ETSI

ETSI TECHNICAL REPORT

ETR 333

January 1997

Source: ETSI TC-HF

Reference: DTR/HF-02015

ICS: 33.020

Key words: MMI, telephony, text

Human Factors (HF);

Text Telephony;

Basic user requirements and recommendations

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE
Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE
X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

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

Contents

Foreword

This ETSI Technical Report (ETR) has been produced by the Human Factors (HF) Technical Committee of the European Telecommunications Standards Institute (ETSI).

ETRs are informative documents resulting from ETSI studies which are not appropriate for European Telecommunication Standard (ETS) or Interim European Telecommunication Standard (I-ETS) status. An ETR may be used to publish material which is either of an informative nature, relating to the use or the application of ETSs or I-ETSs, or which is immature and not yet suitable for formal adoption as an ETS or an I-ETS.

Introduction

The need for text conversation

With the advent of the voice telephone a century ago, a period of segregation started for people who cannot fully use voice communication. Efforts were made in the 1970s to create text telephony as an alternative more suitable to these users. National text telephone methods were created for use in the telephone network. Being a minority, the users depend on support from society to develop and maintain such services. In different countries, the support has led to widely varying penetration of text telephones. They have served their users fairly well. Now, in the era of internationalization and a rapidly increasing number of different telecommunication networks, a new segregating effect is seen. The text telephone systems are still on the functional level as when they were created, causing limitations in connection possibilities and functions for the users. It is again time for actions to give equal opportunities to all telecommunication customers to use conversational services. This ETR is written as a contribution to such efforts. Since none of the current text telephone methods fulfil the requirements of a universal method, this ETR is also intended as the base for development of specific standards for a universally accessible text telephone service.

An overview of the main components in text telephony standardization is presented in the Bibliography (annex A).

Voice telephony has become an important mean of communication that holds our society together. But it cannot be used directly by everybody. For people with disabilities in speech or hearing, other communication services must be provided. One important such service is text telephony. It offers text conversation in real time through telecommunication networks. It is combinable in various ways with voice telephony.

Current incompatibilities

The currently available text telephone methods are nationally implemented, mutually incompatible methods. No single current method has enough functionality to suit as a global standard. Standards are urgently needed. Until suitable standards are established, text telephone users cannot be offered the same accessibility to communication as voice telephone users have.

End to end functionality, regardless of network

Voice telephone services are accessible globally between voice telephone terminals in different networks, even if the coding of voice and control signals differ in the different networks. This level of end to end functionality is also needed for text telephony. This is important because for example text telephony is used for calls to emergency services.

Generally useful function

The need for the service comes from people with disabilities. With proper implementation, text telephony would be found very useful as an add-on to voice telephony for any voice telephone user.

Problem summary

The current situation with many incompatible national methods give rise to a number of problems. This is a list of the major problems:

- The users cannot call internationally.
- There is no good advice to give to "new" countries wanting to start with text telephony.
- The products tend to be expensive, and not well developed and tested because of the scattered market.
- Very little support is found in the general telecommunication environment, like PBX systems, call centres and voice mail systems.
- The functions for combining voice and text do not meet the functional requirements of the users.
- The currently dominating dialogue method of one common screen where all text from both parties is displayed interleaved causes the flow of the dialogue to be inflexible.

Users and policy makers push for standardization

The European Union of the Deaf, EUD, representing one major user group, have issued a resolution, with strong request for a uniform standard for text telephony and user involvement in the standardization process [14].

The World Federation of the Deaf, WFD, has in its commission on Technical Aids as the second priority in its action list (after sign language communication) selected the standardization of text telephone protocols [15].

UN Standard rules for equal opportunities for people with disabilities requires the opportunities to communication to be equal regardless of disabilities [16].

1 Scope

This ETR gives the background for standardization of text telephony. It provides a summary of the basic user requirements and gives information on the existing text telephone methods, characteristics of alternative implementations, and recommendations for implementations in different networks.

2 References

For the purposes of this ETR, the following references apply:

[1] COST 219, Telecommunications for all (1995): Hellström, Gunnar & Currie, Kelvin: "Text telephony and relay services".

[2] COST 219 (1993): Olesen, Casper: "Text telephones and relay services in Europe".

[3] COST 220 (1993): Hellström, Gunnar: "Text Conversation through Telecommunication Networks".

[4] COST 220: "A text telephone service for Europe, Text telephony in ISDN".

[5] COST 219 (1992): "Issues in telecommunication and disabilities".

[6] ITU-T Recommendation V.18: "Operational and interworking requirements for modems operating in the text telephone mode".

[7] COST 220 (1996): "The use of text telephones by people with disabilities other than hearing impairment".

[8] ITU-T Recommendation V.25 ter: "Serial asynchronous automatic dialling and control.

