



**Consultation: Ofcom's response to Vodafone's and Telefónica's requests to update the technical conditions of their mobile licences to enable the deployment of newer technologies including 5G**

Network Rail Infrastructure Limited ("Network Rail") welcomes the opportunity to respond on: Ofcom's response to Vodafone's and Telefónica's requests to update the technical conditions of their mobile licences to enable the deployment of newer technologies including 5G, with its proposal for a variation of licences held by operators in the 900 MHz band to allow the use of 5G and technology neutral deployments.

Network Rail is an arm's length public body of Government, with statutory and regulatory obligations in respect of its functions, and operates under a Network Licence. Network Rail owns, operates and develops Great Britain's railway network, including 20,000 miles of track, 30,000 bridges, tunnels and viaducts and the thousands of signals, level crossings and stations. We manage 20 of the UK's largest stations while all the others, over 2,500, are managed by the country's train operating companies.

We also operate a national GSM-R wireless communications network, which provides critical command and control signalling and voice communications for railway operations throughout Britain. If this critical network is compromised, operations and train movements may be impacted, and citizens and consumers disrupted, with clear potential for economic impacts.

Our response relates specifically to both questions 1a and 1b in Ofcom's consultation document, and our interests against points raised.

Please find attached our response in full.



## Network Rail response to:

### **Ofcom's response to Vodafone's and Telefónica's requests to update the technical conditions of their mobile licences to enable the deployment of newer technologies including 5G**

**1 July 2022**

Network Rail<sup>1</sup> (NR) welcomes the opportunity to respond on: *Ofcom's response to Vodafone's and Telefónica's requests to update the technical conditions of their mobile licences to enable the deployment of newer technologies including 5G<sup>2</sup>*, with its proposal for a variation of licences held by operators in the 900 MHz band to allow the use of 5G and technology neutral deployments.

Network Rail owns, operates and develops Britain's railway infrastructure, including 20,000 miles of track, 30,000 bridges, tunnels and viaducts and the thousands of signals, level crossings and stations. We manage 20 of the UK's largest stations while all the others, over 2,500, are managed by the country's train operating companies.

We also operate a national GSM-R wireless communications network, which provides critical command and control signalling and voice communications<sup>3</sup> for railway operations throughout Britain. If this critical network is compromised, operations and train movements may be impacted, and citizens and consumers disrupted, with clear potential for economic impacts.

The existing *Notice of Coordination Procedure required for 3G or 4G deployment under the Public Wireless Network Licences covering the 900 MHz band<sup>4</sup>* (the Notice) requires operators with licences in the 900 MHz band to coordinate their 3G or 4G deployments with Network Rail in order to avoid interference with GSM-R systems. Ofcom issued this Notice in 2013.

To date, the existing Notice has served the industry well, with any interference issues arising generally being resolved within hours, with established contacts and processes across Network Rail and the MFCNs<sup>5</sup>. However, as technologies, regulations, and commercial models evolve, and as people may move roles, it is essential to maintain this level of coordination, with support from effective regulations.

Our response relates specifically to both questions 1a and 1b in Ofcom's consultation document, and our interests against points raised.

## **Background**

To date, Network Rail has discussed with Ofcom on how to ensure that the proposed licence variations do not create an unacceptable risk of interference with GSM-R:

- Amending the 2013 Notice to accommodate the proposed variation is not our preferred option at this time, as we recognise that development of new industry agreements could take significant time.

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<sup>1</sup> Network Rail Infrastructure Limited.

<sup>2</sup> See: <https://www.ofcom.org.uk/consultations-and-statements/category-2/vodafone-and-telefonica-request-to-update-technical-conditions-of-mobile-licences>

<sup>3</sup> Railway Emergency Call (REC) functionality is a safety critical service that requires the GSM-R network to operate without impairment.

