

Cover sheet for response to an Ofcom consultation

BASIC DETAILS

Consultation title: Battery back-up for superfast broadband services which use fibre optic technology – Proposed guidelines on General Condition 3 for next generation fibre access

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Name Dr. Salah Al-Chalabi

Signed (if hard copy)

Ofcom Consultation: Battery back-up for superfast broadband services which use fibre optic technology

Proposed guidelines on General Condition 3 for next generation fibre access

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Introduction & Background

We welcome Ofcom's consultation on the topic of battery back-up for Fibre-To-The-Home system at customer premises. This topic impacts the provision and availability of uninterrupted access to emergency services in case of power failure, which impacts the safety of life matters of the citizen.

The consultation document, however, raises several regulatory uncertainties which impact investment in innovative technological solutions. It also focuses on battery-back as the only technological solution that can satisfy the regulatory requirements. This is mainly due to the misunderstanding of the power consumption of a standardised telephone apparatus and the required power, rather than the power consumption of the Optical Network Termination (ONT) equipment which consumes much more average power than consumed by a standard telephone apparatus.

The document estimates the probability of power failure at customer premises assuming that it is mainly due to power outage of the national grid. This is obviously a wrong assumption, because the power failure at customer premises depends on national grid outage and power failure due to events at the premises; such as circuit overload which causes mains fuse tripping.

The baseline for service availability should be the availability of the service over copper based system which the current standard technology for telephony. Availability should not be based on theoretical analysis based on certain assumption that can be wrong.

The remainder of the response is mainly comments on certain issues raised by the consultation document, and the answers to the questions posed by the consultation document. We hope that Ofcom finds our contribution useful.

Background and Comments on Regulated Services, Regulatory Requirements in the UK and Ofcom's Role

1. Under the Communications Act, Ofcom's principal duty is to (a) to further the interests of citizens in relation to communications matters and (b) to further the interests of consumers in relevant markets, where appropriate by promoting competition.

Ofcom rightly considers that safety of life matters represent an important citizen interest and therefore are central to this consultation.

The Universal Service and Users' Rights Relating Electronic Communication Communications Networks and Services (Directive 2009/136/EC) identifies Publicly Available Telephone Service (PATS) as one of the universal services of publicly available electronic communication services available at European level. PATS (also more commonly known as POTS) is a technically standardised analogue voice with 4 k Hz bandwidth service defined by ETSI technical standards. However, superfast broadband service to citizens is not one of those regulated services.

One of the regulatory requirements of PATS is that customers should have uninterrupted access to emergency services, and another is high level of service availability. These requirements are technology neutral and should be satisfied independently of the technology deployed. This requirement is effectively reflected in Ofcom's GC3, which is a condition of entitlement set under the Communications Act 2003 where:

The Communications Provider shall take all necessary measures to maintain, to the greatest extent possible: [...] (c) uninterrupted access to Emergency Organisations as part of any Publicly Available Telephone Services offered.

The obligation applies to a “Communications Provider” is “a person who provides Publicly Available Telephone Services and/or provides a Public Communications Network over which a Publicly Available Telephone Service is provided”.

The consultation document clearly states the options and criteria for choosing the most appropriate option to satisfy this requirement and establish “all necessary measures to maintain, to the greatest extent possible: [...] uninterrupted access to Emergency Organisations as part of Publicly Available Telephone Service” over FTTP/H infrastructure.

The options covered by the consultation document are to retain or remove the requirement for battery back-up at customer premises for FTTP deployment and determining the duration of back-up if battery requirement is retained.

The criteria for selecting the option are:

- the level of protection afforded by the solution with respect to the risk that such protection would be called upon (in particular the likelihood that the backup facility would be called upon in an emergency);
- the costs associated with the provision of the solution, and the possible risk to infrastructure investment and competition that may result. High deployment costs incurred by communications providers could result in limited availability of fibre access services offered to consumers, and such costs may be passed on to customers;
- the costs and practicalities associated with the maintenance (i.e. replacement) of batteries (irrespective of whether the communications provider or the consumer takes responsibility for the battery maintenance), and the risk and consequences if such maintenance does not occur;
- the potential environmental issues of battery disposal;
- the issues that could arise in accommodating the solution by consumers and the potential implications for the adoption of FTTP.

In addition, Ofcom seeks to:

- allow for the protection of consumers in the event of a power cut to enable emergency calls where proportionate;
- minimise, where possible, the burden on consumers in accepting and maintaining the protection solution;
- promote efficient levels of investment in fibre access deployment and encourage competition in these markets.

