Commercial Multi User Gateway Review

EE Limited's response to Ofcom's consultation

NON-CONFIDENTIAL VERSION - Confidential redactions are marked with [✂]

Contents

1. Executive summary

1. Use of Commercial Multi-User Gateways ("COMUGs") is liable to cause significant harm in terms of:
    - harmful interference to the operation of mobile networks, causing congestion, and a reduction in service quality;
    - impedance to the provision of accurate information and services such as Caller Location Information, and potentially Calling Line Identification ("CLI"), used, amongst others, by those public agencies responsible for law enforcement, emergency assistance and national security; and
    - inherently inefficient use of spectrum.
2. Use of COMUGs, by concentrating traffic from many users at a single location, is likely to lead to rapid and unpredictable increases in call traffic in the cell site in which the devices are located and, in certain circumstances, in neighbouring cell sites. Equipment and radio frequency planning limitations restrict the number of traffic channels to a maximum of around [✂] channels, and even fewer on the cell edge. COMUGs typically hold up to 60 SIMS, enabling 60 simultaneous calls to be originated on a single cell site and thereby occupying 60 channels. Consequently, when fully utilised, COMUGs have the potential to consume around [✂] of a cell, and even more on the cell edge, which is likely to significantly increase congestion on the network, particularly at the cell edge.
3. Difficulty in identifying the location of COMUGs, and the ease at which they can be relocated, means it is difficult for the Mobile Network Operators ("MNOs") to plan their networks and add capacity in response to increases in traffic. MNOs ability to manage congestion caused by COMUGs is therefore limited.
4. The increase in congestion resulting from use of COMUGs has the potential to significantly reduce quality of mobile services and thereby cause consumer harm. In relation to voice calls, increased congestion can adversely affect acoustic quality, latency and jitter, drop call ratios, call set-up success rates and coverage on the move. Further, given that mobile networks typically prioritise voice calls over data services, the increased congestion on individual cells can lead to a reduction in data user experience, in the form of increased latency, reduced network speeds, and even loss of data connection.
5. The use of COMUGs also prevents MNOs from receiving accurate information on caller location (and potentially calling line identification ("CLI")), and providing it to those public agencies responsible for law enforcement, emergency assistance and national security. This presents a risk to emergency services, law enforcement efforts and national security[1] as the relevant authorities are presented with incorrect information, in particular on the location of callers. It would also potentially obstruct MNOs from complying with their legal obligations under Ofcom's General Conditions of Entitlement ("GCs"), which requires MNOs to provide Caller Location Information for calls to 999.

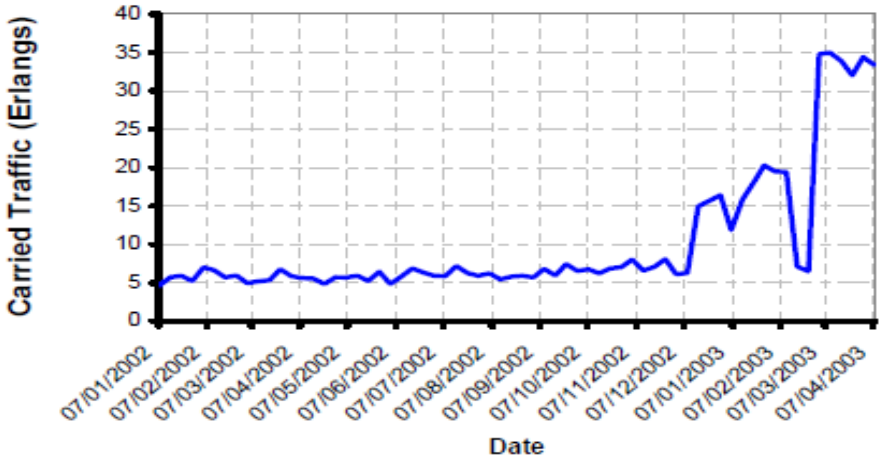
[1] This was a finding that was supported by the High Court in Recall Support Services Limited and Others v Secretary of State for Culture Media and Sport (the 'Recall case')

6. EE has serious concerns that any proposal to allow use of COMUGs subject to the user obtaining consent from MNOs would provide significant scope for illegal COMUG operators to hide behind apparently legitimate operations, and lead to a proliferation of illegal COMUGs. The result would likely be an increase in congestion on the network which would adversely affect the quality of mobile services for consumers. Ofcom has also not considered the significant difficulties and costs associated with a qualified exemption regime, in particular relating to policing the use of COMUGs (including monitoring and enforcement), assessing/processing applications from prospective COMUG users, and maintaining accurate records of authorised devices and their location. Since there is no countervailing benefit whatsoever to these risks and costs, a qualified exemption regime would therefore clearly not be proportionate, and the correct approach is a complete ban.

