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Contents

Foreword.....	5
1 Scope.....	7
1.1 Objectives.....	7
2 References	7
3 Definitions and abbreviations.....	10
3.1 Definitions.....	10
3.2 Abbreviations.....	11
4 Overview.....	12
4.1 Scenario overview	12
4.2 Status overview	13
4.3 Conclusion from overview	15
5 Criteria for scenario selection	15
5.1 Service criteria.....	15
5.2 Availability of base standards.....	16
5.3 Availability of terminals.....	17
5.4 Conclusions.....	17
6 Scenarios for which the base standards are available	18
6.1 Access for an ISDN videophony terminal to an audio-visual database using DTMF	18
6.1.1 Description.....	18
6.1.2 Protocols.....	18
6.1.2.1 ISDN videophony	18
6.1.2.1.1 Basic transfer mode	19
6.1.2.1.2 Optional transfer modes.....	19
6.1.2.2 DTMF	19
6.1.3 Service centre considerations.....	20
6.2 Access for a PSTN videophony terminal to a PSTN service centre using DTMF	20
6.2.1 Description.....	20
6.2.2 Protocols.....	20
6.2.2.1 PSTN videophony	20
6.2.2.1.1 Basic transfer mode	21
6.2.2.1.2 Optional transfer modes.....	21
6.2.2.2 DTMF	21
6.2.3 Service centre considerations.....	22
6.3 Access to an enhanced Videotex service using a combined Videotex and ISDN videophony terminal	22
7 General framework for retrieval and audio-visual services.....	23
7.1 Framework description.....	23
7.2 Framework structuring	25
7.3 Innovation of the framework.....	28
7.3.1 Service and information provider considerations.....	28
7.3.2 Validation of the framework	28
8 Conclusions	30
9 Recommendations.....	31

Annex A: (informative) ITU-T Recommendation T.120 series for audiographic
teleconferencing overview32

History33

Foreword

This ETSI Technical Report (ETR) has been produced by the Terminal Equipment (TE) 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.

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1 Scope

In ETSI Technical Report (ETR) 176 [1] a study of possible scenarios for "interworking and interoperability of retrieval services and audio-visual services on narrow-band networks" is presented.

The scope of that study was to investigate interworking and interoperability between retrieval services (videotex, possibly including moving video) and audio-visual services (videotelephony and videoconferencing) on narrow-band networks (Integrated Services Digital Network (ISDN)) and (Public Switched Telephone Network (PSTN)). Retrieval services include videotex information retrieval applications possibly including moving video and applications based on retrieval of ETS 300 145 [2] or ITU-T Recommendation H.324 [28] coded information.

The interworking and interoperability of retrieval services and audio-visual services support applications consisting of combinations of videotex, videotelephony and/or videoconferencing applications.

The services under consideration are videotex, videotelephony and videoconferencing. In this document the definition videophony is used to address both videotelephony and videoconferencing.

1.1 Objectives

The objectives of this ETR are:

- to define the priority setting for standardisation of interactive audio-visual retrieval services on narrow-band networks;
- to present a service guideline for interactive audio-visual retrieval services based on existing terminals;
- to present a general framework to standardise terminals for future interactive audio-visual services on narrow-band networks.

2 References

This ETR incorporates by dated or undated reference, provisions from other publications. These references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETR only when incorporated in it by amendment or revision. For undated references the latest edition of the application referred to applies.

[1] ETR 176 (1995): "Terminal Equipment (TE); Interworking and interoperability of retrieval services and audiovisual services on narrow-band networks".

[2] ETS 300 145 (1996): "Integrated Services Digital Network (ISDN); Audio-visual services. Videotelephone systems and terminal equipment operating on one or two 64 kbit/s channels".

NOTE: ETS 300 145 is the ETSI equivalent to ITU-T Recommendation H.320 [17]. The scope of ETS 300 145 is restricted to 1B and 2B ISDN videophones.

[3] ETS 300 144 (1996): "Integrated Services Digital Network (ISDN); Audio-visual services. Frame structure for a 64 kbit/s to 1920 kbit/s channel and associated syntax for inband signalling".

NOTE: ETS 300 144 is the ETSI equivalent to ITU-T Recommendations H.221 [39] and H.230 [40].

- [4] CCITT Recommendation B.13 (Blue Book Fasc. I.3 1991): "Terms and Definitions".
- [5] ITU-T Recommendation F.300 (1994): "Videotex service".
- [6] ETS 300 142 (1995): "Integrated Services Digital Network (ISDN) and other digital telecommunications networks; Line transmission of non-telephone signals; Video codec for audiovisual services at p x 64 kbits [ITU-T Recommendation H.261 (1993), modified]".
- NOTE: ETS 300 142 is the ETSI equivalent to ITU-T Recommendation H.261 [18].
- [7] CCITT Recommendation Q.23 (1990): "Signalling frequencies for push-button telephone sets and reception of those signals in exchanges".
- [8] ITU-T Draft Recommendation T.120: "Transmission Protocols For Multimedia Data".
- [9] ITU-T Draft Recommendation T.121: "Generic Application Template".
- [10] ITU-T Recommendation T.122 (1995): "Multipoint communication service for audiographics and audiovisual conferencing service definition".
- [11] ITU-T Recommendation T.123 (1995): "Protocol stacks for audiographic teleconference applications".
- [12] ITU-T Recommendation T.124 (1995): "Generic Conference Control".
- [13] ITU-T Recommendation T.125 (1994): "Multipoint communication service protocol specification".
- [14] ITU-T Draft Recommendation T.126 (1995): "Multipoint still image and annotation protocol".
- [15] ITU-T Draft Recommendation T.127 (1995): "Multipoint binary file transfer protocol".
- [16] ITU-T Draft Recommendation T.130: "Real-time architecture for Multimedia conferencing".
- [17] ITU-T Recommendation H.320 (1994): "Narrow-band visual telephone systems and terminal equipment".
- [18] ITU-T Recommendation H.261 (1994): "Video codec for audio-visual services at P x 64 kbit/s".
- [19] ETS 300 223 (1992): "Terminal equipment (TE); Syntax based Videotex Common end-to-end protocols".
- [20] ETS 300 072 (1990): "Terminal Equipment (TE); Videotex presentation layer protocol Videotex layer data syntax".
- [21] ETS 300 149 (1992): "Terminal Equipment (TE); Videotex Audio syntax".
- [22] ETS 300 177 (1995): "Terminal Equipment (TE); Videotex Photographic Syntax".
- [23] prETS 300 382 (1995): "Terminal Equipment (TE); Videotex Enhanced Man-Machine Interface service".

- [24] CCITT Recommendation G.711 (1990): "Pulse code modulation (PCM) of voice frequencies".
- [25] CCITT Recommendation G.722 (1990): "7 kHz audio-coding within 64 kbit/s".
- [26] CCITT Recommendation G.728 (1992): "Coding of speech at 16 kbit/s using low-delay code excited linear prediction".
- [27] I-ETS 300 380 (1995): "Universal Personal Telecommunications (UPT); Access devices Dual Tone Multi Frequency (DTMF) sender for acoustic coupling to the microphone of a handset telephone".
- [28] Draft ITU-T Recommendation H.324: "Multimedia terminal for low bitrate telephone services over the GSTN".
- [29] Draft ITU-T Recommendation H.245: "Multimedia system control".
- [30] Draft ITU-T Recommendation H.263: "Videocoding for low bit rate communication".
- [31] Draft ITU-T Recommendation H.223: "Multiplexing protocol for low-bitrate multimedia communication".
- [32] Draft ITU-T Recommendation G.723: "Dual rate speech coder for multimedia telecommunication transmitting at 5.3 & 6.3 kbit/s".
- [33] Draft of ISO/IEC 13818-6: DSM-CC: "MPEG-2 Digital Storage Media Command and Control Extension".
- [34] TCR-TR 023 (1994): "Human Factors (HF); Assignments of alphabetic letters to digits on push button dialling keypads".
- [35] ITU-T Recommendation V.34 (1994): "A modem operating at data signalling rates of up to 28 800 bit/s for use on the GSTN and on leased point-to-point 2-wire telephone-type circuits".
- [36] ETS 300 218 (1993): "Integrated Services Digital Network (ISDN); Syntax-based videotex lower layer protocols for ISDN packet mode (CCITT Recommendation X.31 Case A and Case B)".
- [37] ITU-T Recommendation X.213 (1993): "Information Technology; Network service definition for Open Systems Interconnection".
- [38] ETS 300 079 (1993): "Integrated Services Digital Network (ISDN); Syntax-based videotex End-to-end protocols, circuit mode DTE-DTE".
- [39] ITU-T Recommendation H.221 (1995): "Frame structure for a 64 to 1 920 kbit/s channel in audiovisual services".
- [40] ITU-T Recommendation H.230 (1995): "Frame-synchronous control and indication signals for audiovisual systems".
- [41] ITU-T Recommendation T.105 (1995): "Syntax-based videotex application layer protocol".
- [42] ITU-T Recommendation X.31 (1993): "Support of packet mode terminal equipment by an ISDN".

