

**BEREC Report on the outcome of the
public consultation on the draft BEREC
guidelines on how to assess the
effectiveness of public warning systems
transmitted by different means**

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Introduction

This report summarises the responses received to the public consultation on the BEREC's draft guidelines on how to assess the effectiveness of public warning systems transmitted by different means (hereinafter- draft Guidelines). The public consultation was organised from 11 December 2019 until 31 January 2020.

In response to the consultation on the draft Guidelines, BEREC received twenty contributions from the following stakeholders:

1. 112 Iceland,
2. EENA,
3. Ericsson & Mobilaris,
4. Everbridge,
5. Gedicom,
6. General Directorate of Fire Rescue Service of the Czech Republic,
7. General Secretariat for Civil Protection Greece,
8. GSMA-ETNO,
9. Information and Communication Technologies Authority of Turkey (ICTA/BTK),
10. International Homeland Security and Emergency Management Florida,
11. Italian Civil Protection Department (Dipartimento della Protezione Civile, Ufficio risorse umane e strumentali e servizi generali di funzionamento, Servizio sistemi informativi e di comunicazione) (Italian CPD),
12. Ministry of Justice and Security of the Netherlands, Directorate-general of Police and Safety Regions (MoJS NL),
13. Nokia,
14. PSC Europe,
15. SOS Alarm Sweden,
16. State Fire and Rescue Service Latvia,
17. The Association of Informatics and Telecommunications, joint under Chamber of Commerce and Industry of Slovenia (SOEK),
18. The Ministry of the Interior-Communication Information Systems Directorate (CISD) and the Fire Safety and Civil Protection Directorate General (FSCPDG) Bulgaria,
19. The Special Telecommunication Service, Romania (RO ALERT),

20. Zefonar Advisory.

BEREC is grateful for the submissions received and has carefully considered them, and sets out a summary of relevant assessments and responses in this report. The responses are published on BEREC's website and should be consulted for the definitive version of respondents' submissions.

Some respondents repeated points throughout their submissions, and some points were made by multiple respondents, this led to BEREC considering similar points from different perspectives. Given that context, this summary report aims to set out some of BEREC's key observations rather than setting out an inventory on all repeated points.

BEREC recognises that some respondents to its consultation may not be familiar with BEREC consultation processes. It is important that respondents provide reasons for text changes so that the analysis can be as rich as possible bearing in mind that BEREC draws on a great number of experts to consider views received in detail. Unfortunately, in several cases BEREC has received comments asking for it to change "incorrect statements" without supporting evidence proving the fault in the original statement.

In the BEREC response text set out in this document, where there is a reference to a section of a chapter or a chapter, it is a reference to a section or a chapter in the final Guidelines published alongside this document unless stated otherwise.

1. General comments

All respondents welcomed the opportunity to provide comments on BEREC's draft Guidelines.

GEDICOM asks BEREC to make clear that the Guidelines focus on the comparison of PWS channels and not on the PWS software comparison.

BEREC's response:

BEREC's Guidelines consider how to assess the effectiveness of public warning systems transmitted by different means in accordance with Article 110 of the European Electronic Communications Code. BEREC's Guidelines describe features of an example deployment of ECS-PWSs with reference to some different functionalities of each. The Guidelines do not give guidance on either specific software generations or on PWS software comparisons. Some additional functionalities associated with different ECS-PWS are set out for information. It is a matter for the Member State to consider the operational requirements of ECS-PWSs to suit their needs, and to use the BEREC's Guidelines (and the assessment methodology set out therein) in order to assess the effectiveness of PWS transmitted by different means. Section 1.2 of the Guidelines clarifies the scope of BEREC's Guidelines.

2. Answers to BEREC's questions

During the consultation, BEREC invited stakeholders to answer several questions related to their opinion of the minimum operational requirements a public warning system should be able to fulfil. The responses and comments aggregated below by question. In total BEREC received answers from 15 contributors, not all of which replied to all questions asked:

1. 112 Iceland,
2. BE Alert,
3. Everbridge,
4. General Directorate of Fire Rescue Service of the Czech Republic (FRS Czechia),
5. General Secretariat for Civil Protection Greece (GSCP Greece),
6. GSMA-ETNO,
7. Information and Communication Technologies Authority of Turkey (ICTA/BTK),
8. International Homeland Security and Emergency Management Florida (Alert Florida),
9. Italian Civil Protection Department (Dipartimento della Protezione Civile, Ufficio risorse umane e strumentali e servizi generali di funzionamento, Servizio sistemi informativi e di comunicazione) (Italian CPD),

10. Ministry of Justice and Security of the Netherlands, Directorate-general of Police and Safety Regions (MoJS NL),
11. PSC Europe,
12. SOS Alarm Sweden,
13. State Fire and Rescue Service Latvia (FRS Latvia),
14. The Ministry of the Interior-Communication Information Systems Directorate (CISD) and the Fire Safety and Civil Protection Directorate General (FSCPDG) Bulgaria.

1) What are the minimum operational requirements that you would expect from a public warning system operator with regard to the criteria of coverage and capacity to reach end-users? In particular, what are your expectations with regard to targeting concerned end-users in a specific geographical area (required minimum geographical granularity)?

The following operational requirements were proposed by the contributors:

10 contributors (CISD Bulgaria, Everbridge, ICTA/BTK, SOS Alarm, GSCP Greece, MoJS NL, Alert Florida, Italian CPD, FRS Latvia, and FRS Czechia) consider a near nationwide coverage and/or the possibility to reach all end-users concerned as an essential operational requirement in order to have an effective national ECS-PWS.

Seven contributors (CISD Bulgaria, SOS Alarm, GSCP Greece, MoJS NL, PSC Europe, GSMA/ETNO, and Italian CPD) consider a granularity of a single cell to be a sufficient size for authorities to target warning messages. Two contributors (MoJS NL and PSC Europe) recommended using geo-fencing to enhance geographical targeting when using LB-SMS.

SOS Alarm and Alert Florida mention that ECS-PWS' should be able to portray maps, links and/or audio messages.

Three contributors (SOS Alarm, FRS Latvia, and GSCP Greece) deem the capability to send messages in the language of the recipient as essential functionality of an ECS-PWS.

Three contributors (SOS Alarm, FRS Latvia, MoJS NL) consider a quick delivery of warning messages an important feature of ECS-PWS (only a few minutes at most, even in times of high network load).

In the view of two contributors (GSCP Greece and Alert Florida) an ECS-PWS should be able to send longer messages.

MoJS NL and GSCP Greece conclude that ECS-PWS should be free of charge and that they should be sufficiently robust/reliable.

FRS Latvia and 112 Iceland explicitly mention that ECS-PWS should provide information on the actual threat and how to react to it.

Four contributors (FRS Czechia, Alert Florida, MoJS NL, SOS Alarm) assert that an ECS-PWS should not require an end-user to interact with the PWS in terms of registration or to

change any device settings, and Alert Florida considers the option to opt-out of certain types of warnings could be a negative feature.

MoJS NL and SOS Alarm consider a specific, distinct and recognisable alert from the device triggered by an incoming warning message to be a useful operational requirement.

SOS Alarm and 112 Iceland also mention the capability to alert citizens abroad of danger at their current location as a useful feature of ECS-PWS.

Alert Florida highlight that they wanted to ensure with their ECS-PWS that all impacted people are reached, including people outside the immediate affected area with a strong reason to receive alerts irrespective of their location.

SOS Alarm positively mention the capability to display warning messages on devices other than smartphones. Furthermore, they deemed it an essential feature that end-users should be able to view warning messages again, after these have been displayed on their device.

Alert Florida and SOS Alarm also consider sending “all clear” messages to the relevant end-users to be a useful operational requirement. In their view, such messages should also be sent to end-users who left the relevant area after receiving the initial warning message.

FRS Latvia and SOS Alarm emphasize on a possible functionality of ECS-PWS providing feedback on the (un)successful receipt of the warning message which could also enable a near real-time analysis of the amount of active devices in the relevant area. They stressed that this could be beneficial for the competent authorities to be able to react better to changing circumstances.

FRS Latvia and SOS Alarm furthermore see the need to ensure the authenticity of warning messages.

Everbridge, SOS Alarm and 112 Iceland consider it an essential feature of an ECS-PWS to be able to reply to warning messages.

BEREC's response:

Based on the above views, it is clear that stakeholders have different views on the operational requirements of ECS-PWSs, and as a result, BEREC considers that operational requirements are likely to be considered on a case-by-case basis.

With regard to respondents' views on nationwide coverage requirements and/or requirements to reach all end-users concerned, BEREC agrees with the view that coverage is likely to be high priority operational requirements for all Member States. BEREC would observe that nationwide coverage could be achieved by combining several regional or local ECS-PWS (see section 2.1.4) together such that there is some flexibility about how systems could be deployed, however, that targeting population with coverage is necessary. In relation to respondents views on the operational requirement to reach all end-users concerned, which is also mentioned in recital 293 of the EEC, BEREC observes that due to the risk for a control failure somewhere in a PWS system there may be practical reasons why this requirement may not be achievable / realisable in every warning event in practice; e.g. a single cell outage might occur at a critical moment or there might be another unplanned situational limitation such as temporary terrain shielding of signals due to cranes or other temporary obstructions in the

vicinity of warning transmission. BEREC, like all stakeholders, fully supports the aspiration that MS reach *all end users concerned* and reaching as many concerned end-users as possible would be desirable for the reasons set out above. In addition, BEREC observes that the choice of systems under Article 110(1) EECC namely LB-SMS and CB PWS, are considered sufficient by the Legislator to be systems that transmit alerts to all concerned end-users, even though in practice they may not achieve this aim due to the reasons mentioned here above.

Concerning respondents' views on the granularity of a single cell as an operational requirement, BEREC considers that this level of geographical targeting could be achieved by the systems, which it analysed in the draft Guidelines (see section 4.2.1 on geographical targeting). With regard to the use of geo-fencing, BEREC also considers this to be a useful feature, which is however not a standard functionality of LB-SMS e.g. in the Netherlands it is not yet implemented but authorities are considering it to be an enhancing feature in the future.

Regarding the operational requirement on functionality to portray maps, links and/or audio messages, BEREC agrees that there are some useful benefits associated with such features. In this aspect, BEREC refers respondents to section 7.2 (Display Capabilities) for a high-level analysis of similar relevant features observing that such features fall outside of a comparative analysis of effectiveness of different systems as is prefaced in the introduction to chapter 7.

BEREC also agrees that the capability to send messages in the language of the recipient is an operational requirement, which could provide high levels benefits to recipients of PWS messages, and could be considered as an important functionality of an ECS-PWS. Given the benefits of such an operational requirement, reference is made to it in sections 4.2.6; 5.2.1.6 and 5.2.2.6 of the Guidelines.

