I have only answered Question 1 because questions 2 onwards and the Call For Input seem to be primarily intended for networks and require inside knowledge to answer. The response consists of a cover page and four pages of response.

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?

Confidential? N

The measures seem appropriate and proportionate, but there are some extra steps that ought to be considered too:

1.1 Local mobile mast failover
1.2 Availability of local spares
1.3 Resilience by VoLTE and WiFi Calling
1.4 Resilience implication of Ported Numbers
1.5 Maintenance, upgrades and prolonged failures

These are covered in detail below.

1.1: Local mobile mast failover

In 4.23 of the consultation you state *"It would also be quite costly to ensure resilience at all access nodes".* The example that follows it is directed to fixed line users, but the situation with mobile users should also be considered:

·   if a single mobile mast fails, or needs maintenance or upgrade work, there will in many cases be another nearby mast that automatically takes over service. This might possibly be at reduced speed, but should be sufficient to keep the user connected. They will then be able to continue doing the more important tasks, but perhaps more slowly.

·   In less populated areas the network may not have another mast sufficiently close by to take over the service. But networks are not always quick to fix faults, so **a local mast can remain overloaded, out of action or providing only intermittent service for weeks or even months.**

·   Constructing extra masts just for failover is probably overkill for a situation that, ideally, should not arise often.

·   But there is a mechanism already in place for routing Emergency Calls via the masts of another network. I think Ofcom should investigate the feasibility of extending that to cover any downtime of the local mast. This should happen in situations where the user's network does not have an alternative nearby mast with adequate spare capacity.

- When roaming overseas, and indeed when users from overseas networks roam in the UK, it is possible to roam on any compatible network. So it seems likely that the technical capability already exists, but is being prohibited only by access settings.

- The ideal solution would ensure that a phone will automatically roam to a competitor's network. It would do this f the phone does not detect a sufficiently strong and fully functional signal from the user's home network. Then it would periodically recheck the home network and revert to it as soon as possible.

- If any configuration has to be done manually, the user must be able to do it without additional charge whenever they are unable to connect. It must not depend on obtaining individual permission from the home network. That would delay failover, and defeat the resilience requirement.

- This I imagine might require changes to information presently hard-coded into physical sims. Therefore networks might try to use the cost of replacing sims as an excuse to claim failover to competitors networks impractical. But the increasing use of eSim will progressively eliminate that as a valid objection. eSims are already capable of online update at minimal cost.

- Ofcom would need to agree a universal inter-network charging method that covers the competing network's costs of the extra traffic during failover.

- I propose going further. The aim is not just that failover should makes a sensible profit for the alternative network. *Of equal importance is that the cost to the failed network is sufficiently high to encourage the network to fix all faults as quickly as possible.* Ofcom should also require that the cost of the failover is not directly or indirectly charged to the customer. The home network must itself bear the full cost of all failures.

- I consider that any downtime of the local mast, whether it's due to failure, maintenance, upgrade or overload, is an important nuisance which networks should be required to guard against.

- Properly priced compulsory automatic failover to a competitor's network might also encourage networks to provide service in areas where other networks have inadequate coverage. Expected revenue due to automatic failover in areas where other networks are not providing adequate service will contribute to the viability of the network that chooses to provide service there. This all contributes to making the network more capable and resilient.

- Accordingly I ask Ofcom to investigate the feasibility of failover to a competitor's network, with the primary aim of finding a way to make it feasible rather than too readily accepting excuses about why it should not happen.

1.2: Availability of local spares

When helping somebody in a public forum, I came across a case where a user's local mast had been out of action for three months. **The three month delay was stated to be caused by the network's difficulty getting the spare part it needed to repair the mast.**

In places in the consultation I see suggestion of a one hour battery backup. But is that sufficient?

To take a specific example, let's suppose there is a mast which is the only mast capable of providing service to its nearby customers. It has a one hour battery backup,

If the power supply equipment in the mast fails:

· is the local engineer always able to reach the mast and swap out that equipment within that hour?

· does the local engineer always have a fully tested spare on the van ready to swap?

· if not, and the mast is critical to providing service in that area, then that particular mast probably needs a bigger permanent battery backup.

· or, maybe the engineer could bring a ready-charged 6 hour battery that will keep the mast live for the four hours it would take for the replacement equipment to arrive from a more distant area hub?

· is there a local engineer on duty 24 hours per day? Networks are not an office-hours-only facility.

· repeat similar questions for all other equipment in the mast that is most likely to fail.

