Your response

Question	Your response
Question 1: Do you agree that Ofcom should consider working with relevant industry partners to develop a voluntary testing standard, and publishing a list on our website of static indoor mobile phone repeaters that comply with our licence exemption requirements?	Confidential? – N **Our response** YES, we support an installation and testing standard and we agree on publishing a list of compliant mobile phone repeaters. We also recommend that there are suitable controls implemented such as a register and recommend deployment limits are defined and imposed in single premises to control big systems deployed grouping several sub-systems. We understand that Ofcom seeks to help people and businesses improve coverage in their home and below we add our view on mobile phone repeaters. **General intro** Small Cell Forum would like to thank Ofcom for the opportunity to respond to the consultation on the expansion of licencing requirements associated with the deployment of non-operator controlled cellular repeaters. Small Cell Forum and its members fully recognise the social and economic benefits to be gained from the provision of high quality, in-building cellular service. Our forum and its members are actively engaged in promoting this across both the industry and to the wider community. Indoor connectivity solutions provided by our neutral host, system integrator and vendor members maintain the same highest quality of experience available on the outdoor networks and are backed up by stringent SLAs approved by the mobile operator licence holders. We also recognise that, in residential scenarios, consumers are not willing or able to pay for managed network services, and so repeater solutions may be appropriate in this context. We do also note however that with the provision of Wi-Fi calling by all UK MNOs and on many handsets, coupled with extensive rollout of fixed broadband, in most contexts residential requirements are well met. **Capacity** Small cells *densify* networks by adding capacity while repeaters *dilute* the network by spreading the same capacity more thinly. Denser networks also increase resilience by providing alternative backhaul paths and additional coverage. Repeaters are only as reliable as their donor cell, so act to dilute overall network resilience. Regulation should be aiming to increase national network capacity and user data rates. Densification with small cells means

reusing spectrum to carry more gigabits per second over the national network, while repeaters don't increase national network capacity. Serving more people with the same capacity means lower user throughputs.

For commercial locations such as offices or public indoor spaces, an important consideration for the provision of in-building cellular service is ensuring that the required capacity is available. Seamless, high-quality data is quickly becoming as, if not more important than voice capacity. Our members note that the deployment of repeater solutions cannot account for this required capacity without the close involvement and approval from the mobile operator community. An example would be the deployment of a repeater solution into a 1000-2000 seat office that currently does not have any in-building cellular service. The deployment of this without considering the *capacity* requirement would have an immediate and detrimental effect on both the outside macro service levels and of course provide an inferior level of capacity inside the building, because repeaters are parasitic on the macro.

Rural, Urban

Repeaters may make sense for rural and some residential scenarios where macro capacity is plentiful – but certainly not for large indoor and multi-operator deployments in urban and suburban where macros are already congested. MNOs should be the ones to decide if large indoor repeater deployments are temporarily appropriate (e.g. where fibre connectivity is not yet available) waiting a structural solution for that area.

Efficient use of spectrum

In the Consultation, under 2.17, it proposes to "make regulations to exempt specific equipment from the requirement for a licence if its installation or use meets the requirements set out in section 8(5), namely that it is not likely to: lead to inefficient use of the part of the electromagnetic spectrum available for wireless telegraphy".

In the case of large installations and big systems, extending the cell through multiple repeaters rather than creating new cells within the building expands the user base without expanding the capacity through frequency re-use (i.e. with small cells or femtocells) and is therefore inherently spectrally inefficient by comparison.

System dimensions and installer typology

Ofcom definitions seems to be referred to "specific mobile phone repeaters' compliance with the Exemptions Regulations" to enable "to list that device on our website".

	A search of the current, approved repeater providers in the UK would indicate that such solutions are being actively deployed into large, commercial venues today, with several Network Units and up to 53 and even 66 Coverage Units in the same system. Large scale deployments of this type utilising licence exempt equipment run the risk of significantly degrading MNO or neutral host outdoor and indoor service quality as the repeater will have a parasitic effect on the donor network capacity. Adding lots of devices that have not been installed by not professional teams may also impact exposure, so strongly recommend that these kind of installations be deployed ny professional and industrial installers (i.e. system integrator or neutral hosts). Small Cell Forum accepts that, for small locations, such as residential premises or perhaps very small office with few users, a cellular repeater offers a good solution to provide the required service levels and, to defend efficient usage of spectrum, we think as relevant to limit consumer installers deploying at their own residential home to a very low and predefined number of repeaters; a limit should probably be - for consumer installers - one repeater in each premise per operator (or one provider specific, or one multi-operator). Larger in-building systems should be deployed in co-ordination with mobile operators' networks in order to ensure network quality continues to improve in line with MNOs targets and regulatory requirements and be compliant with the latest revision of JOTS (DAS) or JOTS NHIB (small cells). An exception to this would be for the provision of temporary coverage (less than 6 months) to key locations in a building ahead of a permanent DAS or small cells solution being deployed. **Small Cell Forum recommended solutions** We detail our recommended solutions in our "Options for indoor cellular" guide [SCF231]. We would also draw attention to UK MNOs in the Joint Operators Technical Specification for Neutral Host In-Building [SCF250], which is the global first mover in within the Hosted Open RAN framework defined in [SCF244].
Question 2: Do you agree that we should modify IR 2102.1 to allow for 'provider specific' mobile phone repeaters? If you do not agree, please explain your reasons.	Confidential? – N YES under conditions. We understand that Ofcom seeks to help people and businesses improve coverage in their home and that provider specific repeaters may simplify this process, even if we consider as necessary conditions: • define a registration process to avoid MNOs not aware of uncontrolled installations; • to limit in each premise to only one provider specific repeater.

	All comments made in Q1 are also applicable for Q2.
Question 3: Do you agree that we should make 'multi-operator' mobile phone repeaters complying with the technical requirements outlined above (and set out in the draft UK Radio Interface Requirement IR 2102.3 at Annex A3) licence exempt? If you do not agree, please explain your reasons.	Confidential? – N NO A common gain for all MNOs in multi-operator mobile phone repeaters would be more detrimental to QoS than single operator repeaters or provider specific repeaters. All comments made in Q1 are also applicable for Q3.
Question 4: Do you agree with our provisional view as set out in paragraph 3.48 above? If you do not agree, please explain why you think the requirement is not necessary.	Confidential? – N No comments. In case in future this particular requirement will be reviewed we ask to adopt same facilitations also to other indoor coverage technologies (i.e. small cells and DAS) removing any requirement for circuit switched fall back (CSFB) for indoor networks to deliver voice connectivity for non-VoLTE capable handsets.
Question 5: Do you agree that it would not be appropriate to allow the use of licence-exempt repeaters in the 2.6 GHz band? If you do not agree, please explain your reasons.	Confidential? – N YES, we agree with the restriction at 2.6GHz
Question 6: Do you agree that we should allow the use of static indoor mobile phone repeaters (on a licence-exempt basis) in the paired 700 MHz mobile band?	Confidential? – N YES, we agree that 700MHz should be permitted under certain conditions. We understand that Ofcom seeks to help people and businesses improve coverage in their home and that the paired 700 MHz may simplify this process, even if we consider as necessary conditions: • define a registration process to avoid MNOs not being aware of uncontrolled installations; • to limit in each premise to only one repeater per operator or one provider specific repeater. All comments made in Q1 are also applicable for Q6.