



# Resilience Guidance consultation

## Virgin Media O2 response to Ofcom's Consultation on its draft Resilience Guidance

### Executive Summary

Virgin Media O2 ("VMO2") welcomes the opportunity to respond to Ofcom's Consultation ("Consultation") on its draft Resilience Guidance ("Guidance").

As Ofcom notes, reliance upon the telecoms sector has grown significantly over the last two decades. The sector facilitates and supports economic growth across practically all sectors of the economy and must continue to invest in the roll out of full fibre and 5G technologies to support that growth, now and into the future. The sheer volume of data transferred across our fixed and mobile networks has grown significantly every year as customers consume and upload larger and larger data files at ever higher speeds.

However, the telecoms sector is facing multiple challenges and economic headwinds. Input costs have risen, particularly energy costs, and the cost of further investment has also increased. Capacity demand has significantly increased year on year, but at the same time the unit price of data paid by customers has reduced consistently. The climate to invest in next generation technology has become tougher (with higher interest rates) and due to high inflation and the cost-of-living crisis, consumers have less disposable income. Combined with robust competition in the UK marketplace, this has placed significant pressure on margins and makes it more difficult to cover increasing costs and pay for investment in next generation networks.

So, on the one hand, market growth has slowed down and customers are reducing their spending on services, while on the other hand, there is significantly more financial pressure on communications service providers (CSPs) due to increased input costs and higher demand for capital expenditure necessary to continually upgrade capacity (on fixed and mobile), roll out new full fibre and 5G networks and improve resilience.

Many of the measures in the Guidance relate to power. We believe that energy supply is a key dependency of communications services that we cannot eliminate. It is not possible to provide communications services entirely independently of the energy supply industry, and as a communications provider and provider of Critical National Infrastructure (CNI), VMO2 receives no special treatment. All CNI – and our customers' own security of power supply – is dependent on the electricity supply industry – and fixed and mobile services in the home will not work (either for long or at all) if there is no power supply to the home to operate or charge devices.

In the absence of public funding (which has been a model used in some other jurisdictions)<sup>1</sup>, improvements to resilience need therefore to be carefully timed, and targeted to where they would have the best outcome for customers.

We believe that regulatory interventions aimed at improving resilience must be appropriate, proportionate, and executed to a clear, fixed and realistic timetable; all stakeholders need certainty and will need an appropriate amount of time in which to plan for and implement any changes, to ensure they can make efficient and effective investment in their networks.

We set out our comments and recommendations below.

- **The primary responsibility to improve resilience of power supply and ensure greater prioritisation of energy supply to communication providers' sites and to consumers should sit with Distribution Network Operators (DNOs), not their customers; Ofcom's support is critical.**

We believe it is important to acknowledge in the Guidance that secure energy supply is a key dependency, and the risk cannot entirely be eradicated. All CNI provided by CSPs is dependent in some form on secure power supplies, yet VMO2 receives no preferential treatment from energy suppliers, not even in relation to core sites. Although there are arrangements for providing increased resilience and redundant power feeds for certain CNI assets this does not benefit the majority of CSPs and it does not benefit our customers in their homes. Even with power backup at every level of a telecoms network (which would be prohibitively expensive), fixed and mobile services in the home will not work (either for long or at all) if there is no power supply to the home to operate or charge devices.

In a hierarchy of CNI on which all others depend, electricity supply is at the apex. The regulations imposed on the energy supply industry should reflect this, as it clearly should play a vital role in strengthening the energy resilience of the sectors it serves. There needs to be sufficient government and regulatory focus to ensure that power to CSPs and ideally to consumers is maintained. We need to be able to rely on electricity supply – and in most conditions, we can. The average customer lost minutes in 2022 varied per DNO but was below target for all and showing a reduction over time.<sup>2</sup>

We believe there should be stronger measures on energy suppliers to modernise and increase resilience of the power distribution network, both to CSPs and to consumers, and ensure their co-operation with other industries. We would welcome Ofcom's assistance in helping engage DNOs and Ofgem and believe Ofcom can play a critical role in helping to safeguard and improve resilience of power supply and restoration of power to CSPs.

- **Guidance should acknowledge that what is appropriate and proportionate for telecoms networks can vary and measures will not be an appropriate minimum/baseline in all cases.**

The Guidance is significantly more prescriptive than the 2017 and 2022 guidance. We welcome the clarity it brings in setting out what Ofcom regards as appropriate and proportionate, particularly in relation to new build/next generation networks. However, we believe there should be acknowledgement that what is appropriate and proportionate,

<sup>1</sup> As highlighted by Ofcom at paragraphs 2.32, 2.34 and 5.17 of the Consultation.

<sup>2</sup> RIIO ED1 Network Performance Summary from 2015-16 to 2021-22 (ofgem.gov.uk)

particularly for existing networks, will depend on many different factors. As drafted, the Guidance appears to set multiple baseline minimum standards.

Although networks have been built to withstand failures, particularly at the core, the level of resilience and diverse routing will vary, depending on how they were built. Existing networks may have been built on a ‘ring’ model in the core and more traditional tree and branch architecture at the access layer. It is not feasible or proportionate to retrofit those networks to implement a ‘mesh’ architecture and dual parenting. Ofcom’s guidance should acknowledge these variations in historical network design approaches and provide sufficient flexibility to accommodate this variety.

The layers of resilience implemented in networks (and layers of resilience suggested by the Guidance) mean that in some cases, the expenditure necessary to comply with the Guidance would result in no meaningful benefit to service availability. For example, if loss of services at a Core or Metro site can be automatically absorbed by other sites, then huge expenditure on specific measures to further reduce the (already small) risk of losing a site in the first place doesn’t change the service availability outcome for customers.

The Guidance ought to clarify that what is appropriate and proportionate can vary, that different approaches are valid, and the measures set out in the Guidance will not in all cases be appropriate, or a baseline (or minimum) that must be met, as appears to be the intention.<sup>3</sup>

- **Guidance should be outcomes-based rather than mandating specific measures.**

We believe the Guidance ought to be outcomes based with real-world examples of how the outcome may be achieved. However, there are numerous sections<sup>4</sup> where the Guidance also sets out precisely how to achieve this. Ofcom has stated<sup>5</sup> it has been mindful to avoid overprescribing how CSPs design, build and operate networks and we agree with this principle. Network design and measures to achieve a particular outcome can vary. We believe the requirements specifying how to achieve compliance should be deleted or redrafted as examples instead of being mandatory. We discuss this in more detail in response to Question 1.