Furthermore, BEREC, like other stakeholders, supports operational requirements that enable warning messages to be delivered as fast as possible. This is already addressed in sections 4.2.2; 5.1.2.2. and 5.2.2.2 of the Guidelines dealing with Scalability, observing that the speed of message delivery depends on how well an ECS-PWS and the underlying delivery network(s) performs under stress (e.g. high network load).

With regard to the capability of sending longer messages, BEREC agrees that this operational requirement could provide high levels of benefits to recipients of PWS, particularly when detailed information is needed in order to communicate how recipients of messages may stay safe given the warning (e.g. during the Coronavirus pandemic in 2020 some MS selected to provide detailed information on the measures taken and orders to be given to their respective citizens). Managing longer messages is set out at sections 4.2.7 and 5.2.1.7; and 5.2.2.7 of the Guidelines.

Two respondents consider the operational requirement that ECS-PWS should be free of charge. Recital 294 of the EECC sets out that the welcome SMS explaining the access to the national ECS-PWS and the transmission of public warning messages should be free of charge for end-users (however, the EECC is silent beyond that and there are no particular obligations about how this should be implemented). Even though this is only mentioned in recital 294 it is a general prerequisite for all types of ECS-PWS set out by the EECC. Therefore, BEREC amends the Guidelines accordingly at section 5.4.1, 5.4.3.5 and also by adding information on "free of charge" at Chapter 7.1.

In relation to the operational requirement that the ECS-PWS should be robust, BEREC sets out its views on this relevant sub-criterion in sections 4.2.9; 5.2.1.9; 5.2.2.9; of the Guidelines.

Regarding the input from FSR Latvia and 112 Iceland that ECS-PWS should deliver information on the threat and how to react to it, BEREC observes that this is a messaging matter / content matter, and as such is not within BEREC's remit in terms of developing Guidelines under Article 110 of the EECC. BEREC would agree that messaging matters / content matters contribute to the core purpose of any ECS-PWS, and information provided by the relevant competent authorities that consists of clear instructions and relevant safety information is likely to yield high levels of benefits for the recipients of warning messages. BEREC's Guidelines set out relevant technical functionality of systems so that competent authorities are aware that different systems have different dimensions/budgets in terms of maximum numbers of text characters or message sizes. What is clear to BEREC at this time, is that PWS systems need to be considered by Member States according to their operational needs, on a case by case basis.

Concerning the operational requirement that the end-user interface with an ECS- or IAS-PWS, BEREC observes that the EECC forbids systems with "registration" or "login" requirements. BEREC would note that device settings may need to be changed from the manufactures default settings in order to enable the reception and display of public warning systems messages. Illustrative examples of where end-users readily interface with device settings would include activating location services (e.g. GPS or Galileo) for an app or opting out of updates for an app; so users are likely to be well primed to navigate settings in devices in order to activate them for ECS- or IAS-PWS transmissions. The extent to which interfacing with the device would be a barrier to the effectiveness of the PWS would depend on the complexity of the action required. For example, BEREC understands that opt-out is a typical feature of CB, yet BEREC would consider CB to be a system covered by Article 110(1) of the EECC, and as such it would be a valid benchmark system even if there could be some level of user interface – when it comes to alerts of EU-Alert Level 1 no opt-out exists. BEREC explains this in detail in sections 4.2.5; 5.1.2.5 and 5.2.2.5 of the Guidelines.

With regard to the operational requirement that authority public warning alerts are characterised by having a specific, dedicated and recognisable alert tone BEREC concludes that only CB provides this functionality as a default and that LB-SMS and IAS-PWS (depending on the programming) may use standard device sounds assigned to incoming messages. BEREC would note, however, the alert tones in the latter systems can be customised by the end-users if they want to have a specific sound for warning messages, depending on the device used. BEREC's view on this is set out at Chapter 7.2.

BEREC agrees with SOS Alarm and 112 Iceland that it can be a useful feature of an ECS-PWS that citizen are alerted of imminent dangers when traveling in countries where there is no ECS-PWS in place. The ability to provide warnings outside a competent authority's national territory is not a requirement of the Code and therefore, BEREC does not consider this proposal further as it lies outside of the scope of its task.

Regarding Alert Florida's view on the benefits of an operational requirement of alerting people outside the relevant area (for example alerting the relatives of known recipients of warning messages in an area), BEREC has analysed this functionality in section 7.4 of the Guidelines as it is not a feature required by Article 110 EECC but in line with its aim.

With regard to SOS Alarm highlighting the benefits of ECS-PWS also sending messages to other devices than smartphones BEREC has considered this in sections 4.2.4; 5.1.1.4; 5.2.2.4 of the Guidelines.

BEREC has also considered the functionality of calling up active warning messages back to the display and has addressed this in section 2.2 of the Guidelines.

Concerning sending “all-clear” messages to all end-users that were present in the relevant area during the alert, even after they have left the area, BEREC considers that this would be a useful feature as it may be beneficial and add value to recipients of warning messages. However, it is technically not a warning message. Therefore, BEREC considers this in section 7.5 of the Guidelines and believes that may be a useful element of an overall well-functioning warning system.

In relation to the issue of an operational requirement based on the authorities receiving an acknowledgement of receipt or even summary data on the number of active devices in the relevant area, BEREC considers that there could be benefits with such operations as they may enhance the competent authorities’ understanding the state of the target audience, success rate at getting messages through, and give insights to the emergency services to assist them in making deployment decisions in the relevant area. BEREC also considers that this type of technical functionality / operational requirement may require the collection of private location data, which even if anonymized could potentially be tracked back to a single device, and in any case would necessitate the creation of a location database containing sensitive location information. Collecting private location data may raise privacy issues in particular if there were data protection breaches or other unintended uses of the data. Therefore, an MS considering implementing such a feature in their ECS-PWS may need to ensure that the appropriate authorisations (such as on data privacy) are in place. BEREC considers this further in section 7.5 of the Guidelines but does not consider that a new factor should be created to capture this particular type of ‘feedback’ requirement, because strictly speaking generating a feedback-message that possibly also contains location data is not a warning message as described by Article 110 EEC.

BEREC agrees with FRS Latvia and SOS Alarm that ensuring the authenticity of warning messages is essential to avoid sabotage which could cause dangerous panic, and for maintaining the trust of citizens in warning messages generally. BEREC’s analysis of this operational requirement is set out in section 7.3 of the Guidelines.

Concerning the possibility to reply to warning messages BEREC understands that this can be a useful feature. However, BEREC deems such a feature to be outside of the scope of Article 110 EEC which specifically addresses warnings aimed at citizens whereas a reverse PWS requires an entirely different network dimensioning such as is already in place using other channels such as 112.

2) In your experience, what is the ratio (in percentage) of the number of events that trigger a public warning message that can be assigned to each of the following size of targeted area?

targeted area with population up to 5 000;

targeted area with population up to 50 000;

**targeted area with population up to 500 000;
targeted area with population up to 2 million;
targeted area with population up to 10 million;
targeted area with population above 10 million.**

Of the twelve contributions BEREC received to this question only the following provided input to the question asked in a relevant way:

	FRS CZ	SOS Alarm	Everbridge	CISD BG	MoJS NL	BE Alert	FRS LV
< 5k	60%	50%	50%	Most cases	no data	90%	no data
< 50k	30%	48%	30%	no data	no data	10%	no data
< 500k	10%	1,5%	10%	no data	no data	no data	no data
< 2 Mio	no data	0,3%	9%	no data	no data	no data	7 cases
< 10 Mio	n/a	0,1%	0,9%	no data	no data	no data	n/a
> 10 Mio	n/a	0,01%	0,1%	no data	1 case	no data	n/a

PSC Europe's contribution does not seem to match the question posed as the percentages provided in their answer add up to 386% instead of 100%.

BEREC's conclusion:

The above question aimed to uncover relevant insights from stakeholders about the number of events triggered and size of the associated target area where warning messages were dispatched. Having considered responses, it seems to BEREC that there is limited practical experience among those stakeholders who responded. For example, analysis of submissions indicates that between 80% and 98% of warning messages dispatched are sent to areas with up to 50.000 end-users concerned, however, in areas with up to 5.000 end-users concerned, there was a significant variation in numbers of events (between 50% and 90% of warning messages sent to areas up to 5.000 end users concerned).

Cases where up to 500.000 end-users need to be alerted range between 1,5% and 10% and less than 1% of the total warning messages are sent in cases where more than 2 Million. end-users are concerned.

The variations in the percentages may to some extent be explained through the different sizes of countries. E.g. naturally countries that have less than 2 Million. citizens don't send messages to more than 2 Million end-users and consequently they send a higher percentage of messages to less than 2 Million end-users. Furthermore, BEREC considers that the amount of cases does not reflect on the severity and urgency of use-cases. BEREC believes that even though the total cases of alerts affecting more than 2 Million end-users seems to be less than

1% these cases may well be of great importance to the population due to their severity and geographical reach.

Thus, BEREC observes that these numbers may not constitute an reason for Member States to deploy systems that only deal well with the expected majority of small cases. In line with the EECC, ECS-PWS must be able to address even the worst case scenarios, even if they are uncommon.

On the other hand, BEREC observes that in the majority of examples of warnings seem to be only relevant for a small part of the overall population, which might add weight to the benefit of geographical targeting operational requirements as it can be used to avoid unnecessarily alerting end-users. Precise targeting of messages might enhance rescue efforts and/or other relevant measures by the competent authorities.

In light of the above, and having regard to the fact that there are no clear insights to support how an MS might dimension their PWS, BEREC remains satisfied with its methodology, particularly, in regard of Step 1 of the Guidelines, which requires the competent authority to carefully gather the operational requirements of the envisioned IAS-PWS. BEREC therefore considers that MS must seek to carefully identify their own specific requirements on a case by case basis.

3) If your Member State has already rolled out a public warning system using means of electronic communications services (ECS-PWS), how well does it meet your expectations in terms of geographical coverage, population coverage and overall capacity to reach end-users?

With regard to the third question BEREC concludes that the six contributors that gave feedback from a specific Member States with an existing ECS-PWS (FRS Czechia, BE Alert, RO-Alert, SOS Alarm, MoJS NL, GSCP Greece) are content with the rolled out ECS-PWS' and that their systems met all of their expectations. BEREC observes that there were no criticism of these systems (either CB and LB-SMS). However, BEREC did not receive a contribution from a Member State with an existing IAS-PWS used as a nationwide ECS-PWS so more information on the usefulness of these systems might be available in the future.

3. Comments to Executive Summary

Everbridge suggests adding a reference to recitals 293 and 294 in the Guidelines after the following paragraph "Chapter 2 illustrates (...)".

BEREC's response:

When drafting the Guidelines, BEREC carefully considered recitals 293 and 294 of the EECC, which provide additional context in relation to Article 110. Recitals 293 and 294 are informative and have been taken into account by BEREC and no amendment to the Guidelines is necessary to highlight the aforementioned recitals.

