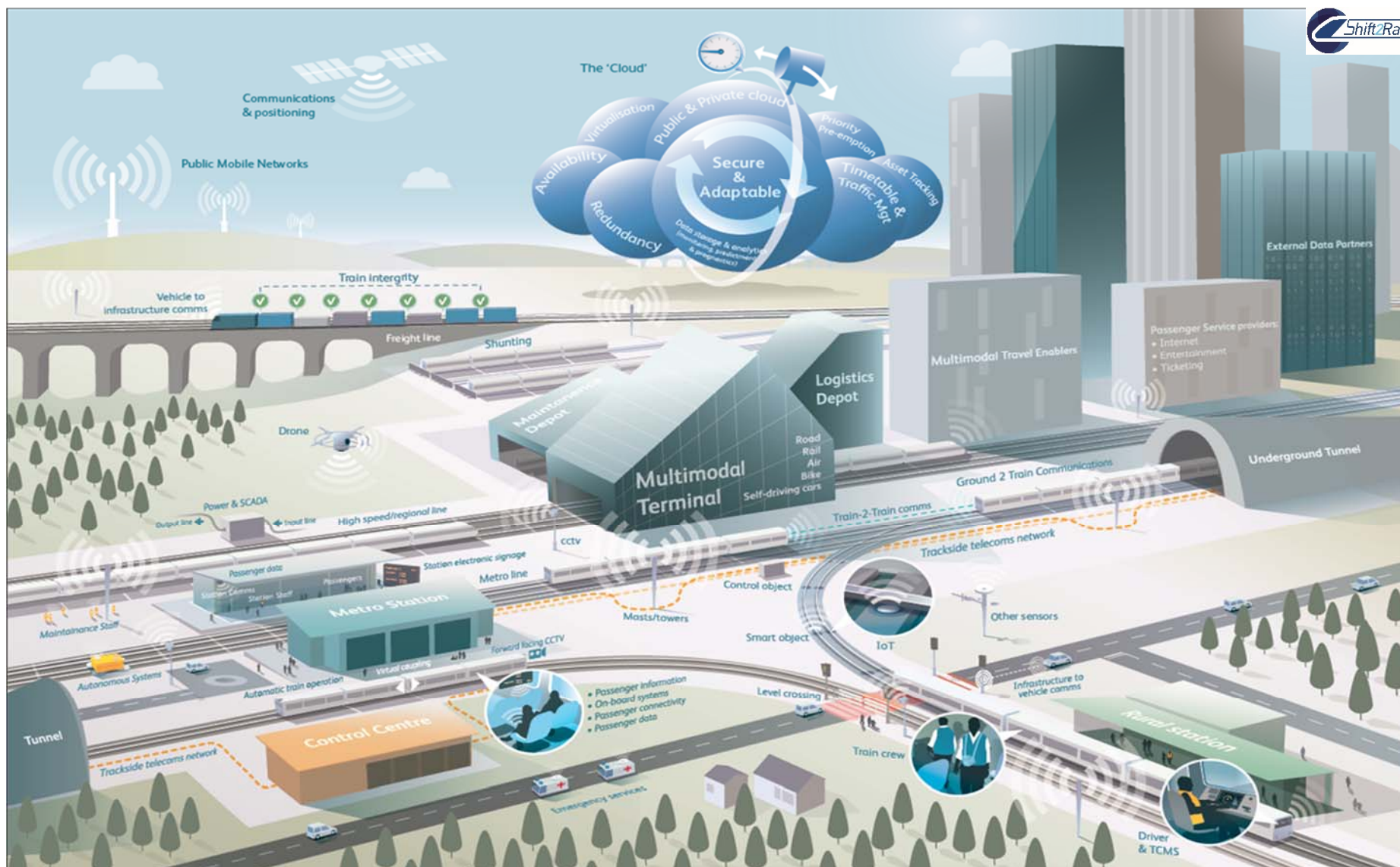
Contents

1. Purpose, role and vision

1.1. Purpose

Network Rail Telecom (NRT) provides the entire GB rail industry with a national telecommunications capability that is essential to its safe, reliable and efficient operation

1.2. Role

We are responsible for delivering communications capability using Network Rail's telecommunication networks, systems and assets, which include our next generation Internet Protocol (IP) telecoms network (called FTNx), the Global System for Mobile communications - Railway (GSM-R) system (which provides dedicated communications between drivers and signallers today, and in the future, will provide the track-to-train communications necessary for the digital railway) and assets such as level crossing telephones, closed circuit television (CCTV) cameras and customer information screens amongst others.

As a key part of the Group Digital Railway directorate, NRT is a central function providing the centre of excellence for expertise and national co-ordination of the telecommunications assets of the GB railway. NRT provides the links that unite the railway, as it is our telecommunications capability that enables the operational railway and the business to run. We support the routes in delivering the service requirements placed upon them by their key stakeholders.

The diagrams below illustrate our position within Network Rail as a route support function (within Group Digital Railway) and, give an overview of the scale of the assets we currently manage on behalf of Network Rail:

Network Rail organisation
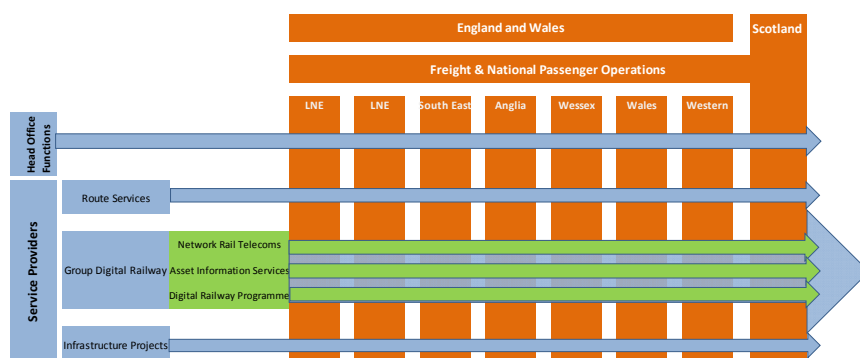
NRT at-a-glance
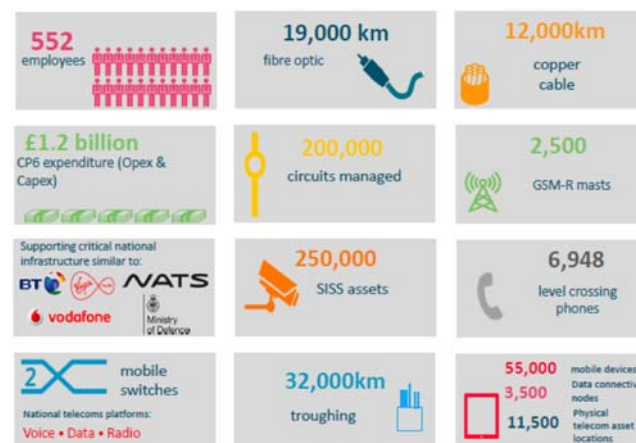
1.3. Vision

Our published vision is: **Placing our customers and stakeholders at the heart of our business, to deliver round the clock, safe, secure and reliable telecommunications infrastructure and connectivity across the GB rail network.**

Introducing our strategy
Our CP6 strategy continues to focus on providing the railway industry with telecoms capability, infrastructure and services which enable the safe, secure and efficient operation of the railway, and increasingly focuses on the growing importance to deliver better passenger connectivity. It also supports Network Rail's strategic business plans such as delivering an always connected digital railway for customers, passengers and lineside neighbours. It is our intention to continue driving service-based outcomes rather than individual asset performance. We will support ETCS infrastructure schemes including ensuring enabling telecoms for our fixed transmission network (FTN) and GSM-R network are delivered to meet enhanced ETCS requirements for the digital railway.

Rationale
Significant numbers of our route based assets and infrastructure pre-date CP4 which, in telecoms technology lifecycle terms, means that they are operating beyond their designed life, are obsolete (no vendor support) and are becoming prone to increased risk of failure. We therefore need to refresh and upgrade these assets and take a smarter systems engineering approach. This will reduce complexity and cost whilst driving standardisation throughout the national network and support Network Rail's strategic plans.

Externally to Network Rail, new train operating franchises are increasingly demanding new and better services for their passengers, employees and assets. Coupled with this, passenger numbers continue to grow rapidly. Our strategy has been designed to help our key customers (the routes) to provide more reliable and available services to their customers, the train operating companies (TOCs), freight operating companies (FOCs) and ultimately, passengers.

Our strategy also caters for the unprecedented demand for communications connectivity along the rail corridor which needs to be managed consistently to ensure best value is achieved for everyone. To this end, NRT is working closely with DfT and DCMS to identify and establish suitable national solutions to mobile connectivity on the railways which is key to the delivery of the Conservative Party 2017 manifesto commitment that: "By 2022…. Main line trains will enjoy full and uninterrupted mobile phone signal, alongside guaranteed wifi internet service on all such trains", and aligns well with several policies and priorities across government. NRT is actively supporting and participating in the DCMS funded 5G testbeds and trial programme to install new fibre networks, construct new masts and upgrade the Rail Innovation and Development Centre (RIDC) such that it can support future 5G technology and user case trials. Additionally, NRT is exploring improved connectivity solutions with industry for other main line routes and is funding an outline business case using HM Treasury's five-case model in support of additional funding for network enhancements that could yield new connectivity opportunities – see section 15 for more details.

Our priorities over the planning horizon are focused on:

Customer

Train performance

Investment

Digital capability

Business maturity

To deliver our strategy, our submission reflects the need to ensure the telecommunications network continues to underpin the three safety critical services that impact both safety and train performance namely; signalling, train detection and driver - signaller voice communications (GSM-R and lineside telephones). It also reflects the growth in nationally distributed asset volumes which, during the course of CP4 to date, have been handed over from project delivery to NRT for whole life asset management.

Our strategy will transform our legacy systems and capabilities into a simpler, resilient and affordable set of technologies. We will do this by consolidating services onto a ubiquitous modern IP telecommunications network. Our strategy will enable us to further deliver our centrally managed highly available, secure next generation network (called FTNx) that will underpin the future needs of Network Rail, its customers and the industry whilst being more cost efficient to own and operate. This will also act as a platform to drive sustainable growth and new avenues to market for us, and our route customers whilst also providing the foundation for the future digital railway.

2. Stakeholder priorities

2,1 Stakeholders & priorities – Our stakeholders include:

2.2 Customer and stakeholder engagement

In developing NRT's CP6 plans, our CP6 planning team has engaged with a wide range of stakeholders both within Network Rail and outside. This has been through a number of meetings and briefings and further meetings are planned throughout the CP6 planning process. Within NRT, all route stakeholder engagement has been undertaken through a dedicated account manager from within the Customer Development element of the team.

Ongoing customer and stakeholder engagement
We maintain relationships with each of our customers and stakeholders both formally and informally. The following table shows how we engage with our customers and stakeholders on an ongoing basis through key forums:

Forum	Frequency	Objectives and key subjects discussed
Route Level 1 meetings	Four-weekly	• Discussion of strategic priorities to address emerging risks, issues and opportunities • Alignment of Strategic Plans • Business critical decisions
TOCs	As requested	• To ensure the correct requirements are captured relating to re-franchising
Suppliers	As requested	• To ensure our suppliers understand the requirements and workloads that will be requested over the planning horizon
Telecom periodic review	Four-weekly	• To ensure the programmes are prioritised and sequenced in line with business requirements and our capacity to deliver
Digital Railway Programme	As Requested	• To ensure the programmes are prioritised and sequenced in line with business requirements and our capacity to deliver

In addition to the above there is regular engagement with stakeholders as part of normal business activities.

2.3 Addressing stakeholders' priorities

Our plan is built around our key stakeholders' requirements and through engagement, our plans are interlocked ensuring alignment. Our key stakeholders' needs, and the delivery of them, are paramount to NRT.

Stakeholder	Prioritised need	Short-term objectives	Long-term objectives
Government	Delivery of performance levels for franchises	Support conversations at the earliest point to share core NRT imperatives - CP5 accelerated spend	Early engagement to drive forward the CP6 core scenario
	M2T (mobile to train) Connectivity	Support the numerous activities in delivering improved mobile connectivity for passengers	Support technical, commercial and operating models to support cost-effective implementation to support government objective of achieving uninterrupted mobile phone signal, alongside guaranteed Wi-Fi internet service

Stakeholder	Prioritised need	Short-term objectives	Long-term objectives
Government cont.	LFFN (local full fibre network)	Support and work with Local Authorities and partners	Create a high capacity fibre optic cable and transmission network that provides fibre optic and bandwidth connectivity along the rail corridor to enable local full fibre network services to be deployed to parts of the UK that are not easily served
Routes	Upgrade GSM-R cab radios to ameliorate national interference	Deliver a proactive programme in CP6 rolling out GSM-R cab mobile radio V.4	Complete the programme in CP6
	Support in improving passenger experience	Continue to focus on providing the routes with telecoms capability, infrastructure and services which enable the safe, secure and efficient operation of the railway, and increasingly focus on the growing importance to deliver better passenger connectivity	Deliver high speed voice and data access for work or play, offering a digital life the way passengers want, where they want it
	Real-time data capture enabling real-time predict and prevent asset management to minimise delays	Drive forward NRT's approach offering universal rail corridor connectivity	Enable trackside internet of things (IoT), real-time data capture which in-turn will enable predict and prevent, condition-based maintenance and the ability to add points of presence as and when required
	Condition-based maintenance approach (including monitoring of off track assets such embankments and third-party slopes)	Drive forward NRT's approach offering universal rail corridor connectivity	Enable trackside IoT wireless connectivity with an ecosystem of low cost, battery-powered data sensors
	Sustained investment required into lineside infrastructure and level crossings	Ensure compliance with NRT's Asset Management Policy which provides guidance on the approach to asset resilience and associated criticality	Target known hotspots and evaluate the complete system to improve support at level crossings
	Operational telephony – greater flexibility, efficiency and resilience	Identify and manage critical site renewals	Deliver renewals in line with the development of a central core network that will facilitate flexibility, efficiency and resilience
	The migration of legacy services to telecoms infrastructure	Further develop the migration plan to realise reduced support costs by reducing the reliance on legacy end of life infrastructure	Drive to a single supportable, scalable and sustainable network environment
	Support the improvement of operational reliability and train performance	Continue to focus on providing the routes with telecoms capability, infrastructure and services which enable the safe, secure and efficient operation of the railway	Use continuous improvement techniques to bring further benefits and operational reliability

