

Mobile coverage enhancers

EE response to Ofcom's call for input

Final version

08 August 2014

Non-confidential version – Confidential redactions are marked with [X]

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1. Executive summary

- EE operates a mobile network on the basis of spectrum licensed to EE exclusively. Licensed spectrum gives EE the ability to plan our radio access network free of interference so as to provide the best user experience to our customers. We have acquired our spectrum licences in Ofcom auctions or pay annual licence fees and therefore have a reasonable expectation that we can continue to efficiently utilise the spectrum licensed to EE.
- The use of mobile repeaters inherently causes degradation in the sensitivity of the base station from which they are retransmitting, referred to as 'interference'. Such interference is affected by a significant number of factors including the proximity of the repeater to the base station and the power and manufacturing quality of the repeater. In real terms this interference can have a variety of effects for the end-user, including increasing the number of dropped calls and reducing call quality.
- EE deploys a small number of repeaters in our network alongside other bespoke indoor coverage solutions, but only where our network engineers are confident such solutions are unlikely to cause harmful interference. We are able to monitor the effect the repeaters we have deployed have on network performance and act swiftly if they were to cause harmful interference. In contrast, illegal repeaters, hereafter referred to as end-user installed repeaters, are often of poor quality and no assessment of the environment they are placed into, would have been made. They also cannot be easily monitored, accessed or controlled, which means that even if we are able to detect that the repeater is causing harmful interference, locating the repeater, and then being able to switch it off, is both resource intensive and likely to lead to prolonged harmful interference.
- It is Ofcom's duty to enforce section 8 of the Wireless Telegraphy Act 2006 ("WTA"), which stipulates that unauthorised use of equipment in licensed bands is illegal. Section 8(4) of the WTA only requires Ofcom to make licence exemptions if a number of important conditions are satisfied, including the requirement that the use of the device is not likely to:
 - involve undue interference;
 - have an adverse effect on technical quality of service;
 - endanger safety of life;
 - lead to inefficient use of spectrum; and
 - it is unlikely to be objectively justifiable for Ofcom to issue licence exemptions under section 8(3) of the WTA where these requirements are also not satisfied.
- EE does not believe that the challenges associated with illegal repeater deployment (e.g. undue interference) can be mitigated by setting certain requirements for repeaters, in order for them to be licence exempt. Since all repeaters have the potential to cause interference when placed incorrectly in the network, there would be no technical criteria that would apply to them, whereby EE could be confident that illegal, end-user

installed, repeaters could be consistently deployed without causing disruptive interference to the EE network.

- EE already offers a number of legal indoor coverage solutions, in particular femto cells and smart repeaters. As a result, we do not see a significant incremental benefit from making repeaters licence exempt.
- Looking ahead, voice over Wi-Fi, as a seamless feature within the handset, may eliminate the requirement for repeaters in many of the places that currently seek them (e.g. in-home, hotels, conference venues, offices). These and other emerging technologies may mean that the demand for mobile repeaters will diminish, as the availability of cheaper and more reliable solutions increases.
- However, EE believes that there is a relatively low level of consumer awareness around the illegality of end-user installed repeaters and the potential for them to cause harmful interference. In order to overcome these challenges EE urges Ofcom to:
 - consider the significant evidence base that already exists on the harmful effects of end-user installed mobile repeaters, including evidence from Ofcom's own enforcement work and the US example of making licence exempting repeaters and the lessons learnt;
 - collaborate with MNOs, consumer groups and other interested parties to improve consumer awareness of the difference between illegal repeaters and the legal alternative solutions. This includes raising awareness around the potential harmful effects of illegal repeaters;
 - [redacted]; and
 - consider whether there is a need to consult on the characteristics of illegal end-user installed repeaters in the future, given the existing evidence base, and the alternative indoor coverage solutions that are currently available and continue to be developed.

2. Introduction

Ofcom has issued a call for input on mobile repeaters, asking one question¹:

“We are keen to develop hypotheses to test, as to the technical characteristics and circumstances of use that might be suitable for self-installation of repeater devices by consumers and other end-users under a licence exemption. In particular, we would like to identify the characteristics and circumstances in which such repeaters might be unlikely to cause harmful interference and/or to cause adverse effects on the technical quality of service.”

We firmly believe that such characteristics or circumstances do not exist in a way that could be made operational under a licence exemption. Any repeater that is effective in improving coverage has the ability to cause harmful interference to mobile networks and degrade the service available to other consumers. The extent of this risk is largely dependent on the specific deployment.

