

BEREC Report on the outcome of the consultation on the draft common position on monitoring mobile coverage

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Executive Summary

This report summarises the 8 responses (BT, Ciqua, ECTA, ETNO, GSMA, Metricell, OpenSignal, P3 Communications) received to the second consultation on monitoring mobile coverage conducted by BEREC in June and July 2018.

Stakeholders contributed their views on the draft common positions on monitoring mobile coverage proposed by BEREC¹, in particular, the definition, monitoring and publication of mobile coverage information and responded to a set of questions regarding the definition by BEREC of common metrics for mobile coverage².

In general, stakeholders welcomed the opportunity to comment on BEREC's Draft Common position on monitoring mobile coverage. They provided their brief comments, addressing matters of principle and also specific recommendations. The stakeholders also highlighted a variety of other issues for BEREC to consider and actions to take.

¹ https://bereg.europa.eu/eng/document_register/subject_matter/bereg/download/0/8165-draft-common-position-on-monitoring-mobi_0.pdf

² https://www.bereg.europa.eu/eng/document_register/subject_matter/bereg/download/0/8166-notice-for-the-launch-of-the-public-cons_0.pdf

1. Introduction

Each national regulatory authority (NRA) uses different means to provide information on national mobile coverage. As such, it may be difficult to use and compare the information.

A common understanding of how mobile coverage is measured and published; and the definition of a common vocabulary for mobile coverage is a first step to allow for a consistent approach.

To this end, BEREC developed a set of common positions comprising of the following:

1. Technical specifications for monitoring mobile coverage in Europe,
2. The use of signal predictions for mobile coverage estimation,
3. Ensuring the accuracy of coverage information provided to the public, and
4. Availability and presentation of mobile coverage information.

BEREC launched a consultation from 20 June 2018 to 19 July 2018 on its draft common positions. The stakeholders were also invited to respond to several questions.

In response to the consultation, BEREC received 8 contributions from the following entities:

1. British Telecom (BT);
2. Ciqua;
3. European Competitive Telecommunications Association (ECTA);
4. European Telecommunications Network Operators' Association (ETNO);
5. GSM Association (GSMA);
6. Metricell;
7. OpenSignal;
8. P3 Communications.

The stakeholder contributions are summarised in the following sections of this report. The responses to the public consultation serve as inputs for further work on BEREC's common positions on monitoring mobile coverage.

The non-confidential responses are also published on BEREC's website.

2. General comments on the document

ECTA stresses the pro-competitive effects of active user choice based on reliable uniform information. BEREC should recognize the interaction between monitoring and publishing mobile coverage, and competitive dynamics. **ECTA** recommends that it should be clear whether coverage is self-provided by operators or contracted through another operator. The title of the Common position should say 'outdoor coverage'. The document should state that coverage is only one element of service provisioning. Information on coverage should include the spectrum and operator uses. Coverage reporting should be differentiated according to end user requirements (e.g. business users require higher reliability). Underlying data on network coverage should be made available to access seekers so they can reproduce coverage maps published by their host operators. **ECTA** suggests that operators that refuse to use network coverage data for anything else than compliance assessment should be named and shamed. Finally, **ECTA** concludes that the CP does not provide a basis for cross-border comparison, and that should be explicitly stated.

P3 Communications and **OpenSignal** strongly advocates crowd sourced measurements. **OpenSignal** believes that coverage alone is not enough to choose between operators, the data performance is important too.

ETNO stresses that NRAs should only publish reliable information on network performance, not 'any' available information. The strengths and weaknesses of different ways to measure coverage should be considered. **ETNO** supports the objective to enable consumers' informed choice and cost-effective and appropriate steps to increase transparency and network competition. According to **ETNO**, there is a trade-off between the granularity of information for consumers and necessary confidentiality of the locations of network elements of operators.

The metrics chosen and the degree of transparency should be tailored to the goal that is pursued. **GSMA** sees no imminent need to harmonise information on mobile coverage across member states in order to enable end-users to make an informed choice, because tariffs are usually provided nationally and end users do not compare network quality in different member states. Perceived coverage is jointly determined by handset and network quality. The CP should only address countries where no reliable monitoring system for coverage and quality of service has been implemented. It should be consistent with national requirements and mechanisms as well as with voluntary measures telecom operators take. There is a limit to which operators can roll out profitably, this should be considered. The approach should be future proof: there should be periodic assessments to evaluate whether the information gathered is still useful and fit for purpose. Only information that is relevant should be gathered and published. Coverage monitoring solutions need to be consistent with the ownership and confidential status of the data being used. The frequency of publication and level of detail of the information presented should enhance competition, not degrade it.