3 Definitions and abbreviations

3.1 Definitions

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

audio-visual conversational service: An interactive service which provides for bi-directional communication by means of real-time (no store-and-forward) end-to-end audio-visual information transfer from user to user or between user and host.

combined Vtx and AV(D) terminal: Terminal equipment that consists of the combination of an ISDN Vtx terminal and an ISDN videophony terminal. Both logical terminals can be active, either separately or together. When operated together, each terminal part will use a B-channel, or two B-channels are allocated for videophony use and the ISDN D-channel for Vtx protocol use.

ISDN videophony terminal ¹⁾ without data-facility: Videophony terminal equipment that conforms to the methods described in ETS 300 145 [2], but does not offer data capabilities. In the scope of this ETR it implies that the terminal is at least capable of receiving audio and video sent in a framed structure (ETS 300 144 [3]) and at least capable of sending audio and video in a framed structure (ETS 300 144 [3]).

ISDN videophony terminal ¹⁾ with data-facility: Videophony terminal equipment that conforms to the methods described in ETS 300 145 [2]. In the scope of this report it implies that the terminal is at least capable of receiving audio, video and data sent in a framed structure (ETS 300 144 [3]) and at least capable of sending audio, video and data in a framed structure (ETS 300 144 [3]).

audio-visual database: An information database that conforms to the methods described in ETS 300 145 [2]. In the scope of this report it implies that the database is least capable of sending audio and video in a framed structure (ETS 300 144 [3]).

interactive protocol: Means to interact between terminal and service centre on the application layer.

interworking unit: A unit that transforms information streams according to the appropriate protocols.

PSTN videophony terminal: Terminal equipment that is able to exchange audio, video (still or moving images) and possibly data over the PSTN network.

retrieval service: An interactive service which provides the capability of accessing information stored in database centres. The information is sent to the user on demand only. The information can be retrieved on an individual basis, i.e., the time at which an information sequence is to start under the control of the user (CCITT Recommendation B.13 [4]).

service centre: A computer system used by a service provider to authorise access to a service. Other functions of the service centre may include assistance to users in selecting the particular application required (either provided by the service centre or by other host computers), as well as management facilities such as billing, statistics gathering, etc. The same computer may also be a host computer and/or provide a gateway function (definition derived from ITU-T Recommendation F.300 [5]).

T.120 Infrastructure Recommendations (T.120 IRs): The ITU-T Recommendation T.120 series consists of Recommendations T.120 to T.130 [8] to [16]. In ITU-T Recommendation T.120 [8] they are categorised as T.120 Infrastructure Recommendations i.e. T.122 to T.125 [10-13] and T.120 Application Protocol Recommendations i.e. T.126, T.127 and T.130 [14-16] (see appendix A).

¹⁾ In ETR 176 [1] this was called an ITU-T Recommendation H.320 terminal.

videophony: In the scope of this document both videotelephony and videoconferencing are addressed in this definition.

Vtx terminal enhanced with H.261: Terminal equipment that uses the Videotex protocols (ETS 300 223, ETS 300 072, etc. [19] to [23]) over the ISDN network and, in addition is able to decode and represent video images encoded according to the schemes defined in ETS 300 142 [6]. The naming of this definition refers to ITU-T Recommendation H.261 [18]. ETS 300 142 [6] is the ETSI equivalent of ITU-T Recommendation H.261.

3.2 Abbreviations

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

AP	Access Point
AV	Audio Visual
AVD	Audio Visual Data
CIF	Common Intermediate Format
CM	Circuit Mode
DAVIC	Digital Audio-Visual Council
DB	Data Base
DSM-CC	Digital Storage Media Command and Control Extension
DTMF	Dual Tone Multi Frequency
GSTN	Global Switched Telephone Network
HSD	High Speed Data
IP	Information Provider
IR	Infrastructure Recommendation
SDN	Integrated Services Digital Network
IWU	Interworking Unit
LSD	Low Speed Data
MCU	Multiple Control Unit
MLP	Multi Layer Protocol
PC	Personal Computer
PM	Packet Mode
PSPDN	Packet Switched Public Data Network
PSTN	Public Switched Telephone Network
QCIF	Quarter Common Intermediate Format
SBV	Syntax Based Videotex
SP	Service Provider
T	Terminal
TFI	Terminal Facility Identifier
UUS	User-to-User Signalling
Vph	Videophony
Vtx	Videotex
WS	Work Station

4 Overview

4.1 Scenario overview

In ETR 176 [1] the results of an investigation of the possible scenarios for "interworking and interoperability of retrieval services and audio-visual services on narrow-band networks" are presented. Nine terminal scenarios were identified in that ETR. In the next list these scenarios are presented together with a short description and a reference to the relevant subclause in ETR 176 [1]:

a) **PSTN videophony without data-facility connected to a service centre.**

This enables users of PSTN videotelephones to have access and interchange information with limited interactive capability (see subclause 5.1 in ETR 176 [1]).

b) **PSTN videophony with data-facility connected to a service centre.**

This enables users of PSTN videotelephones to have access and interchange information with full interactive capability (see subclause 5.2 in ETR 176 [1]).

c) **Vtx terminal enhanced with H.261 connected to an enhanced Vtx centre.**

This can be a dedicated Vtx terminal, able to support ETS 300 142 [6], or a Personal Computer (PC)/Work Station (WS) able to support Vtx protocols with ETS 300 142 [6]. With this a Vtx service can be enhanced with moving pictures (see subclause 6.1 in ETR 176 [1]).

d) **Combined Vtx and AV(D) terminal connected to an audio-visual database/or a Vtx service centre:**

This terminal includes both a Vtx connection and a videophony/videoconferencing connection. With this a Vtx service can be enhanced with moving pictures and audio, although this requires two separate network connections: one for the Vtx service and one from the audio-visual database (see subclause 6.2 in ETR 176 [1]).

e) **ISDN videophony terminal ²⁾ without data-facility connected to an audio-visual database.**

This can be a dedicated ISDN videophony terminal, without data-facility, or a with an extension to support ETS 300 145 [2], without data-facility. The terminal can receive audio and video. Terminal equipment using Dual Tone Multi Frequency (DTMF) CCITT Recommendation Q23 [7] in the audio stream to interchange data of the interactive protocol already exists (see subclause 6.3 in ETR 176 [1]).

f) **ISDN videophony terminal enhanced with data-facility without Vtx decoder connected to an audio-visual database and/or a Vtx database.**

This can be a dedicated ISDN videophony terminal, with data-facility, or a PS/WS with an extension to support ETS 300 145 [2], with data-facility. The terminal can use an audio, a video and a data channel for communication. A protocol needs to be defined to implement the interactivity capability. The terminal itself can be used as a standard videophony equipment (see subclause 6.4.1 in ETR 176 [1]).

g) **ISDN videophony terminal enhanced with data-facility with a Vtx decoder connected to an audio-visual database and/or a Vtx database.**

This can be a dedicated ISDN videophony terminal, with data-facility, or a PC/WS with an extension to support ETS 300 145 [2], with data-facility. The terminal can use an audio, a

²⁾ In ETR 176 [1] this was called an ITU-T Recommendation H.320 terminal.

video and a data channel for communication. Syntax based videotex (ETS 300 223 [19], ETS 300 072 [20] and ETS 300 149 [21]) is used to retrieve information and to achieve the interactivity capability. The terminal itself can be used as a standard videophony equipment (see subclause 6.4.2 in ETR 176 [1]).

- h) **ISDN videophony terminal with data-facility using ITU-T Recommendation T.120 IRs in conjunction with ITU-T Recommendation T.126 and/or T.130 connected to an audio-visual database.**

This provides users with ISDN videophony terminal access to a service centre, including data-facility. The terminal can use an audio, a video and a data channel for communication. ITU-T Recommendation T.120 series of Infrastructure Recommendations (IRs) (ITU-T Recommendations T.122 to T.125 [10-13]) in conjunction with ITU-T Recommendations T.126 [14] and/or T.130 [16] are used to retrieve information and to achieve the interactive capability. The terminal itself can be used as a standard videophony equipment (see annex A in ETR 176 [1]).

