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Submission in relation to the Commission's proposed

Revision of the Guidelines on State aid for broadband networks

Article	Comment
Footnote 5	FWA can also deliver 1Gb/s download speeds. Moreover, FWA also qualifies as a Very High Capacity Networks as defined in and by Article 2(2) of the EECC.
(9)	It is submitted that the NRAs' intervention should be to ensure effective and fair competition.
(10)	The obligation that State aid intervention should limit as much as possible not just the actual crowding out of private investments, of altering commercial investment incentives and ultimately of distorting competition contrary to the common interest but also the risk thereof, is noted.
(19) i)	a) It is noted that *'speed'* means the performance, based on the number of bits per second, of a connection, as defined in recital (5) of Annex I. However, that recital does not define or mention "the number of bits per second" nor does it explain what else if anything speed could also be based upon. Since that recital also does not define or mention 'a connection' nor is 'a connection' defined anywhere in these proposed Guidelines, including the Annexes, it can only therefore be referring to "performance". However, recital (5) of Annex I does not define "performance", but instead refers to "achievable performance" as follows: b) "The "achievable performance" must be characterized at least in terms of the download and upload speeds that can be relied upon under peak-time conditions."

c) It is thus not clear whether *'speed'* means performance, or "achievable performance", nor is it clear what the difference between the two is or might be. Perhaps "performance" *per se* refers to potential performance or theoretical performance, whereas "achievable performance" may be intended to refer to that which is actually possible practice or in real-world terms?

d) It is noted that "achievable performance" must at least be characterized in the terms specified Recital (6) of Annex I says public authorities *"may map also other performance criteria to characterize the performance of networks under peak time conditions."* Examples such as jitter and latency are given and the recital says Member States can choose to map these features to address market failures and ensure an adequate step change.

e) It is further noted that recital (4) of Annex I recites that the objective of the mapping exercise is to have an objective representation of the 'achievable performance' that can be relied upon under peak-time conditions.

f) Trying to put all this together, the objective of the mapping exercise is now proposed to be "*to have an objective representation of the achievable performance which in turn must be characterized, at the very least in terms of speeds (upload and download) based upon the number of bits per second of a connection that can be relied upon under peak time conditions and that Member States can choose to apply other QOS related criteria to address market failures and ensure an adequate step change*." The Commission is requested to confirm that this is a correct assembly of what it intends by the said recitals in Annex I together with Article (19) i)?

g) Under the 2013 Broadband Guidelines at Article (58) NGA networks are understood to have the characteristics of delivering services reliably at very high speed per subscriber through an optical (or equivalent technology) backhaul network which is sufficient close to user premises as to guarantee the actual delivery of the very high speed. Other characteristics include supporting a variety of advanced digital services and having substantially higher upload speeds compared to basic broadband networks. In the case of an *'ultrafast access network'* as defined in Article (19) j) for 100Mb/s minimum download speeds, is it the case that such networks must also be able to support a variety of advanced digital services, or is that requirement now removed? Similarly, in relation to the 100Mb/s minimum download speed, does this have to be guaranteed or is this requirement too also removed and replaced with a requirement that the speed only be delivered in a manner that can be characterized as "reliable"?

h) Separately, it was always understood hitherto that the objective of the mapping exercise was to assess market failure and equity objectives by determining whether broadband infrastructures exist so as not to crowd them out and or whether broadband infrastructures are planned in the target area so as not to disrupt them and that this was to be done in terms of mapping white, grey and black areas (Broadband Guidelines 2013, section 3.2). Since such mapping remains in these new proposed Guidelines the Commission is requested to confirm that this remains the primary objective?

i) It is suggested that the mapping objective has not changed but that in carrying out the mapping exercise to identify existing and future planned

investments in broadband networks this is to be done in accordance with paragraph f) above so as to try to obtain an objective (*i.e.* real and accurate) portrayal of the speeds those networks either do deliver (in the case of existing networks) or are reasonably expected to deliver (in the case of future planned networks). Would the Commission so please confirm?

19 m) It is noted that deploying a State aided measure (SAM) to compete with private market networks is now to be tolerated and is defined for that purpose as *'overbuilding'*. The Commission is asked to explain why in terms of competition policy this is consistent with the statement in Article (10) namely that it should limit as much as possible not just the actual crowding out of private investments, of altering commercial investment incentives and ultimately of distorting competition contrary to the common interest but also the risk thereof?

19 o) The Commission is requested to confirm that *'step-change'* is to be measured by comparing it to existing networks as well as concretely planned private network rollouts, just as it was in the 2013 Broadband Guidelines at Article (51)? This is important because if the comparator is not specified the mere fact of the State aid investment for any purpose can be regarded as so qualifying.

(21) – (22) It is noted that a *'fixed ultrafast access network'* is one providing 100Mb's + of download speed at a fixed location as defined in recital (19) j) to end-users as defined in Article (19) k) and that FWA networks may be capable of being such a network.

(26) It is noted that no focus is placed on the provision of optical fibre to FWA base stations.

(29) It is noted that *'market failure'* is here defined for SGEI purposes as comprising unconnected areas where it can be demonstrated that private investors are not in a position to provide adequate broadband coverage to all users in the relevant time horizon, thus leaving a significant part of the population unconnected.

Leaving aside the problem with the expression "all users" (dealt with elsewhere in these submissions), the question of whether private investors are "not in a position" to provide ultrafast (UF) speed to all users so that "a significant part of the population" will not have access to UF service in the time horizon of the SGEI measure leaves many aspects open to interpretation. Would the Commission please therefore define with precision what it means by "not in a position" (in terms of whether existing FWA networks must have the present capacity to provide service to all in their coverage areas regardless of whether those persons/premises ever actually want or contract for such service with the specified network) and "to all users" (as opposed to "end-users" and or "premises") and what "a significant part of the population" means, whether by reference to entire population of a Member State, or a specified percentage

whether of persons, natural or legal, or both, or premises in the target area, or some lesser reference point?

Would the Commission please confirm that its reference to "coverage" here is recognition that persons (and or their premises) covered by existing or future planned private networks may choose not to contract for service from such networks and thus will not necessarily become connected. This is important because such networks cannot (i) be regarded as comprising market failure unless and until such connections become contracted for and cannot be provided and (ii) cannot be assessed as not being UF by reason of their not having the present capacity to provide UF services to unconnected persons/premises within their coverage areas. Otherwise the corollary is that such networks' lack of present equipment and capacity to provide UF to unconnected premises (who may never want such service from them) in their coverage areas is held against such networks for the purpose of a false definition of market failure.

(41) a) The requirement of verification through mapping is noted. Regrettably however, if an AGA chooses not to recognise the investments of and by existing FWA networks in wireless technology capable of delivering the required minimum speeds then it becomes possible to present the proposed SAM as having the required incentive effect. This is what occurred in the mapping exercise underpinning a recently approved SAM and accordingly the Commission is requested to include steps to address opportunistic behaviours by AGAs.

b) The reference at the second sentence to 'a similar investment' is error because, due to the superiority of the SAM required by the step-change obligation, an apples with apples comparison is not possible.

(42) The Commission is requested to state whether, if an AGA attaches a condition to a SAM that only undertakings with an annual turnover exceeding €100 million can tender to be a beneficiary of the SAM, this comprises a crowding out of the SME market and is objectionable.

(45) It is understood that when the Commission refers to *'the market'* here what the Commission is in reality referring to is situations where there is insufficient profit motive.

(47) Markets left to their own devices do not add, as requirements, expenditure which is un-necessary and uneconomic, for the purposes of delivering minimum broadband speeds. The efficient functioning of the free private market settles on delivering minimum speeds in the most economic and efficient manner it can. It is accepted that stakeholders can be incentivised (by State aid) to carry out activities which as purely private economic market operators they would not do. However, it is equally the case that the setting of conditions for recognition of private economic markets which ignore the economically efficient manner in which they deliver required minimum broadband speeds and the addition, for the purposes of their recognition for State aid mapping purposes, of uneconomic and un-necessary prescriptions methods for such delivery, has the effect of non-recognition of the private market and the artificial creation of a market failure. That in turn then results

in a distortion of the private market and the disincentivisation and crowding out of private investments.

(50) a) The Commission is requested to confirm that the first sentence of this article cannot be used by AGAs to compare FTTH services provided by large operators in urban environments (who will not invest in low density rural areas on grounds of private market economics *i.e.* return on investment and profitability) so as to justify State aid competition (including the superiority created by the step-change improvement built into the SAM and its subsidised prices to subscribers) to outcompete FWA operators in those rural areas.

b) In relation to footnote 42, consumer studies or independent studies were not carried out in the case of a recently approved national SAM and that in combination with the lack of any public consultation about the outcome of the final mapping exercise led to the grant of State aid approval to overbuild the existing FWA NGA capable infrastructure.

(51) a) Regrettably, in the case of a recently approved national SAM the AGA recognised that private market operators had invested in wireless technology capable of delivering the required minimum speeds but obtained State aid approval to overbuild all of them on the basis that they had failed to dimension their access networks to meet dimensioning requirements which the AGA had not disclosed. This is a classic instance of where the private market would normally choose to invest but the application of State aid to overbuild its investments is a significant undermining of them, not least because FWA technology has developed rapidly since 2009 from basic speeds to NGA in 2013 and now to UF and the crowding out of the FWA sector at the NGA level has obvious knock-on effects for investment by it in UF services.

b) The Commission is requested to confirm that in situations where there is existing infrastructure in both senses, namely of real property capable of use for broadband rollout and in the sense of existing FWA networks such as mast sites with or without UF capable wireless technology already purchased and or installed, such private market networks could be appropriate beneficiaries of State aid to roll out coverage in underserved target areas.

c) In relation to the word *'adequate'* the Commission is asked to confirm that this term cannot be used to disqualify an existing UF network for mapping purposes re unconnected premises in its coverage area on the basis that it does not presently have the capability to provide services to those premises.

(52) a) The question of whether an existing FWA network is "able" to address end-users' needs is addressed elsewhere in these submissions and the points made are repeated here. It is submitted that the fact that an existing FWA network cannot immediately provide UF service to 100% of unconnected premises in its existing coverage area (who may never choose to become

customers) cannot be used to define such a network as being unable to provide UF service any or all such unconnected premises in the future.

b) It is noted that this Article now defines 'market failure' as failure to provide 1Gb/s speeds. Especially given (i) that this is not a requirement until 2030 and (ii) that 100Mb/s speeds are the target to be achieved by 2025 and (iii) these Guidelines define and are concerned with *ultrafast access networks i.e.* 100Mb/s speeds, it is submitted that there should be no market failure re the provision of 1Gb/s speeds until at least 2025 and the same applies to the 200Mb/s upload requirement. The reason for this regarding FWA networks is as follows. In the 2009 Broadband Guidelines FWA technology was not considered capable of delivering NGA speeds. However, due to its rapid development it was considered so capable just 4 years later in the 2013 Guidelines. We are now 9 years one from then and FWA wireless technology has continued its rapid development to the point where these proposed Guidelines recognise that FWA may be capable of delivering UF speeds. Given this rate of technological development it cannot be presumed that FWA technology will be unable to provide 1Gb/s service by 2030. The Commission is referred to its own statements in articles (107 – 108) a great deal of which is equally true of FWA technology and networks. Accordingly, to allow the FWA sector to be crowded out of business by SAMs now, on the basis of FWA technologies' present inability to deliver 1GB/s service, is to deprive that technology and that sector from being able to continue in business and invest in the new FWA technologies that will be developed over the next 8 years. In short, if FWA networks can now be overbuilt by SAMs as a result of these Guidelines by virtue of FWA technology's present inability to provide 1Gb/s services then that technology and the FWA private market sector will thereby be crowded out.

(56) The Commission is requested to include the following words from the 2013 Broadband Guidelines' definition of grey NGA areas "is present or is being deployed".

(57) The Commission is requested to explain what "may" means in this particular context. Is it always the case that if an existing or planned UF network cannot presently be shown to be able to provide 1Gb/s download and 200Mb/s upload then this demonstrates market failure? If not, what circumstances arise where this will not be the case? What if, as in the case of a recently approved national SAM, the projected rollout time is 7 years. How is it possible in such circumstances for existing FWA networks wishing to continue investing in their networks to know what technological developments may occur over that time period and prove to AGAs that their future investment will be able to deliver? As it stands this requirement or condition appears, in effect, to be promoting FTTH solutions over all other technologies by depriving those technologies from having the opportunity to compete. Moreover, the Commission's own recent Quantum Communication Infrastructure Initiative adverts to the possibility of rapid the development of the quantum internet, potentially rendering FTTH investments ultimately redundant.

(59) a) It is noted that a white, grey (or black) target area is not a single premises but rather a geographic area which contains multiple premises.

b) The Commission is requested to confirm that the 'target area' to which this article refers for the purposes of the maximum 10% overbuilding of all premises comprises the totality of the mixed white and grey areas. Since judicious selection of a small white area with a large grey area could be used to maximise overbuilding in grey areas the Commission is requested to set out measures to check opportunistic behaviours by AGAs.

c) This facility to overbuild existing private networks in grey areas means that such networks will have to compete with the step-change-superior State aided network and in all likelihood (also as a result of the latter's subsidised charges to end-users) lose market share possibly even to the point of becoming unviable and thereby driven out of business, especially if an SME operator. The fact that the SAM's unfair competition in the grey areas assists in the funding of the SAM in the white areas and thereby reduces the cost of the SAM there provides no counterbalance to its anti-competitive effects. It is therefore submitted that this proposal is unacceptable anti-competitive. Why should an existing private network, especially for example an SME FWA operator, be penalised with a 10% overbuild to fund the SAM in the white areas? If that is to be permitted then such private operators should be financially compensated otherwise the private market will be funding the SAM for the white areas and possibly also the State aided competition against itself in the grey areas.

(60) It is submitted that this Article should also provide for the possibility of new investment plans from entities other than existing networks.

(61) In the case of a recently approved SAM the AGA found that the FWA sector had already invested in and deployed NGA capable FWA technology and were in the process of migrating their customers from basic to NGA speeds. It is therefore not understood why the Commission nonetheless granted State aid approval leading to a distortion of competition and the crowding out of private investors.

(69) It is not understood why State aid support in areas where there is just one mobile wireless access network is considered an unacceptable distortion of competition, but this is not the case with fixed access networks in grey areas.

(70) Regrettably in the case of at least one Member State the State aided FTTx backhaul network has not been administered on non-discriminatory terms.

(74) Once again it is noted that unlike in a recently approved national SAM, intervention areas are geographic areas and not single premises.

(75) Regrettably tenders for a recently approved national SAM were limited to enterprises with an annual turnover exceeding €100 million and the contract was awarded to one beneficiary which will as a result become a new incumbent with SNP.

(76) In view of a recently approved national SAM the Commission is requested to prescribe that consultation with the NRA be in-depth, meaningful and published.

(78-79, 82) It is to be regretted that in a recently approved national SAM the AGA did not carry out any public consultation as to the outcome of their final mapping exercise and that they sought and obtained State aid approval from the Commission before informing submitting FWA operators of their negative NGA decisions and the reasons therefore. As a result there was no opportunity for the public or such stakeholder to question or challenge the AGA's decision nor was there any opportunity to notify the Commission or make any complaint to it in advance of State aid approval being granted.

(85) It is submitted that it cannot be appropriate to require that the private investment will ensure similar performances as the planned SAM not least because the latter is required to be better than that existing due to step-change and further because the SAM can be selected to be future-proofed and therefore be of far higher specification than a private investment. For example, in the case of a recently approved national SAM the existing FWA NGA investments were overmatched by the State aided FTTH measure.

(86) Annex I appears to prohibit an examination and or recognition of the performance of the market economy and the demand-led profit motive approach and manner of performance of delivery of required speeds by existing network operators. For reasons explained in submissions in Annex I it is submitted that this is error.