Metricell states that CP on monitoring mobile coverage would allow regulators to define a common SLA for customers across Europe, ensuring service standards are met consistently. A risk would be that operators do not meet the standards and are subject to penalty. That could make things harder for emerging operators. Crowdsourced data is useful for indoor coverage. Common thresholds make it easier to compare different operators. The thresholds should be reviewed every five years.

BT supports suitably scoped regulatory measures that improve the monitoring of coverage. Harmonisation of mobile coverage monitoring across EU member states needs careful consideration. The proposals in the CP are unlikely to generate significant improvements in the quality of information provided to consumers. Overly stringent or poorly defined measures risk MNOs having to re-engineer their networks at significant cost, diverting resource away from investment in services like 5G. Crowd-sourced data can complement other data about network performance. Rather than focusing on pan-European standardisation for the measurement of mobile coverage, BEREC should instead consider implementing minimum standards for measuring coverage.

3. Comments relating to CP1 (Technical specifications for monitoring mobile coverage in Europe) including answers to the consultation questions

This section summarizes the comments received on the common position regarding technical specifications for mobile coverage in Europe and on the five questions that were asked in the consultation paper on this subject.

3.1. Should BEREC define common metrics for mobile coverage?

Ciqua and **Metricell** are in favour of BEREC establishing a common set of metrics and methods for measuring mobile coverage. **Ciqua** considers that it would enable individual NRAs to understand the set of common metrics and methods available and to be able to select an appropriate subset for local use and adjust thresholds accordingly. **Metricell** explained that the imposition of common thresholds will democratise the evaluation of operators' network quality and that having a centralised body for setting thresholds would allow regulators to better control areas of market innovation and advancement.

BT considers that common parameters may be beneficial for NRAs that are yet to implement robust processes for monitoring mobile coverage. Furthermore, **ETNO** and **GSMA** point that BEREC's position should consider common parameters only for those NRAs who have not yet implemented any reliable monitoring system for coverage and quality of service and only where network operators have not voluntarily established such systems.

ETNO further remarks that the possible definition of a single Europe-wide system designed to monitor and measure the quality of broadband on all national levels must be sufficiently flexible to allow an adjustment to the individual national characteristics and should always be available on an opt-in basis, allowing regulators who have already implemented their measurement systems to maintain them.

BT states that there is no perfect threshold or propagation model that can be applied to standardise mobile coverage across the EU. Each mobile network is unique and their different characteristics affect the thresholds required to meet given coverage targets. MNOs run multi-technology and multi-frequency networks that have been optimised to provide good customer experience. Different locations also have different requirements: in areas with low capacity demand, a fast download speed can be achieved with a relatively low signal.

3.2. What service availability definition and minimum requirements would you consider appropriate?

Metricell considers that, by taking the percentage of observed measurements which surpass a certain threshold (e.g. over -111 dBm for 4G signal strength), BEREC could gain the ability to identify any areas which are falling short of being delivered a great service. This means mobile operators and regulators can instantly identify not just areas of poor service, but more granular elements of poor service such as buildings, rail routes and roads.

ETNO and **GSMA** explain that metrics based on signal power have major advantages: they are comparatively easy to measure, easy to compare, and a good base for signal prediction modelling. However, specifications to determine the level of coverage for monitoring purposes should be objective, end-user oriented and therefore, easy to understand for end-users. For this reason and for enabling end-users informed choice, specifications based on signal strength are in their view inadequate and technically disputable.

BT, **ETNO** and **P3 Communications** favour the probability of successfully using a service over signal strength. **BT** and **P3 Communications** consider that it is more understandable and meaningful to consumers. According to **ETNO**, MNOs can and need to do more than ensuring signal strength to deliver a good product, and that responsibility needs to stay with the MNOs. For **BT**, the application of a binary signal threshold would be the least accurate of the proposed options in the CP because each mobile network is unique and their different characteristics affect the thresholds required to meet given coverage targets and different locations have different requirements: in areas with low capacity demand, a fast download speed can be achieved with a relatively low signal.