- i) **ISDN videophony terminal with data-facility using ITU-T Recommendation T.120 IRs in conjunction with a Vtx decoder connected to an audio-visual database.**

This provides users with ISDN videophony terminals access to a service centre, including data-facility. The terminal can use an audio, a video and a data channel for communication. ITU-T Recommendation T.120 IRs (ITU-T Recommendations T.122 to T.125 [10] to [13]) in conjunction with a Vtx decoder are used to retrieve information and to achieve the interactive capability. The terminal itself can be used as a standard videophony equipment (see annex A in ETR 176 [1]).

In addition to these terminal scenarios, ETR 176 [1] presents possible service configurations to extend multipoint videoconferencing services with retrieval information by interworking with a Multiple Control Unit (MCU).

4.2 Status overview

After identifying all the scenarios in ETR 176 [1] the next step is to prioritise them and find out which should and can be standardised. In ETR 176 [1] a first step was made in that scenarios were identified for short term interest and for mid/long term interest.

The result of that identification is listed in table 1:

Table 1:
The first attempts for prioritisation of interactive audio-visual retrieval services on narrow-band networks as presented in ETR 176 and given by ETSI TC-TE in the December 1994 meeting

Terminal	ETR 176 [1] STC TE1		TC TE findings
	Short term interest	Mid/long term interest	First attempt for priority list
PSTN videophony without data-facility			
PSTN videophony with data-facility		✓	
Vtx terminal enhanced with ITU-T Recommendation H.261	✓		1
Combined Vtx and AV	✓		2
ISDN videophony terminal without data-facility	✓		4
ISDN videophony terminal with data-facility without Vtx decoder		✓	
ISDN videophony terminal with data-facility with Vtx decoder	✓		3
ISDN videophony terminal + ITU-T Recommendation T.120 series [10] to [13] + ITU-T Recommendations T.126 [14] and T.130 [16]		✓	
ISDN videophony terminal + ITU-T Recommendation T.120 series [10] to [13] + ETS 300 223 [19]		✓	

In the December 1994 meeting of TC-TE, ETR 176 was approved and a first attempt to make a priority list was made. This list is presented in the last column of table 1.

Furthermore, TC TE approved a new work-item (DTR/TE-01064) with the goal of establishing a priority list of the possible scenarios in conjunction with STCs TE4 and TE10.

In the January 1995 meeting of ETSI STC TE4 this item was discussed, resulting in a liaison statement in which the view of ETSI STC TE4 was presented in table 2 showing the terms of interest and the protocol types that should be used by the terminals.

Table 2:
The second attempt in prioritisation of interactive audio-visual retrieval services on narrow-band networks given by ETSI STC-TE4 in January 1995 and later liaison statements

Terminal	Terms of interest		Types of protocols		
	Short	Mid/long	DTMF	SBV	T.120
PSTN videophony without data-facility	✓		✓		
PSTN videophony with data-facility		✓	✓		
Vtx terminal enhanced with ITU-T Recommendation H.261		✓		✓	
Combined Vtx and AV		✓	✓	✓	
ISDN videophony terminal without data-facility	✓		✓		
ISDN videophony terminal with data-facility without Vtx decoder	✓				✓
ISDN videophony terminal with data-facility with Vtx decoder		✓		✓	✓

In the view of ETSI STC TE4, all ISDN videophony terminals with data-facility should include the ITU-T Recommendation T.120 series [8] to [16] protocols for data transmission.

ETSI STC TE4 recommended that not only the subtechnical committees should be consulted, but also the market should be checked to establish whether there is any demand, before further standardisation is started.

4.3 Conclusion from overview

From the scenario overview, it can be concluded that at least nine scenarios exist to implement terminals for audio-visual retrieval services. Since, the aim of standardisation is to achieve uniform services with a large market share, it is not useful to standardise all these scenarios. Therefore, a priority setting has to be made to limit the number of scenarios to be worked on.

From the status overview, it can be concluded that the opinions of TC TE, STC TE1 and STC TE4 are not uniform and that it is not straightforward to define a priority order. Therefore, in this document a re-evaluation of the scenarios is presented, to achieve a consistent priority order which can be in line with the future market demands.

5 Criteria for scenario selection

Some criteria can be identified in order to arrive at a priority listing. This document indicates:

- service criteria;
- availability of base standards;
- availability of terminals.

In clause 7 some service centre considerations and a possible service migration scenario are presented.

5.1 Service criteria

A general description of the required terminal functionality for the targeted services is given by the following definition:

"The terminal will give the user the possibility to navigate through information interacting by keyboard and/or pointing device able to retrieve simultaneously: audio, video and textual information".

This definition suggests that the following basic functionality is required:

- full keyboard interaction (alphanumeric);
- pointing device interaction;
- simultaneous audio, video and text (data).

Full keyboard interaction can be used to enter (alpha)numeric characters to make (sub) service selections or to enter alphanumeric text (data). The pointing device interaction can be used to make (sub) service selections by pointing to sensitive areas (hot spots), and also to move and re-size the respective video and text windows.

Video can be still images and also moving pictures.

In table 3 the nine scenarios from ETR 176 are listed. A ✓ indicates that the particular scenario has the ability to achieve this functionality.

Table 3:
Service criteria matching for interactive audio-visual retrieval services on narrow-band networks

Terminal	Full keyboard interaction	Pointing device interaction	Simultaneous audio, video and text
PSTN videophony without data-facility			
PSTN videophony with data-facility	✓	✓	✓
Vtx terminal enhanced with ITU-T Recommendation H.261	✓	✓	
Combined Vtx and AV	✓	✓	✓
ISDN videophony terminal without data-facility			
ISDN videophony terminal with data-facility without Vtx decoder	✓	✓	✓
ISDN videophony terminal with data-facility with Vtx decoder	✓	✓	✓
ISDN videophony terminal + ITU-T Recommendation T.120 series [10] to [13] + ITU-T Recommendations T.126 [14] and T.130 [16]	✓	✓	✓
ISDN videophony terminal + ITU-T Recommendation T.120 series [10] to [13] + ETS 300 223 [19]	✓	✓	✓

5.2 Availability of base standards

In table 4, the nine scenarios from ETR 176 are listed. An estimation is given for the availability of base standards for each scenario. These base standards can be used to build a framework for terminals for retrieval services and audio-visual services. If the availability of base standards is low this implies that considerable effort is necessary to develop a standard for that scenario.

Table 4:
Availability of base standards for interactive audio-visual retrieval services on narrow-band networks

Terminal	Base standards available
PSTN videophony without data-facility	100 %
PSTN videophony with data-facility	90 % ³⁾
Vtx terminal enhanced with ITU-T Recommendation H.261	70 %
Combined Vtx and AV	100 %
ISDN videophony terminal without data-facility	100 %
ISDN videophony terminal with data-facility without Vtx decoder	50 % ⁴⁾
ISDN videophony terminal with data-facility with Vtx decoder	80 %
ISDN videophony terminal + ITU-T Recommendation T.120 series [10] to [13] + ITU-T Recommendations T.126 [14] and T.130 [16]	90 %
ISDN videophony terminal + ITU-T Recommendations T.120 series [10] to [13] + ETS 300 223 [19]	50 %

The ITU-T Recommendations T.120 series [10-13] are published. ITU-T Recommendation T.126 [14] is also ready but ITU-T Recommendation T.130 [16] is still under development. Furthermore, it should be stated that the ITU-T Recommendations T.120 series was developed to solve issues related to multipoint communication services. That is also the background for ITU-T Recommendations T.126 and T.130. How ITU-T Recommendations T.126 and/or T.130 can be used as an interactive protocol for audio-visual information retrieval services and what sub-set of ITU-T Recommendations T.126 and/or T.130 tools should be used, should therefore be studied.

³⁾ Assuming that the scenario using ITU-T Recommendation T.120 IRs + T.126 + T.128 will be used.
⁴⁾ For this scenario the "packaging module" described in subclause 7.1 needs to be developed.

For broad-band information retrieval services standardised by the Digital Audio Visual Council (DAVIC), the ISO/IEC 13818-6 [33] protocol is being proposed as the interactive protocol. This protocol might also become important for narrow-band information retrieval services.

ITU-T Study Group 8 (question 10/8) on Audiographic Conferencing (ITU-T Recommendations T.120 series [10] to [13]) has sent a liaison to ISO/IEC JTC1 SC29/WG 11, MPEG/Digital Storage Media Command and Control Extension (DSM-CC) group, to investigate whether DSM-CC could be used to access a video and control the video stream, and direct this video stream into an ITU-T Recommendations T.120 series [10] to [13] conference using ITU-T Recommendation T.130 [16]. That implies that in investigating how ITU-T Recommendation T.130 [16] can be used as an interactive protocol for audio-visual information retrieval, DSM-CC also has to be considered.

5.3 Availability of terminals

Another criterion to determine whether it is useful to standardise one of the nine scenarios is whether the terminals are already commercially available or expected to be in the short term. In table 5 this availability is presented.