(90) a) The result of operators'/investors' failure to submit relevant information to the public consultation, not the preceding mapping exercise, is noted, thereby emphasising the importance of the public consultation. It is regrettable that in a recent national SAM the Commission granted State aid approval despite no such public consultation being held. As a result of that lapse State aid approval has been granted for the overbuilding of significant private market investments in FWA NGA technology across the SAM intervention area.

b) It is also noted that AGAs are to communicate their assessment results and reasons therefor to every submitting stakeholder. Can the Commission please clarify and state exactly when this should be done. This is vital if stakeholders are to be given the opportunity to take expert advice, challenge and or notify the Commission of opportunistic behaviours by AGAs. Ideally therefore, this notification to stakeholders of their assessment's outcome should take place at least 4 weeks before the AGA notifies the Commission to seek State aid approval.

c) The Commission is asked to confirm that Articles (90) and (91) must also apply to assessments of submissions for/of existing networks and those in the course of deployment.

(91) The submission re Article (76) is repeated here.

(96) a) It is noted that the step-change must be compared with the performance of existing networks. Such a comparison by definition requires a true unvarnished examination of how the existing private market economy

networks perform to deliver their required minimum speeds. It is to be noted that this examination does not involve the addition of additional un-economic requirements and standards, unlike as is proposed for the assessment of existing networks in Annex I. The Commission is asked to explain who it is appropriate to consider existing networks as they actually are for step-change purposes, yet ignore them for mapping purposes unless they meet non-market driven and uneconomic additional criteria?

b) The Commission is asked to explain how and why credibly planned private network roll-outs are not to be taken into account for step-change purposes unless they provide similar performance to the proposed SAM. In the first place, it is often the case that the SAM will be superior to a private planned investment precisely because the SAM requires to incorporate a step-change. In short, this requirement appears to require the private planned investment to include the very step-change component which, if it does so incorporate, will then constitute a network to be taken into account for the purposes of measuring the further step change required for the SAM. The result is in effect circular and *prima facie* does not make sense?

(97) The Commission is requested to explain the circumstances in which a private investment protection period can be called into operation?

(98-99) The Commission is asked to confirm:

a) that the speeds of existing networks are those which they actually deliver, not those which are considered possible (or not) via a hypothetical desk exercise which pays no heed to real world traffic data,

b) that "ultrafast speed" means a minimum of 100Mb/s.

(111-112) In view of the token involvement of an NRA in a recently approved national SAM it is submitted that in these articles the Commission should require that NRAs be involved in all aspects of the SAM from mapping to design and to include all the aspects mentioned in article (112), not merely consulted upon them. Otherwise, there is a risk that such consultation will be at a very high level with the result that the NRA will have very little meaningful regulatory input or oversight from either a State aid or competition point of view. In addition, it is submitted that regardless of the extent of the involvement that the Commission can require it would be helpful, appropriate and transparent for the extent of the NRS's involvement to be published contemporaneously so that stakeholders have a clear and detailed understanding of the NRA's views on all aspects. This might also provide a measure of protection to the private market against opportunistic behaviours by AGAs.

(114) The Commission is requested to confirm whether regularly across the EU 27 NRAs are also the competition authority for telecommunications matters?

(127) The Commission is requested to confirm that the national infrastructure database:

a) is required to comprise all infrastructure that is capable of being used for broadband roll-out, not just that belonging to bidders for the SAM project,

b) is required to map all such infrastructure in a detailed and granular manner down to the highest practical scale stating both its nature as well as its owner and their contact details re its access or use,

c) should be published on a website accessible to all,

c) is a requirement which is not satisfied by offering an incomplete list of infrastructure owners without any detail or mapping. This latter assurance is sought because in a recently approved national SAM the failure of the AGA to set up and publish such an infrastructure database, despite having gathered in such data from all submitting existing networks, resulted in the Commission not being alerted to the existence of infrastructure across the entire intervention area which could have been used to rollout the SAM at far less expense.

(129) a) It is submitted that bidders' recourse to existing infrastructure should be an important constituent part of the scoring system.

b) Footnote 92 is not understood in that the expression "taken into account" appears opaque and ambivalent. Could the Commission please clarify what this means?

(135) The Commission is asked to clarify whether footnote 95 is intended to apply to private market FWA operators if they are not in receipt of state aid?

(143) The submissions above re articles 76 and 112 are repeated.

(146) The Commission is requested to confirm that if an interested party in an adjacent area (whether an existing network or a planned future investment) opposes such extensions during the public consultation (or earlier) then the AGA will not permit them?

(147) a) It appears anticompetitive to require private networks in areas being extended into by a SAM to be providing speed "comparable" to the State aided network given the latter network will have been enhanced by the step-change requirement relative to existing private networks. The Commission is requested to remove any ambiguity about "comparable" by defining exactly what is meant here.

b) The Commission is requested to explain:

i) how it considers a private network can recover a return on its capital investment and make a profit in just two years?

ii) what the position is in relation to an existing network that is investing in upgrading its network as a continuous process?

(148) Articles (148) a) and b) are not understood and the Commission is accordingly requested to explain their operation with greater clarity.

(149) a) The Commission is requested to clarify that if such prices are published anywhere in the Union the lowest of them should be used.

(149) b) It is suggested that the Commission invite the Union's NRAs to pool their data in this respect and make it publicly available on a central website.

(150) The Commission is requested to add the words "and paid heed to" to this article.

(151) The Commission is requested to add the words in the second last line after "restrictions," the words "or redactions or blank sections".

(153) The Commission is requested to include in this article a requirement that in the interests of transparency all of this information be contemporaneously published without redactions and that any and all other State aids granted to the beneficiary also be included such as preferential access to publicly owned infrastructure or discounted prices granted to access incumbent's CEI.

(165) In a relatively recent State aid approved national measure whose mapping processes and tender process lasted many years, a counterfactual conducted 4 years before the AGA sought State aid approval was not repeated, despite the fact that by the end of that intervening period the AGA found that the FWA sector had invested in, equipped and deployed NGA capable technology and were part way through the process of upgrading their coverage areas from basic to NGA broadband. In addition, when the original and only counterfactual analysis was conducted the AGA had specified that it would not recognise certain types of FWA technology NGA but by the end of the intervening period, even though the market was not so informed, the AGA had removed those restrictions so that had they known it, previously excluded private market operators could then have submitted on the basis they could qualify as NGA.

(172) a) It is noted that *'take-up'* is defined as *'subscriptions'*. Mobile wireless access services have in the past been tied to individual end-users and thus each such end-user can be regarded as subscribers taking up subscriptions. However, the same is not true with FWA services whereby it is often the case that one end-user representing or occupying a dwelling takes out a subscription on behalf of multiple end-users using the dwelling. The resulting problem of providing required minimum speeds to all end-users in one premises via the subscription of one representative end-user is thus highlighted and reference is made to submissions on this point re Annex I.

b) The Commission is invited to confirm that voucher schemes are not permitted to be targeted at and for the benefit of any one or any selected group or type of service provider.

(173) It is noted that this article refers to the sub-group of end-users that is responsible for the set-up costs and the subscription fee and that vouchers can be used by them to subscribe to new services or upgrade current subscriptions.

(175) It is noted that in a recently approved SAM the State aid beneficiary has been permitted by the AGA to offer strong discounts on initial connections in order to improve take-up and it would appear, by virtue of this article, that such

discounting advantage granted to the State aid by the AGA to the State aided beneficiary may therefore constitute additional and anti-competitive State aid.

(184) Given the definition of end-user in these Guidelines and in the EECC and given the apparent lack of restriction on vouchers being available to all end-users so far as mobile wireless access services are concerned, the Commission is requested to explain why individual end-users are sought to be restricted in their individual access to vouchers in respect of FWA and why is such a discriminatory approach being taken?

(210 & 214) It is suggested that the Commission mandate that where AGAs have used external independent experts to assist them in the design and implementation of their SAM those same independent experts may not be engaged for the purposes of carrying out the ex post evaluation.

Specific comments observations and questions are set out in-line below:

ANNEXES 1 to 5

ANNEX I - MAPPING

1. SCOPE

(1) The annex outlines recommended methodologies on how to carry out the mapping exercise to support State aid interventions for the deployment of fixed and mobile networks.

Q1. It is noted that despite being recommendations article (74) of the Guidelines in effect requires that they be used by Aid Granting Authorities (AGAs) absent good reason supported by their NRA.

(2) It aims to increase transparency on the methodology to gather and assess information on the availability and performance of networks.

Q2. It is noted that the intended meaning of transparency here is in the vernacular, as in 'clear' and or 'explicit' and their intent is to ensure that they are implemented and faithfully to their spirit and purpose.

(3) The annex lists, for fixed networks and for mobile and fixed wireless networks:

i. the criteria to be used to map the performance of the networks; and

Q3. Does this suggest that if a fixed wireless operator's (FWA) mapping submission shows network performance adequate to service a lesser number of premises than those submitted, AGAs can treat such networks as not meeting the criteria *in toto* due to that miscalculation/error?

ii. the information that the competent public authorities may collect to verify the accuracy of the information provided; and

iii. the additional information about infrastructure that the competent public authorities may request operators to provide in specific

situations, when it is duly justified in order to carry out an in-depth assessment[1].

Q4. Does the Commission propose that AGAs be the sole arbiter of when an in-depth assessment is justified? The Commission is invited to state what mechanism of appeal if any is proposed to protect stakeholder submitting networks/operators against opportunistic behaviours by AGAs?

2. OBJECTIVE AND DEFINITIONS

(4) The objective of the mapping exercise is to have an objective representation of the 'achievable performance' that can be relied upon under 'peak-time conditions'.

Q5. The Commission is requested to explain exactly what is meant by "objective representation" means here. Given the reference to "to verify" in 1(ii) above, is this intended to mean/suggest that data provided by operators is all to be treated as subjective and that only the measurement methods, criteria, hypothetical theories and models set out in this annex are "objective"? If so, aside from demonstrating an innate distrust of all operators in the private market (which appears inherently biased) this raises the problem (discussed elsewhere) of existing operators' real-world network data being ignored and their networks being disqualified on the basis that the standards imposed by hypothetical models are not met. This creates the result that the existing market will be at increased risk of being 'crowded out' purely as a result of these revisions.

(5) The 'achievable performance' must be characterized at least in terms of download and upload speeds that can be relied upon under peak-time conditions.

Q6. a) Definition (19) i) in the proposed Guidelines defines "speed" by reference to this clause (5) and refers to "a connection" but does not define or state what "a connection" is or means. This may be a solution to the problems which arise through these proposals' use of the terms "user" and "end-user".

b) The present 2013 Guidelines at paragraph 58 define NGA as the delivery of services reliably at very high speed to each "subscriber" (which term is defined as persons natural and or legal that contract for service from a provider) via backhaul networks which are sufficiently close to user premises as to guarantee the delivery of the very high speed. The combination of the reliability and guaranteed requirements has introduced a contradiction and space, which has been exploited by AGAs, to disqualify existing networks by their increasing the requirement of the reliability aspect. It is the proximity of the distribution point of the backhaul network to the subscriber which guarantees the high speed being delivered and it is as a result of

[1]This may be subject to confidential treatment in accordance with national law, as relevant.

that guarantee that the advanced digital services (ADS) can be delivered reliably. The vagueness, which remains unaddressed in these proposals, is whether the speeds must be guaranteed, or if not, what exactly is meant by "reliable" and "reliably". If "reliable" is to be the yardstick then in order to avoid subjective interpretation by AGAs and their experts which in turn result in varying standards across the Union accompanied by the destruction of legal certainty for stakeholders, this needs to be defined in a reasonable and transparent manner which is aligned with market practice in the market economy.

c) 100% delivery of the required speeds all the times is impossible, not least due *e.g.* storm damage breaking FTTx systems run overground on poles, flooding damaging electrical equipment and solar flares causing wireless interference. Similarly, outages can occur from unanticipated equipment failure, system maintenance and or power drops where backup/redundant systems also fail. These facts being self-evident, guaranteed delivery in reality means something less – and the Commission should please clarify exactly what this means/applies to – or remove it completely.

d) In the case of a relatively recently State aid approved national measure the AGA relied on their independent international experts to apply the AGA's assessment framework. That assessment framework claimed to be applying the Broadband Guidelines in imposing a requirement that to qualify as NGA existing networks also had to provide NGA speeds *"to all users when they demand it"*. That expression was capable of meaning that to qualify as NGA a network had to be capable of providing the minimum speeds to all users in every subscriber's premises on a concurrent basis, regardless of a network's customers' actual activity and individual bandwidth usage patterns. Even if this expression had confined itself to the Broadband Guideline's term 'subscribers' (*i.e.* just the contracted premises served by the network) even that meaning is not only never deployed in practice in the real world, it is also impossible. It would be nonsensical for *e.g.* to provide train services for the entire population to all destinations at the same time. Similarly, in real world telecoms practice there has to be an element of bandwidth sharing, but in this case no clarification of the applicable measure was provided by the AGA. Their assessment framework did however contain a note that unusual events (such as outages caused by storms and statistically unusual bandwidth demand spikes) could be disregarded in the consideration of reliability. This was a practical concession to real world experience but still left open to question what the applicable standard was, absent those unusual events.

e) The AGA's expression *"to all users when they demand it"* was completely unexplained until the AGA notified submitting private market operators that their networks were not NGA. Only at that point, after obtaining State aid approval, did the

AGA produce reports by their experts stating that the required speeds had to be guaranteed but that what that meant was that *"all users should reliably be able to receive **a minimum speed of 30Mbit/s download** speed at any point in time."* Their experts stated that NGA networks had been defined in line with the Broadband Guidelines. In other words, through their experts the AGA interpreted "guarantee that actual delivery" as meaning that all users should be able to receive the required speeds all the time. However, their experts then reasoned that a 1:1 concurrency ratio:

"would be unreasonable because it is statistically unlikely for all users to demand 30Mbit/s download at the same time, and such a stringent concurrency ratio will substantially increase the cost of deploying an NGA network. Instead, our view is that the dimensioning rules for a network which provides a specified speed to "all users when they demand it" needs to be provisioned with a bandwidth per user that is consistent with the bandwidth provisioned in other NGA networks, that is 3Mbit/s per user.