Stakeholder	Prioritised need	Short-term objectives	Long-term objectives
Routes cont.	Concerns with amount of life-expired station information and surveillance systems (SISS) assets (customer information systems and public address) due to delayed renewals	Deliver a significant increase in renewals - refer to the activity and expenditure table	Early engagement to drive forward the CP6 core scenario as stated in the investment section (scenario planning)
	Concerns over ongoing use of platform based driver only operation (DOO) systems	Deliver a more cost-effective solution for DOO systems	Early engagement to drive forward the CP6 core scenario
	Impact on route teams (reactive approach and increased maintenance inspections)	Deliver migration plan to realise reduced support costs	Early engagement to drive forward the CP6 core scenario
	Deferred replacement of a large amount of assets & systems hardware increases risk to business continuity	Deliver Core CP6 renewals programme to address previous deferment	Continue to deliver planned asset renewals in line with assets sustainability and policy requirements
	Improved performance data is required so that the root cause of issues can be identified and addressed	Adopt a predict and prevent approach to maintenance that puts data at the heart of decision making, with better management information being made available from a wider roll-out of condition monitoring equipment and use of enhanced analytics	Transition to a single IP telecommunications network, improving availability, performance, scalability and security of national connectivity and assets
TOCs	Customer information systems (CIS) at stations (particularly busy ones) should be reviewed	Work with TOCs to deliver improvements to station CIS wherever possible.	Deliver additional improvements in this area as part of the plan for the next control period.
	Communication technology between employees and organisations should be improved. The railway would benefit from more specific and reliable technologies	Continue consulting on the most appropriate systems to use by talking to employees involved in incidents and at times of disruption	Develop a strategic crisis management proposal with an appropriate technology mix
	Wi-Fi in depots	Support TOCs where they have responsibility to upgrade assets	Standardise assets and services - deliver open architecture enabling secure 'plug and play' capability
	SISS equipment that will become life-expired in CP6 should be replaced. Some TOCs have expressed an opinion that like-for-like renewals will not be sufficient	Deliver the agreed CIS renewals and work with the operators to deliver further improvements to the station CIS wherever this is possible. Deliver enhanced CCTV to help counteract the increased risks from terrorism.	Move to IP-enabled assets which can be proactively monitored improving passenger experience and satisfaction
	Mobile to train and on-train data offload	Work with TOCs to enable them to deliver their franchise commitments in delivering improved mobile connectivity for passengers. Utilise our infrastructure to improve real time data offloading from trains (e.g. for on-train CCTV offloading)	
Suppliers	Understand the CP6 workbank and volume of work by activity and type to enable their own forward planning	Define and present a supplier workshop to explain the CP6 strategic aims and give a view on work bank and volumes both at a national and route level and how the commercial supplier frameworks can and will be used to address these needs	Continuous dialogue to be undertaken both with the whole supplier base to explain the ongoing requirements resulting from this plan.

2.4 How these priorities link to our strategic plan for CP6

Whilst section 2.3 demonstrates alignment with our customers' and stakeholders' needs, we have also undertaken further activities with the routes such as supporting them with the writing of the telecoms section within their strategic plans to ensure alignment.

In summary

What will we do	How we will do it
✓ Place our customers at the heart of everything we do	✓ By listening to our Stakeholders requirements and ensuring that we deliver the services they require of us. ✓ Continue to deploy our highly available, secure and scalable, national next generation IP network coverage and capacity
✓ Continue to focus on delivering the telecoms capability, infrastructure and services that enable a safe and efficient railway	✓ Embed our operating model and develop our processes and systems to deliver an exceptional customer experience
✓ Reduce cost and complexity of our infrastructure and assets	✓ Make better use of virtualised and cloud-based capability for new product development and our renewals and enhancement activity
✓ Embed better network management and monitoring capabilities to drive proactive predict and prevent failure reduction	✓ Through the use of intelligent infrastructure (fault/maintain\renew)
✓ Deliver standardised, open access architecture and cost effective (benchmarked) products and services for the railway	✓ Identify and introduce standardised products and services to support an open architecture (plug and play)
✓ Extend the use of our assets to support Network Rail's strategic business plans, the digital railway, our customers, passengers and lineside neighbours' requirements	✓ Invest in and create an integrated plan to ensure our colleagues are skilled and competent
✓ Develop a sustainable business model	✓ Identify and secure non-disruptive inward investment and funding
✓ Continue to articulate our strategy and requirements to our stakeholders	✓ Through focussed meetings and workshops and one to one meetings.

Our strategy has been designed to help our key customers (the routes) to provide additional and improved services to their customers (the TOCs and FOCs) and ultimately, improve passenger experience.

3. NRT objectives

This plan is predicated on the key assumptions laid out in Appendix A and will be impacted as these assumptions change.

Long-term scorecard

Safety		18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	Achievability
LTIFR	WORSE THAN TARGET	0.399	0.332	0.284	0.243	0.209	0.179	0.161	0.145	
	TARGET	0.363	0.316	0.271	0.232	0.199	0.170	0.153	0.138	
	BETTER THAN TARGET	0.327	0.300	0.257	0.220	0.189	0.162	0.145	0.131	
% Close calls closed in 90 days	WORSE THAN TARGET	76.50	76.64	76.77	76.90	77.03	77.16	77.29	77.42	
	TARGET	85.00	85.15	85.30	85.45	85.59	85.74	85.88	86.02	
	BETTER THAN TARGET	93.50	93.67	93.83	93.99	94.15	94.31	94.47	94.62	
Safety Milestones Achieved	WORSE THAN TARGET		80%	80%	80%	80%	80%	80%	80%	
	TARGET	11	90%	90%	90%	90%	90%	90%	90%	
	BETTER THAN TARGET		100%	100%	100%	100%	100%	100%	100%	
Train Performance		**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**24/25**	**25/26**	**Achievability**
Delay Minutes	WORSE THAN TARGET	118,500	114,126	110,932	108,375	107,122	105,953	104,798	103,656	
	TARGET	107,727	103,751	100,847	98,523	97,384	96,321	95,271	94,233	
	BETTER THAN TARGET	96,954	93,376	90,762	88,671	87,646	86,689	85,744	84,809	
Satisfaction		**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**24/25**	**25/26**	**Achievability**
Network Service Availability	WORSE THAN TARGET	82.01	84.81	85.57	86.29	86.98	87.63	88.25	88.84	
	TARGET	91.99	92.39	92.77	93.13	93.48	93.80	94.11	94.41	
	BETTER THAN TARGET	99.97	99.97	99.97	99.97	99.97	99.97	99.97	99.97	
Your Voice Total score (Your voice/EEI*) (1)	WORSE THAN TARGET	72	45	46	47	48	49	50	51	
	TARGET	77	50	51	52	53	54	55	56	
	BETTER THAN TARGET	82	60	61	62	63	64	65	66	
Your Voice – Lowest scoring question (2)	WORSE THAN TARGET	63	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	TARGET	65	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	BETTER THAN TARGET	68	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Local Your Voice action plans completed (2)	WORSE THAN TARGET	N/A	80%	80%	80%	80%	80%	80%	80%	
	TARGET	N/A	90%	90%	90%	90%	90%	90%	90%	
	BETTER THAN TARGET	N/A	100%	100%	100%	100%	100%	100%	100%	

(1) Your Voice/EEI employee satisfaction will move to a new scoring methodology for 19/20 due to supplier and methodology change.

(2) The lowest scoring question improvement measure will be replaced in 19/20 with % of local Your Voice action plans completed.

Investment		18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	Achievability
Strategic Transformation Milestones	WORSE THAN TARGET		80%	80%	80%	80%	80%	80%	80%	
	TARGET	4	90%	90%	90%	90%	90%	90%	90%	
	BETTER THAN TARGET		100%	100%	100%	100%	100%	100%	100%	
Key Milestones	WORSE THAN TARGET		80%	80%	80%	80%	80%	80%	80%	
	TARGET	11	90%	90%	90%	90%	90%	90%	90%	
	BETTER THAN TARGET		100%	100%	100%	100%	100%	100%	100%	
Sustainability and Asset Management Capability		**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**24/25**	**25/26**	**Achievability**
Telecoms service affecting failures	WORSE THAN TARGET	2,679	2,605	2,521	2,450	2,395	2,361	2,335	2,309	
	TARGET	2,435	2,368	2,292	2,227	2,177	2,146	2,123	2,099	
	BETTER THAN TARGET	2,192	2,131	2,063	2,004	1,959	1,931	1,910	1,890	
Renewal Volumes	WORSE THAN TARGET	5,548	3,338	6,377	13,467	10,451	6,116	16,886	6,703	
	TARGET	6,032	3,709	7,086	14,963	11,612	6,795	18,762	7,448	
	BETTER THAN TARGET	6,635	4,080	7,795	16,459	12,773	7,475	20,638	8,193	
Financial Performance		**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**24/25**	**25/26**	**Achievability**
Financial Performance Measure – gross excl. enhancements (£m)	WORSE THAN TARGET	-2.88	-3.03	-3.58	-3.90	-3.33	-2.68	-4.08	-3.50	
	TARGET	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	BETTER THAN TARGET	2.88	3.03	3.58	3.90	3.33	2.68	4.08	3.50	
Cash compliance (Lost Funding) income & expenditure	WORSE THAN TARGET	6%-10%	6%-10%	6%-10%	6%-10%	6%-10%	6%-10%	6%-10%	6%-10%	
	TARGET	1%- 5%	1%- 5%	1%- 5%	1%- 5%	1%- 5%	1%- 5%	1%- 5%	1%- 5%	
	BETTER THAN TARGET	=<1%	=<1%	=<1%	=<1%	=<1%	=<1%	=<1%	=<1%	

Note: This scorecard is used to measure Network Rail Telecom's performance internally.

NRT colleagues eligible for the Annual Incentive Plan scheme are incentivised on the basis of the Group Digital Railway directorate scorecard (Appendix E), which is impacted by NRT performance.

The forward-looking measures in this scorecard are a best estimates made at the time of publication, actual scorecard measures are, and will be, agreed internally within Network Rail on an annual basis.

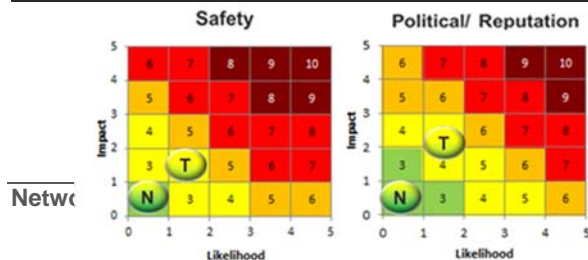| Achievability definitions (applies to "target" value)	
RED	Very challenging, likely to require substantial organisational and cultural change to achieve and/or highly dependent on third party involvement
AMBER	Challenging, likely to require moderate organisational and cultural change to achieve and/or dependent on third party involvement
GREEN	Achievable, builds on existing organisational and cultural capabilities and little or no dependency on third parties for delivery

NRT scorecard definitions

Category	Measure	Weighting	Definition of measure
Safety	Close calls % closed within 90 days	15%	A national safety measure which captures the number of close calls that are closed within 90 days
	Safety milestones		The health, safety, security and wellbeing milestones which are available in NRT's Hub site, these are agreed on an annual basis, therefore only shown for current year
Train Performance	Train Delay Minutes	10%	Train delay minutes attributed to telecoms failures
Finance	Finance Performance Measure	15%	The variance between our budgeted and actual opex, capex and income performance
	Cash compliance		The ability to remain within our funding envelope,
Investment	NRT milestones	25%	The NRT milestones completed which are available in NRT's Hub site
Asset Management	Service Affecting Failures	15%	The number of incidents where telecoms equipment has impacted train performance
	Renewal volumes		The number of telecoms renewals activities completed
Satisfaction	Service availability	20%	A combination of four key performance indicators (KPIs) which indicate the availability of telecoms services (expected delivery dates on projects, service level agreements, enquiry to quote deadlines and journeys not impacted by telecoms failures)
	Your Voice Survey employee engagement index (EEI)		The employee engagement index result of the Your Voice survey. A new scoring matrix for Employee Engagement will be introduced for 2019/20 and the targets have been re-baselined on that basis
	Your Voice 'Pulse' Survey Improvement on lowest scoring question		Improvement in previous Your Voice pulse survey lowest scoring question (18/19 year only)
	Local Your Voice action plans completed.		The percentage of your voice action plans due and completed during the period and (19/20 onwards)

4. Safety

4.1. Safety activity prioritisation and risk outcome

| Summary of objectives	To maintain safety performance at the highest level affordable and within appetite within cash constraint scenarios for CP6. To further improve our safety culture and identify opportunities to improve safety performance throughout the telecoms estate.			
No.	**Key constraints, risks and opportunities**	**What we plan to do**	**Owner**	**Timescale (start/ finish)**
1	C: The plan assumes minimum [financial] constraints on the achievement of safety objectives.	We will monitor changes in financial requirements and manage the asset portfolio in accordance with established safety risk management principles.	NRT Head of Operate	Initiated in Year 5 of CP5, and sustain through CP6
2	C; The plan assumes no increase in risk of failure to meet LTIFR.	We will monitor accident and injury rates, and further improve our safety culture. See also item 6 below.	Professional Head - Telecom	Continued effort throughout CP6
3	R: Wholesale renewal of 'cable trough' is not being undertaken by NRT. There is a risk of increased (1) Close Calls for potential slips, trips and falls related to cable trough condition and exposed cable, and (2) they will exceed the 90-day target.	Work continuously with industry to engage with workers and improve awareness of this issue. Work with major programmes to reduce the likelihood of further damage to troughs and cables, and to reduce the likelihood of related accidents. Promote the development of new asset management process continue to increase awareness of products to drive greater efficiency and safety.	NRT Head of Operate	Initiated in Year 5 of CP5 and sustain through CP6
4	R: Railway Operational Safety: There is increasing risk that a GSM-R emergency call will not be fulfilled to prevent a collision/accident. This is because of three factors: (1) Government and industry plans to address radio interference affecting GSM-R are not yet agreed and we believe that there will be increasing occurrences of radio interference; (2) our ability to monitor radio quality is limited, and; (3) we are deferring renewals of signal boxes' GSM-R signaller terminals, effectively delaying risk reduction.	1 and 2: We have made the case and are funding the introduction of V4 cab radio within the core scenario. We will agree and deliver a roll-out plan for its introduction into service. We will also will develop other short-term mitigation strategies. 3.a: We will optimise the asset management regime for GSM-R signaller's terminals. 3.b: Site inspections will help enable better understanding of site and asset condition, and better fault prevention.	1 and 2: NRT Director 3.a: NRT Head of Operate 3.b: Professional Head - Telecom	1 and 2 case made and plan delivered before end CP5, delivery of solution by end Y2 CP6 3 a and b commenced before end CP5 and sustain through CP6
5	O: An opportunity is taken in the plan to defer some level crossing telephone renewals so as to introduce a better performing product.	Align telecom asset renewals with Network Rail level crossing initiatives to introduce better performing products.	NRT Head of Scope	Continued effort throughout CP5 and CP6
6	O: Opportunities may arise to reduce the risk of lineside accidents by moving assets to a safer location or reducing worker exposure to higher risk maintenance and repair activities.	Site assets in safer locations where practical to do so.	NRT Head of Scope	Managed throughout CP6

Summary of risk outcome:
We plan to continue to manage safety risk within risk appetite throughout CP6. However, GSM-R, level crossing or cable trough issues may affect both safety and related reputation adversely if they manifest in CP6.

