Your response

Question	Your response
Question 1: Please provide a description of your current use of fixed links (or indicate which of the use types in Table 3.1 best describe your use type)	Confidential? – N Network Rail falls within the 'transport user type' identified in Ofcom's Table 3.1. We use fixed links for the provision of communication links for the rail sector. Network Rail owns and manages one of the largest telecoms networks in the UK, which runs along the rail corridor throughout Great Britain and is essential to the operational running of the railway. Our fixed transmission network provides connectivity for railway operational systems. This includes GSM-R, the national wireless communications system that provides critical command and control signalling and voice communications for railway operations throughout Great Britain. Network Rail's preference is to use fibre cable network connections where possible. Network Rail's use of fixed links is therefore typically limited to where geographical, safety or access issues preclude the use of alternative technologies. For example, we use fixed links to carry safety critical data traffic such as GSM-R backhaul and signalling instructions/status reports where it is not possible to lay a cable along the rail infrastructure traversing a river or other physical obstacle (e.g. where a swing bridge is used or there is insufficient space to provide the required clearance from the running lines). Network Rail uses licensed spectrum for these fixed links due to the safety-critical nature of the telecoms traffic being carried. We also use licensed spectrum for fixed links to carry non-safety critical data, for example to carry video inspection content from train inspection cameras that are located in confined locations or where it is not possible to connect to the camera by other means.

Question 2: What are the factors driving your choice of fixed links over alternative connectivity solutions, and which factors have the biggest impact on your decisions? Is this likely to change in the next 5 years? If so, what do you expect will change?	Confidential? – N As explained above, geographical and other factors hindering safe, physical access primarily drive Network Rail's choice of fixed links, typically in circumstances where there is no suitable alternative technology. Network resilience is another driving factor. In some cases, Network Rail employs route diversity to mitigate against communications interruption to safety critical traffic and either the primary or secondary (or indeed both) routing may need to employ a fixed link to achieve connectivity. We do not consider that these factors will change significantly in the next 5 years. It is therefore imperative that Ofcom continues to make sufficient, suitable spectrum available to Network Rail on a licensed basis.
Question 3: Is the current spectrum available for fixed links in the UK suitable and sufficient for your needs? If not, what would you change and why? If you believe changes are required, please give specific examples and reasons along with supporting evidence if available.	Confidential? – N Network Rail believes that the current spectrum available for fixed links meets our needs.
Question 4: Is there anything about Ofcom's current framework for authorising fixed links which you consider could be improved?	Confidential? – N No.

Question 5: How has your use of fixed links changed between 2016 and now? Please provide information on: - Reasons for increase or decrease in the number of your links since 2016; - Changes in the capacity of your links since 2016, including how you have; delivered this capacity change, e.g., different channel bandwidths, different link technology (please specify), etc.	Confidential? – N Network Rail's approach to using fixed links, as summarised in our responses to Questions 1 and 2, has not changed significantly since 2016. Network Rail is also exploring use of licence-exempt spectrum to respond to demand for non-safety critical data-driven services, such as customer information services, including services that support accessibility (e.g. signing or text information services). For example, we are exploring using radio links utilising licence-exempt spectrum within stations to deliver customer information services over very short distances between platforms, in preference to installing undertrack crossings or difficult cable containment installations on over bridges. However, there may continue to be locations where path length or data capacity requirements still need a licensed fixed link to achieve the required connectivity.

