

# Text communication for all (DUST)

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## Abstract

This paper reports the work of a Specialist Task Force (STF) working in ETSI on behalf of the EC/EFTA which developed a guide to Duplex Universal Speech and Text (DUST) services, and the protocols that support them on current and future networks. The DUST services are real time interactive text, speech and video. Such a new service is expected to be attractive to all users.

**Key words:** Text communication, DUST

## 1. General

Text communication services such as chat, instant messaging, SMS and e-mail are now mainstream services, but have the disadvantage that they do not provide a fluent conversation. Real time conversational text provides a fluency of conversation and avoids the disjointed effects of speaking out of turn that often occurs in messaging systems. Real time conversational text has until now been largely restricted to expensive specialised terminals used mainly by the deaf community.

The work was carried out under the *e*Inclusion programme intended to give equal accessibility to telecommunication services to all users.

## 2. User requirements

The guide reports on the requirements of text communication from a user's point of view and then goes on to identify the technical considerations implicit in these requirements. Only the main identified requirements are given in this paper. The guide itself gives a more exhaustive listing of user requirements for text conversation and also treats multimedia calls where video can be used for signing.

### 2.1 Universality

Any voice telephone user can pick up a telephone and talk to another voice telephone user on any network anywhere in the world. Telephony services have been implemented in such a way as to ensure this end-to-end interoperability. Users expect that a modern telephone system will offer a good quality of speech so that the resultant conversation will be quite natural and as a result is often described as "as if they were in the same room".

Some people prefer to communicate by text and others who are deaf or who are speech-impaired are not able to take a full part in a spoken telephone conversation and so use text or a combination of text and voice. These text users need means to communicate with any other telecommunications users worldwide to a similar extent as voice telephony users. Such users

require to be able to set up a text communication as easily as setting up a speech conversation and by using similar means of addressing.

## **2.2 Conversational text**

One of the most disturbing effects occurring on a poor quality speech call is end-to-end delay, where there is a perceptible delay between the spoken word and it being heard at the other end. If the delay is too great, it affects the normal conversational flow and in the extreme, can lead to both parties in the call speaking at once.

This illustrates that one of the most important characteristics of a telephone conversation that makes it seem natural is that it occurs in real time just like a normal spoken conversation, where any sound is heard by both parties as soon as it is uttered. Because simultaneous two way (duplex) communication is possible, each party perceives the other party as being present and that he has the ability to interrupt or comment at any time. Any noticeable delay can affect the normal interactive conversational flow and interfere with the perception of continuous contact.

Similarly, text communication is needed to be conversational by making each letter seem to appear on the screen at both ends when it is typed. In this way the two parties to the call have the feeling of being in continuous contact and are able to carry on a normal interactive two way conversation in a similar manner to a spoken conversation. As occurs with a speech call, any noticeable delay can affect the normal interactive conversational flow and interfere with the perception of continuous contact, but with text, the delays can be greater than for speech before they become a problem.

The speech quality of a call set up on a modern telephone network is normally rated "good" or "excellent" although with some terminals on some connections with IP telephony or mobile telephony, the quality may fall to levels only considered "acceptable". Nevertheless there is a normal expectation that speech will be perceived as undistorted without any gaps in transmission.

Similar qualities of transmission are expected on a conversational text call. Both the terminal and the network should be able to support normal human typing speeds and also the speed of automatic speech to text processing. Any gaps in transmission should not be greater than might be expected to arise from the typing of the user.

Users will wish to use text and voice in various ways, and some will, for example, wish to use text in one direction and speech in the other. Some will wish to use speech with text available to use for clarification where necessary.

## **2.3 Service accessibility**

A text user would expect to be able to receive all of the basic and supplementary services normally supplied by a network operator including any supplementary services such as abbreviated dialling, call transfer, call forwarding, incoming call barring, anonymous call rejection and many others. Some of these services are required under the provisions of European law.

One current cause of friction is that the Universal Service Directive requires that all users "are able to call the emergency services free of charge by using the single European emergency

call number "112" and must have the facility of selective call barring for outgoing calls. Users must be able to access operator assistance and directory enquiry services and calling line identification should also be available. The 112 facility is often difficult to provide on many current text services.

#### **2.4 Call progress information**

The provision of any telecommunications service normally requires call progress indications often provided by special tones and spoken messages.

All of these services should be accessible to all users and their provision may require special arrangements for deaf users. This may require the provision of text alternatives for spoken messages or tones or arrangements in a terminal to permit the connection of some assistive device such as a flash display or a vibrator. Alternative modes of communication should be available for all of the call progress information that is normally provided in audio form in both basic and supplementary services.