Table 5:
Availability of terminals for interactive audio-visual retrieval services on narrow-band networks

Terminal	Availability of terminal
PSTN videophony without data-facility	ITU Recommendations H.324, H.245, H.263, H.223 and G723 [28-32] stable. Terminals expected end 1996
PSTN videophony with data-facility	ITU Recommendations H.324, H.245, H.263, H.223 and G723 [28-32] stable. Terminals expected mid 1997
Vtx terminal enhanced with ITU Recommendation H.261	Not yet
Combined Vtx and AV	Not yet
ISDN videophony terminal without data-facility	Available now
ISDN videophony terminal with data-facility without Vtx decoder	Not yet
ISDN videophony terminal with data-facility with Vtx decoder	Not yet
ISDN videophony terminal + ITU-T Recommendation T.120 series [10] to [13] + ITU-T Recommendations T.126 [14] and T.130 [16]	Terminals with ITU-T Recommendation T.120 series of IRs announced for end 1995
ISDN videophony terminal + ITU-T Recommendations T.120 series [10] to [13] + ETS 300 223 [19]	Not yet

ISDN videophony terminals have been commercially available for several years. Manufacturers have announced they will implement ITU Recommendation T.120 series [10] to [13] together with ITU Recommendation T.127 [15] in both ISDN videophony terminals and MCUs.

Since the ITU Recommendations H.324, H.245, H.263, H.223 and G723 [28-32] are now stable, it is expected that these terminals will come to the market soon. Especially, the fact that PCs are becoming more and more powerful makes it attractive to open the route to software-only decoders/encoders.

5.4 Conclusions

For three scenarios (PSTN videophony without data-facility, ISDN videophony terminal without data-facility and combined Vtx and AV), the complete base standards are available. That implies that for these scenarios it is a straightforward matter to define the service and to develop an ETS. In subclauses 6.1 to 6.3, a description is given for each of these scenarios, intended to reflect a first concept for such an ETS.

For the scenarios concerned with ITU Recommendations T.120 series [10] to [13], some effort is necessary to develop the base standards. This is performed within ITU Study Group 8 (question 10/8), and completion is only a matter of time. For the other scenarios new standards need to be developed. Since that will entail an extensive amount of work this seems not to be attractive. However, from a re-evaluation of the scenarios, it can be concluded that the major part of the scenarios have a common structure. Therefore, it was proposed to evaluate whether these scenarios fit into a general framework. This general framework for retrieval and audio-visual services has been investigated in more detail and is described in clause 6.

6 Scenarios for which the base standards are available

This clause describes the following scenarios:

- ISDN videophony terminal without data-facility: "Access for an ISDN videophony terminal to an audio-visual database using DTMF";
- PSTN videophony without data-facility: "Access for a PSTN videophony terminal to a PSTN service centre using DTMF";
- combined Vtx and ISDN videophony terminal: "Access to an enhanced Videotex service using a combined Videotex and ISDN videophony terminal".

The complete base standards for the above scenarios are available, suggesting therefore that for these scenarios it is straightforward to define the service and to develop an ETS. In subclauses 6.1 to 6.3, for each scenario a description is given, which is intended to reflect a first concept for such an ETS.

6.1 Access for an ISDN videophony terminal to an audio-visual database using DTMF

6.1.1 Description

An application that can be of interest in the short term is the connection of an ISDN videophony terminal to a remote audio-visual database. This application would allow the terminal to retrieve audio-visual information, using CCITT Recommendation Q.23 [7] for the interactivity protocol.

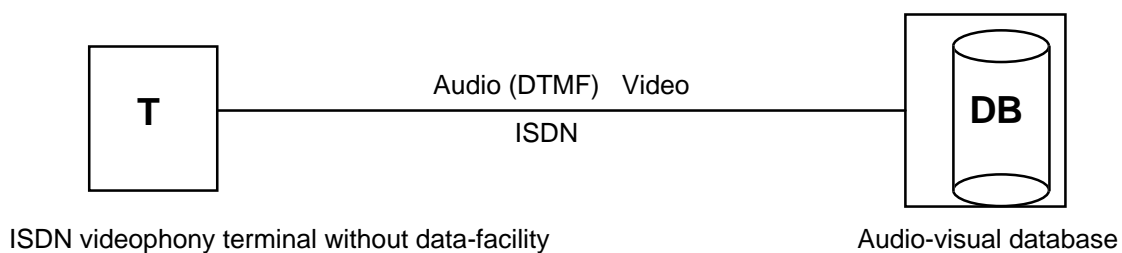


Figure 1:
ISDN videophony terminal without data-facility with access to an audio-visual database, using DTMF for the interactivity protocol

6.1.2 Protocols

6.1.2.1 ISDN videophony

Both ISDN videophony terminal equipment and the audio-visual database have to conform to the methods described in ETS 300 145 [2], but do not necessarily offer data capabilities. In the scope of this report it implies that the terminal is at least capable of receiving audio and video sent in a

framed structure (ETS 300 144 [3]) and that the database is at least capable of sending audio and video in a framed structure (ETS 300 144 [3]).

The call-set-up procedures described in ETS 300 144 [3] for call-set-up between terminals is also used for call-set-up between a terminal and an audio-visual database. In general, the terminal will be the call initiator, although an audio-visual database might set-up a call.

A problem area is the number of combinations that are possible for dividing the bandwidth between video and audio, and the number of options with which the information can be encoded. Combination of the above options leads to a large number of transfer modes. Since ISDN videophony terminals support different modes, and not all modes are common between all vendors (or terminal types), in this report one basic transfer mode is defined. Other transfer modes are optional.

6.1.2.1.1 Basic transfer mode

The basic transfer mode for audio-visual retrieval services is:

- ISDN: 2 B channels (2 × 64 kbit/s);
- audio: Using CCITT Recommendation G.711 [24] (A-law) at 56 kbits/s;
- video: Using ETS 300 142 [6] in Quarter Common Intermediate Format (QCIF) mode with a frame rate of 7.5 frames/s.

6.1.2.1.2 Optional transfer modes

The optional transfer modes for audio-visual retrieval services are:

- ISDN:
 - a) 1 B-channels (1 × 64 kbit/s ⁵);
 - b) 2 B-channels (2 × 64 kbit/s ³);
 - c) 6 B-channels (6 × 64 kbit/s ³).
- Audio:
 - a) using CCITT Recommendation G.711 [24] (A-law, μ -law) at 56 kbits/s;
 - b) using CCITT Recommendation G.722 [25] at 48 or 56 kbit/s;
 - c) using CCITT Recommendation G.728 [26] at 16 kbit/s.
- Video:
 - a) using ETS 300 142 [6] in QCIF or CIF mode with a frame rate of 7.5, 10, 15 or 30 frames per second.

6.1.2.2 DTMF

The ISDN videophony terminal should support means for its user to control the retrieval process. In this case the terminal and/or the service centre does not necessary support the data facility. Therefore, the interaction between the end user and the service centre has to take place via the audio channel (inband signalling) or via outband signalling (e.g. the ISDN D-channel) or by using ISDN supplementary services (e.g. User-to-User Signalling (UUS)).

In this ETR the solution using DTMF (CCITT Recommendation Q.23 [7]) in the audio stream is defined. The interactive protocol is very simple since the service centre can instruct the user, either in text or speech, in the same way as in voice response systems.

DTMF (CCITT Recommendation Q.23 [7]) is a modern and flexible system that can be used for both user-network signalling and end-to-end signalling. The prime use is number selection, but it allows for simple interactions and is used frequently for voice interactive systems. In TCR-TR 023 [34] a method is given for encoding/transferring ASCII using DTMF tones. Eventually,

also pointing device data on a PC/WS could be transferred using DTMF. However, this can only be used as an add-on service to a service which uses DTMF selection from a keyboard.

Although DTMF signals are usually generated electrically, acoustical coupling of a DTMF device to the microphone of a handset is another option. It should however be pointed out that when using this option the electrical level to the network will depend on the characteristics of the telephone set to which it is acoustically coupled. Annex B to I-ETS 300 380 [27] indicates the variation level that could be expected. A worst case scenario is that a device conforming to I-ETS 300 380 [27] will not ensure proper functioning.

6.1.3 Service centre considerations

In ISDN videophony the sending terminal normally instructs its codec to encode the audio/video information according to the receiving capabilities of the other terminal. As a consequence the database should be able to provide information using the basic transfer mode. If optional modes are also available this might require multiple storage of the information (in multiple modes), or an on-line re-encoding mechanism.