Considering the above factors, it is in our view reasonable that the concurrency ratio for the NGA broadband network (as defined by [the AGA]) should not be greater than 10:1 (meaning 1 out of 10 subscribers) to ensure that users receive a minimum download speed of 30Mbit/s when they demand it. In the context of mapping NGA networks, it is therefore considered that a concurrency ratio of 10:1 or 3Mbit/s per user is a reasonable parameter for the assessment of NGA broadband. In other words, in principle, we classify a network as NGA-compliant if it can supply 10% of its active subscribers with 30Mbit/s, or 3Mbit/s per subscriber during busy hours."

f) In other words, through the mechanism of the subjective views of their experts, the AGA interpreted 'guaranteed delivery' and 'reliably' as (i) excluding abnormal outages and (ii) to be satisfied if the network was capable of providing the required minimum speeds on the basis that usage would be concurrent if more than 10 active subscribers on the network had to compete for each available allocation of 30Mb/s. Neither the specific concurrency ratio submitting networks had to meet to qualify as NGA nor the fact that it only applied to such proportion of their subscribers as were active during peak hours was explained by the AGA to the private market when they were invited to make their submissions to qualify as existing NGA networks. Only after State aid approval had been granted by the Commission did the AGA explain these requirements. As a result, not a single applicant network was declared to be NGA and all their coverage areas were included by the AGA in the State aided intervention area.

g) It is precisely because of the ambiguity and uncertainty in the 2013 Broadband Guidelines concerning guaranteed delivery and reliability that these expressions need to be clarified. Is this AGA and their experts correct in excluding natural events such as storms, acts of God etc. in considering reliability? It certainly seems sensible but the details need to be spelled out. Is the 'guaranteed' requirement inapposite and if not then its real meaning needs to be clarified especially in view of the new 'reliability' proposals in these new Guidelines. Is reliability to be considered in relation to the total number of (i) connected subscribers or (ii) only in relation to those that are active? The first category pays no attention to the reality that not all connected subscribers use the service or are active at the same time. The second category recognises that the question of whether a network is presently delivering the required speeds is a function of the demand placed upon it. At their respective peak-times, some networks may have high demand, some low. Each may have different theoretical ratios of potential bandwidth delivery but in practice both may nonetheless be delivering the required service. Therefore, the question of whether networks are to be assessed by

reference purely to an hypothetical model which pays no heed of a network's real world subscriber demand and actual performance become critical. If theory is set above the reality practiced in the market economy then, as with the SAM example described above, networks actually delivering NGA speeds were failed on the basis of total rejection of real world data and in favour solely of an hypothetical paradigm.

h) Into this matrix the question of "active" subscribers intervenes. What is meant by "active"? Is it solely a matter of a live connection between the distribution point and the subscriber equipment (it is often the case that subscribers de-power their subscriber equipment at night or when away from their premises. Clearly, in such cases, whilst the subscribers remain 'subscribers' in the 'contracted parties' sense, there is no way they can be said to be 'active'. Focusing on subscriber equipment that is powered but not being actively used for personal activity by end-users, is such a live connection to the base station to be treated as 'active' even though it is placing no or insignificant bandwidth demands on the network? Should 'active' subscribers only be used to refer to active in-person use and if so, does any such use *e.g.* minimally bandwidth-demanding email traffic so qualify? The problem sought to be identified and addressed by these questions is a set of requirements which by being too rigorous demand more than is actually required of a network to deliver the required service. It is submitted that as long as the required speeds are actually being delivered then all higher requirements imposed by theoretical models should be subservient. It is also submitted that the requirements should not, as was claimed by the AGA in the above example, be set by reference to an AGA's experts' personal subjective views of statistical unlikelihood and the relative degrees of additional expense which they consider too onerous which result from tighter and tighter concurrency ratios.

i) The lack of clarity in the 2013 Broadband Guidelines about the precise meaning of 'reliable' and the lack of any requirement on AGAs to pay any heed to individual networks' real-world data (especially those from SME networks which by definition are likely to be atypical compared to large operators) created the ability for AGAs and their experts to impose their subjective and thus varying standard with the resulting destruction of legal certainty for both the private market generally and market operators specifically. It is for these reasons therefore that the Commission is requested to provide greater clarity in relation to "reliable".

(6) The public authorities responsible for the public intervention may map also other performance criteria to characterize the performance of networks under peak-time conditions (e.g. latency,

packet loss, packet error, jitter, service availability[2]). Member States may choose to do so in order to better target the public intervention to address market failures and ensure an adequate step change.

Q7. There is a danger that these quality of service KPIs are used so as to influence the consideration of "reliability", which being concerned with speeds, is and must be kept completely separate This needs to be precisely specified so as to prevent AGAs from using ambiguity to reject private networks that otherwise meet the main criteria. Moreover, if the specifications for these 'other performance criteria' are set so high that in practice only FTTx solutions can realistically meet them then the Commission will be bringing about, through these changes, the very crowding out of non FTTX private networks (as well as technological bias) which the Commission seeks in its Guidelines to minimise and or prevent.

(7) Peak-time is the time of the day with a typical duration of one hour where the network load usually has its maximum[3]. Peak-time may vary among Member States and regions. As a result, in order to identify the most challenging peak-time, NRAs should be consulted.

Q8. A) The acceptance of the fact that peak-time is variable depending on the circumstances is welcomed. However, peak time also varies between networks, especially as between large operators and SME operators. It also varies, for SME operators at least, depending on the subscriber mix of and the geographical areas in which they provide service. For example, a small regional SME operator providing service to premises primarily used as summer holiday residences will have a completely different bandwidth demand pattern (and, often, peak-times as well) than large national operators where averaging, both as to peak-times and bandwidth patterns is likely to be more evenly experienced.

b) It is not at all clear how the NRA would have any, let alone detailed knowledge of this kind. The only entity that has the data about SME network's bandwidth demand patterns and peak-times are the networks themselves. However, if real-world data provided by operators is to treated as "subjective" (see 2(a) above) and to be ignored in favour of wholly unrealistic hypothetical models then a situation arises where actual true delivery of the required speeds can as a result be completely crowded out. Is this

[2] For these quality criteria the technical specifications provided by BEREC should be used: IP packet error ratio (Y.1540); IP packet loss ratio (Y.1540); Round-trip IP packet delay (RFC 2681); IP packet delay variation (RFC 3393); IP service availability (Y.1540).

[3] BEREC BoR (20) 165.

the Commission's true intention here? Moreover, when the Commission says "should", does it mean must? If not, then as has been seen in the case of the Irish NBP the consultation appears to have been light-touch where the NRA simply confirmed it had been consulted in general terms and had no objections, notwithstanding such Guidelines breaches as the Irish Authorities' complete failure to hold a public consultation about the outcome of the final mapping exercise before seeking (and obtaining) State aid approval from the Commission.

(8) The 'peak-time conditions' are the conditions expected to be experienced by the network at 'peak-time'. Appropriate peak-time conditions are listed in Section 3.1 for fixed access networks and in Section 4.1 for mobile and fixed wireless access networks.

Q9. The use of the expression "expected to be experienced" seems applicable only to future investment planned networks, not existing ones. If it is intended that this expression is to be applied to existing networks then once again this provides an example of an assessment which ignores the network's real-world data in favour of the assessing AGA's "expectations" of what the network will need to provide. This expression also seems to be referring to "peak-time" as a generalised concept extracted as an average across all operators. This by definition would be skewed to match the experience of large national operators, as opposed to paying heed to the actual real-world data If left unaltered this demonstrates an inherent bias against SME networks. It also provides yet another subjective means for assessing bodies to ignore networks' real-world data, ratchet up their "expectations" (*e.g.* in line with those experienced by large national operators in population dense urban areas) and so disqualify existing networks so as to overbuild and crowd them out of business with State aided measures.

(9) The mapping exercise must be carried out at address level for fixed and fixed wireless access networks on the basis of 'premises passed' and at address level or on the basis of maximum[4] 100x100 meter grids[5] for mobile networks.

Q10. It is noted here that FWA networks must be mapped on a premises by premises basis *i.e.* one by one so that each individual premises in a target area is assessed as being

[4]Smaller grids (i.e. 20x20 meters) are considered preferable.

[5]The data delivery should be provided in the form of geographical (polygons) areas (raster & vector data).

able to receive service. This has implications for a network being assessed on a "whole of network" approach and where some base station sites are assessed positively and others are not. If as a result of the partial negative assessments the entire network is assessed as non-compliant then this has the contradictory result that those individual premises assessed as being able to receive service are then re-assessed to the contrary. Both views cannot stand.

> (10) 'Premises passed' means premises which can be connected within a short period of time at the normal activation fee for the end user, regardless of whether those premises are connected to the network. A stakeholder can report premises as passed only if, following a request from an end user, it commits to connect the premises and activate the service within 4 weeks from the date of the request and for normal activation fees, meaning without any additional or exceptional cost and, in any case, not exceeding the average activation fee in the Member State concerned.

Q11. A) This is a very considerable change. The 2013 Guidelines at Footnote 92 require existing networks to be mapped on the basis of premises passed but without any requirement that the existing network be assessed on the basis of it being presently capable of providing each and every one of them immediately (*i.e.* within 2-4 weeks) with NGA service. Rather, existing networks have been able to show they were providing NGA service to their connected customers and include in their network for the purposes of the mapping exercise, all premises within their existing coverage area. This meant that such premises were being so mapped on the basis that there was an existing NGA network by which they were 'passed' that could provide them with service if they so wished. It also meant that the existing network was being mapped on the basis of having room to grow. That is important not least because such a network had no reasonable expectation that 100% of those non connected but 'passed' premises would wish to become subscribers *i.e.* be provided by the network with service. That apprehension is all the more valid in the case of 2 or more networks that 'passed' such premises. It also meant that although 'passed' the network did not have to upgrade its network purely for the sake of having its coverage area mapped as including all premises passed, so as to have the immediate capacity to connect such premises and provide service to them within a short period. Such expenditure by an existing network would be uneconomic unrealistic overkill. It would also require not just an economically unjustified acceleration of expenditure but would also be predicated on the false premise that all such premises 'passed' would actually become customers. In the real world of the private market, networks scale up and expand to meet demand. Unlike state aided or otherwise regulatory imposed schemes, private networks add customers and bandwidth to service those customers on an organic and demand-led basis.

b) This proposal would thus place the existing network in an impossible position. If it wants to preserve room to grow (in the form of unconnected premises where it will not be outcompeted and overbuilt by the State aided network (which by definition will be superior by virtue of the step-change requirements and provide service at

subsidised rates), it must scale up prematurely so as to be assessable as being immediately able to provide service to all unconnected premises 'passed', even though it has no certainty that any of them let alone 100% of them will ever want to become customers.

c) This approach also changes the 2013 Broadband Guidelines' requirement to map future investment plans in that it moves any intention of a network to provide service to unconnected premises in its existing coverage area (to which it cannot presently provide service – within the required 'short time') out of an existing network's 'premises passed' which are (under the 2013 Guidelines) includable in its mapping as an existing network and into the category of a future investment plan. This has the result that the existing network is forced, under threat of the State aided overbuild, to provide concrete and definitive plans to provide service to all premises regardless of whether (or any certainty about) the number of them that will actually want and contract for service for them. This appears to be an artificial 'forcing' of uneconomic private investment in order for such a business to preserve room to continue to grow *i.e.* through these proposed Guidelines an anticompetitive application of State aid and crowding out of the private market.

d) A solution might be for the existing network to be able to declare all premises in its existing coverage area as being 'premises passed' on the basis of being able to provide service *to any one of them* that wants service within the specified short period *i.e.* by removing the 100% requirement all the network has to do is to show that the premises claimed to be passed are within its existing coverage area and that it currently has (or will within the specified short period) the capacity and ability to provide service to any one of them.

e) A short period restricted to 4 weeks is unrealistic and too strict, at least in the case of SME FWA networks. If backhaul capacity has to be increased and is reliant on microwave links (not existing fibre to the transmission site), then it can take more than 4 weeks to apply to and get additional spectrum licence permissions from the NRA. In addition, especially given the current worldwide microchip shortage, ordering and purchasing new base station equipment (to add capacity to transmission sites) can take a great deal longer, leaving aside the practicalities of mounting and installing such equipment and bringing it into service.

(11) In providing the information on the performance of their networks, stakeholders should adhere to the highest scientific and professional standards. In particular, the methodology and the

techniques used to for the purpose of mapping should derive from accepted professional standards.

Q12. a) Without precise definition this could create more problems than it attempts to solve. In a relatively recent State aid approved national plan the AGA was able to criticise existing operators' submissions because they used a well-known design tool for radio links even though that methodology is prescribed by that Member State's NRA for the purposes of applying for licensed spectrum. Similarly, in that State aid approved measure the AGA rejected operators' submissions for failing to meet a concurrency ratio (10:1) but without telling operators' before they made their submissions that this was a requirement. The AGA also criticised an operator's FWA mapping submission on the ground of it having failed to provide the wireless data whilst it was being transmitted from base station to receiving antenna. Since the interposition of any equipment between those two points would by definition interfere with the transmission itself, it was impossible to know exactly what the AGA or its experts required and it was therefore impossible to pass their assessment.

b) Moreover, since it is all too easy for international experts engaged by AGAs (particularly Member States in national schemes) to state 'from their experience' that certain standards are the highest/most professional, the Commission is requested to address and prevent opportunistic behaviour by having BEREC designate the relevant standards and their alternatives as well as the acceptable methodologies and techniques, tailored to meet not just the resources and abilities of large national operators but also those of SME operators lacking such resources and abilities. Thus for example, if expensive geomapping data or software licences are required for SME operators' submission data, these should be provided or funded by the AGA conducting the mapping exercise at nominal or notional cost. The same applies to the costs of retaining the relevant expertise to prepare, submit and answer the follow up questions of and by the AGA. If that is not done then the standard should be reduced from 'the highest' (not least because there will always be room for argument about what so qualifies at any particular time as technology and methods evolve) to one that is reasonable.

c) Similarly, "accepted professional standards" should be designated as those which are generally used by all operators across the market in the normally understood manner, to include SMEs not just large national operators.

(12) In providing performance figures, operators must consider any bottleneck that could prevent them from being able to actually reach the performance declared (e.g. backhaul). Should the operators not confirm of having provided information on this basis, Member States can disregard this information.

Q13. a) "Any bottleneck" is so wide as to give complete license to the AGA to reject submissions *in toto*. Would an unanticipated solar flare event and its resulting outage

be "any bottleneck"? What of storm or flooding damage, covid type lockdowns, equipment failures in both primary and redundant/backup systems *etc etc*?

b) All that a dishonourable AGA has to do, using this requirement, is to identify a bottleneck which the submitting operator has not thought of / considered / overlooked, so as to reject the operator's entire submission. This is neither fair nor reasonable and whilst the obligation should be on the operator to identify and address all reasonable apparent bottlenecks with supporting data in its submission the AGA should not be able to reject its submission for non-deliberate failure.

(13) As regards the alternative methods for carrying the mapping exercise, for instance, for packet-switched fixed networks, public authorities may propose as an alternative, where duly justified, to use 20% utilisation factor of the most loaded (bottleneck) links defined as the average traffic rate divided by the nominal rate, at peak-time. In the case of wireless and mobile networks public authorities may propose an alternative method for instance in terms of the calculation on a 95% cell edge probability or in terms of the calculation of the nominal cell load[6] not lower than 50%[7]. In any case, irrespective of the method pursued, all network performance figures must be provided in terms of 'peak-time conditions' in line with paragraph (8).

Q14. a) Should the first line of this paragraph have the word "out" after the word "carrying"?

b) Does this clause 13 relate to the mapping exercise generally, or just to alternatives for assessing bottlenecks?

c) How many alternative methods in total are there?

d) FWA networks are fixed packet switched networks, so does the beginning of this clause referring to packet switched fixed networks intend to refer to and include FWA or not? If yes, then it is understood that the rest of the clause sets out

[6] The 'cell load' (cell loading) means the average percentage of the resources of a base station that are used by end-users with respect to a certain service.