#### **2.5 Relay services**

In order to carry on a conversation between a user in one communication mode (e.g. text) with a user in a different mode (e.g. voice), some form of service is needed to convert between the two modes. Such services are commonly called relay services and advice on their requirements can be found in ETSI TR 101 806.

Such relay services should also provide a speech path in both directions so as to permit voice connection in either direction when desired. They can also provide the necessary protocol conversion between different text protocols and some, with video capabilities, can enable a deaf signer to interact with a voice or text user, sometimes with the text mode being used as a supplementary information channel.

### **3. The present situation**

Real time interactive communication with speech uses the voice telephony service, with global interoperability between many forms of networks and terminals. The corresponding text feature is provided over the telephone system using various kinds of text telephone.

The text telephone systems that are currently implemented are intended mainly for distant conversation with deaf, hard-of-hearing, speech-impaired and deaf-blind users. These text telephone systems offer a real time, character by character conversation in text, optionally combinable with voice. This text telephone service is described in general terms in ITU-T Recommendation F.703.

Text telephony is used with dedicated text telephone terminals and, with software and modems, with computers, handheld computers and programmable communication devices. In the PSTN, seven different, openly specified systems for text telephony exist, and each country uses its own national system. The text feature is thus not harmonized or globally supported even though international standards exist. Some proprietary modes are also used.

### **4. The Dust concept**

The present PSTN legacy text communication systems all have limitations and can only satisfy less than half of a user's requirements that are described in clause 2 above.

The best method of achieving the required text conversational function is to offer a system that has facilities equal to those offered to mainstream voice users. This can be done by offering an enhanced network based text communication service that is designed for all and based upon existing mainstream solutions where possible.

The use of mainstream protocols facilitates multi-platform provision of text conversation services and permits interoperable European and world wide provision of services.

The title **Duplex Universal Speech and Text** with the acronym **DUST**, conveys the main special features of the communication proposed.

**D** – the communication should be **Duplex**, i.e. it should have the ability to send and receive simultaneously. This allows interruptions to occur as in a real live conversation.

**U** – the communication should be a **Universal** means of communication available to all users on a worldwide basis.

**S** – the communication should provide the facility for **Speech** or voice communications in both directions.

**T** - the communication should provide a real time **Text** flow.

It is evident that a move to internationally standardized protocols could increase the number of potential terminals and at the same time prevent the exclusion of textphone users from mainstream text communication.

A primitive form of such communication can be provided over the Internet on a peer to peer basis but in order for a user to have the full capabilities of DUST as described above it is necessary that a service provider offers such a service in the same way that a telephone service is offered, providing both the communications channel and a means for universal access to any other user.

Such a DUST service can be provided by digitally based communication with text, voice and optionally video. This is readily achieved in the form of PC software, and also may be embedded in dedicated terminals. Such terminals can fulfil all user requirements listed, and users, appreciating the higher functionality provided, can be attracted to these new services and form a pioneering user group for DUST services.

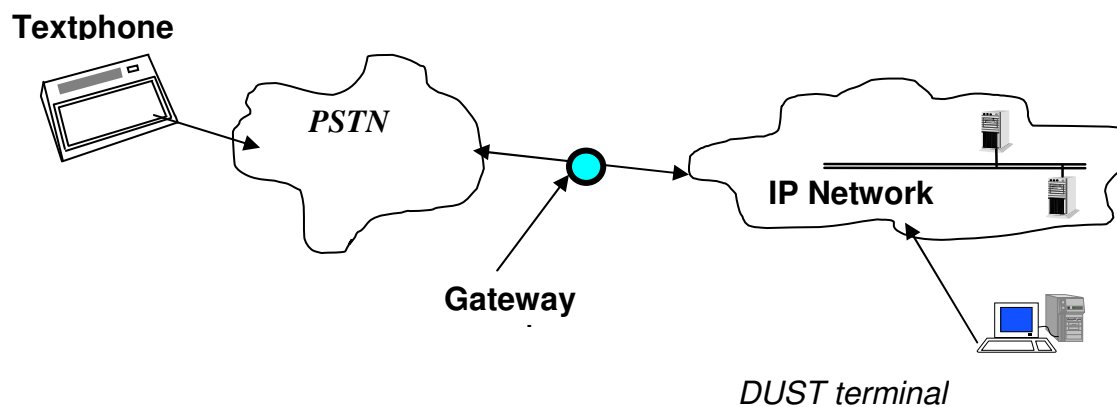
Examples of the higher functionality as compared to most PSTN text telephony implementations that should attract users are:

- Simultaneous text and voice – no cumbersome mode switching actions required.
- Simultaneous transmission in both directions, with no need for formal turn-taking.
- Full typing speed transmission.
- Support for text in any language.
- The possibility to use DUST in Wireless LANs and other wireless environments.
- The possibility to use text in video calls - - or video in text calls.