5.   Financial performance

Financial performance activity prioritisation

| Summary of objectives		To acquire funding for CP6 activities and exercise control over NRT finances and monitoring and responding to financial performance issues.			
No.	Key constraints, risks and opportunities	What we plan to do	Owner	Customers impacted	Timescale (start/ finish)
1	R: NRT will lose funding as a result of not meeting its total budget of £1.2bn and not meeting the required annual spend envelopes within the plan.	Prioritise asset renewals and drive efficiencies within Operational costs to ensure deliverability against targets. Manage envelopes within DEL process.	NRT Director	Routes, NRT and GDR	Managed throughout CP6
2	R: Financial Performance Measure and Cash Compliance – Capex Unit Rates: There is a risk that the assumed unit rate reductions will not be realised, impacting the ability to deliver the volumes in the plan.	Monitor and respond through periodic reporting against the plan.	NRT Director	Routes, NRT and GDR	Managed throughout CP6
3	R: FPM and Cash Compliance – Capex Supplier Prices: There is a risk that external market prices will increase the cost of products or services, impacting the ability to deliver the plan.	Monitor and respond through periodic reporting against the plan.	NRT Director	NRT and GDR	Managed throughout CP6
4	R: Cash Compliance – Operational costs: There is a risk that operational support contracts and third-party service contracts will increase in cost due to deferral of work or retention of obsolete assets remaining in service longer than planned.	Monitor and respond through periodic reporting against the plan.	NRT Director	NRT and GDR	Managed throughout CP6
5	R: There is a risk that efficiency targets will be set that are not within the plan.	Review areas of key costs and identify opportunities to achieve efficiency targets.	NRT Director	NRT and GDR	Managed throughout CP6
6	O: Opportunity to secure incremental revenue and/or investment at an appropriate point during CP6, subject to business case, Route, NRIL and stakeholder approvals.	Build a compelling business case underpinned by an integrated financial case that supports rail and passenger user cases sharing common digital fixed and wireless connectivity that delivers efficiencies through design, build and 'deliver once' methodology benefitting rail, passenger, freight and UK economic outcomes.	NRT Commercial Director	All routes, TOCs and other external stakeholders	Business case to be produced in line with DfT / DCMS defined requirements during Y1 CP6 Continued effort throughout CP6
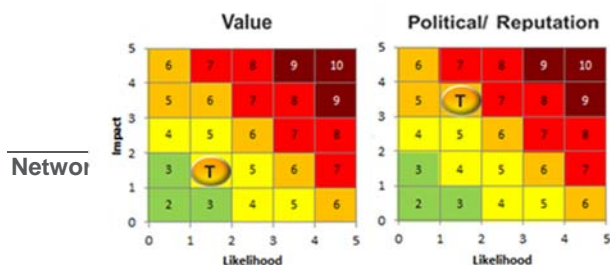
Summary of risk outcome:
Financial risk will be monitored to ensure that NRT remains within its funding envelope. The plan intends to remain within risk appetite throughout CP6.

Please note, Net and Target scores are identical within both Political/Reputation and Value assessments for financial performance.

6. Investment: capacity & growth

6.1. Financial performance activity prioritisation

| Summary of objectives	To build the capability, capacity and reach of our next generation network to ensure it meets the needs of the business and of our customers. Exploit opportunities to reduce the cost and complexity of our asset base through consolidation and rationalisation.				
No.	Key constraints, risks and opportunities	What we plan to do	Owner	Customers impacted	Timescale (start/ finish)
1	**C:** NRT does not have a 'capacity' target or plan to be achieved.	Work proactively with our key stakeholders to understand their future demands of the telecoms network. These will inform our capacity planning processes and projects will plan for such.	NRT Head of Scope NRT Head of Build	Internal Network Rail, rail industry and government customers	Managed throughout CP5 and CP6.
2	**C:** Enhancements or investments arising from the Digital Railway Programme or other rail infrastructure projects are not budgeted within this plan.	Strengthen our presence in their Investment Panel meetings and ensure that customers are aware of the provision that must be made in their project and operating budgets to support their telecoms need.	NRT Head of Scope NRT Head of Build	Internal Network Rail, rail industry and government customers	Managed throughout CP5 and CP6.
3	**R:** There is a risk that railway programmes and projects will place orders with milestones that NRT cannot meet. [This will be due to them engaging NRT insufficiently early (1) to check their assumptions and jointly agree milestones or (2) for NRT to prioritise support to complete the work to the project schedule.]	Strengthen our customer account management capability and engage earlier with our customers to understand their requirement early in the project lifecycle and ensure that our plans are aligned.	NRT Head of Scope	Internal Network Rail, rail industry and government customers	Managed throughout CP5 and CP6.
4	**R:** There is a risk that NRT will not gain additional funding to meet delivery milestones for railway programmes and projects that are not explicitly funded already in this plan. [This will be due to them failing to engage with NRT to (1) check their assumptions or (2) jointly agree the budget and expenditure to meet project scope.]	Strengthen our customer account management capability and engage earlier with our customers to understand their requirement early in the project lifecycle and ensure that our plans are aligned.	NRT Head of Scope	Internal Network Rail, rail industry and government customers	Managed throughout CP5 and CP6.
5	**R:** There is a risk that NRT will not have the organisational or network capacity to meet new customer demands, the assumptions of operational users and customers or projects that are not explicitly funded already in this plan.	Strengthen our customer account management capability and engage earlier with our customers and our supply chain. Ensure that funding for organisational and network capacity is included in customer proposals.	NRT Head of Scope NRT Head of Build	Internal Network Rail, rail industry and government customers	Managed throughout CP5 and CP6.
6	Opportunities may arise in future plans to identify minor efficiencies or to identify how to use capacity more effectively [for example, in station upgrades or system renewals] that are not part of NRT's present plan for capacity and growth.	Work with our customers to identify and to exploit opportunities to reduce cost by leveraging next generation technologies, available capacity and by delivering integrated programmes of work such that cost can be shared.	NRT Head of Build	Internal Network Rail, rail industry and government customers	Managed throughout CP5 and CP6.
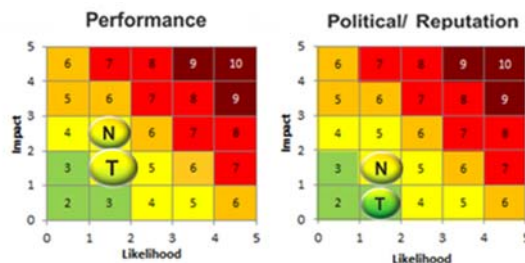
Summary of risk outcome:

The investment element of performance is within appetite for both performance and reputation. Measures to improve customer and supply chain engagement and to ensure better alignment of plans are intended to develop us as a service provider and reduce the impact in both performance and reputation over CP6.

7. Sustainability & asset management capability

7.1. Sustainability & asset management capability activity prioritisation

Summary of objectives	Achieve sustainability targets by delivering against the target investment plan in keeping with targets set by ORR, and avoiding overspend to stay within budget. Strive to achieve optimal whole life costs in asset management regimes.		
No.	**Key constraints, risks and opportunities**	**What we plan to do**	**Owner**	**Timescale (start/ finish)**

| No.	Key constraints, risks and opportunities	What we plan to do	Owner	Timescale (start/ finish)
1	C: There is a bow wave of renewals work due to a lack of funding in CP4 and CP5 that needs to be addressed in CP6. Some renewals scheduled for CP6 have been deferred because they cannot be afforded in CP6 will be addressed in CP7.	Design, develop and execute a delivery/transformation plan that is underpinned by stable investment, resource and product development and cyclic maintenance to deliver the requirements of the core scenario of CP6. Stability and development of efficiencies in CP6 will support further investment planning in CP7.	NRT Head of Scope	Developed CP6 readiness plan by end January 2019. Continued effort throughout CP6
2	R: There is a risk that the budget for the CP6 readiness plan will not address sufficient volumes to stabilise the decline of the asset sustainability figure.	The core cost in the delivery of Telecoms assets has been identified. Efficiencies have been targeted based on available CP5 delivery data. Further efficiencies in technology and delivery will drive lower unit rates and whole life cost reductions to deliver increased volumes within a sustainable budget for CP6 and CP7.	NRT Head of Operate	Developed integrated delivery plan by January 2019. Continued effort throughout CP6
3	O: Opportunities may arise to align, coordinate or merge projects together so as to drive efficiency and derive benefit from products, services and organisational capabilities.	The NRT decision support tool has been utilised to undertake the initial packaging of works and will be utilised to drive further package opportunities. Route engagement is ongoing and will identify opportunities to include our packages within their overall work plans and realise efficiencies that way.	NRT Head of Operate	Developed revised DST with work packages by end CP5 Continued improvement throughout CP6
4	O: Opportunities may arise to deliver national ubiquitous connectivity earlier than planned. This may be offered as an alternative for some renewals projects to utilise and hence gain greater efficiency.	We will assess our reliance on legacy/third party infrastructure. We will monitor progress with delivery of the national network capability, and identify opportunities to affect the design or utilise the final network to avoid the costs of using legacy or third party networks.	NRT Head of Build	Continued effort throughout CP6
5	O: Opportunities may arise to develop a more intelligent asset or asset management regime that will derive greater efficiency from the renewals schedule with reduced resource requirements.	We will support internal research and development of intelligent service based infrastructure and reliability centred maintenance which may offer opportunities to influence projects in CP7 and beyond.	NRT Head of Scope	Continuous review during CP6.
6	O: Opportunities may arise to develop or acquire new decision support tool(s) that will assist asset managers to derive greater efficiency from the renewals schedule.	Dependent upon funding becoming available, we will develop or acquire a better decision support tool to support whole life cost modelling and identify downstream opportunities to realise efficiencies.	NRT Head of Build	Opportunities to be investigated by end Y1 CP6 with a view to deployment in CP6.
7	O: Opportunities may arise to optimise the frequency of asset maintenance and renewals activities and therefore to drive efficiency in the resource plan.	Dependent upon items 5 and 6 above potential improvements in whole life costs may be realised and changes to the resource plan proposed.	Professional Head - Telecom	Emergent opportunities to be continually assessed during CP6.
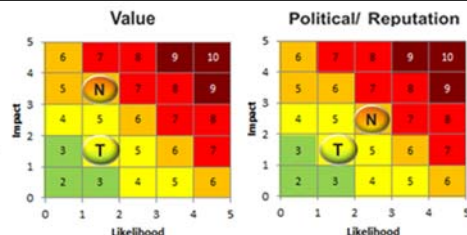
Summary of risk outcome:
Our present risk position for sustainability and asset management is within appetite. However, our plan for CP6 is dependent upon our ability to identify and reduce the core cost of the delivery of telecoms assets, and dependent upon as yet unrealised unit cost reductions. We perceive greater risk is being taken in the plan, and therefore the target scores for value and reputation are each ambitious at 2:2.