For less likely causes of failure, it will probably not be economically possible to hold a complete set of spares in every maintenance van, but there should always be spares *already in the UK* and an express delivery method lined up to get them wherever they need to be. It's not something that can be ignored until the fault arises, and certainly not appropriate for spares to need obtaining from overseas, as the three month example given earlier implies.

1.3: Resilience by VoLTE and WiFi Calling

When a local mast fails, a user may still be able to do limited work if their network supports VoLTE or WiFi calling.

The problem here is that MNOs may provide those services only to contract customers. Many MVNOs do not provide them at all. Worse, it seems that in some cases MNOs may be forbidding the MVNOs from providing those services as a bogus method to encourage customers to buy direct from the MNO.

Unlike Lycamobile, some MVNOs are wholly owned by the MNO that provides their connectivity and therefore do not have the option which Lyca exercised of changing to a network that is willing to provide these important resilience services.

VoLTE and WiFi calling are a feature of most recent phones and ought to be made available to **everybody** regardless of whether they are on contract or PAYG. Accordingly, I suggest Ofcom insists that MNOs **must** automatically provide VoLTE and WiFi Calling services, not just to its own contract customers, but to every customer. This should apply even if service is provided indirectly via an MVNO.

As a related requirement, Ofcom should be telling networks that they **must not** switch off 2G in any area *unless and until* they can guarantee the availability of VoLTE and WiFi Calling to **every** user they or their MVNOs serve.

1.4: Resilience implication of ported numbers

A ported number continues to rely on network that first allocated their phone number to forward their calls and texts. Most members of the public are unaware that this happens: not just for a day or two after switching, but in most cases *for ever more*. That doubles the probability of failed incoming calls and texts on ported numbers. They will not get through if either the old or the new network has a problem.

Nothing illustrates this better than the unplanned total failure of Vectone in October 2023. As well as those who were still customers of Vectone at the time, large numbers of previous Vectone customers suddenly found they could not receive incoming calls or texts.

Ofcom doesn't seem to have had a plan for this. I can find no official Ofcom guidance to help customers with numbers ported from Vectone. Customers were mostly told by their current network that they will never be able to get their old number back, and would have to use a new number.

This fails to recognise the substantial importance of phone numbers in the 21st Century. Banks and other organisations typically use text messages to verify the customer's identity. Without access to a phone with the number they have registered, they cannot make payments, order goods or even check statements. This has far worse resiliance implications than losing network access for a few days, because those customers have *permanently* lost their important phone number. They have been involved in a very substantial amount of work to reinstate those services using a new number.

I presume that the Vectone problem arose because EE, which took over Vectone's operations, had no way of finding out which customers had ported out Vectone numbers or what networks they had ported them to. Therefore, EE could not rapidly start forwarding their calls to the correct networks.

Ofcom needs a proper plan for situations like this. Another MVNO could fail at any time. Maybe even a MNO. Some organistion, operating under Ofcom's guidance, needs a constantly maintained database of all historical number ports. There also needs to be a tested plan ready to reinstate the forwarding of those calls and texts by whatever MNO takes over the failed MVNO's services. Ofcom **must not** allow another Vectone situation to arise.

This also calls into question whether it's now time to rethink the current number porting mechanism. A centralised lookup system was once proposed. If that had been implemented, it would have prevented the problem. But it would of course itself need very careful consideration of resilience of the lookup system to ensure switchover to alternative servers under fault conditions.

Maybe there's a better solution. Could every MNO hold a permanent database of all ported numbers, and be advised in real time of all number porting updates? That seems better for resilience, and also for efficiency. It could also result in a fully automated number porting system that allows porting 24/365 with 10 minutes notice and no manual input, rather than being restricted to office hours and previous working day notice as at present. Then a user who has requested a number port more than 10 minutes ago should be able to log on to a test site which sends a text via each VNO to prove that it is correctly routing the traffic, rather than relying on its own network to investigate.

1.5 Maintenance, upgrades and prolonged failures

It is my understanding that networks are able to provide transportable mast equipment to venues where large crowds are expected to overload the permanent capacity of networks in the area.

Ofcom should consider encouraging or requiring VNOs to provide similar equipment for resilience reasons:

· when planned maintenance or upgrades exceeding an hour is scheduled

· after a prolonged failure exceeding 12 hours

This would probably only be needed in areas with no nearby alternative mast with adequate capacity.

It might also be less necessary if a competitor provides automatic failover in the area (as described in 1.1 above). But should still be considered as an essential requirement for any rural areas served by a single network, or by only two networks where one of them is already overloaded.

End of response