ETSI TECHNICAL REPORT

ETR 296

July 1996

Source: ETSI TC-TE

Reference: DTR/TE-10012

ICS: 33.020

Key words: multimedia

Terminal Equipment (TE); Multimedia; Standardization areas to be covered by the Multimedia project

ETSI

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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.

Introduction

This ETR is Milestone 3 of the Multimedia Project Plan (TCR-TR 026 [1]) and is the step needed for getting to the final objective of the Multimedia Project: the identification of the specific Work Items required for having a complete set of standards covering all aspects of Multimedia Applications (referred to as Milestone 4 in the Multimedia Project Plan (TCR-TR 026 [1]).

The purpose of this ETR is the structuring of standardization areas within the field of Multimedia Application and Services according to the already agreed classification scheme, and the identification of those areas not yet covered, considering a standardization area as a subset of the whole standardization package which has elements in common (e.g. security area, service management area, etc.).

This ETR focuses on specific points that are currently directly relevant to the field of Multimedia. This should be regarded as a "snapshot" taken as of March 1996 and it is not intended to further update this ETR. As a result, general issues, such as Broadband Integrated Services Digital Network (B-ISDN), Intelligent Network (IN), Universal Personal Telecommunications (UPT), and Telecommunication Management Network (TMN), and network infrastructure issues, are not included in this ETR because they are outside the general expertise of the Multimedia Management Group (MMG), and would need much more collaboration and contribution from other TCs/STCs. However, these issues are recognize d as being important to Multimedia and it is expected that they will be comprehensively covered by the project to be set up in accordance with Recommendation 11 of the SRC6 report [5].

The content of this ETR is derived from the following ETSI documents:

- TCR-TR 026 [1]: Multimedia Project Plan;

- ETR 181 [2]: Multimedia Portfolio;

- ETR 173 [3]: Multimedia Functional Model;

- ETR 227 [4]: Multimedia applications and services; Inband and outband signalling protocols; A survey.

Multimedia Project Plan (TCR-TR 026 [1])

The Multimedia Project Plan identifies the final Objective of the Multimedia Project "to get a complete set of standards covering all aspects of Multimedia Applications which will minimize incompatibilities and ensure interoperability" and the Interim Milestones planned to converge on this Objective.

The Multimedia Project Plan drives the activities of the Multimedia Project. The scope of the project is:

- to identify and define Multimedia scenarios for which there is a market opportunity and which can potentially be implemented across existing and future networks;

- to identify related standardization activities;

- to identify gaps and propose relevant additional work;

- to co-ordinate the standardization activities within ETSI while liaising with other bodies and fora outside ETSI.

Multimedia Portfolio (ETR 181 [2])

The Multimedia Portfolio is a compilation of Multimedia applications and service descriptions and their associated service parameter tables, provided by ETSI members in response to a questionnaire. Even though a more complex general classification of the Multimedia Services is included in ETR 181 [2], it was limited to 3 families on the basis of the answers to the mentioned questionnaire:

- Teleconference services (videoconference, videotelephony, audiographic conference);
- Retrieval services (excluding Video on Demand);
- Video on Demand combined with other information and retrieval services for residential users.

For the purpose of Milestone 3, the Video on Demand and associated services for the residential users are included as Retrieval Services, as the only differentiation is made on the basis of the market area addressed. Therefore, the present ETR focuses on the Multimedia Applications and Services classified as:

- Retrieval services;
- Teleconference services.

An important conclusion to be drawn from the Multimedia Portfolio is that applications and services indicated as more important by ETSI members do not fall completely into only one classification. For example, applications combining Retrieval and Teleconferencing functions (e.g. Tele-education, or Co-operative Working) are highly supported in ETR 181 [2].

It should be noted that although from the Multimedia Portfolio the above mentioned application areas are regarded as highest priority from ETSI members, other categories such as joint document editing, hyper documents etc. also are multimedia application areas for standardization and are not included in the scope of this ETR.

Multimedia Functional Model (ETR 173 [3])

The Multimedia Functional Model is a reference model for Multimedia applications with the purpose of identifying functional units, interfaces between them and interrelations between them for any kind of Multimedia Application or Service within a communication environment.

This Model forms the basis of the work on Milestone 3. However, in order to help in the identification of standardization activities, and the subsequent gaps in the present standards, it has been found useful, for the purpose of this ETR, to present it in a slightly different form (see subclause 4.1).

Multimedia applications and services; Inband and outband signalling protocols; A survey (ETR 227 [4])

This ETR presents the result of a study of communication protocols and formats related to multimedia communication services and applications.

The study covers protocols and formats that are standardized and under study within standardization organisations. The study represents a general survey and certain de facto standards, including some relating to the Internet, are also included. However, it should be noted that the survey does not provide an exhaustive coverage of these types of specifications, and does not make reference to signalling protocols carried by Local Area Networks (LAN)s.

The objective of this ETR is to present an executive overview over the communication protocols and formats related to multimedia communication services and applications. This ETR does not present all details about these protocols. Some general analysis and recommendations are made to indicate to the Technical Committee of ETSI where further analysis is required.

1 Scope

The scope of this ETSI Technical Report (ETR) is the identification of standardization areas and of relationships among them as a first step towards the identification and assignment of individual work items within the scope of the Multimedia project (TCR-TR 026 [1]).

Priorities have not yet been assigned to the identified standardization areas. This will be done as part of the work of completing Milestone 4, which is the identification of the individual work items.

For each standardization area, a list is given of the existing standards and work items, and then an assessment is made of the standardization needs for the area. Finally a proposal is made for work areas to cover the identified standardization gaps.

This work is based on the contents of the Multimedia Portfolio (ETR 181 [2]), and the results of the work on the Functional Model (ETR 173 [3]) and takes into account the activities and projects from international and European Standards Bodies and from commercial initiatives and fora. In order to limit the current task, this ETR focuses on specific points currently relevant to the Multimedia Project, as indicated in the Portfolio. As a result, the scope of this work covers Retrieval Services, Teleconferencing Services, and the Connection and Interconnection needed to achieve these. Although general issues, (such as Broadband Integrated Services Digital Network (B-ISDN), Intelligent Network (IN), Universal Personal Telecommunications (UPT), and Telecommunication Management Network (TMN)), network infrastructure issues and items such as dynamic bandwidth allocation are all recognize d as being very important to multimedia services, they have not been included in this work as it is assumed they will be comprehensively covered by the project to be set up in accordance with Recommendation 11 of the SRC6 [5] report.

2 References

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

[1] TCR-TR 026 (1994): "Terminal Equipment (TE); Multimedia Project Plan".

