Emergency Services Accessibility for Persons with Disabilities
(2021 update)

This document explains the obligations of EU Member States to ensure equivalent access under recent legislation and explores in detail the solutions available.

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EMERGENCY SERVICES ACCESSIBILITY FOR PERSONS WITH DISABILITIES

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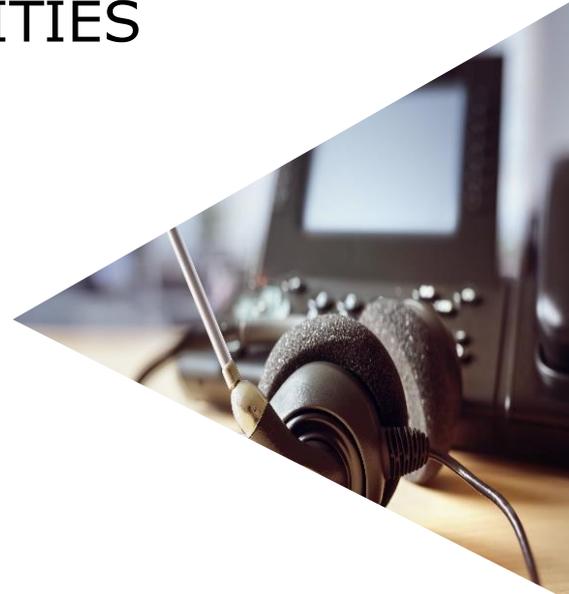
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EXECUTIVE SUMMARY

Disability affects a high proportion of the population, but many countries still do not provide accessible emergency services. Limited communications options can leave persons with disabilities in particularly dangerous situations in times of emergency, particularly as many emergency services are only accessible via voice call. The situation is nevertheless changing, as recent European Union (EU) legislation requires equivalent access to emergency services through emergency communications.

What obligations must Member States abide by? What solutions are available to ensure access? This document explores the main legislation regarding accessible emergency services, including the 2018 European Electronic Communications Code and the 2019 Accessibility Act. It presents the functional requirements of effective solutions, including caller location, reliability, roaming and call-back, among others.

Several solutions are currently in use in different European countries, including total conversation, relay services, SMS, Real-time Text (RTT), smartphone applications and fax. The document explores the pros and cons of these systems and defines a number of recommendations for countries implementing solutions.

The need to provide accessible emergency services has been addressed in recent European Union (EU) legislation, which will help to ensure that all people have equivalent access to emergency services.

In this document, the European legislation on accessibility of emergency services will be presented in detail, alongside current solutions which can be implemented.

LIST OF ACRONYMS

EC	European Commission
ETSI	European Telecommunications Standards Institute
EU	European Union
ICF	International Classification of Functioning
ICIDH	International Classification of Functioning, Disability and Health
ICT	Information and communication technologies
IP	Internet Protocol
MMS	Multimedia Messaging Service
MS	Member states
PSAP	Public Safety Answering Point
TRS	Text Relay service
TS	Technical Specification
TTY	US term for Textphone
UN	United Nations
VRS	Sign Relay service
WHO	World Health Organisation

GLOSSARY

Deaf: Gallaudet University describes a deaf individual as "Anyone who cannot understand speech (with or without hearing aids or other devices) using sound alone (i.e. no visual cues such as lip reading)."

Deaf-Blind: A term used to describe a person in whom hearing loss and vision impairment combine to interfere with his/her ability to hear and see. S/he may have either total or partial loss of both senses.

Disability: UN Convention on the Rights of Persons with Disabilities refers to disability as "long-term physical, mental, intellectual or sensory impairments, which in interaction with various barriers may hinder people's full and effective participation in society on an equal basis with others".

Hard of Hearing: The term 'hard of hearing' refers to those who have some hearing, can use it for communication purposes, and who are reasonably comfortable in doing so. A hard of hearing person, in audiological terms, may have a mild to moderate hearing loss.

Next Generation 112 (NG112) - NG112 (ETSI TS 103 479) is defined by two major aspects:

- Interoperability between emergency services: NG112 enables the several Public Safety Answering Points (PSAP) to be part of a common emergency service IP-network, providing them with redundancy and interoperability features. This network should support data and communications needs for coordinated incident management between PSAPs and provide a reliable and secure environment for emergency communications.
- Communication between citizens and emergency services: NG112 is designed to enable citizens to reach an authority (e.g., PSAP) by calls using Voice over Internet Protocol, text messaging, instant messaging, real-time text, pictures, and videos. It could also provide emergency services with more data such as telematics and health data. Based on a caller's location, NG112 enables the delivery of calls, messages, and data to the appropriate PSAP and other appropriate emergency entities and makes call handling easier.

Pre-registration: Before being able to use a communication channel, you may be required to give your phone number and details such as your name or information about your disability.

Sign Languages: Sign languages are fully-fledged, natural languages with linguistic properties, including grammatical features, such as morphology, phonology, and syntax. They have these qualities in common with all spoken languages.

1 | INTRODUCTION

Disability affects 15-20% of every country's population: there are at least 650 million persons with disabilities worldwide[1], while persons with disabilities represent 100 million persons in the European Union[2]. It is therefore both surprising and concerning that many emergency services can still only be reached via voice call.

When establishing emergency communications systems, their accessibility for all people must be considered. This may involve, for instance, providing text chat, video services, or a combination of both to access 112, using easy to understand alerts, or including pictograms on buttons and menus in 112 apps. Limited options for communication leave persons with disabilities in particularly dangerous situations in times of emergency.

The need to provide accessible emergency services has been addressed in recent European Union (EU) legislation, which will help to ensure that all people have equivalent access to emergency services. In the past, legislation has been vague about the meaning of "equivalent access" for persons with disabilities. However, the 2018 European Electronic Communications Code (EECC) clarifies this with a shift from *emergency calls* to *emergency communications.* This addresses the need to provide services beyond voice calls, such as SMS, video, messaging, and total conversation. The deadline for transposition of the text is 21 December 2020.

