



TECHNICAL REPORT

**User Group;  
Collection of user requirements from visually impaired people  
for e-accessibility to ICT products and services**

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Reference

DTR/USER-00041

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**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

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## Foreword

This Technical Report (TR) has been produced by ETSI User Group (USER).

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## Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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## Introduction

The Information Communication Technology (ICT) can significantly improve the living conditions of people with disabilities. New platforms such as smartphones phablets and tablets, combined with attractive and innovative applications and services open now new horizons.

Several studies are available on the subject and many websites from association, governmental organization, regulation or standard bodies provides valuable information.

[http://www.e-accessibilitytoolkit.org/toolkit/international\\_cooperation/international\\_standards\\_development](http://www.e-accessibilitytoolkit.org/toolkit/international_cooperation/international_standards_development)

The present document intends to gather some concrete requirements and make proposals for communication tools/devices/Services/interfaces, for vision impaired people (blind, or low vision, or partially sighted people).

- Blindness is defined by the World Health Organization (WHO) as vision in a person's best eye of less than 20/500 or a visual field of less than 10 degrees. (According to numbers from the WHO, 90% of blind people live in the developing world).
- Low vision generally refers to a severe visual impairment, not necessarily limited to distance vision. Low vision applies to all individuals with sight who are unable to read the newspaper at a normal viewing distance, even with the aid of eyeglasses or contact lenses.
- Partially sighted indicates some type of visual problem.

According to WHO, 285 million people are estimated to be visually impaired worldwide: 39 million are blind and 246 have low vision. 65 % of all people who are visually impaired are aged 50 and older, while this age group comprises about 20 % of the world's population.

With an increasing elderly population in many countries, more people will be at risk of age-related visual impairment.

Vision impaired people face sometimes insurmountable difficulties when they want to access new technologies using a computer, Internet access, editing and printing a text, reading a document can be extremely complex tasks despite their simplicity to another user, but ICT may today give people with vision disabilities capabilities to improve their social and economic integration in their society if some specific requirements are taken into consideration when product and services are designed.

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# 1 Scope

The present document aims at identifying use cases for vision impaired people for e-access to ICT products and services but also use cases to allow users to interact with machines or equipment (e.g. users terminal, user interface) via dedicated devices (M2M communications) in order to define appropriate protocols (NFC or similar).

The intention is not to define technical solutions but to forward the requirements to the appropriate ETSI Technical bodies.

Equal access to services, to WEB content, to public places is now required by law in many countries. Vision impaired people often use of specialized devices which can help them in the current life and also provide access to entertainment (access to Television, book reader, etc.).

Being able to use computers, mobile phones and other tools for, work, leisure and keeping in contact are key tools for blind and partially sighted people. In the present document, some requirements and/or proposals in possible assistive technology for the vision impaired people are listed.

The present document is divided in 3 sections:

- Section 1 where accessibility requirements have already been studied and proposed solutions identified. However, these requirement are often ignored. This is the case for web and content document accessibility.
- Section 2 where accessibility requirements exist are partially considered, however this report bring some new considerations and propose recommendations. This is the case for terminals smartphone, phablets, and tablets.
- Section 3 where accessibility requirements are not yet really considered, because several type of requirement may be requested. This is the case for e-purchasing, Kiosks, Television, M2M, etc.

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## 2 References

### 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

Not applicable.

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References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ETSI EG 201 013: "Human Factors (HF); Definitions, abbreviations and symbols".

[i.2] W3C Recommendation (December 2008): "Web Content Accessibility Guidelines (WCAG) 2.0".

[i.3] Recommendation ITU-T I.112: "Vocabulary of terms for ISDNs".

## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

**access:** function that enables a service session from an end user equipment

**availability:** likelihood with which the relevant components of the service function can be accessed as required by the contractual conditions (temporal and spatial)

NOTE: Space covers the geographic coverage and resource size aspects.

**capability:** ability of an item to meet a demand of a given size under given internal conditions

**function:** set of processes defined for the purpose of achieving a specified objective

NOTE: See Recommendation ITU-T I.112 [i.3].

**Terminal Equipment (TE):** functional group on the user side of a user-network interface

**usability:** effectiveness, efficiency and satisfaction with which specified users can achieve specified goals (tasks) in a particular environment

NOTE: In telecommunications, usability should also include the concepts of learnability and flexibility; and reference to the interaction of more than one user (the A and B parties) with each other and with the terminals and the telecommunications system, ETSI EG 201 013 [i.1].