[9] ITU-T Recommendation V.61: "A simultaneous voice plus data modem operating at a voice plus data signalling rate of 4800 bit/s with optional automatic switching to data-only signalling rates of up to 14400 bit/s, for use on the General Switched Telephone Network and on leased point-to-point 2-wire telephone type circuits".

[10] reserved

[11] ITU-T Recommendation V.70: "Procedures for the simultaneous transmission of data and digitally encoded voice signals over the GSTN, or over a 2-wire leased point-to-point telephone type circuits".

[12] ITU-T Recommendation V.8: "Procedures for starting sessions of data transmission over the general switched telephone network".

[13] ITU-T Recommendation V.8 bis: "Procedures for the identification and selection of common modes of operation between data circuit-terminating equipments (DCEs) and between data terminal equipments (DTEs) over the general switched telephone network and on leased point-to-point telephone-type circuits".

[14] European Union of the Deaf resolution from Design for All conference in Rotterdam, November 1994.

[15] World Federation of the Deaf recommendations from the commission on technical aids, July 1995.

[16] UN Standard Rules on Equal Opportunities to People with Disabilities, 1994.

[17] ISO 10646-1: "Information Technology; Universal multiple-octet coded character sets (UCS); Part 1: Architecture and basic multilingual plans".

[18] ISO 6429: "Information Technology; Control functions for coded character sets".

[19] ITU-T Recommendation H.324: "Terminal for low bit rate multimedia communication".

[20] ITU-T Recommendation T.120: "Data protocols for multimedia conferencing".

[21] ITU-T Recommendation V.21: "300 bits per second duplex modem standardized for use in the general switched telephone network".

[22] ITU-T Recommendation V.34: "A modem operating at data signalling rates of up to 28 800 bit/s for use on the general switched telephone network and on leased point-to-point 2-wire telephone-type circuits".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this ETR, the following definitions apply:

relay service: A telecommunications service that enables users of different modes of communication to interact by providing translation between the modes of communication. This translation is normally provided by a human operator.

text relay service: A telecommunications service that enables text telephone users and voice telephone users to interact by providing translation between the two modes of communication. This translation is normally provided by a human operator.

text telephone: A terminal offering text telephony functions, as a stand-alone unit, as an addition to a voice telephone, or as an application in a multi-function computer based terminal.

text telephony: A telecommunications facility offering real-time text conversation through telecommunication networks. Text telephony may be combined with voice telephony.

3.2 Abbreviations

For the purposes of this ETR, the following abbreviations apply:

ADSI	Analogue Display Services Interface
BLISS	A symbolic language used by people with language related disabilities
EDT	European Deaf Telephone - a text telephone protocol
EUD	European Union of the Deaf - a user organization
GSM	Global System for Mobile Communication - The GSM mobile telephone system
IRC	Internet Relay Chat - a text conversation protocol in Internet
ISDN	Integrated Services Digital Network

LAN	Local Area Network
PSTN	Public Switched Telephone Network
TDD	Telephone Device for the Deaf - a denegrated abbreviation used in the USA for text telephones
TTY	TeleTYpe - abbreviation used in the USA for text telephones
UCS	Universal Character Set (ISO 10646 [17])
UMTS	Universal Mobile Telecommunications Service
DSVD	Digital Simultaneous Voice and Data
WFD	World Federation of the Deaf

4 User requirements on text telephony

4.1 The users

4.1.1 Primary users

The primary users of text telephony are people who have a disability in hearing or speech, including their families, and close social and business relations feeling that their communication need is a reason to acquire a text telephone. As always in the disability area, it is hard to draw limits and evaluate numbers, but it can be anticipated that this presumptive user group (based on figures in Telecommunications for All [1]) is 0,5 to 1 % of the population in any country. This means 2 to 4 million presumptive primary users in Europe.

4.1.2 Indirect users

Indirectly, anybody could become a user of text telephony. For communication with people who only have a voice telephone available, there are text relay services set up translating between a spoken and a written dialogue, thus enabling conversation between voice telephone users and text telephone users.

4.1.3 Other users

In a globally standardized, convenient and generally available text telephone facility providing simultaneous text and voice communication, anybody may find it useful to express something in writing through the text telephone facility during a voice telephone call.

4.2 User requirements

Users need a system supporting them in telephone conversations. Of equal importance are capabilities for conversation in text between two text telephone users, and conversation through a relay service, where a translation takes place between spoken and written language.

This is a list of basic requirements on a standardized text telephone system.

4.2.1 Text conversation

Text telephone users need capabilities for real time text conversation through telecommunication networks.

This conversation can be performed between a person with a text telephone and another person, the emergency service, an organization, an automatic information service, a telecommunications network, or to any voice telephone user through a relay service.