4. Comments to Introduction

1.1. What are Public Warning Systems?

Everbridge suggests to state even more clearly in section 1.1. who is responsible for the evaluation of the equivalence of effectiveness of alternative ECS-PWS. Hence the evaluation should be carried out by the competent PWS user-authorities either in conjunction with or instead of the NRA.

BEREC's response:

BEREC agrees with Everbridge's comment that the Guidelines should be clear on the roles of the various stakeholders in PWS and the Guidelines have been amended accordingly in Chapter 2.

5. Comments to BEREC's interpretation of the scope of article 110 EECC

2.1.2 Obligation of article 110 EECC

Everbridge sets out its interpretation of recital 293 that the capability to reach all end-users would be a binding criterion from the EECC, and that this criterion should be added in several sections throughout the Guidelines by highlighting that *all end-users need to be reached*.

GSMA/ETNO points to the fact that the EECC does not ask Member States to build mobile networks for the purpose of transmitting public warnings, but rather that existing networks are likely be used for the purpose of transmitting PWS messages and that consequently the ECS-PWS systems need to be built in order to function effectively on existing mobile networks.

BEREC's response:

BEREC has considered Everbridge's views on recital 293 but does not find it to be convincing. In BEREC's view Recital 293 should not be interpreted in isolation and must be read in the context of the Article 110 itself. Article 110(1) considers the ECS-PWS falling under its scope to be sufficient to fulfil the obligation from this Article. BEREC's assessment is that systems may not be capable of reaching *all end-users concerned* under all circumstances. As set out earlier, BEREC observes that due to the risk for a control failure somewhere in a PWS system there may be practical reasons why this requirement may not be achievable / realisable in every warning event in practice; e.g. a single cell outage might occur at a critical moment or there might be another unplanned situational limitation such as temporary terrain shielding of signals due to cranes or other temporary obstructions in the vicinity of warning transmission. BEREC, like all stakeholders, fully supports the aspiration that MS reach *all end users*

concerned and reaching as many concerned end-users as possible would be desirable for the reasons set out above.

Consequently recital 293 must be interpreted in the light of the ambition represented in Article 110. Thus, BEREC interprets recital 293 which means that ECS-PWS should reach as many end-users concerned as possible. Furthermore BEREC considers that reaching “all end-users” is a part of the “capacity to reach end-users” which is already taken into consideration and mentioned at several places in the guidelines e.g. in section 4.2.

To be clear, in relation to GSMA/ETNO’s point the EECC does not ask Member States to build mobile networks for the purpose of transmitting public warnings, BEREC did not make a statement that networks should be built for the purpose of fulfilling its obligations under the EECC. In addition, BEREC is of the view that in order to transmit warning messages, the systems contemplated by Article 110(1) may require certain additional components to be added to existing mobile network infrastructure, so that public warnings could be transmitted effectively, and a number of examples of existing networks being equipped for ECS-PWS are set out in the Guidelines. In terms of additional technical equipment BEREC observes that CBC would be necessary for CB and MLC would be necessary for LB-SMS.

2.1.3. Equivalence of 110(2)-PWS’

Everbridge asks BEREC to provide advice regarding the way to achieve the statement in recital 294 ““where a public warning system relies on an application, it should not require end-users to log in or register with the authorities or the application provider””.

BEREC’s response:

BEREC considers this matter is dealt with in chapter “Steps required for recipient to enable receiving warning messages”. Essentially, BEREC observes that the use of IAS-PWS requires downloading and installing of an application, including the granting of the necessary permissions to receive warnings (e.g. by enabling location services whether GPS or Galileo). The EECC, however, only forbids a registration or log-in. Enabling location services for the app is neither registration nor log-in. BEREC observes that there are diverging approaches to registration and login, presently. For example, some of the currently deployed IAS-PWS’ (Austria, Germany, Portugal and some regions of Spain) applications come pre-configured in a way that warnings for the current location can be received if locations services are activated upon installation. In addition, in Austria, Germany and Poland additional features can be activated or filters applied e.g. by entering specific locations the end-user wishes to monitor for specific warning types. Current systems in other countries need further configuration in order to receive warnings through IAS-PWS applications (Finland). By setting out this information in the Guidelines, BEREC raises the awareness of the potential need for app developers and competent authorities to make informed decisions about how to establish compliance with the obligations of the EECC. BEREC has no vires to mandate how developers of IAS PWS should address this issue given that there are likely to be a considerable number of ways that app developers, in concert with competent authorities, can develop suitable solutions.

BEREC also notes that competent authorities should consider how best to maximise the number of end-users that install on-device application ECS-PWS. e.g. by considering raising end-users' awareness on the benefits of having an ECS-PWS available to them.

2.2.2. Cell Broadcast (CB) implemented according to ETSI EU-ALERT standard

MoJS NL sets out several aspects as missing from section 2.2.2 (time needed to receive a message, reach of the NL system and the compatibility of CB-systems).

MoJS NL also proposes to include the following sentence "A CB-message is being transmitted over and over each minute, until it is cancelled. Hence, devices that were outside the area and then enter it, will show the message as well as long as the message is active." on page 9 of the Guidelines after the first paragraph.

Everbridge highlights that CB is not well suited for terrorist attacks when the use of CB would trigger a loud signal revealing the location of the end-user and possibly exposing them to attacks.

Furthermore Everbridge criticizes CB for not facilitating for two-way communication, thus failing to meet one of the key requirements of the EECC.

Everbridge also highlights that the roll-out of CB can be costly as MNOs have no use case to roll-out CB for commercial purposes. In the same vein Gedicom commented that while an LB-SMS implementation will indeed require an MLC to be available within the MNO, such MLCs may already be in place for other purposes, thus reducing the deployment costs.

Everbridge sets out that BEREC is incorrect when it states: "The mobile device remembers the serial number of the CB message, so the CB message is shown only once on each mobile device but can be called up again by the end-user" and proposes an alternative sentence "All attached mobile devices connected to the cell listen for these broadcasts and display the message on the users' mobile devices where appropriate."

Everbridge also proposes to add the aspect of default CB support and correct device configuration to the capability of CB to alert users that arrive in a hazardous area after the initial alert has been sent.

BEREC's response:

BEREC would like to highlight that the aspects which MoJS NL considers to be missing are, in fact, part of the description of CB, see also section 5.1.

Furthermore BEREC does not support MoJS NL's proposal to add the proposed text on page 9 of the Guidelines, as this matter is addressed by the text at section 2.2.2 as follows "*CB is, as the name suggests, a broadcast technology operating at the default granularity of a single cell up to any size of cell group (e.g. all cells in a particular region). In this scenario the alerting gateway interacts with the CBC which sends a message to the destination cell (BTS/NodeB/eNB/gNBs), which forwards this message over the air interface only in pre-defined time intervals until it is not needed any more. Therefore, even users that arrive in the affected area later (or have been in that area but have not been in coverage of mobile network)*

could be warned by CB. All attached mobile devices connected to the cell listen for these broadcasts and display the message on the users' mobile devices where appropriate. Each warning has got its unique serial number. The mobile device remembers the serial number of the CB message, so the CB message is shown only once on each mobile device but can be called up again by the end-user."

BEREC agrees with Everbridge regarding the potential risk involved when using CB during certain kinds of terrorist attacks, and considers this in section 7.2 of the Guidelines.

BEREC does not agree with Everbridge's view that "two-way" communications are part of the requirements of the EECC for ECS-PWS. BEREC has considered the obligations of Article 110 of the EECC and observes that there is no obligation related to two way communications. The Article concerns warnings targeted at citizens, thus an ECS-PWS that is one-directional is compliant with the EECC. Furthermore, BEREC considers that there are already sufficient safeguards in place to enable citizens in need to alert the authorities (e.g. 911/112).

Regarding Everbridge's and Gedicom's comments on cost-effectiveness of CB and LB-SMS BEREC considers that whichever system is selected there will be cost implications. However, according to Article 110 EECC BEREC is only allowed to assess the equivalence of IAS-PWS effectiveness and not cost-effectiveness *per se*. Thus, this point is out of scope of the BEREC Guidelines.

BEREC has considered Everbridge's proposal to amend the text (copied also above in italics in reference to MoJS NL) with an alternative sentence, but does not consider there to be merit in the proposal. The wording set out by BEREC fully reflects the functional operation of CB, in BEREC's view. Therefore, BEREC does not support the replacement of the sentence "*The mobile device remembers the serial number of the CB message, so the CB message is shown only once on each mobile device but can be called up again by the end-user*".

BEREC has considered the proposal by Everbridge to add the aspect of CB support and correct device setting so that it is clear to competent authorities that CB may - after the correct setting has been chosen - be capable of alerting users that arrive in a hazardous area after an initial alert has been sent. As a result, BEREC amends the Guidelines at 4.2.10 and thereafter by including information on this particular operational requirement as a separate factor (observing it was also suggested by other stakeholders in their comments on that part of the draft Guidelines).

2.2.3 Location Based SMS (LB-SMS)

Gedicom and Everbridge raise concerns that the draft guidelines contained a bias in favour of CB over LB-SMS.

Gedicom and Nokia comment upon BERECs description of Location Services as integrated into an LB-SMS service. Gedicom specifically suggested that locating the MLC outside the MNO domain, might lead to GDPR limitations, which the draft guidelines underline. Gedicom

suggested that moving the MLC within the MNO domain would help maintain location privacy and that this scenario could be described in a second diagram for illustrative purposes.

Nokia draws a distinction between the “last known” location data which would be constantly sent to the MLC and the “real time” location of the devices which must be ascertained at the time of the query.

Furthermore, Gedicom comments that the approach in footnote 8 of the draft Guidelines is obsolete, and commented that Belgium has “successfully deployed such a system, with no significant time for executing it, and it works for now 2 years”.

Gedicom, Nokia and Everbridge comment that several use-cases could have been included in the draft guidelines

1. Alerts being sent to end users entering the warning area, after the initial alert has been sent
2. Alert updates to previously alerted users (E.g. an “all clear” message to users that left the warning area)

Gedicom and Everbridge comment on the diagram in Figure 3, raising questions as to its accuracy and a perceived lack of clarity in terms of the boundaries between the MNO's network & components vs user/application. Everbridge also pointed out that MLC is only one of many alternatives for location source. It proposed that BEREC should add other sources like non-intrusive probe data to the diagram as well.

Everbridge, Nokia and 112 Iceland describe some of the functionalities, which are enabled under an LB-SMS deployment, assuming the PWS provider can support them. The described use cases range from delivery rate tracking for previously sent alert messages, to the potential benefits of providing aggregated & anonymised reporting the numbers of end users located in a warning area, and the ability to track the movement of people out of a warning area. 112 Iceland stated that quite often they don't necessarily send an alert messages, rather they just prepare to send to get a sense of the size of the problem should a situation develop where evacuation might be required.

112 Iceland and Everbridge describe a use case where the PWS could facilitate messaging towards citizens who are in a foreign country, in case of serious events. An example provided was of the British Government sending updates to the subscribers of British mobile networks in the aftermath of the 2004 “Boxing Day Tsunami”.