Recognising the importance of rights of access of persons with disabilities and the obligations in EU legislation, countries are now facing the challenges of implementing accessibility and removing existing barriers. In this document, the European legislation on accessibility of emergency services will be presented in detail, alongside current solutions which can be implemented to improve accessibility. It will describe the main issues related to accessibility of 112 services for persons with disabilities, outline some of the 'best practices' from system-focused as well as user-focused perspectives, and inspire further action eradicating barriers for access to crucial, potentially lifesaving 112 services.

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[1] https://www.worldbank.org/en/topic/disability
[2] http://www.edf-feph.org/newsroom/news/how-many-persons-disabilities-live-eu

2 | CHALLENGES OF ENSURING FULLY ACCESSIBLE EMERGENCY SERVICES

Accessibility of 112 means that all users who face any restriction of communication can contact rescue services without hindrance.

One of the challenges is to ensure the accessibility of 112 services for deaf, deafblind, and hard of hearing citizens, who use alternative communication means to contact emergency services. It should also be considered that many of the population will experience hearing loss. A large number of deaf citizens use means other than voice to communicate. People with other types of disabilities, including those with speech disabilities and cognitive disabilities, face barriers while accessing emergency services.

The current systems deployed all over the EU at PSAP level are predominantly voice-centric (focused on communication via voice). This means persons with disabilities are discriminated against while accessing emergency services. The general aim shall be to enable access to 112 and existing national emergency numbers for persons with disabilities in an equivalent manner to that enjoyed by other end-users. Persons with disabilities shall be able to use their everyday communication means to reach emergency services.

What is needed to ensure an equivalent access to emergency services?

Still today, most emergency services are only capable of receiving voice communications, while only a marginal share of data and multimedia is used by European Public Safety Answering Points. Inherently, improving access to 112 for deaf, deafblind and hard of hearing citizens requires enabling PSAPs to handle other modes of communications such as text and communications in a sign language and thus implementing access to 112 through text and video. It also involves adapting their operations policy (e.g. training call takers to use text messages in conversations) or employing sign language interpreters to handle video calls through a sign language.

In order to offer a highly accessible 112 service, it is important to keep in mind the following aspects:

- Responsiveness – can a PSAP respond to a person in need in a timely fashion?
- Reliability – does the solution make sure that citizens can access 112 and call-takers can respond to the emergency call (request) in all cases?
- Mobility – can (or could) citizens access 112 everywhere in their country and Europe, not only at local level?
- Availability – is the tool readily available, used or potentially used by the majority of concerned citizens and are PSAPs prepared to integrate the new technology?
- Cost – is the cost of the device (or the costs of its use, e.g. data usage) bearable and in line with the requirements for 112 (call free of charge)?

Large disparities in Europe are reflected also by factors such as:

- Availability of smartphones with data and text services
- Availability of total conversation terminals and services
- Availability of relay services (sign language, text to voice, captioned telephony, speech-to-speech)
- Level of provision for necessary functional requirements at PSAPs (actual integration of identified solutions/tools into PSAP systems)

3 | LEGISLATION AND POLICY CONTEXT

3.1 GENERAL CONTEXT

Rights of persons with disabilities are guaranteed by the United Nations' Convention on the Right of Persons with Disabilities (CRPD)[3], which is ratified by the European Union and all its Member States. This convention aims to "*promote, protect and ensure the full and equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities, and to promote respect for their inherent dignity*" (article 1, CRPD) and defines "persons with disabilities" as "*those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others*" (article 1, CRPD). Article 9 of this Convention includes some specific provisions related to emergency communications: "*To enable persons with disabilities to live independently and participate fully in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation, to information and communications, including information and communications technologies and systems, and to other facilities and services open or provided to the public, both in urban and in rural areas. These measures, which shall include the identification and elimination of obstacles and barriers to accessibility, shall apply to, inter alia: […] b) Information, communications and other services, including electronic services and emergency services.*" (Article 9, CRPD). Additionally, the Convention obliges the signatories to protect persons with disabilities in situations of risk, including humanitarian emergencies and the occurrence of natural disasters (Article 11, CRPD).

The Charter of Fundamental Rights of the European Union[4] also includes some provisions related to persons with disabilities, especially in its article 26: "*The Union recognises and respects the right of persons with disabilities to benefit from measures designed to ensure their independence, social and occupational integration and participation in the life of the community*" (article 26, Charter of Fundamental Rights of the EU). Article 21 also prohibits discrimination on the basis of disability while the 1st article of this charter recalls that "*human dignity is inviolable*" (article 1, Charter of Fundamental Rights of the EU).

The European Convention on Human Rights, which is legally binding on the 47 Member States of the Council of Europe and is justiciable before the European Court of Human Rights does not specifically refer to persons with disabilities. However, the Court has repeatedly ruled that discrimination against persons with disabilities fall in the scope of article 14 of the Convention about prohibition of discriminations, considering in 2009 that there is a "*European and worldwide consensus on the need to protect persons with disabilities from discriminatory treatment*"[5].

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[3] *https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities/convention-on-the-rights-of-persons-with-disabilities-2.html* (retrieved 31-03-2020)

[4] *https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A12012P%2FTXT* (retrieved 31-03-2020)

[5] "Persons with disabilities and the European Convention on Human Rights", European Court of Human Rights, *https://www.echr.coe.int/Documents/FS_Disabled_ENG.pdf* (retrieved 31-03-2020)

In its Disability Strategy 2017-2023, the Council of Europe and its Member States recalled the importance of promoting accessibility: "*Accessibility, as defined in UNCRPD (Article 9) is a precondition for persons with disabilities to be able to enjoy human rights actively, participate and contribute fully and equally in the society, be independent and make choices about all aspects of their lives.*" (article 55, Council of Europe Disability Strategy 2017-2023)[6].

3.2 EU LAW ON ACCESSIBILITY TO EMERGENCY COMMUNICATIONS

EU law related to emergency communication is binding on all the Member States of the European Union and the three other members of the European Economic Area (Iceland, Liechtenstein and Norway). The European Commission ensures the correct implementation of these laws and may impose sanctions on the countries that are not respecting the obligations that are set out.