- **We need a clear framework to help us determine what is appropriate and proportionate in the circumstances.**

The Guidance ought to recognise that full compliance with the Guidance for all components of a network may not always be appropriate and proportionate. There are some references in the Guidance to “where appropriate” and “where necessary” and we believe these qualifications are important, as there is no single approach that fits all sites and circumstances. However, we would welcome inclusion of a framework to help determine what is appropriate and proportionate in the circumstances, for instance as Ofcom has done to some extent in the Call for Inputs for Mobile RAN backup (“CFI”).

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<sup>3</sup> Paragraph 4.12 of the Consultation.

<sup>4</sup> For examples, see Section 4.2.1 and 4.2.3 of the draft Guidance.

<sup>5</sup> Paragraph 4.49 of the Consultation

As discussed above, layers of resilience in networks can vary. CSPs may have adopted other designs, techniques and safeguards that affect service availability and therefore the appropriateness of measures set out in the Guidance.

We believe what is appropriate and proportionate is likely to be fact specific, taking into account many factors including the seriousness of the risk, the probability of this risk occurring, the impact to customers were the risk to materialise, what measures can be taken to mitigate any impact on customers and the feasibility, timing and cost of implementation.

- **The proposal to introduce a minimum 4-hour battery backup raises similar concerns to Mobile RAN backup and ought to be considered alongside options for Mobile RAN.**

We do not believe that introducing a blanket requirement for a minimum of 4-hour battery backup for all active street cabinets is appropriate or proportionate for the reasons we articulate in our response to Question 1.

We believe that battery backup at the access layer (fixed and mobile) ought to be considered holistically as part of a wider cross sector consultation on power resilience before implementing any minimum requirement for active street cabinets in Guidance. Most customers in the UK have access to, and are indeed customers, of both fixed and mobile operators. What is appropriate and proportionate in terms of fixed battery backup should take into account improvements to average customer minutes lost and obligations placed on DNOs and may depend to some degree on what decisions are made by Ofcom regarding additional power backup at the mobile RAN, and indeed vice versa.

We believe the factors to consider are similar to those set out in the CFI and we welcome Ofcom's approach in asking for further input in relation to power back up for Mobile RAN before implementing specific requirements. We believe the same ought to apply to backup for active street cabinets on fixed networks.

We note that in relation to Mobile RAN power backup, Ofcom gathered initial estimates from MNOs regarding the number of sites and the costs and complexity of Mobile RAN power back up. However, in relation to fixed street cabinet power backup, Ofcom did not gather numbers from VMO2 (which are significant) or initial estimates. We believe, therefore, that a proper, comprehensive Impact Assessment, as required by Section 7 of the Communications Act 2003, must be undertaken, since the assessment set out at A1 of the Consultation is incomplete. This exercise must consider measures to improve the resilience across mobile and fixed infrastructure and must cover the proposals in both the Consultation and the CFI, since some aspects are interdependent.

- **The cost and complexity of retrofitting has been underestimated and exclusion of broadband cabinets due for decommission in 3-5 years is too short a period of time and we believe this should be extended to 10 years from expected migration of customers (we believe migration not decommissioning is a more appropriate measure)**

The cost and complexity (and time it would take) to retrofit existing networks is far more significant than Ofcom has assumed as part of the Impact Assessment. For the reasons we articulate in response to Question 1, we do not believe it is appropriate or proportionate to mandate that all existing cabinets are retrofitted to provide a minimum of 4-hour battery backup, but if some requirement to retrofit existing networks is retained in Guidance, then we believe that cabinets which are expected to cease serving customers within the next 10

years ought to be excluded (decommissioning may take place at a later date without impact to customers). This is discussed in more detail in response to Question 1.

- **Obligation to implement minimum 4-hour battery backup should be reviewed even for new full fibre networks.**

Best practice for new fibre networks is to build with battery backup at the OLT. However, as currently worded, even new full fibre networks may have to replace batteries recently installed, as they have generally been architected to meet 3-4 hours in typical use as published by the supplier.<sup>6</sup> Requiring newly built networks to replace batteries which have approximately 3-4 hours battery backup because they do not have a minimum of 4 hours battery backup would not in our view be appropriate or proportionate given the cost of this exercise compared with the minimal additional benefit to customers. We set out in response to Question 1 below some suggestions how the measure could be reframed to address proportionality concerns.

- **Guidance should clarify that battery life is guidance and may vary.**

Battery life is affected by temperature and use and will deteriorate over time. At some point batteries will need to be replaced.

By specifying a minimum battery backup in the Guidance, the implication is that CSPs would be expected to replace batteries as soon as they offered less than 4-hour minimum backup. We are not clear how we would be able to determine this, and even if we could, replacement at this point would be costly, environmentally wasteful and, we believe, disproportionate.

- **The risks associated with battery backup – notably fire risk and theft risks – ought to be relevant factors in determining what measures are appropriate and proportionate.**

We discuss this in response to Question 1 below.

- **Environmental factors should be relevant to considering what is appropriate and proportionate.**

We discuss this in response to Question 1 below.

- **Retrofitting networks to comply with new requirements may not always be appropriate and proportionate and will take time. The Guidance should acknowledge this.**

The Guidance (which is due to be published in final form in Summer 2024) ought to acknowledge that implementation may take time, and as cost and complexity rises, compliance will take longer, and the measure is less likely to be appropriate and proportionate.

CSPs operate on a budgetary cycle, often over several years as part of longer-term capital expenditure plans. Major and immediate budget demands may be highly disruptive to pre-existing network rollout and improvement expenditure.

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<sup>6</sup> The Xantaro press release set out at footnote 63 of paragraph 4.56 of the Consultation includes the statement that “*In the event of power outages, the cabinet can obtain 3-4 hours of battery backup.*” This would not comply with the requirement for a minimum of 4-hour battery backup.

- **Time to plan and implement any measure will affect feasibility and costs.**

We discuss this in response to Question 1 below.

- **Unless alternative methods of funding are made available, the Guidance should acknowledge that prioritisation by CSPs will be inevitable.**

Unlike in other jurisdictions, where public funding has been applied to power resilience, for instance in Mobile RANs<sup>7</sup>, here the expectation is that CSPs will fund resilience improvements out of their own budgets. Given the competitiveness of the UK marketplace, and the increasing pressures on their finances, CSPs have limited flexibility to accommodate incremental capital expenditure, which means that prioritisation will be necessary.

The cost and complexity of some of the measures, such as redundant power supplies across the estate and introducing mesh architecture and dual parenting is completely disproportionate to the marginal benefit customers would see. We believe that it is in the best interests of our customers to prioritise limited funds on the roll out of new network and by taking a risk-based approach to improving resilience, rather than retrofitting physical infrastructure to meet specific measures at prohibitive cost and minimal benefit to customers.