2. COMUGs cause significant congestion on mobile networks

7. EE has serious concerns about the impact that use of COMUGs would have on our network in terms of congestion and service quality. Equipment and radio frequency planning limitations assume that [✂] is operating a terminal and restrict the number of traffic channels to a maximum of around [✂], and even fewer on the cell edge. COMUGs and supporting equipment may contain up to 60 SIMs cards, enabling 60 simultaneous calls to be originated on a single cell site and thereby occupying 60 channels. As a result when fully utilised, COMUGs have the potential to consume a very significant proportion of the overall capacity of a typical macro cell (i.e. at least [✂] of a cell), even if the unit is located in an optimal location in the cell (close to cell centre in excellent radio conditions so as to minimise the resources required per user).
8. Figure 1 illustrates how COMUGs can lead to rapid and unpredictable increases in traffic, which creates congestion on cell sites. Traffic would normally be expected to grow relatively steadily over time and give sufficient opportunity for the operator to respond. Figure 1 shows how a COMUG caused a sudden and dramatic rise in traffic on the cell towards the end of the trial period. This gave us no time to take action and the spike in traffic would have deprived service to users who may have wished to use the cell. This is an inherent problem with the use of COMUGs which an MNO does not control.

Figure 1 – Busy Hour Traffic Carries on Cell[2]



Source: Internal trial

9. This potential for congestion is even more acute when a COMUG is located near to the cell edge. At the very cell edge a [✂] carrier supports about [✂] simultaneous voice calls at desired coding rate with linear capacity growth [✂]. A single 60 SIM COMUG, could therefore potentially consume [✂] and a considerable proportion of a [✂] at the very cell edge.
10. The impact on other users could be substantial in either case. Depending on its usage pattern, the COMUG could cause [✂],[3] and at the very cell edge, significantly impact service availability and quality in areas with [✂]. We detail the likely impact on the technical quality of service in section 3 below.
11. [✂].

Difficulties managing congestion from use of COMUGs

12. The timescales required to respond to unpredictable increases in traffic caused by use of COMUGs, and ease at which COMUGs can be relocated, mean that MNOs ability to manage congestion is severely limited.
13. Whilst it would vary substantially on a case by case basis it would typically take [✂] simply to identify and decide on action in relation to an unexpected increase in traffic. Addressing the problem would then depend on a range of factors including the ability to upgrade the site, availability of staff and equipment.
    - If the problem could technically be addressed merely by modifying the equipment at a site, this could take from [✂] but might be longer (or ultimately not possible) depending on factors such as [✂]. These can be large and space would be needed. This may not be possible for a street works or a roof top. The increase in the number of speech and data channels might also require additional transmission e.g. another radio fixed link.

[2] Whilst we note that this
[3] It should be noted that [✂]

- If a new cell site is required then lead times can be very lengthy as it raises site-search and planning issues. This can often take between from [✂], and in some areas can take [✂].

14. Furthermore, in some cases options to increase capacity by adding additional carriers to heavily loaded urban cells, to meet the demands of COMUGs, may have already been exhausted or are blocked because of issues such as planning permission for additional antennas. As such, in these cases there may be limited options for operators to manage the significant additional load of a COMUG, let alone the potential for multiple COMUGs in the same cell.

15. We also note that the fact that COMUGs are highly mobile and may be relocated quickly and easily, without the MNOs knowledge, could lead to a MNO attempting to address a problem caused by a COMUG which could just as quickly be relocated without its knowledge. This could lead to MNOs making inefficient investments, and in the process diverting resources from 4G roll-out, to the detriment of consumers overall.