More information about EU law and the provisions on emergency communications can be found in EENA's Document on "*Emergency Communications & the EU Legislative Framework*"[7].

3.2.1 Previous EU laws on accessibility to emergency communications

The first explicit reference to persons with disabilities in relation to providing access to emergency services dates back to 2009 and the Directive 2009/136/EC[8]. This legislation amended the 2002 Universal Service Directive which did not directly mention persons with disabilities and introduced the concept of 'equivalent access'. "*Member States shall ensure that access for disabled end-users to emergency services is equivalent to that enjoyed by other end-users.*" (Article 26 of directive 2002/22/EC as amended by directive 2009/136/EC).

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[6] *https://rm.coe.int/16806fe7d4* (retrieved 31-03-2020)
[7] *https://eena.org/document/emergency-communications-the-eu-legislative-framework/* (retrieved 01-04-2020)
[8] *https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0136* (retrieved 31-03-2020)

3.2.2 The European Electronic Communications Code

The European Electronic Communications Code (EECC) is a directive that was adopted in December 2018 and will serve as the main legal reference for emergency communications starting from December 2020. A 'directive' is a legal act of the European Union which is legally binding on all the Member States. However, unlike a 'regulation' which is self-executive, a 'directive' sets out objectives that Member States need to reach by a specific deadline but leaves some flexibility on how to achieve that result. Thus, directives need to be 'transposed' in the Member States' national laws.

3.2.2.1 From emergency calls to emergency communications

One of the main changes brought by the EECC is the change of vocabulary from "emergency calls" (referred in previous legislations) to "emergency communications". Hence, paragraph 1 of article 109 specifies that: "*Member States shall ensure that all end-users of the service referred to in paragraph 2, including users of public pay telephones are able to access the emergency services through emergency communications free of charge and without having to use any means of payment, by using the single European emergency number '112' and any national emergency number specified by Member States*" (article 109, paragraph 1, directive 2018/1972/EC). This change is also reflected in the specific provisions related to accessibility for persons with disabilities: "*Member States shall ensure that access for end-users with disabilities to emergency services is available through emergency communications and equivalent to that enjoyed by other end-users in accordance with Union law harmonising accessibility requirements for products and services […]*" (article 109, paragraph 5, directive 2018/1972/EC).

Beyond a simple change of vocabulary, 'emergency communications' encompasses the new information and communication technologies, which provide new possibilities to contact the emergency services. While the EECC defines 'emergency communications' as "*communication by means of interpersonal communications services between an end-user and the PSAP with the goal to request and receive emergency relief from emergency services*" (article 2, paragraph 38, directive 2018/1972/EC), the recital 285 brings more clarity as to what falls in the scope of the requirements: " *[…] Emergency communications are means of communication, that include not only voice communications but also SMS, messaging, video or other types of communications, for example real time text, total conversation and relay services […]*" (recital 285, directive 2018/1972/EC). However, decision-makers left some flexibility to the Member States to define which technology is the best suited for them: "*[…] Member States, taking into account the capabilities and technical equipment of the PSAPs, should be able to determine, which number-based interpersonal communications services are appropriate for emergency services, including the possibility to limit those options to voice communications and their equivalent for end-users with disabilities, or to add additional options as agreed with national PSAPs […]*" (recital 285, directive 2018/1972/EC).

While previous legislation referred to 'emergency calls' and 'equivalent access', the change to 'emergency communications' brings clarity in making sure that all the requirements on what was before 'emergency calls' also include the ways persons with disabilities can contact 112, such as the fact that these means of communication should be free of charge and that location information should be provided.

3.2.2.2 Provision of location information for emergency communications

While this is not explicitly mandated in legislation, the change of vocabulary from 'emergency calls' to 'emergency communications' means that the requirements to provide location information to the emergency services also include the way persons with disabilities contact 112: "*Member States shall ensure that caller location information is made available to the most appropriate PSAP without delay after the emergency communication is set up*" (article 109, paragraph 6, Directive 2018/1972/EC).
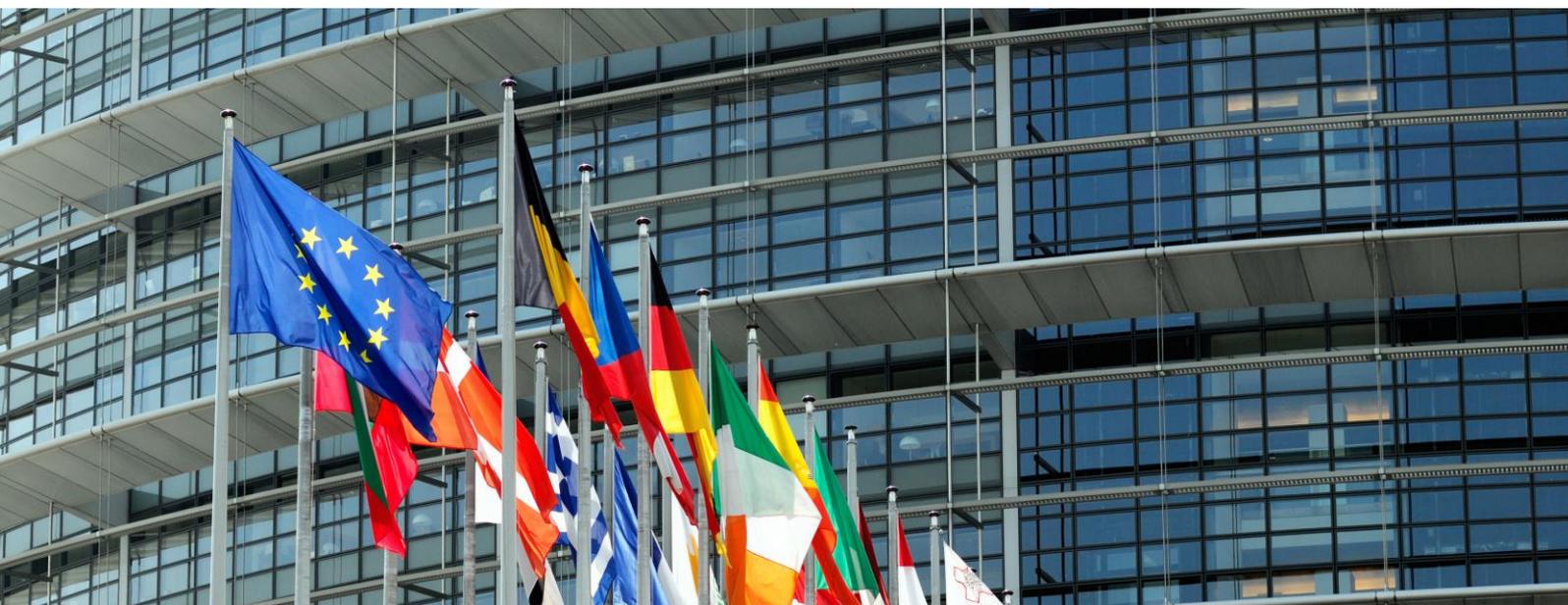
3.2.2.3 Specific provisions regarding deaf and hard–of–hearing persons travelling to other Member States