8. Train performance

8.1. Train performance activity prioritisation and risk outcome

Summary of objectives	We will change the approach to on-going management and maintenance of telecoms services, networks and assets across Network Rail. This is because telecoms technology improves efficiency by concentrating high volumes of critical services onto a high capacity, high availability and secure platform. Reliability is improved by building resilience and using technology to predict and prevent failures. Train delays thus become more infrequent, however higher impacting.

| No.	Key constraints, risks and opportunities	What we plan to do	Owner	Customers impacted	Timescale (start/ finish)
1	O: Current telecoms management and maintenance processes are aligned to an asset management model. There is an opportunity taken in the plan to develop NRT as service provider, using service level agreements to define and deliver services to the digital railway, wider Network Rail, TOCs, FOCs and third party suppliers.	Design, develop and implement a national service level agreement with the customer/supplier/ maintainer community for telecoms services delivered across the rail corridor.	NRT Head of Operate	Routes, RS-IT, TOCs, FOCs, Level 3.	Start: Year 5 CP5 End: Year 2 CP6
2	R: NRT fails to attract the right kind of new talent into the organisation and tend to promote from within. New technologies will require the development of new capabilities and ways of working to support the digital railway. NRT will need to become more attractive to new talent and technology experts whilst retaining scarce legacy technology skill sets.	Establish a relevant customer and market-facing brand identity aligned to the strategic roles which in turn are benchmarked against telecommunications industry and aligned to the start of the NRT people plan, competence programme and transformation journey set out in our SBP for CP6.	Director NRT	All	Start: October 2017 End: December 2019
3	O: There is an opportunity taken in the plan to exploit centrally managed telecoms systems and to gather data about real-time asset and service condition. This in turn presents opportunities for 'predict and prevent analyses' and 'proactive maintenance'.	Implement data farming and harvesting policy combined with a service architecture that delivers benefits to NRT and its customers. Network management project and analytical framework workstream to begin in CP6.	NRT Head of Operate	All	Start: Year 1 CP6 End: Year 5 CP6
4	O: There is an opportunity taken in the plan to develop intelligent system integration combining processes, data and system information. This will deliver real-time automation that builds intelligence and analytics into a simplified user interface, combining processes, data and system information.	Develop a network element intelligence strategy that delivers real-time automation that leverages standard service models to deliver a world-class service to our customers.	NRT Head of Operate	All	Start: November 2017 End: Year 2 CP6
5	C: Current NRT telecoms services delivered across Network Rail do not benefit from service management. The introduction of service management as part of an ITIL framework would make efficient use of resources and improve the quality and reliability of services NRT delivers to our customers.	Become service-led and adjust the organisation to ensure we put the customer experience at the heart of what we do. This will be reflected with the application of a more formal ITIL framework across NRT.	NRT Head of Operate	All	Start: November 2017 End: November 2019
6	R: NRT currently operates legacy, end of support, end of life and obsolete assets. These assets/services cannot sustain service levels required to build the digital railway, and take up space, power, resource which could be more effectively purposed for ubiquitous national telecoms network.	Develop a complete migration strategy that sunsets the frame-based technologies that reside within our network	NRT Head of Scope	All	Start: March 2017 End: into CP7
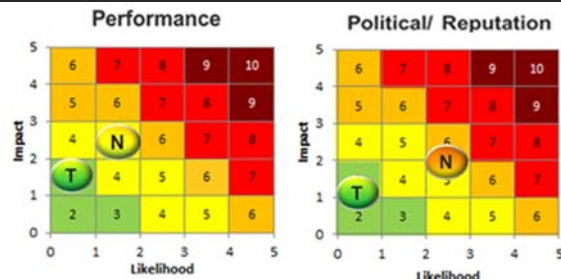
Summary of risk outcome:
We are managing train performance risk within appetite however keeping reputation within appetite is more challenging. Increased dependency on telecoms in CP6 will drive greater risk to both measures but, by exploiting the identified opportunities, we will address this and drive towards our target position by the end of CP6.

9. Locally driven customer measures

9.1. Locally driven objectives activity prioritisation and risk outcome

Summary of objectives	NRT will move from a transactional to partnership relationship with its customers by engaging earlier in the planning cycle. We will achieve this by transitioning from asset to service based outcomes through enhancing our standard product portfolio.				
No.	**Key constraints, risks and opportunities**	**What we plan to do**	**Owner**	**Customers impacted**	**Timescale (start/ finish)**
1	R: There is a risk that we continue to deliver bespoke, expensive non-repeatable services to the railway	Implement a single front door for customer requests underpinned by a service catalogue with standard and repeatable products and services	Head of Scope	All Routes, TOC's	June 2017 to September 2019
2	R: NRT engages internal customers too late in projects to steer customers to standard telecoms services	Build account management capability to engage and align with customers earlier in the planning lifecycle	Head of Scope	All Routes, TOC's	June 2017 onwards
3	R: There is a risk that Network Rail is targeted as part of a local/national cyber/security breach resulting in reputational damage	Develop products and services to support and protect our customers	Head of Scope	All Routes, TOC's	July 2017 onwards
4	R: There is a risk of increased cyber-attack as we move to open IP architectures.	Build the services and operating models to better protect our customers	NRT CISO	All Routes, TOC's	January 2018 onwards
5	R: There is a risk of multiple third parties accessing safety critical track side assets in an uncontrolled manner	Deliver commercial products and services in a way that protects and leverages those critical assets (assuming mandate and funding secured)	Head of Scope	All routes, TOCs and external stakeholders	Late 2015 onwards
6	O: In support of our route based customers (i.e. TOC's),to Improve the passenger journey experience by enabling wireless and mobile connectivity to trains through improved intelligent trackside infrastructure.	Deliver commercial products and services in a way that protects and leverages those critical assets (assuming mandate and funding secured)	Head of Scope	Routes, TOC's, Passengers	Late 2015 to onwards
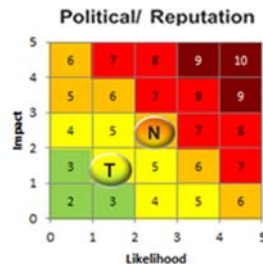
Summary of risk outcome:
Through management of the risks and opportunities identified we will move to become a more commercial and service orientated telecoms provider whilst maintaining telecom support for the railway and improving passenger journeys.

10. Activities & expenditure

10.1. Cost and volume summary

This plan is predicated on the key assumptions laid out in Appendix A and will be impacted as these assumptions change.

RENEWALS COSTS (post headwinds and efficiencies in cash prices)

	Unit of Measure	Funded by	CP5 (£m)	CP6 (£m)						CP7 (£m)	
			18/19	19/20	20/21	21/22	22/23	23/24	CP6	24/25	25/26
Route Operational Communications	£m	Renewals	12.6	17.0	21.5	22.0	28.0	30.1	**118.5**	57.7	25.4
Route Network	£m	Renewals	7.2	11.9	15.2	13.2	16.2	12.6	**69.2**	25.0	22.1
Station Information and Surveillance Systems	£m	Renewals	21.8	8.4	40.9	66.1	43.2	16.2	**174.8**	58.5	39.8
Route Projects and other	£m	Renewals	2.8	2.5	2.5	2.5	2.5	2.5	**12.6**	3.6	2.6
Non Route Central capital	£m	Renewals	29.9	79.9	65.4	70.2	68.3	51.9	**335.8**	66.7	80.3
Total Renewals (excl FTN)	**£m**	**Renewals**	**74.3**	**119.8**	**145.5**	**174.0**	**158.4**	**113.4**	**711.0**	**211.4**	**170.2**
Non PR-FTN*	£m	Renewals	0.3	0.7	0	0	0	0	**0.7**	0	0
Telecoms including FTN	**£m**	**Renewals**	**74.6**	**120.4**	**145.5**	**174.0**	**158.4**	**113.4**	**711.6**	**211.4**	**170.2**
Digital Railway	£m	DR Programme	0	0	0	0	0	0	**0**	0	0
Total Renewals + Digital Railway	**£m**	**All**	**74.6**	**120.4**	**145.5**	**174.0**	**158.3**	**113.4**	**711.6**	**211.4**	**170.2**

KEY VOLUMES

	Unit of Measure	Funded by	CP5	CP6						CP7	
			18/19	19/20	20/21	21/22	22/23	23/24	CP6	24/25	25/26
Transmission Node	No. of	Renewals	6	90	184	160	311	284	**1029**	556	385
Radio	No. of	Renewals	0	0	27	44	88	68	**227**	263	249
Concentrators	No. of	Renewals	3662	2196	378	1959	1136	2039	**7708**	883	1359
SISS	No. of	Renewals	5688	1269	6286	12193	9684	3788	**33220**	15606	5228
DOO CCTV and mirrors	No. of	Renewals	2	0	100	389	96	231	**816**	839	12
Human Machine Interfaces	No. of	Renewals	24	50	27	62	80	136	**355**	237	78
PETS	No. of	Renewals	0	43	24	24	22	55	**168**	56	32
Power Conductor Rail renewal	No. of	Renewals	12	61	60	132	195	194	**642**	322	105

Note on significant volumes in CP6:
- **Concentrators:** Reduced volumes compared to CP5 due to roll-out of centralised fixed voice platform, enabling capability delivery with fewer assets.some shift from year 1 to year 2 due to data centre facility build timescales
- **SISS:** Increased volumes in CP6 as a result of CP4 and CP5 deferral of renewal which are now life expired, decrease in year 5 due to some deferrals into CP7.

OPEX COSTS (post headwinds and efficiencies in cash prices)

	CP5 (£m)	CP6 (£m)						CP7 (£m)	
	18/19	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**CP6**	**24/25**	**25/26**
Operations									
Support	70.1	87.2	107.2	109.3	91.3	93.5	**488.6**	96.6	99.8
Total Controllable Costs	**70.1**	**87.2**	**107.2**	**109.3**	**91.3**	**93.5**	**488.6**	**96.6**	**99.8**
Non-Controllable Costs	0	0	0	0	0	0	0	0	0
Headcount	**556**	**603**	**603**	**603**	**603**	**603**	**603**	**603**	**603**
Permanent	552	602	602	602	602	602	602	602	602
Agency	4	1	1	1	1	1	1	1	1

Note: Accommodation, training and GDR leadership costs are held separately within GDR Support.

10.2.   Route Business Scotland details

	CP5	CP6					CP6 total	CP7	
	18/19	19/20	20/21	21/22	22/23	23/24		24/25	25/26
National Cost (£m)	144.7	207.7	252.9	283.3	249.6	206.9	1200.2	306.9	268.9
Scotland Route based renewals	4.5	5.9	13.9	9.6	7.0	2.7	39.0	7.1	10.4
Scotland Network wide renewals	3.5	9.1	7.2	7.7	7.5	5.7	37.3	7.3	8.8
Scotland Renewals Cost (£m)	**8.0**	**15.0**	**21.1**	**17.3**	**14.5**	**8.4**	**76.3**	**14.4**	**19.2**
Scotland Operational Costs (£m)	7.7	9.9	11.9	12.0	10.0	10.3	54.0	10.7	11.1
Scotland Cost (£m)	**15.7**	**24.9**	**33.0**	**29.3**	**24.5**	**18.7**	**130.3**	**25.1**	**30.2**
Scotland (%)	**10.8%**	**12.0%**	**13.0%**	**10.3%**	**9.8%**	**9.0%**	**10.9%**	**8.2%**	**11.2%**
National Cost	The CP6 national cost represents, route based renewals of £374.3, Network Wide asset renewals of £337.3m and operational costs of £488.6m								
Basis for allocation to Route Business Scotland	Route assets renewal expenditure has been allocated on the basis of a detailed analysis of asset by asset build programme identified within Scotland route. Central capital and operational cost expenditure has been apportioned from a national fund on the basis of train km on an annual basis.								
Activity	Route asset replacement will cover the replacement of specifically identified route assets within the area controlled by the Scotland route and is based upon the NRT Decision Support Tool which lists each asset, its age, condition and replacement cycle. Network Wide capex will provide for the national telecommunications network capability required to keep the railway running across GB, which Scotland benefits from. The operational costs represent the apportioned costs of running the national telecoms service and networks (excluding maintenance which is budgeted for within the route directly). The plan for Scotland has been prepared in light of the requirements outlined in the High Level Output Specification issued by Transport for Scotland in July 2017 and has been designed to meet the aspirations for improved customer benefits outlined within it.								

10.3. Asset intervention strategy

Asset area	Intervention strategy
Telecoms	The Telecoms Asset Management Policy provides clarity of direction on the Asset Intervention Strategy, a summary of this is contained below. Asset Intervention Types Three intervention types are used to provide service to our customers, mitigating the effects of the asset's degradation and failures: • Monitor • Inspect (predict) and maintain (prevent) • Replacement and renewal Monitor - check that equipment meets the defined performance thresholds by checking the asset by automated management systems or direct observation. If the performance threshold is breached or failures are detected, secondary intervention or remedial action such as rectify, or periodic service is required to restore service. Inspect (predict) and maintain (prevent) - check that equipment meets the defined performance thresholds by periodic visual and physical activities including tests and measurements, restoring (service) performance to defined thresholds if within expected levels. Maintenance can be at hardware or software level. Replacement and renewal - replacing or renewing components or systems with serviced or repaired spares or new purchase. Three types of renewal or replacement are available: 1) Full system renewal generally comprises the system itself and the supporting equipment, containment and structures. Project management, design, testing and commissioning are included in the package. 2) Targeted renewal is the renewal/replacement of a component part of a system such as a monitor/display or camera where there is a little or no requirement for design work and minimal testing and project management. 3) Maintainer swap-out is replacement of equipment as part of the normal service/system rectification activity, generally using the Telecommunications Maintenance Testing & Failure Investigation (TMT&FIP) Process.

10.4. Weather resilience

Within the CP6 investment scenario there is funding identified for the development of improved environmental management equipment and processes. The allocation of funds will be used to develop environmental solutions that mitigate against hot weather conditions and deliver a sustainable solution that reduces the reliance on operational cost funding associated with maintenance and faulting of traditional environmental systems e.g. air conditioning.

Our networks and systems are, and will continue to be, designed and implemented to provide physical and logical diversity, up to the point the application connects to the telecoms infrastructure. Significant weather or external infrastructure events do cause issues to the telecoms infrastructure locally, but data passing across our core systems can be rerouted (usually automatically) to avoid problem areas and giving inbuilt resilience.

We are working with our stakeholders to develop a suite of telecoms services to support remote condition monitoring of our infrastructure, to assist in the early warning and management of weather related incidents.

10.5. Operational plan

10.5.1. Train performance strategy

The investment identified within the core scenario is designed to maintain the CP5 exit figures for train performance. There are opportunities to drive minimal performance improvements however the investment is primarily targeted at maintaining systems' stability utilising an efficient level of investment. The key imperatives are to deliver simplicity through a single network environment that supports commercial off the shelf (COTS) plug and play solutions. This will be a key enabler in driving down cost through increased system reliability and supporting train performance requirements/improvements.

10.5.2. Route operations strategy

The core investment scenario has been created in consultation with the information provided by the route asset management teams. Renewals are supportive of known operational changes and implement technologies that will form enablers to many of the requirements for the route projects delivering operational change. A summary of the key operational asset groups is as follows:

- Transmission will be provided by a single supportable network (FTNx) by the close of CP6. Legacy transmission systems will be migrated to the FTNx network over the duration of the control period and where operational efficiencies can be identified, third party supplier provisions will also be migrated to the single network
- GSM-R will continue to be the single operational radio network in England and Wales. Scotland will continue to utilise a mix of GSM-R and RETB for track-to-train communications
- Driver Only Operation (DOO) despatch systems will be renewed to support the operational requirements of the routes and associated TOCs. The introduction of new rolling stock with on-board systems is a key consideration in the creation of the core investment scenario
- Level crossing telephony forms a key part of the core scenario with a plan to maintain asset renewals and support the development of product/technology improvements
- Enabling telecoms for ETCS infrastructure schemes for FTN and GSM-R will be delivered to meet enhanced ETCS requirements.