Sent and received text should be displayed on the text telephone. There is a need for some way to enter text, and a way to transfer text through the telecommunication network. The normal operation is to connect one user terminal to another through the network and transfer entered text so that it can be displayed at both terminals. Transmission should take place soon after text is entered. Most users are used to transmission on a character by character basis. The transmission should not be more seldom than once per sentence.

4.2.2 Dialogue presentation and control

Two way simultaneous transmission is preferred because it gives the users the opportunity to interrupt each other and a possibility to comment without interrupting.

(Because of technical constraints, many of the current systems use two way alternate communication).

The display of sent and received text should be presented in separate areas, so that a natural dialogue can be supported. A limited set of editing and control functions should be provided to the user. Both ends are given a synchronized view of the dialogue.

The required editing functions are limited to force a new line and to erase the last character displayed in the sent text. More advanced editing functions are not needed because the users are in real time conversation and do not want to devote time to editing.

A screen of at least 12 rows with 30 characters per direction is preferred by users, whilst when portability requires it, the screen size may be limited to 30 characters per direction.

Scrolling functions for looking back in the session are required. To allow the user to pick up details from the session, the text from a session should not be erased until specifically requested by the user, but instead held in a memory. The operation for erasing the screen and the memory should be simple and easily accessible.

The display should scroll the text as new lines are entered. Automatic line wrapping at word boundaries should be used at the receiving end.

Further descriptions of user interface requirements can be found in "Issues in telecommunications and disabilities" [5].

4.2.3 Interworking with current text telephones

Automatic interworking should be provided with the current types of text telephones. When operating in interworking mode, the presentation functionality may be limited to what the emulated current text telephone offers.

4.2.4 Text telephony in and between different networks

Text telephone users are interested in using text conversation in any information technology environment: mobile telephone networks, multi-media communication over ISDN and ATM, private office premises and Internet. One of the main reasons behind the effort to create a global standard for text telephony is to assure interworking throughout different networks. Therefore, when a new network is introduced, text telephony should be defined in it, as well as the ways of interworking with standardized text telephones in current networks.

4.2.5 Character set

For users, it is very important to be able to use their national characters in the written dialogue. The character set used shall be suitable for use at least in Europe. The internationalizing trend calls for using a universally useful character set.

Today, most text telephone systems use a national, 7-bit character code. This is not adequate for international communication.

Certain positions in the character code table are reserved for national characters, different for different countries. If terminals from different countries are interconnected, distortions occur in the communication. For example, an "Ö" from Sweden becomes "Ñ" in Spain and "\" in the UK. In contacts between universally standardized text telephones, such distortions should not occur.

Special requirements for character sets may arise that may be beyond the capabilities of some terminals (such as using the Bliss symbol Graphic Character Set). Therefore, controlled negotiation of the character set is a user requirement. This guarantees a synchronized view of the conversation.

4.2.6 Combine text and speech

It should be possible to use text and speech in combination in a session in a convenient way.

4.2.7 Combine text with video

In environments where video conversation is supported, it is also of interest to allow text conversation, both concurrently with video and separately in text only sessions.

4.2.8 Network functionality

The functionality of the network employed should be accessible from text telephones. This means that the text telephone user should be able to invoke the calling procedures and the main supplementary services and get distinct, perceivable responses and signals from the network.

4.2.8.1 Call set-up

Users need functions to initiate calls. Calls may be directly set up in text mode, or be first established in voice mode, and at a later stage enter text mode. If the call is initiated in text mode, the called station and its user should get indications about this fact, so that text telephone capabilities are invoked.

4.2.8.2 Call answering and user alerting

The users need a way to select to be alerted by a clear visual, tactile or audible signal, or a combination of them, when a call is received.

The time from a user initiating an answer until the text connection is established should normally not be longer than 10 seconds and normally much shorter. During connection establishment, both users should be given clear indications of the progress.

4.2.8.3 Call progress and session status presentation

Users need full information on the progress of their calls. Call progress information, call status information and events during the session should be presented visually to the user. The indications should be presented in enough detail to give the user good control and understanding of progress and failures.

4.2.8.4 Identification of a calling text telephone to the users

In the telephone network, a calling text telephone should produce a standardized calling signal that can be identified both audibly and by automatic answering equipment. This is to make it possible for hearing persons to understand that they must activate the text telephone function or even move the call to an extension where the text telephone function is available. It can also be used to automatically activate text telephone functions where such functions are installed. An automated, short voice message alternating with an identifiable signal is the preferred combination that both terminal equipment and inexperienced users can identify and react properly to.

4.2.8.5 Identification of an answering text telephone

In the telephone network, an answering text telephone should produce a standardized answering signal that can be identified both audibly and presented visually.

When implemented in other networks, like ISDN, where there are procedures for signalling capabilities, the users expect more reliable selection procedures for visual and audible indication to the user, and activation of proper equipment.