[2] ETR 181 (1995): "Terminal Equipment (TE); Multimedia portfolio; A compilation of multimedia applications and services provided by ETSI members".

[3] ETR 173 (1995): "Terminal Equipment (TE); Functional model for multimedia applications".

[4] ETR 227 (1995): "Multimedia applications and services; Inband and outband signalling protocols; A survey".

[5] SRC6: "Report of the sixth Strategic Review Committee on European Information Infrastructure; Part A: Summary and Recommendations, Part B: Main Report and Annexes".

3 Definitions and abbreviations

3.1 Definitions

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

audiographic conference: A connection between two or more terminals, exchanging audio, text and graphic information only.

end-to-end: Refers to concepts concerning, and protocols between, pieces of software residing "architecturally" above and independent of network and transport.

interactive service: A service which provides the means for bi-directional exchange of information between users or between users and hosts. Interactive services are subdivided into three classes of services: conversational services, messaging services and retrieval services.

local application: A piece of software which is one part of the terminal application and is running on the considered equipment.

multimedia application: An application which involves the presentation of Multimedia information to the user.

multiparty: Three or more terminals exchanging information.

multimedia: The property of simultaneously handling multimedia objects.

NOTE: The term Multimedia is an adjective to be attached to a noun which provides the context: e.g. multimedia service or application, multimedia terminal, multimedia network, multimedia presentation.

software application: A piece of software meeting a set of user's requirements and for use by a computer user.

software interface: A boundary across which a software application uses facilities of programming languages to invoke software services. These facilities may include procedures or operations, shared data objects and resolution of identifiers.

software service: Set of functions provided by a server software or system to a client software or system, usually accessible through an application programming interface.

telecommunication application: A set of user's requirements that involve the transmission of information across a telecommunications network.

telecommunication service: That which is offered by a service provider to its customers in order to satisfy a specific telecommunication requirement.

teleconference: This term is used as a superset of Telephoneconference, Videoconference and Audiographic conference.

telephoneconference: Three or more terminals exchanging audio information.

terminal application: A piece of software running on the terminal and performing the part of the processing that is required to make the terminal appropriate for user access to the application. The terminal application is usually the "master" module in the terminal.

user: A person or machine delegated by a person which uses the services and/or facilities of a telecommunications network.

videoconference: A connection between two or more terminals. The terminals are normally exchanging audio/video/graphic information.

videotelephony: A connection between two terminals only. The terminals are normally exchanging audio/video/graphic information.

3.2 Abbreviations

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

AAL	ATM Adaption Layer
ADF	Application profiles for Document Filing
ADPCM	Adaptive Differential Pulse Code Modulation
AOD	Application profile for ODA
ATM	Asynchronous Transfer Mode
API	Application Programmable Interface
ATS	Abstract Test Suites
AV	AudioVisual
AVI	Audio Visual Information
BAS	Bitrate Allocation Signal

BC	Bearer Capability
B-ISDN	Broadband ISDN
CATV	Community Antenna Television
CBR	Constant Bit Rate
CD-I	Compact Disk Interactive
CD-ROM	Compact Disk - Read Only Memory
C&I	Control & Indication
CIF	Common Intermediate Format
CSPDN	Circuit Switched Public Data Network
CSS	Common Scrambling System
DAVIC	Digital Audio Visual Council
DCT	Discrete Cosine Transform
DECT	Digital Enhanced Cordless Telephone
DMAC	Multiplexed Analogue Components, version D
D2MAC	DMAC, version 2
DSM-CC	Digital Storage Media - Command and Control extension
DSVD	Digital Simultaneous Voice and Data
DTAM	Document Transfer And Manipulation
DTMF	Dual Tone Multiple Frequencies
DVB	Digital Video Broadcasting
ECT	Explicit Call Transfer
EDI	Electronic Data Interchange
EDIMS	EDI Message Store
EUROFILE	European File Transfer Protocol
FEC	Forward Error Correction
FOD	File structures for ODA documents
FTAM	File Transfer Access Management
GUI	Graphical User Interface
HCI	Human/Computer Interface
HDMAC	High Definition Multiplexed Analogue Components
HDTV	High Definition Television
HIPERLAN	High Performance Radio Local Area Network
HLC	Higher Layer Compatibility
H-MLP	Multi Layer Protocol in accordance with H recommendations
HSD	High Speed Data
HTML	HyperText Mark-up Language
HTTP	HyperText Transfer Protocol
IDL	Interface Definition Language
IETF	Internet Engineering Task Force
IN	Intelligent Network
IP	Internet Protocol, (RFC 791)
IPM	Inter-Personal Messaging
ISDN	Integrated Services Digital Network
ISP	International Standards Profile
IT	Information Technology
JBIG	Joint Bi-level Image Experts Group
JPEG	Joint Photographic Experts Group
JTC	Joint Technical Committee
LAN	Local Area Network
LBR	Low Bit Rate
LD-CELP	Low Delay - Code book Excited Linear Prediction
LLC	Lower Layer Compatibility
LSD	Low Speed Data
MAC	Multiplexed Analogue Components
MCS	Multipoint Communication Service
MCU	Multipoint Control Unit
MHEG	Multimedia & Hypermedia Experts Group
MHI	Multimedia & Hypermedia Information
MIRS	Multimedia Information Retrieval Services
M-JPEG	Motion JPEG
M&HIRS	Multimedia & Hypermedia Information Retrieval Services
MHS	Message Handling System
MLP	Multi Layer Protocol

MMCF	Multimedia Communication Forum
MPEG	Moving Pictures Expert Group
MTS	Message Transfer System
NAF	Network Access Facility
NICAM	Near Instantaneous Companded Audio Modulation
NNI	Network to Network Interface
ODA	Open Document Architecture
OMG	Object Management Group
PCI	Programming Communication Interface
PCM	Pulse Code Modulation
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
PSPDN	Packet Switched Public Data Network
PSPN	Packet Switched Public Network
PSTN	Public Switch Telephone Network
PUF	PCI User Facility
QCIF	Quarter Common Interface Format
QoS	Quality of Service
RSA	River Shamir Adelman (cryptosystem)
SBV	Syntax Based Videotex
SCM	Selected Communication Mode
SMATV	Satellite Master Antenna Television
TCM	Template Correction Method, (based on IBM-Q codec)
TCP	Transmission Control Protocol, (RFC 793)
TMN	Telecommunication Management Network
TP	Transaction Processing
TSI	Transport Service Interface
TSS&TP	Test Suite Structure & Test Purposes
TTCN	Tree & Tabular Combined Notation
UDP	User Datagram Protocol
UMTS	Universal Mobile Telecommunications System
UNI	User Network Interface
UNO	Universal Networked Objects
UPT	Universal Personal Telecommunications
VBR	Variable Bit Rate
VCR	Video Cassette Recorder
VEMMI	Videotex Enhanced Man Machine Interface
WST	World System Teletext

4 Approach to identifying gaps in multimedia standardization

4.1 The functional model

The method of identifying the standardization gaps in order to complete Milestone 3 was first to study again the Functional Model described in ETR 173 [3]. It was found that when concentrating on the two key Multimedia Applications and Services of "Retrieval", and "Teleconferencing", a better representation of the model could be made. This is described below.