3. Adverse effects of COMUGs on the technical quality of service

16. The use of COMUGs has the potential to have an adverse impact on the technical quality of mobile services. This includes a degradation in call quality, data services, and the correct functioning of other mobile services (e.g. Dual Tone Multi Frequency ("DTMF") support and international roaming). Furthermore, unlike other devices such as authorised mobile repeaters used on public transport, COMUGs fail to bring any benefits to consumers (e.g. in the form of improved coverage), which might otherwise go some way to offsetting the substantial externalities that they impose on the network and consumer experience.

Degradation in voice call quality

17. The congestion created by the use of COMUGs manifests itself through an increased likelihood of being unable to make or receive a call (call blocking), reduction in voice quality (e.g. degraded acoustic quality, latency and jitter), dropped calls, reduced coverage on the move and increased interference on neighbouring cells. EE considers these effects to constitute harmful interference as defined by the WTA.

18. The reduced quality of service caused by COMUGs can also create erroneous perceptions of negative network reliability which is a key aspect of mobile services. Research by Enders Analysis, upon which Ofcom has previously relied[4], reported that reliability is consistently the most important factor for consumers when considering the quality of a mobile network.[5] Reduced network reliability caused by the use of COMUGs is therefore likely to lead to significant consumer harm.

[4] See Ofcom's consultation on the "Award of the 2.3 and 3.4 GHz spectrum bands", November 2016
[5] Enders Analysis / TNS-RI survey, May 2015

19. In addition to the quality problems caused by congestion that arises from use of COMUGs, these devices also cause three particular problems in relation to the quality of voice calling:

    Increased dropped calls - Although MNO networks are continuously improving, radio propagation may still be less reliable than a fixed connection. This means that the quality of the call and the probability of the call dropping are likely to be worse than a customer will be expecting (since the customer will ordinarily be unaware of the additional and unnecessary mobile leg of the call).

    Speech delay - The digitisation and transmission process of voice used by COMUGs introduces delays into the call. Whilst some delay tends to be acceptable to customers using mobile terminals, it is less so to fixed customers who expect shorter delays. Further, if a mobile call is routed over a COMUG and then onto another mobile to terminate the call there will be three sets of speech delays which decreases the utility associated with calling, since greater delay makes calling more difficult.[6]

    Increased call set up delay - By converting a fixed call to a mobile one, customers experience the additional delay in setting up the call arising from the dialled digits from the originating terminal being passed to the COMUG which in turn has to implement the call set up.

Impact on data services

20. The congestion caused by the use of COMUGs also has the potential to have a detrimental impact on the quality and provision of 3G and 4G data services. This is because voice call users are allocated a higher system service priority than data users and so any congestion caused by use of COMUGs would be likely to impact on the quality of data services first. Furthermore use of COMUGs also has the potential to distort the assumptions on randomness that are important for data services to function efficiently. The consequence is that the cell capacity is reduced for long periods of time and service, particularly those of high speed, denied to data users. Given the significant value that consumers place on data services, which is expected to increase over time, the extent of consumer harm caused by COMUGs is likely to be substantial and increase over time. Moreover the spectrum efficiency of the cell is greatly reduced and is disproportionate to the channel it occupies for reasons given above.

Impact on Dual Tone Multi Frequency support (DTMF)

21. The use of COMUGs is likely to hinder the transfer of information that subscriber enter using the handset keypad, which is essential to a wide array of telecommunications services such as voicemail, service selection at call centres ("press 1 for …"), phone banking, automated phone purchasing using debit or credit cards etc.[7] Modern digital telecommunications networks rely upon a technique called Dual Tone Multi Frequency ('DTMF') dialling to transfer information which a subscriber enters using the handset

[6] EE notes that this is more likely to apply to calls made over 2G than 4G services as 2G call set up times are typically longer.

[7] The importance of providing DTMF is well established see recital 39 to the Universal Service Directive (2002/22/EC) ('USD')

keypad. The correct transfer of this type of information is a requirement under Article 29 of the Universal Service Directive (USD) and GC 16.1(a).