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<sup>7</sup> See 2.32, 2.34 and 5.17 of the Consultation.

## Introduction

The obligations relating to security and resilience of public electronic communications networks and services have seen considerable change over the years, which has led to some regulatory uncertainty in interpretation and differences in approach.

The obligations were originally set out in s105A of the Communications Act 2003 and updated as a result of the Telecoms Security Act 2021. As Ofcom notes in the Consultation, this includes a general duty to take such measures as are:

*“appropriate and proportionate for the purposes of— (a) identifying the risks of security compromises occurring; (b) reducing the risks of security compromises occurring; and (c) preparing for the occurrence of security compromises.”*

Further general duties are set out in section 105C, which require communications providers to take such measures as are appropriate and proportionate to prevent adverse effects arising from a security compromise that has occurred. Where the security compromise has an adverse effect on the network or service, the provider must take appropriate and proportionate measures to remedy or mitigate that effect.

What this means in practice is open to interpretation, and that interpretation by Ofcom has changed over time. The architecture of networks and what is best practice has also changed over time. What was best practice when some parts of physical network infrastructure were designed and built (potentially many years ago) may be different to what is best practice for new network build today.

The Electronic Communications (Security Measures) Regulation 2022 sets out at Regulation 3(1) that a:

*“network provider must take such measures as are appropriate and proportionate to ensure— (a) except in relation to an existing part of the public electronic communications network, that the network is designed and constructed in a manner which reduces the risks of security compromises occurring, (b) in relation to an existing part of the public electronic communications network, that the part is redesigned and developed in a manner which reduces the risks of security compromises occurring, and (c) that the public electronic communications network is maintained in a manner which reduces the risks of security compromises occurring.”*

The separation of new from existing networks gives the impression that different considerations of what is appropriate and proportionate may apply when designing and implementing new networks versus retrofitting existing ones.

Ofcom then published Resilience Guidance in 2022 which set out at a high level what a CSP should consider in order to comply with its security duties under s105A of the Communications Act 2003. This Guidance was helpful but lacked detail or specific examples and led to questions regarding what was and was not appropriate and proportionate in practice.

The new Guidance, following just over 12 months after the 2022 Resilience Guidance, is considerably more prescriptive. We welcome the clarity it brings in setting out what Ofcom regards as appropriate and proportionate, particularly in relation to new build/next generation networks, but we believe that nuance is missing, given the variety of networks and topologies covered by the Guidance, and

would welcome further clarity on what might (and might not) be appropriate and proportionate, particularly when retrofitting existing networks.

## General Points applicable to all of Section 4 of the Guidance

### 1. Guidance as a ‘baseline’ and ‘mandatory’

The Guidance is significantly more prescriptive than the 2017 and 2022 Guidance. Although as stated above, we welcome the clarity it brings, particularly in relation to new build/next generation networks, we believe there should be acknowledgement that what is appropriate and proportionate, particularly for existing networks, will depend on many different factors.

As drafted, the Guidance appears to set baseline minimum standards, with only very limited acknowledgement of the changes that may need to be made to existing networks as a result, or how the appropriateness/proportionality of such measures might vary.

Ofcom states on page 3 of the draft Guidance that:

*“The guidance in this document is not the only way for communications providers to comply with their resilience-related security duties under s105A-D. A communications provider may choose to comply with their resilience-related security duties by adopting different technical solutions or approaches to those specified here. What is appropriate and proportionate will depend on the particular circumstances of the provider.”*

We agree with this statement. Ofcom then goes on to state that:

*“Where a provider has taken a different approach to that set out in this guidance, we would expect them to be able to explain their reasons for doing so.”*

This suggests that different approaches may be possible. However, at 4.12 of the consultation, Ofcom states that:

*“We consider the measures proposed to be the baseline. Communications providers can of course take additional measures to further improve the resilience of their networks and services, and we would encourage them to do so.”*

It is therefore unclear in what circumstances any deviation from the Guidance will be permissible, other than by taking *additional* measures to those set out in the Guidance, and if deviation is permissible, in what circumstances it would be permissible and what factors would be relevant to the assessment of what is ‘appropriate and proportionate’.

As noted above, although the Guidance is helpful, particularly in relation to new/next generation networks built to current best practice, it appears to treat new networks and existing networks that may have been built to best practice applicable at the time of construction in exactly the same way, with full compliance for new and existing networks expected as soon as the Guidance is published in final version. We give examples below in response to Question 1 where this creates a problem, such as specified minimum requirements for Core and Metro sites, dual parenting and minimum battery backup.

It would be helpful to clarify in the Guidance:



- (a) that **there may be circumstances when it will be appropriate and proportionate not to meet the Guidance’s baseline** for all infrastructure or components, and
- (b) **when it would be appropriate and proportionate to take a different approach and the factors Ofcom would use to assess what is appropriate and proportionate** in those circumstances.

We discuss this further in response to Question 1 below.

## **2. Outcomes-based approach**

We believe the Guidance ought to be outcomes based with real-world examples of how the outcome may be achieved. However, there are numerous sections<sup>8</sup> where the Guidance also sets out precisely how to achieve this. Ofcom has stated<sup>9</sup> it has been mindful to avoid overprescribing how CSPs design, build and operate networks and we agree with this principle. Network design and measures to achieve a particular outcome can vary. We believe the requirements specifying how to achieve compliance should be deleted or redrafted as examples instead of being mandatory. An illustration of where this occurs is Section 4.2.3. relating to Core/Metro sites, which we discuss in more detail in our response to Question 1 below.

## **3. Time and Cost to retrofit (particularly physical infrastructure) of existing networks has been underestimated**

We note that the Guidance gives no timeline to implement any retrofitting which may be required, even for requirements such as “dual resilient power supplies” and “minimum 4-hour battery backup” which were not specified as required in the 2022 Resilience Guidance. It takes time and considerable cost to plan, design and implement changes to architecture of networks, and in some cases this may not be feasible at all. This does not appear to be acknowledged in the Guidance or the Impact Assessment.

The Impact Assessment assumes that the impact and cost of implementation ought to be limited as most of the Guidance is best practice and therefore CSPs ought to be taking these steps already, and if there is significant cost to comply with measures then the benefit to customers outweighs those costs.<sup>10</sup> We disagree with this analysis. The costs involved for some measures will be very significant, particularly mesh architecture, dual resilient power supplies and dual parenting, while the benefits to customers of taking these steps may be marginal. We set out in response to Question 1 some specific examples and recommendations.

## **Question 1: Do you consider the measures in the proposed guidance relating to the resilience of the physical infrastructure domains to be appropriate and proportionate?**

We do not consider these measures to be appropriate and proportionate for the reasons set out above and discussed in more detail below.