Figure 1a is the Functional Model as described in ETR 173 [3], and has been utilized to describe the Terminal Function and User in more detail.

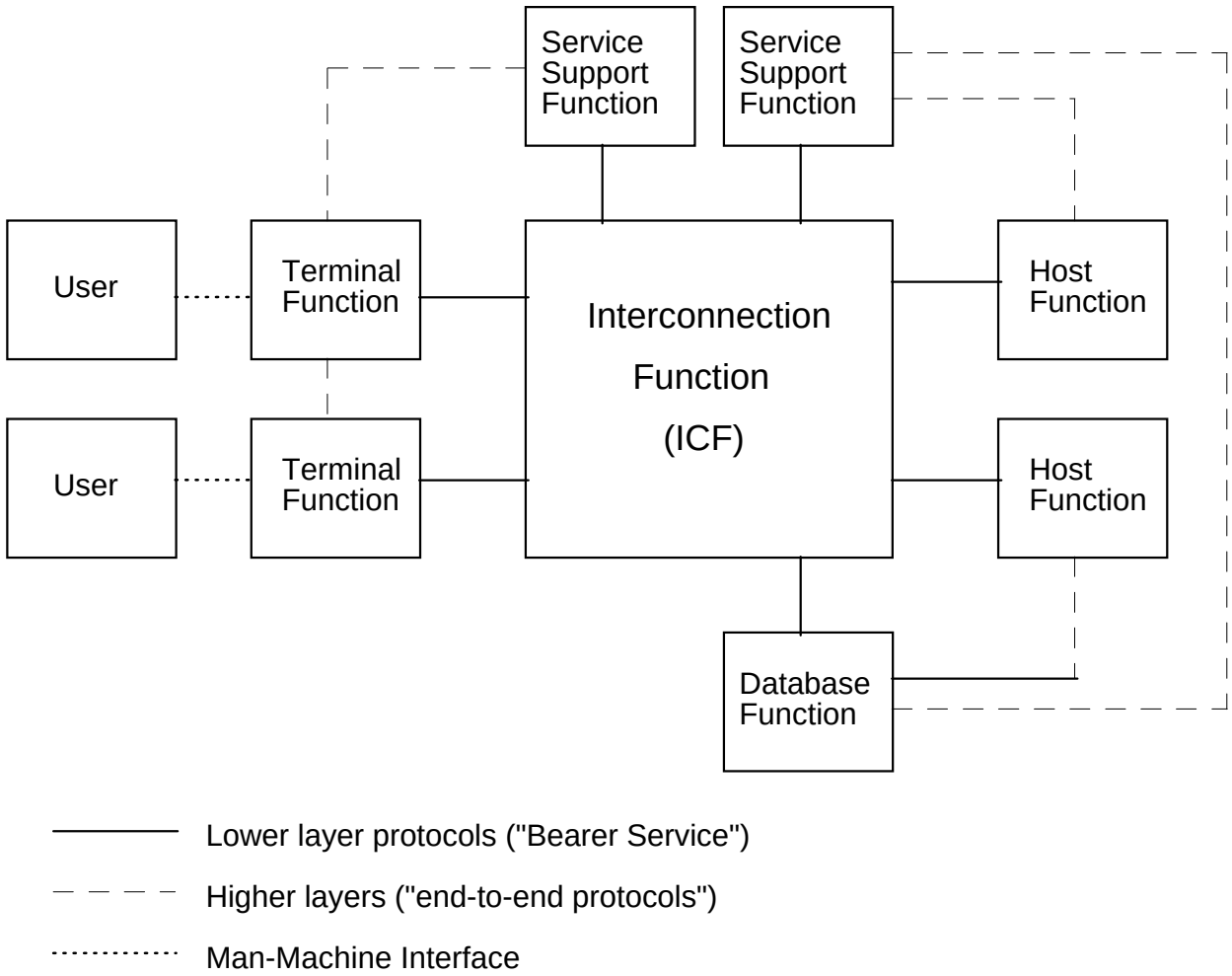

Figure 1a: Original functional model

The User Function shown in figure 1b contains both the Application Software in the users equipment, which manages and presents multimedia information according to the local application process, and the human user. The Terminal Communication Function provides network independent communication services to the User Function, and the Connection Function provides lower layer protocols in support of network specific User Network Interfaces (UNI)s. It has been decided to refer specifically to the Connection Function in this case, rather than use the more general term Interconnection Function, which is now retained for use in describing connections that occur within the network between Network Node Interfaces.