One of the main limitations regarding the current means of accessibility for deaf and hard-of-hearing persons within the EU is that the means of contacting emergency services in an accessible manner are different from one country to another. Furthermore, the use of some channels may also require pre-registration or the download of another solution. This can be problematic when people travel to other countries and cannot contact the emergency services due to lack of awareness or technical limitations.

The EECC requires the European Commission and national regulatory authorities to adopt specific measured to address this issue: "*[…] The Commission and the national regulatory or other competent authorities shall take appropriate measures to ensure that, whilst travelling in another Member State, end-users with disabilities can access emergency services on an equivalent basis with other end-users, where feasible without any pre-registration. Those measures shall seek to ensure interoperability across Member States and shall be based, to the greatest extent possible, on European standards or specifications laid down in accordance with Article 39 […]*" (article 109, paragraph 5, Directive 2018/1972/EC). The European Commission is required to adopt a first delegated act on this matter by 21 December 2022.

In addition to the measures described above, a part on how persons with disabilities can access the emergency services has also been added in the provisions related to the promotion of the European emergency number 112. In addition, it is also required that such information is communicated in accessible formats: "*Member States shall ensure that citizens are adequately informed about the existence and use of the single European emergency number '112', as well as its accessibility features, including through initiatives specifically targeting persons travelling between Member States, and end-users with disabilities. That information shall be provided in accessible formats, addressing different types of disabilities. The Commission shall support and complement Member States' action*" (article 109, paragraph 7, Directive 2018/1972/EC).

3.2.3 The European Accessibility Act

The European Accessibility Act, or EAA, or Directive 2019/882/EC[9] was adopted in April 2019 and intends to harmonise the accessibility requirements for products and services in the European single market. Parts of the text include some requirements on emergency access that complete the EECC and clarify the scope of 'emergency communications'. Most of the provisions in this text have to be transposed in the Member States' national law by 28 June 2022 and these national measures should start being applied not later 28 June 2025. This shall not prevent Member States from complying with these requirements at an earlier date.

One important clarification is that at least real time text should be implemented: "*The provision of services in order to maximise their foreseeable use by persons with disabilities, shall be achieved by including functions, practices, policies and procedures and alterations in the operation of the service targeted to address the needs of persons with disabilities and ensure interoperability with assistive technologies: (a) Electronic communications services, including emergency communications referred to in Article 109(2) of Directive (EU) 2018/1972: (i) providing real time text in addition to voice communication; (ii) providing total conversation where video is provided in addition to voice communication; (iii) ensuring that emergency communications using voice, text (including real time text) is synchronised and where video is provided is also synchronised as total conversation and is transmitted by the electronic communications service providers to the most appropriate PSAP […]*" (annex I, section IV, Directive 2019/882/EC).

Another important requirement is that PSAPs should respond with the same communications mean as the one received: "*Emergency communications to the single European emergency number '112' shall be appropriately answered, in the manner best suited to the national organisation of emergency systems, by the most appropriate PSAP using the same communication means as received, namely by using synchronised voice and text (including real time text), or, where video is provided, voice, text (including real time text) and video synchronised as total conversation*" (annex I, section V, Directive 2019/882/EC). For instance, when receiving a communication by video, it is not possible to respond by an SMS. It is important to note that the deadline for transposition of this requirement is extended, in accordance with article 31(3) of this text. Hence, Member States may decide not to apply these measures before 28 June 2027. However, the

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deadline being quite far away, it is recommended that Member States implement these measures as early as possible in order to guarantee the best quality of emergency communications for everyone.

3.2.4 The main requirements in a nutshell

The following paragraph intends to sum up in short what was described in this section:

- Persons with disabilities must be able to contact emergency services on an equivalent basis compared to other end-users.
- The concept of 'equivalent access' has been clarified in the European Electronic Communications Code and the European Accessibility Act.
- As of June 2025, at least real time text will have to be deployed in the Member States.
- Means of access to emergency services should be free of charge to the user.
- Location information of the person contacting 112 should be provided to the emergency services.
- Relevant authorities should seek to facilitate the way citizens with disabilities can contact emergency services in other EU countries, "where feasible without any pre-registration".
- Current requirements might be completed by a delegated act in 2022.

3.2.5 List of relevant EU legislation and dates of application

NAME	REFERENCE	DATES AND EVOLUTIONS
Universal Service Directive	2002/22/EC	• Entry into force: 24/02/2002 • Amended by Directive 2009/136/EC on 19/12/2009. • End of validity: 20/12/2020
European Electronic Communications Code	2018/1972/EC	• Entry into force: 20/12/2018 • Deadline for transposition: 21/12/2020 (measures should be adopted, published and applied not later than this date)
European Accessibility Act	2019/882/EC	• Entry into force: 27/06/2019 • Deadline for transposition: Measured should be adopted and published by 28/06/2022 and be applied not before 28/06/2025 or 28/06/2027 for some provisions.