NOTE: The above situation is very similar to that known to exist for Vtx services where many terminals support different profiles. Via the Terminal Facility Identifier (TFI) the terminal informs the database about its receiving capabilities. Then the Vtx service tries to serve the terminals in the most efficient manner possible. Some services use duplications of the data-base, others use converters and again others just degrade the service to a level supported by the terminal (might involve no provision of data).

6.2 Access for a PSTN videophony terminal to a PSTN service centre using DTMF

6.2.1 Description

An application that can be of interest in the mid-term is the connection of a PSTN videophony terminal to a remote PSTN service centre. This application gives the terminal the possibility to retrieve audio-visual information, using DTMF (CCITT Recommendation Q.23 [7]) for the interactivity protocol.

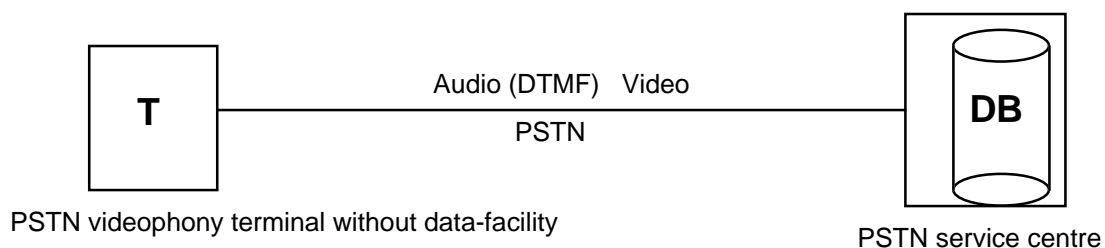


Figure 2:
PSTN videophony terminal without data-facility with access to a PSTN service centre, using DTMF for the interactivity protocol

6.2.2 Protocols

6.2.2.1 PSTN videophony

Both PSTN videophony terminal equipment and the PSTN service centre need to conform to the methods described in ITU-T Recommendation H.324 [28], but do not necessarily offer data capabilities. In the scope of this report it implies that the terminal is at least capable of receiving

audio and video sent in packed mode (ITU-T Recommendation H. 223 [31]) and that the database is at least capable of sending audio and video in packet mode structure (ITU-T Recommendation H.223 [31]).

The call-set-up procedures described in ITU-T Recommendation H.324 [28] for call-set-up between terminals is also used for call-set-up between a terminal and an audio-visual database. In general, the terminal will be the call initiator, although an audio-visual database might set-up a call.

A problem area is the number of combinations that are possible for dividing the bandwidth between video and audio, and the number of options with which the information can be encoded. Combining the above options leads to a large number of transfer modes. Since PSTN videophony terminals support different modes and not all modes are common between all vendors (or terminal types), in this report one basic transfer mode is defined. Other transfer modes are optional.

6.2.2.1.1 Basic transfer mode

The basic transfer mode for audio-visual retrieval services is:

- PSTN: Using ITU-T Recommendation V.34 [35] (at 28,8 kbit/s);
- audio: Using ITU-T Recommendation G.723 [32] at 5,3 kbits/s;
- video: Using ITU-T Recommendation H.263 [30] in QCIF mode.

6.2.2.1.2 Optional transfer modes

The optional transfer modes for audio-visual retrieval services are:

- PSTN: Using ITU-T Recommendation V.34 [35] (up to 33,6 kbit/s);
- audio: Using ITU-T Recommendation G.723 [32] at 5,3 or 6,3 kbits/s;
- video: Using ITU-T Recommendation H.263 [30] in subQCIF, QCIF, CIF, 4CIF or 16CIF mode;
- using ITU-T Recommendation H.261 [18] in QCIF or CIF mode.

6.2.2.2 DTMF

The PSTN videophony terminal should support means for its user to control the retrieval process. In this case the terminal and/or the service centre does not necessary support the data facility. Therefore, the interaction between the end user and the service centre needs to take place via the audio channel.

In this document the solution using DTMF (CCITT Recommendation Q.23 [7]) in the audio stream is defined. In this case the interactive protocol is very simple since the service centre can instruct the user, either in text or speech, in the same way as voice response systems.

DTMF (CCITT Recommendation Q.23 [7]) is a modern and flexible system that can be used for both user-network signalling and end-to-end signalling. The prime use is number selection, but it allows for simple interactions and is used frequently for voice interactive systems. In TCR-TR 023 [34] a method is given for encoding/transferring ASCII using DTMF tones. Eventually, also pointing device data on a PC/WS could be transferred using DTMF. However, this can only be used as an add-on service to a service which uses DTMF selection from a keyboard.

It is not mandatory to transparently transport DTMF by ITU-T Recommendation G.723 [32] audio-codec which is used in PSTN videophony. However, tests have shown that the codec seems transparent if the duration of the DTMF signals is between 100 and 150 ms. In any case, it is mandatory to transport the numbers 0-9 and the symbols # and * in ITU-T Recommendation H.223 [31] (multiplexing) using ITU-T Recommendation H.245 [29]. In ITU-T Recommendation

H.324 [28] this user data in the ITU-T Recommendation H.245 messages is not considered as data capability.

Although DTMF signals are usually generated electrically, acoustical coupling of a DTMF device to the microphone of a handset is another option. It should however be pointed out that when using this option the electrical level to the network will depend on the characteristics of the telephone set to which it is acoustically coupled. Annex B to I-ETS 300 380 [27] indicates the variation level that could be expected. A worst case scenario is that a device conforming to I-ETS 300 380 [27] will not ensure proper functioning.

6.2.3 Service centre considerations

In PSTN videophony the sending terminal normally instructs its codec to encode the audio/video information according to the receiving capabilities of the other terminal. As a consequence the database should be able to provide information using the basic transfer mode. If optional modes are also available this might require multiple storage of the information (in multiple modes), or an on-line re-encoding mechanism.

NOTE: The above situation is very similar to that known to exist for Vtx services where many terminals support different profiles. Via the TFI the terminal informs the database about its receiving capabilities. Then the Vtx service tries to serve the terminals in the most efficient manner possible. Some services use duplications of the data-base, others use converters and again others just degrade the service to a level supported by the terminal (might involve no provision of data).

6.3 Access to an enhanced Videotex service using a combined Videotex and ISDN videophony terminal

A terminal type that could be of interest in the short term is the combined Vtx and ISDN videophony terminal. The combined terminal includes a Vtx terminal and a videophony terminal running independently and simultaneously. The combined terminal providing the received Vtx information and the received video image on the same display in different windows. The user can arrange the windows on the screen as required. Combining the windows (e.g. one (partly transparent) on top of the other) is for further study.

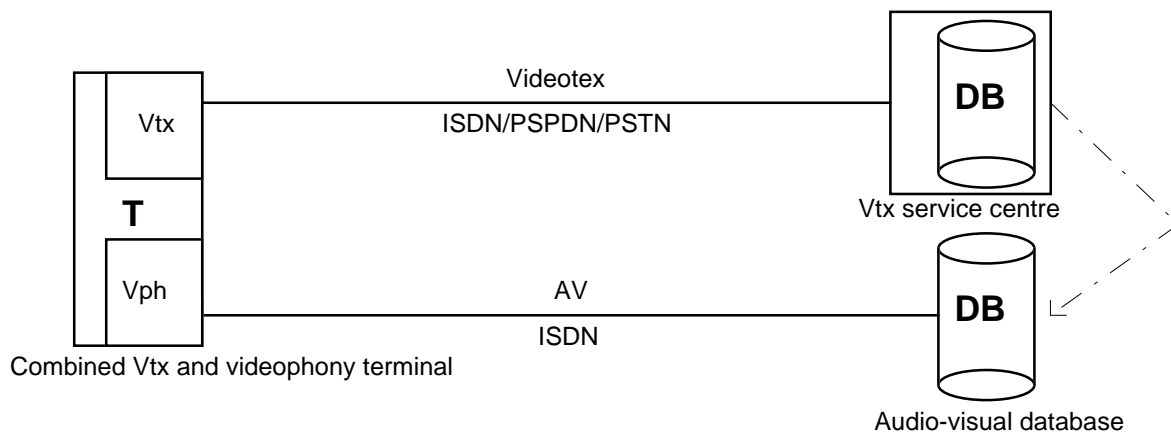


Figure 3:
Combined Vtx and videophony terminal access to a Vtx and an audio-visual service centre

The Vtx part of the terminal can connect to a Vtx service centre using ISDN, PSPDN or PSTN. The videophony part of the terminal can connect to an audio-visual database or to another videotelephone using ISDN.

An efficient way of connecting the combined terminal is by using packet mode in the D-channel of the ISDN (ETS 300 218 [36]) for the Vtx connection and one or two B-channels for the ETS 300 145 [2] connection.