Everbridge describes how “LB-SMS sends the alert repeatedly to mobile devices until it is delivered successfully”, and also how “LBSMS is accessible to and reaches everyone with a mobile phone when they are within network coverage”.

In addition Everbridge claims that the following statement from the draft guidelines is incorrect “since the SMS standards do not have a ‘one-to-many’ or a broadcast capability”, asserting that the end user experience is the same when receiving the alert, in spite of each message being handled by the network individually.

BEREC's response:

BEREC considers the Guidelines to contain a neutral assessment of the advantages and disadvantages of the ECS-PWS technology. Further, BEREC has considered all the specific comments raised by respondents, and where there is merit in doing so BEREC adopts relevant suggestions and proposals for new sub-criteria. In BEREC's view it has set out an objective and neutral assessment in the Guidelines. Respondents may have an interest in setting out content in order to lobby for certain outcomes, but BEREC remains consistent in how it considers the material before it and does so in an objective and balanced manner. For example, BEREC received diverging submissions from respondents with some seeking BEREC to illustrate LB-SMS in a more favourable way and others seeking BEREC to emphasize more the advantages of CB over LB-SMS.

In response to Gedicom's and Nokia's comments on figure 3 in the Guidelines, BEREC reiterates that the illustration of the technical setup described in section 2.2.3 was developed so as to be sufficiently indicative, and high-level, that Member States and relevant competent authorities would have an overview of key elements. The diagram is not intended to provide a detailed technical schematic or to distinguish between the MNO domain and the domain of the competent authority, however BEREC will consider making it clearer that as published it was intended to show the MNO domain only.

One key assumption underlying BEREC's approach the draft Guidelines is that end user locations would never be shared outside the MNO domain. While the draft Guidelines do not refer to the GDPR, the reference to privacy implications refers to the implementation of a network-wide user tracking facility, which should be considered by competent authorities.

With regard to Nokia's comment on the distinction between "last known location" and real-time location section 2.2.3 attempts to describe a setup where each MNO maintains a (near) real-time location database, which is fed from one or more location sources. In this scenario, the competent authority/PWS would notify each MNO of the desired alerting area (in terms of one or more polygons) and the alerting message (or other action to perform). The MNO is then responsible for deciding which users to notify and for the distribution of the alert messages.

BEREC recognises ECS- or IAS-PWS will be implemented on a case-by-case basis in Member States depending on national operational needs, and design choices made. BEREC is aware that a given MNO's capability in relation to location tracking will vary according to the type of location tracking used, the network technology and many other factors. BEREC is also aware that multiple location sources can feed into the location store (referred to in the draft guidelines as the "MLC") and that location information might be based on network activity from some time in the past, and that it is possible to query the network in real time to ascertain its current location. According to BEREC's understanding, this might involve the network paging a UE/MS in an idle state.

Having regard to the above, and BEREC's own assessment, BEREC updates the Guidelines to better reflect some of the operational requirements identified above, observing that the location accuracy (spatial and temporal) will vary from MNO to MNO. BEREC also thanks Nokia for drawing the distinction between real-time and last-known locations, and addresses this in the updated Guidelines.

BEREC has considered Gedicom's comment on footnote 8 and clarifies its original view. BEREC considers the possibility of an approach which doesn't utilise real-time location tracking, instead the list of users is ascertained at alert time by querying the network and

paging users. For instance, it is possible that in order to ascertain a list of users that might be in a cell, it would be necessary for the network to page all users for their location in that cell/sector of cell (this could perhaps result in paging a list of all users in a city/large area and subsequently ignoring users that are not in the cell/sector of cell to be targeted). In BEREC's view this paging approach could be inefficient as set out in footnote 8. BEREC accepts that this approach may not always require the network to page the end user, nevertheless BEREC addresses the point in the updated Guidelines.

Regarding Nokia's, Gedicom's and Everbridge's comments on missing use-cases BEREC considers "alerts being sent to end-users entering the warning area after the initial warning has been sent" to be a worthwhile addition to the final Guidelines and makes this a new sub-criterion. In relation to "sending "all-clear" messages BEREC considers that this feature is not strictly required by Article 110 of the EEC, but believes it may have value and thus includes it in the context of other characteristics in the final Guidelines as set out in section 7.6.

With regard to Gedicom's and Everbridge's comment to Figure 3 of the draft Guidelines BEREC considers that the included diagram (Figure 3) is provided as a high level description only, simply illustrating the key logical components of an LB-SMS PWS, and not lower level details such as components vs user/application. In relation to the source of location, the draft guidelines use the term "MLC" as a shorthand for any (near) real time source of location information, irrespective of the source of that information. BEREC therefore, updates figure 3 to more clearly reflect the concept of multiple location sources.

Concerning the functionalities described by Everbridge, Nokia and 112 Iceland BEREC considers that these features are not strictly required by Article 110 EEC, but believes they have value and will consider their inclusion in the context of other characteristics in the final Guidelines in section 7.

While BEREC believes that while alerting citizens abroad of dangers in their vicinity has value, it also introduces legal questions regarding location tracking outside of the user's home country. In addition, BEREC considers that this is outside the scope of Article 110 EEC which only requires Member States to deploy an ECS-PWS on its territory.

In reaction to Everbridge's comments on LB-SMS sending alerts repeatedly BEREC observes that MNO behaviour in terms of SMS retries and expiry varies from MNO to MNO, and this consideration was made by BEREC in the description of LB-SMS as being "simply a normal SMS message which is sent to a subset of the mobile network's attached devices". In addition BEREC has considered Everbridge's claim that "LB-SMS is accessible to and reaches everyone with a mobile phone when they are within network coverage" and finds that it does not take into account the possibility of devices in a limited service state (e.g. no sim card) and therefore overstates the LB-SMS functionality.

Regarding Everbridge's claim of LB-SMS having a broadcast capability and the end-user perceiving it as a broadcast type service BEREC would caution such statements in light of the clear technical differences between LB-SMS and CB, which it sets out in the Guidelines. Further BEREC observes that Everbridge provides no evidence to support its claim that the statement in the draft Guidelines to this effect is not correct. Given that this section of the draft Guidelines is focussed on the network handling of LB-SMS, BEREC considers the experience of the end user in receiving a message to not be relevant.

2.2.5 Conclusion

Everbridge suggests that BEREC advises Member States to consider developing a hybrid PWS solution that would have LB SMS at its core and would be complemented by CB. Everbridge adds that the PWS design will also benefit from automated interfaces with other public warning and information channels to ensure the broadest coverage, accessibility and reach including TV and radio broadcasts, sirens and public address systems, IAS, and the systems used by people with hearing and visual disabilities to receive public information.

BEREC's response:

BEREC considers that it is important to be technology and service neutral, and objective in its analysis, when fulfilling its obligations under Article 110 of the EECC. As such it is not appropriate for BEREC to advise Member States on the roll-out of a specific system or a combination of systems. BEREC's obligation pursuant to Article 110 of the EECC is to develop Guidelines for MS (competent authorities) on how to assess the effectiveness of PWS transmitted by different means. BEREC's approach to this task is to provide a comprehensive methodology to identify if a proposed system according to Article 110(2) EECC would be equally as effective as the systems defined by Article 110(1) EECC, and which would, in BEREC's view, in line with national circumstances; i.e. PWS deployment in MS will be conducted on a case by case basis. It is up to the Member States to decide which system/combination of systems best fits their purpose. Furthermore, BEREC considers that the EECC states that stand-alone systems can be sufficient to fulfil Member States obligations in the EECC(see Article 110(1)). BEREC therefore, rejects Everbridges lobbying that BEREC promote a certain combination of systems.

2.3.2 IAS Mobile Application Based PWS

Everbridge suggests that, when using an IAS-PWS, the ability to send warning messages to a subset of attached devices that have subscribed to receiving warning messages for a set of specific locations of interest is not feasible without prior registration. Everbridge states that this functionality is similar to LB-SMS.

BEREC's response:

BEREC considers that it is possible for an IAS-PWS to support the absent residents/area of interest feature without prior registration. Unlike LB-SMS, the application running on the device is capable of deciding whether to display the warning message depending on its location. This approach corresponds to Option 1 described in section 2.3.2 and is used in practice by the German NINA app. Therefore the end-user can subscribe for certain areas of interest within the app and the corresponding data is stored only on his device. When an alert is triggered for such an area of interest it is broadcast to the whole country but only devices that are in the relevant area or that have subscribed to the area show the message. Thus, there is no registration process involved and the originating authority does not have to keep a list of subscribers.

6. Comments to Methodology

3. Methodology

GSMA/ETNO asserts that BEREC should assess the equivalence of effectiveness solely on the basis of the criteria described in the EECC on “coverage and capacity to reach end-users”.

GSMA/ETNO also points out that the EECC provides flexibility to comply with the obligations in a variety of different means, including e.g. app-based solutions and more modular PWS that are conveyed across various communication channels. Accordingly, GSMA/ETNO recommend that BEREC should not narrow down the assessment to selected technical solutions but remain principle-based.

GSMA/ETNO calls on BEREC to also take into account end-user usage patterns since messaging services such as apps other than NB-ICS are today commonly used by a large percentage of the population.

BEREC’s response:

With regard to GSMA/ETNO’s comment, BEREC considers that the Guidelines fully accord with the obligations of Article 110 of the EECC. For example, BEREC identifies factors which are based directly on coverage and capacity to reach end users provides a concrete basis to assess the equivalence of the alternative ECS-PWS effectiveness, and BEREC is satisfied that its proposed factors are fully within the boundaries / obligations of the two main criteria referenced in the EECC (“coverage and capacity to reach end-users”). Indeed, in light of the views received BEREC sets out a chapter of other characteristics which seem to impact the effectiveness of systems but cannot be used in the equivalence assessment as they cannot be tied to either coverage or capacity to reach concerned end-users. In addition, the difficulty faced by BEREC was that the EECC is silent on how the two main criteria might, in practice, be assessed by competent authorities. Using the technical expertise available to BEREC within its constituent NRAs, BEREC has developed a suitable set of practical reference criteria referred to in the Guidelines as sub-criteria – which are well understood by PWS application developers, MNOs, competent authorities and other relevant stakeholders - and which provide the above concrete basis for competent authorities conduct their assessments.

BEREC also sets out views on a set of additional characteristics which may have an impact on effectiveness (see in section 7 of the Guidelines) observing these cannot form part of the equivalence assessment in BEREC’s view. For example, the transmission of an ‘all-clear’ message may help create a more effective ECS-PWS systems though arguably such a requirement does not strictly fall under the umbrella of being a “warning message”.