Comment: To achieve those objectives and satisfy the criteria, alternative technical solutions to battery back-up can be used where optical power is supplied over the fibre from the telephone exchange to customer premises to power the telephone apparatus to provide access to Emergency Organisation. Although Ofcom claims that it is aware of its existence (footnote 13 page 13), Ofcom seems to ignore totally these solutions. Instead of considering and supporting such innovative solutions that best achieve the objectives, Ofcom seems committed to solutions that rely on battery back-up supported by certain stakeholders but not all. We urge Ofcom to consider and support those innovative solutions.

Comments on Possible Technological Solutions For The Access Network

2. Although regulatory requirements are “technologically neutral”, it is much easier to provide uninterrupted access to Emergency Organisation with a twisted-pair copper network than an optical fibre network. A copper pair can easily deliver enough power from the telephone exchange to operate a telephone without the need for a local electricity supply, and achieve better than 99.99+% availability.

Optical fibre as a transmission media has extremely high bandwidth (more than 30,000 GHz) and much lower transmission losses than other media such twisted-pair copper and coaxial cable. Fibre to the premises (FTTP) provision leads to a future-proof, very large bandwidth infrastructure, which can be exploited by incrementally upgrading the terminal equipment to provide superior broadband experience to the customer.

Comment: Contrary to commonly held belief that optical fibre “does not carry power”, optical fibres can deliver optical power from the telephone exchange to customer premises. Although the fibre’s optical power handling capacity is limited by several technical and safety factors, sufficient optical power can be delivered to customer premises from the telephone exchange to customer premises to operate the “lifeline”. As a result, in the event of a power cut at a household, telephone service can be supported by the optical fibre network and will continue to operate, in the same manner as customers using conventional phone services using copper wires. Superfast data services, HDTV, DECT, VoIP are locally powered as they are not covered by the Universal Service Directive. Ofcom’s consultation ignores this technical solution which satisfy the impact assessment criteria much better (higher level of citizen protection due to higher availability of telephony, short restoration time, lower capital and maintenance cost, and environmentally friendly technology) than battery back-up.

3. Ofcom considers only currently standardised Optical Network Termination (ONT) equipment which consumes more than 2.5 W in the quiescent/idle state and 10W when fully operational to deliver the superfast broadband service.

Comment: Standardised telephone apparatus (CPE) consume much less than currently standardised ONTs. The telephone apparatus consumes less than 1 mW in the quiescent/idle state, and 2-5 mW average power in the call state. The currently standardised ONTs consume 2.5 W in the quiescent/idle state, 4.5 W when delivering POTS, and 10 W when fully operational to deliver Gigabit services. The voice channel (normally 64 kbps) is one of the multiplexed channels. Obviously, a new standard is required that supports the “lifeline” over fibre that consumes similar power to the currently standardised telephone apparatus supporting POTS. This has implications on the technical specifications of the Network Termination Point (NTP) covered by the European Directive 1999/5/EC – Radio Equipment and Telecommunications Terminal Equipment and Ofcom’s General Condition 2: Standardisation and Specified Interface.

Comments on Technical, Market, Investment and Regulatory Issues and Uncertainties

4. Access network infrastructure is capital intensive and it might be uneconomic to provide more than one infrastructure built by different players competing in this market. Therefore, it is more economical to deploy an infrastructure that supports all services with the specified quality to the customers.

The consultation document raises several issues and uncertainties:

Ofcom’s statement that “fibre access technology are less likely to have an operational copper line available for traditional telephony services, either because the premises is in a new-build development in which there is no copper line available, or because the existing phone line has been discontinued in favour of fibre and hence is no longer operational.”

Comment: This implies that the network operator designated as Universal Service provider is not obliged to supply PATS where fibre is deployed, although PATS over fibre with battery back-up does not offer availability, reliability and access emergency services similar to that offered over copper. This policy will expose customer to unnecessary risks.

5. Ofcoms document states that “The FTTP optical network terminal (“ONT”) represents the interface between the operator’s network and the customer’s in-home wiring. It is this unit that requires backup power to be provided in order for telephone calls to be made in the event of a power cut. The ONT forms part of the electronic communications network as apparatus comprised in the transmission system within the definition set out in section 32 of the Communications Act 2003. This means that regulatory obligations concerning an electronic communications network would include elements up to and including the ONT.”