Question 6: How do you expect your usage to change over the next 5-10 years? Please provide information on: - any increase/decrease in the number of links (by band) and bandwidth expected; - likely changes in geographic distribution of links; - likely changes in distribution of links by frequency band; - likely changes in capacity of links and how you expect to deliver this capacity; - other changes not covered above	Confidential? – N Network Rail's current usage of fixed links is specific to locations and circumstances and is not likely to change significantly unless external factors, such as the introduction of new regulatory requirements, telecommunications systems or applications, cause an increase in data traffic. Network Rail may need to revisit its fixed link needs and capacity to accommodate the transition from GSM-R to a new successor technology, FRMCS (Future Railway Mobile Communication System). The GSM-R system will become obsolete in the 2035 – 2040 period and the GB rail industry expects migrate to FRMCS over a time-period that may be more than a decade on inclusion of contingency. FRMCS technology is being designed under the UIC[1], with related technical standards development under 3GPP[2]. The new system will support a range of new use cases and the UIC has defined a framework of use case categories, which includes: onboard users, depot and trackside, station and platform, railway offices, and data centres[3]. Specific use cases defined include CCTV, infrastructure monitoring, and ATC/ATO[4]. The permitted use of FRMCS is beyond that currently permitted by standard for GSM-R. Depending on the use cases adopted in Great Britain, migration from GSM-R to FRMCS may drive an increase in data traffic across Network Rail's infrastructure, which may require additional capacity at those locations where fixed links are used to span geographical features such as rivers etc. It is not possible to be any more definitive at this time.
Question 7: Which of the developments listed above are expected to have the biggest impact on your use of fixed links? Are there other developments to be aware of that have not been listed? Please explain the reasons for your answer.	Confidential? – N Network Rail considers that migration from GSM-R to FRMCS has the potential to have the biggest impact on our use of fixed links. Please see our answer to Question 6.

[1] See: https://uic.org/rail-system/frmcs/
[2] See: https://www.3gpp.org/
[3] See: https://uic.org/IMG/pdf/brochure_frmcs_v2_web.pdf
[4] ATC: Automatic Train Control; ATO: Automatic Train Operation.

Question 7a: Are you considering using NGSO satellites to provide backhaul for your network? If so, please provides details of the capacity requirements/expectations and the locations where delivery of this type of backhaul would be likely.	Confidential? – N The railway industry is in the very early stages of exploring satellite communications as a possible backhaul solution to complement other solutions. However, given the safety critical nature of telecommunications on the railway, at this stage, we envisage that satellite communications services may only be suitable in specific, clearly defined circumstances or as a fall-back telecoms provision.
Question 8: If you already use alternative transport options for delivering your services, please: - Provide an indication of the proportion of your services delivered over fixed links vs each alternative that you currently use. Is this proportion likely to change over the next 5-10 years? Is so please provide details; - Explain how your business rationale for use of fixed links vs alternative connectivity solutions is changing over time; - If possible, provide examples of your decision-making process for recently deployed connections	Confidential? – N Network Rail currently uses a very small number of licensed fixed links to carry safety critical data traffic. These fixed links represent less than 1% of Network Rail's network. Please see our answers to the previous questions regarding changing usage of fixed links and Network Rail's rationale for use of fixed links vs alternative solutions.
Question 9: Which of the listed technologies are you already using or do you plan to use in the future? For each that you are using/plan to use, please explain: - the current extent of your use, whether you expect to expand or shrink your use over the next 5-10 years, and how availability of these capabilities might impact your choice to deploy fixed links vs an alternative. Estimates of numbers or percentage of links deployed with each capability now and in the future would be valuable. We are particularly interested in feedback on future use of BCA.	Confidential? – Y / N No comments provided.

Question 9a: If you plan to use BCA would you plan to use this primarily for new links, upgrades to existing links or a mix? What factors affect your decision to deploy (or not deploy) BCA today? Please provide whatever detail you can	Confidential? – Y / N No comments provided.
Question 10: Do you have a need for W and D bands for fixed links use (or alternative uses)? If so, in what timescale? Please provide further details, including any evidence you have to support your response**.**	Confidential? – N Not known at this time.
Question 11: Do you expect to apply for new fixed links in the upper 6 GHz band in the future, and if so, in which geographical areas? What are the reasons for choosing this band over other available bands or alternative technologies? Is there a technical reason why you would choose the upper 6 GHz band?	Confidential? – N Network Rail does not expect to apply for any new links in this band.
Question 12: Are there other international developments that you are aware of that could affect availability and utility of fixed links in the next 5-10 years?	Confidential? – N No.

Please complete this form in full and return to fixedlinks.review@ofcom.org.uk.