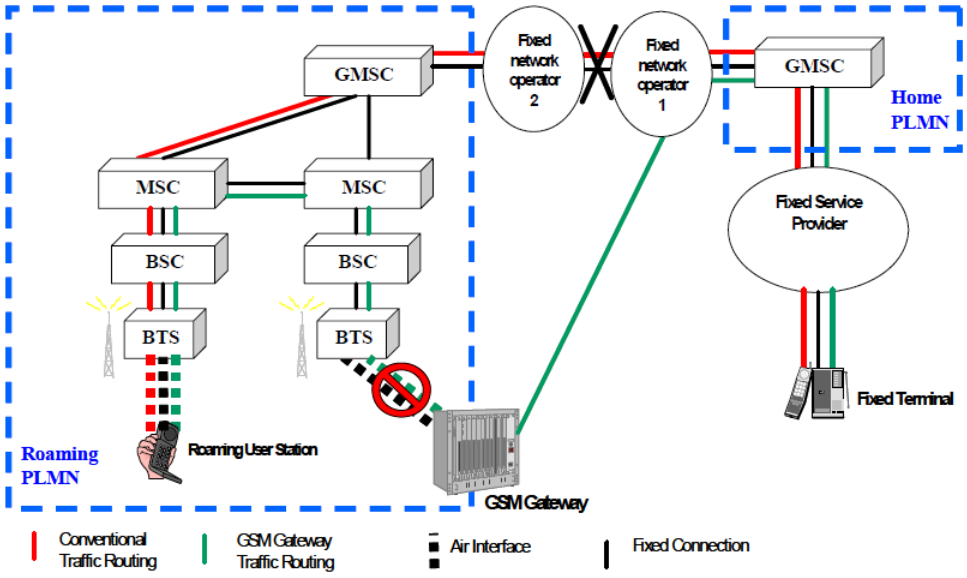
22. LTE and GSM networks makes use of a highly efficient digital speech coding algorithm to transmit high quality voice over a low bandwidth. However, this algorithm does not transmit DTMF well. To overcome this weakness DTMF signals must be transmitted in a different manner to voice and are transmitted as a digital message which is then converted to true DTMF tones at the Mobile Switching Centre (MSC) for onward transmission to other networks.

23. Some COMUG equipment on the market purport to support DTMF. However, it is EE's understanding that the extent of this support does not permit translation of incoming DTMF into the appropriate format for GSM or LTE, with the consequent malfunctioning of services which rely on the correct transfer of such tones.

24. International Roaming Problems

25. The use of COMUGs could adversely affect roaming call set up and accessing voicemails while roaming. EE understands that some fixed networks are using COMUGs. These fixed networks can form part of the transmission path between MNO networks as illustrated in Figure 2.

Figure 2 – Illustration of International Roaming Problems caused by gateway



26. Figure 2 shows the situation where a call is made to a mobile roaming on another network. For the call to be routed correctly, signalling information, is passed between the fixed and the MNO network elements e.g. between the GMSCs, the MSCs and the fixed networks 1 & 2.

27. If one of the interconnect partners uses a COMUG (e.g. fixed network operator 1 above) a mobile terminal, in effect, becomes involved in inter-network signalling which is not understood by the relevant network nodes and the messages are rejected. This means that the roaming call fails to set up and communication between the parties (or checking of voicemail etc.) cannot take place. This is a significant problem; it would be an

extremely substantial task (requiring changes in the specifications) to attempt to remedy it.

Impact on mobile services in rural areas

28. Congestion problems may be equally as prevalent in areas of low mobile activity (i.e. rural areas) as in areas of high mobile activity (i.e. urban areas). MNO networks are scaled, and the appropriate equipment installed, to handle the predicted traffic in a particular area – whether that is urban and rural. COMUGs can therefore still cause precisely the same unexpected surges relative to capacity whether located in rural or urban areas – indeed the surges in rural areas could in some cases be even more disproportionate when compared to predicted traffic. All of the problems highlighted above apply equally to rural areas, including the difficulties in upgrading sites.

4. Impeding provision of caller information

29. COMUGs do not permit the passing of correct Caller Location Information and may also not facilitate the provision of accurate Calling Line Identification ("CLI") to MNOs. This is because from the perspective of a MNO, the SIM card installed in a COMUG may appear to be the source or termination point of a call, while in reality it would be an intermediate point in an end to end connection between two devices. This has negative implications for the provision of accurate information to emergency authorities, as well as the correct functioning of mobile services which rely on these functions. We set these out in detail below, as well as explaining why Ofcom's proposed changes to General Conditions may have unintended consequences for the use of COMUG devices.