BEREC agrees with GSMA/ETNO’s comment on the flexibility of the EECC with regard to the types of ECS-PWS which may be rolled out and this is reflected in the Guidelines in section 2.1.4. While it would be possible to deliver public warnings using other methods on an NB-

ICS, the Guidelines are not intended to describe every conceivable method. BEREC recognises that Member States may consider rolling out a combination of ECS-PWS which best fit their needs. BEREC therefore, clarifies this view in section 2.1.4.

Regarding GSMA/ETNO's proposal to also take into account end-user usage patterns BEREC considers that on the one hand BEREC cannot predict such usage patterns for each Member State as they may differ greatly depending on the network architecture and the dispersion of types of devices. Furthermore, BEREC considers that receiving warning messages is not a question of actively using one of the systems but rather of being alerted by one of the systems described.

3.1. Evaluating ECS-PWS performance

Everbridge states that "accessibility" should be considered as the third main-criterion to assess PWS effectiveness.

GEDICOM asks to add a new sub-criterion "possibility to send updates".

Furthermore Gedicom proposes to make "impact on the battery life" an additional sub-criterion.

EENA considers requirement on privacy-compliance should be better highlighted in the guidelines, in particular regarding the rolling-out an IAS-PWS since processing the user's privacy data would require the active consent from the user.

Nokia proposed to add further sub-criteria (Security, Network Capacity Impact, Architecture/Standards&Evolution).

BEREC's response:

BEREC observes that the EECC specifically cites "coverage and capacity to reach end-users" as the criteria to be used in an assessment of the effectiveness of PWS. BEREC is of the view that "accessibility" essentially falls under the "capacity to reach end-users" main-criterion. In addition, BEREC is also of the view that there may be several considerations that could affect a PWS's accessibility, for example: the range of devices supporting it, the steps required to enable receiving warning messages (e.g. download, configuration) and the ability to reach end-users with disabilities. As a result, BEREC considers that all of these considerations should be included as factors, and sets them out in specific section under the "capacity to reach end-users" main-criterion.

Concerning GEDICOM's proposal to add a new sub-criterion regarding the possibility to send updated warning messages, BEREC considers that this is not needed. If an authority wished to update a previous message, it could simply send a new one.

Regarding GEDICOM's comment on introducing "impact on battery life" as a sub-criterion BEREC considers that the ECS-PWS' impact on battery duration is not a threat to receiving warning messages and therefore an ECS-PWS' capacity to reach end-users. In addition, the differences in battery consumption by the respective systems is not remarkably different. The influence of using Cell Broadcast on the battery life of a Mobile has been investigated and researched for by ATIS (ATIS-0700006v.002 – chapter 5). The calculated conclusion was that the battery life is reduced by around 1 second when using Cell Broadcast.

BEREC agrees that the privacy aspect should be mentioned in the guidelines. However, BEREC considers that this is relevant for all systems and not only IAS-PWS. BEREC notes that recent communications by the Commission has highlighted the importance of highest eprivacy and security standards in relation to Covid 19 tracing apps https://ec.europa.eu/health/sites/health/files/ehealth/docs/covid-19_apps_en.pdf . Chapter 7 sets out that *“It would also be a matter for Member States or competent authorities to ensure that any measures taken to improve the effectiveness of ECS-PWS’, comply with other relevant legislations and promote the highest standards in terms of technical security functionalities, e-Privacy requirements, and Open Internet guidance. In this regard, BEREC encourages stakeholders to consult widely and appropriately before committing to deploy functionalities in their ECS-PWS’.”*

Regarding Nokia’s proposal BEREC considers that the matters raised under “Security” are already covered by Authenticity in section 7.3. and that “Network Capacity Impact” is essentially covered in terms of the Coverage and Scalability factors. Standards/Architecture/Evolution are covered in the general descriptions of the systems. Also ‘standards’ cannot be a sub-criterion because having a standard is not a necessary requirement for the capacity to reach end users.

3.1 Coverage

The MoJS NL suggests to add a timeframe sub-criterion to the guidelines, as with early warning, a short timeframe is very important. Hence, the message should be received within minutes or preferably seconds, and without risk of congestion when usage of mobile networks is high (as normally is the case during crisis).

PSC Europe considers that the evaluation criteria derived from information collected on national systems seem to be incomplete and / or imperfect and that the guidelines should be based on reliable, solid and complete data.

PSC Europe adds that the LBSMS and CB systems are constantly evolving and that many Member States are choosing a hybrid solution combining the characteristics of the two solutions to obtain improved results. Consequently PSC Europe queries whether, and if so how these Guidelines, which are based on technological criteria, will be updated because the benchmark carried by Member States will be rapidly based on outdated data.

BEREC’s response:

BEREC considers that the Guidelines take into account all the relevant issues in relation to the timeframe for delivering messages, see the section on scalability sections.

BEREC does not agree with PSC-Europe’s assertion that there is incomplete information in the Guidelines, or that the Guidelines are lacking reliable, solid and complete data (which is also not specified by PSC Europe). BEREC conducted an internal survey, backed up with desk research, held an early call for inputs and conducted a consultation on the draft Guidelines, and all the information available to it has been carefully considered (including the 20 submissions in response to the consultation). Where data has been available to BEREC, it has been carefully assessed and is correctly referenced (in particular see Chapter 2 above).

Regarding PSC Europe's question on a possible update of the Guidelines, BEREC is open to considering options that would keep its Guidelines relevant and up to date, but that it would be considerably more beneficial to first have some practical experience in terms of the operation of the Guidelines before committing to a review. BEREC is therefore of the view that it would be too early to make any further statements about a review of these Guidelines. BEREC would urge stakeholders to engage with it during its annual call for inputs on its work program, which would be one suitable way to raise the issue of reviewing Guidelines. In addition to note, an update of the Guidelines is not foreseen by the EECC. In addition, BEREC considers that competent authorities request information on already deployed ECS-PWS' in other jurisdictions, from other Member States, and from relevant expert groups such as the Early Warning Systems Expert Working Group organised by the Commission, or similar bodies. BEREC considers that this may enhance their assessments and would enable them to rely on information about relevant state of the art technologies.

Regarding the possibility of a benchmark becoming outdated, BEREC points out that establishing a reference benchmark is prescribed by the EECC, pursuant to Article 110(1). Further the stand-alone systems prescribed under Article 110(1), which BEREC considers could be either CB and LB-SMS, are sufficient as benchmarks irrespective if later generations of CB and LB-SMS technologies come to fruition. Unless the EECC is amended this benchmark is not changing. A combination of CB and LB-SMS is therefore not the benchmark for systems according to Article 110(2).

3.1.1 Geographical coverage

PSC Europe considers the methodology followed by BEREC does not succeed in giving sufficient indicators on the criterion "geographic coverage", leaving the Member States a considerable margin of flexibility, whereas this criterion should be essential and should not be open to wide variation.

PSC Europe adds that national specificities of communication networks should not be taken into account in this regard; that rural areas must benefit from a significant level of coverage due to the often-long delays in the delivery of civil protection services.

PSC Europe adds that National authorities wish to obtain the highest possible coverage and populations cannot be satisfied with insufficient coverage in certain areas of the territory.

BEREC's response:

BEREC sought detailed information about coverage requirements and levels of granularity during the project (both in a questionnaire to Member States and during an early call for input from stakeholders). BEREC has carefully assessed the information received and does not consider that the Guidelines omit any geographic coverage information requirements. BEREC also notes that PSC Europe did not set out any supporting evidence about how it would propose to address this criterion and therefore, BEREC is satisfied with the level of detail of information it has set out on this criterion (including by reference to relevant sub-criterion and the fact that Member States will have to consider the operational requirements of PWS on a case by case basis). BEREC would also refer to the Chapter 2 above in this document in

particular that – of the 15 contributors that answered the three specific questions and relevant insights include on coverage were:

Between 80% and 98% of warning messages dispatched are sent to areas with up to 50,000 end-users concerned

Between 50% and 90% of warning messages sent to areas up to 5,000 end users concerned (wide variation)

Between 1.5% and 10% there were cases where up to 500,000 end-users need to be alerted

Less than 1% of the total warning messages are sent in cases where more than 2 Million end-users are concerned.

This leads BEREC to consider that population figures may not constitute a reason for Member States to deploy systems that only deal well with the expected majority of small cases. Further the examples add weight to the benefit of precise geographical targeting systems (& avoid unnecessarily alerting end-users), all of which are dealt with in the Guidelines.

With regard to the question of whether or not geographical coverage should be assessed before the background of the national specificities of communication networks BEREC disagrees with PSC Europe's proposal to leave this out of the equation. For example, a counter view set out by GSMA and ETNO is that coverage is mainly determined by the two criteria:

- where there is geographical coverage by the network, [and where]
- the device must be able to receive the communication.

Thus, BEREC is satisfied that the architecture of the relevant communications network plays a fundamental role in the delivery of PWS messages, and must therefore be assessed by the respective Member State in order to be able to determine the geographical coverage of each relevant system during its analysis of the equivalence of effectiveness of alternative ECS-PWS.

One reason why stakeholders may not have provided more detailed coverage and granularity information during the public consultation could be because many stakeholders consider a granularity of a single cell to be sufficient for warning messages (see Chapter 2 above). BEREC observes that only one respondent, the Netherlands, provided information that they have 99% geographical coverage but that only 85% of the population concerned may receive warning messages directly. This shows that even 99% geographical coverage does not lead to perfect results and that Member States should be setting out the requirements of their PWS on a case by case basis.

3.1.2 Population Coverage

The MoJS NL asks BEREC to link population coverage to the time needed to deliver the warning message and add a maximum timeframe.

BEREC's response:

Regarding the proposal of linking population coverage with the need to deliver warning messages as swiftly as possible BEREC considers that the latter aspect is already discussed

in the sections dealing with scalability. Furthermore – according to the proposed methodology – all factors need to be linked with each other in the assessment by the competent authority as the final outcome should be the result of an overall performance assessment for each system under all factors as described in section 4.

Regarding the comment to introduce a maximum timeframe, the Guidelines highlight that the time to deliver messages would be dependent on several criteria (size of the targeted area, number of end-users within area, network load, if it is a rural or urban environment, ECS-PWS used etc.). Also, BEREC cannot define a maximum time limit/frame for warning message delivery, but would reiterate that it is up to the Member States to decide what they consider to be reasonable when considering their operational requirements. BEREC recommends that competent authorities would work closely with MNOs to establish what volume of messages could be carried in the desired time interval using a given delivery method.

In addition, as a general point at section 5 in the Guidelines BEREC sets out the following view when discussing performance analysis *“BEREC did not attach numerical values or assign a score to the performance of systems as it did not have access to suitable information in order to be able to do so. Further the EECC does not require BEREC to set out metrics to quantify differences between PWS’ but only asks for the distinction whether a system performs better, worse than or as well as another system, without the need to quantify the level of diverging performance. Nevertheless competent authorities may attach metrics to the factors to assist their analyses if relevant quantitative data is available to support such an approach. In this aspect, BEREC encourages competent authorities to request information on already deployed ECS-PWS’ in other jurisdictions, from other Member States, and from relevant expert groups such as the Early Warning Systems Expert Working Group organised by the Commission, or similar bodies. Thus, the actual reasoning for the competent authorities’ assessment should to be provided similarly to the description of their assessment in sections 5.1 and 5.2.”*

3.1.6 Managing longer messages

Regarding the message concatenation features and risks of lost or delayed message segments, the MoJS NL states that that risk was present on implementations via 2G and 3G networks and that their experience in 4G networks prove that transmission speeds are very high as well as quality of delivery and missing parts are hardly seen nowadays.