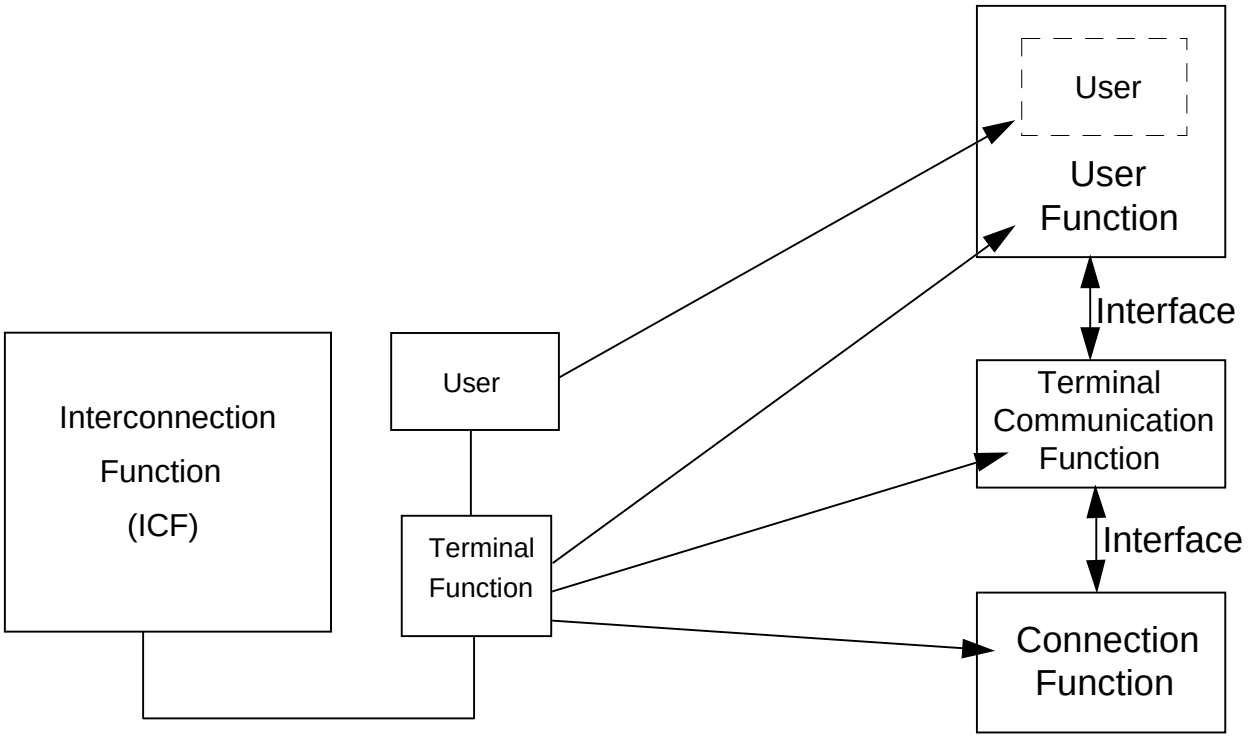

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Figure 1b: Functional model

The Functional Model described in ETR 173 [3], defines the End User Function in terms of a local Application Process, an Object Manager, a Presentation Agent, an Access Agent, and a Local Information Base. It also defines a number of Application Programmable Interface (API)s for interconnecting the functional units.

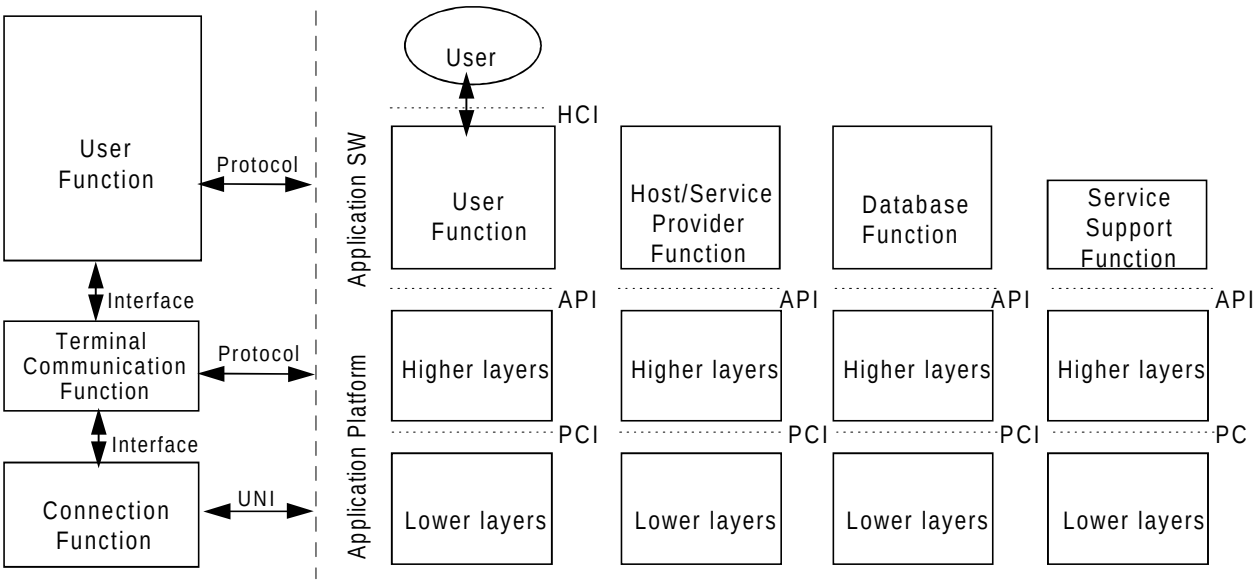

Figure 1c: Functional model

Host Function, Database Functions and Service Support Functions defined in the Functional Model, are decomposed in the same way as the Terminal Communication Function, as illustrated in figure 1c. In particular, the Host/Service Provider contains the same functional units as the End User Function except for the Presentation Agent, whilst the Database Function contains only the Access Agent and Local Information Base. The Service Support Function which could for example represent a Multipoint Control unit (MCU), would also have a subset of these functional units. The Connection Function (referred to as "lower layers"), and the Terminal Communication Function (referred to as "higher layers"), are collectively referred to as the Application Platform.

This platform provides a uniform interface to the using Application Software, although the lower layers of the Application Platform can be different according to different networks. Note, the interfaces in figure 1c are referred to as Programming Communication Interface (PCI), API and Human/Computer Interface (HCI) at the appropriate functional interfaces.

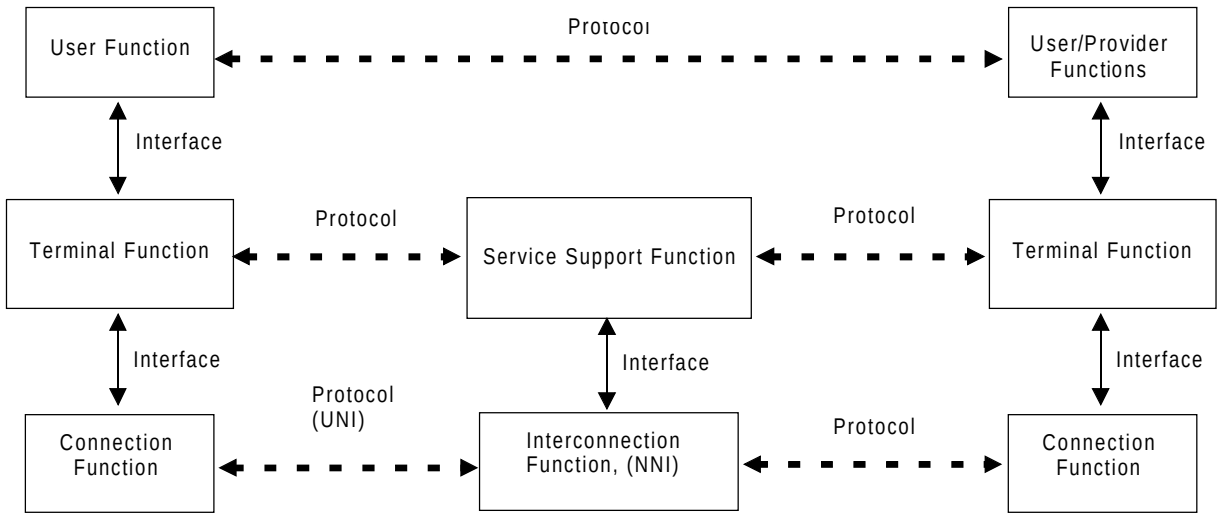

Figure 2: Derivation of the functional model

The approach used in identifying existing standards and standards areas to be covered, throughout this ETR, is based upon the Functional Model described in ETR 173 [3]. As can be seen in figure 2, the functional model is basically divided up into three layers of functionality. Functions in the bottom layer are referred to as "Connection Functions", or "Interconnection Functions", functions in the middle layer are referred to as "Terminal Functions", or "Service Functions", and functions in the top layer are referred to as "User Functions". For the purpose of this ETR, functions in different layers communicate by means of "Interfaces", and functions in the same layers communicate by means of "Protocols".