### 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ADSL	Asymmetric Digital Subscriber Line
API	Application Programming Interface
DVB	Digital Video Broadcasting
EAN	European Article Numbering
GARI	Global Accessibility Report Initiative
GPS	Global Positioning System
GSM	Global System for Mobile
ICT	Information and Communication Technologies
M2M	Machine to Machine
NFC	Near Field Communication
PIN	Personal Identification Number
QR Code	Quick Response Code
SIM	Subscriber Identity Module
SMS	Short Message Service
URL	Uniform Resource Locator
W3C	World Wide Web Consortium
WAI	Web Accessibility Initiative
WCAG	Web Content Accessibility Guidelines
WEB	Last part of World Wide WEB
WHO	World Health Organization
WI-FI™	Wireless Fidelity

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## 4 Section 1: Web and document content accessibility

### 4.1 Definition

A document is considered accessible if it can be read and used by any user, regardless of the computer tool at its disposal: screen, screen reader voice synthesizer, braille display, keyboard or others devices

NOTE: A screen reader allows a totally blind person to hear what is on screen ,a screen reader read it out in a synthetic voice and its give a couple of extra ways of interacting with what on screen from the keyboard.

### 4.2 Proposals

Several rules and principles should be taken into account to provide the Web content & document accessibility.

As examples the following may be listed:

- Structuring the document by separating different content.
- Presenting Information and user interface components to users in ways they can perceive them:
  - E.g. Provide text alternatives to graphics.
  - Make accessible tables to display the data with an organization facilitating understanding.
  - Use contrasting colours and pretty standard fonts.
  - Find an alternative to font enrichment (bold, italic, underline).
- Operability - User interface components and navigation should be operable.
- Understandability - Information and the operation of user interface should be understandable.
- Robustness - Content should be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies.

If a content is not compliant with these rules, users with disabilities will not be able to use the Web.

The best objective for any webmaster or document editor is to comply with "WCAG 2.0" [i.2] specification.

NOTE: The BrailleNet Association (W3C member) has registered a trademark "Accessiweb" with the following missions:

- Production and maintenance of Repositories from the work of W3C/WAI.
- Training for web professionals and the general public.
- Benchmarking the compliance of websites with accessibility standards W3C/WAI (e.g. [http://www.accessiweb.org/index.php/accessiweb\\_2.2\\_liste\\_generale.html](http://www.accessiweb.org/index.php/accessiweb_2.2_liste_generale.html)).
- Participation in European projects and carrying initiatives eAccessibility.

For vision impaired people, it is really important to get on line ,to feel included in the society, to be able to participate in learning and in leisure, so it is highly recommended that any WEBSITE comply with "WCAG 2.0" [i.2] (e.g. via "accessiweb" benchmarking process or equivalent).

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## 5 Section 2: Terminals requirement for vision impaired people

### 5.1 Introduction

There are many degrees of visual impairment ranging from difficulty in reading small characters through to total blindness.

With all mobile phones incorporating displays providing a range of options for users with visual impairments is important.

The following criteria are highly recommended to improve accessibility to smartphone/phablet/tablet, usage.

Terminals designed to meet requirements for visually impaired people need to offer appropriate ergonomics and include **as basic** functionalities: Speech synthesis/speech recognition/and if possible physical-keypad.

### 5.2 Proposals for terminal characteristics

#### 5.2.0 Accessibility

All parameters regarding accessibility should be located in One Menu: e.g. named "accessibility parameters".

#### 5.2.1 Ergonomics

In particular the following features are likely to be of interest:

- On-off button should be physical, dedicated and distinct.
- Audible/haptic/or visual feedback when keys are pressed e.g. Audible alert, visual and/or haptic signal.
- On physical AZERTY/QWERTY keyboards, key 5, and letters F - J are marked.
- Standardized colours: green to call and red to hang off are required.
- Volume settings + and - should be dedicated and distinct.
- Easy access to SIM card/memory cards, battery.
- Audible alert, visual and/or haptic is required for:
  - Code pin (acceptance/denied).
  - Wireless network availability.
  - Low battery level.
- Information on Calling line identity:
  - Different ringing tone depending on caller identity.
  - The ability to assign different ring tones to different numbers stored in the phone allows vision impaired people to allocate a specific ring tone to a family member.
  - This feature lets visually impaired people know easily who is calling when the phone rings, without the need to even look at the display of the phone.
  - This feature can be enhanced with the name announcement.
  - Display on screen.
- Calls history (missed, incoming, outgoing, calls).



- Key lock screen dedicated and perfectly distinct.
- Dynamic key allocation to services/applications.
- Make easy contact list (from an incoming call).
- Possibility to use voice control to dial a number or to access phone functionalities.
- Phone book with picture/photos (image of the person beside their name and phone number).

NOTE: GARI (Global Accessibility Report Initiative) bring assistance to user to select terminals identifying accessibility features available on smartphones proposed by different manufacturers (<http://www.mobileaccessibility.info/>).

## 5.2.2 Smartphones applications

The Operating System of Smartphones should include natively services/applications such as speech recognition /speech synthesis/and screen reader functionalities, etc.