However on the same aspect GSMA/ETNO recommends to avoid the use of special characters and to limit the text-length of the communication in case of emergency events to avoid sending messages in several parts to avoid incomplete reception of the long warning messages.

BEREC’s response:

BEREC has carefully considered the views of respondents and notes there would always be a risk of some messages being delayed or delivered in the wrong order and that this could prove to be essential in a survival situation because it may take longer for messages to be

displayed in the correct order. Further, GSMA/ETNO set out that this is a risk, which should be considered. BEREC's Guidelines consider this in Section 4.2.7.

3.1.8 Accessibility for end-users with disabilities

BEREC's response: None needed

3.1.9 Reliability

The MoJS NL suggests to consider reliability for cold and hot phases of a crisis since during the hot phase, the impact of the crisis itself may be impacting the reliability of the PWS.

BEREC's response:

BEREC considers the reliability for hot phases (congestion etc.) in the scalability sections of the Guidelines where it highlights the risks in worst case scenarios.

3.2.1.3 Support of inbound roamers

Everbridge claims that CB does not work for phones from a country which does not have a domestic CB-system. MoJS reported the opposite for Apple devices.

The MoJS NL, based on their experience, estimates that handset vendors in Android distribute their software on a European level or even a global level (there are some smaller exceptions). They consider that there is no reason that support of CB on handsets is lower in other European countries, than the excellent level of CB support in The Netherlands. Nearly all handsets now sold in shops support CB.

BEREC's response:

BEREC considers that android phones from a country which does not have a domestic CB-system might have this feature turned off by default and thus recipients may not be alerted with warning CB messages. As a possible counter measure, Member States (or competent authorities) could work with stakeholders to relay instructions to inbound roamers, perhaps using a similar approach as the welcome SMS of the home network operator, or some other suitable approach. Whatever the solution, the aim of such a communication should be to highlight to inbound roamers how to enable CB alerts on their android phone until such time as this feature is enabled by default.

With regard to iPhones BEREC has observed that a new CB settings menu is activated when roamers enter a country with CB, and notes that MoJS NL pointed out that receiving CB messages is activated per default (starting from iOS version 12.3). End-users may decide to turn warnings on or off, except EU Alert Level 1 (equivalent to presidential alert) warnings which are always on.

Cell Broadcast is also supported on Android since Android 4.4 Kitkat, According to BERECs calculations this means that 99.14% of Android devices in Europe support Cell Broadcast, however depending on the manufacturer and the country of origin settings of the device warning message reception may need to be activated manually¹. BEREC highlights this in the Guidelines so that Member States can explore this matter when they are specifying their PWS with MNOs and providers of PWS. If required, competent authorities should check the steps to enable CB on mobile devices in their market.

Therefore, BEREC considers that CB fulfils this criterion but excels at fulfilling this criterion for phones that come pre-configured in a way to receive CB messages and iPhones.

3.2.1.6 Managing longer messages

The MoJS NL comments that receiving messages in the wrong order is a thing of the past.

BEREC's response:

BEREC has considered this point and believes that while messages could still be delivered in the wrong order, reassembling the message pieces back together in the wrong order is a thing of the past (so the Guidelines are more clear on this issue). BEREC is also of the view that Message error correction may still result in messages taking longer to be displayed, and which is now clarified in the Guidelines.

3.2.1.8 Accessibility for end-users with disabilities

MoJS NL comments that CB has a specific siren sound and vibration cadence as a support for end-users with disabilities.

BEREC's response:

BEREC considers a specific siren sound and vibration cadence may only be useful to inform recipients that a warning message has arrived. This device functionality may not help with informing recipients about the content of the warning message, BEREC's Guidelines set out how to assess the effectiveness of PWS transmitted by different means, and Member States may need to investigate issues around how end-user devices treat warnings received in different conditions.

3.2.2.1 Geographical coverage

Everbridge points out that section 3.2.2.1 of the draft Guidelines appeared to inadvertently limit the delivery of SMS messages to 2G/3G networks.

BEREC's response:

¹ <https://gs.statcounter.com/android-version-market-share/mobile-tablet/europe>.

This statement will be updated to remove reference to the mobile network generation in section 5.2.2.1/7.

3.2.2.3 Support for inbound roamers

Both GSMA-ETNO and Everbridge comment upon the availability of LB-SMS for inbound roamers, however the statements appear to be contradictory. GSMA-ETNO states that “some MNOs do not know about roamers’ MSISDN and thus cannot send SMS”, whereas Everbridge states “As soon as an inbound roamer registers successfully on the VPLMN, it has the same access to the PWS as all national roamers on the HPLMN”.

BEREC’s response:

BEREC thanks GSMA-ETNO for raising a potentially important point regarding the VPLMN’s knowledge of an inbound roamer’s MSISDN in a real-world scenario. BEREC notes that Everbridge’s statement seems to contradict the GSMA-ETNO submission, however, Everbridge’s access to operator specific information would likely not be at the same level as would GSMA/ETNOs be given that its membership includes national / transnational mobile network operators with significant direct experience in operation mobile networks. BEREC’s Guidelines set out relevant information for Member States so that they may best reflect this risk when assessing PWS.

3.2.2.5 Supported Languages

GSMA-ETNO suggests that depending on the target group it should be considered to send a separate message for each language instead of sending a message to a specific sub-group of target customers, while Everbridge points out the tendency for warning alert recipients to share information that they receive from the PWS when language is a barrier.

Everbridge claims that the draft Guidelines are incorrect in relation to the support for international text characters.

BEREC’s response:

Section 5.2.2.6 of the Guidelines describes that each recipient receives an individual message, which could potentially contain a different message for each recipient. The Guidelines also describe that the MNO would have visibility of the originating country for each inbound roamer, so in practice it would be possible for Members States to issue tailored language specific messages.

BEREC finds Everbridge’s view about the possibility of recipients of warning messages translating and passing them on in local languages to be an approach of last resort / redundant approach, should other technical options fail. A technically sophisticated and well-functioning PWS system should not have to rely on ‘friendly bystanders’ translating messages or alerting citizens that did not receive messages. In addition, in so far as the comment concerns messaging content BEREC is satisfied that it is irrelevant for the purpose of the Guidelines to be produced by BEREC pursuant to the EECC.

BEREC rejects Everbridge's view that the Guidelines are inaccurate regarding the support for international characters. In particular, BEREC's views on this matter as set out in section 5.2.2.6 are informed by international standards on Alphabets and language specific information as specified in ETSI's 3GPP TS 23.038 , and furthermore BEREC refers Everbridge to the fact that the draft Guidelines reference TS23.038 in the footnote, and refer indirectly to the use of shift tables with Unicode encoding also being possible. BEREC finds no evidence to support Everbridge's view. As a result, BEREC does not amend its views on this matter in the Guidelines.

3.2.2.6 Managing longer messages

GSMA-ETNO suggests that competent authorities should limit the text of communications to avoid sending messages in several parts, to avoid potential incomplete reception of longer warning messages.

In contrast, in the section on 3.2.2.6 Everbridge comments that "no evidence exists to support this statement [therein]" and sets out that "getting the order of concatenated MSS wrong is a thing of the past".

Everbridge points out the capacity impact of sending longer messages, stating that an alert message which is composed of 2 x SMSs will double the number of messages that the network must carry.

BEREC's response:

Firstly, BEREC observes that GSMA-ETNO and Everbridge provide diverging recommendations regarding longer messages.

BEREC agrees with the caution advocated by GSMA-ETNO in this case, as it would be reasonable to avoid practices that might lead to delayed or possibly confused messaging for recipients of warning messages.

BEREC also notes the contradictory position outlined by Everbridge. It appears to BEREC that Everbridge may have misunderstood the purpose of section in so far as Everbridge seems to focus on the possibility of messages arriving out of order but not on messages being reassembled in the wrong order. BEREC observes that in general the behaviour/ability of the recipient device to reassemble messages in this situation is often device-dependent, and therefore recommends that competent authorities and Member States take measures to consider this behaviour / ability when specifying their PWS which could involve surveying the most common devices in their given market. BEREC's above assessment is without prejudice to the fact that Everbridge did not specify which statement from the draft Guidelines it was referring to when it claimed there was "no evidence to support this statement". Therefore the content covering this issued is unchanged and set out at 5.2.2.7.

Concerning Everbridge's comment on the capacity of sending longer messages BEREC agrees with the approach as described by Everbridge here, while noting that this suggestion is at variance to other statements / concerns it makes in relation to SMS capacity, or the risk of out of order delivery of concatenated SMS messages.

3.2.2.7 Steps required to receive

GSMA-ETNO comments that PWS should be reserved for critical event notifications only, in which case considerations regarding opt-out for SMS should be moot.

Everbridge submitted that section 3.2.2.7 contains “inaccurate statements” and suggests some replacement text, which states that LBSMS “reaches every mobile device automatically without the need for the user to configure their device”

BEREC’s response:

BEREC’s role in PWS is set out in the EECC and requires it to establish Guidelines to assess the effectiveness of PWS transmitted by different means. BEREC has no mandate to recommend that PWS systems be reserved for particular warnings, levels of threats, urgency or number recipients. BEREC does promote that these and other relevant considerations are carefully considered by Member States / competent authorities at the time when PWS operational requirements are being considered. In summary, it is a matter for Member States / competent authorities to capture their operational needs and work with the PWS providers to implement systems, which match those requirements.

BEREC has considered Everbridge’s comment about inaccurate statements in the section (now at 5.2.2.5), but does not find there to be such statements. BEREC has carefully considered all the submissions received and finds no reasons supporting Everbridge’s view. BEREC recognises that some respondents to its consultation may not be familiar with BEREC consultation processes. It is important that respondents provide reasons for text changes so that the analysis can be as rich as possible bearing in mind that BEREC draws on a great number of experts to consider views received in detail. In this aspect, Everbridge is not clear about which statements are considered to be inaccurate. In light of the above, BEREC is satisfied that the section addresses all concerns raised and does not propose to make any additional amendments.

3.2.2.8 Accessibility for disabled end-users

Everbridge provides some suggestions to enhance the reachability of PWS warnings to end users with disabilities, for example by sending voice messages to visually impaired end-users based on a combination of LB-SMS with a database, and/or setting custom ringtones for messages from the PWS system. Everbridge also suggests that community education programmes could compliment the rollout of any PWS.