This document is EE's response to Ofcom's call for input and it explains why we believe it would not be appropriate to make illegal end user installed repeaters licence exempt. The response focuses on a number of key points covered in the following sections:

- Section 3 provides the context to this call for inputs, as well as outlining some of the different indoor coverage solutions EE currently offer;
- Section 4 explains why there would be no technical criteria that could be applied to any repeaters licence exemption, whereby the MNOs and Ofcom could be confident that the repeaters could be deployed without causing undue interference. It also describes how illegal repeaters severely inhibit the operators' ability to manage capacity on the network;
- Section 5 explains why making any illegal repeater licence exempt will seriously compromise Ofcom's ability to monitor use of illegal repeaters, which could in turn lead to a further proliferation of illegal repeaters and an increase in harmful interference;
- Section 6 outlines how the development of some of the alternative legal indoor solutions are likely to mean the demand for mobile repeaters is reduced significantly, as the availability of cheaper and more reliable solutions increases; and
- Section 7 sets out our proposed strategy for overcoming key issues such as lack of consumer awareness around the harmful effects of illegal repeaters.

We look forward to further discussions with Ofcom on how we can reduce the increasing number of illegal repeaters causing harmful interference to our network.

¹ Ofcom, 'Mobile Coverage Enhancers and their use in licensed spectrum', May 2014, Page 6, Para 1.21

3. Context to the call for input

EE operates a mobile network on the basis of spectrum which is licensed to EE exclusively. Licensed spectrum gives EE the ability to plan its radio access network free of interference from other users so as to provide the best user experience to our customers, subject to their demand and willingness to pay. We have invested heavily in acquiring our spectrum licences in auctions conducted by Ofcom. Ofcom has recently tabled a proposal which would lead to a substantial increase in the annual licence fees for mobile bands that were not awarded by auction². We have a reasonable expectation that we can continue to efficiently utilise our exclusive access to the spectrum licensed to us and that Ofcom will continue to enforce against illegal use of that spectrum. This will enable us to provide the service our customers expect.

[REDACTED] Our 4G coverage is increasing on a daily basis. It is impossible to accurately predict indoor coverage levels, given the number of factors that influence indoor coverage (e.g. type of building materials used) and the limited information we have about these factors. We have indoor coverage solutions available for customers in cases where the customer suffers an unacceptably low level of in-building coverage:

- For consumers as well as business customers we offer the EE Signal box (a femto cell). Standardisation and development of femto cells means they are becoming increasingly sophisticated, allowing for multiple femto cells to be deployed throughout premises, to allow seamless handover of calls between different areas of a building. While limited to one operator per device, femto cells give dedicated capacity to the targeted building, with minimal impact to existing cells in the area. They are relatively easy for the user to install, but require access to a broadband connection for backhaul.
- For large corporates we also offer the EE Signal booster (a smart repeater) as well as other bespoke solutions. We have worked with an external supplier (Nextivity) to authorise the direct sale of their smart repeaters, through their chosen retailers, to EE customers and small businesses. These repeaters are targeted at EE customers and therefore configured for the EE network.³

A defining characteristic of both femto cells and legal smart repeaters that we deploy is that we are able to switch them off remotely if they are found to cause harmful interference to our network. Customers agree to this condition when purchasing one of these devices. In contrast illegal repeaters cannot be easily monitored, accessed or controlled remotely. This means that even if we are able to detect that interference is being caused by an illegal repeater, locating the repeater and then being able to switch it off is both resource intensive and likely to lead to prolonged harmful interference.

In addition to products that are targeted at customers who need a single operator coverage solution, there are also Distributed Antenna Systems (DAS)

² Ofcom, Annual licence fees for 900 MHz and 1800 MHz spectrum consultation, October 2013

³ [REDACTED]

available to hotels and shopping centres (etc.), who wish to improve coverage from multiple operators.

Against this background, it would be inappropriate and an error of judgement if Ofcom were to make illegal repeaters licence exempt. Notwithstanding the significant potential for repeaters to cause interference, there is unlikely to be any incremental benefit from making illegal end-user installed repeaters legal under a licence exemption, given the legal indoor coverage solutions already available to consumers in the market.

4. Harmful effects of mobile repeaters

As noted earlier in this submission, section 8(4) of the WTA only applies where apparatus causes neither “undue interference” nor an “adverse effect on technical quality of service”.