Besides using the two terminal types separately the combined terminal can be used in an enhanced Vtx service where audio-visual information is added to conventional Vtx information. The control of the retrieval process in the audio-visual database is carried out using the Vtx interactive protocol. During the Vtx session the audio-visual database might receive information from the Vtx application at the Vtx service centre to establish a communication with the terminal (call back procedure).

In this case the audio-visual database should be able to set up a connection to the terminal, i.e. the database shall know the subscriber number and maybe other details of the ETS 300 145 [2] part of the combined terminal.

When the SBV protocol (ETS 300 223 [19]) is used between the terminal and the Vtx service centre, the Vtx service centre can instruct the terminal to build a connection to the audio-visual database and request a certain piece of information. The Vtx service centre can do this repeatedly per retrieved video sequence or just once for the duration of the session.

In this case a connection between the Vtx part and the videophony part of the terminal should exist to control the dialling to the audio-visual database. In a simple form, this could be written instructions in the Vtx window for the user to dial-up.

A protocol should be available to establish communication between the Vtx service centre and the audio-visual database in order to indicate the AV sequence to be sent. This protocol can be proprietary to the service centre and definition of it is outside the scope of this ETR.

7 General framework for retrieval and audio-visual services

The scenarios described in ETR 176 [1] and subclause 4.1 of this ETR can be grouped in a framework. This framework identifies the building blocks that can be used and re-used in specific terminals. In subclause 7.1 the overall idea of the framework is introduced.

The subsequent document structuring can be given on the basis of the terminal framework overview. A proposal for the table of contents is given in subclause 7.2.

7.1 Framework description

The framework splits the Terminal Equipment in three parts:

- user Interface, not dealt with in great detail as this is a part of the hardware/software platform;
- higher layer protocols;
- lower layer protocols.

For the higher layer protocols there are two possible base standards available. Furthermore some additional options can be indicated:

- ETS 300 223 [19] including the photographic syntax (JPEG still images (ETS 300 177 [22])) and the graphical user interface protocol elements offering full key-board control and/or pointing device control (VEMMI (prETS 300 382 [23])). A small extension is required that can position and size the video display area, this extension can be based upon the relevant subclauses from ETS 300 177 [22]. An optional further elaboration of that extension can be made to deal with embedding compressed moving video syntax (ITU-T Recommendation H.261) in a similar way to how ETS 300 177 [22] embeds the JPEG syntax;
- ITU-T Recommendation T.126 [14] and/or ITU-T Recommendation T.130 [16].

For the Lower layer protocols several modules are possible:

- N-ISDN D-channel packet mode to carry the interactive protocol (SBV) and ETS 300 145 [2] using 2B-channels for the audio and video information (ETR 176 [1] subclause 6.2 and 6.3);
- ETS 300 145 [2] using the 2B-channels for the audio, video and data (LSD/HSD) streams (ETR 176 [1] subclause 6.4.2). To carry the interactive SBV protocol, an extra extension to upgrade the LSD/HSD bit-pipe type of service to an OSI service interface layer 3 (ITU-T Recommendation X.213 [37]) network service is required. This extra extension is called the "packaging module";
- ETS 300 145 [2] using the 2B-channels for the audio, video and ITU-T Recommendation T.120 information streams (ETR 176 [1] annex A);
- N-ISDN B-channel (packet mode) running ITU-T Recommendation X.25 protocol (ETS 300 218 [36]);
- N-ISDN B-channel (circuit mode) running ITU-T Recommendation X.25 protocol (ETS 300 079 [38]);
- Videophony for PSTN.

In table 6, valid combinations of these higher and lower layer modules are given:

Table 6:
Overview of valid combinations of higher and lower modules for interactive audio-visual retrieval services on narrow-band networks

Combinations	SBV		ITU-T Recommendation T.126 and/or T.130
	+ video positioning	+ video syntax	
1) D-ch + ETS 300 145	✓		
2) ETS 300 145 (LSD/HSD)	✓		
3) ETS 300 145 (ITU-T Recommendation T.120 series of IRs)			✓
4) ITU-T Recommendation X.25 (circuit mode)		✓	
5) ITU-T Recommendation X.25 (packet mode)		✓	
6) PSTN (note)	?		✓

NOTE: The ? mark for scenario 6 reflects the situation for the combination of PSTN with SBV. For PSTN, a valid combination can be made by using ITU-T Recommendation T.126 and/or T.130.

The above description is depicted in figure 4.

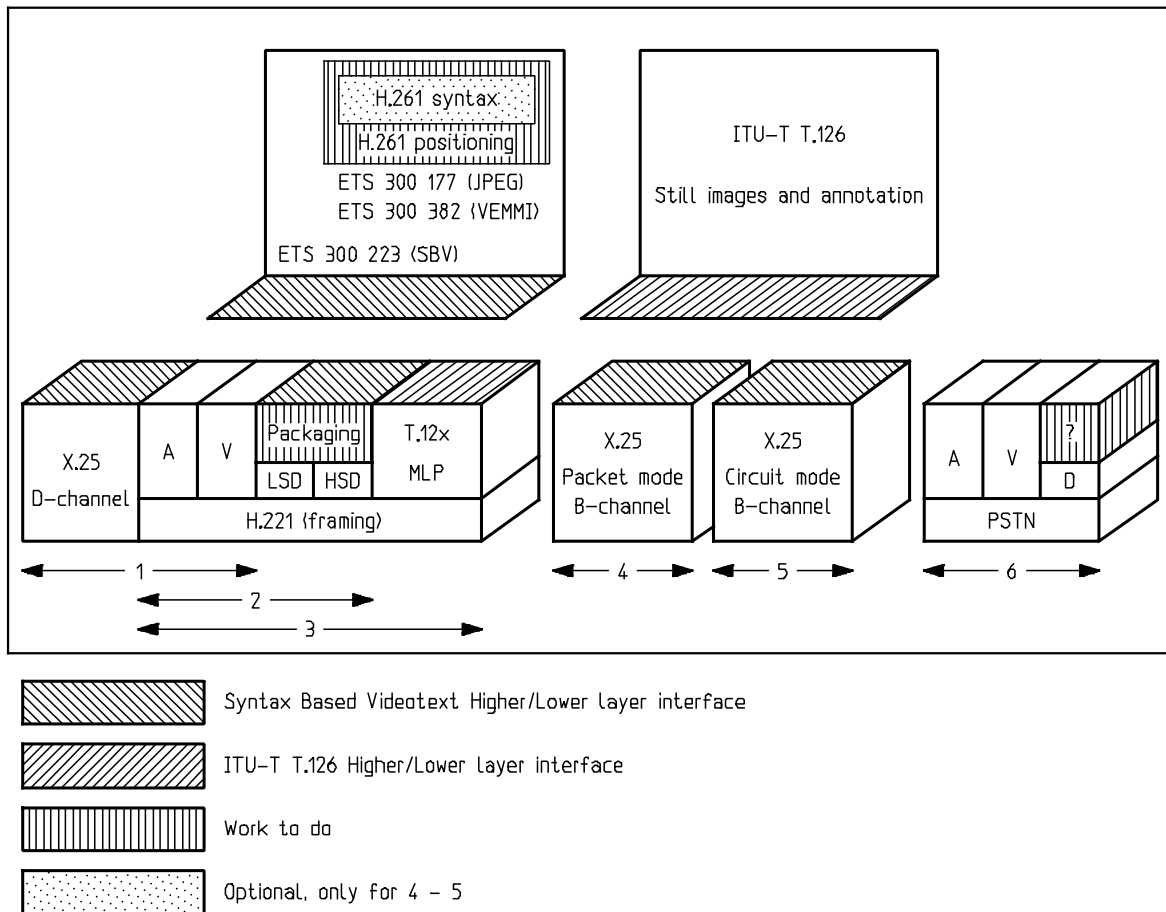


Figure 4: General framework for retrieval and audio-visual services

In figure 4 compatible data-interfaces are indicated by similar hatching. The service for the PSTN videoconferencing data option can be similar to the ITU-T Recommendation T.120 series [8] to [16] service or similar to the LSD/HSD service. In the latter case, a bit-stream-to-packet adapter (packaging module), similar to the ETS 300 145 [2] (LSD/HSD) solution is required.

7.2 Framework structuring

This subclause reflects the current ideas on how to structure the required elements for a standardised framework of terminal equipment necessary for interworking and interoperability of retrieval services and audio-visual services on narrow-band networks.

The subclause is divided in several parts thus providing the flexibility to realise the required structure according to market demand. The content of each part is very small. The main content will be formed by referencing the appropriate base standard and pinpointing the profiles (parts) applicable for the interworking and interoperability of retrieval services and audio-visual services.