- Easy to find access possibilities when travelling.
- Multi-party calls
- Call transfer

Nevertheless it is recognised that legacy systems and terminals will remain in existence for many years and so suitable migration steps are necessary in order to permit coexistence with legacy systems and the effective management of the transition from old to new.

Simple small scale gateways between the digitally based form of DUST terminals and legacy text telephony can be deployed. ITU-T H.248.2 describes procedures for such gateways that are applicable even if the gateway itself is not designed according to the H.248 architecture. In countries where text relay services and emergency services are available for PSTN text telephone users, access to these services can also be provided through gateways.



*Figure 1: The use of gateways*

In countries where text relay services and emergency services are not yet available, new services can be provided with access directly through digital networks using the same DUST standards for access to these services.

The products and methods for firewall and NAT router traversal, commonly used for SIP calls, can be validated and used for text services as well as other SIP calls.

## **5. The ETSI Guide**

The ETSI Guide (EG 202 320) aims to set out detailed and practical requirements for Duplex Universal Speech and Text (DUST) protocols and services that can provide enhanced real time text and speech conversation for all users and contains information applicable to network operators, service providers, terminal and network manufacturers.

It also describes the current background by describing existing textphones, chat systems and protocols, it identifies user requirements for effective text and telephone conversation, and gives methods of fulfilling these requirements.

It then identifies the necessary extensions to signalling protocols and transport facilities of current multimedia systems to achieve the DUST requirements. In addition it sets out a migration process from existing national textphone systems to a future DUST system.

The Guide describes a path to achieve text and multimedia conversation in all global communications systems and flags up those areas where further standardisation work is required to resolve any remaining problems.

It looks forward to a future where all text users can communicate on a worldwide basis as shown in figure 2.

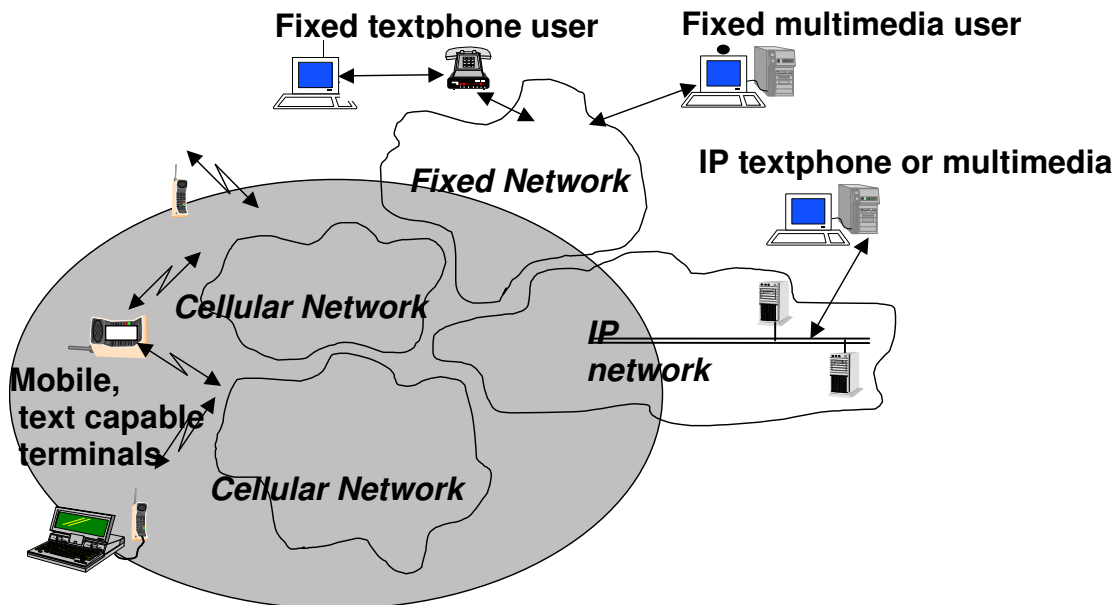


Figure 2: The future of DUST

## 6. Acknowledgements

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## 7. References

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ETSI references can be obtained free of charge from  
[http://www.etsi.org/services\\_products/freestandard/home.htm](http://www.etsi.org/services_products/freestandard/home.htm)