[7] If the resulting cell load is lower than 50% this should be properly justified by the operators to the competent public authorities.

alternatives, but if not, what is the 20% utilisation factor method an alternative to, *i.e.* what are the other alternatives for non FWA packet switched fixed networks?

e) Which "alternative methods" are being referenced here? How many of them are there in total and if the AGA is free to pick and choose from among them how is the submitting operator to know which one will be chosen/used and supply the appropriate data unless informed in advance?

f) "20% utilisation factor" is defined here as "the average traffic rate" at peak time divided by the nominal rate, again, at peak time (because the standard is defined as "*the average traffic rate divided by the nominal rate, at peak-time*" - *i.e.* both numbers have to be calculated at peak time). Assume that a particular bottleneck has a nominal maximum rate of 10Gb/s and an average traffic rate of 8Gb/s. 8/10 = 80%. A 20% utilisation here would be 2Gb/s. Is this proposal therefore one which requires that operators ensure their bottlenecks always have 80% unused capacity at peak periods and if yes what is the justification for such an enormous, uneconomic and unnecessary surplus. Surely what should be intended here is that the utilisation rate <u>not exceed</u> 80%?

g) Despite the final sentence of this clause saying all figures must be provided in terms of peak time performance, it has been suggested that what was intended here was that the 80% ratio is to be applied to the <u>non</u> peak time average traffic rate. So for example (using low numbers for simplicity and illustration), if the network's average traffic across a particular bottleneck is 2Gb/s and that bottleneck's total nominal capacity is 10Gb/s, then the standard being proposed would be that out of the 10Gb/s of total capacity there must be at least 2Gb/s x 80% (i.e. 1.6Gb/s) of spare capacity on/at that bottleneck at peak times. Is this correct?

h) Either way (*i.e.* whether this suggestion is correct or not) it appears that the actual real world data of the network whose bottlenecks are being considered are to be taken into account. Is this correct? Alternatively, is such real world data from an existing network to be ignored in favour of the AGA's view of what average traffic must be? If the latter, what is the point of the submitting network even bothering to give facts such as even the total capacity of the bottleneck if its real world data is to be treated as irrelevant and ignored in favour of a value substituted by the AGA? The entire exercise will thus become an exercise in semantics totally controlled by the AGA and totally divorced from reality of what occurs in the real world market economy.

i) Re 'wireless and mobile networks', what alternative methods (other than the cell edge/area related methods discussed) are available *i.e.* what are they? If the AGA "may" propose, how is the submitting operator to know (i) what all the alternative methods are and (ii) even if all are explained how is it to know which one the AGA "may" use. Without such knowledge in advance of mapping submission the operator is at a total disadvantage as a result of a complete lack of transparency in the assessment process and open to opportunistic application and interpretation against

them, it being a given that the AGA will be likely to want to roll out the biggest and best via the State aided measure to the widest possible area and thus seek to strike out the private market mapping submissions wherever possible.

may propose an alternative method for instance in terms of the calculation on a 95% cell edge probability or in terms of the calculation of the nominal cell load not lower than 50%. In any case, irrespective of the method pursued, all network performance figures must be provided in terms of 'peak-time conditions' in line with paragraph (8).

Q15. a) The alternate method offered by this clause refers to that specified as being just one example ("for instance") thereby suggesting other methods can be used. What are they? These should be specified with particularity. Here, it appears the Commission is proposing that the mapping authority can choose to decide how it calculates cell edge probability/nominal cell load. Surely that cannot be right? Surely the intent contemplated here is that the mapping authority has the option of using the alternative method of assessing the cell edge and/or nominal cell load, not picking and choosing in a totally opaque manner how it will calculate either of them?

b) Are the cell edge probability and nominal cell load requirements the components of one alternative method, or do they each constitute a separate method?

c) It appears, but confirmation is sought, that what was intended was the suggestion that the mapping authority can use, as an alternative method, measurement of the cell edge probability and nominal cell load and that each must be better than 95% and 50% respectively. Is this correct? If so and considering the application of the 95% cell edge probability to an existing network, in the case of an existing FWA network's connected premises this measurement method appears to be completely redundant due to the fact that there is already a fixed connection (in the form of the exterior receiving antenna) to, from and through which there is a wealth of real data. FWA networks only connect such receiving equipment to premises to which the required level of service can be supplied, as is and can be verified from the connection itself and speed tests to and from it.

d) If the proposed definition of "premises passed" is used then, in effect, existing networks will be confined, for mapping assessment purposes, to their existing connected premises together with, depending on their spare capacity, a percentage margin more that could be connected to the existing system and remain compliant with the ultrafast (UF) standard. In that situation, how is any reference to "cell edge"

in any way relevant? There is no uncertainty regarding already connected premises. The inherent "probability question" is already answered by the network's real world data and as long as the unconnected premises which the network is proposing be included as "premises passed" fall within the furtherest limit of already connected premises the cell edge measurement is both unnecessary and irrelevant. If therefore the Commission permits mapping authorities to condemn existing networks from being UF because they have not provided their cell edge probability this would simply be an improper excuse for the mapping authority to crowd out an existing network and the Commission by these Guidelines would be promotional in that regard.

e) Considering the proposed requirements for nominal cell load and footnote 8 and 9's statements that the 'cell load' (cell loading) means the average percentage of the resources of a base station that are used by end-users with respect to a certain service and that if the resulting cell load is lower than 50% this should be properly justified by the operators to the competent public authorities, leaving aside the problem with the definition of end-users (see Q18 below), it is necessary for the Commission to define exactly what it means by "service" here. Given the assessment of UF is by reference to the download/upload speed (plus kpi's such as latency and jitter) one must presume the Commission is referring, in effect, to the advanced digital data-related services conveyed over the UF connection. That being so, there are multiple potential services the Commission might have in mind such as generic (email, VOIP, web conferencing, tv streaming, games playing, IOT related connections, data file transfers etc), or perhaps by reference to OSI layers, or some other method of categorisation. Either way, the Commission is requested to specify exactly what it means and to explain whether each "service" is to be assessed on a standalone basis. If not, then the Commission is requested to explain how the assessment of a combination of the defined services is to be performed. For example, do each and every one of them have to result, at peak time, as consuming no more than 50% of the available capacity, or can services consuming more be netted off against services consuming less so as to arrive at a blended average?

f) Moreover, why should an operator need to justify anything to the mapping authorities where the "resulting cell load" (*i.e.* the average percentage of base station's resources being used) is less than 50%, for surely that means there is more than 50% surplus/not being used? Did the Commission not intend to specify here that the average percentage used by users (is this to be calculated only at peak time or across a full 24 hour period (or some longer period?)) must not exceed 50%? Without clarification here it is impossible to know exactly what it is that the Commission is seeking to specify. In addition, when referring to "the average percentage" once again it is not clear over what period of time is being contemplated or specified, nor whether this is applicable to the entire network or each discrete base station coverage area/cell nor whether the averages are to be tied to existing network data for each cell or whether the latter is/can be totally disregarded in favour of hypothetical requirements imposed by the mapping authority?

3. RECOMMENDED METHOD FOR MAPPING SPEEDS OF FIXED ACCESS NETWORKS

3.1. CRITERIA FOR MAPPING SPEEDS OF FIXED ACCESS NETWORKS

Q16. Guideline 19(b) defines fixed networks as including FWA. Confusingly, it thus appears that FWA networks can be mapped both or either by the mapping methods recommended both in this section applies and in the next section dealing with fixed and wireless access networks. Is this what the Commission intended and if so which of all the recommended methods is to have precedence and how is an existing or future plan investor to know which applies?

(14) For the purpose of this mapping method, Member States must request stakeholders to provide information on the speed provided by their network under peak-time conditions.

Q17. It is noted that the actual real world speed provided by their network is required for these purposes (and that this is in complete contrast to that set out at clause (20) (when introducing section 4) where operators must produce calculations to meet mapping authorities' hypothetical model requirements). However, if it is the Commission's position that such data is to be disregarded by mapping authorities the point of existing networks providing such data is not understood? The conflated application of this method for assessing both existing and future planned investments in networks is regrettable, for in the former case the network clearly already possesses real world data based on its network's actual performance, whereas the latter can only provide hypothetical data. If however it is the Commission's intention that existing networks' real world data is irrelevant to their assessment as UF by AGAs, then the Commission is requested to make this section specify that the data to be provided by such networks is that which demonstrates that the AGA's hypothetical model is satisfied.

(15) Peak-time conditions is understood as whenever a minimum 20% of the users are active and transmitting concurrently at the nominal peak rate provided by the operator

to each of them, both downstream and upstream, which correspond to the usual oversubscription rate definition[8].

Q18. a) It is not clear from the term "whenever" whether the Commission asking for a time-based/temporal assessment *i.e.* that peak time conditions are to be regarded as arising when these specified events occur *i.e.* at any time when 20% of users (ignoring the problem with this expression – see below) are active and concurrent, or whether the Commission is mandating that AGAs and private market stakeholders are required to assume that, at peak time conditions, 20% of users will always, regardless of the reality in the market economy, be active and concurrent in use. The first scenario requires analysis of the network's actual traffic patterns whereas the second ignores it. The Commission is thus requested to clarify this.

b) The question arises as to what is a "user" for these purposes? Article 19 does not define "users" but Article 19(k) defines "end-user" as a natural or legal person (citizens, businesses, public administrations) using or requesting electronic communications services. It is thus not clear if a "user" for the purposes of these Guidelines is to be regarded as the same as an "end-user" and if not how a "user" is different?

c) EECC Article 2(13) and (14) define "user" and "end-user" as follows:

> "(13) 'user' means a natural or legal person using or requesting a publicly available electronic communications service;
>
> (14) 'end-user' means a user not providing public electronic communications networks or publicly available electronic communications services;" (emphasis added)

d) Could the Commission please clarify why it has added "public administrations" to its definition of "end-user" when it is clearly the case that public administrations are not legal persons? Does the Commission intend to change the EECC's definition in these proposed Guidelines?

e) That aside, it is clear from the EECC's two definitions that a user can include an ECN or ECS provider but an end-user cannot include such entities:

- Recital (9) of the EECC refers to facilitating access for end-users with disabilities, but it is difficult to see how businesses or public administrations can so suffer. Recital (13) mentions focus in the past having been on growing bandwidth available to each individual user, but once again it is difficult to see how a public administration

[8] The very same network infrastructure can provide very different performance levels to the end users depending on how many users are being multiplexed in bottleneck links and what their nominal speeds are. Performance depends on the number of users concurrently active (which increases during peak-time conditions). Such 'statistical multiplexing gain' (minimum 20% meaning 1:5 activity level) requires also that accurate- enough user traffic distribution models are employed by operators.

can be regarded as one individual user, as opposed to a public body containing many individual users.

- Recital (23) distinguishes Union citizens and Union businesses thereby suggesting they are different so far as being users or end-users are concerned.
- Recital (67) distinguishes users from consumers, the former perhaps a more general expression and the latter referring only to those actually purchasing the service.
- Recital (68) clearly regards end-users as including consumers, microenterprises and small enterprises (as defined).
- Recital (96)'s discussion of warning about security threats being given to users clearly contemplates all persons legal and natural using the service.
- Recital (140's) reference to end-users using public buildings and public infrastructure again indicates that end-users are individual users, not collections of them.
- Recital (144)'s reference to an end-users' network termination point makes it clear that it is the persons using the NTP that are users, not the NTP itself.
- Recital (199) distinguishes end-user premises from end-users themselves.
- Recital (215)'s focus on the speed of internet access experienced by a given user demonstrates that a user of the service is just that.
- The removal of the definition of and any reference whatsoever to "subscriber" in the EECC (as defined and used previously in the Directives which the EECC recasts) shows that the replacement of "subscriber" with "user" and "end-user" is not accidental and that it is intended that user and end-user do not refer in any limited sense to persons previously defined as subscribers but now extend to all users of the service regardless of whether they are the persons who contracted for the service or persons who use that contracted for service.
- EECC Recital (219)'s focus on affordable price is not solely directed at persons who contract for service to a premises but also to all members of households which are low income or have special social needs.
- Similarly, EECC Recital (227)'s concern with text sign and speech communication services for persons with disability is not targeted on the basis of one household only ever having one such user with such requirements, but on all of them where there is more than one.
- Recital (242)'s reference to "Providing a connection which supports broadband speeds to an increased number of end-users enables them to use online services and so actively to participate in the digital society" amplifies this point.

f) As a result, it seems plain that absent any other definition having been provided the Commission intends the word "user" here to mean anyone using or requesting the service. Would the Commission please confirm this?

g) With this in mind, the Commission's use of the word "users" is unclear. "Users" can include (i) the person (legal or natural) contracting for the internet access service (*i.e.* the requester of the service – and bear in mind that the person that contracts for a service to be provided for internet service to a premises may not be the person owning or renting those premises) (ii) legal and natural persons owning or leasing those premises (iii) any natural or legal person at those premises using the contracted for service. There is also the problem of the use each "end-user" makes of its internet service. Increasingly, end-users have multiple devices using internet access services for many purposes, both identical, similar and different (*e.g.* PCs, laptops, tablets, mobile phones, smart devices, household and business premises' plant and equipment all connected increasingly as part of the internet of things). Worse, as part of the development of the IOT non physically present entities may own devices within households and business premises which they use to provide services to persons within and or without those premises (*e.g.* security monitoring) so that even though not present they still qualify as "end-users" of the internet service. Given the breadth of that meaning, would the Commission please explain how (a) any network operator, whether of an existing network or one intending to develop a network in the future as an investment plan, is able to know how many users there will be at any time, how many devices each "owns" and how many each "is using" (the difference is that some may be powered off, powered on but not active, or active) for the purposes of calculating how much bandwidth must be delivered to all and each end- user and (b) how any mapping authority can know that information for the purpose of imposing its hypothetical model requirements on any network?

h) In the Commission's proposals specific to wireless networks in section 4 at clause (20) iv it is stated that the network's speed per end-user should be measured by reference to outdoor antennas and that if a receiving antenna is shared among multiple end-users the overall performance should be considered equally shared among end-users. Footnote 15 explains that with FWA this might be applicable for shared rooftop antennas for a multi-dwelling building. This footnote makes clear that what the Commission has in mind is that the individual dwellings in multi-dwelling buildings are each to be regarded as one "end-user", but (i) this is inconsistent with both the EECC's and the Commission's definition of "end-user" (because as demonstrated above) a dwelling is not an "end-user" and (ii) this also ignores the fact that each and every single dwelling may be occupied by multiple (and varying numbers of) end-users. Is what is being said here that notwithstanding these definitions, the Commission will in practice disregard them for these purposes? If so, the Commission is requested to explain its specifying of a definition but then applying it to have a completely different meaning?

i) Leaving the above issues to one side, on the basis that this would tie the measurement of the internet access service to its delivery to the network termination device/receiving antenna of each 'subscriber' (using the pre EECC definition) would the Commission please clarify whether in its view a user/end-user is to be regarded as "counting" as such if, notwithstanding being a contracted subscriber for service, the subscriber's antenna is powered off? The reason for the question is because if the device is powered off it has no demand for service that the network needs to meet.

Therefore, in calculating whether a network can deliver UF service, are submitting operators and AGAs to regard all subscriber's devices as being "users" regardless of whether they are in fact using or not?

j) Assuming subscriber antennas are powered on and thus qualify as "users", the Commission is requested to explain what it means by "active"? If an antenna is powered on but is not being used in the sense of actively generating traffic, is it nonetheless to be regarded as being "active"?

k) The Commission is requested to indicate whether the use that is made of each such connection matter? The bandwidth consumption of households occupied by elderly persons may be limited to such things as internet browsing and emails, whereas those occupied by young families may have completely different and far higher "usage" of the service. Can a network use average overall consumption by subscribers at each bottleneck to show that it is able to deliver UF speeds, even though a hypothetical model might require that all subscribers be regarded as high usage users? If the latter, does the Commission appreciate that it will thereby be requiring operators in the private market to spend money time and resources to upgrade the capacity of their network to meet a wholly unrealistic, unnecessary and non-economic market-based purpose? Presenting a business plan to a bank or investor to secure investment on such a basis by definition, because the revenue stream remains exactly the same from existing customers, has far less chance of success and in effect maximises the chances of driving the network out of business *i.e.* has the very crowding out effect the Commission seeks to minimise.

l) The Commission is requested to state whether the overall result of the above discussion is that, as far as the Commission is concerned, 20% of all antennas contracted for service, regardless of whether they are installed on premises, powered on, or active, are nonetheless to be treated, for the purposes of an UF mapping assessment, as being both active and being used concurrently? In short, is the Commission insisting on a mapping of the reality of the market economy based on non-recognition of whatever market economy operators are doing and only recognising operators that apply more stringent and non market economy based standards?

"(15) Peak-time conditions is understood as whenever a minimum 20% of the users are active and transmitting concurrently at the nominal peak rate provided by the operator to each of them, both downstream and upstream, which correspond to the usual oversubscription rate definition. [FN 8]

Footnote 8 - The very same network infrastructure can provide very different performance levels to the end users depending on how many users are being multiplexed in bottleneck links and what their nominal speeds are. Performance depends on the number of users concurrently active (which increases during peak-time conditions). Such 'statistical multiplexing gain' (minimum 20% meaning 1:5 activity level) requires also that accurate- enough user traffic distribution models are employed by operators."