PART A: Terminal framework for narrow-band multimedia information retrieval services

- 1 Scope
 - 1.1 General (see subclause 5.3.1)
 - 1.2 Basic objective
- 2 References
- 3 Definitions and abbreviations
- 4 Framework for narrow-band information retrieval terminals
 - 4.1 Higher Layer protocols
 - 4.2 Lower Layer protocols
- Annex A, Operational considerations (informative)

- A.1 terminal procedures for dynamic use of the communication channels
- A.2 terminal profiles

**PART B1: Higher Layer protocols for narrow-band information retrieval services:
SBV, Common end-to-end protocols**

- 1 Scope
 - 1.1 General
 - 1.2 Basic objective
- 2 References
 - ETS 300 223 [19], (ITU-T Recommendation T.105 [41]), ETS 300 177 [22], prETS 300 382 [23]
- 3 Definitions and abbreviations
- 4 SBV, Common end-to-end protocols
 - 4.1 Video window positioning
 - 4.2 Video syntax extension
- Annex A, Operational considerations (informative)

**PART B2: Higher Layer protocols for narrow-band information retrieval services:
Multipoint still image and Annotation Conferencing protocol**

- 1 Scope
 - 1.1 General
 - 1.2 Basic objective
- 2 References
 - ITU T ITU-T Recommendation T.126 [14] and/or T.130 [16]
- 3 Definitions and abbreviations
- 4 Multipoint still image and Annotation Conferencing protocol
- Annex A, Operational considerations (informative)

**PART C1: Lower Layer protocols for narrow-band information retrieval services:
Combined Vtx and videoconferencing configuration (N-ISDN)**

- 1 Scope
 - 1.1 General
 - 1.2 Basic objective
- 2 References
- 3 Definitions and abbreviations
- 4 Lower layer protocol for carrying the interactive higher layer protocol packet mode SBV lower layer protocols
- 5 Lower layer protocol for carrying the AV information ETS 300 145 [2]
- 6 Profiles
- Annex A, Operational considerations (informative)

**PART C2: Lower Layer protocols for narrow-band information retrieval services:
videoconferencing configuration (N-ISDN)**

- 1 Scope
 - 1.1 General
 - 1.2 Basic objective
- 2 References
 - ETS 300 145 [2]
- 3 Definitions and abbreviations
- 4 Lower layer protocol for carrying the interactive higher layer protocol LSD/HSD data channel enhanced with Packaging module
 - 4.1 Packaging module
- 5 Lower layer protocol for carrying the AV information ETS 300 145 [2], ETS 300 142 [6], CCITT Recommendations G.711 [24], G.722 [25] and G.728 [26]
- 6 Profiles
- Annex A, Operational considerations (informative)

**PART C3: Lower Layer protocols for narrow-band information retrieval services:
videoconferencing configuration with ITU-T Recommendation T.120 series of
IRs [10-13] (N-ISDN)**

- 1 Scope
 - 1.1 General
 - 1.2 Basic objective
- 2 References
- 3 Definitions and abbreviations
- 4 Lower layer protocol for carrying the interactive higher layer protocol ITU-T Recommendation T.120 [10] to [13] series of IRs
- 5 Lower layer protocol for carrying the AV information ETS 300 145 [2]
- 6 Profiles
- Annex A, Operational considerations (informative)

**PART C4: Lower Layer protocols for narrow-band information retrieval services:
Packet mode SBV end-to-end protocols (N-ISDN)**

- 1 Scope
 - 1.1 General
 - 1.2 Basic objective
- 2 References
 - ETS 300 218 [36]
- 3 Definitions and abbreviations
- 4 Lower layer protocol for carrying the interactive higher layer protocol ETS 300 218 [36] (packet mode B-channel, ITU-T Recommendation X.31 [42] case B)
- 6 Profiles
- Annex A, Operational considerations (informative)

**PART C5: Lower Layer protocols for narrow-band information retrieval services:
Circuit mode SBV end-to-end protocols (N-ISDN)**

- 1 Scope
 - 1.1 General
 - 1.2 Basic objective
- 2 References
 - ETS 300 079 [38]
- 3 Definitions and abbreviations
- 4 Lower layer protocol for carrying the interactive higher layer protocol ETS 300 079 [38] (circuit mode B-channel)
- 6 Profiles
- Annex A, Operational considerations (informative)

**PART C6: Lower Layer protocols for narrow-band information retrieval services:
Videoconferencing configuration (PSTN)**

- 1 Scope
 - 1.1 General
 - 1.2 Basic objective
- 2 References
- 3 Definitions and abbreviations
- 4 Lower layer protocol for carrying the interactive higher layer protocol
- 5 Lower layer protocol for carrying the AV information
- 6 Profiles
- Annex A, Operational considerations (informative)

7.3 Innovation of the framework

7.3.1 Service and information provider considerations

The service and information providers of retrieval Vtx services are the key actors in driving development of new terminal applications. The main question will be whether these providers will build up complete new platforms to give the markets the services they demand.

If the service and information providers are willing to do so, the service providers need to do the following:

- base the service on VEMMI, build a new platform;
- build a new access point including ISDN videophony (ETS 300 145 [2]);
- provide new tools for information providers to manage the new service;
- drive terminal producers to implement the proposed framework standard.

It is considered to be doubtful whether service and information providers will replace their platforms at once. A solution based on a step-by-step migration seems to be an easier way to penetrate the market.

In conclusion therefore, it should be taken into account that the short and mid-term solutions have an add-on possibility which should fit into the long term interest for enhanced terminals.

7.3.2 Validation of the framework

In this subclause a migration path is described to validate whether the suggested framework takes into account the step-by-step philosophy that service and information providers tend to use. This natural innovation for terminals and Vtx service and information providers is clarified in table 7. The table shows how migration to the framework model is made step-by-step. Through this, it has been made clear which terminal types are suitable for interworking and interoperability of retrieval services.

In table 7 a possible migration path is presented for five terminals. This migration path is coupled to the migration path of the service and information providers. In the "Notes" column references are made related to subclause 6.1 and 6.3. Furthermore, a cross-connection to the standardisation requirements is made. This cross-connection is referred to in the "framework modules" column. In the far right column the timeline is indicated while in the far left column the status of the service after each step is described.

In the "Terminal" columns a statement is placed if a working version of that terminal becomes available. For clarity, these statements have been shaded.

For example the ISDN videophony (Vph) DTMF terminal is available after adding DTMF capability to the service. Whereas for the combined Vtx with ISDN videophony terminal, several stages can exist:

- Vtx on PSTN/PSPDN;
- combined Videophony & Vtx on ISDN;
- enhanced Vtx (VEMMI, prETS 300 382 [23]) + Videophony on ISDN;
- full VEMMI + ISDN videophony terminal.

In this case each step presents an enhancement of the service and represents a feasible terminal. In practise, some of the steps can be implemented at the same time.

Table 7:
Possible migration path for five terminals for interactive audio-visual retrieval services on narrow-band networks

Status of terminals and Vtx service:	Terminals					Service provider/ Information provider		Framework modules	Time line
							Notes		
	PSTN with data-facility	Vtx enhanced with ITU-T Recommendation H.261	Vtx combined with ISDN Vph	ITU-T Recommendation H.320 with DTMF (without data-facility)	ISDN Vph with Vtx decoder				
	None standard Videophone running on PSTN	Vtx equipment running on PSTN or PSPDN	Vtx equipment running on PSTN or PSPDN	Videophone equipment running on ISDN	Videophone equipment running on ISDN	Vtx service based on SBV(JPEG) (alpha mosaic)			
Retrieval Vtx service + DTMF with interactive functionality				+ DTMF		+ ISDN Vph information (A+V) + DTMF	Requires ISDN Vph equipment pool and off-line DTMF unit		Tomorrow
Retrieval Vtx service + add on A+V call-back function			+ Vtx ISDN CM and PM-D			+ ISDN Vph call-back + Interactive protocol between Vtx and the old dB (A+V)	Requires ISDN Vph call-back equipment	ISDN PM	
VEMMI service with A+V call-back function			+ VEMMI			+ VEMMI	AP is still call-back	VEMMI	↓
VEMMI full service			+ positioning			+ positioning + ISDN Vph access point	full access point implementation	positioning	
VEMMI service based on the framework model					+ Packaging module	+ Packaging module	Complete framework	Packaging module LSD/HSD	
Pure Multimedia-Vtx service (spin off)		+ H.261 syntax				+ PM-B + H.261 info (V)		+ PM-B H.261 syntax	
PSTN Videophone service	PSTN equivalent of ITU-T Recommendation H.261 + PSTN equivalent ITU-T Recommendation G.7xx								

From table 7 it can be concluded that the framework for the protocols provides an elegant way to add-on and combine terminal protocols. Furthermore, it can be concluded that the service and information providers can also migrate their service step-by-step. This implies that market demands can be explored in small steps.