4.2.8.6 Support for supplementary services and calls through an exchange

Where supported by the network, text telephony should support supplementary services like: calling line identification, call waiting, call back when free, call diversion, call forwarding and call hold.

When calling through an exchange, where the call first is handled by the receptionist and then transferred to the extension, the text telephone must be able to handle the broken connection and regained connection to another terminal.

There is also a need for text telephone access to all services around the modern business telephone environment: call centres, mail servers, announcements, automatic responses etc.

4.2.8.7 Auto answering

A function corresponding to the telephone answering machine is convenient. It automatically answers text telephone calls, gives a brief response and collects the message that the calling user may deliver. The called user should be allowed to intercept an automatically answered call and take it over manually.

4.2.9 User procedures

The connection procedure should be reliable and not require unrealistic decision capabilities from the user. This means for example that the user should not be troubled with selection of different text telephone methods or parameters when initiating a connection. Technical decisions on how to establish the connection should be made by the equipment.

All the current documented text telephone methods are symmetrical in their connection procedure. One simply activates them and starts using them. Only the computer and standard modem (pre-V.8 bis) used as a text telephone does not behave symmetrically. When starting regular (pre-V.8 bis) modems, they must be told to work in originate mode or answer mode. On a connection, the two parties must each select one mode. There are many cases in modern telephony when it is not obvious what mode one should select. One simple example is when it is wished to switch from voice telephony to text mode during a call. One simple operation, "enter text mode" should be enough.

4.2.10 User preferences

Regardless of what is stated above about not bothering the user with technical parameters, there may be a need to store user preferences to be used during call establishment or during the dialogue. Such parameters are:

- the most common of the current text telephone types that the user has contact with (to optimize call set-up time);
- the preferred mode: pure text or text plus voice.

4.2.11 Physical implementation of the text telephone

There is a need for:

- very small text telephones that can easily be carried, being mobile or attachable at all telephones;
- public text pay-phones; and
- regular stationary text telephones for home or office use.

Implementation can be both in the form of dedicated devices and of applications in personal computers.

4.2.12 Cost of equipment

A technical solution is needed that is possible to implement in a reasonably priced terminal. A text telephone with basic functionality provides the same utility to the users as the voice telephone. Because of the lower volume and the higher complexity, text telephones tend to be more expensive than voice telephones. In many countries, subsidies exist that compensate the primary users for the higher cost of

equipment. However, in order to stimulate wide spread use of text telephony it is important not to require a design that causes high equipment costs for users.

A global standard is one means of keeping equipment costs reasonable, spreading development and testing cost on a large number of terminals.

4.2.13 Cost of calls

It is sometimes claimed that the lower information density in a text conversation than in a voice conversation would give text users the right to reduced telecommunication rates. This is implemented in different ways in some countries. This is a political issue, beyond the scope of the present ETR.

Users have an interest to get a continuously updated display of the cost of the call during the call.

4.2.14 Multi-function terminals

The text telephone is usually a device with a screen, a keyboard and a network connection. Therefore it is tempting to imagine other applications of interest that can use the same equipment.

Some users may find it useful to have a of functions for text telephony, fax and data communication (for bulletin-board services, information services, electronic mail, Internet etc.). Well integrated, user friendly applications are required to make use of this capability. In order to reach this goal, the identifiable signals from text telephones mentioned above are of great importance.

4.2.15 Connection to other equipment

With a broad spectrum of users, direct contacts without using the relay service are of value. Therefore, equipment capable of performing text dialogues generally available to the general public is of interest for text telephony interworking. It is for example of interest to be able to connect in text telephone mode to personal computers equipped with ordinary data communication modems. In this case, a lower functionality and lower reliability than in the native text telephone mode may need to be accepted, because the data communication modem standards are not designed for conversation purposes.

4.2.16 Diversion to other services

Unsuccessful voice calls can be diverted to voice mail services. Diversion of unsuccessful text telephone calls should be possible to text mail services, message services associated with mobile phone systems, or paging services.

4.2.17 Adaptability to special needs

There are text telephone users who cannot use ordinary keyboards or ordinary displays because of disabilities. Text telephone products should be adaptable to other means of input and display, in order to make it economically reasonable to establish text telephony for these users.

One identified user group is deaf-blind users, who use a terminal implementation with a Braille display and a user interface carefully designed to be manageable.

Another user group are the Bliss users, using the symbolic language Bliss, who want to communicate in the character set associated with that language.

People who have motor impairments might want to use specially adapted keyboards or alternative input devices.

A third group is people with combined speech disabilities and motion disabilities, usually appreciating simultaneous voice and text methods, alternate keyboard solutions and word prediction support.

More information on this area is found in the COST 220 report [7].

4.2.18 Emergency services

Emergency services should always be available through text telephony. The text telephone should maintain access to emergency services even in the event of faille of mains power.