BEREC’s response:

BEREC accepts that Everbridge’s suggested measures can enhance the LB-SMS experience for end users with disabilities, and competent authorities are of course free to consider implementing some or all of these measures, however the purpose of section 5.2.2.8 is to provide a straight assessment of the default capability of LB-SMS and not of a combination of LB-SMS with other systems or external functionalities.

3.2.2.10 Geographical targeting

GEDICOM & Everbridge state that with LB SMS it is technically possible to alert end-users that enter the warning area after the initial warning message has already been sent

GEDICOM adds that it is also possible to continue to notify users that have left the area in order to keep them informed and consider it should be an independent criterion of comparison.

BEREC's response:

BEREC has considered Gedicom's and Everbridge's comment on alerting end-users that enter the area after the alert has been sent, and finds it to be an operational requirement that might bring benefits for recipients of warnings and therefore proposes to set out information on this under a new sub-criterion in the Guidelines (4.2.10, 5.1.2.10, 5.2.2.10 and 5.4.3.10).

Concerning Gedicom's comment on informing end-users that have left the area, BEREC discusses this operational requirement in section 7 as it may be useful in terms of assessing the effectiveness of PWS transmitted by different means, and bring benefits to recipients of warning messages. BEREC observes that such a message may not, of itself, be a warning message as described by Article 110 EEC (e.g. it may no longer be an imminent or developing major disaster for a recipient who has subsequently left an area) and cannot be used in the equivalence assessment.

3.2.2.11 Scalability

Everbridge claims that LB-SMS can send 10.000 messages per second and provided some examples of large LB-SMS alerting events in other territories. Examples were provided of large alerting events for India (2.6 million messages) and Saudi Arabia (1 million+ messages), although no sending interval was mentioned in these cases. Neither of Australia nor Saudi Arabia are reported to have experienced network congestion. A further example of Australia sending 2000 messages per second was provided, while a general statement that MNO capacity being typically 1200 – 3000 SMS messages per second was also made.

In addition to the above examples, Everbridge submitted that "As mobile operators are introducing VoLTE with SMS delivery over SIP on 4G and 5G technologies, throughput on SMS is expected to multiply to the point where this is no longer an issue." Elsewhere (in response to section 3.2.3), Everbridge claims that LB-SMS and CB "usage shows that they are equally scalable automatically both (sic) to the size of the [...] network coverage of the constituent MNOs".

On the same topic, Cees Theunisse and Ericsson & Mobilaris team stated "The assessment of scalability should take in to account that LB-SMS has proven from live implementations being capable to support several millions of recipients. From experience we know that

campaigns on a live network with a capacity of 5000 SMS / sec per Mobile Network Operator is more than sufficient”.

GEDICOM considers Portugal's experience regarding the time to deliver the warning messages in LB-SMS may not be representative and it asks for context as it is usually much quicker.

BEREC's response:

BEREC notes Everbridge's description of large alerting events in countries outside Europe, and observes firstly that the examples for India and Saudi Arabia were provided without a time dimension, and secondly that in general the comments were limited to messages being “sent”, with no information provided about the delivery rate of these messages.

BEREC is aware of a number of trends in the European mobile industry in relation to SMS that informed the draft Guidelines. SMS volumes in general have decreased in recent years as OTT messaging has partially substituted SMS for person to person communications, leading to an overall decrease in demand for SMS capacity. Separately, many MNOs have traditionally built out their SMS carrying capacity based on some multiple of a normal busy hour traffic pattern, rather than according to exceptional traffic spikes such as those experienced during New Year's Eve (in the pre-OTT era), or during a mass alerting event.

BEREC is aware of the efficiencies offered by SMS over IMS/SIP in 4G (and future 5G core) networks, while also recognising that this capability is far from ubiquitous at this point, and that the so-called intermediate environment of delivering SMS over the SGs (or diameter) interface is not without capacity impact, particularly when delivering an SMS to a UE/MS in an idle state.

Section 5.2.2.2 of the Guidelines makes reference to submissions by several member states regarding SMS delivery performance, in particular by Portugal in an early phase of rollout of LB-SMS.

BEREC disagrees with Everbridge's dismissal of MNO SMS capacity as a factor. BEREC's views are objective, neutral and factual, and BEREC believes that it is appropriate that Guidelines recommend that “Competent authorities should work closely with MNOs to establish which volume of LB-SMS messages can be carried in the desired time interval in order to identify whether LB-SMS performs sufficiently well in regard to the purpose foreseen for the ECS-PWS. It is recommended that load testing or a simulation is undertaken of a high volume of warning messages, and the behaviour of SMS retried delivery attempts.”

BEREC considers that the following submission from the GSMA/ETNO to be particularly relevant in supporting the BEREC's view on scalability, as follows:

“The network capacity to deliver warning SMS via LS-SM will reach a limit. It is impossible to deal with a huge number of SMS without latency (e.g. the experience with new year's SMS, when the the delivery of SMS is often delayed. For instance, in Portugal it required 1 hour to send only half of 1 million SMS been sent). If the LB-SMS solution is adopted, the costs will be disproportionate to expand network capacity to deal with a large amount of SMS.”

Regarding Gedicom's comment on Portugal's experience, BEREC adds that the relevant context to the Guidelines to set out that this was the first year after the roll-out of the PWS system and that it was not yet at full efficiency.

3.2.3 Overview of 110(1) performance – Geographical Coverage

For both geographic coverage and population coverage, Ericsson & Mobilaris team submitted that LB-SMS should be described as “fulfils sub-criterion”, stating that LB-SMS is available wherever mobile network coverage exists.

BEREC’s response:

BEREC is aware that wherever a recipient device is reachable by a mobile network that, in theory, CB and LB-SMS could be implemented as working PWSs, and so the geographic (or population) coverage is a function of the available mobile network coverage.

To be clear, the reason BEREC suggests that the factor in chapter 4 of the Guidelines are “to be assessed by competent authorities” is because every mobile network has different coverage characteristics and may be dimensioned for different user experiences, and as a result BEREC considers that competent authorities would be best placed to assess the coverage sub-criteria in the particular territory as part of considering the operational requirements for their PWS. BEREC considers that it would add very little value to these Guidelines if there was an assessment of each MNOs national coverage as the preliminary views of stakeholders supports the case by case assessment by relevant authorities, the risks and benefits of coverage reporting obligations for PWS have not been considered, and the primary purpose of BEREC’s Guidelines to assess the effectiveness of PWS transmitted by different means may come into question. See also section 5.3 and the discussion above herein at section 3.1.2 where BEREC copies a general point about the potential for competent authorities to exchange information to improve their assessments.

3.2.3 Overview of 110(1) performance – Support of inbound roamers

For Support of inbound roamers, Everbridge suggested that LB-SMS should be “++” as it “automatically supports all inbound roamers immediately after they connect to the local network. As such, no configuration is needed to include tourists and visitors in LB-SMS alerts”.

Everbridge submitted the following comment “LB-SMS should be ++; CB should be “-/+; Comment: Our assumption is that geo locating is identical for both CB and LB-SMS, as both technologies rely on cell tower location”

BEREC’s response:

BEREC notes the submission from GSMA-ETNO, which points out that the MSISDN of inbound roamers may not be available to the MNO/VPLMN and that this contradicts Everbridge’s claim that LBSMS automatically supports all inbound roamers. For the reasons set out above, including that GSMA/ETNO has access to operator specific information with significant direct experience in the operation mobile network at national / transnational levels BEREC does not propose to amend its illustrative assessment of LB SMS in line with Everbridge’s proposal.

3.2.3 Overview of 110(1) performance – Geographical Targeting

In relation to Geographical targeting, Ericsson & Mobilaris team states that standardized location solutions exist and submit that LB-SMS should be considered as “fulfils sub-criterion”. Later in the submission Ericsson & Mobilaris team states an opinion that LB-SMS should be assessed as “excels as fulfilling sub-criterion.”

Everbridge submitted the following comment “LB-SMS should be ++; CB should be “-/+; Comment: Our assumption is that geo locating is identical for both CB and LB-SMS, as both technologies rely on cell tower location”.

BEREC’s response:

BEREC considers that a device’s assessment of its own location based on a GNSS service (as in the case of CB with DBGF) to be sufficiently superior to a network detected location (as in the case of LB-SMS) to merit a ‘highly effective’ assessment.

Competent authorities would be, of course, free to reach their own conclusions on the effectiveness of a given location detection facility provided by the MNOs in their country, and after seeking appropriate evidence make an informed judgement on the operational requirements of their PWS. As a result BEREC does not amend its Guidelines and highlights the relevant guideline that “To be amended by competent authorities where necessary”, which is the same guidance provided by BEREC for all the sub-criteria.

BEREC does not understand Everbridge’s comment, which appears to say that LB-SMS and CB merit different assessments of effectiveness while stating that their “assumption is that geo locating is identical for both CB and LB-SMS, as both technologies rely on cell tower location”.

3.2.3 Overview of 110(1) performance – Supported languages

In relation to “supported languages”, both Ericsson & Mobilaris team and Everbridge describe the ability of LB-SMS PWS to tailor the language of an SMS message based on the inbound roamer’s originating country, and Ericsson & Mobilaris team suggests that this should merit an assessment that LB-SMS excels at fulfilling this sub-criterion.

BEREC’s response:

BEREC confirms that the draft Guidelines already describe the functionality to tailor SMS messages according to the originating country for LB-SMS (see also sections 5.2.2.3 and 5.2.2.6 of the Guidelines), and BEREC is satisfied that this could be an effective method of alerting foreign visitors in the language spoken in their country of their home network.

BEREC considers CB to be superior in this regard, however, as CB would not require additional business logic to be built into the PWS, and also an end user may configure their desired language on their device, such that they are not tied to the predominant language of their home country.

3.2.3 Overview of 110(1) performance – Managing longer Messages

In relation to “managing longer messages” Ericsson & Mobilaris team recommend that competent authorities should consider using the payload option in SMPP when submitting an LB-SMS message. According to Ericsson & Mobilaris team, this would allow SMS messages to be sent up to 4k bytes without segmentation.

BEREC’s response:

BEREC is unaware of any increase to the maximum size of an SMS message beyond 160 characters/140 Octets, and understands that submitting a large message to an SMSC using the SMPP message_payload field would simply move the responsibility for message segmentation from the ESME to the SMSC. In this case the message would be still delivered to the recipient device, but in multiple segments as referred to in the Guidelines and having regard to the issues identified in section 5.2.2.7

3.2.3 Overview of 110(1) performance - Reliability

In relation to reliability, Ericsson & Mobilaris team disagrees with the explanation text relating to Reliability in section 3.2.3 of the draft Guidelines, citing the telecom grade (hardware) and designs that employ geo-redundancy. Also pointed out is that the SMS service is a long established technology, deeply anchored in network solutions & operational processes. Everbridge made similar comments, stating that once configured, both CB and LBSMS are proven to be robust PWS platforms.