4 | SOLUTIONS DESCRIPTION

Solutions in the context of the call-handling procedure, addressing the requirements for the accessibility of communication specific target groups of users with a disability, including the deaf-blind and people with speech disabilities or intellectual disabilities, are discussed further in this subsection.

4.1 FUNCTIONAL REQUIREMENTS

FUNCTIONAL SERVICE EQUIPMENT	DESCRIPTION
Location	The precise location of the person contacting emergency services should be sent to the most appropriate PSAP.
Restorability	Should a disruption occur, services must be capable of being reprovisioned, repaired, or restored to required service levels on a priority basis.
Reliability / Availability	Services must perform consistently and precisely according to their design requirements and specifications and must be usable with high confidence.
Accessibility	Services and terminals must be utilisable by target groups and in line with EN 301 549.10
Routing	Routing to the most appropriate PSAP must be ensured, based on the caller's geolocation (among other factors). A mechanism for service specific routing (e.g. specific relay service) is needed. There should also be a way to use the communication preferences of the caller if the caller had registered them in their terminal or operator provided service. It includes media required in both directions as well as language (e.g. sign language) used for communication. This could give an indication to the operator or called PSAP if a translation/relay service needs to be inserted in the conversation.
Roaming	Equivalent access to emergency services, according to the EU legislation. Citizens with disabilities must be able to contact emergency services in case of roaming using the same means they use in their home country. It should be noted that citizens with disabilities (e.g. deaf and hard of hearing persons) may only be served appropriately in their home country. (For instance, a Swedish deaf citizen might only be served appropriately if a Swedish Sign Language relay service can communicate with both the citizen and a Swedish speaking PSAP operator.) In this case, the call could be routed to the home country and the emergency information passed from the national PSAP to the PSAP responsible in the visited country.
Prioritisation	All emergency communications must be prioritised over other

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[10] *https://www.etsi.org/deliver/etsi_en/301500_301599/301549/03.01.01_60/en_301549v030101p.pdf*

	communications to guarantee quick and reliable access to the PSAPs.
Multimedia Call-back	PSAPs should always be able to call back using the original media. Call-back shall include the same extra services, such as relay services, that were included in the original call.
Impact management	High call volume management techniques should be made available (e.g. call clipping, recorded message in PSAP or originating network). PSAPs should also be able to interrupt the communication. There should also be a mechanism to prevent accidental emergency calls.
Mode conversion support	Text to speech and speech to text On speech, add text Sign language to speech and speech to sign language Weak voice <> supported speech Real-time text availability during these modes for short items of text transfer during mainly voice or mainly sign conversation.
PSAP adding media to a text-initiated emergency call	PSAPs should also be able to add media in case of a "voice-initiated emergency call". For instance, video should be used when relevant for PSAPs e.g. when the emergency situation is not well described and when the PSAP believes that video could improve the intervention. PSAPs should have the possibility and the responsibility for activating the video stream, unless there are specific needs for the callers in the context of a particular set-up (e.g. a sign-language user that is recognised as such by the PSAP network).
Testing	Testing should be carried out considering a wide range of disabilities. It is important to test widely and not be restricted to testing accessibility for certain disabilities only.
Materials	All materials for end-users should also be accessible. This may include application manuals, videos describing functionalities to users, etc.

It should be noted that some of these requirements are already covered by ETSI TS 103 479.

4.2 Technical Solutions
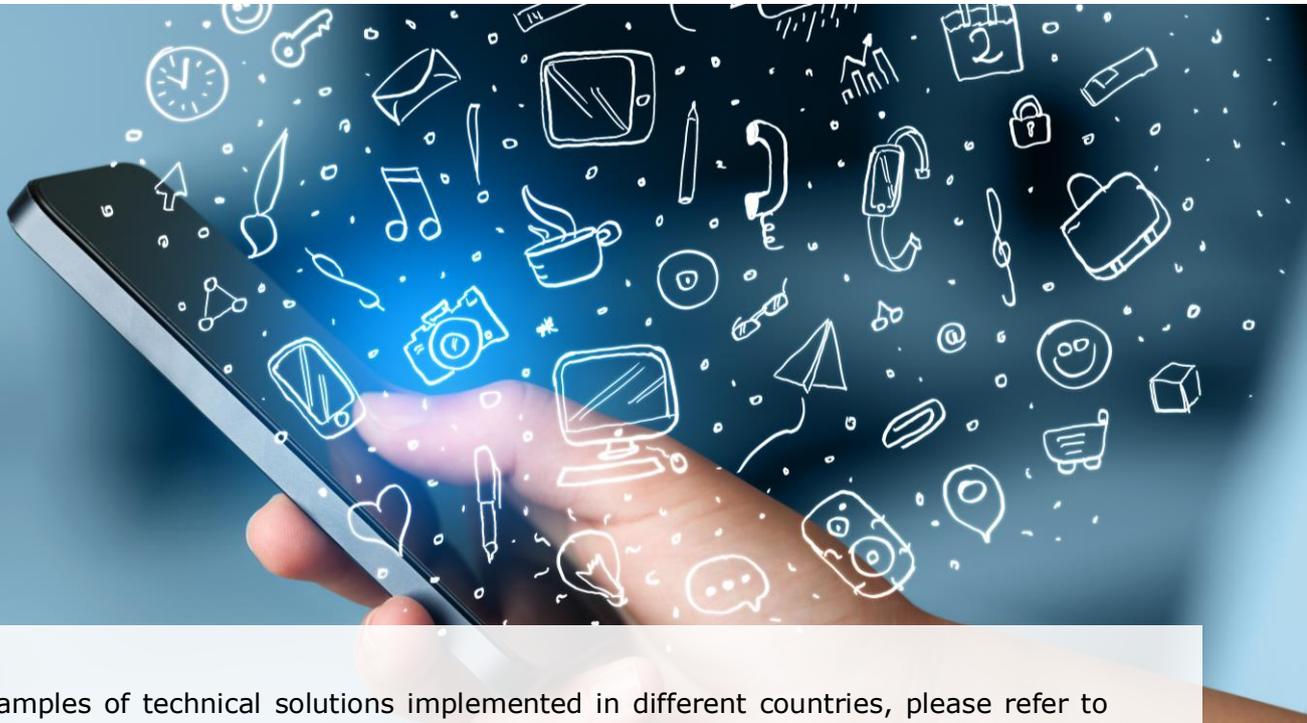
For examples of technical solutions implemented in different countries, please refer to the European Commission *COCOM Report on the Implementation of the European Emergency Number 112*. For the technical standards covering NG112, please refer to *ETSI TS 103 479*.