Users need a simple way of knowing the number to call in an emergency. Therefore it offers best security to let the standard number used by the general public (normally 112) serve also text telephone calls. The calls need to be routed to text telephones and to personnel trained in handling these calls.

4.2.19 Relay services

Relay services for conversion between voice telephony and text telephony are important for communication between users of the two systems [1].

The text telephone function of the relay service must adhere to the same standards as the text telephone. Users require high availability, good integrity protection, and simple procedures when using the relay. Combinations of text and voice through the relay is required.

4.2.20 Directory services

Text telephone users should have access to directory services through the text telephone.

4.2.21 Information services

Any service provider like public services, banks and commercial services should regard text telephony as an important medium, and provide their services through this medium.

Whenever an information provider sets up a voice response service, the provider should consider making the same information available through text telephone information services in order to follow the intentions in the UN Standard Rules [16].

4.2.22 Test and approval of text telephone implementations

The buyers of text telephones and text telephony equipment need a way to know that the equipment behaves reliably in all different operating situations. This can be met by a system of testing and approval of the equipment according to a basic functional and interworking test specifications.

5 Relations with other services

There are a multitude of services that are of interest to text telephone users. Some of them occasionally are proposed to replace text telephony. This clause identifies such services, and comments on their relation to text telephony.

5.1 Audio-visual and multi-media services

In multi-media communication services and video telephony, text conversation should be supported concurrently with voice and video. Video telephony is of great importance for many text telephone users for sign language communication or lip reading supported telephony. Smooth introduction of video telephony to these users requires text telephony to be implemented in the same equipment. The text conversation mode should be accessible both in multi-media communication together with video and voice, and for interworking with pure text telephones.

5.2 Paging services

It is convenient to have a function to retransmit received messages to a text pager when the text telephone operates in the auto-answer mode.

5.3 Short message facility of the GSM network

It is convenient to have a function to re-transmit received messages to the short message facility of the GSM network when the text telephone is in the auto-answer mode. Another useful service is text telephone access to messaging services for pager and GSM text, as well as a way for text originating in a GSM mobile station to be delivered to a text telephone.

5.4 Fax

Fax has now in many countries completely penetrated the commercial sector and started to enter the home market. Therefore it offers an excellent opportunity for direct communication with companies and authorities. But some kinds of communication are very hard to perform in the message oriented fashion that the fax offers. The direct dialogue that is offered by voice telephony and text telephony is definitely needed, and fax is simply a good complement. There is a need for good functions to enable coexistence of fax and text telephones on the same line and in the same equipment. Therefore, functions are important for routeing an incoming call to the proper device or application, and making the user aware of what kind of call it is.

5.5 Screen based telephony

An ideal situation would be for everybody to have equipment which could be used for both voice telephony and text telephony. Everybody would have a terminal with a display and a keyboard, capable of performing text telephone functions. There is a de facto standard for screen based telephony called Analogue Display Services Interface (ADSI), which is aimed at just that - a telephone with screen and keyboard as extras.

The designers of ADSI had primarily in mind visual support for the telecommunication services and information services like number information and bank services. Unfortunately, the present ADSI proposal does not include direct communication from one user device to another, but only between such a device and an information centre.

The idea of visual support to facilitate telephone network services is of great interest to the text telephone users.

If ADSI is to get widespread use, it is important include text dialogue directly from one ADSI user terminal to another.

ADSI is incompatible with all the old text telephone methods. Therefore the possibility of adding auto-moding to current text telephony methods should be examined.

5.5 Internet

In Internet there are conversation applications available, the most common being Internet Relay Chat (IRC) that can be used for text telephone functions. But currently it is only possible to reach persons who are already logged in. No ring is produced to alert a called person not currently connected. Therefore, Internet does not offer any replacement to text telephony. Internet is growing, and its functions are rapidly improving. It is definitely of interest for many text telephone users to use it both for dialogue and for other purposes.

5.6 Use of electronic mail

Electronic mail is a very convenient way to communicate by messages, and it is useful as a complement to text telephony in the same way as it complements voice telephony with message oriented functions. But it is no replacement for the conversation purposes. Electronic mail has the same limitation as Internet conversation. It is not common to send any alerting signal to a person not logged in to the mail service. It also lacks the direct conversation mode that is important in many situations.

5.7 Use of a PC and currently available data communication modems for text telephony

The V.21, the American ASCII, and the French Minitel solutions are partly compatible with carefully selected non-V.18 standard modems handled by specially designed text telephone software in a personal

computer. So communication with PCs and standard modems as text telephones is possible, but it does not show enough functionality to be a universal solution for future text telephony. Firstly, only if the modem implements the V.18 standard, will it be compatible with all current text telephones. Secondly, current modems give too little indication on call progress. It is very hard to follow the progress of the call and get information on reasons for call failures. Thirdly, a regular modem is not easily handled together with voice telephony. The channel selection required on entering data mode introduces a risk of mistakes and connection failures. But of course it is of interest to the text telephone users to be able to contact other persons with ordinary PCs and ordinary modems, providing the PC user has selected a proper modem and installed proper software for text telephony. With the advent of V.18 and V.8 bis functionality in standard modems, the opportunities become much better for proper text telephone handling with a PC.