10.5.3. Approach to resilience

The Telecom Asset Management Policy provides guidance on the approach to asset resilience and associated criticality. This guidance has been reflected into the Telecoms Decision Support Tool (DST) and the tool has been utilised to drive the renewals work bank. The key elements that have been prioritised within the plan are summarised below:

- Power support systems have been prioritised to maintain operational continuity in the times of national operator failure. A battery strategy is in the process of being developed to drive power support in line with system and geographical needs. This will drive a sustainable position for this asset base
- Operational telephony will progress with a combination of site renewals in line with the development of a central core that will facilitate flexibility, efficiency and resilience
- Sustained investment into lineside infrastructure and level crossing telephony will deliver improvements to availability of the service and hence support resilience. Known hotspots will be targeted alongside the evaluation of the complete system and support at level crossings
- The migration from third party services to our own telecoms infrastructure will be undertaken to deliver greater resilience at level crossing locations
- Further network build is planned to facilitate the completion of the FTNx infrastructure to enable the single network environment
- The migration from legacy services to our own telecoms infrastructure will be undertaken to drive to a single supportable, scalable and sustainable FTNx network environment

- Evolution of technology will also bring enhanced levels of active service performance monitoring supporting enhanced end-to-end measurement of service performance.
- As well as technology, an ongoing continuous service improvement effort will apply regular scrutiny to the people, processes and tools used to maintain and repair the network.

10.5.4. Operational performance

Performance of the telecoms service suite is planned to evolve to be ready to match the aspirations of the routes. Network architecture and technology will continue to deliver increased service resilience against equipment failure or infrastructure damage.

An ever-increasing range of smart reporting will be developed to inform route operators and the TOCs of trends in performance. This will be supported by an enhanced level of co-operation between NRT and route teams using closer integrated common tools and processes to predict and prevent service loss. This will be achieved whilst maintaining a UK-wide, consistent and integrated approach to technology introduction, minimising spares holding, simplifying competence management and maintaining volumes of scale.
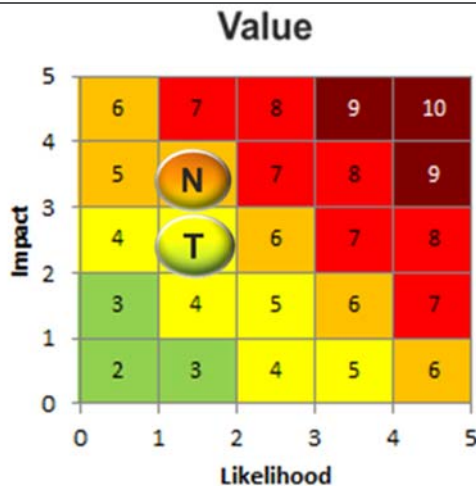
10.6. Output summary

10.6.1. Risk
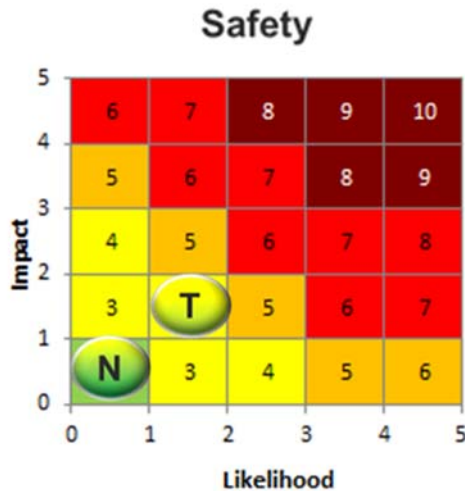
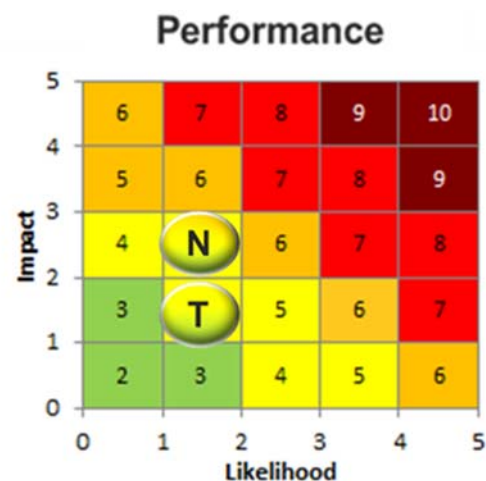**Summary of risk outcome: Safety**

We plan to continue to manage safety risk within risk appetite throughout CP6. However, GSM-R, level crossing or cable trough issues may affect safety adversely if they manifest in CP6.

Summary of risk outcome: Value

The target risk position reflects a combination of value (finance) and planned efficiencies for whole life costing in the asset management regime.

Financial risk will be monitored to ensure that NRT remains within its funding envelope. The plan intends to remain within financial risk appetite throughout CP6.

Performance

Summary of risk outcome: Performance

The target risk position reflects a combination of train performance and investment capacity and growth.

We are managing train performance risk within appetite. By exploiting the identified opportunities we will drive towards our target position by the end of CP6.

Similarly, the investment element of performance is within appetite. Measures to develop us as a service provider over CP6 (improve customer and supply chain engagement and to ensure better alignment of plans) will enhance our performance in delivery.

Political/ Reputation
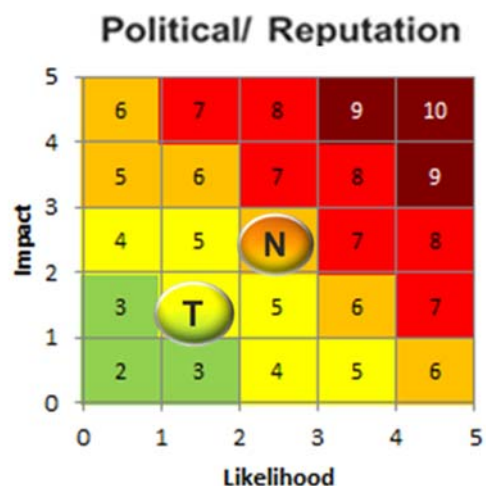
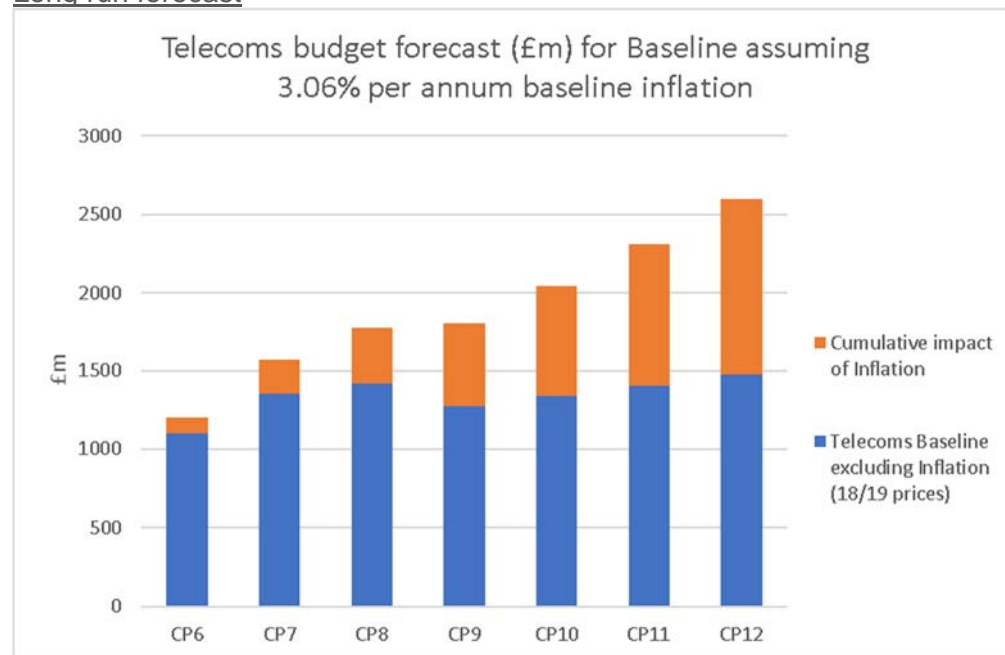**Summary of risk outcome: Political/Reputation**

The target risk position strikes a balance between diverse impacts in all six activity areas.

Overall we expect that delivery of all elements of the plan will cause a reduction in both frequency and impact related to political and reputational issues.

Long run forecast

- This graph describes the long-term expenditure forecast to control period 12, assuming expenditure levels for CP6 are consistent with the levels outlined in this plan
- Beyond the end of CP6, the assumed level of expenditure is that required to meet the increasing demand for telecommunications services by the GB rail industry (inflation is assumed at 3.06% per annum post CP6)
- The increase in demand is partly offset by assumed technological advances, capacity and cost improvements driven by these advances.

Given the speed of technological advancement over recent years and the ever-increasing demands for new and innovative services, forecasting of demand, and costs, within the field of telecommunications over more than the eight years contained in this plan, is considered to be highly speculative.

The increasing underlying trend (5% per control period) is predicated on data growth from intelligent infrastructure use, digital asset and sensor information, remote condition monitoring, digital train control systems and out payments for spectrum and licence upgrades. There is also an investment spike in CP8 for technology refresh of £200m to address software defined networking in the core and uplifts to OSS and BSS systems for orchestration and network management, and a further in late CP7 £200m to migrate GSM-R to FRMCS (future railway mobile communication system).

Some costs could be offset partially or fully, contingent on externalisation of the network to drive income and private investment.

The speed of technological change within the telecommunications industry is fast, as evidenced below:
- 1985 – First ever mobile telephone call made in the UK
- 1985 – BT installs first 204km of fibre cable in UK
- 1992 – UK's first dial up internet introduced by Pipex
- 1992 – First portable mobile handset introduced
- 2000 - UK's first ADSL broadband line providing a maximum of 2Mb/s
- 2007 – First Apple iPhone introduced
- 2012 – iPhone 5 launched with 2.7 times the processing power than the 1985 Cray-2 supercomputer (which cost £8 million).

11. Customer focus & business development

11.1. Operating model and business development

During 2016/17 we reviewed and updated our operating model. This was done to take account of the changing environment in which we operate and the requirements that were placed upon us by the outputs of the Shaw review. Route devolution has also impacted the design of our operating model.

This review led to the adoption of a scope, build and operate model as set out in the diagram adjacent.

We will continue to review and where appropriate revise our operating model throughout CP6.

We are part of the Group Digital Railway directorate and are a central support function within Network Rail. We provide routes with a national telecommunications capability specifically aimed at the railway. We support the routes by providing a national centre of excellence and ensuring that telecommunications are installed to a common set of interoperable standards across our network.

We are investigating the feasibility of extending the use of our assets and infrastructure with a view to supporting Network Rail's strategies, the digital railway, our passenger and lineside neighbour communities. To do this, it is anticipated that a degree of investment is required to enhance our existing infrastructure which in turn could yield incremental income. Further details on this can be found in section 14 of this document.

11.2. Future capacity & growth

Whilst the foundation of our CP6 strategic plan is based on asset renewals, we plan to take a service capability-based approach linked to a system of systems methodology, developing newer technology and business operating models to reduce our operating costs and deliver our services more effectively.

We recognise the ever-increasing demands made for our services, and the ever-increasing technological change within the commercial telecoms market. Therefore, within this strategic plan, we are proposing to retire the various legacy networks, which are now costly to maintain, and deliver equivalent capability via a ubiquitous IP telecommunications network (FTNx). Our aim is to migrate services from legacy core networks by the end of CP6.

We also propose to centralise some of the functionality currently at the edge of the network into two/three data centres, to provide a lower cost, more reliable and more agile service offering to our customers.

11.3. Digital railway

We are a key enabler for the digital railway providing the communications backbone over which capability such as in-cab signalling and Traffic Management will operate. We are working closely with the Digital Railway programme to develop a detailed set of requirements that will ultimately define our service offerings for this programme.

Our strategic plan and the financials within it specifically exclude direct expenditure required to facilitate the requirements of the Digital Railway programme. However, the strategy adopted has been cognisant to ensure that no options have been taken that would run counter to the current identified potential requirements for the programme.

11.4. Communications

The role of our Communications team is to support the business through the delivery of timely, accurate and compelling communications to our stakeholders, enabling us to achieve our vision, mission and objectives as well as develop a more mature culture. Our communications activities seek to build trust and confidence in NRT. We do this by helping stakeholders understand what we do, and how we do it.

We will continue our focus on increasing levels of customer and employee engagement as well as reputation management and enhancement. This focus will be achieved through following corporate guidelines, collaborative working, effective stakeholder management and benchmarking activities.

All activities will be delivered using a structured continuous improvement approach to ensure that all our communications activities are better every day.

12. Cost competitiveness & delivery strategy

12.1. Summary telecoms deliverability statement

The volumes proposed in this strategic plan are challenging, as they represent a step change in expenditure from those committed in CP5. To this end we will continue to use our industry supplier partners to provide both industry best practice and flexible, scalable and sustainable delivery capability. Route based assets have been subject to a local deliverability assessment between the national telecoms asset and performance managers and their route based Senior Renewal and Enhancement Engineering teams.

For centrally delivered assets, the majority will be delivered by third party specialist telecoms companies with rail expertise, who will be able to resource adequately in line with requirements rather than via internal delivery mechanisms.

12.2. Access

Access to the railway to undertake both renewals and maintenance will be more complex given the ever-increasing level of services being operated by the routes, coupled with the increasing challenge of securing possessions to allow safe working. We will therefore develop a strategy to where possible, integrate our works with other projects across the network.

We will actively look to use the work bank visualisation and Schedule 4 decision making tools being developed within Group Digital Railway and elsewhere within the business.

Access restrictions will also require new methods of working for both maintenance and renewals. We will look to analyse our working practices, processes and utilise new technologies as they become available, to minimise, as much as possible, possessions and electrical isolations during operational running times of the network.

12.3. Maintenance delivery

We are experiencing unprecedented change in terms of requirements, access restrictions and technology development within the telecoms industry which subsequently pose significant maintenance challenges.