Section 115 of the WTA explains what is meant by the term “undue interference”. It states that wireless telegraphy is “interfered with” if the fulfilment of the purposes of the telegraphy is prejudiced (either generally or in part and, in particular, as respects all, or as respects any, of the recipients or intended recipients of a message, sound or visual image intended to be conveyed by the telegraphy) by an emission or reflection of electromagnetic energy. It further explains that such interference is to be regarded as “undue” only where it is “harmful”, with interference explained to be harmful if it:

- creates dangers, or risks of danger, in relation to the functioning of any service provided by means of wireless telegraphy for the purposes of navigation or otherwise for safety purposes; or
- degrades, obstructs or repeatedly interrupts anything which is being broadcast or otherwise transmitted by means of wireless telegraphy in accordance with a wireless telegraphy licence, regulations under section 8(3) or a grant of recognised spectrum access or otherwise lawfully.

The WTA does not define the circumstances in which an adverse effect on technical quality of service may be caused. The rationale for this requirement is explained in recital 35 of Directive 2009/140/EC, which states that:

“Restrictions on the principle of technology neutrality should be appropriate and justified...to ensure the proper functioning of services through an adequate level of technical quality of service, while not necessarily precluding the possibility of using more than one service in the same frequency band...”

In a recent judgment⁴, the High Court considered the definition of “undue interference” in the WTA and in this regard drew a distinction between unwanted signals that cause undue interference and signals generated by the use of networks in accordance with the way that they are meant to be used – with the latter being termed in the judgment as “self-interference”, which the Court determined should not be regarded as being harmful. Whilst we acknowledge the High Court judgment, we do not consider it to be of direct relevance to the present CFI. In the present case, we consider that it is clear that the interference caused by illegal repeaters involves the generation of “unwanted” signals – falling into the latter category in the following example given by the High Court:

“I do not accept Professor Saunders' characterisation of the use of SIM cards in GSM Gateways as being 'outside the control' of the MNOs in the same way as, for example, the presence of an entirely extraneous signal from another MNO or different electronic device.” (para 145).

⁴ [2013] EWHC 3091 (Ch), Recall Support Services Ltd and others v Secretary of State for Culture, Media and Sport

We also note that the High Court judgment is the subject of an ongoing appeal.

In considering the requirements that, to be licence exempt, Ofcom must be satisfied that the exempted apparatus would be likely to cause neither undue interference nor an adverse effect on technical quality of service, we also think it is relevant to consider the impact illegal repeaters have on operators' ability to manage the network in the context of this CFI.

In this section we explain why there would be no technical criteria that would apply to illegal repeaters, whereby EE and Ofcom could be confident that the illegal repeaters could be deployed without causing undue interference and/or the likelihood of an adverse impact on the technical quality of EE's services provided under its exclusive spectrum licenses. We also describe how illegal repeaters severely inhibit the operators' ability to manage capacity on their networks.

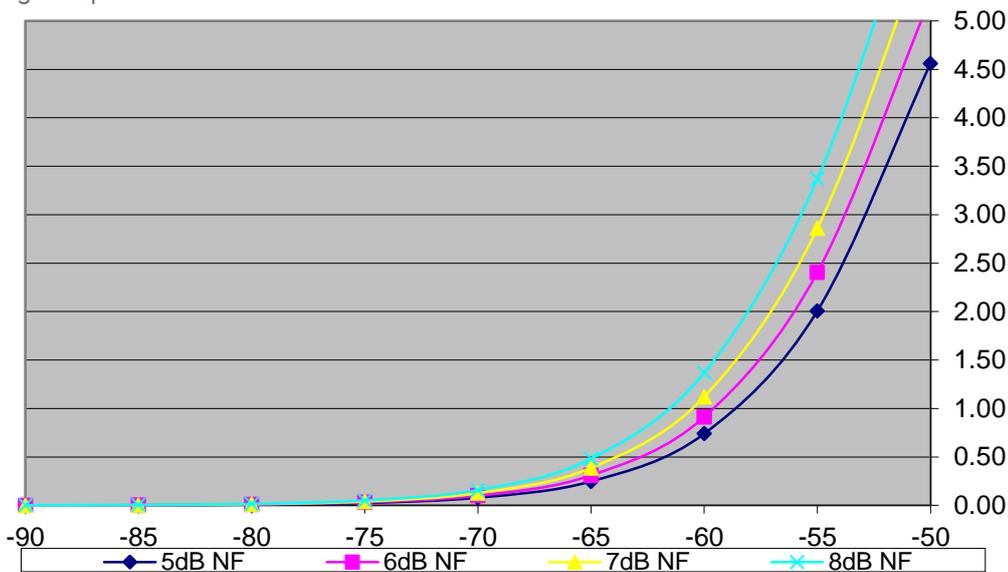
Undue interference and adverse effect on technical quality of service