Implications for emergency services, law enforcement and national security

30. The use of COMUGs prevents MNOs from receiving accurate information on caller location (and potentially on calling line identification ("CLI")), and providing it to those public agencies responsible for law enforcement, emergency assistance and national security. This presents a risk to emergency services, law enforcement efforts and national security[8] as the relevant authorities are presented with incorrect information, in particular on the location of callers.

31. The public policy importance of providing Caller Location Information for emergency purposes is clearly established: recital 36 to the Universal Service Directive (2002/22/EC) ("USD") provides:

    "Caller location information, to be made available to the emergency services, will improve the level of protection and the security of users of '112' services and assist the emergency services, to the extent technically feasible, in the discharge of their duties, provided that the transfer of calls and associated data to the emergency services concerned is guaranteed."

[8] This was a finding that was supported by the High Court in Recall Support Services Limited and Others v Secretary of State for Culture Media and Sport (the 'Recall case')

32. Accordingly, Article 26 of the USD provides:

"Member States shall ensure that undertakings which operate public telephone networks make caller location information available to authorities handling emergencies, to the extent technically feasible, for all calls to the single European emergency call number '112' "

33. This is reflected in Condition 4 of the General Conditions of Entitlement:

"4.2 The Communications Provider shall, to the extent technically feasible, make accurate and reliable Caller Location Information available for all calls to the emergency call numbers "112" and "999", at no charge to the Emergency Organisations handling those calls, at the time the call is answered by those organisations.

Where a Communications Provider provides an Electronic Communications Service:

(a) at a fixed location, the Caller Location Information must, at least, accurately reflect the fixed location of the End-User's terminal equipment including the full postal address; and

(b) using a Mobile Network, the Caller Location Information must include, at least, the Cell Identification of the cell from which the call is being made, or in exceptional circumstances the Zone Code."

34. MNOs provide Caller Location Information to the relevant authorities when requested, however, the use of a COMUG prevents the correct Caller Location Information being identified as the network will identify the location of the originating caller as the physical location of the COMUG. EE is not aware of any solution which makes it technically feasible for this information to be made available to MNOs for calls routed through COMUGs. Caller Location Information is generated by analysing which cell(s) have been used to route a call onto the mobile network and where the caller is likely to be located within a given cell. By its very nature then, since the COMUGs makes the network respond as if it were the handset, this information is always in respect of the COMUG, not the original caller. As a result the MNO is highly unlikely to be able to accurately identify the originating location of specific users sitting behind the device.

35. These problems in obtaining accurate caller information are likely to be very serious. Not only would do they potentially obstruct MNOs from complying with their obligations under GC 4 of the General Conditions of Entitlement, but they could also be detrimental to the functioning of emergency services, law enforcement, and security agencies.

Implications for ordinary use of mobile services

36. Calls routed through a COMUG may not provide accurate CLI information to the receiving party, making it more difficult for the receiving party to distinguish between urgent and nuisance calls. EE understands that a majority of customers make sophisticated and extensive use of CLI information in their choice of answering phone calls – using CLI to 'filter' their calls and choose which ones to accept. This may take the form of rejecting non-urgent calls during meetings, rejecting unwanted calls from known numbers, rejecting calls from all unknown numbers or rejecting calls from numbers with barred CLI to prevent connection of nuisance calls. Customers' ability to do this is enhanced by the fact that mobile handsets link the calling number to that stored in their phone book. The probability of a calling party having their call connected will, therefore, tend to depend on whether the CLI is transported correctly. Routing a call through a

COMUG may result in an urgent or wanted call being repeatedly rejected by a subscriber who will not be aware that provision of CLI is not functioning correctly, with the potential to cause significant consumer harm.

Implications for supplementary services

37. Furthermore, the inability of COMUGs to provide accurate CLI information to the receiving caller party may also affects the normal provision/functioning of other supplementary services.

38. Firstly, voicemail services which allow the return of a call when the user has reviewed a voicemail message do not function because incorrect information regarding the number calling a mobile is stored by the voicemail facility. Furthermore, users who wish to access their voicemail via a fixed line or whilst roaming internationally will have problems doing so, because voicemail requires line identification (to allow access to voicemail) which is disrupted by the COMUG.

39. Secondly, users cannot use the number stored in their phone's call list to monitor such calls or to return a missed call as it retains an incorrect number.