These challenges require the adoption of new maintenance approaches, changes within processes, organisational alignment to ensure clear accountability, tools and training. We will use lean-based techniques to develop new maintenance delivery methods based upon lowest whole life cost for each asset type.

The maintenance and renewal strategy will be based on a predict and prevent regime, using enhanced remote monitoring, increased asset intelligence and more effective team working with all stakeholders.

Our overall aim is to provide safe, reliable and high performing services to our customers and minimise delays attributed to the telecoms.

At the heart of this strategy is our people and those within the route maintenance teams - it is our people's skills and passion that will enable delivery of our maintenance strategy.

Like other assets, we have a four-strand approach to delivering our maintenance strategy:

- Task standardisation and improved collaborative working
- Reliability centred maintenance and renewal regimes based on improved asset knowledge and intelligence
- An effective and responsive organisation founded on a multi-

discipline approach with highly trained and skilled workforce
- Use of technology to predict faults and to ensure deployment of the right solution for each task.

12.4. Project delivery

We will continue to develop a diverse contracting strategy with Infrastructure Projects and with our external suppliers. We will seek to introduce new contractors with the requisite skills to deliver our highly technical requirements whilst also driving further competition and efficiency, with a view to driving down whole life cost.

We will also continue to act as a delivery agent for the telecom's components of large internal customer projects e.g. the resignalling workbank. Our delivery will utilise our project management and technical expertise and be fully in-line with the appropriate financial, project management governance (GRIP and MSP4NR) and with our ISO9001 Quality Management System.

12.5. Supply chain (Contracts and Procurement)

Our Commercial team will add significant value to pre- and post-contract management through effective supplier selection and deploying strategic supplier management activities including, segmentation to focus our resources with those suppliers that will add the greatest value.

Supplier management will be supplemented with the use of bespoke telecoms frameworks, innovative procurement strategies and whole life cost analysis, delivering high quality and service standards, assurance of supply, operational and safety requirements and value for money across new and repeating spend. An example of an innovative procurement strategy is Early Contractor Involvement which has already resulted in the development of new ideas and potential solutions which could generate significant time and cost benefits.

We will work closely with our customers and stakeholders and engage proactively with the supply chain to develop an integrated category strategy for telecoms that will meet our future business requirements and influence the supply market to provide a range of delivery options, ensuring we can offer our customers flexible, scalable and sustainable solutions.

Ongoing supplier engagement will ensure that we collaborate with key suppliers to keep them informed of our changing workbank and priorities, enabling them to support our delivery strategy from a resource, time and cost perspective.

We will work closely with the Route Services Contracts and Procurement team to share best practice and expertise across common platforms and to leverage economies of scale and skill across overlapping areas of spend, maximising value and mitigate supply risks. There will be ongoing reviews of supplier performance and third-party contracts to ensure overall value for money and delivery of commercial obligations. Process and governance procedures will be streamlined in conjunction with Route Services Contracts and Procurement to ensure these are lean in content, transparent to our customers and timely in their execution.

12.6. Innovation

In CP5 we established a telecoms innovation team which has delivered credible, aligned and original work demonstrating technology in action to a wide rail industry and government audience. We will continue and expand this work; much of it at the Rail Innovation & Development Centre at Melton, to deliver an industry showcase for connected technologies and mechanisms for the widest possible access to live infrastructure data, supporting an open marketplace of value-add information suppliers.

12.7. Technology (R&D)

Wherever possible, we will look to re-apply developed technology components in a manner which best addresses both similar and unique rail challenges. As a service provider to Network Rail, and the rail industry, we will define and propose service product-offerings aligned to railway needs, along with the information and control flows necessary to ensure the most effective operation of the enterprise architecture.

12.8. Security

Protection of the telecoms network from physical and cyber threats is critical so that NRT can maintain and deliver services to its customers. Our Security team is developing its capability aligned to the Network Rail Security Operating Model in order that security services will protect the telecom infrastructure and asset base and provide essential security services out to the wider business where required.

Through a risk-based approach, security threats to our business and assets will be understood and mitigating security controls will be applied appropriately. We are actively moving towards a 24/7 operational security capability allowing us to protect, detect, respond and recover from security events or incidents in a timely manner.

Working closely with other Network Rail Security teams and aligned to recently introduced regulatory requirements around security, our Security team will continue to develop its security management system that allows us to develop our strategy around security through understanding the threats and vulnerabilities to our business and application of appropriate physical and logical protection measures.

12.9. Information Management

Information management is a critical element within NRT where integrity and availability of up-to-date accurate information allows us to delivery services to our customers in a timely manner. We are actively developing our strategy and processes around information, data and knowledge with alignment with the central Information Governance strategy and teams. This includes also working with the central data protection (GDPR) team and Route Services Enterprise Content Management (ECM) programme to ensure the tools being delivered across the organisation meet our needs. We will seek to improve the way we manage our information as we move in to CP6 by development of skills, processes and appropriate tools and continued engagement across the wider Network Rail business areas.

12.10. Property

Will work collaboratively with Network Rail Property to enable them to maximise the realisable value from their strategy around the release and sale of surplus land assets, to enable re-investment in the railway. Where appropriate, we will relocate both assets and operations to the most appropriate location whilst maintaining our quality of service to minimise costs both to NRT and Network Rail overall.
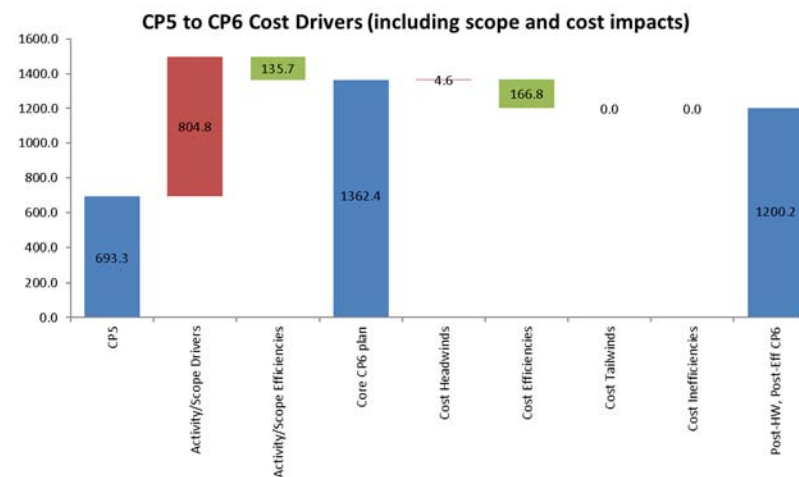
12.11. Financial Sustainability

We will work to attract inward investment into the railway from both private industry and other government departments to maximise the value-add from the assets we have and to procure additional capability that can be leveraged to support railway communications at lowest whole life cost, looking and behaving like a normal private sector company.

Costing approach

Asset	Supplier of cost	Basis of cost	% of asset covered
Route assets (£374.3m)	Head of asset and performance management – Network Rail Telecom	Costs are based upon our decision support tool which shows asset life, remaining life and asset condition data for all route based assets. This consists of over 100,000 individual assets by type. Each asset has a condition and useful remaining life calculation which in turn, with the asset policy requirements, generates a replacement schedule by asset which is then multiplied by a unit cost to get the total renewals policy compliant requirement of £948m in CP6. The unit costs are based upon current CP5 unit costs with appropriate inflation applied. Based upon allowable derogations from the asset policy and affordability, certain assets type renewals have been deferred into subsequent control periods this deferral is c. £317m in CP6. Efficiencies in both unit cost and new ways of working are expected to be delivered during CP6. This has been modelled by asset type and is captured within identifiable asset plans. These total £221m. The resulting route asset cost of £410m has then had a further 9% efficiency applied to it over CP6.giving a post efficient total of £374.3m	53%
Network Wide assets (£337.3)	Head of product and strategy - Network Rail Telecom	Cost profiling and assessment of the Network Wide asset proposal, has been generated using actual figures from projects implemented during CP5, whilst using forward looking external market data and vendor roadmaps to arrive at predicted costs. An efficiency of 7.5% has been applied to the current costs as we drive down supplier and framework costs going forwards.	47%

12.12. Cost drivers, headwinds and efficiency

Summary of cost changes between CP5 and CP6

CP5 to CP6 Cost Drivers (including scope and cost impacts)

Summary of efficiency

Totex (O,M,R)	Year						
	18/19	19/20	20/21	21/22	22/23	23/24	CP6 total
Pre-efficient plan[1] (£m)	168.4	222.4	287.3	363.7	344.4	280.2	1498.1
Activity/scope efficiencies (%)		-4.3%	-4.0%	-9.3%	-12.6%	-13.4%	-9.1%
Core plan (£m)	168.4	212.8	275.8	330.1	301.2	242.6	1362.4
Headwinds (%)	4.5%	0.0%	0.8%	0.7%	0.0%	0.0%	0.3%
Efficiency (%)	-18.6%	-2.4%	-9.1%	-14.9%	-17.1%	-14.7%	-12.2%
Tailwinds (%)							
Inefficiency (%)							
Post-HW, post-Eff spend (£m)	144.7	207.7	252.9	283.3	249.6	206.9	1200.2

[1] Note that pre-efficient plan is equivalent to core CP6 plan + 2a (activity/scope efficiencies) in the waterfall.

Headwinds and efficiency by theme

Theme	Area	Description	Net % change
Access (3)	Efficiency (3a)		
	Tailwind (3b)		
	Inefficiency (3c)		
	Headwind (3d)		
Workbank planning (4)	Efficiency (4a)		
	Tailwind (4b)		
	Inefficiency (4c)		
	Headwind (4d)		
Technology (5)	Efficiency (5a)		
	Tailwind (5b)		
	Inefficiency (5c)		
	Headwind (5d)		
Delivery (6)	Efficiency (6a)	**PAVA speakers** – drive lower unit cost by implementation of enhanced renewal strategy **£11.4**	(0.8%)
	Tailwind (6b)		
	Inefficiency (6c)		
	Headwind (6d)		
Design (7)	Efficiency (7a)	**Battery app dev.-** reducing strings, capacity and REB solution **£7.5m** **Station management systems** - review and develop new solution using COTS elements **£1.8m**,	(0.7%)
	Tailwind (7b)		
	Inefficiency (7c)		
	Headwind (7d)		
Commercial (8)	Efficiency (8a)	**CCTV -** Unit costs framework reduction using standardised COTS products **£40.5m** **CIS small** - rate renegotiation with suppliers based on new technology **£12.4m** **SISS small speakers -** renegotiation with suppliers for new solution using COTS elements **£11.5m** **Central asset framework agreements** –reduced costs based on standardised solutions **£26.6m** **Operational support contracts -** Negotiate discounts for ongoing contracts **£20.0m** **Route commercial framework review** - renegotiation with suppliers to achieve reductions **£35.0m**	(10.7%)
	Tailwind (8b)		
	Inefficiency (8c)		
	Headwind (8d)		
Other (9)	Efficiency (9a)		0.3%
	Tailwind (9b)		
	Inefficiency (9c)		
	Headwind (9d)	**GSM-R core –** potential renewals requirement above funding level **£4.6m**,	

13. Risk and uncertainty in the CP6 plan

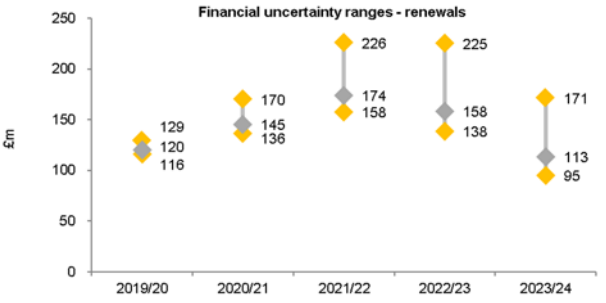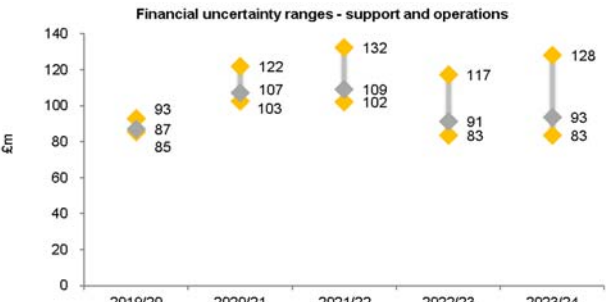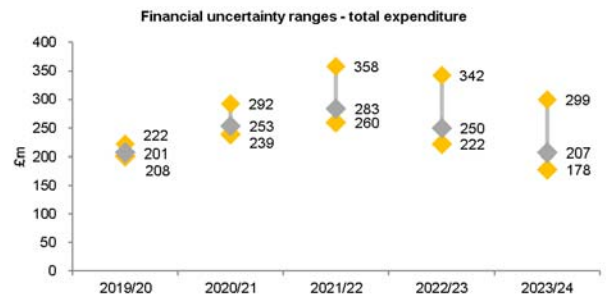This section sets out our estimate of the degree of financial uncertainty within our plan.

Pre-efficient costs in our plan are based on 'current rates' but include any additional scope needed to deliver the outputs in the plan. We have used 2016/17 unit rates to develop our capital expenditure forecasts and CP5 exit rates for support, operations and maintenance expenditure forecasts. Drivers of rate increases (headwinds/inefficiencies), or rate reductions (efficiencies/tailwinds), where there is a reasonable expectation they will occur, have been identified separately from the core CP6 plan.

The combination of our core CP6 plan, headwinds/tailwinds and efficiencies/inefficiencies is our 'submission' and represents the 'most likely outcome' for CP6. However, it excludes any funding for financial risk that sits in our plan.

Whilst it is difficult to precisely estimate the likelihood of delivering our plan in CP6, it seems reasonable to suggest that, overall, there is a 45% to 55% likelihood of the outputs in the plan being delivered for the forecast cost in our CP6 plan (i.e. our plan is set at around P50). This means that approximately half of the time, we will be able to deliver our plan for the forecast cost. However, financial uncertainty varies between expenditure categories. For example, we consider that there is significantly more uncertainty in our renewals plan than in the support, operations and maintenance plans in CP6. Our analysis also shows that there is significantly more financial uncertainty in later years of the control period.