The use of illegal mobile repeaters inherently causes degradation in the sensitivity of the base station from which they are retransmitting. This is generically referred to as 'interference'. This form of 'interference' is affected by a significant number of factors including:

- the donor signal level at the repeater input (i.e. the proximity of the repeater to the base station);
- the noise figure of the repeater (i.e. primarily how well designed and manufactured the repeater is);
- the gain of the repeater (i.e. how much power the repeater is emitting); and
- the bandwidth the repeater transmits over, with wideband repeaters potentially causing much more interference than repeaters which transmit across a smaller range of frequencies.

The donor signal level at the repeater input (i.e. the proximity of the repeater to the base station) can significantly affect the level of interference caused by the repeater. Figure 1 shows the effect that the donor signal level, at the repeater input (x-axis), has on the degradation (y-axis) for an 80decibel (dB) gain repeater on a single 3G carrier. The graph shows how quickly the degradation worsens from around the -65 dBm donor signal level. [X]The degradation at a donor signal level of -60dBm is between 0.74dB and 1.37. [X]. Based on planning levels and typical repeater gains, this therefore indicates that there is a large proportion of EE's network, where repeater installation may cause significant interference for EE customers.

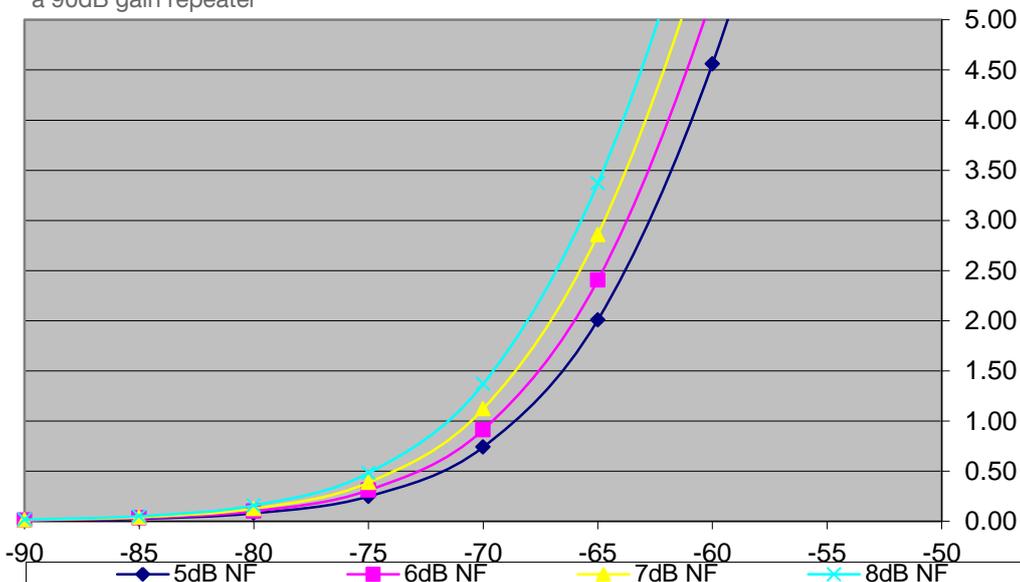
Figure 1. Effect of donor signal level at the repeater input on the level of degradation for an 80dB gain repeater



Source: EE

The potential for increased interference as donor levels increase is compounded by a high noise figure for the repeater (e.g. lower quality repeater in terms of design) and higher gain devices (i.e. higher powered repeaters). Figure 2 shows the change in degradation as donor signals increase for 90dB gain repeaters with different noise figures (NF). Clearly repeaters with a higher noise figure have higher degradation for any given donor signal level. For example, at a -65dBm donor signal level a repeater with a 5dB noise figure would cause degradation of approximately 2.0dB. In comparison a repeater with a higher noise figure of 8dB would cause degradation of approximately 3.4dB at the same donor signal level.

Figure 2. Effect of donor signal level at the repeater input on the level of degradation for a 90dB gain repeater



Source: EE



In real terms this degradation will have the effect of either causing customers, near the edge of coverage on a cell, to drop their call involuntarily, or poor call quality resulting in broken speech. The worse the degradation, the larger the area effected. Examples of the impact of illegal repeaters on the performance of a cell are shown in annexes 1, 2, and 3 of our response.