Q19. a) The Commission is requested to clarify a number of aspects. The wording *"which correspond to the usual oversubscription rate definition"* is not understood. It this by chance referring to the "nominal peak rate" provided to each subscriber? What is the "nominal peak rate" provided to each subscriber? Is it the minimum speed requirement (*i.e.* 100Mb/s for UF, or 1Gb/s for what one might term "Gigabit")? What is an "oversubscription rate" in this context? What is "the oversubscription rate definition" in this context? What is "the usual oversubscription rate definition" in this context?

b) In relation to footnote 8, performance is understood not just to depend solely on the number of active and concurrent users. Performance is understood to be a function of the totality of the bandwidth provided for the subscriber base in question, how many of them are active at peak times and their particular (high and low), general and average, bandwidth consumption/demand (*i.e* the network's traffic patterns in the case of an existing network) and as long as the network stays comfortably ahead of bandwidth demanded at peak time so as to provide the requirements of any active users and carry as overhead an reasonable margin of additional channels of the required minimum speeds (and assuming the technology is capable for the task) a mandatory 5:1 concurrency ratio based on being applied to all contracted subscribers (regardless of whether in reality they are actively generating traffic let alone demanding the minimum bandwidth requirement concurrently) may be completely unnecessary and wasteful to ensure those that are in reality active and concurrent are provide with the speeds they contract for. However, this paragraph and footnote 8's reference to 20% meaning "a 1:5 activity level" is not clear in that, whilst for the purposes of these submission it is presumed that the Commission intends that a 5:1 concurrency ratio is required, this may not be the Commission's intent? Given its significance however, the Commission is therefore requested to provide explicit clarity.

c) It is understood that a concurrency ratio contemplates a situation where there is competition for bandwidth. In the case of a requirement (but not a guarantee) that a specified minimum speed be available reliably to each subscriber the question arises as to how many subscribers can share a channel of the required speed (say 100Mb/s in the case of UF) without their usage competing so vigorously that they cannot reliably access it. This is the discussion already covered in Q6 above in which it can be seen that in relation to any minimum speed requirement (be it NGA-30Mb/s, UF-100Mb/s, or Gigabit-1000Mb/s) the Commission approved a 10:1 ratio as being statistically appropriate to ensure reliability. For this reason the Commission is asked to explain

why, having approved that 10:1 ratio (namely no more than 10 subscribers for each channel of the required speed limit) within the last few years, the Commission now appears to have reduced this to an even more statistically pessimistic 5:1?

d) Applying the effects of this reduction to an exemplar FWA base station with say a total of 1Gb/s of total download capacity, with a 10:1 concurrency ratio requirement such an FWA network could connect no more than 10 subscribers per 100Mb/s *i.e.* 100 subscribers in total to that base station. The moment the concurrency ratio drops to 5:1 the total number of subscribers permissible connected to that 1Gb/s supply is 50, a dramatic and costly reduction.

e) Moreover, footnote 8's requirement for operators to provide "accurate-enough" "user traffic distribution models" so as to demonstrate they are not breaching the mandated 5:1 active and concurrent peak time bandwidth capacity assumption appears to switch the real for the theoretical when all that existing networks, operating as a market economy operators, have to do is to show that they are actually in practice providing sufficient (and as a result economically and financially efficient and prudent) amounts of bandwidth to ensure the required minimum speeds and the ADS run over them are reliable. Ignoring that real world efficient market operator data to enforce a higher more stringent and market uneconomic hypothetical model which is heedless to that which is actually required in an efficient market situation and by which existing operators' networks (through failure to show good enough (in the AGA's judgment) hypothetical user traffic models) can be disregarded as non compliant (and thus available for overbuild by a SAM) does not appear to be a mapping of the reality of the market economy reality and carries the implication that an artificial non-market economy-based assessment will be substituted by which the private market will be crowded out.

3.2. INFORMATION FOR VERIFICATION PURPOSES – BEST PRACTICES

(16) To limit risks of opportunistic behaviours by stakeholders and ensure that the information provided is sufficient, consistent, and can reliably be counted upon, with a view to avoid delaying the delivery of services in the target area, the competent public authorities carrying out the mapping exercise may decide to require stakeholders to submit further information regarding their networks for verification purposes.

Q20. a) The Commission is requested to say how it proposes (and where) to limit the risks of opportunistic behaviours by AGAs private market crowding out, especially for example in preferring larger operators over SMEs?

b) The Commission is requested to say how a submitting operator is to know if an AGA "may decide" it wants further information? Does the AGA have to justify (whether publicly or at all) the exercise of this discretion to the Commission or is it solely a decision for the AGA to make?

c) It is noted that the decision to seek further information is to be for the purpose of verifying information already provided, not for the purposes of ignoring or evading it or finding reasons to do so.

(17) The competent public authorities may ask stakeholders to provide the full description of the methodology used to calculate their achievable performance, including, but not limited to:

i. the access network technology used (FTTH, FTTB, ADSL, VDSL, VDSL + vectoring DOCSIS.x, etc.), with full specification of the corresponding standard;

ii. the topology of the network (e.g. P2P or a P2MP), including a simplified graph that reflects the physical layout of the cables/fibers (for instance, a tree topology in a GPON);

iii. the bottleneck links in the topology of the network, defined as the network segments with larger statistical multiplexing gain, including clear information concerning either (i) the oversubscription ratio used for dimensioning such a link (e.g. in the backhaul network) or (ii) the capacity planning exercise performed for such bottleneck links. In any case, the public authority may request a statistical characterization of the achievable speed for an end-user (e.g. the average or typical speed or probability of achieving the nominal speed to be provided to the end-user at any point in time, with indication of the user model assumptions).

Q21. a) As far as hypothetical models are concerned this section appears to be more appropriate to future planned networks as opposed to those which are already in existence. In the case of an existing network there is no need to calculate any theoretically achievable performance based on "statistical characterizations of the achievable speed", a capacity planning exercise or explaining the assumptions in the model due to the fact that the existing network already possesses the real world market economy end-user data.

b) In the case of the recently State aid approved national measure referred to previously the AGA used this kind of information request to demand copies of the data actually sent between a test base station to a receiving antenna submitted by an FWA network. The AGA rejected traffic graphs captured at the endpoints and claimed that

the network's non-production of the data demanded was a failure to provide information. If this or similar behaviours is regarded as such by the Commission, the Commission is requested to indicate in relation to this section how it proposes to prevent opportunistic private market crowding out behaviours by AGAs?

3.3. INFORMATION FOR IN-DEPTH VERIFICATION PURPOSES – BEST PRACTICES

(18) The competent public authorities may decide to require stakeholders to submit further information on network components and their locations for in-depth verification purposes, for instance to review the methodology used to calculate the performance submitted.

Q22. a) The Commission is requested to explain whether this verification is part of the same verification exercise in section 3.2 above and by which the Commission is providing further detail/more examples, or is this yet another level of verification? If the latter, what controls its exercise and in particular how is it controlled so as not to have a disproportionate burden on SME operators? For example, in the case of a recently approved State aid measure the AGA took 12 months of detailed (and expensive to answer) questioning to one FWA network about the performance of one single base station at one single site. How does the Commission seek to control such burdensome behaviour so as to prevent that very behaviour, by itself, forcing SME operators to drop out of the mapping process and be crowded out?

b) Re network components and their locations, in a recently approved State aid measure the AGA criticised operators as failing to provide information in circumstances where the information in question concerned the detail and specifications of fibre-optic equipment owned by unrelated third-party wholesale bandwidth providers through whom the operator purchased backhaul connectivity to the internet. Once again, it would be helpful if the Commission could indicate what steps it proposes to prevent opportunistic behaviours by AGAs in relation to these new Guidelines?

The Commission is requested to make it clear that the methodology sought to be verified is the methodology provided by the submitting operator, not that imposed by the AGA as requiring to be satisfied. In the case of the recently approved national State aid measure referred to earlier the AGA demanded information without disclosing that they would not pay any heed to submitting networks' real-world traffic data and that instead such operators had to satisfy an undisclosed purely hypothetical model containing an undisclosed 10:1 concurrency ratio applicable to all users of the operator's service, irrespective of whether such users were subscribers as defined in the Directives replaced by the EECC or end-users as defined in the EECC *i.e.* all persons in each premises actually using the service. The Commission is invited to confirm that

lack of clarity by an AGA and lack of advance notice as to its information requirements will be addressed in these Guidelines.

(19) The competent public authorities may thus ask stakeholders to submit further information on the access part of the fixed network, including but not be limited to:

i. the location of the cabinets and the wiring distance from the cabinet to the household;

ii. clear information on link-budget calculations (e.g. on how the received signal power level is mapped to bit-rates, link-budget margins used etc.). The competent public authorities may ask operators to provide all applicable link-budgets used to design and dimension the network services, with their key parameters, including the description of the methodology followed by the operator to develop the link-budget and the rationale.

Q23. a) The Commission is requested to confirm that this section is directed to assess a future network plan as opposed to using the market economy data available from existing networks. If not, Also, the Commission is requested to confirm that this section's requirements are predicated on and presume a large network operator approach. It is submitted that such an approach is inapplicable to all types of networks. In the case of SME FWA operators which started their networks from very small beginnings, no link budgets, design and or dimensioning of network services, methodology or rationale will have been involved. Such operators will have started with one site and added base stations and bandwidth to meet demand. Premises will have been connected without any advance design or plan or link budget. Connected properties will have been validated (in terms of their being connected to the network) by their physical (not desktop theoretical or hypothetical) site survey and physical test connection. Such networks will thus have followed a simple market economy model of growing their network by investing in it where they had a reasonable opportunity of making a profit and by following and meeting demand for connections and thus also bandwidth capacity as and when it arose.

b) If therefore the Commission imposes the kinds of models, data and hypothetical requirements appropriate to a future investment plan to such a network in order for it to qualify as UF, the Commission will be requiring information to be provided which has never been developed or used by networks of this kind. As a result the Commission will be imposing a one-size-fits-all set of requirements based on large-scale operator network which are totally inapposite for small scale organically grown demand-led SME networks. In so doing such networks with their comparatively limited resources will be forced to purchase the specialist expertise they are unlikely to have internally as well as the software licenses and mapping data to develop the necessary designs, models and information and, given the time and expense requirements relative to their resources, are at risk of being intimidated into giving up on making the effort and thereby being crowded out of the market.

4. RECOMMENDED MAPPING METHOD FOR MOBILE AND FIXED WIRELESS ACCESS NETWORKS

4.1. CRITERIA FOR MAPPING THE PERFORMANCE OF MOBILE AND FIXED WIRELESS ACCESS NETWORKS

(20) For the purpose of this mapping method, Member State should request stakeholders to calculate their network performance taking into account the following principles:

Q24. a) It is noted that, unlike the introduction to section 3.1 at clause (14), FWA stakeholders:

- are not invited to provide information to demonstrate their networks' speed at peak time conditions for verification of that information, but instead are required "to calculate" network performance by reference to hypothetical requirements. To the extent that these two approaches are different and to the extent that non wireless fixed access networks are entitled to submit their networks' real time traffic data, this would appear to constitute a discriminatory approach.

- are being required to demonstrate not just the speeds they provide but also the far more nebulous and ill-defined concept of "performance". Once again the Commission is requested to explain this technological discrimination and the creation of far more opportunities for AGAs to indulge in opportunistic behaviours by finding any one of far more available excused not to recognise FWA infrastructures so as to promote a FTTx agenda.

b) In relation to protection for stakeholders against opportunistic AGA behaviour (the systemic and in-built attraction being entirely understandable that AGAs might wish to have the best possible broadband technology system and the greatest amount of EU funding that might be available) and on the basis that the more means the Commission provides for AGAs to fail submitting existing networks the greater the room for AGAs to find such reasons, the Commission is requested to clarify whether a stakeholder's failure to meet any one recommendation thereby entitle an AGA to reject such network's entire submission as non-compliant? If so, would the Commission please explain how it proposes to protect the private market against such opportunistic behaviour? Would the Commission also please confirm that existing network's real-world data is to be completely ignored in preference for them being required to meet all these hypothetical requirements and simulations and be failed as being an existing network on that basis *i.e.* even though their real data can demonstrate the required minimum speeds are actually being delivered reliably?

i. use the best industry practices[9] considering all the major effects on the wireless signal propagation[10];

Q25. It is submitted that the following problems arise with this recommendation:

a) 'best industry practices' change over time and unless specified in a commonly available and regularly updated source it is all too easy for AGAs and their experts to decline to accept and fail a submitting network for using "the wrong" industry practice on the basis they disagree that it is "the best industry practice". Whilst this recommendation appears designed to protect AGAs against opportunistic behaviours by submitting stakeholders, by not providing protections for stakeholders against opportunistic behaviour by AGAs (*e.g.* at the very least by providing specificity) this un-balances the chances of a fair assessment process. For example, in a recent approved State aided measure FWA operators' submissions to the AGA included a best industry practice 2m resolution LIDAR survey of their total coverage area showing all base stations and connected premises, but this was disregarded out of hand by the AGA's experts who preferred a far less expensive and far less accurate polygon mapping model.

b) 'best industry practices' are likely to be the most expensive, whether because of the expertise, technology or software licenses involved. Accordingly, this requirement appears weighted in favour of large national operators with deep pockets and easily able to apply them, but precisely because SME operators do not have such resources it appears weighted against SME operators. The Commission is therefore invited to re-weight this balance by ensuring that these resources are provided to SMEs with an annual turnover below [say €20 million] either free of or at notional charge and thereby ensure a level playing field. Otherwise SME operators that have never used these methods and practices before, having grown organically from scratch on a market economy demand-led basis must automatically be able to engage with AGAs at the highest and most expensive possible level. Either way, the Commission is requested to ensure that AGAs are required to specify exactly what is required in advance.

[9] Best industry practices mean modelling parameters, tools, planning, and error boundaries that are common in planning of wireless communications systems and business, and which can be deemed to be faithful and correct enough by experts in the field if they were to verify the methodology.

Q26. The Commission is asked for its proposals to protect stakeholders against opportunistic behaviour by AGAs whereby their experts (against whose collective opinion there is no appeal, especially in cases where there is no public consultation about the outcome of the final mapping exercise) "deem" modelling parameters *etc* in a biased manner to the detriment of submitting stakeholders and in support of the AGAs' preferences (and their own, usually substantial, fees).

[10] Such as terrain, building, and clutter when predicting the received signal power.