Connection and interconnection functions

The category of Connection and Interconnection Functions contains all functions which are tied to a particular type of transport technology, (i.e. 64 kbit transport, Modem, LAN, Asynchronous Transfer Mode (ATM), etc.). In other words, the implementation of either of these Functions is dependant upon the type of transport mechanism being used.

Terminal and service functions

The Terminal and Service Functions contain all functions which are independent of any particular transport technology. For example, "codecs" are a major part of Terminal Functions, (although codecs are often optimized towards a particular type of transport).

User functions

The User Functions are implementations of application software. e.g. for Teleshopping, Teleworking, Teleeducation, Telemedicine. Functional entities for managing multimedia applications are described in ETR 173 [3] (Functional Model), e.g. Presentation Agent, Object Manager, Local Application Process. Specific subsets are used to implement End User, Host/Service Provider, Database and Service Support Functions shown in figure 1c.

Interfaces and Protocols

Interfaces, including APIs and PCIs, involve the concept of offering access to functionality in the various functional blocks in a more consistent and "usable" manner. Thus, different implementations of a particular function will have the same interface.

The protocols between Connection and Interconnection Functions (e.g. related to a UNI), or between Interconnection Functions, (e.g. related to a Network to Network Interface (NNI)), deal with aspects such as "In-band signalling", or, "communication procedures", or "interworking" between transport mechanisms.

Protocols between higher layer entities, in general, deal with context, exchange of data, negotiation of functionality and communication management. It should be noted that in multimedia applications, the use of multiple data streams, (video, audio and data), requires synchronization between these streams.

"Protocols" between Users, e.g. between humans or between humans and computing platforms, are considered to be defined in terms of a sensible sequence of events, which means there is no explicit protocol, but rather an "information flow". Events trigger protocol data units between Terminal Communication Function and Service Support Function or between Terminal Communication Functions respectively in the higher layers.

4.2 Existing standards

This subclause identifies the standardization bodies and fora which produce specifications in the field of multimedia.

- **ETSI**: All Multimedia related Work Items within ETSI are considered in this ETR;
- **ITU-T**: ITU-T H.series, T.series, F.series, Q.series, X.series, I.series and some J.series specifications are considered;
- **ISO/IEC**: JTC1 work items are considered, in particular, SC6, SC18, SC21, and SC29;
- **DAVIC**: Digital Audio Visual Council (DAVIC) 1.0 specifications are considered;
- **IETF**: Internet Engineering Task Force (IETF). A number of specifications are considered, e.g. Transmission Control Protocol/Internet Protocol (TCP/IP), User Datagram protocol (UDP), HyperText Mark-up Language (HTML), Hypertext Transfer Protocol (HTTP);
- **ATM Forum**: Asynchronous Transfer Mode (ATM) forum UNI 3.1 is considered;
- **MMCF**: Multimedia Communication Forum (MMCF) Transport Services Interface and Quality of Service (QoS) specification are considered;
- **IMTC**: IMTC API work items are considered;
- **OMG**: Object Management Group (OMG) Interface Definition Language (IDL) and Universal Networked Objects (UNO) are considered.

4.3 Analysing existing standards in respect to the functional model

This ETR categorizes functions, their interfaces and protocols using the Functional Model, and indicates where current standards and industry fora are concentrating their efforts. This was considered to be an effective approach to finding gaps in standardization work as opposed to the more philosophical approach of analysing the functionality of a "model" alone, or analysing the functionality of one or more implementations.

5 Retrieval services

The following subclauses deal primarily with retrieval applications. In addition, they identify multimedia content creation and manipulation where available.

NOTE 1: For reasons of clarity, the numerous references to ITU-T publications shown in tables contained in this clause are presented in a shortened format, e.g. ITU-T T.107 means ITU-T Recommendation T.107.

NOTE 2: References to ETSI work item numbers shown in tables contained in this clause do not imply availability of the document, merely that the item is under study.

5.1 General description

From ETR 181 [2] (the Multimedia Portfolio), attributes of retrieval services are:

- normal bandwidth less than 2 Mbit/s;
- on demand;
- any time;
- any duration.

Common applications of retrieval systems are:

- Videotex;
- News on Demand;
- Teleshopping;
- Videoshopping;
- Video on Demand.

In ETR 181 [2] (the Multimedia Portfolio), it is mentioned that the majority of these services are dedicated to professional or enterprise users (70 %). The remainder (30 %) is dedicated to residential users. Heterogeneous Multimedia terminals are desired by 40 %. The following features are in great demand (> 50 %):

- possible use of several services simultaneously;

- variable bandwidth allocation for the different media during the session;

- local processing and information storage, (Compact Disk Interactive (CD-I), etc.), in combination with that of the network;

- access to the same information (80 %);

- editing of Multimedia data.