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<sup>8</sup> For examples, see Section 4.2.1 and 4.2.3 of the draft Guidance.

<sup>9</sup> Paragraph 4.49 of the Consultation

<sup>10</sup> A1.8 of the Impact Assessment

- **The primary responsibility to improve resilience of power supply and ensure greater prioritisation of energy supply to communication providers' sites and to consumers should sit with DNOs, not their customers; Ofcom's support is critical.**

We believe it is important to acknowledge in the Guidance that secure energy supply is a key dependency, and the risk cannot entirely be eradicated. All CNI provided by CSPs is dependent in some form on secure power supplies, yet VMO2 receives no preferential treatment from energy suppliers, not even in relation to core sites. Although there are arrangements for providing increased resilience and redundant power feeds for certain CNI assets this does not benefit the majority of CSPs and it does not benefit our customers in their homes. Even with power backup at every level of a telecoms network (which would be prohibitively expensive), fixed and mobile services in the home will not work (either for long or at all) if there is no power supply to the home to operate or charge devices.

In a hierarchy of CNI on which all others depend, electricity supply is at the apex. The regulations imposed on the energy supply industry should reflect this, as it clearly should play a vital role in strengthening the energy resilience of the sectors they serve. There needs to be sufficient government and regulatory focus to ensure that power to CSPs and ideally to consumers is maintained. We need to be able to rely on electricity supply – and in most conditions, we can. The average customer lost minutes in 2022 varied per DNO but was below target for all and showing a reduction over time.<sup>11</sup>

We valued Ofcom's assistance in facilitating co-operation from Ofgem and energy suppliers through the working group set up in winter 2022.<sup>12</sup> We believe there should be stronger measures on energy suppliers to modernise and increase resilience of the power distribution network, both to CSPs and to consumers, and ensure their co-operation with other industries. We are encouraged by plans to pilot prioritisation of power restoration to phone masts and would like to see more such initiatives. We need more commitment from DNOs to prioritise restoration of power, particularly to key sites as identified by CSPs. We would welcome Ofcom's assistance in helping engage DNOs and Ofgem and believe Ofcom can play a critical role in helping to safeguard and improve resilience of power supply and restoration of power to CSPs.

- **Guidance should acknowledge that what is appropriate and proportionate for telecoms networks can vary and measures will not be an appropriate minimum/baseline in all cases (particularly in relation to existing physical infrastructure that would require retrofitting)**

We believe there should be acknowledgement that what is appropriate and proportionate, particularly for existing networks, will depend on many different factors. As drafted, the Guidance appears to set multiple baseline minimum standards.

There are many practical implications that may affect the feasibility, proportionality, timing and cost of retrofitting existing infrastructure. Although networks have been built to withstand failures, particularly at the core, the level of resilience and diverse routing will vary, depending on how they were built. Existing networks may have been built on a 'ring' model in the core and more traditional tree and branch architecture at the access layer. It is not feasible or proportionate to retrofit those networks to implement a 'mesh' architecture

<sup>11</sup> RIIO ED1 Network Performance Summary from 2015-16 to 2021-22 (ofgem.gov.uk)

<sup>12</sup> The working group addressed the risk of possible rota-based power cuts in the winter of 2022/23.

and dual parenting. Ofcom’s guidance should acknowledge these variations in historical network design approaches and provide sufficient flexibility to accommodate this variety.

This is discussed further below in the sections headed “Section 4.2.1”, “Section 4.2.2” and “Section 4.2.3”.

There are also significant practical issues with rolling out a minimum of 4-hour back-up at active street cabinets which have already been built. These batteries are large and may not be accommodated within existing street furniture which was not built to house batteries of this size, thus necessitating additional cabinet space and civils work (which is not straightforward even with code powers). There may also be planning implications and significant additional resource required.

Compliance with this new Guidance, as drafted, will require changes to newly built networks and retrofit of existing network sites and components – at significant (and prohibitive) cost and often marginal benefit to customers. In some cases, these changes may not be feasible at all.

CSPs should be able to take a risk-based approach to improving resilience. The layers of resilience implemented in networks (and layers of resilience suggested by the Guidance) mean that in some cases, the expenditure necessary to comply with the Guidance would result in no meaningful benefit to service availability. For example, if loss of services at a Core or Metro site can be automatically absorbed by other sites, then huge expenditure on specific measures to further reduce the (already small) risk of losing a site in the first place doesn’t change the service availability outcome for customers.

The Guidance ought to clarify that what is appropriate and proportionate can vary, that different approaches are valid, and the measures set out in the Guidance will not in all cases be appropriate, or a baseline (or minimum) that must be met, as appears to be the intention.<sup>13</sup>

- **We believe it is appropriate and proportionate for the Guidance to be outcomes-based where necessary, rather than mandating specific measures.**

This is discussed in point 2 above and in more detail below.

An illustration of where measures are mandated (regardless of whether they are appropriate or proportionate) is Section 4.2.3. (Core/Metro sites). We understand and support the requirement for Core network sites to have 5 days power backup (the outcome), but the Guidance then sets out exactly how this must be achieved, which includes as a minimum “dual resilient mains electricity power feeds” at all Core and Metro sites. What this means is unclear. This could mean dual resilient power feeds (for instance A and B feeds to equipment level) at a site from a single DNO, or it could mean a requirement for a redundant incoming power feed from a second DNO. The outcome (5 days power backup) does not require a redundant incoming power feed from a second DNO and might not require A and B feeds to equipment level, depending on what power backup and other resilience is implemented at a

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<sup>13</sup> Paragraph 4.12 of the Consultation.

particular site, the size and importance of that site and whether it can maintain power to the site for 5 days.

For Metro sites, the required outcome may be different. For some sites, particularly if there are alternative layers of resilience in place (such as automatic failover or logical resilience) and a power outage would not cause a service outage, there may be no need for 5 days power backup and implementation in those cases might not be appropriate and proportionate.

Retrofitting all Core and Metro sites (and potentially aggregation sites) to enable redundant incoming power feeds where this is not already available would take years, is dependent on DNOs (and given the number of sites not likely to be feasible) and will provide minimal improvement to customer availability at enormous cost which we do not believe is appropriate or proportionate.

Retrofitting all Metro and aggregation sites to an A and B feed structure (if this is what is meant), where this is not already available, will also be extremely costly and take time, and provided the outcome (customer availability) is met by the means implemented, we do not agree that specifying how to achieve that outcome is necessary or proportionate.

Instead of mandating how to achieve a particular outcome, we believe the Guidance ought to state the outcome desired (preferably in terms of customer impact during an incident such as a 5-day power outage) and then include examples of how that might be achieved, as it has for aggregation sites.