5.8 Use of video telephony or multi-media communication for text telephony

Many of the current text telephone users are deaf people who want good quality video telephony to conduct conversation in their native sign language. But that is not at all the whole presumptive text telephone user group. Many users with hearing impairment or speech impairment do not master sign language, and are therefore not helped by a videophone. Mobility and affordability aspects may also be better for devices with text telephone capabilities.

Therefore, the videophone is not an alternative to the text telephone, but of great interest to the same user group. When selecting the standardized method of text telephony, the standard protocols for merging video, voice and data should be judged as a presumptive carrier of the text dialogue also.

This offers an interesting opportunity of finally entering mainstream development with text telephony.

5.9 Conclusion

There are many services of interest to text telephone users. Some get extra value if interworking with text telephony is provided. But no single service can currently replace text telephony as that needed for real-time text conversation.

6 The current methods for text telephony

This is an overview of how the current different text telephone systems operate. More detailed information can be found in COST 219 [2].

6.1 The dialogue

Today, in most cases, the text telephone has a single screen where texts from both parties are mixed. The users turn the dialogue using special codes like "∗", "∗∗", "+" or "GA" (Go Ahead). One person writes at a time. The whole procedure is a bit inflexible, and the limitations tend to hamper the dialogue flow.

6.2 The transmission methods

6.2.1 Minitel V.23

Minitel is used in France and Belgium.

A special version of the Minitel videotex terminal is used for text telephony, called Minitel Dialogue. The special version allows both outgoing and incoming calls and implement a channel selection procedure, while the ordinary Minitel is originally only intended for outgoing calls and has fixed channel allocation. Calls are possible with ordinary Minitels. The method uses the V.23 modem standard. The character and control code system is the French version of the CEPT videotex code.

Turn is indicated with the "ENVOI" key, sending 1/3,4/1.

6.2.2 V.21

Finland, Sweden, Norway and UK use the V.21 method.

The text telephones use a carrier for keeping in contact. Data is sent with modulation according to the V.21 modem standard and at 300 bits/s.

In V.21 and many other modem standards, two channels for transmission are used, one for the calling party and one for the called one. A special method has been introduced for random choice of channel so that the user does not need to make this decision. Many Nordic V.21 text telephones adhere to this method, making their behaviour differ a little from what is normal in the data communication world.

It is also accepted to follow the normal V.21 method, where the choice of channel depends on who is the calling and called party, respectively. In such a case, the calling equipment is to send repeated beeps, named calling tone according to V.25, so that any hearing person who may answer the call will understand that it is a text telephone call.

Characters are coded in national T.50 code. Turn is indicated by the user with "*" in the Nordic countries and with "GA" in UK.

6.2.3 DTMF

The DTMF method is used in Holland and Denmark.

There is one method based on the same standard as the tone signals used for dialling in telephony.

To include the whole alphabet, combinations of from 1 to 4 tone characters have been assigned to the letters of the alphabet. The method is slow, but it has the advantage of enabling a person to transmit small quantities of text using an ordinary telephone (equipped for DTMF dialling). The character set is specified in a CEPT standard.

Turn is indicated with "+".

6.2.4 Baudot

This method is used in the USA, Canada, Ireland and Iceland, and partly in the UK.

In New Zealand and Australia the 50 bit/s version is used.

Baudot, TTY, 5-bit or TDD (Telecommunication Device for the Deaf) are different names for the same method. It has its origin in surplus Teletype terminals, communicating via the telephone network using special modems. In this system, no carrier is sent between characters. The text is sent at 45,45 or alternatively 50 bits/s, modulated with 1 400 / 1 800 Hz. The coding is 5 bit, with a character set limited to capital letters and some special characters. Turn is indicated with letters "GA" for Go Ahead.

6.2.5 EDT

Germany, Switzerland, Austria, Italy, Spain, Malta and a few other countries use EDT (European Deaf Telephone).

The V.21 modulation method is used, but on only one channel, used alternately by the two parties. Transmission speed is 110 bits/s, and sending is on only as long as there is something to send.

The character code is national T.50, and turn is indicated by the user with "+".

6.2.6 ASCII

It is possible to use regular non-V.18 modems for text telephone functions with some limitations. In the USA, this method is called ASCII, from the American name of the character coding used. Some efforts to harmonize the use of ASCII has led to the following definition in the USA:

- Modem: Bell 103 at 300 bit/s;
- Characters: 7 bit, even parity, 1 stop bit;
- Local echo.