<sup>4</sup> See: [https://www.ofcom.org.uk/\\_data/assets/pdf\\_file/0029/76079/gsmr\\_operators.pdf](https://www.ofcom.org.uk/_data/assets/pdf_file/0029/76079/gsmr_operators.pdf)

<sup>5</sup> We use the term MFCN (Mobile or Fixed Communications Network) to include MNOs and FWA operators, as applicable.



- Instead, Ofcom informed us that it has powers (via a clause in the MFCNs' licences) to require the MFCN licence holder to cooperate with Ofcom and other licensees (i.e. Network Rail). We understand that Ofcom are of the view that this power is sufficient to require Vodafone (and other MFCNs) to coordinate with NR on 5G and other wireless deployments.
- We understand that Ofcom has scope to make this expectation clear to all parties through the process of varying Vodafone's licence (and those of other MFCNs).

Consequently, **our comments below refer principally to a requirement to maintain coordination.**

Specifically, **our request to Ofcom is to ensure that the principle of coordination is written into any licence variations.**

**Question 1a: Do you have any comments on our proposal to agree to Vodafone's request for changes to its licences in the 900 MHz and 1800 MHz bands to enable 5G?**

**Question 1b: Do you have any comments on our proposal to make substantially similar licence changes available to the other MFCNs with licences in the 900 MHz and 1800 MHz bands?**

The existing Ofcom Notice explicitly specifies the coordination procedure that Ofcom considers is necessary to ensure the protection of existing GSM-R equipment from potentially harmful interference from the deployment of 3G or 4G equipment in the neighbouring spectrum bands (the E-GSM bands 880 – 890 MHz paired with 925 – 935 MHz). The procedure sets out that operators must establish if a site is likely to breach specified radio power level coordination thresholds, set by Ofcom. If thresholds are not breached, no coordination is required. If breach is likely to occur, sites cannot be brought into operation until successful coordination is established with the GSM-R operator.

In response to requests from Vodafone and Telefónica, we understand that Ofcom is proposing to make changes to some licences they hold. The changes would allow them to deploy new technologies, including 5G, and deliver the next generation of connectivity and services to their users. The proposed changes will remove technology restrictions in the licences, rendering them technology neutral.

Changes proposed in the consultation pertain only to the 900 MHz, 1800 MHz, 2100 MHz and 2.6 GHz bands.

Subject to consultation responses, Ofcom has stated that similar licence changes will be made available (with direct consultations) to other licensed operators with operations in these bands<sup>6</sup>.

**With these changes and deployment of new wireless equipment in the market such as 5G<sup>7</sup> and others under the technology neutral clause, capable of operating in the 900 MHz bands, NR sees that it is essential that coordination between licensed operators<sup>8</sup> and NR continues, ensuring enduring protection of the UK's GSM-R network and any successors.**

**Whereas Ofcom notes that the proposed changes are to enable benefits for citizens and consumers with the introduction of new wireless technologies and associated services, these benefits should not be at the expense of impairing the quality of critical network services**

<sup>6</sup> Licences for operation of wireless equipment in the 900 MHz bands are currently held in the UK by Telefónica and Vodafone.

<sup>7</sup> That is, radio equipment using the 5G New Radio physical layer radio standard, which may include mobile or fixed wireless systems.

<sup>8</sup> Licensed operators may include mobile network operators (MNOs), new entrants, fixed wireless operators, or others holding licences for operation of radio equipment in bands of interest to Network Rail.



**supporting the UK's railway network – which also provides essential benefits for citizens and consumers.**

We raise a number of further issues below.