Q27. *c.f.* the far superior and more expensive LIDAR survey commissioned in the State aided case referenced above which was completely ignored by the AGA concerned.

ii. base the calculation on a 95% cell edge probability[11] of reaching the declared performance and in any case no less than 95% of probability to reach the declared performance in each of the grid points considering possible variations of propagation conditions due to random effects and possible variations among the points within the area considered (i.e. at address level or on the basis of maximum 100x100 meter grids);

Q28. a) It is noted that submitting existing networks are to be required to submit their calculations not based on their real-world market economy-based traffic and bandwidth supply and demand *etc* data but so as to meet requirements far more onerous and expensive than required by the market economy.

b) On the basis that, due to the proposed change to the definition of "premises passed" (presently at footnote 92 of the 2013 Broadband Guidelines), existing networks appear now to be limited in terms of being affirmatively mapped solely to their connected subscribers (albeit possibly with a small allowance for some unconnected premises) in their coverage area, then as long as such unconnected "premises passed" are within the perimeter already defined by connected premises, the requirement for proof of a 95% connection probability for such a coverage area's cell edge appears un-necessary.

c) In addition, since clause (9) already prescribes that mapping of fixed and FWA networks must be done on a premises passed basis and that only mobile wireless access networks must be mapped on a maximum 100x100m grid basis, this recommendation's reference to grid points is confusing and open to opportunistic behaviour by AGAs. The Commission is therefore requested to clarify that the grid point assessment basis in this recommendation is confined solely to mobile wireless access networks. Otherwise AGAs/their experts could assert that mapping performed on a coverage polygon basis has too high a degree of imprecision for the submitting network to satisfy the 95% cell edge and equivalent cell area percentage requirement (even though the probability of being able to provide a connection throughout the totality of a cell area, for FWA mapping purposes is an unnecessary requirement due to the fact they only connect to designated non mobile fixed points).

iii. assume peak-time conditions as follows:

[11] The 'cell edge probability' means the likelihood that the minimum performance will be met at the ultimate edge of the coverage area (maximum claimed coverage distance in the area considered). The calculation needs to be based on realistic propagation simulations, link-budget calculations, and sufficient margins.

a. for mobile networks, a nominal cell load[12] no lower than 50%[13] or higher in the case of peak-time traffic conditions being significantly higher;

Q29. a) The Commission is requested to confirm that it is hereby recommending that the percentage of base station resources used at peak time by end-users must never go below 50% in respect of individual advanced digital services (ADS) run over the mobile wireless connection and if so which particular ADS and how are these to be identified and particularised?

b) It is submitted that for a network to be restricted to running a system at never more than 50% of its capabilities carries has the appearance of a requirement which is not grounded on the experience of the broadband market economy and which as a result of being un-economic and un-necessary, has an anti-competitive, market distorting and crowding out effect.

b. for fixed wireless access networks, the expected realistic peak-time traffic conditions should be used to derive the appropriate cell load for calculations[14];

Q30. a) This is not understood. The Commission has already specified that FWA networks must assume that 20% of their users are active and concurrent at peak time (and see earlier for the imprecision problems therein that require clarification). As a result it is not clear how "expected peak time traffic conditions" have any bearing. The Commission is asked to confirm if it is saying here that existing networks' real-world data can now be relied upon – and if so – what if that data shows the required speeds and ADS are being delivered reliably but the hypothetical models do not? What if AGAs and their experts indulge in opportunistic behaviour by refusing to accept a network's real-world traffic-data and information about their equipment's capabilities and refuse to carry out site inspections to validate it, as is exactly what occurred in the case of a recent State aid approved measure?

b) It is submitted as stated above that a restriction requiring a system never be run at more than 50% of its capabilities looks like un-economic anti-competitive overkill. Footnote 14's contrast between mobile and FWA networks and its statement that FWA will have higher competition for base station resources suggests that FWA networks must have even more resources kept free at peak times and appears to be recommending that FWA networks must never use more than 10% of their base stations' capabilities at peak time. This would be extraordinarily restrictive and far worse than the 50% restriction for mobile base stations. An alternative reading of this footnote is perhaps that the Commission intends that FWA networks be permitted to use up to 90% of base station capabilities, which would be far less

[12] The 'cell load' (cell loading) means the average percentage of the resources of a base station that are used by end-users with respect to a certain service.

[13] If the resulting cell load is lower than 50% this should be properly justified to the competent public authorities.

[14] If peak-traffic estimation is not used, the nominal 90% cell load for fixed wireless access shall be used. The higher cell load for fixed wireless access (compared to mobile networks) reflects the expected different usage pattern resulting in higher competition for the use of the shared resources of the serving base station.

onerous. The Commission is therefore requested to clarify and explain what it intends here and why as well as explaining what exactly is the status of the "recommended mapping methods" and what happens if AGAs do not follow them?

c) Finally in relation to footnote 14 the Commission is requested to explain exactly whose expectations are being referred to in the expression "expected cell load" *i.e.* expected by whom? If this is an expectation of either the Commission or AGAs and what is the position if such expectations prove unfounded by reference to real world traffic data?

iv. provide the performance per end-user and based on outdoor antennas. If a receiving antenna is shared among multiple end-users, the overall performance should be considered equally shared among end-users[1516];

Q31. It will often be the case that the UF service provided to a premises will be used by more than one 'end-user' (as EECC defined). Given the EECC and these Guidelines' definition of "end-user" (which does not include "outdoor antennas"), the Commission is requested to explain how a submitting network is to know, even by reference to receiving antennas, how many end-users there are. each of whom by definition have to be provided with the required minimum speeds? Footnote 15's comment about FWA networks having rooftop antennas which are shared to serve a multi-dwelling building is of no assistance. All that means is that the minimum speed delivered to such a shared antenna must be a multiple of the per end-user minimum speed which is consistent with the number of end-users to be served. It is noted that the Commission seems to be suggesting that a shared antenna "can be considered" as being an end-user and that as long as the required minimum speeds are deliver to that antenna that minimum speed can be regarded as being shared equally between each dwelling sharing it. However neither the EECC nor the Commission's definition permits such a potentially massive reduction in minimum speeds to be delivered to each end-user as so defined and any such person will be justified without reproach in complaining to their NRA that they are not being provided with the requisite speeds and services to which they are entitled.

[15] In fixed wireless access this may be the case for shared rooftop antennas for a multi-dwelling building.

[16] 3G UMTS and HSPA technologies; 4G LTE or LTE–advanced technologies; 5G either the 3GPP Release 15 (New Radio (NR) non -standalone- the core network is 4G) and NR standalone (the core network is 5G) and further developments - 3GPP Release 16 under development and will include new specifications for 5G. The competent authority may, and is recommended, to collect information from 3GPP based technologies so that the used 3GPP Release levels can be known, but the previous granularity is also adequate.

v. provide the performance per technology and per operating frequency in case of coverage with multiple technologies[16] and multiple frequencies [17], considering the bandwidth actually available per frequency. In case of use of unlicensed frequencies, this should be clearly stated.

Q32. a) It is noted that the Commission appears to accept in these Guidelines that FWA networks are able to be mapped as providing UF using unlicensed frequencies. The 2013 Broadband Guidelines never prohibited such FWA technology yet in a recent State aid approved national measure the AGA effectively prohibited such technology from so qualifying when mapping NGA networks with the result that out of a large SME FWA operator sector not one network was recognised and mapped as NGA by the AGA concerned and the State aided measure (SAM) approved by the Commission is presently being rolled out to completely overbuild their coverage areas.

b) The Commission is requested to confirm that footnotes 16 and 17 only relate to mobile wireless networks.

(21) In line with paragraph (12), operators must consider in particular:

i. the type[18] of backhaul and its capacity for each base station[19];

Q33. It is submitted that this gives the appearance of a technologically biased observation due to the fact that the provisioning of even a fibre optic cable to a base station would need to be examined, verified and assessed. It is therefore suggested that this footnote be deleted.

ii. for fixed wireless networks, the number of served and of passed premises present in each calculated grid.

Q34. a) Clause (9) (of these Annexes) requires that FWA networks be mapped on a "premises passed" basis. Accordingly the Commission is requested to explain exactly what "grids" have to do with this recommendation and what grids FWA networks have to use or refer to for these purposes and where this is explained.

b) The recommendation at "ii" makes it clear that FWA networks are to be assessed for mapping purposes by reference to whether they currently have the technical facilities available to provide the required minimum speeds and ADS reliably to all premises within their coverage areas, regardless of whether such premises are to be treated as falling within the definition of "premises passed". On the basis that "passed premises" means something completely different the Commission is requested

[17] This is to separate sub-6 GHz and mm-wave frequency bands as they are often used for different categories of services.

[18] Fibre optic, carrier grade copper Ethernet, wireless, etc.

[19] In the case of fibre optic connection this can be normally assumed to be sufficient.

to confirm that as a result of this recommendation the Commission is increasing the burden of proof still further on FWA networks so that they not only must prove they can provide the required minimum speeds and ADS to premises falling within these proposals' new definition of "premises passed" (*i.e.* in grids) but also all other premises within their coverage area *i.e.* 100% of them. Both such requirements (the lesser and the greater) appear to comprise the imposition of non-economic market behaviour as a basis for existing networks being mapped so as not to be overbuilt by a SAM and as such appear to constitute a distortion of the market economy and a crowding out.

c) In the above context therefore the Commission is requested to explain what "serve" means. Is a "served premises" one that is (i) presently connected as a subscriber or does it include (ii) one which qualifies as a "premises passed" because the covering network presently has the ability to connect it and provide it with service within the premises passed required timescale even though it is not yet connected to the network?

4.2. INFORMATION FOR VERIFICATION PURPOSES – BEST PRACTICES

(22) To limit risks of opportunistic behaviours by stakeholders and ensure that the information provided is sufficient, consistent, and can reliably be counted upon, with a view to avoid delaying the delivery of services in the target area, the competent public authorities carrying out the mapping exercise may decide to require stakeholders to submit further information for verification purposes.

Q35. a) The Commission is requested to clarify who is to be the arbiter of such "risks", by what yardstick are they to be measured and to what truly independent body is there any means of appeal?

b) The burden of ensuring that the information provided is sufficient, consistent and 'can reliably be counted upon' is dependent upon AGAs informing operators, in advance, of exactly what information is required. Accordingly, and in order to balance the risk of opportunistic behaviours by AGAs, the Commission is requested to make such advance disclosure a requirement so as to ensure that submitting FWA operators cannot be disqualified on the grounds of failing to provide information they were not informed in advance was required. This is exactly what occurred in a recent State aid approved measure where if the AGA had informed stakeholders in advance such things as: that the AGA no longer prohibited non LTE-Advanced technology nor all technology using unlicensed frequencies from qualifying as NGA; that existing FWA networks' real-world traffic data was irrelevant; that hypothetical models had to be satisfied, and; that FWA access networks had to be dimensioned on a 10:1

concurrency ratio, then the FWA operators that made submissions might at least have had some chance of being able to provide the information required for the assessment.

(23) The competent public authorities may thus ask stakeholders to provide the full description of the methodology used to calculate their coverage maps, including, but not limited to:

Q36. The comments already made above in relation to providing "the full description of the methodology used to calculate" are repeated here, including measures to prevent opportunistic behaviours by AGAs to unfairly and unreasonably disqualify FWA networks.

i. propagation models and key parameters for propagation simulation;

Q37. Without protection for stakeholders especially SME FWA operators against opportunistic behaviours by AGAs and their experts it is submitted that this recommendation risks creating a "battle of the experts" and one in which operators have no means of appeal or redress for unfairness in its application.

ii. general information on network components and in particular on antennas (*e.g.* transmission power, MIMO, antenna site locations);

Q38. In the case of a recent State aid approved measure FWA operators were criticised for failing to detail the equipment and specifications of their independent wholesale backhaul provider from whom they purchased transit. If the Commission considers this to be an example of opportunistic behaviour by an AGA it is requested to address this.

iii. key information on link-budget calculation (*e.g.* how received signal power level is mapped to bit-rates, link-budget margins used *etc*.). Stakeholders should provide all applicable link-budgets used to design and dimension the network services, with their key parameters, including also the description of how the stakeholder developed the link-budget and the rationale;

Q39. a) It is submitted that link budgets are a calculation that shows the intensity of a signal on a given frequency over distance. In its simplest form, a link budget is derived from (1) transmit power of the base station (2) transmit antenna gain of the base station (3) signal losses over distance (free space path loss) assuming transmission on the relevant band (4) gain of the receive antenna. By adding the transmit power and gain, then subtracting the free space path loss, then adding the receive gain, it is possible to predict the signal level at any distance. Link budgets *per se* therefore, do not output bit rates. This is stated here because in the case of a recently approved State aid measure the AGA and their experts criticised FWA operators' link budgets <u>for not outputting speeds</u>, even though they were well able to calculate this for themselves. The Commission is thus requested to include measures to prevent opportunistic behaviour

by AGAs in requesting data they can themselves calculate and to ensure that AGAs specify exactly what is required and how it is to be presented in advance.

b) The Commission is referred to comments made earlier concerning how SME FWA networks that have grown organically from small beginnings and that in so doing unlike large national operators or SAM measures, link budgets or network dimensioning/design plans as well as underpinning rationales were never required, developed or used, precisely because such networks developed on an economic market demand led basis. To require such networks to produce this data requires them, in effect, retrofit their networks in this respect. The comments made earlier re unequal resources and crowding out pressures are repeated.

c) It is submitted that the only "rationale" for link-budgets from existing FWA networks will be to show that non connected premises are within the coverage area and can be served with the required minimum speeds and ADS? If other rationales are contemplated here the Commission is requested to specify what other rationales submitting operators should provide?

iv. the location of cell sites;

Q40. See Q41 below. Could the Commission please confirm that, in the context of FWA networks, the Commission when using the term "cell" is referring to all the base station coverage areas at a particular site, or is it referring to the coverage area of each base station transmitter?

v. characteristics of the backhaul.

4.3. INFORMATION FOR IN-DEPTH VERIFICATION PURPOSES – BEST PRACTICES

(24) The competent public authorities may decide to require stakeholders to submit further information on network components and their locations for in-depth verification purposes, for instance to review the methodology used to calculate the performance submitted. The competent public authorities may thus ask stakeholders to submit further information on their networks, including but not be limited to:

i. number of transmitters at each site;

ii. the ground elevation of such transmitters;

iii. number of sectors at each cell site;

Q41. a) With cellular radio (which expression is usually used to refer to mobile wireless access networks) and historically with omnidirectional antenna systems a simple hexagon was used to represent the complex object comprising the geographical area covered by the cellular radio transmitter. That area was called a "cell". Such hexagonal cells enable the visualisation of cellular system coverage on a map to depict the area totally covered by radio without any gaps. By definition a cell site is a point on a map which gives radio coverage to a cell. However, as directional antenna systems developed an increasing number of cells have become associated to a cell site.

b) Accordingly, it is submitted that the problem with this information request is that, due to the fact that the coverage areas of FWA sectoral base stations (each with a sectoral coverage area) may overlap (or indeed may duplicate so as to provide additional coverage in the same area), it is not clear whether by this question the Commission intends to ask about how many geographically separate coverage areas/distinct cells there are, or in effect, how many base station transmitters are providing coverage (whether overlapping or not)? However, since in the case of FWA networks the Commission's emphasis is on premises covered it is suggested that perhaps the question might be better targeted if it asked the extent to which the cell site provided coverage to each of the premises within it?

iv. used technology at transmitters including MIMO-order, available channel bandwidth;

v. the effective isotropic transmission power employed by each transmitter.

ANNEX II – PUBLIC INTERVENTIONS FALLING OUTSIDE THE SCOPE OF ARTICLE 107(1) OF THE TFEU

(25) The following sections present ~~a~~ comprehensive, but not exhaustive, instances in which these guidelines do not apply. Given the cumulative nature of the criteria of Article 107(1) TFEU, if one of the criteria is not met, the presence of State aid can be excluded and therefore there is no need to notify the measure to the Commission prior to its implementation under these guidelines.

5. NO ECONOMIC ACTIVITY

(26) Aid for activities that are not of an economic nature[20], i.e. are not used for offering goods or services on the market, is not considered State aid. Therefore, the funding of infrastructure that is not meant to be commercially exploited is in principle excluded from the application of State aid rules. This concerns for instance cases where public funding is allocated to build infrastructure or procure broadband services to satisfy the own needs of the public administration, such as to connect only public authorities

[20] See Commission Notice on the notion of State aid, as referred to in Article 107(1) of the Treaty on the Functioning of the European Union ('Notice on the notion of State aid'), paragraph 201 *et seq*. (OJ C 262, 19.7.2016, p. 1).

among themselves through 'closed networks' not used for any commercial exploitation[21]. The funding of such activities consequently falls outside the scope of State aid rules, as does, accordingly, the public funding of the related 'closed networks'[22].