Comment: This architecture lacks the technical standard specifying the interface for the Network Termination Point undefined. The ONT is a box with connections. However, the functionality, and technical interfaces have to be defined in technical standards to enable equipment manufactures to design customer equipment that interwork with the network.

6. Ofcom’s statement resulted from previous consultation on battery back-up “Ofcom has left it to network providers to feel “comfortable” with the duration of battery back-up. “

Comment: This is unsatisfactory statement. It should be the citizen and customer who should feel "comfortable" rather than the PTN and PATS providers. Ofcom has the duty to protect the interest of the citizen first and not the provider. It seems the solution of 4 hours battery back-up has been reduced to 1 hour which exposes the citizen to unnecessary risks. This shows uncertainty in the measures Ofcom is undertaking to protect user interest, and that it supports measures that lowers the cost to promote investment in FTTH/P. Ofcom should promote investment in technologies that offer better solutions than currently standardised technologies.

7. Ofcom’s consultation document compares the performance, installation cost, maintenance cost, and customer acceptance of different types of batteries over fibre infrastructure.

Comment: This contradicts the principle of “Technological Neutrality” regulations.

Comments on evidence used in impact assessment

8. The figures used to conduct the impact assessment represent all outages including High Voltage transmission (that tends to result in shorter duration outages for large numbers of customers) and Low Voltage distribution.

Comment: This data is the power outage of the national grid. The power failure at the customer premises is much more frequent, because the events that can lead to failure of power mains at premises can include those due to circuit overloads, including electrical wire cuts, causing mains fuse activation. In addition, many customers switch off the supply for power saving or other reasons ...etc. All these events should be considered in calculating the level of service availability when battery back-up is used. In addition, the event can happen during the night or while the resident is away from premises for long period. Those cases will lead to battery depletion which will result telephone failure or non-availability to contact repair services as well as emergency services.

This is obviously degradation in the quality of service of PATS service compared to availability better than 99.99+% (1 failure per 27 years!!!) for copper based or remotely powered systems.

Article 22 of the “EC Citizen Right, Universal Service..” Directive on "Quality of Service" states that “In order to prevent the degradation of service and the hindering or slowing down of traffic over networks, Member States shall ensure that national regulatory authorities are

able to set minimum quality of service requirements on an undertaking or undertakings providing public communications networks.”

Quantifiable Quality of Service parameters can be service availability/reliability and service restoration time. The probability of failure of a communication system is given by the probability of failure of telecom equipment at telephone exchange, link, and CPE. Assuming probability of failure of telecom equipment at telephone exchange AND CPE is zero or very small, and the link does not fail, then the probability of service availability is:

$$\begin{aligned} & \text{Probability\{ of failure of the communication equipment at the telephone} \\ & \text{exchange OR failure of CPE equipment/Given that the link has NOT failed\} =} \\ & \text{Probability\{ of failure of the communication equipment at the telephone} \\ & \text{exchange/Given that the link has NOT failed\} +} \\ & \text{Probability\{ of failure of CPE equipment/Given that the link has NOT failed\}} \end{aligned}$$

which is greater or equal to the Probability {of failure of the communication equipment at the telephone exchange/Given that the link has NOT failed}. This shows that very reliable powering from telephone exchange is inherently more reliable than local powering of CPE.

Telephone exchanges have redundant power sources - commercial feeds from local utilities, back-up generators with dedicated fuel supplies, and large batteries that provide the equipment with at least an additional 8 hours back-up. In addition, there is an alarm system which flags failures of any of the power supplies. This enables telecom network operators an availability level of 99.99+% over copper wires, and reasonable restoration time in case of natural or man-made disasters as it is a centralised system with dedicated, and trained work force.

This shows that the impact assessment of using battery back-up at customer premises (with availability of 74% with 1 hour duration) to deliver PATS over FTTH/P will result a major degradation the PTAS's Quality of Service over to copper.

9. The statistics in Table 1 and Table 4 of the consultation document is used to calculate the probability of service availability during an emergency when a 1 hour battery back-up is used. It estimates this probability at around 99.95% of the time (or, put another way, for just over 4 hours in a year a customer would be unable to make a call due to a power outage). For a two hour battery backup, this increases to 99.98%, and for a 4 hour battery this increases to 99.99% (which translates to around 1 hour in a year that customer would typically be unable to make a call as a result of a power cut). We also note that many customers have mobile phones, which greatly increases their capability of contacting the emergency services in the event of a power failure. “

Comment: This conclusion is misleading and is not supported by realistic analysis. In addition, no comparison is made to a baseline, which should be copper based system which is the dominant current network technology for delivering PATS.