5.2 User

5.2.1 Functions

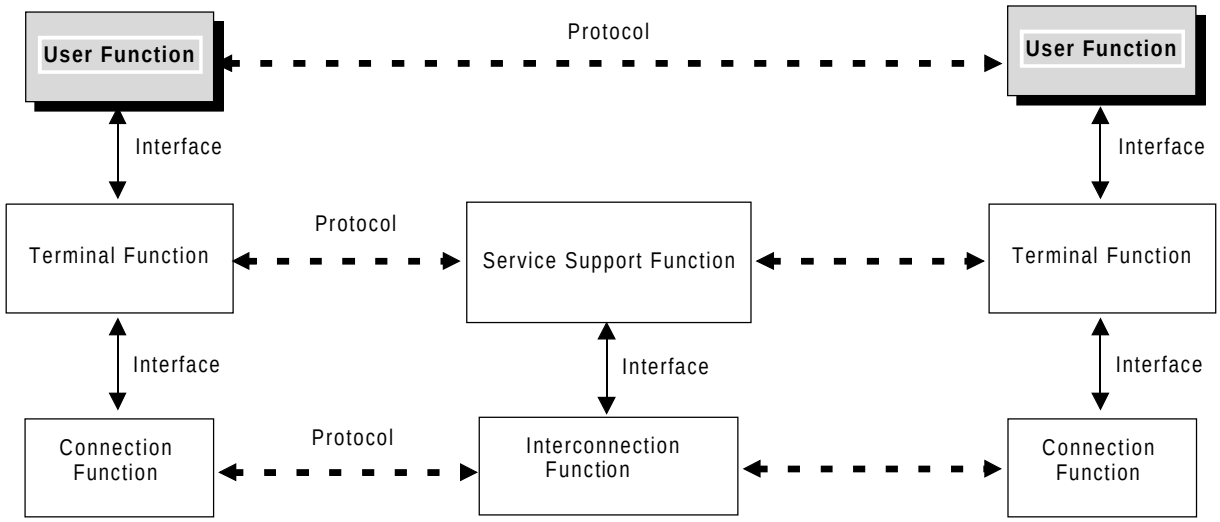

Figure 3: User functions

5.2.1.1 Description

The category of User Functions are implementations of application software using any of the Terminal, Service and Connection Functions.

5.2.1.2 Existing standards and work items

Table 1

Document no.	Short Title	Comments
DTR/HF 01037	Human Factors; Issues in Multimedia Retrieval Services.	
DTR/TE 01059 (stopped)	Terminal Equipment; VEMMI implementation guidelines.	For ETS 300 709 implementations, concentrating on usability and GUI consistency.

5.2.1.3 Assessment of standardization in this area

This area is entirely proprietary, in which developers create functions dependant upon the type of application. However, some media conversion functions could be considered for standardization. In order to give guidance on Navigators, Icons and Window layout for Multimedia Retrieval Services and to get acceptance of the introduction of these new services, ETRs should be developed (see subclause 8.1.1 a)).

5.2.2 Interface to the terminal functions

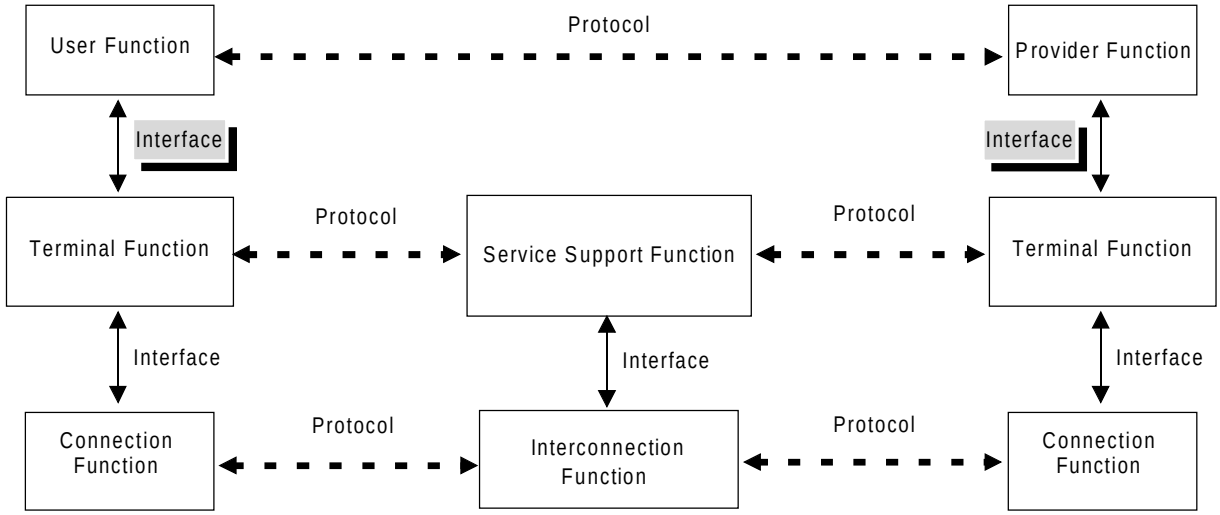

Figure 4: User interface to the terminal functions

5.2.2.1 Description

These interfaces offer access to Terminal Functions in a more consistent and "usable" manner. Thus, different implementations of particular Terminal Functions will have the same interface.

5.2.2.2 Existing standards and work items

Table 2

Document no.	Short Title	Comments
DE/TE 01043	API for simple file transfer over ISDN.	Service definition for 2 protocol stacks: ETS 300 075/EN 41216, (ISP10607), "Simple FTAM". Not studied in ITU-T.
ETS 300 715	MHEG Script Interchange representation.	Related to ISO CD 13522-3 Related to ITU-T T.173; developed jointly with ISO/IEC: MHEG-3.
DE/TE 01053 (stopped)	Recommendation for a common user interface for M&HIRS.	Not studied in ITU-T.
ETS 300 777-3	API for MHEG-5.	Related to ITU-T T.175 (Draft).
ETS 300 777-4	VEMMI enhancements to support broadband multimedia information services.	
ETS 300 709	Enhanced Man Machine Interface for Videotex and Multimedia/Hypermedia Information Retrieval Services.	Supercedes ITU-T T.107 and ETS 300 382.
ETS 300 714	API for the manipulation of Multimedia and hypermedia information objects.	To specify an API above the MHI objects allowing their manipulation, (e.g. by scripts). Not studied in ITU-T.
ETR 225	API and script representation for MHEG requirements and framework.	Make use of ETR 173 [3]. Determine technical requirements, benefits, investigating implementability.
DTR/TE 02034	Generic PCI for Multimedia applications. Identification of PCIs needed.	Taking into account existing work.
ISO CD 13522-5	MHEG Subset for base level implementation.	This standard is referenced by DAVIC as "High level API" Related to ITU-T T.172 (Draft).
ISO IS 13522-1	MHEG Object Representation, Base Notation (ASN.1).	Related to ITU-T T.171: MHEG-1.

5.2.2.3 Assessment of standardization in this area

This area is partly covered by existing standards or standardization activities currently in progress in different bodies (ETSI, ISO/IEC JTC1 SC29, ITU-T, DAVIC).

Definitions of Profiles from the Moving Pictures Experts Group (MPEG)-1 standards for other applications which are out of the scope of the DAVIC 1.0 Specification will be needed.

Identified gaps are mentioned in subclause 8.1.4.