4.2.1 Smartphones Applications

Specific **Accessible Emergency Communications Smartphone Applications** have and are being deployed taking into account the needs of persons with disabilities. They can easily be downloaded by end-users. Registration is needed in most cases. Unfortunately, they are usually working only in concrete regions/areas and they tend to use proprietary technologies. Thus, they usually do not provide access to emergency services all over Europe.

These apps are frequently developed by 112 organisations in cooperation with organisations for the deaf at local/regional level.

Advantages

- More conversational, may include audio, text, and video communication. This may enable several means of communication (text, sign language, lip-reading, etc.)
- Users are familiar with apps services
- Many apps are developed in cooperation with 112 emergency services to meet the needs of deaf and hard of hearing citizens.

Potential disadvantages

- Usable only for contacting emergency services, not for other communications (thus not widely spread)
- Most apps can be only used regionally or nationally, meaning that people would need to download several apps in case of travelling.

Most of the widely used messenger apps are currently not allowing communication with emergency services. This may change in the future and it would provide access to emergency services in a well-known way to most users.

As Next Generation 112 (NG112) is deployed across Europe, the architecture will ensure that apps can be used natively across borders, as demonstrated by the CELESTE project[11]. There is also an ongoing initiative – the PEMEA network – following the PEMEA standard[12], interconnecting PSAPs and apps used in other countries.

4.2.2 SMS

Emergency SMS is functioning in several EU countries. Person to person SMS is used by deaf and hard of hearing citizens, thus it is widely available, easily implementable and usable.

Access to emergency services through SMS is not possible in all countries via the European emergency number 112. In some countries/regions another short number or a specific long number must be used. Knowing the local emergency number to be contacted is a difficulty.

Additionally, registration to a national/regional emergency SMS service is needed in most cases and a person in distress would not be able to send an SMS to the emergency services unless he/she has previously registered.

In case of foreigners visiting a country, sending an SMS to 112 or another short number would not currently work as the SMS is sent to the "home" network and would never reach the "visiting" PSAP. For example, a 112 SMS sent by a Swedish tourist in Ireland would be sent to his/her home network and would not be sent to the Irish PSAP.

Furthermore, several concerns have been raised about the network delay of transmission for SMS as well as the duration of emergency conversations (10 to 18 minutes). The availability of location data for 112 SMS has also been reported as lacking in most cases.

Advantages

- Widely spread communication tool
- Natively available in the mobile phone
- Caller location is possible
- Low cost solution

Potential disadvantages

- Possible delays (no priority in networks)

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[11] *https://eena.org/document/ng112-project-report-celeste*
[12] ETSI TS 103 478

- Less interactive and conversational than real-time text, voice, and video. Conversation is based only on sent and received text and may last in some cases for more than 10 minutes, while technical delay concerns are in practice much less severe than the human usability aspects, with factors like time needed to compose a message or selecting the right information to be typed in support of an effective emergency services intervention. This makes this form of communication less recommendable for effective communication in the context of 112 services.
- Text messages are sent and received; thus no real-time communication is established.
- Some users with disabilities do not use written language as a means of communication, thus their ability to use SMS as a communication tool in emergencies is very limited.
- Roaming

SMS is often used by hard-of-hearing and deaf people but this means is not fully satisfactory for different reasons: SMS can be put in a queue along with all other messages or even get lost; SMS is a store-and-forward medium which is difficult to localise and can hinder the interaction between emergency services and users. A response to these issues can be found in solutions that prioritise text messages that are dialled to emergency services.

4.2.3 Textphone

For individuals who are deaf or hard of hearing, telephone communication can involve using text rather than voice, typically using a textphone (Called TTY in North America, Minicom in UK, texttelefon in Sweden, DTS in Italy, teksttelefon in Norway etc.). A basic textphone consists of a keyboard, a display screen, and a modem, which operates over standard telephone lines. If a deaf individual communicates with another textphone user, both users send and receive text.

In some countries, contacting emergency services using a text phones is possible. The PSAP need to be equipped with this technology.

Advantages:

- Well-known by the deaf community

Potential disadvantages:

- Obsolete technology that was only available in a few countries and it currently has been largely replaced by IP-based solutions.

- Mobility- does not suit the majority of situations that happen on the move

4.2.4 Use of relay services (e.g. sign language to voice)

Relay services through a third-party service provider:

Text relay service:

If a deaf individual communicates with a hearing individual who doesn't have a textphone or equivalent (e.g. smartphone application), they will use the Text Relay Service (TRS). The TRS is a service in which relay operators provide two-way translation between spoken word and typed text.

Video relay service:

Video Relay Service (also sometimes mentioned as VRS) is similar to the TRS, but a relay operator provides translation between spoken word and Sign Language (SL), rather than spoken word and text. The hearing user communicates by voice, the non-hearing user communicates by video using SL. The relay operator serves as a liaison, communicating by voice to the hearing party and by video using SL to the non-hearing party. VRS is an important alternative to the original TRS, since many deaf individuals prefer SL as their primary method of communication. VRS can occur over Internet connections with video conferencing software, Total Conversation terminals or over special video-equipped phone terminals.

Access for deafblind individuals:

Deafblind individuals may use the Text Relay or the Video Relay Service. For instance, computers or smartphones can be connected to braille displays, which enable deafblind individuals to access relay services. A relay call of a user who is deafblind can be performed in the same way as a text relay call, however, the text transmission speed is often reduced to increase the ability of the user who is deafblind to read braille on the braille display or large print on the Large Visual Display (LVD). Relay operators must be familiar with Braille abbreviations that users who are deafblind may use.[13]

Advantages

- Can ensure equal communication access to the telephone service for people who are deaf, deafblind, hard of hearing and speech disabled.
- Services can be made accessible without geographic limits, tailored to the needs of specific groups of users with disabilities.