- We wish to remind Ofcom of previous correspondence relating to requirements pertaining to telecoms installations on and close to railway infrastructure and sites<sup>9</sup>. This has led to a requirement for a telecoms clearance of at least 100m distance on all sites with proximity to railway sites and infrastructure. **We request that Ofcom includes this 100m minimum clearance requirement in any revisions to licences held by wireless system operators.**
- The Notice, as it currently stands, provides NR with assurances that radio interference to GSM-R systems operating in the 900 MHz bands can be satisfactorily prevented, by means of the requirement for coordination between MFCNs and NR. **We see it essential for this requirement for coordination to be maintained with the deployment of new radio technologies in the market which are capable of operation in the 900 MHz bands and thereby interference with GSM-R systems.** Any such interference could impair the operation of GSM-R which would in turn render track and train command and control and voice systems inoperable. Loss of radio bearer service can cause railway operated radios to go into a reboot mode, which can take minutes, preventing system access in emergency situations. This would give rise to unacceptable operational risk in the UK's rail networks, requiring halting of services. In short, a major incident would be declared. The economic, social, and commercial impacts of this would be severely damaging. **Therefore, we request that Ofcom includes the written requirement for ongoing coordination into any revisions of the licences.**
- We note that Ofcom has powers (via clauses which can be inserted into MFCN's licences) to require the licence holder to cooperate with Ofcom and other licensees, including Network Rail. **We request that Ofcom confirms that this power is sufficient to require MFCNs to coordinate with NR on all existing and new radio developments, including 2G, 3G, 4G, 5G, and technology neutral deployments, in order to prevent radio interference. We further request that Ofcom makes this clear to all MFCNs during the process of any licence variations, and includes clear written reference to the Ofcom power in any licence revisions.**
- We note that the ECC Report 229<sup>10</sup>, which was agreed by Ofcom, provides detailed recommendations as to how MFCNs and Railway network operators should cooperate to prevent inter-system radio interferences. The Report notes that:
  - *Requirements and conditions for the provision of harmonised functionality along railway lines are defined in the EIRENE FRS (Functional Requirements Specification) and SRS (System Requirements Specification) documents. Those related to interoperability are legally binding in Europe, since they are part of the Interoperability for Control Command and Signalling Technical Specification (CCS TSI), which is published through the European Decision<sup>11</sup> and its amendments. Also,*
  - *Changes at the GSM-R radio equipment such as incorporation of a filter at trains (in front of cab radios or EDORs) or exchange of radio modules, as well as changes on the MFCN*

<sup>9</sup> See: BS/EN 50121-4 (2019): Railway applications - Electromagnetic compatibility - Part 4: Emission and immunity of the signalling and telecommunications apparatus.

<sup>10</sup> See: <https://docdb.cept.org/download/42bc81c7-22bc/ECCREP229.PDF>

<sup>11</sup> See: EC Decision 2012/88/EU on the technical specification for interoperability relating to the control-command and signalling subsystems.

*network side, are expensive and time consuming.*

- **We request that Ofcom takes note of ECC Report 229, and the importance of coordination as it proceeds towards revision of operators' licences, taking into account the requirement for mitigation of potential interference from new radio technologies such as 5G, 5G derivatives, AAS, and others which may be implemented under technology neutral licensing terms.**
- Network Rail has recently undertaken a major system upgrade with new GSM-R train cab radios, incorporating new electronic filters. **Whilst this upgrade provides additional protection against radio interference, it does not remove all risk<sup>12</sup>, and therefore, we request that Ofcom notes and specifies that coordination is still needed (i.e. with the upgrade in place).**
- In Europe, CEPT's Electronic Communications Committee (ECC) approved a harmonised use of the unpaired frequency band 1900–1910 MHz for railway mobile radio (as well as the paired frequency bands 874.4–880.0 MHz and 919.4–925.0 MHz), which includes both GSM-R and FRMCS<sup>13</sup>. Whereas network equipment is not yet deployed for railway usage in the UK in the 1900 MHz band, there is a future requirement. Ofcom states in the consultation document (para. 1.6) that it has “actively promoted and participated in the CEPT work” and that “CEPT and EU decisions support the technically efficient use of spectrum in the region through harmonisation of technical standards and spectrum use” (para. 1.7). **Therefore, we request that Ofcom notes the CEPT ECC decision and the future requirement for railway network deployments in the 1900-1910 MHz band, and requires coordination between operators as this may arise.**
- We note that the 1800 MHz band is one of the shared access bands<sup>14</sup>, meaning that new entrants could acquire licences or rights for operation in the band. Third party access to mobile bands is also possible, subject to agreement with Ofcom and incumbent licence holders. This could add complexity to the process of coordination. **We request that Ofcom notes that with any spectrum sharing and third party access, complexity in coordination will increase, and we request that coordination is required for all licence holders and users – including in cases where equipment may be operated by third parties on a shared or dynamically accessed, or separately licensed basis.**
- Newer wireless technologies, including 5G and 5G chipset based systems, can include active antenna systems (AAS) such as massive (higher order) MIMO, which apply beamforming techniques. These can cause received signal power levels to vary actively over both time and space dimensions, as beams are dynamically adjusted. Evidence shows that the TRP of unwanted emissions, rather than EIRP, is correlated to throughput losses in victim networks, where aggressor systems use AAS. Therefore, TRP has been adopted in the industry as the appropriate metric for specification of acceptable emissions levels with aggressor networks which deploy AAS technologies<sup>15</sup>. With commercial AAS 900 MHz band equipment already available in some markets, we disagree that AAS is *impractical* in the 900 MHz band (though we note that EC Decision (EU) 2022/173 states that “AAS base stations shall not be used in the 900 MHz frequency band”; hence, depends on regulatory decisions), and **with any licence revisions, we request that Ofcom considers the impact of the proposed changes across all relevant bands, including the 900**