Unintended consequences of Ofcom's proposed changes to GCs of entitlement

40. We note that if COMUGs were to made licence exempt this could come into conflict with Ofcom's proposal in its consultation on "General Conditions of Entitlement relating to consumer protection"[9], which would require CPs to "take reasonable steps to identify and block calls on which invalid or non-diallable CLI is provided". Given that the CLI information provided to a receiving caller party for a call originated through a COMUG may not be accurate or valid, under Ofcom's proposal to revise GC 4, MNOs would effectively be required to block these calls. This would is likely to be to the detriment of consumers making and potentially receiving calls where a COMUG is used to originate the call.

5. COMUGs lead to inefficient use of spectrum

41. Use of COMUGs inherently represents inefficient use of spectrum. Firstly, using a COMUG introduces an additional and entirely unnecessary mobile leg into a call. Ordinarily a fixed line would be directly routed into the PSTN and then to the backbone network which connects the base stations of a mobile network; it would then be routed to the receiving party's mobile handset via a wireless telegraphy link from the nearest base station to the handset. By contrast, when a call is routed through a COMUG it is first converted into a mobile call and then transferred using a wireless link to the base station of the terminating network before being transferred again using a further wireless link to the receiving party's handset. This needlessly and inefficiently causes 100% greater use of the relevant radio spectrum, crowding out legitimate calls and necessitating further inefficient investment. Similarly, if a COMUG is placed in an off-net mobile to mobile call,

[9] Ofcom, Consultation on "General Conditions of Entitlement relating to consumer protection", December 2016.

it adds a third (unnecessary) wireless link in addition to the two necessary ones, leading to 50% over-utilisation of the radio spectrum.

42. Secondly, the technical characteristics of COMUGs mean that they use a disproportionate amount of capacity compared to mobile phones.

    - The capacity of a mobile cell is dependent on the way in which it is used: the cell relies on assumptions about randomness in the nature of calling (length and timing) to ensure that it is used optimally. This gives rise to a non-linear relationship between the available number of channels in a cell and its capacity: more available channels in a cell gives rise to a more than proportionate increase in capacity (and conversely, less available channels gives rise to a more than proportionate decrease in capacity).
    - However the assumption of randomness breaks down when a cell is used by a COMUG. This is because the very high volumes of traffic on a COMUG effectively "blocks" entire channels in a mobile cell for the COMUG's use. For example, if a COMUG consistently uses just 1 channel out of 8 available in a mobile cell[10], the reduction in capacity is not 1/8 (12.5%) but rather 17% because of the non-linear relationship between capacity and channel usage. This means that 17% more radio capacity has to be provided by the network operator to restore the level of service arising from the COMUG occupying just one channel.
    - In reality the situation tends to be far worse. Whilst many cells are typically configured to accommodate [✂] channels, as noted in section 2 of this response, COMUGs are known to accommodate up to, and in some cases more than, 60 SIMs. If such COMUGs are used at anywhere near their capacity, they would simply [✂].
    - The non-linear relationship between capacity and usage can be even more marked in a [✂] depending on where the COMUG is placed in the cell. This is because users at the edge of the cell utilise a substantial amount of the resources available in the cell.

6. Distinction between COMUGs and authorised mobile repeaters used on public transport

43. EE considers it important to make clear the distinction between the impact COMUGs have on mobile operators' networks, and the impact that authorised repeaters used on public transport have on these networks. In the case of repeaters that are authorised by mobile operators, and used to improve coverage on public transport (e.g. serving sites to the railway line), the location of these devices is known in advance and they are then dimensioned appropriately so as minimise/manage any potential interference or congestion on the network. The loading is also of relatively short duration and transient as trains for example travel past sites and are not stationary. As a result even if

[10] Illustrative only.

temporary high loading occurs, it will not affect other users for long periods. Furthermore, these authorised mobile repeaters on public transport are likely to bring significant benefits to consumers, in the form of wider/improved coverage.

44. In contrast, as explained in section 2 of this response, COMUGs have the potential to significantly increase congestion on the network, and in the process adversely affect the technical quality of service provided to other users of the network. Their use may also potentially drive inefficient network investment diverting resources away from 4G deployment. Use of these devices is also likely to lead to an inefficient use of spectrum, and impede the provision of accurate Caller Location Information to emergency services.