ECTA indicated that the common position should clarify whether BEREC is more in favour of probability based or radio signal level oriented measurement and mapping, and whether quality of experience (QoE) or quality of service (QoS) will be used.

Ciqual considers that RF signal levels are meaningless to the consumer, and are not an adequate predictor of service performance. In a regulatory environment, key quality indicators (KQIs) should be used that focus on the availability and performance of services, and not on simplistic RF measurements. For example, the KQI “No Internet Coverage” (NIC) is defined as the aggregated % of data connections that failed due to no connectivity for this specific time period/location/device/cell/customer. This is a more useful coverage metric for a NRA or Consumer, compared to an overly-simplistic RF signal level.

BT considers that a better solution would be to create measurement metrics that relate more closely to reliability rates like call success rates i.e. a multi-thresholding approach that considers the availability of different technology types and the probability of a consumer successfully making a call or completing a data session.

3.3. What signal power thresholds would you consider appropriate for different mobile technologies?

BT stated that a binary signal strength threshold can provide a misleading view of mobile coverage experience, since not just the strength of the signal from a mobile base station to customer terminal that dictates customer experience but also factors like the quality of the device/terminal. **BT** is concerned that to overcome such issues, operators would be forced to densify networks, particularly in areas of low population or capacity demand, leading to over-indexation of mobile performance against consumer expectations at substantial cost for the MNOs.

GSMA considers that thresholds exceeding -110 dBm seem overly ambitious in a multi technology/frequency band environment and would correspond either to very high data rates or very high service probability, potentially indicating no coverage in areas where users can get satisfactory service, or leading to over engineered and costlier coverage than required. A high binary coverage threshold applied to a single layer as though it is the sole resource available will overestimate the resource that is required to provide consumers with highly reliable service coverage since it fails to account for the available contributions to probability from other coverage layers. In case thresholds keep differing across Europe, it must be made transparent and clear that measurements are not comparable as they would relate to different user experiences or probabilities within the areas deemed covered according to the different thresholds.

ETNO adds that it should be considered that overly ambitious thresholds are not always conducive, as higher signal power does not necessarily lead to better quality or better consumer experience. MNOs can and need to do more than ensuring signal strength to deliver a good product, and that responsibility needs to stay with the MNOs. **ETNO** considers that the minimum probability of successful service method appears to be more relevant.

ECTA suggests that the minimum of three levels of mobile coverage should be included in the common position together with an upper limit to the number of levels.

Metricell would recommend that the signal power thresholds are derived from a technology and frequency band specific link budget and that link budget is carefully validated by measurements. For LTE, this will also depend upon the channel bandwidth. There is obviously a wide range of factors to be taken into account by NRAs. For comparison purposes **Metricell** suggests the following levels for basic services provided outdoors: GSM RxLev -95 dBm, WCDMA RSCP -105 dBm and LTE RSRP -118 dBm.

Ciqua notes that no single threshold can be used everywhere. Thresholds for service coverage metrics should be set on a per-country basis to reflect local conditions and regulatory objectives.

3.4. What might be the practical implications associated with selecting thresholds such as the impact of factors outside of the control of the mobile network operators?

BT, **ETNO** and **GSMA** suggest excluding from the monitoring system factors outside the control of MNOs such as infrastructure beyond the MNO's backbone and the end-user's infrastructure. **ETNO** and **GSMA** point that only a robust monitoring system can deliver measurements that provide transparency of an MNO's actual performance. **BT** noted that selecting thresholds based on metrics that are outside of the control of MNO creates many practical challenges for MNOs.

GSMA indicates that properly reflecting the perception of coverage by end-users and isolating coverage metrics from factors outside the MNOs influence are two conflicting objectives. Depending on the context, one should prevail over the other.

Metricell mentioned that environmental factors (new buildings, growing foliage, etc.) are outside of the control of the mobile network operators.