Potential disadvantages

- Requires a developed infrastructure for service provision, including well-trained relay operators.
- Relay services may incur costs (e.g. sign language interpreters for video relay) and users in emergencies should not need to pay for this service.
- These services are not always available around the clock, which is especially crucial in relation to emergency services

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[13] *http://en.wikipedia.org/wiki/Telecommunications_Relay_Service*

- Provides an indirect communication that may cause the user to not exactly know what communication takes place with the PSAP.

Automated Relay Services:

There are internet relay services, called Automated Relay Services, that provide functionality similar to textphone to voice services, replacing the textphone and telephone line with a specialised computer or smartphone program and internet connection. Voice to text recognition, as well as text-to-voice transmission is used in Automated Relay Services.

These services offer a lower cost, but accuracy may be a problem.

4.2.5 Real-Time Text (RTT)

Real-time text is a text-based mode of communication. It works by sending and receiving text character-by-character: characters are sent immediately as they are typed and are then displayed immediately to the receiving party (the user does not need to press "send").

RTT uses Internet Protocol (IP) technology to deliver texts. This is the same technology that supports Voice over IP (VoIP) and video. It also allows text and voice to be transmitted simultaneously. The text is encoded according to IETF RFC 4103 (RTP Payload for Text Conversation), which supports an optional error-correction scheme based on redundant transmission (as described in RFC 2198).

It can be used on many devices (smart phones, laptops, text phones, total conversation phones, etc.) and can provide direct 112 access and/or invoke relay services (text, sign language to voice). RTT is standardised and recognised by international organisations such as ITU-T, ETSI, IETF, and it is in use in several European countries, in the United States and in Canada as the successor of Textphones/TTYs.

RTT is available natively on the phone (Native RTT) or through an Over the top app (OTT RTT):

- Native RTT needs to be enabled by telecommunication operators[14], and then it has to be configured in a wireless device[15] [16].
- OTT RTT are available in apps that can be downloaded to a smartphone, a computer or via a web-based application. OTT RTT is also standardised; the text is encoded according to IEFT RFC 4103. Real-time text uses the standard session initiation protocol (SIP) (RFC 3261) and the session description protocol (SDP) (RFC 4566). SIP is used without any alteration; there is no difference between real-time text and VoIP for SIP.

Advantages:

- Widely recognised text standard.
- Native RTT is natively available in the phones
- OTT RTT is already widely available in 10 EU countries (2020)
- Text and voice are available on SIP calls that use RTT.

Potential disadvantages:

- Currently, the technology is not generally implemented in all EU countries nor globally.

4.2.6 Total Conversation

Total Conversation is a universal and standardised (ETSI TS 103 479) set of communications enabling citizens to communicate with voice, video, and RTT (point 4.2.5, above). It was developed and is supported by deaf and hard of hearing stakeholders, and it is in use in a number of European countries[17]. It permits person to person communications, either directly or indirectly using a relay service that serves as an interpreting service between voice, sign-language, and real-time text.[18]

In addition, Total Conversation can be implemented in a large number of devices such as computers, laptops, smartphones, videophones, tablets and it is able to bridge with legacy devices such as textphones. It is also available for web browsers.

As opposed to emergency SMS, citizens "call" 112 and get an instant response from emergency call-takers. A conversation follows with real time text (every letter typed is seen instantly by the recipient in real-time) and/or with video using a sign-language interpreting service or a lip speaker (for hard of hearing people). The immediacy of the emergency conversation can therefore be preserved.

Every citizen can benefit from communicating with emergency services using multimedia. This may involve, for instance, sharing videos recorded on mobile phones at emergency and disaster scenes.

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[16] *https://www.fcc.gov/sites/default/files/documents/events/fact_sheet_about_real-time_text_for_public_safety_answering_points.pdf*

[15] *https://support.apple.com/guide/iphone/rtt-and-tty-iph3e2e47fe/ios*

[16] https://support.google.com/accessibility/android/answer/9042284?hl=en

[17] As of 2020, 10 European countries are using Total Conversation standard in relay services. These countries either have the requirement in the description of the services (France, the Netherlands, Sweden) and/or have procured national services that include RTT in their technical description (Belgium Flemish and Walloon Regions, Denmark, Finland and Germany). Other European countries that require RTT are Norway and Switzerland.

[18] *https://eena.org/our-work/eu-projects/reach-112/*

Advantages

- It is considered by users to be the best option for equivalent access to emergency services
- Extension to traditional telephony
- Developed by deaf community and not by 112 emergency services
- Enables several means of communications (text, sign-language, lip reading…)
- Very conversational
- Standardised[19], fast and mobile service

Potential disadvantages

- Need PSAPs to either be able to communicate using sign-language, or to be able to connect the on-going call to an external Video Interpreter (VI) or Video Relay Service (VRS).

In order to implement Total Conversation, PSAPs have to face some challenges:

- Adaptation of emergency services to new media: SIP calls that enable video and RTT.
- Deployment of NG112 services: the increasing use of IP communication requires immediate adoption of existing open standards for the exchange of audio, video, real-time text and data (refer to *ETSI TS 103 479*) by PSAPs throughout Europe.
- Getting exact caller-location information
- Training staff for specific communication needs of disabled users
- Definition of standards for operation procedures related to provision of services in this segment at PSAP level, ensuring quality of service management and mainstreaming of service-related policies (in preparation for open standards, explained below).
- Ensuring interoperability to guarantee speed, coordination, and transfer of information across emergency services as these are key in providing effective reaction and response to incidents and disasters. Issues to be addressed in the context of interoperability include sharing, formatting, storing, and retrieving data and providing access to data for relay services.

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[19] *ETSI TR 103 201*

4.2.7 Fax

Fax is also made available in several EU Member States. In practice, deaf and hard of hearing citizens are provided with A4 sheets to be faxed in case of an emergency. The process is recognised as slow and, once again, can hardly be used outside homes.