These are risks that EE needs to manage even for a good quality repeater with a bandwidth limited to specific carriers.

EE deploys repeaters itself in the network at a small scale, alongside other bespoke coverage solutions. We have a rigorous new product introduction process which ensures any product offered by a vendor for use on our network is fit for purpose. Our legal repeaters are deployed by a dedicated 'Special Projects' team of engineers. This team models the impact of a repeater, given the characteristics of other sites around the proposed location. Repeaters are deployed only if we are satisfied that the risk of interference is minimal and that there are no planned network changes that will have an impact in the near future (notably new sites being built closer to the donor antenna). [X] EE also fails to see how a move to licence exemption would promote any of the statutory duties to which Ofcom is required to have regard when exercising its functions under the WTA – certainly not to any extent sufficient to counteract the material risks of harm to the MNOs and their customers that this move would create.

Inhibiting operators' ability to manage the network

A further issue created by repeaters being added to the network without the knowledge of the mobile operator is that it severely inhibits the operator's ability to manage capacity on the network. Typical examples may be offices or hotels with a significant number of high volume users. Since the repeater does not provide capacity itself (indeed, it diminishes it for the cell as a whole), the requirements for service from these new users has to be provided by the existing capacity of the donor base station. Where a base station is already heavily utilised, this can result in congestion and poor service for all users in the area.

In addition, since the new coverage is in an area not planned by the MNO's network planning engineers, neighbour definitions may be invalidated or simply not present, which could lead to issues with mobility (i.e. calls will be dropped instead of being handed over to a neighbouring cell).

Overall, EE does not believe that the challenges to technical service quality, associated with illegal repeater deployment, can be mitigated by setting certain requirements for repeaters in order for them to be made licence exempt. Since all repeaters have the potential to cause interference when placed incorrectly in the network, there would be no technical criteria that would apply to them whereby EE could be confident that the repeaters could be consistently deployed on a licence exempt basis without carrying a likelihood of causing disruptive interference to the EE networks and an adverse impact on technical service quality. Members of the public simply do not have the detailed information about the location and characteristics of our network equipment, or

indeed the level of skill, required to assess the potential implications of a repeater deployment.

5. Difficulty in identifying specifications of repeaters

Any decision to make mobile repeaters licence exempt would lead to repeaters being deployed without the EE network specific safeguards and guidelines that EE has in place in respect of legal repeater deployments, which are authorised by EE under the terms of its spectrum licence. This is unacceptable to EE and would inevitably lead to areas of interference which could not be effectively managed, with the corresponding harmful impact on quality of service for other consumers.

As Ofcom is fully aware from its existing enforcement work on illegal repeaters, in order to be offered cheaply in the consumer market, illegal repeaters are often poorly manufactured. The devices may be wideband repeaters, covering all operators simultaneously, and are typically deployed by individuals without the necessary technical expertise to install and maintain them. Ofcom has already dealt with over 240 cases, over the past three years, where the operators have reported interference issues caused by such devices at a level sufficient to be directly visible in the KPI stats of a cell (i.e. affecting such a wide area that it is statistically significant in a cell carrying thousands of calls). If Ofcom were to make any illegal repeater licence exempt, this would undoubtedly exacerbate the problem. Manufacturers and installers would be in a stronger position to promote, supply and install devices, whether or not the device actually met any criteria that would be put in place. There would therefore clearly be an indirect increase in interference and adverse impact to the quality of the services provided by the MNOs, resulting from making any illegal repeater licence exempt.

Indeed, making illegal end-user installed repeaters licence exempt is likely to result in making enforcement action nearly impossible, with Ofcom having to prove whether an allegedly exempt device actually met whatever the defined criteria for such a device may be for each and every specific case. Given that Ofcom struggles to enforce existing basic conformity requirements (CE marking) of these devices, there is every reason to believe that compliance to other criteria would be even less effective. We firmly believe that a licence exemption would open the floodgates to vast amounts of (likely sub-standard) equipment being deployed by users in an uncoordinated way. This would seriously compromise Ofcom's ability to enforce effectively, which could in turn lead to consumer harm through reduced mobile services availability and quality and reputational damage and potential financial loss for operators.

We have explained in section 3 that it would be inappropriate and an error of judgement if Ofcom were to make illegal repeaters licence exempt. Notwithstanding the significant potential for repeaters to cause interference, there is unlikely to be any incremental benefit from making illegal end-user installed repeaters licence exempt, given the alternative legal indoor coverage solutions already available to consumers in the market. In contrast the potential costs in terms of increased enforcement (due to increased difficulty in identifying specifications of repeaters) and increased interference and degradation in technical service quality (through the resulting proliferation in illegal repeaters) could be substantial.