However, most touch screen phones make navigation and keypad operation quite difficult.

Features such as, screen contrast, icons size, colours or voice speed should also be easily customized by the visually impaired user.

NOTE: For Android™ devices, a guide has been edited to help application developers to address the services accessibility ([http://eyes-free.googlecode.com/svn/trunk/documentation/android\\_access/index.html](http://eyes-free.googlecode.com/svn/trunk/documentation/android_access/index.html)).

## 5.2.3 Touchscreen devices

**Smartphones should natively include screen reader functionalities.**

A screen reader will provide right information if the applications fulfil recommendations given by Worldwide web consortium.

The issue of web accessibility has been addressed by the Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C) has produced a series of recommendations, the Web Content Accessibility Guidelines, to help content developers producing websites or web applications.

- **Speech synthesis**

The voice should be clear and pleasant to hear, and the playback speed should be adjustable.

High definition sound is recommended and attenuation of ambient noise around the speaker's voice.

Speech synthesis provided by screen readers should be compatible with wireless headsets.

- **Speech recognition**

Voice recognition is also a very useful feature that can help people with a visual impairment. This allows the user to use voice commands for dialling and accessing features on the phone.

Speech recognition often needs cloud resources, and in such a case data transmitted on the radio path to the speech recognition server should be encrypted.

If no encryption, no sensitive transaction (consulting bank account, purchase internet, transfer order) requiring the sending of personal data (code number and credit card, bank references, in particular) should be performed via speech recognition.

In order to improve ergonomics, availability of an API allowing additional software to provide additional screen reader services.

## 5.2.4 Screen

For people with low vision a phone with a large screen will be easier to use. Almost all displays are colour, with adjustable brightness, contrast and font size. These screens should be very bright, with high resolution and contrast, making colours intense and blacks very dark, in particular Screen colour and font colour should be customizable. This feature should be easily configurable and for example yellow font on a dark blue background is particularly appreciated by some visually impaired.

## 5.2.5 Shape

The shape of the device may also be something to consider. In this case a sliding or flip phone design may be of interest to make it easier to answer or hang up a call.

## 5.2.6 WI-FI connectivity

Setting access to a Wi-Fi™ hot spot is still a difficult task.

Three steps are required:

- Selection of right Wi-Fi™ network: this recognition can use Speech synthesis to identify the right network.
- Entering the key: In some router or ADSL Boxes, the mac address is used as a Wi-Fi™ key. In such a case, the mac address should be associated to a QR code containing same information (applications may read the QR code and automatically configured the Wi-Fi™ access).

NOTE: An example is the Wi-Fi™ joiner application (an Android™ application that can add networks to phones by just scanning a QR code).

- Getting the confirmation of the successful connection. The connection acknowledgment could be done by speech synthesis or any solution giving a positive feedback.

## 5.2.7 Receiving Sending SMS

Ability to send and receive short messages are basic functions of different Phones/smartphones.

For SMS messages, it is however necessary that the following information is accessible to the visually impaired and thus reported using speech synthesis:

- A new message has been received and available.
- With the name of the SMS sender.
- With the date and time.

When sending an SMS, SMS application should:

- Provide access to the address book via vocalization.
- Allow generation of SMS by voice recognition.
- Provide an acknowledgement of the sending via speech synthesis.

## 5.2.8 Mails

Ability to Send and receive mails are basic functions of various telecommunication equipment (tablet, phablet smartphone).

When receiving messages, mail application should ensure that following information is accessible to the visually impaired people:

- A sound notification indicating arrival of a new message.
- A Speech synthesis providing essential information such as number of non read messages, existence of attachment with its title, size, its type, name of the sender, and time of reception.

- Ability to read mails and attachments via speech synthesis.

When sending mails, mail application should:

- Provide access to the address book via vocalization.
- Allow generation of mails by voice recognition.
- Provide an acknowledgement of the sending via speech synthesis.

### 5.2.9 Voice mail

Voice mail application should ensure that following information is accessible to the visually impaired people:

- A sound notification indicating arrival of a new voice message.
- A Speech synthesis providing essential information such as number of non read messages, name of the sender, subject, and time of reception.
- Ability to easily select voice mails depending on parameters (date/sender, subject).
- Ability of pre-recorded voice message.

### 5.2.10 Global Positioning System

New applications and services are now using GPS to guide the blind and visually impaired in their travels within the city.

When using GPS products, a blind/visually impaired person should be able to prepare travel routes without leaving home.

GPS applications may announce the closest point of interest and explore the surrounding area.

Proposals:

- A pedestrian GPS is considered as a key smartphone feature and should be natively available.
- GPS status should be clearly indicated.
- GPS should verbally announces names of streets, intersections.
- GPS should offer capability to prepare travel and record routes.
- GPS should provide information about the current user Location.