In addition, the meaning of “dual resilient mains electricity power feeds” in these examples ought to be clarified.

As we note above, in practice there are likely to be different, layered, methods of achieving reliability. For example, Metro sites will have transmission resilience such that if a site goes down due to a power issue, the traffic is transferred to another site. Logical resilience is also used, for instance on the Mobile network. This is discussed further in the section below headed “Section 4.2.3”.

Instead of mandating measures for Core and Metro sites, we believe the Guidance ought to:

- (a) include examples, not a minimum, as it has for aggregation sites (provided the appropriate outcome can be met);
  - (b) include renewable energy sources amongst the examples;
  - (c) clarify the meaning of “dual resilient mains electricity power feeds” in these examples; and
  - (d) acknowledge that alternative approaches to achieve reliability are possible.
- **When is greater resilience appropriate and proportionate? We need a clear framework to help us determine what is appropriate and proportionate in the circumstances.**

There are references in the Guidance (for instance in Section 4.2.1) to “where appropriate” and “where deemed necessary”. We agree that these qualifications are important, as there is no single approach that fits all sites and circumstances. However, we would welcome inclusion of a framework for consideration of what is appropriate and proportionate in the circumstances, for instance as Ofcom has done to some extent in the Call for Inputs for

Mobile RAN backup (“CFI”). What is appropriate and proportionate is likely to be fact specific, taking into account many factors which we believe ought to include the seriousness of the risk, the probability of this risk occurring, the impact to customers were the risk to materialise, what measures can be taken to mitigate any impact on customers and other factors such as:

- whether the infrastructure/component is new or part of an existing network (and may therefore need retrofitting);
- the commercial lifespan;
- the cost, feasibility and complexity of implementation of the measure in relation to that site or network (which may be different for new build and retrofit);
- how long it will take to implement; and
- whether alternative layers of resilience have been implemented.

Paragraph 5.39 of the 2022 resilience guidance included factors to consider in assessing single points of failure. There are no such factors included in the Guidance and so we do not know whether any of these factors would be relevant factors in the assessment of what is appropriate or proportionate and this leads to uncertainty.

- **We believe the proposal to introduce a minimum 4-hour battery backup raises similar concerns to Mobile RAN backup and ought to be considered alongside options for Mobile RAN.**

We believe that battery backup at the access layer (fixed and mobile) ought to be considered holistically as part of a wider cross sector consultation on power resilience before implementing any minimum requirement for active street cabinets in Guidance. Most customers in the UK have access to, and are indeed customers, of both fixed and mobile operators. What is appropriate and proportionate in terms of fixed battery backup should take into account improvements to average customer minutes lost and obligations placed on DNOs and may depend to some degree on what decisions are made by Ofcom regarding additional power backup at the mobile RAN, and indeed vice versa.

We believe the factors to consider are similar to those set out in the CFI and we welcome Ofcom’s approach in asking for further input in relation to power back up for Mobile RAN before implementing specific requirements. We believe the same ought to apply to backup for active street cabinets on fixed networks.

- **The cost and complexity of retrofitting has been underestimated and exclusion of broadband cabinets due for decommission in 3-5 years is too short a period of time and we believe this should be extended to 10 years from expected migration of customers (we believe migration not decommissioning is a more appropriate measure)**

The cost and complexity (and time it would take) to retrofit existing networks is far more significant than Ofcom has assumed as part of the Impact Assessment. For the reasons we articulate below, we do not believe it is appropriate or proportionate to mandate that all existing cabinets are retrofitted to provide a minimum of 4-hour battery backup, but if some requirement to retrofit existing networks is retained in Guidance, then we believe that cabinets which are expected to cease serving customers within the next 10 years ought to be excluded (decommissioning may take place at a later date without impact to customers).

Although VMO2's aim is to overlay its existing DOCSIS/HFC network with full fibre by 2028<sup>14</sup>, it will take longer to migrate customers and decommission cabinets.

We note that in relation to Mobile RAN power backup, Ofcom gathered initial estimates from MNOs regarding the number of sites and the costs and complexity of Mobile RAN power back up through an information request. However, in relation to fixed street cabinet power backup, Ofcom did not gather numbers from VMO2 (which are significant) or initial estimates. We believe, therefore, that a proper, comprehensive Impact Assessment, as required by Section 7 of the Communications Act 2003, must be undertaken, since the assessment set out at A1 of the Consultation is incomplete. This exercise must consider measures to improve the resilience across mobile and fixed infrastructure and must cover the proposals in both the Consultation and the CFI, since some aspects are interdependent.

- **Obligation to implement minimum 4-hour battery backup should be reviewed even for new full fibre networks.**

If the obligation for battery backup of active street cabinets is retained in some form, then to address proportionality concerns our recommendation is that the Guidance should:

- make a clear distinction between new (next generation) and existing networks (which as described above would be very costly and time consuming to retrofit);
- express the obligation as guidance/best practice rather than as a minimum;
- enable factors such as commercial lifespan and number of customers served to be taken into account when determining the proportionality of the measure;
- enable CSPs to take a targeted approach, focussing on areas more susceptible to power outages (as we have suggested in relation to Mobile RAN backup);
- enable CSPs to implement measures over time; and
- express the suggested battery backup as a range in typical use (so for instance it should be expressed as 'approximately 3-4 hours in typical use as stated by the supplier') rather than as a minimum of 4 hours (which gives no indication of how that 4-hours is calculated).

Best practice for new fibre networks is to build with battery backup at the OLT. However, as currently worded, even new full fibre networks would have to replace batteries recently installed, as they have generally been architected to meet 3-4 hours in typical use as published by the supplier, as Ofcom acknowledges at footnote 63 of paragraph 4.56 of the Consultation.<sup>15</sup> Requiring newly built networks to replace batteries which have approximately 3-4 hours battery backup because they do not have a minimum of 4 hours battery backup would not in our view be appropriate or proportionate given the cost of this exercise compared with the minimal additional benefit to customers.

- **Guidance should clarify that battery life is guidance and may vary.**

Battery life is affected by temperature and use and will deteriorate over time. At some point batteries will need to be replaced.

By specifying a minimum battery backup in the Guidance, the implication is that CSPs would be expected to replace batteries as soon as they offered less than 4-hour minimum backup.

<sup>14</sup> <https://www.libertyglobal.com/virgin-media-o2-announces-2028-full-fibre-upgrade-plan/>

<sup>15</sup> The Xantaro press release includes the statement that "In the event of power outages, the cabinet can obtain 3-4 hours of battery backup." This would not comply with the requirement for a minimum of 4-hour battery backup.

We are not clear how we would be able to determine this, and even if we could, replacement at this point would be costly, environmentally wasteful and, we believe, disproportionate.