6. Technology landscape and evolution

Ofcom's CFI focusses on potential circumstances under which illegal mobile repeaters could be desirable and operationally viable as indoor coverage solutions. We have demonstrated in the previous sections that there are no general circumstances, which can be made workable in practice, under which illegal end-user installed repeaters are unlikely to cause harmful interference and/or an adverse effect on technical quality of service. We have also explained that we consider there to be a number of suitable legal alternative indoor coverage solutions that are currently available to consumers.

In addition to the legal indoor coverage solutions that are currently available, we believe that the technology landscape is evolving in a way that will reduce the need for mobile repeaters in the future or, at the very least that, the requirements will be different. This suggests Ofcom should be very careful in implementing any major changes to the regulatory regime that are difficult to reverse.

The most important development on our current roadmap in this respect is voice over Wi-Fi. EE has recently announced that it is working to make the use of Wi-Fi for voice calls a seamless feature within the handset⁵. We are set to launch voice over Wi-Fi in autumn 2014 on the latest handsets capable of supporting the service⁶. There are already a number of voice over Wi-Fi apps available for smartphones but voice over Wi-Fi will clearly be much more convenient for consumers to use if integrated into the handset⁷. If all MNO's adopt this functionality in due course, there is the potential to eliminate the requirement for repeaters in many of the places that traditionally seek them (e.g. in home, hotels, conference venues, offices) because these locations have Wi-Fi.

EE has also recently announced that we are starting a trial of Voice over LTE ('VoLTE') later in 2014 with a commercial launch to follow in 2015. When deployed on our 800 MHz frequency, VoLTE can increase the geographical reach of our network. These and other emerging technologies are likely to mean the demand for mobile repeaters could fall over the next few years.

In conclusion, we see the need for repeaters diminishing over the medium term, as voice over Wi-Fi is developed and the prevalence of compatible handsets in the subscriber base increases, and VoLTE is rolled out.

⁵ <http://ee.co.uk/our-company/newsroom/EE-announcing-live-trials-of-phone-calls-over-WiFi-and-4G-as-part-of-275-million-pound-voice-investment>

⁶ We also understand that Hutchison 3G UK (Three) have plans to launch an app, which will allow customers to talk and text via Wi-Fi connection using existing monthly allowance or prepaid credit. <http://www.telecoms.com/268022/3-uk-offloads-network-traffic-onto-wifi/>

⁷ Examples of voice over Wi-Fi apps include Skype and Whatsapp.

7. Addressing the challenges

It is Ofcom's duty to enforce section 8 of the WTA (2006), which stipulates that unauthorised use of equipment in licensed bands is illegal. Ofcom has a large team of engineers whose full time job it is to remove such equipment where it has been found to cause interference to MNO networks. Hence Ofcom is, if anybody, fully aware that any illegal user-installed equipment, which has not been coordinated in the MNO's radio planning, carries a risk of causing interference depending on where and how it is deployed.

EE's primary concern is that the lack of consumer awareness around the harmful effects of mobile repeaters and the legal alternatives that we offer, is leading to a proliferation of illegal repeaters. This has the potential to detrimentally affect mobile coverage at a time when there is increasing demand for reliable access to mobile services in outdoor and indoor locations.

In order to overcome these challenges EE urges Ofcom to:

- Consider the significant evidence base that already exists on the harmful effects of illegal end-user-installed mobile repeaters, including international examples where end-user installed repeaters have been made licence exempt and the lessons learnt;
- Collaborate with MNOs, consumer groups and other interested parties to improve awareness of the potential harmful effects of illegal mobile repeaters;
- [X]; and
- Consider whether there is a need to consult on the characteristics of illegal end-user installed repeaters in the future given the existing evidence base and the alternative indoor solutions that are currently available and continue to be developed.

Existing evidence base

EE has provided a comprehensive explanation of the technical challenges that arise from the use of illegal repeaters in section 4 of this response. EE has also provided specific case studies that demonstrate the harmful effects of illegal repeaters in Annexes 1, 2 and 3.

However, the harmful effects of illegal mobile repeaters are already well documented and supported by a strong body of evidence. As noted in the consultation *'[Ofcom's] Enforcement team has significant experience in the harmful effects of mobile repeaters'* and is *'aware of over 240 occasions over the past three years where unlicensed repeater devices have caused disruption of service to other mobile users'*. EE is surprised that given Ofcom's extensive experience and understanding of the scale and scope of interference, it has chosen to issue this call for inputs on the *"technical characteristics and circumstances"* under which illegal end-user installed repeaters could be made licence exempt.