(27) However, if such a network (for instance, its extra capacity) is made available for use by commercial broadband investors or other operators, the public financing of such infrastructure may constitute State aid. Similarly, if an initially 'closed network' is subsequently made available for commercial use, State aid rules may apply[23]. For instance, when public authorities select a third party as their provider of connectivity services and finance the construction of a network to address the own needs of the public authorities, State aid may be involved if this provider uses the infrastructure for other commercial activities.

(28) If broadband infrastructure is used for both economic and non-economic activities, public funding thereof will fall under State aid rules only insofar as it covers the costs linked to the economic activities[24] in question. To avoid falling under State aid rules as concerns economic activities, Member States have to ensure that the public funding provided for the non-economic activities cannot be used to cross-subsidise the entity's economic activities, for instance by ensuring that the operator using the network for commercial purposes pays a market price for this use of the network and by limiting the public funding only to the net cost (including the cost of capital) of the non-economic activities, to be identified based on a clear separation of accounts[25].

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[21] See Commission Decision C(2007) 2212 final of 30 May 2007, case N 46/07 – United Kingdom – Welsh Public Sector Network Scheme (OJ C 157, 10.7.2007, p.3).

[22] See Judgment of the Court of 19 December 2012, Mittel*deutsche Flughafen and Flughafen Leipzig-Halle v Commission*, C-288/11 P, EU:C:2012:821, paragraph 42; Commission Decision C(2007) 2212 final of 30 May 2007, case N 46/07 – United Kingdom – Welsh Public Sector Network Scheme (OJ C 157, 10.7.2007, p.3).

[23] See Commission Decision C(2011) 3498 final of 23 May 2011, case SA.31687 (N 436/2010) – Italy – Broadband in Friuli Venezia Giulia (Project Ermes) (OJ C 274, 17.9.2011, p.3) and Commission Decision C(2010) 5696 of 11 August 2010, case N 407/09 – Spain – Optical fibre Catalonia (Xarxa Oberta) (C 259, 25.9.2010, p.1).

[24] See Commission decision in case Commission Decision C(2010) 5696 of 11 August 2010, case N 407/09 – Spain – Optical fibre Catalonia (Xarxa Oberta) (C 259, 25.9.2010, p.1). See also paragraph 205 of the Notice on the notion of State aid.

[25] See paragraph 206 of the Notice on the notion of State aid. CAPEX (and related depreciations) used both for non-economic and economic activities would have to be allocated between the two activities on the basis of relevant allocation keys.

6. NO STATE RESOURCES / NO SELECTIVITY

6.1. NON-MONETARY DEMAND-SIDE MEASURES

(29) Member States may choose to foster the demand for broadband services with nonmonetary demand-side measures. In principle, non-monetary demand-side measures do not amount to State aid. They can take various forms.

Q42. The Commission is requested to clarify that such measures must not be targeted for the benefit of just one sole operator and must be applied to promote demand for broadband services from all suppliers.

(30) They may be measures that aim to increase the perceived value of broadband internet access by addressing aspects of broadband demand other than price. Such measures usually aim at either increasing the quality of the available content[26] or informing consumers on how to make use of them.

Q43. The point made immediately above is repeated.

(31) Non-monetary demand-side measures may also take the form of demand aggregation tools that can be used to reduce uncertainty about the size of a market for potential suppliers, to coordinate demand and to provide more certainty about the likely profits of entering a specific market. This can be done by first measuring potential demand through the use of surveys and then presenting the results of the surveys on a publicly available website of the public authorities. This may include an element of general endorsement of the users before the roll-out, for instance through service platforms, to verify and aggregate a certain level of demand in advance of public or private investment. Users can also have an option of becoming stakeholders of a project through bottom up/self-help models of investment, such as cooperatives. This information should be made available to all operators on non-discriminatory terms. However, if the demand thus aggregated is made available only to one or selected operators, for instance by pooling customers into one contract, or by including an element of commitment of the users to subscribe to a single or few operators, this may result in State aid granted to those operators.

Q44. a) The point made immediately above is repeated. Moreover, it is submitted that any element of general endorsement of the users before the roll-out, for instance through service platforms, to verify and aggregate a certain level of demand in advance of public or private investment should not be targeted, for example, at just and for the sole benefit of the State aid beneficiary, but for all broadband service providers.

b) It is noted that the Commission is open to the option of bottom up/self-help models of investment in broadband networks, as it is submitted that this often exactly describes the position, for example, of FWA operators and how they commence

[26] This can include (i) the promotion of e-government programs (e.g. telemedicine, eCare, distance education, ICT in schools); (ii) the promotion of local and sectoral digital content (e.g. cultural heritage, tourism, educational content, local agriculture/food products, etc.); (iii) the increase of Internet security, privacy and setting quality or advertising standards

organically from small beginnings without necessarily large complex designs and hypothetical models.

c) In relation to the last sentence of (31) the Commission is requested to explain why such activity only "may" as opposed to "will" result in State aid being granted?

6.2. ADMINISTRATIVE AND REGULATORY MEASURES

(32) Member States may choose several types of measures in order to accelerate the deployment of broadband networks, including 5G networks, besides providing direct funding to companies[27]. They may, in line with (or going beyond) legal obligations, facilitate for instance the process of granting rights of ways[28] and/or require that network operators share part of their infrastructure. Further, in line with regulatory rules, Member States may require that operators be given access to physical infrastructure controlled by public bodies, which is capable of hosting very high speed networks' elements[29].

Q45. The Commission is requested to confirm that this should be all be done on an unbiased basis and without operators being presented with complex and burdensome administrative procedures.

(33) Operators that want to deploy very high-speed networks can request e-communications, gas, electricity, heating and water network companies performing civil works, fully or partially financed by public means, to meet reasonable request to coordinate civil works, provided that this does not entail any additional costs and does not impede control over the coordination of the works[30]. Such coordination will not constitute State aid provided that the requesting operator bears its own costs and the opportunity is offered in a transparent and non-discriminatory way to all interested operators (i.e. electricity gas, water utilities, etc.) not just electronic communications operators[31]. However, it cannot be excluded that public funding of such works may entail State aid if they are limited to or clearly geared towards the broadband sector or towards one or several selected broadband operators.

Q46. "Very high-speed networks" are not defined in these proposals. The Commission is therefore requested to confirm that by this expression the Commission is referring to very high capacity networks as defined in the EECC.

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[27] As also explained in the Commission's Connectivity Toolbox Recommendation, Commission Recommendation of 18.9.2020 on a common Union toolbox for reducing the cost of deploying very high capacity networks and ensuring timely and investment-friendly access to 5G radio spectrum, to foster

(34) In order to facilitate access to existing physical infrastructure in a transparent way, public communications network providers have the right to access minimum information, upon request, regarding location and route, type and current use of the infrastructure, and a contact point.

Q47. The Commission is requested to confirm:

a) whether this paragraph (34) refers only to the entities described in paragraph (33), or more generally to all infrastructure owning entities public and private?

b) the infrastructure referred to here is any and all infrastructure of any kind which is capable of being used for the rollout of broadband services?

(35) The Connectivity Toolbox Recommendation sets out guidance for developing best practices for fostering connectivity, building upon the Broadband Cost Reduction Directive and the provisions in the European Electronic Communications Code with the aim to identify measures that are most efficient in allowing and encouraging operators to rollout very high capacity networks. On 25 March 2021, the Commission adopted a Common Union Toolbox for Connectivity[32], which consists

connectivity in support of economic recovery from the COVID-19 crisis in the Union (C(2020) 6270 final)

28 The Broadband Cost Reduction Directive (Directive 2014/61/EU of the European Parliament and the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks, OJ L 155, 23.5.2014, p. 1) provides for faster, simpler and more transparent permit-granting procedures.

29 According to the Broadband Cost Reduction Directive, new buildings shall be equipped with high-speed physical infrastructures (such as mini-ducts) and provide access to in-building infrastructure.

30 Civil engineering works, such as the digging-up of roads to lay down high-speed broadband, account for up to 80% of the cost of deploying high-speed networks.

31 See Commission Decision K(2010)889 of 8 February 2010, case N 383/09 – Germany – Amendment of the State aid broadband scheme N 150/2008 - Broadband in the rural areas of Saxony (OJ C 93, 13.4.2010, p.13). This case concerned a situation where general civil engineering works, like road maintenances, did not constitute State aid. The measures taken by the German authorities constituted 'general civil engineering works' which would have been carried out by the State for maintenance purposes in any event. The possibility of placing ducts and broadband infrastructure when carrying out road maintenance – and at the costs of the operators – was announced publicly and not limited to or geared towards the broadband sector. However, it cannot be excluded that public funding of such works falls within the notion of aid of Article 107(1) TFEU if they are limited to or clearly geared towards the broadband sector.

32 https://digital-strategy.ec.europa.eu/en/news/connectivity-toolbox-member-states-agree-best-practicesboost-timely-deployment-5g-and-fibre

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of a set of best practices that are considered as the most efficient in allowing and encouraging operators to roll out very high capacity networks.

7. NO ADVANTAGE

7.1. MARKET CONFORM INVESTMENTS

(36) If a public authority invests into the development of broadband infrastructure in terms comparable to those of a private investor operating under normal market conditions, in line with the Market Economy Operator Principle (MEOP), State aid would not be involved.[33]

[33]For more details, see section 4.2 of the Notice on the notion of State aid. To note, only the benefits and obligations linked to the role of the State as an economic operator, to the exclusion of those linked to its role as a public authority, can be taken into account (e.g. if a State intervention is driven by public policy reasons such as bridging the digital divide, the State's behaviour, while being rational from a public policy perspective, may at the same time include considerations which a market economy operator would normally not consider.

(37) According to the case-law of the Court, it follows from the principle of equal treatment that capital placed by the State, directly or indirectly, at the disposal of an undertaking in circumstances which correspond to normal market conditions cannot be regarded as State aid. When equity participation or capital injections by a public investor do not present sufficient prospects of profitability, even in the long term, such intervention shall be regarded as aid within the meaning of Article 107 TFEU, and its compatibility with the common market shall be assessed on the basis solely of the criteria laid down in that provision[34].

(38) Compliance with market conditions would need to be established on an ex-ante basis~~[28]~~[35], based on information available at the time the intervention was decided upon (e.g. by means of a business plan based on economic evaluations comparable to those which, in similar circumstances, a rational market economy operator would have had carried out to determine the profitability or economic advantages of the transaction). A transaction's compliance with market conditions can be directly established through transaction-specific market information: where the transaction is carried out 'pari passu' by public entities and private operators~~[29]~~[36]; or where it concerns the sale and

[34] Judgment of the Court of 21 March 1991, *Italian Republic v Commission*, C-303/88, ECLI:EU:C:1991:136, paragraphs 20-22.

[35] *Ex post* economic evaluations entailing a retrospective finding that the investment made by the Member State concerned was actually profitable would not be sufficient.

[36] See paragraphs 86 to 88 of the Notice on the notion of State aid. In particular, to consider a transaction '*pari passu*', the following criteria should be assessed: (a) whether the intervention of the public bodies and private operators is decided and carried out at the same time or whether there has been a time lapse and a change of economic circumstances between those interventions; (b) whether the terms and conditions of the transaction are the same for the public bodies and all private operators involved, also taking into account the possibility of increasing or decreasing the level of risk over time; (c) whether the intervention of the

purchase of assets, goods and services (or other comparable transactions) carried out through a competitive, transparent non-discriminatory and unconditional tender procedure[37]. If the intervention of the public bodies is not pari passu with that of private operators or a transaction has not been realised through a tender, it may be possible to demonstrate that the transaction complies with market conditions through benchmarking[38] or other assessment methods[39]. Specific considerations apply to establish whether the terms for loans and guarantees are in line with market terms[40].

(39) In the broadband sector[3041], the Commission has clarified in its case practice that the conformity of a public investment with market terms may be demonstrated[3142], for instance if it is made at the same time[3243], at equal terms and conditions (and therefore with the same level of risks and rewards) as an economically significant participation of a private operator (e.g. in capital, total amount, share of the total cost) of a comparable size and situation operating in normal conditions of a market economy ('concomitant participation'). The concomitance analysis constitutes one but not necessarily the only element for establishing the absence of State aid. Other elements are also relevant, such as the existence of an ex ante sound business plan (preferably

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private operators has real economic significance and is not merely symbolic or marginal; and (d) whether the starting position of the public bodies and the private operators involved is comparable with regard to the transaction, taking into account, for instance, their prior economic exposure vis-à-vis the undertakings concerned, the possible synergies which can be achieved, the extent to which the different investors bear similar transaction costs, or any other circumstance specific to the public body or private operator which could distort the comparison.

[41] See Commission Decision C(2007) 6072 final of 11 December 2007, in case C-53/2006 (ex N 262/2005, ex CP 127/2004) – The Netherlands – Citynet Amsterdam (OJ L 247, 16.9.2008, p.27) and Commission Decision C(2012)5051 final of 25 July 2012, case SA.33063 – Italy – Trentino NGA (OJ C 323, p.6). In the "Citynet Amsterdam" case, the Commission confirmed that investment by the City of Amsterdam in a fibre-to-the home (FttH) network did not entail State aid. In the "Trentino" case, the Commission expressed significant doubts that the project met the criteria to be considered in line with market conditions. The Trentino NGN project notified to the Commission in 2012 concerned a public-private partnership between the Province of Trento and Telecom Italia (TI) for the rollout of a Next Generation Network (NGN) including FTTH in remote areas of the province. The Province made a cash contribution of 50 million EUR while TI would make contributions in kind, including (1) Indefeasible rights of use (IRUs) on its existing passive infrastructure (ducts and poles) immediately and (2) the ownership of the whole copper network with the perspective of migrating the customers into the new FTTH network to be deployed. Two additional shareholders joined the project with smaller financial participations. After six years from the first contribution or a certain number of lines activated on the new network, TI could decide to exercise a "call" option and acquire the full ownership of Trentino NGN. Additionally, Telecom Italia was to be appointed as service provider for Trentino NGN for the construction and operation of the network and the provision of connectivity services. In particular, the Commission had doubts about whether: (a) The evaluation of the in-kind contributions made by Telecom Italia was done on market terms and did not contain any hidden advantage for TI, and in particular the value of the copper network to be switched off; (b) There were any hidden advantages from the separate contracts appointing TI as supplier of services to Trentino NGN and connectivity services to end users; (c) The project was effectively profitable taking the perspective of a Market Economy Investor; and (d) The call option recognised to Telecom Italia did not limit the return of the PAT to a level which a private investor would not have accepted, given the level of risk taken by the PAT as financial investor to the project.

[42] See Commission Decision C(2007) 6072 final of 11 December 2007, in case C-53/2006 (ex N 262/2005, ex CP 127/2004) – The Netherlands – Citynet Amsterdam (OJ L 247, 16.9.2008, p.27).

[43] The existence of consecutive State interventions concerning the same broadband infrastructure project might invalidate the conclusion that a similar measure would also have been undertaken by a market economy investor. See in this respect paragraph 81 of the Notice on the notion of State aid.

validated by external experts) demonstrating that the investment provides an adequate rate of return for the investor(s), in line with the normal market return that

37 See paragraphs 89 to 96 of the Notice on the notion of State aid.

38 Benchmarking in the light of the terms under which comparable transactions carried out by comparable private operators have taken place in comparable situations. See paragraphs 98 to 100 of the Notice on the notion of State aid.

39 See paragraphs 100 to 105 of the Notice on the notion of State aid.

40 See paragraphs 108 to 114 of the Notice on the notion of State aid.

would be reasonably expected by operators on similar projects taking into account the level of risk and future expectations (based on a calculation of the internal rate of return of the investment or Net Present Value calculations)[33][44]. As underlined in the case practice, where private investors take part in the project, it is a sine qua non condition that they would have to assume the commercial risk linked to the investment under the same terms and conditions as the public investor, so that the public investment does not fall under State aid rules[34][45]. This would also apply to other forms of State supports such as soft loans or guarantees[35][46].