Ciqua explains that the metrics used to measure adequate service coverage should be evolved and adjusted accordingly. In their experience with deploying device-based crowdsource QoE solutions, thresholds need to be adjusted regularly to reflect changing usage patterns, new services and evolving subscriber expectations. As the external influencing factors are evolving within the measured networks (technologies, frequency bands, radio resource limitations, network congestion, core network latency, cell backhaul bandwidth, gateway congestion, IPX latency, etc.), the thresholds (and even the KQI set used) will also need to evolve. In **Ciqua**'s opinion, if NRAs are focused on delivering good QoE to their citizens, then a subjective feedback mechanism will be valuable to enable subscribers to deliver their opinions and perspectives on the services delivered by their selected network operators directly to the NRA.

3.5. Given the rapid evolution of mobile data consumption, how often do you consider that common metrics should be reviewed to remain fit for purpose or useful for consumers in the future?

BT suggests reviewing the metrics at fixed intervals, for example, 2 years. A 2-year period would align with the maximum contract tenures for consumers while still be frequent enough to ensure the metrics remain relevant and fit for purpose.

GSMA considers that the frequency of the reviews cannot be set in advance. BEREC should periodically assess whether technology or use have changed to a point that makes the review necessary.

Metricell suggests a standard frequency for reviewing the common usage of every five years. It would be aligned to each stage of each mobile generation and should ensure that the common coverage metrics stay relevant and up to date with technological advancements.

However, **Metricell** noted that due to the nature of rapid evolution of mobile networks, the five-year period would act as a guideline, and in the case of a new technology being introduced outside of the averaged five-year timeframe, an ad-hoc review would be required.

As the networks evolve to support increased data consumption, **Ciqual** considers the metrics used to measure adequate service coverage should be evolved and adjusted accordingly.

BEREC Response:

BEREC welcomes these views and updates its draft common position in the following way.

In its common position, BEREC recommends a coverage definition based on service availability for NRA that provides maps for consumer's information. It indicates that service availability depends on many parameters such as signal strength, cell loading, capacity, backhaul, etc. and that signal power is a metric easily to calculate and measure in the field. It recommends that NRAs use a neutral receiving device when calculating coverage predictions using signal strength.

In its common position, BEREC further encourages NRAs to provide consumers with a multi-level coverage information and provides some examples of such multi-level coverage.

4. Comments relating to CP2 (The use of signal predictions for mobile coverage estimation)

BT favours an approach where operators predict coverage and the NRAs only verify the predictions (by drive testing), as NRAs predicting coverage would be impractical and risk

inaccuracies. **GSMA** prefers a scenario in which estimations are based on operator input and are also carried out by the operators and not the NRAs (simpler, less intrusive).

ETNO stresses the need for confidentiality of the data which NRAs would need to obtain in order to do the signal prediction by themselves.

ECTA considers it essential that signal predictions should follow a common specification to avoid unjustified discrepancies, notably where the NRA relies on operator calculations.

As a starting point, **ECTA** suggests that operators should use the same simulation techniques. If no uniform simulation approach can be agreed upon **ECTA** suggests that any publication be accompanied by a standardised label indicating the sourcing, consistency of calculation approaches used and degree of divergence in the information reported. **GSMA** considers that any harmonisation regarding the requirements and parameters that impact the results of the theoretical model should be subject to the greatest consensus and done in an open transparent way.

Regarding the network data used for signal prediction, **ECTA** would welcome transparency with regard to the sources used for the predictions.

BEREC Response:

BEREC recognises that operators prefer doing their own signal predictions instead of handing the relevant data over to NRAs, either for reasons of confidentiality or practicability. Whether NRAs generate the predictions or the operators themselves, BEREC considers it key that the NRAs must be confident of the accuracy of the generated predictions (see CP3). Measurements by drive-testing offer an effective method of testing the accuracy of mobile signal predictions.

With regard to those NRAs that do not intend to make their own signal predictions, BEREC does not plan to promote a common methodology. Often each operator has its own model and the complexity and accuracy of the model depends on the financial resources of the respective operator. Thus, BEREC recognises the risk that a common methodology imposed on operators may pose a financial burden to those operators that would have to change their prediction model. Additionally, for NRAs as well as for consumers, it is more important that the prediction models are accurate (this is tested by the NRAs during their field tests) than that operators use the same methodology in their prediction models.