BEREC’s response:

BEREC’s remains of the view that SMS as a service is dependent on the mobile network and generally very stable, with much attention given by MNOs to ensuring it works reliably under normal conditions” (See also section 5.2.2.9 of the Guidelines). However, in section 4.2.9 BEREC sets out that “The reliability (sometimes also referred to as ‘resilience’ or ‘robustness’) of any Telecoms or IT system will be influenced to a large extent by its complexity. Put simply, the greater the number of nodes, links or components that are involved in the handing of a particular operation, the greater the risk that an operation may fail (i.e. the threat areas is wider).

While BEREC accepts that MNOs invest in SMS service reliability and pay great attention to service issues, BEREC does not agree that a service, which is inherently more complex, processing and delivering each recipient’s message separately, can be considered to be as reliable as a service which carries a single message per cell in this context. As a result, BEREC makes no amendment to section 5.2.2.9.

3.2.3 Overview of 110(1) performance - Scalability

Ericsson & Mobilaris team points out that in their experience, most warning messages have an audience below several hundred thousand recipients, and some real campaigns have exceeded 5000 messages per second.

BEREC's response:

BEREC agrees that in cases where the number of recipients is low compared to the normal level of SMS traffic on that network, the issue of SMS capacity is not likely to be significant. However, the extreme cases must also be taken into account because the system should also be able to work well in case of an urgent nationwide alert as described in section 4.2.2.

3.3. Assessing the equivalence of the effectiveness of IAS-PWS

AlertFlorida presents reasons it favours a hybrid approach, which combines Cell Broadcast (WEA) and LB-SMS, and explained that this was important for reaching the most impacted people, vulnerable populations and those who, although not located in the affected areas, ask to be warned about events in specific areas of interest.

Everbridge suggests amending “using the set of criteria & sub-criteria from section 3.1” to include “section 3.2” in the first paragraph of section 3.3.

BEREC's response:

BEREC considers that Member-States may decide to roll-out several ECS-PWS' in parallel to maximize the overall PWS effectiveness. However, the EECC also considers stand-alone ECS-PWS sufficient (see Article 110(1) of the EECC). Thus, the benchmark for the assessment of IAS-PWS in the Guidelines is a stand-alone ECS-PWS, whether CB or LB SMS or some other system which would be defined by Article 110(1).

Regarding Everbridge's comment BEREC considers that the set of criteria & sub-criteria (which are renamed as factors in the Guidelines) used for evaluating ECS-PWS performance is appropriately defined in section 4.1 and 4.2 and the proposed amendment is not justified as the subsequent sections just refer to the factors set out section 4.1. and 4.2 and applies them to CB and LB-SMS 5.1; 5.2 and 5.3.

3.3.1.1 Coverage

EENA warns that despite the considerable efforts of authorities to promote IAS-PWS applications, there is still a very low rate of downloads and that “it would be dangerous to consider that IAS-PWS could reach as many people as CB or LB-SMS, simply because data connection exists”.

BEREC's response:

BEREC sets out its views on the issue raised by EENA in section 5.4.1 and 5.4.3.5 of the Guidelines on the “steps required for recipient to enable receiving warning messages”. BEREC would note that MS / competent authorities may have access to a wide variety of information tools which could promote their IAS-PWS and mitigate the risk of a low download/install rate e.g. by doing ad-campaigns, raising awareness of deployed systems in schools, providing training in recreational clubs, and supporting workplace training etc. BEREC would defer to Member States / competent authorities on how to extend the reach of IAS-PWS having regard to the information set out in the Guidelines.

3.3.1.5 Steps required for recipient to enable receiving warning messages

Everbridge states that the EECC needs to be reviewed because in their view it is not technically possible to update the server continuously with the user’s location without prior user consent after the application is downloaded.

BEREC’s response:

BEREC does not consider Everbridge’s views that the EECC should be reviewed except to record that not only would BEREC not be the correct body to address the point but also the suggestion is inappropriate in the context of the obligation to develop these Guidelines, the ongoing work within Member States to prepare for transposition of the EECC pursuant to Article 124, and the overall scheme of telecommunications regulation in Europe. BEREC also sets out in section 2.3.2, Option 1 which provides for geographical targeting without real-time location tracking communicated to a server, therefore no privacy concerns exist in this regard. Furthermore BEREC considers that recital 294 provides useful insight on the aims of Article 110(2) EECC as regards “Public warnings shall be easy for end-users to receive.” . BEREC therefore considers that changing the device’s settings may not be an impediment to IAS-PWS and that the only behaviours which are explicitly prohibited by the EECC are registration or log-in.

3.3.2.1 Comparison with regard to the criteria mentioned in the EECC

The MoJS NL does not recommend the possibility of having underperforming sub-criteria compensated by other outperforming sub-criteria under the same main-criterion.

BEREC’s response:

BEREC’s Guidelines set out information on the essential criteria explicitly mentioned in the EECC, and maintains its position on what factors might be used to compensate for the operation of lower performing sub-criteria on a case-by-case basis (e.g. the need to maintain the support of inbound roamers cannot be compensated for). BEREC is aware of the risk MoJS NL refers to and as such considers that competent authorities should highlight underlying considerations very clearly, explaining in detail why they consider some underperforming sub-criteria are compensated for by other outperforming sub-criteria – perhaps, explicitly referring to their specific national needs and circumstances.

BEREC is of the view that as more assessments take place there may be benefit in Member States / competent authorities exchanging information on this (and other relevant considerations) so that PWSs are implemented and deployed to the highest standards throughout Europe. At present BEREC does not envisage that it would have a role in this process, as NRAs are often not the competent authority for PWS in the Member State.

Further, BEREC has revisited the wording of the proposal and provides the following clearer text (or rules) as set out in Chapter 3 as follows:

“[...] For this exemption to be applied, i.e. for the envisaged IAS-PWS to fulfil the obligation of Article 110(1) EECC even though it underperforms with regard to at least one factor, the envisaged IAS-PWS needs to be at least equivalent to the performance of the benchmark in the overall assessment of both “coverage” and “capacity to reach concerned end-users. For this purpose, BEREC considers that:

- *The IAS-PWS do not underperform with regard to either geographic targeting, scalability or support of visiting end-users.*
- *The competent authority demonstrates that the underperformance of any other factor is compensated for by the outperformance with regard to other factors that have a bigger positive impact on the overall performance of the IAS-PWS regarding coverage or regarding the capacity to reach concerned end-users under the national circumstances.*
- *The IAS-PWS still provides a sufficient level of performance according to the Member State with regard to the underperforming factor (i.e. if it would fail to provide any performance with regard to that factor, it would not fulfil the obligation of Article 110 EECC).*
- *It is not possible to compensate the underperformance of a factor falling under “coverage” with the outperformance of a factor falling under “capacity to reach concerned end-users...” [emphasis added].*

BEREC also sets out to provide additional clarity in a new Chapter 6 which demonstrates the type of compensation which might be successful as well as the type of compensation which would not be successful (as it would fail to comply with the Code). BEREC is satisfied that these examples would assist competent authorities ‘greenlight’ only those IAS-PWS which would be compliant with the Code. BEREC is satisfied this text now addresses the concerns of MoJS NL.

3.4 Comparison with regard to further considerations in line with the aim of article EECC PSC Europe considers new comparison criteria although relevant, are added to those provided for by the European legislator which could distort the analysis of the technical options available (mainly display capabilities and support to absent residents).

With regard to the additional comparison criterion “support of absent residents” Alert Florida considers this criterion to be a valuable asset as it helps to reach all impacted people and that includes people who are not directly in the immediate affected area but have a strong reason for knowing what is going on there.

Everbridge points out that an LB-SMS service would typically use an originating number which is known to end users (e.g. 112), which would reassure the recipient of the authenticity of the SMS, as this number is limited (by the operators). In addition, Everbridge suggested that alerts

could include information, which could allow end-users to corroborate the content of the alert (E.g. via TV/Radio etc).

Everbridge also comments, that the EECC requires Member States also to contact end-users indirectly impacted by an alert.

Everbridge suggests that the final Guidelines make it clear that that an LB-SMS message can be enhanced with the inclusion of a short web link which could point to a web page with more information, enabling potential 2 way communication between authorities and end users.

Everbridge also takes issue with perceived negativity in the draft Guidelines regarding device support for emoji, stating that all 3G and 4G devices support emoji, and that older devices which do not support it, will instead display the emoji as text.

BEREC's response:

General

Regarding additional factors, BEREC sets these out at chapter 7 where they are prefaced that these factors cannot form part of the equivalence assessment. BEREC considers the the content set out therein may help inform authorities about how to create more effective systems, which is in line with the aim of Article 110.

Also feedback from other contributors show that they consider these factors are considered by them to be valuable as well, and the value of listing these factors is not denied by PSC-Europe. BEREC does not therefore consider how these criteria could distort the analysis of the available technical options if they are equally tested against all systems in the assessment. The opposite is the case. They help with the analysis.

Support of absent residents

BEREC contradicts Everbridge's statement that also end-users, which are indirectly affected, need to be alerted in any case as an obligation by the EECC. The EECC does not say anything in this regard. That is why BEREC discusses this useful feature in section 7.

Display Capabilities

BEREC understands that the inclusion of a hyperlink into either an LB-SMS or a CB message is likely to result that link being clickable, but this is dependent on handset functionality. Therefore, BEREC has amended the Guidelines accordingly.

BEREC considers Everbridge's assertions about emoji display to be something of a simplification. According to BERECs understanding, support for emoji glyphs commenced in smart phones in Europe from around 2011 onwards. Previous 3G devices (outside of the i-mode ecosystem) did not support emoji. The behaviour of devices which do not support emoji cannot be relied upon, while some might display some alternative text, others might interpret the message as corrupt and discard it. BEREC recommends that competent authorities work with MNOs to establish the behaviour of devices in that market when receiving emoji rather than assuming universal support.

Authenticity

BEREC would draw Everbridge's attention to the Authenticity sub-section of section 7.2 which includes the following statement "*Given the wide availability of commercial SMS gateways on*

the internet which allow the user to set an arbitrary source Mobile Subscriber ISDN Number (MSISDN), it would be straightforward for an unauthorised 3rd party to create SMS messages which appear to come from a LB-SMS PWS”.

In relation to Everbridge’s other statements regarding multiple channel alerting (TV/Radio etc), and end to end security optimization, BEREC regards this as sensible advice for competent authorities, however these are not features which are rooted in the ECS-PWS itself and could be deployed alongside any type of PWS (LB-SMS, CB, IAS-PWS). Therefore, these features cannot be relevant when assessing systems against each other.

7. Comments to Annex 1

Everbridge objected to the references to Gedicom in the draft Guidelines, claiming that these references introduce a bias. No objection was raised about references to other private companies.

BEREC’s response:

BEREC identifies the source of various comments made during previous consultation phases in its Guidelines, except where the submission has been made confidentially. BEREC does not accept that this practice introduces any bias.