45. Any changes to legislation that have the effect of limiting MNOs ability to deploy coverage enhancing mobile repeaters on public transport and/or making use of COMUGs licence exempt would be contrary to Ofcom's principal statutory duties, "to further the interests of citizens in relation to communications matters" and secure "the optimal use for wireless telegraphy of the electro-magnetic spectrum", under section 3 of the Communications Act ("CA 03"), as well as its duties under section 3 of the Wireless Telegraphy Act 2006 ("WTA 06") and Articles 8 and 9 of the Framework Directive.

7. Conditional exemption cannot be justified

46. In the Consultation Ofcom suggests that there may be "*a case for a qualified exemption of COMUGs*", and "*one option might be to exempt the use of COMUGs subject to a condition requiring the users of such devices to obtain prior written consent /authorisation from a host network*".[11]

47. EE has serious concerns that allowing use of COMUGs under certain conditions gives greater scope for illegal COMUG operators to hide behind apparently legitimate operations. EE is aware that some gateway operators have in the past unlawfully modified IMEI numbers in an attempt to mask their operation of illegal gateways. Qualified exemption also creates a lack of clarity in relation to the legal status of COMUGs, which will inevitably lead to undertakings believing (or at least claiming to believe) that unlawful activities are in fact lawful. As a result, a qualified exemption regime has the potential to lead to a proliferation of illegal COMUGs, which in turn causes increased congestion on the network and adversely effects technical quality of service for consumers, as described in sections 2 and 3 of this response.

48. Moreover, it is not clear how such qualified exemption could be effectively monitored and policed. Such an exemption regime is likely to increase time-consuming and costly monitoring for MNOs and Ofcom as they attempt to locate COMUGs and determine whether they meet the qualification conditions. There will also be serious enforcement problem as successful prosecution will depend, not simply on identifying the use of a COMUG, but on establishing the precise location and circumstances of that use to determine whether it represents illegal use. These problems are compounded by the fact that COMUGs can be easily relocated, so for example, illegal devices can be relocated before being identified, and devices that may be authorised to operate in a specific area being moved to an unauthorised location, making monitoring and policing almost

[11] Ofcom, 'Commercial Multi User Gateway Review' Consultation, December 2016, Para 3.19-20.

impossible. Any benefits from effective monitoring and policing would clearly be outweighed by having a simple blanket prohibition.

49. Assessing, processing and maintaining records of consent requests for use of COMUGs is also likely to be hugely burdensome for MNOs. MNOs would need to process, assess and then maintain accurate records of potentially large volumes of consent requests. In assessing the viability of a request a MNO would have to undertake a detailed assessment of the network configuration, current traffic levels and the required capacity to accommodate use of a COMUG in the particular location. This process could be time consuming and ultimately pointless.

50. We also note that the fact that COMUGs are highly mobile and may be relocated quickly and easily, without the MNOs knowledge, could lead to an MNO investing in/configuring its network (where practical) to accommodate a COMUG(s) only for the COMUG to relocate without its knowledge. This could lead to MNOs making inefficient investments, and in the process diverting resources from 4G roll-out, to the detriment of consumers overall.

51. Notwithstanding the significant scope for consumer harm under a qualified licence regime (through a proliferation of non-qualified COMUGs), even if a MNO received a request for consent to use a COMUG its ability to manage the additional traffic routed through the COMUG(s), without affecting the quality of service for other users, is likely to be limited. As explained in section 2 of this response, options to increase capacity by adding additional carriers to heavily loaded urban cells may in some case already have been exhausted or are blocked because of issues such as planning permission for additional antennas. As such, in these cases there may be no realistic way for operators to manage the significant additional load of a COMUG, let alone the potential for multiple COMUGs in the same cell.

52. Furthermore, even if MNOs had the capability to accommodate COMUGs and manage any adverse effects on technical quality of service, the use of COMUGs would still be likely to: (i) represent inefficient use of spectrum; (ii) adversely affect the functionality and provision of some supplementary mobile services (e.g. voicemail functionality and caller identification); and (iii) impede vital Caller Location Information being shared with emergency services. This has serious implications for consumer choice, satisfaction, and the functioning of the emergency and security services, with minimal benefits to consumers.

53. Since there is no countervailing benefit whatsoever to these risks, a proposal to exempt the use of COMUGs subject to the users of such devices obtaining prior written consent /authorisation from a host MNO would therefore clearly not be proportionate, and the correct approach is a complete ban.