<sup>12</sup> As noted within the ECC Report 229, interference may occur due to out of band (OOB) emissions.

<sup>13</sup> See: <https://uic.org/rail-system/frmcs/>; <https://docdb.cept.org/download/4039>

<sup>14</sup> See: [https://www.ofcom.org.uk/\\_\\_\\_data/assets/pdf\\_file/0033/157884/enabling-wireless-innovation-through-local-licensing.pdf](https://www.ofcom.org.uk/___data/assets/pdf_file/0033/157884/enabling-wireless-innovation-through-local-licensing.pdf)

<sup>15</sup> See: ECC Report 281: <https://docdb.cept.org/document/3360>



**MHz band, taking into account potential interference with deployment of AAS technologies<sup>16</sup>, as well as non-AAS systems.**

- We note that with the proposed changes, with paired bands, Ofcom is planning to permit use of both uplink and downlink bands for transmission from the network, whereas previously restrictions were in place with licences, allowing uplink transmissions from terminal devices only. **It is therefore possible that interference could result from network transmissions in uplink bands. We request that Ofcom considers this carefully, in association with all other points raised in our response (including potential use of AAS and other technologies), and ensures that adequate interference protections are established, with any licence revisions, across both uplink and downlink bands.**
- With proposed revisions to licences removing technology specific power limitations, replacing these with technology neutral limits, **we request that Ofcom ensures that any new limits provide at least the same levels of interference protection for GSM-R and relevant railway communications systems, taking into account both current and emerging technologies available for deployment in the market (including but not limited to 2G, 3G, 4G, 5G, AAS), and any new commercial models that may be in place or develop (e.g. neutral host and shared spectrum operators).**
- In any event where wireless equipment causes unacceptable levels of interference (e.g. unlicensed use, faulty equipment, non-compliance with regulations), **we request that Ofcom ensures adequate protection from any interference to railway networks, making this clear through reference to adequate enforcement procedures in any licence revisions.**

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<sup>16</sup> Note: Following ECC Reports 80 (covering UMTS, LTE, WiMAX, 5G NR and NB-IoT) and 297 (covering 5G and AAS) (<https://docdb.cept.org/download/3466>; <https://docdb.cept.org/download/5949a9c0-66bd/ECC%20Report%20297.pdf>), the European Commission Implementing Decision (EU) 2022/173 (as amended 4 March 2022) states that "AAS base stations shall not be used in the 900 MHz frequency band"; see: <https://docdb.cept.org/download/3739> and [https://eur-lex.europa.eu/eli/dec\\_impl/2022/173](https://eur-lex.europa.eu/eli/dec_impl/2022/173)