We believe it would be helpful if the Guidance clarified that timing of replacement should be subject to factors including the expected lifetime of the battery, cost of replacement, relative benefit to customers given average power outages<sup>16</sup> and environmental impact.

- **The risks associated with battery backup – notably fire risk and theft risks – ought to be relevant factors in determining what measures are appropriate and proportionate.**

The introduction of a publicly documented mandated minimum battery life in cabinets and cell sites will make these cabinets and cell sites an increasingly well-known and attractive target for theft, as the batteries are valuable and popular for storing solar energy. Thefts and attempted thefts can cause significant damage and cause outages. They are also costly to rectify. Although we are continually striving to improve the security of cell sites and street cabinets, street cabinets are in public places and cannot be protected from harm to the same degree a private site can and despite our best efforts both street cabinets and cell sites have been targets for theft and vandalism in the past. Moreover, increasing security typically comes with significant additional cost. Better security can also sometimes result in greater site damage (and therefore greater risk to customer service).

Batteries also increase the fire risk – and precautions will be necessary which may be costly and impractical to implement at some sites, and simply not possible at others.

- **Environmental factors should be relevant to considering what is appropriate and proportionate.**

In considering whether (and if so, what) additional measures ought to be imposed on CSPs, we believe environmental matters and commitments to net zero ought to be a factor. Diesel generators, for example, cause CO<sub>2</sub> and noise pollution, and batteries are also not without their own environmental impact, for instance due to mining practices, sustainability of minerals and disposal of toxic components. Lithium is a finite resource and batteries are not an environmentally beneficial solution, particularly at scale. We need to find a balance between appropriate and proportionate power resilience and minimising environmental harm. We believe renewable energy sources may play an increasingly important role over time.

- **Retrofitting networks to comply with new requirements may not always be appropriate and proportionate and will take time. The Guidance should acknowledge this.**

The Guidance (which is due to be published in final form in Summer 2024) ought to acknowledge that implementation may take time, and as cost and complexity rises, compliance will take longer, and the measure is less likely to be appropriate and proportionate.

CSPs operate on a budgetary cycle, often over several years as part of longer-term capital expenditure plans. Major and immediate budget demands may be highly disruptive to pre-existing network rollout and improvement expenditure.

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<sup>16</sup> Set out in A2 of the Consultation.

- **Time to plan and implement any measure will affect feasibility and costs.**

The length of time a CSP is given to plan and implement a measure will have a significant impact on feasibility and on the operational costs of a measure. Meeting new regulatory requirements is likely to be achieved for lower operational costs if the work necessary can be planned and spread out over time (for instance as part of build work for new sites, or through BAU maintenance work, planned work or planned site visits for existing sites). Although this will not reduce the costs of additional civils works, or obtaining additional permissions, in general, the longer the time period to implement, the lower the operational cost and the easier it is for CSPs to plan and implement. Tight implementation timescales mean implementation will cost more money – and may not be feasible at all within those timescales. There will be many practical issues to address, such as available resource (whether internal or obtainable via third parties), how to retrofit sites and cabinets (and any associated planning and landowner consents). If all CSPs are trying to implement the same changes at the same time, competition for resource will increase costs and likely increase the time needed to implement. It is generally easier, quicker and less expensive to implement requirements for new build than it is to retrofit large numbers of existing sites.

- **Unless alternative methods of funding are made available, the Guidance should acknowledge that prioritisation by CSPs will be inevitable.**

Unlike in other jurisdictions, where public funding has been applied to power resilience, for instance in Mobile RANs<sup>17</sup>, here the expectation is that CSPs will fund resilience improvements out of their own budgets. Given the competitiveness of the UK marketplace, and the increasing pressures on their finances, CSPs have limited flexibility to accommodate incremental capital expenditure, which means that prioritisation will be necessary.

The cost and complexity of some of the measures, such as redundant power supplies across the estate and introducing mesh architecture and dual parenting is completely disproportionate to the marginal benefit customers would see. We believe that it is in the best interests of our customers to prioritise limited funds on the roll out of new network and by taking a risk-based approach to improving resilience, rather than retrofitting physical infrastructure to meet specific measures at prohibitive cost and minimal benefit to customers.

In addition, as we state above, battery back up on the fixed network at the access layer is likely to provide very limited benefit to customers, given that telecoms services are in any event reliant on devices in the home which must be powered to work. We believe it is a relevant factor when considering what measures are appropriate and proportionate at the access layer. Localised power cuts are likely to affect both cabinet and home at the same time, particularly DOCSIS/HFC level 3 cabinets, which are more numerous and geographically closer to the customer (and typically support fewer customers) than an OLT on a full fibre network.

## **Comments on specific Sections of the Guidance**

- **Section 4.2.1**

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<sup>17</sup> See 2.32, 2.34 and 5.17 of the Consultation.



### **Automatic failover – clarification required**

At paragraph 4.26 of the Consultation Ofcom states: *“Further, we explain that we would expect that network equipment within access sites to have automatic failover functionality built in, so that when equipment fails, network traffic is immediately diverted to another device or path that can maintain end user connectivity.”*

This could be interpreted far more widely than the statement in Section 4.2.1 of the draft Guidance, which states: *“Additionally, in order to provide appropriate resilience to core site failures, we would expect communications providers to take measures to ensure that network equipment within the access sites supports automatic failover from one core site to another, and services should be maintained or re-established automatically. This capability needs to be supported by the upstream aggregation or backhaul network connectivity.”*

The draft Guidance limits this statement by reference to “resilience to core site failures”, while the Consultation wording suggests that Ofcom is looking to ensure automatic failover to redundant equipment or another site at the access layer when equipment at the access layer fails.

We assume that the outcome Ofcom is seeking is to ensure that in the event of a core site failure of some kind, devices automatically connect to another resilient instance.

### **Automatic failover – the Guidance should acknowledge that there may be exceptions, particularly for older technologies**

Core resilience in 2G and 3G networks: the technology did not historically support the concept of a geo resilient controller node in the core. Hence in the event of the loss of a Base Station controller, the aggregate connection to the controller, or the site hosting one or more Base Station controllers, 2G (or 3G) service will be lost in the area(s) covered.

Core resilience in 4G/5G is different. Service will continue to be provided through 4G/ 5G in the event of core site impacts because these radio technologies do support the ability to support connections from a different core site.

Resilient Base Station Controllers are now available from at least one supplier, but this would require very significant investment and network re-engineering in the Core, which we do not believe would be appropriate or proportionate given the age of the technology, its likely commercial lifespan and the cost and complexity of redesign and re-engineering.