In essence three migration paths can be discerned:

- Vtx → Vtx + ITU-T Recommendation H. 320 → Vtx + ISDN Vph + VEMMI;
- Vtx → Vtx + VEMMI → Vtx + VEMMI + ISDN Vph;
- ISDN Vph → ISDN Vph + Vtx → ISDN Vph + Vtx + VEMMI.

These scenarios terminate in similar multimedia retrieval services. Therefore it is proposed to start with the standardisation of the scenarios which tend to migrate to each other: the combined ISDN Vph & Vtx terminal and the ISDN videophony terminals with data-facility using the packaging module. A spin-off of this will be that the embedding of ITU-T Recommendation H.261 in Vtx terminals will be a relatively easy task, which could be the next step in the standardisation process.

Another scenario starting from ISDN Videophony is to implement the ITU-T Recommendation T.120 series [8] to [16]. This will give the required data and interactivity capability. However, this implies that these types of terminals will not be capable of interworking with standard Vtx service centres or future VEMMI (prETS 300 382 [23]) service centres. Although interfacing SBV protocols to ITU-T Recommendation T.120 [8] to [16] series could be considered, this does not seem an attractive scenario, since their interactivity capabilities appear to be similar and no one gains from it. It is considered more likely that ISDN Vph + ITU-T Recommendation T.120 [8] to [16] series systems will emerge from new players in the information retrieval market, who are free to base terminals and host configurations on new techniques. This suggests therefore, that in the chosen market strategy, the direct approach will be from another direction.

8 Conclusions

For the scenarios:

- ISDN videophony terminal without data-facility: "Access for an ISDN videophony terminal to an audio-visual database using DTMF";
- PSTN videophony without data-facility: "Access for a PSTN videophony terminal to a PSTN service centre using DTMF";
- combined Vtx and ISDN videophony terminal: "Access to an enhanced Videotex service using a combined Videotex and ISDN videophony terminal."

It can be concluded that it is straightforward and relatively easy to define an ETS for the ISDN videophony terminal scenario without data-facility - terminals and audio-visual database are already commercially available. Therefore this scenario has a short term interest. Since terminals for the PSTN telephony without data-facility scenario are not expected before the end of 1996, this scenario has a mid-term interest.

A disadvantage of both scenarios is that the use of DTMF for the interactive protocol, does not allow a full keyboard and/or pointing device interaction.

The combined Vtx and AV scenario is attractive from a service provider point of view, since it allows migration from a Vtx service to an audio-visual information retrieval service. From that point of view it has a mid-term priority. Furthermore, it has the advantage that it can meet all the service criteria (see subclause 5.1).

Since the above scenarios are limited in functionality, it is expected that the market will ask for a scenario in which full key-board and/or pointing-device interaction is possible. For scenarios based on PSTN and ISDN videophony terminals, it is believed that using ITU-T Recommendation T.120 [8] to [16] series of IRs in conjunction with ITU-T Recommendation T.126 [14] and/or T.130 [16] is the most promising scenario. Perhaps DSM-CC (ISO/IEC 13818-6 [33]) can be considered as a possible extension of ITU-T Recommendation T.130 [16], within the scope of narrow-band information retrieval services.

In this ETR a general framework is presented in which the major part of the scenarios of ETR 176 [1] can be defined. This framework inhibits the possibility to easily anticipate market demands for the embedding of new types of protocols. However, apart from the scenarios based on ITU-T Recommendation T.120 [8] to [16] there seems to be no short or mid-term market demand for these new protocols. Therefore, it is not recommended to define the framework at this moment.

9 Recommendations

It is recommended that ETSI start the following Work Items for interactive audio-visual retrieval services on narrow-band networks:

- To define standards for interactive audio-visual retrieval services on narrow-band networks without data-facility: This work item will contain two parts:
 - a) To define an ETS for "Access for ISDN or PSTN videophony terminals to audio-visual databases using DTMF";
 - b) To define an ETS for "Access to an enhanced Videotex service using a combined Videotex and ISDN videophony terminal".
- To define an ETR to investigate how the ITU-T Recommendation T.120 [8] to [16] series can be used as an interactive protocol for audio-visual information retrieval services based on PSTN and ISDN videophony terminals and what sub-set of ITU-T Recommendation T.126 [14] and/or T.130 [16] tools should be used for a standardised audio-visual retrieval service. Furthermore, it should be investigated whether DSM-CC (ISO/IEC 13818-6 [33]) can be incorporated in this scenario for narrow-band audio-visual retrieval services. The dynamics of session establishment (connection-control and choice and initialisation of in-band protocols), also needs to be included in this study.

The given order represents the priorities.

Annex A: (informative) ITU-T Recommendation T.120 series for audiographic teleconferencing overview

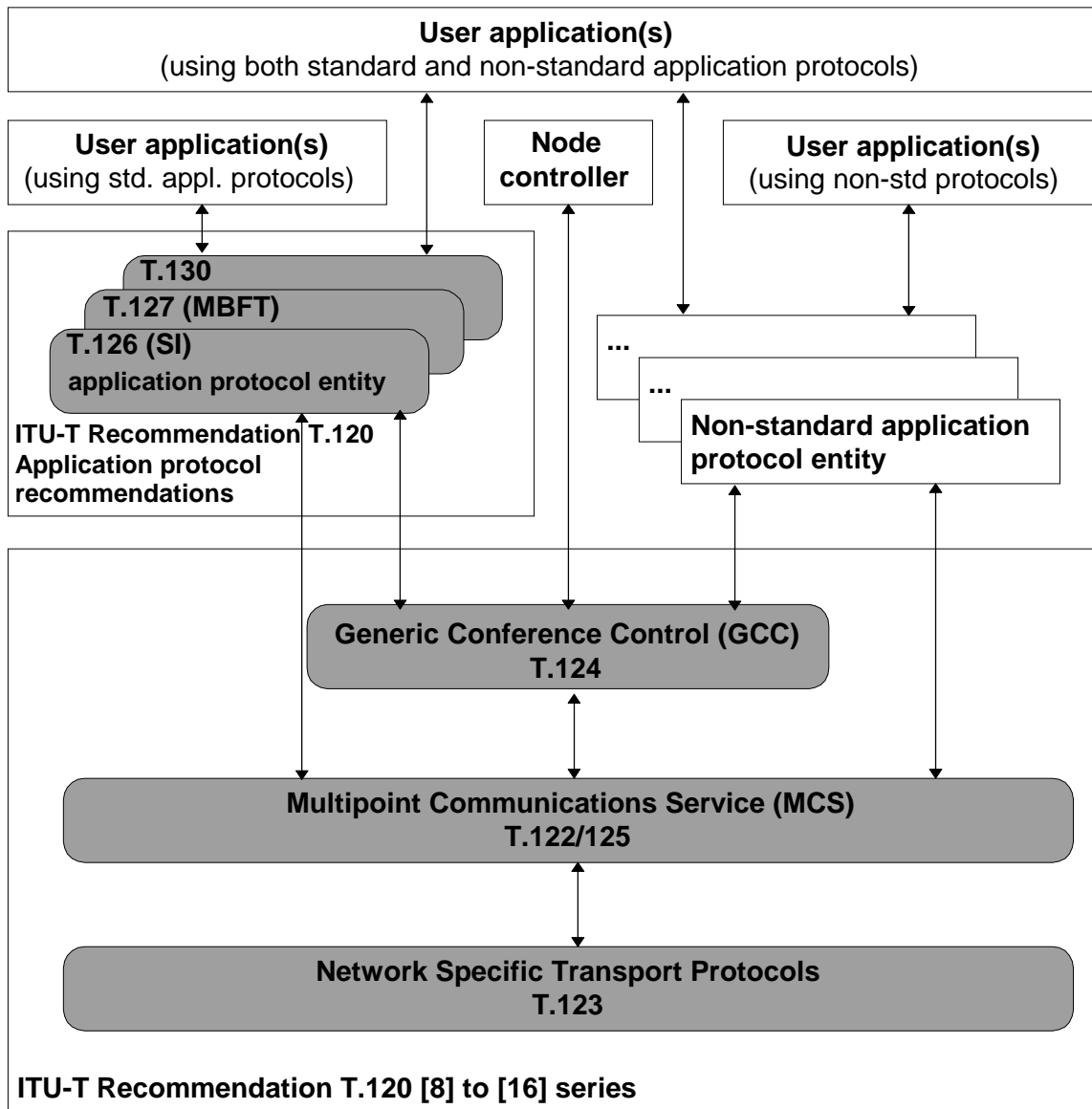


Figure A.1: Overview of ITU-T Recommendation T.120 [8] to [16] series.

History

Document history	
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