The caller always selects the originate mode of the modem.

7 Implementation possibilities

This clause presents a framework for specific recommendations for each type of network. It also gives motivations behind the recommendations.

More reasoning behind the recommendations can be found in references COST 219 [2], COST 220 (1993) [3] and COST 220 [4].

7.1 General implementation possibilities

A text telephone system fulfilling the user requirements needs to follow a set of standards to insure inter-operability.

The following features in text telephony needs to be standardized:

- presentation (visual appearance, character code, formatting, …);
- session control (connection and disconnection);
- data transmission (character framing, flow control, transmission protocol);
- transmission method (interworking with older systems, physical transmission, interworking with speech and video transmission);
- call set-up and text mode negotiation (deciding on working mode and transmission);
- interworking between text telephony in different networks. (GSM, ISDN, ...).

As there are other networks than the telephone network, e.g. mobile telephone networks, ISDN, and LAN, it must be possible to carry out text telephone calls via several of these. The standard can be same in the upper layers, while the lower ones will be network-specific. Interworking mechanisms are then needed in the network or terminals.

7.1.1 Text telephony - a service

Text telephone users should be served by a text telephone service permitting different kinds of terminals, interworking methods with different networks, relay services for translation between speech and text, connection possibilities to emergency services, supplementary services, information on the system and its users and test and approval services to secure the quality of the service.

7.1.2 The Dialogue

A dialogue presentation in separate areas for text from the both sides is recommended. With such a presentation, and if the user can be sure that the other party has the same view, it is possible to relinquish the requirement for taking turns in a formal way. The right to write can pass from one communication partner to the other in a natural way, and while one of the parties is writing a long passage, the other one can produce a sort of small acknowledgements like "Sure", "Oh, really?", "Yes, I know" and so on. This would not disturb the dialogue but it would enhance the feeling of contact.

7.1.3 Character set

There is a 16/32-bit character code named ISO 10646 [17], covering all recognized written languages in the world and a lot of other symbols. A gradual migration to this character code in computer systems can be observed. In a new text telephone standard, this modern character set should be used, so that for example Æ and Ç would be received as Æ and Ç in all countries, and countries with different character sets can use them within the framework of the standard. In addition a control character standard must be selected for control of e.g. erasure, new line insertion and character code selection. The ISO 10646 [17] 16 bit format (level 1) is the natural choice.

The standard for control characters is ISO 6429 [18], where a subset for text telephony can be selected.

7.1.4 Combining text and speech

Standards are currently in development for modems supporting voice and data connections simultaneously on a single telephone connection. Products supporting this are on the market, but in order to be useful as part of a standard, they must of course be standardized. This functionality is of high interest for a text telephone standard. The ITU-T Recommendations V.61 [9], V.34Q [not yet available], and V.70 [11] modem proposals as well as the ITU-T Recommendation H.324 [19] multi-media communication proposal for PSTN include such functionality. They should be incorporated in the selections available when the text telephone connection is set up.

7.1.5 Smooth connection

The requirement for a symmetric connection procedure can be met in PSTN by a modem negotiation procedure called ITU-T Recommendation V.8 bis [13]. The need to be able to first connect in voice mode and then enter text mode is met by that procedure, also supporting a negotiation on the modulation method to use in the session.

7.2 Implementation possibilities in PSTN

In PSTN, the ITU-T Recommendation V.18 [6] modem with its auto-moding procedures offers an important possibility to achieve compatibility with current equipment, and a common route to a standardized future.

7.2.1 The basic idea of the V.18 modem

All text telephones contain a modem which sends and receives signals in a form suitable for the telephone network. A modem for text telephony has been standardized in ITU-T SG 14 and approved in September 1994, named V.18 [6]. The revised 1996 version of V.18 features:

- An initial modem negotiation phase according to ITU-T V.8 bis.
- Automatic interworking at the modulation level with the current text telephone methods. (Nordic V.21, British V.21, DTMF, EDT, Baudot, Bell 103, Minitel-V.23).
- A signal to the user giving indication of any signal on the line.
- Indication of what type of connection is established.
- Default transmission with V.21 300 bps full duplex when two V.18 modems are connected.
- Negotiable selection of modulation method between: the default V.21, the low complexity voice+data method V.61, the higher speed voice+data V.34Q and the digital voice+data V.70 type.
- Combinable with fax and data communications in the same modem design.
- A near-symmetric connection procedure using the V.8 bis mechanism.

V.18 can be used to introduce a new text telephone method, but keep controlled compatibility with current methods. If one V.18 modem is connected to another V.18 modem, both will recognize this situation. They will then adjust themselves to the new method and report this fact upwards, to the higher layers in their respective terminals. Then they will rapidly establish contact for the exchange of text.