### **Resilient connectivity to an additional ‘parent’ site**

Section 4.2.1 states: *“In cases where greater resilience is appropriate, communications providers should equip mobile base-stations or cabinets with resilient connectivity to an additional ‘parent’ site.”*

We also refer to this statement at page 12 of our response. We would welcome clear guidance on what factors can be taken into account when determining what is “appropriate”. We do not believe that the Guidance or the Impact Assessment properly recognises the difficulty and cost of adding resilience in the last mile.

In relation to cell sites, would a relevant factor in what is appropriate and proportionate be cell site coverage overlap, which is normally used to provide cell site resilience? The cost of implementing connections to an additional parent site across existing fixed and mobile networks at the access layer is not considered as part of the Impact Assessment at A1. The work and costs involved when this is scaled up across the mobile estate would be enormous – and similar if not greater on the fixed network, given the volume of street cabinets within the access layer. Retrofitting existing sites is significantly more challenging than building forward to a particular standard.

It should be noted that in the majority of cases a second route into a cell site or to a cabinet would be an order of magnitude more costly than the first link (often itself costly to dig in). It is not just double the cost but may in fact be 3-5 times the cost. This due to the difficulties in obtaining a diversely routed connection which may involve significant extra distance, different wayleaves, and be impacted by physical barriers – rivers, railways, motorways etc.

Guidance on what is appropriate and proportionate will be essential given the feasibility issues, potential costs involved and the time it will take to retrofit sites. Although connections to an additional parent site may be appropriate and proportionate on a small scale for very important sites, we do not believe this is appropriate and proportionate at scale, particularly if retrofitting networks would be required.

Another factor that might be relevant to an assessment is the extent to which fully resilient solutions implemented from the outset might limit innovation. Some clarification would be helpful regarding small-scale build and (live) proof of concept deployments to encourage innovation, provided the number of customers is low and the risks have been assessed.

It would be helpful if the Guidance could also clarify whether backup connectivity, particularly where retrofitting is required, can provide a lower service level than primary connectivity (e.g. no-QoS, lower throughput, higher loss, perhaps restricted services e.g. VoLTE/VoNR-only). This may be a factor in determining when it is ‘appropriate’ to provide greater resilience as the cost, complexity and technical constraints around doing it may be different.

#### **Single points of failure – 2022 Guidance had helpful statements about what was appropriate and proportionate**

The 2022 Guidance was helpful in this regard, particularly paragraph 5.39, which set out factors relevant to an assessment. This is now missing from the Guidance. Instead in Section 4.2.1 Ofcom states: *“Ofcom is aware that this domain is likely to have single points of failure, but also understand that the customer concentration should be significantly lower in comparison to the core of networks.”*

This does not assist us in making an assessment of any single point of failure.

All CSPs seek to avoid single points of failure, but it is not possible to eliminate them all. We agree with Ofcom’s 2022 guidance that the extent to which avoiding single points of failure is proportionate is likely to vary at different points in the network and the factors referred to in that guidance were helpful in any assessment of what is appropriate and proportionate. This language (particularly from Section 5.39) is not replicated in the Guidance and we believe it would be helpful to include similar language.

The concept of a sliding scale where the edge of the network (last mile) will carry the greatest risks of single point of failure and the Core network the least, appears to have been lost.

- **Section 4.2.2**

**Determining when it would be appropriate and proportionate to adopt measures such as enhanced onward connectivity and physical resilience, e.g., through equipment redundancy, separate transmission links and dual parenting. User hours lost reporting threshold is not a helpful measure.**

As we state above at page 12 and discuss in relation to Section 4.2.1. above, we would welcome clear guidance on what factors can be taken into account when determining what is “appropriate”. We do not believe that user hours lost reporting threshold is a helpful measure.

At paragraph 4.29 of the Consultation Ofcom states: *“The proposed guidance (section 4.2.2) explains that significant numbers of customers can be impacted if a single aggregation node fails. This is because aggregation nodes combine the traffic from multiple access points. The proposed guidance highlights the importance of examining resilience implications when making design decisions affecting the aggregation and backhaul domain. In particular, as the number of aggregated customers/premises increases at an aggregation point in a network, we would expect communications providers to adopt measures to address such risks. This includes measures such as enhanced onward connectivity and physical resilience, e.g., through equipment redundancy, separate transmission links and dual parenting.”*

Paragraph 4.30 goes on to say: *“The introduction of these types of resilience measures can be costly and communications providers may need to prioritise where they deploy these resources to have the most impact. The proposed guidance sets out a number of measures which communications providers can implement to improve resilience. The proposed guidance also outlines the factors which communications providers should consider when deciding where best to deploy these resources. In particular, the proposed guidance advises communications providers to consider Ofcom’s ‘user hours lost’ reporting threshold when deciding on which sites to prioritise resilience measures, as this sets out our view of the level at which service impacts are likely to be significant.”*

We do not understand how the ‘user hours lost’ reporting threshold can be used to decide on which sites to prioritise. The lowest level of user hours lost specified in the Procedural Guidance is 250k user hours lost, but incidents must be batch reported even if that threshold is not met. Incidents affecting a single cabinet can sometimes meet a reporting threshold for batch reporting, even though ‘user hours lost’ is far lower than 250k.

In addition, for Mobile incidents, user hours lost can only be calculated after an incident has taken place.

Given that there is no minimum user hours lost reporting threshold in the Procedural Guidance, and the inherent difficulty in determining this in relation to the mobile network, we do not believe it is a helpful factor to determine which sites to prioritise for additional investment. We believe there may be many other factors to consider, including number of customers potentially affected (rather than user hours lost) but also factors such as those we list at page 14 of our response, plus other factors such as overlapping coverage and other

alternative mitigations. Some of these were set out in Section 5.39 of the 2022 guidance but are now absent from the Guidance.

As we state above, we would value a clear list of factors that would be relevant to the determination of what is appropriate and proportionate, for this and other measures.

- **Section 4.2.3**

**Core and Metro sites for existing networks never designed for a ‘meshed’ approach to diversity.**

Section 4.2.3 contains the following statements: *“Core sites are expected to have a significant amount of resilient meshed connections to other core sites using separate and diverse transmission. In large scale networks, this could mean resilient connections to four or more other core sites.”* And: *“In larger networks containing metro sites, they are expected to have resilient connections to at least three other metro or core sites using separate and diverse transmission.”*

These are expressed as minimum standards. What is being proposed is therefore meshed physical transmission paths from both core and metro sites for all networks, which is not how networks have traditionally been built (much more East/West ring structures at the transmission layer). We do not believe networks can be cost effectively built or retrofitted in this manner, and it is unlikely to be practical/possible (even if it were financially viable) in the UK given limited fibre plant across the UK as a whole (which itself tends to be constrained to a level of shared routes due to geographic features). We believe the Guidance ought to consider that other measures set out in the Guidance (e.g. being able to survive loss of applications/functions at specific sites, with other sites taking the load) combined with a traditional ring-based build of underlying transmission networks, provides a very high level of service resilience and availability, without needing to resort to meshing at this layer.