Figure 13.1, below, presents our estimate of the overall range of financial uncertainty across our income and expenditure for CP6. It also identifies the main drivers of the uncertainty ranges. The information in this table is based on route analysis of the financial uncertainty in support and operations, maintenance and renewals costs, and income. The spot values in Figure 13.1 include headwinds/tailwinds and efficiencies/inefficiencies. The financial uncertainty ranges represent our assessment of the outturn income and expenditure that could occur in 95% of scenarios in CP6.

.

Figure 13.1 CP6 financial uncertainty ranges

Area	Potential range (low – spot – high)	Summary of key drivers of the uncertainty range	% of range	
		Driver of range	Lower %	Upper %
Renewals		Network Wide renewals, project by project analysis	-47%	30%
		Route based asset renewals, based upon asset by asset cost assumptions	-32%	26%
		Deliverability of assumed efficiencies	-0%	33%
		Inflation uncertainty	-21%	10%
Support and operations		Cost of supplier and contractor costs - operational support contracts	-29%	35%
		Staff costs net of capital recoveries	-15%	14%
		Other costs	-23%	28%
		Deliverability of forecast efficiencies	0%	9%
		Inflation uncertainty	-33%	13%
Total expenditure				

14. Culture strategy

14.1. Safety

Our strategic aim, in line with Network Rail's overall strategy, is to maintain delivery of injury-free (workforce, passenger and public) operations so everyone who interacts with our railway returns home safe every day.

Our strategy to deliver this is based around the following:

- Improving workforce safety, reducing injuries from road driving, train strikes for people working on the railway, slips, trips falls and manual handling injuries
- Focusing on health and wellbeing such as, monitoring sickness, fatigue, excess working hours and stress, putting in a new structure to address these
- Ensuring compliance with and implementing improvements to our Safety Management system which includes safety by design methods.

Progress against these key measures will be tracked and managed on a periodic basis and will be widely communicated in our safety and sustainable development briefs.

14.2. Change

Safety, performance, value for money and modernisation are key drivers of business change within NRT during CP6.

We have no further plans for significant organisational change but will continue to monitor and review our performance and make any changes as required.

We have several change programmes running currently which will inform ongoing improvements in the processes we adopt for delivering services to our stakeholders.

Our project management office is focused on transforming our processes, so we become more flexible and adaptable to change as and when it occurs.

We recognise that the introduction of new technology alongside existing railway technology may cause short-term issues as the solutions are installed. We will adapt our organisational capability and manage change to minimise initial impact on services and to provide longer term benefits.

14.3. Organisational capability

We are currently developing a People strategy that is aligned to the CP6 'Great People Great Teams' strategy that is being launched nationally across Network Rail. The high level aims of this strategy are to:

- Show that by working collaboratively towards a set of shared outcomes for our people, there will be demonstrable business benefits, which will in turn enable us to achieve our business objectives
- Highlight to our people how we are doing which will have a positive impact on them, personally and professionally.

The People strategy will underpin our organisational capability by ensuring we are a great place to work and a high performing organisation. It is essentially about attracting the right type of individual, developing and managing these individuals and retaining them through robust talent management and personal development plans that focus on career and personal development. It is also about identifying skills gaps in the short, medium and long-term and the implementation of effective strategic workforce planning in respect of resource gaps in the future.

One area of focus is to make NRT an employer of choice within what is a competitive job marketplace and to attract the right calibre of applicants. We actively encourage our people to gain and maintain appropriate professional qualifications and memberships of appropriate professional

institutions. For example, we provide Finance colleagues with sponsorship and appropriate time off to gain professional status and pay appropriate examination and membership fees.

14.4. Sustainable development

We strive to continually improve our management of our economic, social and environmental impacts which is key to maintaining a strong and responsible business. We will drive efficiency, build trust and create long-term value for our stakeholders within this area.

To achieve this, we have set the following strategic objectives:

- Deliver outstanding value for money to taxpayers, customers and funders
- Make efficient use of natural resources, innovate with sustainable materials, and reduce, reuse or recycle any waste
- Be energy efficient across our infrastructure, operations, and contribute to this across the rail industry as a whole
- Use low carbon energy sources to minimise our carbon footprint
- Make our network and our operations resilient to future changes in the climate
- Manage our ecological diversity, and increase its economic and social value where identified
- Protect land, air and water from pollution and other negative impacts
- Improve the accessibility and inclusivity of our assets and services, enabling more people to enjoy our services where practical and ethical
- Make a lasting positive contribution to our lineside neighbours and the communities we serve
- Respect the rights of our employees and those working in our supply chain.

14.5. Diversity & inclusion

Our objective is to be a more open, diverse and inclusive organisation. To realise this, we are committed to providing a great working environment which recognises that people from different backgrounds, with different experiences and abilities, can bring fresh ideas and innovation to improve our business and practices.

We want to ensure that equality, diversity and inclusion is embedded in our culture, and reflected in our people and behaviours, all of which will help us to better serve our customers. We will endeavour to:

- Provide fair and open access to development opportunities to fully utilise the talents of all employees
- Improve the recruitment and retention of people from diverse backgrounds
- Ensure that employment decisions are objective, and reflect the collective agreements that have been established where appropriate
- Enhance decision-making and innovation, by encouraging positive interactions and involvement throughout the business
- Increase our ability to relate to existing and potential customers wherever they exist
- Build effective and productive relationships in the wider community through partnerships with community-based groups and stakeholders
- Ensure that people are treated fairly and protected from discrimination, bullying or harassment and we will take appropriate steps when complaints arise
- Be committed to reviewing all existing policies within Network Rail to ensure they demonstrate our equality, diversity and inclusion values
- Be committed to exceeding the minimum legal requirements.

14.6. Quality

Compliance with Network Rail's system of standards and controls is monitored via internal audit (coordinated by the S&SD Assurance team) and a self-assurance process undertaken by senior management (GALP) that generates an annual report on compliance across the business.

Outputs from this monitoring are reviewed and cascaded through to the NRT Business Assurance Committee (BAC), which is formed by Director NRT's Senior Leadership Team (SLT), every quarter. BAC assigns actions to mitigate any areas of non-compliance, and these are implemented and monitored via assurance and quality management staff.

Accountability of control owners has been established, and to allow greater flexibility this is reviewed regularly in NRT BAC and periodic meetings attended by NRT SLT. (i.e. When risk, control or response actions are complex, accountability and responsibility are reassigned as necessary within and between SLT and monitored in BAC and periodic meetings). Actions arising in relation to our CP6 plan will be brought under the same system of control as the plan matures.

The NRT assurance strategy is to identify at an early stage any activities that will be categorised as high risk. This strategy is enacted using formal quarterly and periodic reviews undertaken with senior NR managers and NRT SLT.

Our assurance processes are aligned to the requirements of the Network Rail Assurance framework, namely internal audit and compliance to the level 2 assurance requirements of the 'functional audit program' (FAP). Analyses of FAP outputs are reviewed as part of NRT's continuous improvement approach, and trends can be used at a strategic level to implement predictive measures.

NRT is also ISO 9001:2015 certified in two main functions, aligned to a global standard of procedures and processes that supports the Network Rail assurance framework.

We intend to introduce this ISO Standard across all operational functions.

Our overall strategy is to commit to continuous improvement and to review the current robust assurance and quality management processes we have in place.

To ensure that we can sustain and improve high levels of development and governance required for our business and key stakeholders, we will work within the structure of the corporate integrated management system (IMS) and embed quality management processes that provide accountability, delivery of process and collective assurance responsibilities.

15. Strategy for commercial focus – third party cash funded contributions

15.1. Current and planned third party funding

Network Rail's telecoms assets and infrastructure are very valuable due to their reach and the services they deliver. Today, Network Rail operates a largely closed private network which underpins many vital rail services such as signalling, train detection, operational voice (GSM-R and level crossing) communications and Supervisory Control and Data Acquisition (SCADA). Network Rail has the opportunity to also provide connectivity services for passengers and lineside neighbours whilst raising external investment/funding by extending the use of telecoms assets and infrastructure. These activities will be undertaken subject to appropriate legal, regulatory and licence considerations being understood and addressed.

In CP6 we believe that we could extend use of telecoms assets and infrastructure and extend Network Rail telecommunications infrastructure to one that:

- Delivers sustainable benefits to Network Rail, its stakeholders and passengers
- Retains safe and secure control of telecoms assets and of the rail corridor
- Is designed to deliver modern telecommunication services
- Exploits public assets (including fibre, optical networks and geographic reach)
- Potentially attracts external investment and income for Network Rail
- Helps deliver on government manifesto and policy commitments including actively supporting the developing government Digital Agenda

The primary focus of any future telecommunications infrastructure will be to support NRTs key purpose; to provide a national telecommunications capability that enables the safe, reliable and efficient operation of the GB railway.

15.2. Capability and business development

Due to the national reach of Network Rail's telecommunications infrastructure and the nature of the services that could be provided on the network, there is a strong level of demand particularly from the mobile network operators for connectivity services along the rail corridor, which will enable services to be provided to rail customers as well as to the surrounding urban population.

There is also growing political demand, as evidenced in the manifestos of the major political parties for the June 2017 election, for the provision of improved broadband and mobile communications:

Conservative party manifesto (May 2017)
- "We will ensure that consumers and businesses have access to the digital infrastructure they need to succeed. By the end of this year, 19 out of 20 premises will have access to superfast broadband.

- "By the same date (2022), all major roads and main line trains will enjoy full and uninterrupted mobile phone signal, alongside guaranteed Wi-Fi internet service on all such trains."

NRT will continue working with its key stakeholders to explore areas where our assets can further support passenger services and provide digital capability to customers, passengers and lineside neighbours. This will include areas where digital connectivity is limited and where the assets can support digital coverage for remote and rural communities.

15.3. Focus for third party involvement

NRT is continuing to investigate the different commercial options of third party funding to help develop the capability needed to extend the use of the telecoms assets and infrastructure. In particular, the investment required in core next generation IP telecommunications network, telecommunications estate and fibre optic cables required to provide connectivity services for passenger and lineside neighbours.

Initial discussions have revealed a positive level of interest in this potential opportunity and we continue to evaluate the options.

16. Sign-off

This document and accompanying templates are owned by the Telecoms Director.
Submission of this document indicates confirmation that:

- **all appropriate level 1 assurance activities have been undertaken (see separate advice on definition of level 1 assurance);**
- **the Telecoms Director is satisfied with the quality, currency and appropriateness of the content of this document as well as the cost, volume and activity projections to which it refers;**
- **the signatories are satisfied that the plan has been assessed as deliverable, subject to the assumptions articulated in Appendix A.**

Authorised by:

S.CALVERT
David Waboso
Group Digital Railway Managing Director   28th February 2019

Simon Atterwell
Director Network Rail Telecom   28th February 2019

John Gerrard   28th February 2019
Group Digital Railway Finance Director

Appendix A   Key assumptions

Ref no.	Topic (e.g. access, deliverability, climate etc.)	Assumption	Areas of spend impacted (e.g. all opex, track renewals, all spend etc.)	Is this a change of assumption for CP6?
NRT 1	Digital railway	All expenditure related to the Digital Railway programme has been excluded from this plan. Telecoms costs for central elements of the Digital Railway programme are contained within the separate Digital Railway programme submission	All spend	No
NRT2	Supervisory control and data acquisition (SCADA)	All SCADA expenditure has been excluded from this plan as it has been agreed that the Safety, Technical & Engineering directorate will budget for it	All spend	No
NRT3	Unit costs	Unit cost reductions have been assumed within route based assets in line with expectations based on market analysis	Efficiencies	Yes
NRT4	Network configuration	This plan has been built based on NRT transforming and migrating from several legacy systems and networks to a ubiquitous IP-based network by the end of CP6	Renewals	Yes
NRT 5	Capability and products	This is a renewals-based plan with capabilities offered at the end of CP5 being maintained throughout CP6 and at least maintaining asset reliability	Renewals	No
NRT 6	Refranchising	Customers' requirements after any refranchise will be the same as at the time of submission	All spend	No
NRT 7	Routes	The current route model and touch points will be the same as at the time of submission	All spend	No

Ref no.	Topic (e.g. access, deliverability, climate etc.)	Assumption	Areas of spend impacted (e.g. all opex, track renewals, all spend etc.)	Is this a change of assumption for CP6?
NRT 8	Organisation	We will move to a capability-based delivery model with a small increase in resource headcount above our CP5 exit position during year 1 of CP6 and then remain constant for the remainder of the control period.	All spend	Yes
NRT 9	Technology	We will deliver a capability based on our end-state architectures. This will be based on a system of systems approach rather than like for like renewals	Renewals	Yes
NRT 10	Migration	We will retire our legacy systems whilst rolling out a multi-service platform	All spend	Yes
NRT 11	Organisation	We will shape our organisation to deliver capability with the lowest practical whole life cost	All spend	Yes
NRT 12	Value for money	We will commission, build and operate capability that delivers best value to the GB railway	Renewals	No
NRT 13	Dual running	We will need to support some legacy systems and applications throughout CP6	All spend	No
NRT 14	GSM-R	GSM-R's service performance will remain at least consistent throughout CP6 as per CP5 exit	All spend	No
NRT 15	Technology	We will consolidate our multi-service platform around IP/MPLS technology	Renewals	Yes
NRT 16	Future proof	Our multi-service platform will support the railway and will be scalable to support other government/commercial services	Renewals	Yes

Ref no.	Topic (e.g. access, deliverability, climate etc.)	Assumption	Areas of spend impacted (e.g. all opex, track renewals, all spend etc.)	Is this a change of assumption for CP6?
NRT 17	Value for money	We will partner with industry to consolidate our technology systems and reduce our unit rates	Renewals	No
NRT 18	Asset demarcation	Demarcation of assets will remain consistent throughout the control period in line with current agreed demarcation	All spend	No
NRT 19	Extended use of telecoms infrastructure	Any costs or income associated with the extended use of telecoms infrastructure has been excluded from this plan.	All spend	No

Appendix B   Telecoms context

We provide Network Rail (routes and functions) and the rail industry with a national telecommunications capability that enables the safe, reliable and efficient operation of the GB railway. We are responsible for all Network Rail's telecommunications networks, systems and assets such as our fixed and wireless networks, GSM-R system and level crossing telephones, CCTV cameras, public address speakers and customer information screens.