It is still available in several EU countries. This type of service is based on an A4 sheet sent to a long number (not 112 or other short numbers).

Advantages

- Pre-filled sheets provide clear information about the intervention needed; it might be an easier alternative for people already used to using fax.

Potential disadvantages

- Fax is not widely used
- Very slow procedure
- Works only from home or office and at the local level only, assuming one has a fax machine
- Special number needed

Although **Fax is not a** satisfactory means to reach emergency services, unfortunately some countries still use this as the main communication tool for some people with cognitive disabilities. This is not considered acceptable access to emergency services.

5 l CALL MANAGEMENT PROCEDURES
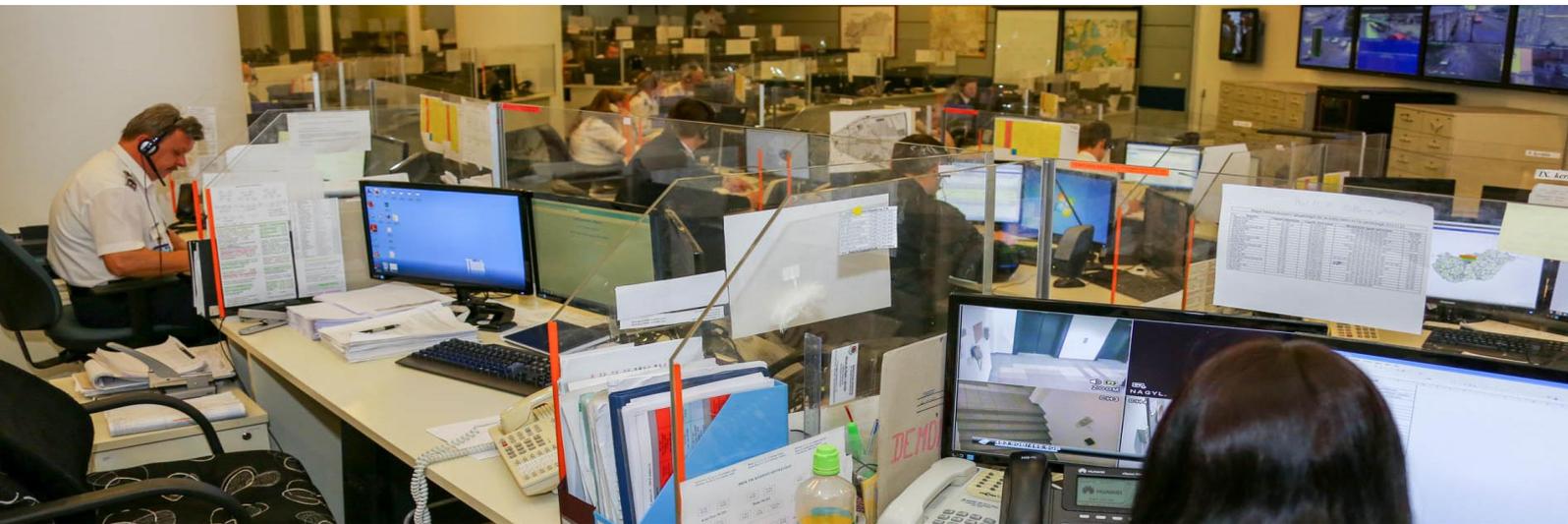
- When using any type of text-based communication, emergency services shall provide an acknowledgement of receipt to say that the emergency contact has been received, the emergency is being handled and when emergency services will be on site.[20]

- Operators who handle contact via videophone shall be able to answer using national and international sign languages.[21] For total conversation, the call could be processed using RTT for direct communication with the PSAP and involving a video relay service for the conversation based in sign language.

- Alongside technical solutions, accessibility for persons with intellectual disabilities should be maintained by using easy to understand language, clear direct instructions, yes/no questions, avoiding complex series of steps, among other considerations.

- Procedure of pre-registration of users can serve as a measure to eliminate hoax calls and identify caller specific communication needs by verifying the user, and to support the collection of statistical data. However, it is an additional difficulty for persons with disabilities and could block a call from a citizen in a real emergency because he/she is not pre-registered. It should be avoided as much as possible as it increases the difficulty for European users travelling in multiple countries, and also due to data privacy issues.

- Pre-configured messages, using for example already-written text or pictograms, can support users unable to use written language well and or fast enough. Pre-programmed emergency messages with easy access can also be created.[22]

- A PSAP Policy on silent, hang-up and abandoned 112 calls should be integrated, considering that the call may be silent as the person in a real emergency situation may not speak or may not hear that the call has been answered. This should be integrated into standard operation procedures (SOPs).[23]

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[20]This applies to SMS and fax only. For SIP-based communications, there is already a natural acknowledgement of receival.

[21]http://www.europarl.europa.eu/document/activities/cont/201104/20110413ATT17668/20110413ATT17668EN.pdf

[22]http://www.europarl.europa.eu/document/activities/cont/201104/20110413ATT17668/20110413ATT17668EN.pdf

[23] For further reference, please consult the EENA Operations document on Emergency silent, hang-up and abandoned 112 calls
https://eena.org/knowledge-hub/documents/silent-hang-up-abandoned-112-calls/

6 | CONCLUSIONS & RECOMMENDATIONS

- Every EU country must implement a standard-based, reliable, effective solution which enables equal access to emergency services for persons with disabilities. As the pros and cons in the document show, total conversation provides the best equivalent access to emergency services.

- The number to contact emergency services should be the same for everybody and pre-registration should not be needed.

- The solution must perform consistently and precisely and must be usable with high confidence, based on 24h/365 days service provision.

- The solution must be able to accurately locate the user.

- The solution should perform everywhere, including when the user is roaming. To ensure this, the implementation of NG112 is crucial.

- Emergency services must ensure that they establish appropriate procedures for the management of communication with users with disabilities, including adequate training of call-takers and dispatchers.

- The available solutions must be well communicated to the public also in an accessible manner, to ensure that persons with disabilities are aware of how they can contact emergency services.

- Best practices should be shared so that countries and organisations can learn from each other.