In addition to Ofcom's own experience, international case studies provide further compelling evidence that making illegal repeaters licence exempt, is likely to lead to significant interference with mobile networks. In the United

States (U.S), for example, the Federal Communications Commission (FCC)⁸ introduced new legislation which permitted the use of consumer repeaters⁹. However, the FCC was recently forced into making significant legislative changes to the terms on which these repeaters could be used, following a proliferation of harmful interference from consumer mobile repeaters,.

The FCC's revised regulations impose significant conditions on the ownership and use of consumer repeaters. In the FCC's March 2013 Report and Order, the FCC commissioner, Robert McDowell, stated that:

"Wireless service providers have experienced some harmful interference with boosters interacting with their networks".¹⁰

In particular the FCC were concerned that consumer repeaters had been shown to have the potential to cause significant interference to commercial networks. The FCC's March 2013 Report and Order stated that:

"Malfunctioning, improperly-installed, or technically-deficient signal boosters, however, may cause harmful interference to commercial and public safety wireless networks. Such interference might disrupt cellular service, including 911 emergency assistance calls"¹¹.

The reversal in policy and subsequent change in legislation demonstrates that making end-user installed repeaters licence exempt comes with significant risks of causing harm to consumers.

The need to improve consumer awareness

There is a considerable amount of misleading information already in the public domain regarding illegal mobile repeaters. For example, easily accessible websites that sell illegal repeaters under the pretence that these are products approved by MNOs. EE is concerned that a lack of consumer awareness around illegal mobile repeaters and possible alternatives is leading to a proliferation in the use of illegal repeaters. Until this is addressed, there is a risk that consumers will continue to suffer from reduced coverage and call quality as a result of harmful interference from illegal repeaters.

In order to address this we believe Ofcom should focus its resources on raising consumer awareness of illegal mobile repeaters and legal alternatives. We would encourage Ofcom to, in conjunction with the MNOs who are licensed to use mobile bands, develop a long term strategy for raising consumer awareness around:

- The harmful effects of illegal end-user installed repeaters. Existing users of such devices may be unaware of the potential detrimental impact it may have on mobile services for other consumers. Improving information and

⁸ The FCC regulates telecommunications in the US

⁹ Consumer repeaters in the context of the FCC refers to signal boosters that are designed to be used "out of the box" by individuals to improve their wireless coverage within a limited area such as a home, car, boat, or recreational vehicle.

¹⁰ FCC, Amendment of Parts 1,2,22,24,27,90 and 95 of the Commission's Rules to Improve Wireless Coverage Through the Use of Signal Boosters, Statement of commissioner Robert M. McDowell, February 20, 2013, Page 101,

¹¹ FCC, Amendment of Parts 1,2,22,24,27,90 and 95 of the Commission's Rules to Improve Wireless Coverage Through the Use of Signal Boosters, February 20, 2013, Page 5

raising awareness around the harmful effects may convince consumers to seek alternative, legal indoor coverage solutions.

- The consequences of using these devices in terms of possible penalties. Ofcom has the powers to investigate and press charges against offenders, where a conviction could lead to a fine and/or imprisonment. Ofcom has to date not sought to prosecute anyone found to have caused harmful interference from the use of an illegal repeaters. We suggest that it may be useful to seek prosecution against any parties known to have used an illegal repeater that caused harmful interference, particularly where that party had not co-operated fully with Ofcom's enforcement action. Securing a conviction under such circumstances may help to raise awareness that the use of end-user installed repeaters is illegal.
- Alternative (legal) indoor coverage solutions that are available. This should involve raising awareness around the benefits of femtocells and smart repeaters for consumers and small and medium sized enterprises (SMEs) authorised by the MNOs under the terms of their spectrum licences. Alternatives such as Distributed Antenna Systems could be targeted towards venues (e.g. hotels, offices etc.) where the landlord wants to improve coverage for all networks. This may encourage both existing and potential users of illegal repeaters, to seek alternative legal indoor solutions that don't cause interference.

We recognise that MNOs also have a role to play in improving consumer awareness. In recognition of this we are looking at ways of improving awareness amongst consumers. We are keen to work in collaboration with Ofcom on this.



Future consultations

As EE has stated throughout our response, we believe that Ofcom's CFI is an inefficient use of resources, carrying the risk of creating further confusion amongst consumers around the use of illegal repeaters. This is something we have previously raised in informal discussions with Ofcom.