Where NRAs receive data from operators to perform signal predictions, the data shall be handled confidentially where required. Nevertheless, and as minimum, the NRAs should disclose the sources used for the predictions in order to ensure the necessary transparency.

5. Comments relating to CP3 (Ensuring the accuracy of coverage information provided to the public)

GSMA generally agrees with CP3 and **ETNO** welcomes the notion of drive-tests to ascertain accuracy of coverage information. **BT** and **GSMA** insist on the need to ensure statistical robustness of the measurement methodology.

BT, ETNO and GSMA consider that crowdsourcing is not reliable enough to verify accurate and reliable coverage information. On the contrary, **ECTA** proposes to open the CP to the use of other measurement approaches which generate results of a similar quality as drive-testing (e.g. crowdsourcing). Also, **BT** sees worth in crowd sourced data for identifying “black spots” and for informing policy decision makers on where and how networks can be improved.

ETNO proposes that NRAs should seek dialogue with ISPs to align measurement methods.

ECTA suggests naming explicitly the circumstances under which field measurements would not appear appropriate. Also the CP should mention the countries in which the NRA and the MNOs have achieved a consensus on the exact set of parameters to be measured in the field as well as describing the “standard method” in more detail.

P3 Communications and **OpenSignal** strongly advocate for incorporating crowd sourced measurements as additional source of data for monitoring coverage and service quality for mobile networks. **P3 Communications** highlights that in the same way the signal level is an “indicative measure towards the definition of the level of coverage”, the coverage itself is just an indicative measure of mobile services being available to the consumers. Both **P3 Communications** and **OpenSignal** collect data from a wide range of smartphones, reflecting most of the devices in use by consumers. According to them, there are currently more than 190 million consumer smartphones having crowd sourcing technology installed and billions of individual measurements performed every day from consumer devices globally. Based on billions of data points analysed to investigate the extent of correlation between measures of signal and service quality, **OpenSignal** has analysed billions of data points to investigate the extent of correlation between measures of signal and service quality and has found correlation between some such measures, but not all.

BEREC Response:

BEREC welcomes the overall positive responses with regard to the performance of appropriate drive testing in order to ensure the accuracy of coverage information provided to the public.

BEREC very much welcomes the views expressed by the stakeholders on crowd sourced measurements. BEREC considers that incorporating crowd sourced measurements in a BEREC common position would require more studies, in particular to understand the

methodology behind crowd sourced measurements and its compliance with the general data protection regulation (GDPR).

6. Comments relating to CP4 (Availability and presentation of mobile coverage information)

BT emphasises the impact devices have on the quality of experience for consumers and therefore proposes to have the possibility in the coverage maps to choose the device the consumer uses in order to give more accurate information about what quality of experience the user can expect with his device (personalised coverage prediction).

ECTA, **ETNO** and **GSMA** indicated that only accurate and verified information should be published.

ETNO and **GSMA** emphasises that NRAs must avoid publishing business secrets – particularly not to reveal sensitive data on how competing companies deploy their networks (e.g. through providing real-time information with overly granular maps).

ECTA notices that on the one hand a coverage map resolution of 100m or lower does not seem congruent with more granular 5G network designs. On the other hand a 100m or lower granularity does not meaningfully correspond with other wireless technology and should thus not be imposed on operators.

ETNO considers that maps should reflect the development of coverage over time.

ETNO is in favour of operators providing the coverage maps and NRAs providing links to those maps while facilitating an agreement on minimum degree of homogeneity of those maps on a national level.

Concerning maps based on crowd sourced data **ETNO** considers, that only anonymised data should be used, to protect customer privacy.

ECTA proposes to clarify whether re-publishers of open coverage data are expected to test their publications.

BEREC Response:

Overall BEREC considers that NRAs should verify regularly published information and could indicate the degree of verification.

BEREC notices that operators are very sensitive about NRAs possibly 'leakage' of business secrets when publishing coverage maps. While BEREC recognises the sensitivity of the topic, BEREC is also convinced that where NRAs publish their own coverage maps those will not give away confidential information as the maps will be aggregated and colour coded to display only a few coverage layers meaningful for consumers.

BEREC also recognises that when QoE is displayed it could be favourable to provide a set of data for varying models of handsets in order to inform the consumer that handsets have an influence on QoE.