In addition, the fact that the customer might have mobile phones is related to the probability of the customer accessing the emergency services and NOT the probability of failure of the PATS service. The probability of access to emergency services will obviously depend on the number of alternative communication means as they represent redundancy in the system. However, this analysis is irrelevant to the analysis of availability of a PATS service over fixed line.

It seems that the assessment is biased to justify the decision of 1 hour. Ofcom should avoid such impact analysis.

FTTP (with battery back-up), DECT and mobile all depend on battery and they will all be affected by power failure. The main difference in availability will totally depend on the availability of a charged battery when the power outage occurs.

Of course, people will try not to rely on the fixed line when it becomes unreliable.

10. The consultation document notes that “FTTP manufacturers that the power consumption of optical termination terminals (ONTs) can be of the order of 8-10W. While we are aware of activities to introduce power saving modes in such equipment²³ we are not aware of any widespread implementations to date.”

Comment: Currently standardised ONTs’ power consumption is 8-10W. However the analogue telephone apparatus consumes less than 1 mW in the quiescent state, 5-10 mW in the Call state, and around 100 mW in the Ringing states. In addition, the average call/usage duration of a telephone per day is 30 minutes. This yields average power consumption by a telephone of less than 2 mW per day which is three orders of magnitude lower than the power consumed by the ONT. This clearly shows that the current standards ONT are not designed for low power consumption to support PATS. In addition, current ONT power consumption is too high resulting in a much larger carbon footprint than POTS based on copper based system.

11. The consultation document also notes that batteries can be obtained in a variety of forms, sizes, materials and capacities.

Comment: The impact analysis should include the dependence of battery lifetime on operating and storage temperatures. The temperature variation will depend on the location of the battery; i.e. indoors, outdoors...etc, which will also affect its installation and maintenance cost. This fact is completely ignored by Ofcoms’ impact assessment. These costs are borne initially by the communication provider, and will be passed on to the consumer who ultimately pays all costs either through the bill or taxation in case of government subsidy.

12. The consultation document states that “As a result, we consider that smaller battery durations offer customers flexibility as to how to accommodate the battery solution, as well as increasing the likelihood that consumers maintain/replace the batteries as and when required. This should ensure that the levels of protection available closely match the original expectations, particularly over time. “

Comment: This is a very risky conclusion based on cost reduction, and market acceptance of aesthetic aspects of battery at the expense of exposing the citizen/customer to unnecessary risk. It seems that this consultation offers the design and costing of a technical solution based on battery back-up. We don't believe that this is the duty of Ofcom.

13. The consultation document states that “If the resulting business case for the communications provider is too weak, then this may result in the communications provider not deploying FTTP technology either in a particular area or in general.”

Comment: Of course, if the business case is too weak, then the communication provider, as a profitable enterprise, will not deploy FTTH/P technology. This makes it imperative that a technical solution is deployed which makes the business case for FTTH/P more attractive than copper or FTTC solutions. Optical powering from the telephone exchange is such a solution.

14. The consultation document states that “The importance of maintaining power to the ONT whenever possible to prevent unnecessary battery usage/drain and to maximise the availability of the telecommunications network (for example, not to switch the power off at night).” Is an appropriate solution.

Comment: It might be unrealistic to expect that a contract term "not to switch power off at night" will protect the citizen or change users’ behaviour. This example clearly shows that the justification of 1 hour back-up duration based completely on outage of electrical power from national grid, which is only one event that leads to power cut at a residence, is inadequate.

Question 1: Do you agree that Ofcom's guidance on battery back-up lifetime needs to be reviewed at this time?

Reply to question 1: We agree that Ofcom should continuously review and clarify the guidance on satisfying the General Conditions. In this case, the relevant GC are: GC3 "Proper And Effective Functioning Of The Network" and relevant General Conditions; GC2 "Standardisation And Specified Interfaces", GC15 "Special Measures For End-Users With Disabilities", GC21 "Quality Of Service", and GC5 "Emergency Planning" to reflect changes in network technology, market, and regulations.

It should also provide guidance relevant GCs; such as GC 9, GC 10, and Annex 3 to GC 14.

Ofcom and UK government should continue to protect the UK citizen by promoting and supporting innovative technical solutions and standards in the relevant European and International Standards Organisations. We also support the deployment of FTTH/P infrastructure which will provide a bandwidth of more than 30,000 GHz to each customer.