Ofcom can address the problems of interference from illegal repeaters by focussing its resources and strategy on raising awareness around the harmful impact and penalties associated with the use of repeaters and promoting the safer and more desirable alternative indoor coverage solutions.

EE considers that going forward, consultations on the use of harmful illegal repeaters, will not only continue to be unhelpful and an inefficient use of resource, but also an increasingly irrelevant issue. This is largely due to the technological developments in indoor coverage solutions, which we outlined in section 6. These will make illegal repeaters a less desirable solution to indoor coverage in comparison to alternatives such as voice over Wi-Fi.

On this basis we see limited benefit in Ofcom following this CFI with a formal consultation. Instead, going forward, we urge Ofcom to consider the relevance of such consultations in the context of improved indoor coverage solutions (e.g. voice over Wi-Fi) becoming available. Ofcom should undertake this assessment

before opting to consult on an area, which we believe will become less of an issue if Ofcom and MNOs collaborate effectively in raising awareness around the harmful effects of illegal repeaters and the superior alternative indoor solutions.

Ofcom should also be mindful of possible wider impacts of introducing uncertainty over the quality of service licensees will be in a position to offer. This may affect investment decisions and thus have unintended consequences that would be detrimental to consumers. Operators who have invested in exclusive licences have legitimate expectations that regulation will remain proportionate throughout the licence tenure, and any changes will be subject to consultation and evaluation, with respect to short and long run impacts.

Annex 1. [X]

Annex 2. [REDACTED]

Annex 3. Case study on the impact of an illegal repeater in Malmesbury

Figure 3 below is an extract from a news article published on the Gazette and Herald website¹². The article describes the case of an illegal repeater being detected and removed in Malmesbury, Wiltshire, where the repeater was causing harmful interference to coverage for consumers and local businesses.

Figure 3. Extract from Gazette and Herald website on the investigation into use of an illegal repeater in Malmesbury, Wiltshire

The screenshot shows the top section of the Gazette & Herald website. At the top, there are navigation links for 'Mobile site', 'E-Newsletters', and social media icons. The date is 'Tuesday, 9 August 2014'. The main header reads 'Gazette & Herald' with a search bar and a 'Search' button. Below the header is a navigation menu with categories like 'News', 'Sport', 'Leisure', 'Info', 'Twitter', 'Business', 'Announcements', 'Calendar', 'Jobs', 'Homes', 'Cars', 'Click2find', 'Buy & Sell', 'Dating', and 'Advertise'. A secondary menu lists local areas: 'In Your Town', 'Cane', 'Chippenham', 'Corham', 'Devizes', 'Malmesbury', 'Marborough', 'Stroud', 'Fosse', 'Royal Wootton Bassett', and 'Wiltshire'. The article title is 'Ofcom raid should solve mobile phone misery in Malmesbury'. To the right of the title are social media sharing buttons for Twitter, Facebook, and LinkedIn. Further right is a weather widget for Devizes showing a temperature of 19.2°C and a 21% chance of rain.

2:00pm Thursday 9th January 2014 in Malmesbury By Victoria Latchman



Ofcom has seized illegal phone repeater equipment

Illegal phone repeater equipment blamed for the poor O2 mobile signal in Malmesbury since November has been seized.

¹²http://www.gazetteandherald.co.uk/news/towns/malmesburyheadlines/10925913.Ofcom_raid_should_solve_mobile_phone_misery_in_Malmesbury/

The equipment which, ironically, is used to help boost a poor phone signal, was taken from a home on the outskirts of the town, after months of misery for those who rely on their phone.

Use of a mobile phone repeater carries a maximum fine of £5,000 and one-year imprisonment, says Ofcom.

In a statement from the communication regulator on Tuesday, it said: "Ofcom takes the matter of interference extremely seriously.

"We have today traced a case of mobile signal interference in Malmesbury, and removed illegal mobile phone repeaters from a property in the area.

"These devices can cause serious interference problems, meaning that other people in the area get poor or no mobile reception."

The move could bring an end to two months of frustration for O2 users in Malmesbury, although it is too late for those who have cancelled their contracts, and for businesses.

Julie Exton, of Exton Removals, said: "This has affected us badly. "My husband is self-employed and I help on the phones with the bookings so it has been hard.

"If I need to go out I divert the phone to my mobile so I can carry on with the business, which I haven't been able to do and we have lost an awful lot of work because of it. It has been so difficult.