5.2.3 Protocols to other user functions

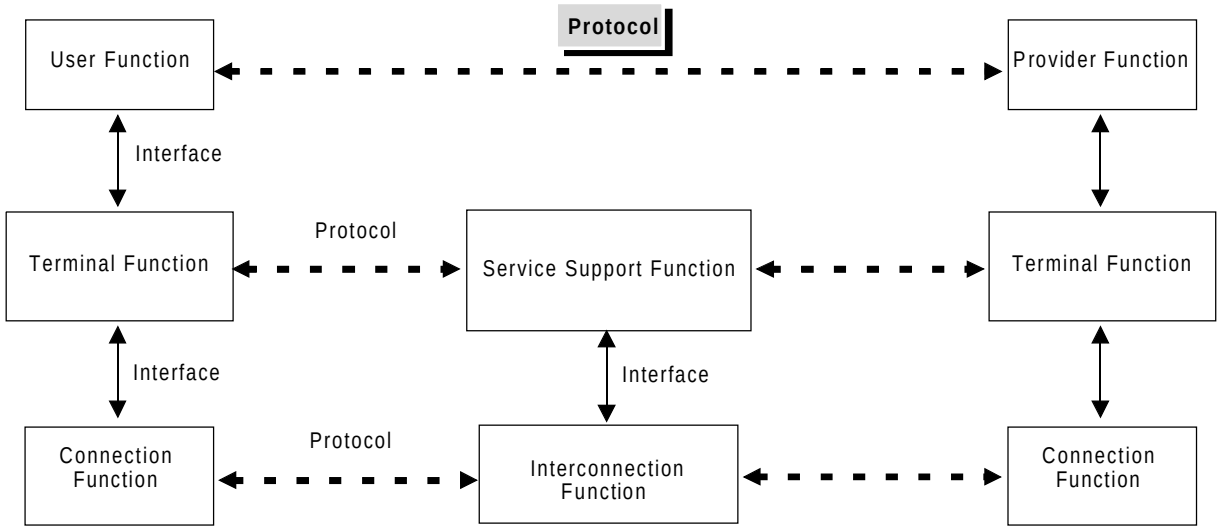

Figure 5: User protocols to other user functions

5.2.3.1 Description

Protocols between Users are considered to be an abstraction of Terminal to Terminal protocols, i.e. a sensible sequence of events. A distinction is made between:

- information flow (content information with or without encapsulated data, unmodified by intermediate elements at higher elements at higher layers);
- command flow (application command information, e.g. pause, fast forward);
- data information (upstream/downstream response).

5.2.3.2 Existing standards and work items

Table 3

Document no.	Short Title	Comments
ETS 300 709	Enhanced Man Machine Interface for Videotex and Multimedia/Hypermedia Information Retrieval Services.	Supersedes ITU-T T.107 and ETS 300 382.
DAVIC S1	(Principal) service information flow.	Between Server, (content source) and Terminal, (content sink).
DAVIC S2	(Principal) service command flow.	End-to-end control between Server and Terminal.
ETS 300 777-1	MHEG-5 encoding.	Coding for basic Multimedia applications.
ETS 300 777-1	DSM-CC user profile MHEG-5 applications.	Use of DSM-CC for basic Multimedia applications.
ETS 300 777-4	VEMMI enhancements to support broadband multimedia information services.	
ETR 176	Interworking and interoperability of retrieval services and Audio Visual services on narrowband networks.	Study of differences between ret. & a/v services on narrowband networks. Not studied in ITU-T.
ETR 272	Priority setting and description of interactive AudioVisual Retrieval Services on narrow-band networks.	Study the embedding of SBV videotex protocols with ITU-T T.120. Defining the different services, interactive protocols and interworking units.
DTR/TE 01069	Application walk-through of a DAVIC system.	
DTR/TE 01070	Interworking between DAVIC system and Videotex System.	
DE/JTC-DVB-5	DVB, Part 5 - Service information and identification system.	
ETS 300 468	Digital Broadcasting Systems for TV, sound and data services; Specification for Service Information, (SI) in DVB systems.	Part of MPEG-2 bit-stream, so that the user can select services and the decoder can configure itself (automatically) to the service.
ISO DIS 13818-1	MPEG-2: Systems.	Related to ITU.T H.222.
ISO DIS 13818-6	MPEG-2 System Extension.	Command Control for Digital Storage Media (DSM-CC) (User-User). Related to ITU-T T.176 (Draft) See also DE/TE 01057-2 above.
ETR 154	Digital Broadcasting Systems for Television Implementation guidelines for the use of MPEG-2 systems; Video and Audio in satellite and cable broadcasting applications.	

5.2.3.3 Assessment of standardization in this area

The streams ("Transport Stream" and "Program Stream") defined in MPEG-2 are intended to be as useful as possible to a wide variety of applications.

The Transport Stream may be more suitable for error-prone environments, such as those used for distributing compressed bit-streams over long distance networks and broadcast systems. Many applications require storage and retrieval of MPEG-2 bit-streams on various digital storage media. For that purpose "MPEG-2 Part 6 (DSM-CC) User-User" is appropriate (see subclause 8.1.6 b)).

A further possible enhancement dealing with Video and Audio is already identified for Videotex Extended Man Machine interface (VEMMI) in subclause 8.1.4 which should also include protocol aspects.