Question 2: Do you agree with the scope of this consultation as set out in Section 4?

Reply to question 2: No. We disagree with scope of this consultation, because it only covers the back-up battery in customer premises equipment for FTTH/P. This implies that Ofcom excludes all other technological solutions that better meet the criteria of selection stated in the consultation document.

The scope should be "providing PATS service over fibre (FTTH/P) with uninterrupted access to emergency service, and high availability". The scope should cover all systems and their elements supporting PATS, and this should include the telephone exchange equipment, any equipment in the link, and the equipment at the network termination point (ONT) that affect the quality of service including uninterrupted access to emergency service. The baseline for PATS quality of service of service and availability (in event of power outage, disasters, war time, and force majeure) should be copper based systems, which is the current dominant technology.

Footnote 13 on page 13 claims that "Ofcom is "aware of other solutions", but it completely excludes them as an option. This makes this consultation limited to battery back-up solution rather than solutions that protect the citizen. This approach violates the principle of "technology neutral" regulations. Those ignored non-standardised technical solutions satisfy the selection criteria much better than battery back-up solutions. Ofcom can provide direction to cover new and innovative technologies that protect the interest of the citizen/user, while ensuring the safety of personnel of the network provider.

The reasons that optical powering systems that deliver optical power from the exchange over the fibre to support analogue telephony are not commercially available include: no agreed standard, lack of active support from Ofcom, and vested interest of current players in the UK telecom market. The uncertainty in regulatory requirements and policy makes it impossible to attract investors to develop the technology. Ofcom has been provided with information about the capabilities systems. To exclude these solutions from the scope of this consultation implies that Ofcom has already accepted the battery back-up as the preferred technology. This is a dangerous position which exposes citizens to unnecessary risk. Battery back-up solutions are obviously not the best necessary measure to maintain and ensure, to the greatest extent possible, uninterrupted access to emergency services.

Question 3: Do you agree that a battery backup facility should always be provided?

Reply to question 3: Ofcom's most important criteria should be the protection of the interest of the citizen/customer. This objective is achieved by ensuring that regulated services offer the same quality of service, safety, and protection independent of deployed network technology. The baseline for PATS quality of service over any network technology should be the copper based systems. If FTTP/H can only offer this level of protection by using battery back-up, then we agree that battery back-up should always be provided to offer similar levels of protection. However, the analysis given in this consultation, which is incomplete and can be misleading, shows that even battery back-up used with current ONTs consuming 2-10 W (which is much higher than standard telephone power consumption) can not offer quality of service similar to copper based systems. There are, however, innovative optical solutions where optical power is supplied to customer premises over optical fibre to operate a standard telephone. This solution consumes much less power (less than 1 mW in the quiescent state) than currently standardised ONTs. Ofcom should consider seriously these innovative solutions, rather than analyse the business case and risks of battery back-up solution of currently standardised technical solutions. Ofcom should also assess the impact of its decision of battery back-up on GC 5: "Emergency Planning" related to the arrangements for the rapid provision and restoration of the communication services, especially PATS, in case of Disasters.

Question 4: Do you agree that the proposed minimum battery longevity of 1 hour is appropriate?

Reply to question 4: We disagree that the proposed minimum battery longevity of 1 hour is appropriate for the following reasons:

- the quality of service in terms of reliability and availability of PATS over FTTH/P infrastructure with battery back-up solution is inherently inferior to copper based solutions with 99.99+% availability, or other optical solutions which do not rely on battery back-up with similar availability to copper based solution. Therefore, 1 hour back is not appropriate when compared to quality of service and availability offered by alternative technologies.
- electricity outage at customer premises is not only due to national grid outage. Outages can occur due to electrical faults in the customer premises, such as short circuit, appliance overload ...etc. Those events occur much more frequently than national grid outage, and more than 1 hour might be needed to restore the electricity to the telephone.
- an outage during the night can go unnoticed for at least 6 hours, causing the 1 hour battery to be totally inadequate. It is unrealistic to expect to solve this problem by making the customer aware of the importance of maintaining power to the ONT "for example, not to switch power off at night". Maintaining power connection to ONT overnight or when the premises is vacant for long period might be a safety hazard.

Question 5: Do you agree with our proposed approach to address the needs of individual customers requiring additional protection?

Reply to question 5: Yes. We agree with the proposed approach to address the needs of individual customers requiring additional protection.