(40) Public intervention in line with the MEOP may be relevant for various network deployments, especially in urban/peri-urban areas, where there is a sufficient business case to allow for a credible commercial investment from private and public partners under normal market conditions. For instance, in urban areas and major terrestrial transport paths where the deployment of 5G networks may attract private financing, Member States may consider to what extent private operators and public entities could participate in a 5G mobile deployment project or a 5G corridor in conformity with normal market terms, in which case no State aid would be involved. Such projects may take the form of a joint-venture or the set-up of equity programmes or funds[36]47 to support operators to deploy new or modernise existing networks, with the overall aim to attract additional private investment. Such measures would not involve State aid if they are designed in line with normal market conditions.

a. Operation of broadband infrastructure entrusted as a service of general economic interest (SGEI) in line with the Altmark criteria

(41) In some cases, Member States may consider that the provision of an electronic communications network should be regarded as a service of a general economic interest ('SGEI') within the meaning of Article 106(2) TFEU[37]48 and the Altmark jurisprudence and provide public funding on this basis. In this case, State aid is excluded.

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44 For more information see in this respect chapter 4.2 and in particular paragraphs 101 to 105 of the Notice on the notion of State aid. See also Commission decision C(2012) 3025 final of 8 May 2012, case SA.22668 (C 8/2008 (ex NN 4/2008)) – Spain – Ciudad de la Luz film studios (OJ L 85, 23.3.2013, p.1) and Commission Decision C(2012)5051 final of 25 July 2012, case SA.33063 – Italy – Trentino NGA (OJ C 323, p.6).

45 See paragraph 17 of the 2013 Broadband Guidelines.

46 Commission Notice on the application of Articles 87 and 88 of the EC Treaty to State aid in the form of guarantees, OJ C 155, 20.6.2008, p. 10-22 and the Corrigendum to the Notice, OJ C 244, 25.9.2008, p.32.

47 See paragraphs 108 to 114 of the Notice on the notion of State aid.

48 According to the case-law, undertakings entrusted with the operation of services of general economic interest shall have been assigned that task by an act of a public authority. In this respect, a service of general economic interest may be entrusted to an operator through the grant of a public service concession; see judgment of the Court of First Instance of 13 June 200, EPAC - *Empresa para a Agroalimentação e Cereais, SA v Commission*, joined Cases T-204/97 and T-270/97, ECLI:EU:T:2000:148, paragraph 126 and Judgment of the Court of First Instance of 15 June 2005, *Fred Olsen, SA v Commission*, T-17/02, ECLI:EU:T:2005:218, paragraphs 186, 188-189.

(42) The compensation for the provision of broadband services defined as SGEI does not involve State aid if it complies with the following four cumulative conditions (the so-called Altmark conditions)[38]49:

- First, the infrastructure project shall be necessary for the provision of genuine services of general economic interest for the provision of which the recipient undertaking has been entrusted with clearly defined public service obligations; in broadband, this includes compliance with the conditions concerning the SGEI definition laid down in Section 3 of the guidelines.
- Second, the parameters based on which the compensation is calculated shall have been established in advance in an objective and transparent manner; in broadband, compensation should be established on an ex ante basis to cover the expected funding gap over a given period[39]50.
- Third, the compensation cannot exceed what is necessary to cover all or part of the costs incurred in discharging the public service obligations, taking into account the relevant revenues and a reasonable profit for discharging those obligations; in broadband, the compensation should be limited to the provision of wholesale access services.
- Fourth, where the undertaking that is to discharge public service obligations is not chosen following a public procurement procedure to select a tenderer capable of providing these services at the least cost to the community, the level of compensation shall be determined based on an analysis of the costs of a typical well-run undertaking[40]51.

(43) When at least one of the above criteria is not met, the public intervention amounts to State aid within the meaning of Article 107 TFEU. In such situations, the aid should be considered in light of the compatibility conditions of the SGEI Decision or the

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49 See judgment of the Court of Justice of 24 July 2003, *Altmark Trans and Regierungspräsidium Magdeburg*, C-280/00, EU:C:2003:415 and Communication from the Commission on the application of the European Union State aid rules to compensation granted for the provision of services of general economic interest (OJ C 8, 11.1.2012, p. 4).

50 See Commission Decision C(2016)7005 final of 7 November 2016 in case SA.37183 (2015/NN) – France – Plan France Très Haut Débit (OJ C 68, 3.3.2017, p.1).

51 In some of its broadband cases, the Commission has acknowledged the non-existence of State aid due to the fulfilment of the *Altmark* criteria, e.g. in Commission Decision C (2004) 4343 final of 16 November 2004, case N381/2004 – France – Projet de réseau de télécommunication haut débit des Pyrénées Atlantiques (OJ C 162, 2.7.2005, p.5), Commission Decision C(2009) 7426 final of 30 September 2009, SA.21630 (N 331/2008) – France – Réseau à très haut débit en Hauts-de-Seine (OJ C 256, 23.9.2010, p.1), and Commission Decision C(2016)7005 final of 7 November 2016 in case SA.37183 (2015/NN) – France – Plan France Très Haut Débit (OJ C 68, 3.3.2017, p.1).

SGEI Framework, taking into account the specific conditions recalled in Section 3 of the guidelines[41]52.

7.2. GENERAL ADMINISTRATIVE MEASURES TO CONSUMERS

(44) Under certain conditions, it may be possible to exclude that an advantage is granted to building companies collecting vouchers, for instance if the measure is designed as a general administrative measure. This may be the case in situations where the Member State offers vouchers to individual consumers not carrying out any economic activity for general civil engineering works, for instance to ensure the smart readiness of new constructions and/or buildings. In this case, to exclude the presence of State aid, vouchers should be offered to end-users to use for general works for all utilities (which may include among others electricity, gas, water, inhouse wiring). End-users shall be free to select the construction company for the general works and free to connect to whatever utilities operator (including electronic communications operators) that offers services to the premises. The opportunity to benefit from vouchers should be offered in a transparent and non-discriminatory way to all interested operators (not limited to or geared towards electronic communications operators, but open to all relevant utilities, e.g. electricity, gas, water, etc.).

8. NO EFFECT ON TRADE BETWEEN MEMBER STATES AND NO DISTORTION OF COMPETITION

(45) For cases covered by the de minimis Regulation[42][43][44] [53]with very low amounts of public support or by the SGEI de minimis Regulation[45]54, distortion of competition can be excluded a priori.. For cases falling under the de minimis Regulation, there is no need for prior approval from the Commission. Member States do not even have to inform the Commission of such public support.

(46) Services provided through Wi-Fi hotspots created in public administration buildings in order to provide access to public sector services and information to the citizens may not distort or threat to distort competition under some conditions[46]55.

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52 In such cases, the measures would need to be designed in compliance with the SGEI Decision or SGEI Framework, taking into account the specific conditions of these Guidelines section 3 or could possibly be designed in compliance with the *Altmark* conditions.

53 Commission Regulation (EU) No 1407/2013 of 18 December 2013 on the application of Articles 107 and of the Treaty on the Functioning of the European Union to *de minimis* aid, OJ L 352, 24.12.2013, p.1

54 Commission Regulation (EU) No 360/2012 on the application of Articles 107 and 108 of the Treaty on the Functioning of the European Union to *de minimis* aid granted to undertakings providing services of general economic interest, OJ L 114, 26.4.2012, p. 8.

55 The activity would be deemed non-economic and thus fall outside State aid rules if only public services and public-sector content is made accessible over such Wi-Fi networks (public-sector websites and websites of public services providers), ensuring free accessibility of public services online which would also be available gratuitously offline (such as administrative information, e-Government, or non-commercial tourist information). To preserve the non-economic character, Member States should not allow the commercial exploitation of the new network to provide broadband services to residential or business users, thus limiting risks of substitutability to unlimited broadband access to the internet and reducing risks of distortion of competition vis-à-vis third parties offering similar content and/or services (Commission

Decision C(2007)2200 of 30 May 2007, case NN24/2007 – Czech Republic – Prague Municipal Wireless Network (OJ C 141, 26.6.2007, p.2.)).

ANNEX III- TYPICAL INTERVENTIONS FOR BROADBAND SUPPORT

(47) In its case practice, the Commission has observed certain recurrent funding mechanisms used by Member States to foster broadband deployment, which typically amount to State aid within the meaning of Article 107(1) TFEU unless the funding is carried out on market terms in line with the market economy investor principle (see Annex II). The following list is illustrative and not exhaustive, as public authorities might develop different ways of supporting broadband deployment or deviate from the models described.

(48) Gap funding model: In the gap funding model, the Member State support the deployment of fixed or mobile networks by funding the gap between what is commercially viable and the objective that the aid granting authority aims to achieve[47]56. The Member State[48]57 provides direct monetary grants or subsidies to broadband investors[49]**58** to design, build, manage and commercially exploit a network, taking into account the relevant receipts and a reasonable profit. In the gap funding model, reasonable profit is determined as the rate of return on capital that would be required by an investor, taking into account the level of risk specific to the broadband sector and the type of services provided. The required rate of return on capital is typically determined by the weighted average cost of capital (WACC). In determining what constitutes a reasonable profit, Member States may introduce incentive criteria relating, in particular, to the quality of service provided and gains in productive efficiency. Efficiency gains must not reduce the quality of the service provided. Any rewards linked to productive efficiency gains must be set at a level such as to allow balanced sharing of those gains between the broadband investor and the Member State and/or the end-users. Under the gap funding model, the infrastructure built is fully owned by the aid recipient that bears the risks associated with building new infrastructure and attracting sufficient customers.

(49) Support in kind: In this case, Member States support fixed or mobile broadband deployment by putting at the disposal of electronic communication operators existing or newly built infrastructures. This support can take many forms, with the most recurring being Member States providing broadband passive infrastructure by carrying out civil engineering work (for instance by digging up a road), by placing ducts or dark fibre or giving access to existing infrastructure (for instance ducts, pols or towers).

(50) Direct investment model: In the direct investment model, the Member State builds a fixed or mobile network and operates it directly through a branch of the public administration or via an in-house operator[50]59. The state funded network is often

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56 'Gap funding' refers to the difference between investment costs and expected profits during the life span of the network

57 Or any other public authority granting the aid.

58 The term 'investors' denotes undertakings or electronic communications network operators that invest in the construction and deployment of broadband infrastructures.

59 Commission Decision C(2011) 7285 final of 19 October 2011, case N 330/2010 — France – Programme national «Très Haut Débit » - Volet B (OJ C 364, 14.12.2011, p.2), which covered various intervention modalities, inter alia one in which the collectivités territoriales can operate own broadband networks as a 'regie' operation.

operated as a wholesale-only network with a view of making it available to retail broadband services providers on a non-discriminatory basis.

(51) Concessionaire model: In the concessionaire model, the Member State finances the rollout of a fixed or mobile broadband electronic communications network, that remains in public ownership, but whose operation will be offered through a competitive selection procedure to an electronic communication provider to manage and commercially exploit it. The network may be run by an electronic communication operator to provide only wholesale services or, alternatively, to provide both wholesale and retails services.

ANNEX IV – INFORMATION TO BE PUBLISHED BY MEMBER STATES PURSUANT TO TRANSPARENCY OBLIGATIONS

The information on individual awards referred to in paragraph (202)(b) of the Guidelines must include the following[51]60:

— Identity of the individual aid beneficiary

— name

— aid beneficiary's identifier

Q48. The Commission is requested to confirm that that the Transparency Directive as revised in 2013 does not extend to or deal with situations where the State aid beneficiary is a limited company set up for the purpose of the SAM but where the State aid funds it is paid are distributed through a network of other entities so that in practice there is no visibility as to where and whom the State aid funds are paid.

— Type of aid beneficiary at the time of application:

— SME

— large enterprise

— Region in which the aid beneficiary is located, at NUTS level II or below

— The main sector or activity of the aid beneficiary for the given aid, identified by the, NACE group (three-digit numerical code)[52]61

— Aid element expressed in full in the national currency. For schemes in the form of tax advantage, the information on individual aid amounts[53]62 can be provided in the following ranges (in EUR million):

— [0,1-0,5]

— [0,5-1];

— [1-2];

— [2-5];

— [5-10];

— [10-30];

60 With the exception of business secrets and other confidential information in duly justified cases and subject to the Commission's agreement (Commission communication on professional secrecy in State aid decisions, C(2003) 4582 (OJ C 297, 9.12.2003, p. 6)).

61 Regulation (EC) No 1893/2006 of the European Parliament and of the Council of 20 December 2006 establishing the statistical classification of economic activities NACE Revision 2 and amending Council Regulation (EEC) No 3037/90 as well as certain regulations governing specific statistical domains (OJ L 393, 30.12.2006, p. 1).

62 The amount to be published is the maximum allowed tax benefit and not the amount deducted each year (e.g. in the context of tax credit, the maximum allowed tax credit shall be published rather than the actual amount which might depend on the taxable revenues and vary each year).

— [30-60]; —

[60-100];

— [100 and over].

— Where different from the aid element, the nominal aid amount, expressed in full in the national currency[54]63

— Aid instrument [64]:

— grant/interest rate subsidy/debt write-off

— loan/repayable advances/reimbursable grant

— guarantee

— tax advantage or tax exemption

— risk finance

— other (please specify)

— Date of award and date of publication

— Objective of the aid

— Identity of the granting authority or authorities

— Where applicable, name of the entrusted entity, and the names of the selected financial intermediaries

— Reference of the aid measure, as stated in the decision approved under these Guidelines

63 Gross grant equivalent, or where applicable, the amount of the investment. For operating aid, the annual aid amount per aid beneficiary can be provided. For fiscal schemes, this amount can be provided by the ranges set out in paragraph 139. The amount to be published is the maximum allowed tax benefit and not the amount deducted each year (e.g. in the context of a tax credit, the maximum allowed tax credit shall be published rather than the actual amount, which might depend on the taxable revenue and vary each year).

64 If the aid is granted through multiple aid instruments, the aid amount shall be specified by instrument.

ANNEX V – INFORMATION TO BE PROVIDED BY MEMBER STATES PURSUANT TO REPORTING OBLIGATIONS

The report referred to in paragraph (208) of the guidelines must include information on, for the relevant reporting period, and for each individual project implemented in application of an aid measure approved under these guidelines:

— Name of the aid beneficiary or beneficiaries;

— The total cost (or estimated total cost) of the project and average cost per premises passed (defined as per paragraph (10) of Annex I)

— Aid amount awarded and aid expenditure

— Aid intensity

— Sources of public financing

— The coverage rates prior to and after the State intervention (in absolute and in percentage terms);

— For projects supporting the deployment of electronic communication infrastructure:

  — Date when the infrastructure was put in use;

  — Technology deployed on the publicly funded infrastructure;

  — Minimum and average (up- and download) speeds of services provided;

  — Wholesale access products offered, including conditions for access and prices/pricing methodology. Wholesale access products requested on reasonable demand and treatment of such requests;

  — Number of access seekers and service providers using wholesale access;

  — Number of households and businesses passed by the publicly funded infrastructure.

  — Take-up rates

— For project supporting take-up of electronic communication services, such as vouchers:

  — Duration of the aid measure;

  — Voucher value;

  — Subscriptions/Services supported including support for customer devices or for in-building wiring and/or drop down cable within a private domain;

— Take-up rates and number of end-users having benefited from the aid measure (by category, e.g. individual end-users, SMEs and by type of subscriptions/service supported);

— Number of eligible broadband service providers;

— Number of broadband service providers that have actually benefited from the aid measure;

— The evolution of the market position of operators by type of subscriptions/services supported, taking into account the relevant infrastructure and technologies (i.e. FTTH, FTTC, DOCSIS, FWA, etc.);

— Wholesale and retail prices before and after implementation of the measure.