NOTE: For security reasons, the mobile user could also be localized by third parties if the regulation and/or user allows this feature.

### 5.2.11 Smartphone Documentation

Video tutorials should be available, including physical description of the device.

Proposals concerning Accessibility:

- for phone software maintenance (e.g. update of firmware);
- for data synchronization (between PC and phone, etc.);
- for web surfing (e.g. with bookmarks);
- for access to application stores (e.g. with clear information on applications rights/costs, etc.).

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## 7 Section 3: e-Purchasing, Kiosks, Television, M2M

### 7.1 e-Purchasing

#### 7.1.0 Assistive Technologies

The development of for the visually impaired can now provide access to cloud information, e.g.:

- To allow all these people to purchase product/services, with the right level of information.
- To give a clear Identification of the products and of their use is needed.

To provide protection against fraud and/or counterfeiting becomes also a key requirement.

The GenCode more precisely BarCodeEAN\_8 or 13 which is standardized and present on product packaging need to be considered.

#### 7.1.1 Bar codes applications/restrictions

Many useful applications are possible with bar codes.

Bus time schedule product information, /Geo-localization/Url for web access, Food traceability, etc.

However visually impaired people encounter severe difficulties to get all advantages of bar code information such as:

- How to detect the presence of a 2D bar code?
- How to use the flash when ambient light is too low?
- How to save the information in the user's database?

#### 7.1.2 Proposals

It is proposed:

- to expand the role of the linear barcode (EAN8 & EAN13) about customer experience rather than only product information;
- to educate bodies responsible for establishing rules of web accessibility (W3C) to advocate its presence whenever possible and desirable, therefore its ranking by the search engines, incidentally increase the visibility of commercial sites;
- to clearly differentiate product identification (marking) and product information;
- to facilitate the location thus capture all via a judicious positioning advantage of tactile cues;
- to create a database. (providing information on products).

The EAN bar code that appears on a product is truly a serial number designating family product identification. It is the technical element used internally by professionals despite the emergence of 2D barcodes reading EAN does not provide information on a product, so it is proposed to create a database which will be fuelled by the professional willing to introduce their goods on the market.

This database should be available online and placed under the supervision of the Public Authority, identifying the product information.

NOTE: One key application for EAN would be to assist visually impaired people when elections are held.

EAN should be marked on ballot paper in order to allow right identification of the selected ballot paper.

## 7.2 Kiosks: interactive information terminals

### 7.2.1 Introduction

Electronic Kiosks covers different applications/services, such as information kiosks, information display and electronic vending machines and automated telling machines.

The user interface accessibility should be considered with the various physical actions associated with the kiosk: for example, pressing buttons, or using keypads, inserting cards, reading display each of which needs to be addressed from the accessibility viewpoint.

### 7.2.2 Proposals

Electronic Kiosks accessibility is already addressed in different documents or on web sites such as:

- [http://www.e-accessibilitytoolkit.org/toolkit/technology\\_areas/electronic\\_kiosks](http://www.e-accessibilitytoolkit.org/toolkit/technology_areas/electronic_kiosks).

This website proposes a Joint ITU/G3ict Toolkit for Policy Makers Implementing the Convention on the Rights of Persons with Disabilities.

The aim of the following paragraph is to add some suggestions to improve kiosk accessibility for visually impaired people.

For any electronic kiosk using a display:

- Either the kiosk provides a screen reader function.
- Or a technical solution should allow the transfer of the displayed kiosk information on a smartphone/tablet:
  - 1) E.g. a basic communication system (using Wi-Fi™/Bluetooth®, etc.) should allow duplication of the kiosk screen on the smartphone/tablet and thus allow the use of the native screen reader.
  - 2) E.g. Kiosk screen includes a 2D bar code which provides access to a web site providing appropriate information.
- For kiosk providing a Paper receipt, a duplication of the receipt information should be sent electronically to the Smartphone/tablet.
- More generally for kiosks providing paper output, a duplication of the content information should be electronically accessible with appropriate security mechanisms.

## 7.3 Television and DVB decoders

### 7.3.1 Introduction

The Television has a major role in our society in particular access to information and culture, and digital Television offer new opportunities to improve accessibility to programs for people with disabilities.

### 7.3.2 Proposals

Vocalization for digital television is a key feature which allows visually impaired people to follow a Television channel.

It is a process that can reproduce via a voice message, any textual information normally displayed by the receiver on the Television screen, as the setup menu the receiver's name and channel number, data of the electronic program guide, the selected audio track.

## 7.4 M2M

For furthers studies.

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## Annex A: Bibliography

ETSI EG 201 219: "User requirements; Guidelines on the consideration of user requirements when managing the standardization process".

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## History

<b>Document history</b>		
V1.1.1	August 2015	Publication