Our mission is to deliver an outstanding operational service today whilst developing a connected digital railway infrastructure for the future. By using the power of telecommunications, the best technologies and our people's expertise, we will create an agile and powerful, digitally-enabled business which is best placed to serve the growing needs of the railway and its passengers.

There are currently over 550 colleagues in NRT who between them design, build and operate telecom solutions and services using assets which include:
- 19,000km fibre optic cable
- 12,000km copper cable
- 2,500 GSM-R masts
- 6,948 level crossing telephones
- 250,000 Station information and surveillance systems

For today's railway, we manage the ongoing maintenance, enhancement and renewal of telecommunications assets to keep the railway running. We deliver improved train performance by increasing system availability and enhancing the performance of our telecommunications networks and assets. We also support telecom works for projects such as; Thameslink, Crossrail and resignalling schemes.

For tomorrow's railway, we support the development of the digital railway where reliable communications between trains and infrastructure will be essential to address the railway's current capacity challenge and to support the introduction of digital railway technologies to maximise the opportunities they present for reducing safety risks and improving performance.

We are also focused on the effective stewardship of Network Rail's telecoms networks and assets which are of strategic importance to the future of the railway. We are working with industry partners, financial institutions and government departments to explore how inward (external) investment can be generated to provide benefits to passengers, lineside neighbours and additional funding to invest in the development of the digital railway.

Appendix C   Scenario planning

Part 1: decrease in total remaining expenditure for CP6

This section describes the impact of a 10% decrease in expenditure across CP6 based on all risk funding has been exhausted.

Asset	Outstanding CP6 expenditure	Maximum potential saving	Risk of curtailing expenditure				Comment on impacts/issues
			Safety	Performance	Sustainability	Reputation	
Route Operational Communications	118.5	19.2	A	R	R	R	Removal of 33 % year 4 and 5 operational communications spend leading to an aging asset population and increased potential for addition asset failures and increased delay minutes, spend would be deferred into CP7
Route Network	69.2	10.3	A	A	A	R	Removal of 15% of route network spend will have an impact on safety as this covers toughing which is a major cause of close calls within NRT. Reduced spend on transmission systems will also slow down the installation of additional network capability across the routes. Spend would be deferred into CP7
Station Information and Surveillance Systems	174.8	19.6	G	A	R	R	Removal of 33 % year 4 and 5 station information and surveillance spend leading to adverse reaction within routes and adverse public reaction due to increasing failures. Spend would be deferred into CP7
Route Projects and other	12.6	1.3	G	A	A	A	Removal of 10% of minor works expenditure, which will limit the ability of NRT to respond to issues as and when they arise and to carry out small interventions on the network
Non-Route Central capital	335.8	50.8	A	R	R	R	Removal of 50% of GSM-r infills, reactive infrastructure funds, mast climbing, and development of new products, reduction in migration activities and Business Tools, leading to reduction in ability to manage faults and potential increased delay minutes
Operational Costs	488.6	19.2	G	R	A	R	People capability not increased to support and deliver new technologies. Legacy systems not supported by third party support contracts, leading to additional train delays as issues will take longer to resolve
Total	1200.2	120.4	A	R	R	R	

Key to risk colours G: no additional risk A: some additional risk R: considerable additional risk

Part 2: CP6 strategic investment options

(Business case 1)	CP6 total: (£m)	45	CP6 capex: (£m)	37	CP6 opex: (£m)	8	Total BCR	1.2	Appraisal period	10 years
Description	**Qualitative benefits**						**Quantitative benefits**			
Enhanced national access network deployment: Delivers connectivity regionally to support route and digital railway intelligent infrastructure requirements i.e. a full 'plug and play' telecoms connectivity solution that delivers secure, highly available on demand connectivity to customers.	• Common national architecture, scoped and scaled to meet current and emerging demands • Lower cost of implementation overall, as current scheme by scheme approach inefficient due to multiple project management costs and lack of intra route dependencies • Delivers a common single platform sooner, and will allow wholesale retirement of legacy technology, reducing operational costs and complexity, whilst increasing telecoms availability, reducing delay minutes.						• Reduction in project management implementation costs through CP6 of up to 30% by running a larger national roll-out programme • Potential to drive better deals with vendor community with better forecast of requirements • Reductions in time to deliver services and connectivity, months > days • Significant operational flexibility and agility, delivering the capability to dynamically reconfigure the network at lower cost, essential in order to meet our Rail Operating Centre (ROC) and ETCS-based digital railway future.			

(Business case 2)	CP6 total: (£m)	38	CP6 capex: (£m)	30	CP6 opex: (£m)	8	Total BCR	1.26	Appraisal period	10 years
Description	**Qualitative benefits**						**Quantitative benefits**			
Full national centralised operational voice platform	Our plan to deliver an initial centralised voice platform during CP6 would be enhanced by developing it into a full national solution. This would leverage the IP network to deliver voice capability, and in theory, allow for the retirement of over 600 individual signal box concentrators. This will have great impact in reducing asset numbers and associated support and maintenance costs, whist also allowing for a reduced set of appropriate competencies.						Early retirement of existing assets and cessation of associated support contracts. If implemented along with business case 1 above (full national IP network) we can reduce 3-4 assets into 1 consistent solution, whilst improving resilience. Current concentrator support contracts are running at c. £13m in CP6, this would reduce by more than half if integrated with the national IP network and other data centre based works in CP6.			

(Business case 3)	CP6 total: (£m)	23.7	CP6 capex: (£m)	15	CP6 opex: (£m)	8.7	Total BCR	1.72	Appraisal period	25 years
Description	**Qualitative benefits**						**Quantitative benefits**			
Additional trackside fibre capability	During the deployment of the FTN programme, cost-based engineering decisions were taken which led to certain areas not being fibre enabled. Additional funding could be used to improve the resilience of the network where this was the case. Many of these areas are rural and would also open up other commercial opportunities that are being explored with external stakeholders and government. Additional fibre deployment would also ease capacity issues in some areas and could also facilitate the national IP network roll-out.						By delivering this as a central programme we would: • Reduce/remove project management costs associated with individual schemes • Increase system availability leading to a reduction in train delay • Improve GSM-R availability due to removal of single points of failure.			

Appendix D   Glossary of terms

Term	Definition
BAC	Business Assurance Committee – A periodic meeting to discuss and ensure appropriate governance is being undertaken within Network Rail Telecom
BSS	Business support systems - the components that a telecommunications service provider uses to run its business operations towards customers. Together with operations support systems (OSS), they are used to support various end-to-end telecommunication services
Capex	Capital expenditure
CCTV	Closed Circuit Television
Central assets	Assets that are within the telecommunications national network and which serve more than one route
CIS	Customer information systems
COTS	Commercial off the shelf – a solution that is readily available and is not specifically designed for Network Rail
CP4	Control Period 4 – The Railway Control Period lasting from 1 April 2009 – 31 March 2014
CP5	Control Period 5 – The Railway Control Period lasting from 1 April 2014 – 31 March 2019
CP6	Control Period 6 – The Railway Control Period lasting from 1 April 2019 – 31 March 2024
DEL	Departmental Expenditure Limits - The government budget that is allocated to and spent by government departments This amount, and how it is split between government departments, is set at Spending Reviews
DOO	Driver only operation
DRP	Digital Railway programme – a programme being undertaken with Group Digital Railway that aims to deliver the benefits of digital signalling and train control more quickly than current plans, deploying proven technology in a way that maximises economic benefit to the UK
ERTMS	European rail traffic management system - the system of standards for management and interoperation of signaling for railways within the European Union
ETCS	European train control system – the signalling and control component of ERTMS
FOC	Freight operating company – a freight-carrying company operating trains over Network Rail's infrastructure
FRMCS	Future railway mobile communication system – an international wireless communications standard for railway communication and applications which is currently being developed with a view to replacing GSM-R
FTNx	The next generation IP telecoms network operated by Network Rail Telecom
GALP	The Group Assurance Letter Process, by which Network rail provide assurances to the DFT that is has appropriate governance processes in place.

GDR	Group Digital Railway – a directorate within Network Rail responsible for telecommunications, asset information and the Digital Railway programme
GRIP	Governance for railway investment projects – Network Rail's lifecycle management methodology which details the project deliverables and the stage in the project at which they need to be delivered
GSM-R	Global system for mobile communications – railway – an international wireless communications standard for railway communication and applications
HMI	Human machine interface
IP	Internet Protocol – the principal set (or communications protocol) of digital message formats and rules for exchanging messages between computers across a single network or a series of interconnected networks
KPI	Key performance indicator
LAN	Local area network
MPLS	Multiprotocol label switching – a type of data-carrying technique for high-performance telecommunications networks
MSP4NR	MSP4NR is Network Rail's mandated programme management methodology to be used for all business change programmes
MTBF	Mean time between failure
MTTR	Mean time to repair
NRT	Network Rail Telecom – an operating unit within the Group Digital Railway directorate of Network Rail with responsibility for providing the telecommunications infrastructure for the railway within Great Britain
Opex	Operational expenditure
OSS	Operations support systems - computers used by telecommunications service providers to administer and maintain network systems
PABX	Private automatic branch exchange
PETS	Public emergency telephone system
RETB	Radio electronic token block – a system for signalling trains on single lines by a combination of computer control and radio messages. There is no physical token but the software issues messages allowing trains to proceed on the single line
ROC	Rail operating centre
Route assets	Assets specifically installed for the use of one particular operating route
Route(s)	There are nine routes businesses within Network Rail, eight geographical areas and a national freight and passenger operators route. Each of these routes is run locally so that we can work more closely with the relevant TOCs and FOCs to better meet the needs of their passengers and local businesses.

Schedule 4	The schedule within the track access contract operating licence that describes and defines the compensation payments to third parties for disruptive possessions.
SISS	Station information and surveillance systems
TMT&FIP	Telecommunications maintenance testing & failure investigation process
TOC	Train operating company – a passenger-carrying company operating trains over Network Rail's infrastructure
WAN	Wide area network
Wi-Fi	Wi-Fi – a technology for wireless local area networking with devices based on the IEEE 802.11 standards.

Appendix E   Group Digital Railway Long Term Scorecard

Safety			19/20	20/21	21/22	22/23	23/24	24/25	25/26
LTIFR	WORSE THAN TARGET		0.332	0.284	0.243	0.209	0.179	0.161	0.145
	TARGET		0.316	0.271	0.232	0.199	0.170	0.153	0.138
	BETTER THAN TARGET		0.300	0.257	0.220	0.189	0.162	0.145	0.131
% Close calls closed in 90 days	WORSE THAN TARGET		76.64	76.77	76.90	77.03	77.16	77.29	77.42
	TARGET		85.15	85.30	85.45	85.59	85.74	85.88	86.02
	BETTER THAN TARGET		93.67	93.83	93.99	94.15	94.31	94.47	94.62
Train Performance			19/20	20/21	21/22	22/23	23/24	24/25	25/26
Delay Minutes	WORSE THAN TARGET		114,126	110,932	108,375	107,122	105,953	104,798	103,656
	TARGET		103,751	100,847	98,523	97,384	96,321	95,271	94,233
	BETTER THAN TARGET		93,376	90,762	88,671	87,646	86,689	85,744	84,809
Locally Driven Measures			19/20	20/21	21/22	22/23	23/24	24/25	25/26
Service Availability	WORSE THAN TARGET		90%	90%	90%	90%	90%	90%	90%
	TARGET		94%	94%	94%	94%	94%	94%	94%
	BETTER THAN TARGET		96%	96%	96%	96%	96%	96%	96%
Your Voice Total score	WORSE THAN TARGET		45%	46%	47%	48%	49%	50%	51%
	TARGET		50%	51%	52%	53%	54%	55%	56%
	BETTER THAN TARGET		60%	61%	62%	63%	64%	65%	66%
Local Your Voice Action Plans Completed	WORSE THAN TARGET		80%	80%	80%	80%	80%	80%	80%
	TARGET		90%	90%	90%	90%	90%	90%	90%
	BETTER THAN TARGET		100%	100%	100%	100%	100%	100%	100%

Investment			19/20	20/21	21/22	22/23	23/24	24/25	25/26
Strategic Transformation Milestones	WORSE THAN TARGET		80%	80%	80%	80%	80%	80%	80%
	TARGET		90%	90%	90%	90%	90%	90%	90%
	BETTER THAN TARGET		100%	100%	100%	100%	100%	100%	100%
Level 1 Milestones	WORSE THAN TARGET		80%	80%	80%	80%	80%	80%	80%
	TARGET		90%	90%	90%	90%	90%	90%	90%
	BETTER THAN TARGET		100%	100%	100%	100%	100%	100%	100%
Asset Management			19/20	20/21	21/22	22/23	23/24	24/25	25/26
Telecoms service affecting failures	WORSE THAN TARGET		2,605	2,521	2,450	2,395	2,361	2,335	2,309
	TARGET		2,368	2,292	2,227	2,177	2,146	2,123	2,099
	BETTER THAN TARGET		2,131	2,063	2,004	1,959	1,931	1,910	1,890
Renewal Volumes	WORSE THAN TARGET		3,338	6,377	13,467	10,451	6,116	16,886	6,703
	TARGET		3,709	7,086	14,963	11,612	6,795	18,762	7,448
	BETTER THAN TARGET		4,080	7,795	16,459	12,773	7,475	20,638	8,193
Financial Performance			19/20	20/21	21/22	22/23	23/24	24/25	25/26
Financial Performance Measure – gross excl. enhancements (£m)	WORSE THAN TARGET		-£15m	-£18m	-£20m	-£19m	-£17m	TBC	TBC
	TARGET		£0m	£0m	£0m	£0m	£0m	TBC	TBC
	BETTER THAN TARGET		£15m	£18m	£20m	£19m	£17m	TBC	TBC
Cash compliance (Lost Funding) income & expenditure	WORSE THAN TARGET		6%-10%	6%-10%	6%-10%	6%-10%	6%-10%	6%-10%	6%-10%
	TARGET		1%- 5%	1%- 5%	1%- 5%	1%- 5%	1%- 5%	1%- 5%	1%- 5%
	BETTER THAN TARGET		=<1%	=<1%	=<1%	=<1%	=<1%	=<1%	=<1%