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?	Yes
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.	Yes Nextivity's products currently on the UK market work on the provider-specific principle: Each band/technology/channel per network operator independently obeys the IR2102.1 rules, regardless of then how many channels (and potentially networks) a particular device supports.
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.	No. The ETSI EN specifications EN 301 908-11 and EN 301 908-15 set an absolute limit on harmful emissions in the pass band and are not applicable to wideband 'multi-operator' repeaters (EN 301 908-11 §4.2.2.2.3 & EN 301 908-15 -15 §4.2.2.2.2). That is in our experience usually one of the reasons that mobile network operators generally object to such repeaters. If Ofcom continues to be minded to allow 'multi-operator' wideband repeaters as described then Ofcom should consider gain limitation as per the FCC part 20 rule: *–34 dB–RSSI + MSCL* MSCL (mobile station coupling loss) is 36dB in the low band (700, 800, 900 MHz) at 2m distance. Simplifying the above equation using that gives *2–RSSI* as opposed to *10–RSSI*. In addition Ofcom should consider the secondary FCC part 20 gain limit of: *6.5 dB + 20 Log10 (Frequency)*

So the device should impose a gain limit of the lower of the *x–RSSI* limit or the *6.5 dB + 20 Log10 (Frequency)* limit.

Because of

- the 10dBm per 5MHz PSD limit
- the wideband nature of 'multi-operator' repeaters
- the requirement that to support legacy 4G devices relying on 2G or 3G to make phone calls, meaning bands 8, 3 and 1 (900, 1800, 2100 MHz bands) must be repeated in their entirety

the minimum total downlink bandwidth relayed for licence exempt 'multi-operator' repeaters is 165.8 MHz. At 10dBm per 5MHz, that is a total downlink EIRP of 25.2 dBm / 336.1mW which may be considered a relatively high limit from an RF exposure point of view.

Penta-band devices including bands 28 and 20 (700 & 800 MHz) in addition, would be relaying a total of 225.8 MHz. At 10dBm per 5MHz across all bands that is a total downlink EIRP of 26.5 dBm / 451.6 mW, which some may consider high for a licence exempt device.

Nextivity suggests that Ofcom may want to consider the FCC part 20 limit of 17dBm per band in the downlink, a limit which also applies in the licence exemption specification in force in the Republic of Ireland for whole band RF repeaters.

Turning to the uplink, because of

- the 17dBm per 5MHz PSD limit
- the wideband nature of 'multi-operator' repeaters
- the requirement that to support legacy 4G devices relying on 2G or 3G to make phone calls, meaning bands 8, 3 and 1 (900, 1800, 2100 MHz bands) must be repeated in their entirety

the minimum total uplink bandwidth relayed for licence exempt 'multi-operator' repeaters is 165.8 MHz. At 17dBm per 5MHz, that is a total uplink EIRP of 32.2 dBm / 1661.9 mW which may be considered a relatively high limit from an RF exposure point of view.

	Penta-band devices including bands 28 and 20 (700 & 800 MHz) in addition, would be relaying a total of 225.8 MHz. At 17dBm per 5MHz across all bands that is a total uplink EIRP of 33.5 dBm / 2263.3 mW, which some may consider high for a licence exempt device, and maybe would require a non-trivial exclusion distance for humans, from the donor antenna. Finally, as observed in the Ofcom consultation document, wideband 'multi-operator' repeaters can suffer from the 'near-far' problem where the system adapts to a nearby cell site for network A and a far site for network B receives insufficient gain to be usable.
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.	No. We understand the technical issue expressed, and that it is a finely balanced decision. We believe that there is a significant cost benefit of, for instance, a single-band provider-specific repeater that can be configured to relay a 4G signal where that works for the end-user that has a VoLTE phone. This has been our experience in the Australian market, where Nextivity has supplied tens of thousands of single-band, single operator repeaters capable of 4G-only operation, but with advanced band and frequency selection features.
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.	No. The omission of band 7 (2.6 GHz band) denies a valuable option for repeater deployment in urban areas: • Band 7 is often deployed in urban areas as it offers large capacity. • The band 7 capacity however is often only available outdoors, as most buildings strongly attenuate the band 7 signal due to its high frequency. • Band 7 channels in urban areas often have spare capacity as much mobile network activity takes place indoors and not outdoors. • Compare that to lower-frequency spectrum which penetrates buildings more in urban areas, but because of that is typically overloaded, leading to poor user experience. • By bringing band 7 into the licence exemption, repeaters can bring the spare

	band 7 capacity that exists outdoors, into buildings in urban areas. We believe that licence-exempt provider specific repeaters, which only operate in the presence of an actual mobile network frequency where the BSCL-30 rule can be calculated (therefore a base station relatively nearby) cannot interfere with ATC radar as band 7 base stations are unlikely to be deployed near airports or other ATC radar installations. If full licence exemption for band 7 is not possible, would Ofcom consider a notification obligation for devices that that include the relay of band 7 frequencies, where the user is obliged to notify the network, or the vendor or Ofcom of the location such a device is installed at. This is something that Nextivity supports in other jurisdictions via reporting of location using, for instance, a mobile app, before a device will operate.
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?	Yes. Nextivity has provider specific devices commercially available that meet IR2102.1 specifications and can operate in the 700MHz band.