We believe the Guidance ought to make a distinction between physical diversity and logical diversity. Our Mobile Core network works through logical resilience, not underlying meshed physical resilience, which we believe ought to be a factor in what diversity is appropriate and proportionate.

The different layers of resilience implemented in networks (and layers of resilience suggested by the Guidance) mean that in some cases, the expenditure necessary to comply with Section 4.2.3 of the Guidance would result in no meaningful benefit to service availability. For example, if loss of services at a Core or Metro site can be automatically absorbed by other sites, then huge expenditure on specific measures to further reduce the (already small) risk of losing a site in the first place doesn’t change the service availability outcome for customers.

**Automatic failover – further clarification needed**

Section 4.2.3 includes the statement: *“Network functions at core sites, along with the underlying transport network connectivity, should allow network equipment in aggregation and access sites to fail over from one core site to another automatically. This requires all network functions in core sites to be configured and scaled to cater for the loss of a core site including instantaneous load that may result. Networks are expected to be configured to distribute this load across remaining core sites effectively to ensure overall network stability.”*

Our comments on 2G and 3G technology capability (in response to Section 4.2.1) are also relevant to this section.

In addition, we believe the Guidance ought to be clarified so that the requirement to ‘allow network equipment in aggregation and access sites to fail over from one core site to another automatically’ applies only where the employed standards, maturity of developing standards and available products allow this approach.

For example, assuming disaggregated RAN (e.g. ORAN) is considered a ‘network function’, there are issues with what is possible both at standards level and available product level. Currently, for example, O-RAN specifications do not cater for failover of a vDU to a different vCU (i.e. to move the load to a different site as proposed by Section 4.2.3); vDU pooling is discussed (which in turn could allow movement of O-RUs to different vCUs) but is not specified yet and not available in product. The current specification release says the following:

**(O-RAN.WG6.CADS-v06.00 - O-RAN Working Group 6 Cloud Architecture and Deployment Scenarios for O-RAN Virtualized RAN)**

*"We note that being able to share/ O-DU resources somewhat dynamically is expected to be a solvable problem, although we understand that it is by no means a trivial problem. There are management considerations, among others. There may be incremental steps toward true shared pooling, where rehoming of O-RUs to different O-DUs can be performed more dynamically, based on traffic conditions."*

**Question 2: Do you consider the measures in the proposed guidance relating to the resilience at the Control Plane to be appropriate and proportionate?**

Some of the sections of the Guidance (including Sections 4.3, 4.4 and 4.5) have considerable overlap with the Telecommunications Security Code of Practice and we believe that measures should align wherever possible. Is Ofcom planning to run two parallel monitoring and enforcement programmes covering security and resilience?

**Question 3: Do you consider the measures in the proposed guidance relating to the resilience of the Management Plane to be appropriate and proportionate?**

We have no additional comments specific to Section 4.4 of the draft Guidance.

**Question 4: Do you consider the measures in the proposed guidance relating to communications providers’ own managed services to be appropriate and proportionate?**

**Section 4.5.1 – Use of Cloud**

One of the key services highlighted in this section is a CSP’s own voice over IP service. The Guidance states that for critical services, CSPs are advised to design, host and operate these critical services

(which we assume includes primary voice services) entirely within their own infrastructure, in a manner that does not depend on the functioning of the wider internet.

Given that many services including voice are increasingly being made available through Cloud services, would this requirement prohibit the use of private or public Cloud services for CP-managed services? We do not believe such a prohibition would be appropriate or proportionate. There is an overlap here with the Telecommunications Security Code of Practice where we have raised similar questions regarding use of public Cloud.

There is a use case for moving certain workloads to Cloud or hyperscaler PoPs, which is becoming more commonplace in CSPs (and is a potential future deployment model in all CSPs). We believe that it would be helpful to clarify in the Guidance that such deployments are not prohibited under the Guidance as long as they are securely separated from untrusted networks such as internet and are not dependent on the internet for their operation. This might dictate for example use of dedicated hyperscaler links (or intermediary services such as 'Equinix CloudExchange') but should not prevent these types of deployments being possible under the Guidance.

The Guidance refers to 3GPP and GSMA standards that prescribe for the separation of voice and internet traffic on mobile networks and devices. This is not entirely accurate as from 4G onwards all types of services are carried in the same parent data channel (albeit logically separated at the bearer level into different GTP tunnels that can be classified differently). For Broadband 'Voice over Cable' services, it is possible to differentiate between Voice over Cable and data services, and Voice over Cable is prioritised over other data to ensure access to emergency services. Over the top services, however, such as WhatsApp will just run in the 'bulk data internet' logical bearer.

#### **Section 4.5.3 – further clarification would be helpful**

Although the majority of Section 4.5.3 of the draft Guidance is an articulation of best practice, we believe the following paragraph requires clarification:

*"We recognise that there are complexity, scalability, and cost implications to the different failover approaches above. We understand that it is unlikely to be technically feasible or cost effective to support option 1 for all services or traffic types. Aspects relating to how a service recovers from a failure should also be considered. **Communications providers must make choices that align with their service design requirements and obligations.**"*

We agree that it is not technically feasible or cost effective to support option 1 for all services and traffic types. However, we are not sure what the words in bold/italics mean in practice.

### **Question 5: Do you consider the measures in the proposed guidance relating to communications providers' arrangements for preparing for adequate process, skills and training to be appropriate and proportionate?**

#### **Section 5.3.1.1. Network Control Plane Monitoring - overlap with Code of Practice and whether this applies internally as well as externally**

Section 5.3.1.1 states: *"In a mobile network for example, MNOs are expected to log, monitor, and correlate signalling between the radio access network and mobile core network (S1-C for example) in addition to all Diameter, 5G SBA (HTTP2), SIGTRAN/SS7, GTP-C, and SIP signalling messages and associated errors."*

Under the Telecommunications Security Code of Practice MNOs are expected to comply with certain measures relating to external signalling, but this statement appears to go beyond that and apply also to internal signalling. Is that the intention? Where CSPs are required to take specific measures under the Code of Practice, we believe requirements in Guidance ought to align with those requirements.

If Ofcom is requiring MNOs to carry out the same logging and monitoring for internal networks as MNOs are required to do for external networks under the Code of Practice, we do not believe that such a requirement for internal signalling is appropriate, proportionate or necessary.

**Virgin Media O2**