If, instead, a V.18 modem is connected to one of the present text telephones, the modem will find out which standard that text telephone adheres to, and adjust to this method.

In this way, text telephones with the new modem can be introduced without causing confusion. They will coexist well with present text telephones. They should become appreciated by users because of their good facilities for international communication and modern conversation implementation, and because of good combination possibilities with voice, data communication, and fax.

7.2.2 Negotiation between modems according to V.8 bis

For greater reliability and speed of connection between modems, a new standard for fast negotiation between modems was introduced, IRU-T Recommendation V.8 bis [13].

Using this method, the two modems will agree on how the session will be used. The call function "text telephony" is among the possible signals. Thus, a connection for standardized text telephony can be established directly.

The result of the negotiation is also reported to the higher levels of the terminal software, enabling them to adjust to the type of communication that has been agreed upon.

The negotiation signals consist of audible beeps. This enables hearing telephone users to find out that an incoming call is for some sort of data communication, such as text telephony.

7.2.3 Modem commands

In most cases, modems are controlled by computers by means of commands, telling the modem about parameters for the communication and when to call, answer, or disconnect. In conjunction with the commands, rules for standardized answers and call progress reports are also given. The specification of this is standardized in ITU-T Recommendation V.25 ter [8], including details needed for text telephony according to V.18 [6].

Since V.18 provides interworking with all the present methods, it may take time to identify the sort of text telephone with which contact has been established. This is especially true when V.18 is on the answering side. Therefore, there are commands for setting the order of priority between the interworking methods.

7.3 Implementation possibilities in ISDN

In ISDN, an implementation within the framework of the ITU-T Recommendation T.120 [20] family of standards for conference terminals seems most feasible because the multiplexing of voice, video and data is solved in a structured way. Interworking with PSTN types of text telephones should be achieved by emulating a V.18 [6] modem in the ISDN adapter.

7.4 Implementation possibilities in GSM

In the GSM mobile network, there is a data channel and a voice channel. Only one at a time can be connected. For text telephony, the method would be to set up a data channel and use the common text telephone presentation layer. For interworking with the telephone network, there is a set of modems in an interworking unit. There is a need for V.18 [6] capable modems in the interworking units.

7.5 Implementation possibilities in UMTS

In UMTS, the future mobile telephone system, text telephony should be specified from the beginning, as part of the multimedia services of UMTS.

7.6 Implementation possibilities in Internet

In Internet, Internet Relay Chat (IRC) is an application and a protocol that allows a conversation with other people logged in. Currently, there is no known alerting mechanism for Internet calls.

8 Protocols

Here is a summary of the protocols to be used in the universal text telephone service. Certain networks or situations may require other selections, but then interworking with the common protocols must be provided. The information here is given as recommendations only, to be settled and detailed by other standard groups responsible for the respective application areas.

8.1 Presentation

The character set used for transmission is the two octet version, level 1 of ISO 10646-1 [17]. The character set can be changed if agreed in a control procedure. A viable alternative is for example the BLISS character set.

A basic set of presentation control functions from ISO 6429 [18] is used. The functions are:

- CR Carriage return;
- BS Back Space;
- LF Line feed;
- SPD Select presentation direction;
- DSR Device status report;
- INT Interrupt;
- ESC Escape to ISO 2022 control;
- DCH Delete character;
- BEL Bell.

When the 16 bit character set is being used, these ISO 6429 [18] control functions will be transmitted padded with null characters as specified in ISO 10646-1 [17]. The escape sequence to designate a character set follows the ISO international register of coded character sets to be used with escape sequence, with ESC 2/5 2/15 4/0 being the code to return to UCS-2 level 1.

Received characters are not echoed by the receiving end. It is the responsibility of the sending terminal to display sent text to the user.

8.2 Transmission

Depending on the network, the transmission should be selected from the following alternatives:

- **Multiplexing with other applications:** It is recommended that all multiplexing with other applications, is done according to a protocol for text conversation in the ITU-T Recommendation T.120 [20] family. This is recommended for ISDN and for all combinations with video telephony and multi-media communication.

- **Straight asynchronous data:** transmission ITU-T Recommendation V.21 [21] should be supported as the default modulation, while V.61 [9] is the option to select for simultaneous voice-data functionality and V.34 [22] for higher speed. Modem connection should follow the V.8 bis [13] procedure to assure connection and selection of a common modulation.

- **GSM data channel:** transmission is to be done in the data channel.

8.3 Interworking between networks

ISDN terminals emulate the terminal they get in contact with.

For interworking between GSM and PSTN, the interworking unit should use V.18-capable modems.

8.4 Interworking with current text telephones in PSTN

Interworking with current text telephones is achieved by V.18 [6] functionality in modems, and emulation of the old terminal when contact is established.

History

Document history	
January 1997	First Edition

ISBN 2-7437-1222-8
Dépôt légal : Janvier 1997