5.3 Terminal

5.3.1 Functions

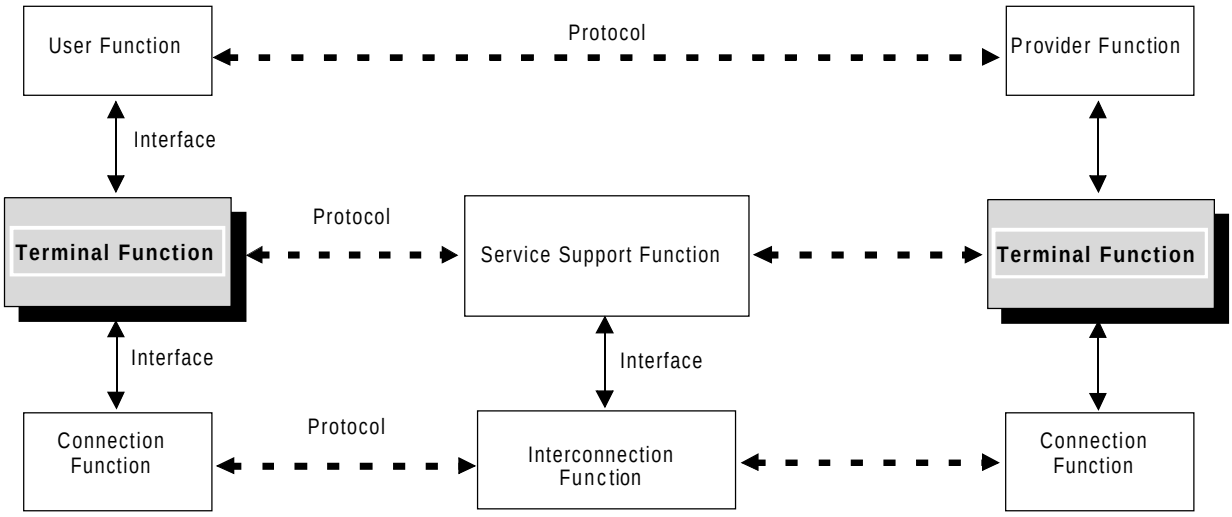

Figure 6: Terminal functions

5.3.1.1 Description

The category of Terminal contains all functions which are independent of any particular transport technology, but offers all functions necessary for the Application platform, which in the case of an End System is offered (via an "interface" described in subclause 5.2.2) to the User Function. In terms of OSI terminology the functionalities offered by the transport layer, session layer, presentation layer and partly of the application layer have to be provided by the Terminal Function.

5.3.1.2 Existing standards and work items

Coding

Table 4

Audio	Std. body	Technique	Bit rate	Quality	Application
MPEG1	ISO/IEC	sub.encoding	64-192 kbps	20 kHz	Video stereo
MPEG2	ISO/IEC	sub.encoding	>64 kbps	20 kHz	5.1 channel
MPEG4	ISO/IEC	under study	from 10 kbit/s up	no impl. yet	Mobile, fixed, interactive, conversational
G.711	ITU-T	PCM	64 kbps	3,1 kHz	Telephony
G.721	ITU-T	PCM	32 kbps	3,1 kHz	Telephony
G.722	ITU-T	ADPCM	within 64 kbps	7 kHz	Extended b/w
G.723.1	ITU-T	LD-CELP	5,3/6,3 kbps	3,1 kHz	PSTN videotelephony
G.726	ITU-T	ADPCM	32 kbps	3,1 kHz	Telephony
G.728	ITU-T	LD-CELP	16 kbps	3,1 kHz	ISDN AudioVisual
G.729	ITU-T	LD-CELP	8 kbps	3,1 kHz	Telephony
G.729, annex A	ITU-T	under study	8 kbps	3,1 kHz	DSVD modem
G.4kbit	ITU-T	under study	4 kbps	3,1 kHz	PSTN videotelephony
G.WB	ITU-T	under study	16/24 kbps	7 kHz	Extended b/w

Table 5

Video	Std. body	Technique	Bit rate	Quality	Application
ETS 300 142 (H.261)	ETSI (ITU-T)	DCT	64-2 048 kbps	CIF/	Videoconferencing, Videotelephony
ETS 300 174	ETSI	ADPCM	34 Mbps	Broadcast	TV
H.263, H.263+	ITU-T	DCT	9,6k - 2 Mbit/s	CIF, QCIF, subQCIF, 4CIF, 16CIF	Videotelephony, Videoconferencing
H.264	ITU-T	under study	LBR	Low Delay	Mobile, PSTN
M-JPEG	proprietary	DCT	HBR	High definition	Editing video
MPEG-1	ISO	DCT	1,5 Mbps	640x480	CD-ROM
MPEG-2 (H.262)	ISO (ITU-T)	DCT	2-40 Mbps	up to HDTV	Broadcast / Conversational
MPEG-4	ISO	(tbd)	9,6-28,8 kbps	no impl. yet	Mobile, Retrieval

Table 6

Image	Std. body	Technique	Compression	Quality	Application
JBIG, (T.82)	ISO/ITU-T	TCM	250:1	lossless	Bi-level image (e.g. fax)
JPEG, (T.81)	ISO/ITU-T	DCT	30-80:1 (lossy) 2:1 (lossless)	variable (compr. vs. quality)	continuous tone, colour images

Application specific activities

Table 7

Document no.	Short Title	Comments
DE/JTC-DVB-1 (stopped)	DVB, Part 1 - Baseband image coding	Related to ITU-T H.262
DE/JTC-DVB-2 (stopped)	DVB, Part 2 - Baseband sound coding	Related to ISO/IEC 13818-3
DE/JTC-DVB-3 (stopped)	DVB, Part 3 - Baseband data service coding	
ETS 300 472	DVB, Part 4 - Multiplexing	Related to ISO/IEC 13818-1, and ITU-T H.222.0 (H.222.1)
DE/JTC-DVB-9	DVB, Common scrambling system	
MI/NA 051107 (stopped)	Studies related to ISO/IEC MPEG activities in relation to the ITU-T video coding work	Related to ITU-T H.262
DE/NA 051106 (stopped)	Conformance tests for ETS 300 142	
DI/NA 051105	Video coding for ATM environments	Studies for ATM & B-ISDN networks. Related to ITU-T H.262, (ISO/IEC 13818-2)
DI/NA 051110 (stopped)	Video source encoding for digital TV	Studies for digital TV applications

Multiplexing

Table 8

Document no.	Short Title	Comments
ITU-T: (under study)	Multiplexing & c. for distribution services including television	
ITU-T: (under study)	Multiplexing for storage/retrieval services	

Videotex

Table 9

Document no.	Short Title	Comments
prETS 300 072	Extension videotex data syntax for alpha-mosaic display,	Related to ITU-T T.101 (1995)
ETS 300 073	Geometric Display,	Related to ITU-T T.101 (1995)
ETS 300 074	Transparent Data,	Related to ITU-T T.101 (1995)
ETS 300 076	Videotex; Terminal Facility Identifier,	Related to ITU-T T.101 (1995)
ETS 300 149	Audio Syntax,	Related to ITU-T T.101 Annex E
ETS 300 177	Videotex; Photographic Syntax,	ITU-T T.101 Annex F
ETS 300 222	Framework of Videotex Terminal Protocols,	Related to ITU-T T.106
IETF	HTML	

Adaption services

Table 10

Document no.	Short Title	Comments
ITU-T J.52	System and sound-programme channels on ISDN,	Adoption of ITU-T H.221 frame structure for sending MPEG audio over multiple dial-up ISDN
ITU-T J.82	Transport of CBR television signals in B-ISDN	MPEG-2 systems applied to carrying broadcast TV; aligned with ITU-T H.222.1

5.3.1.3 Assessment of standardization in this area

Standardization for Videotex is covered, however, enhancements are desirable in direction of Multiservice-terminal functions.

For other retrieval services, many areas are not yet covered. Identified gaps are mentioned in subclause 8.1.2

5.3.2 Interfaces to the connection functions

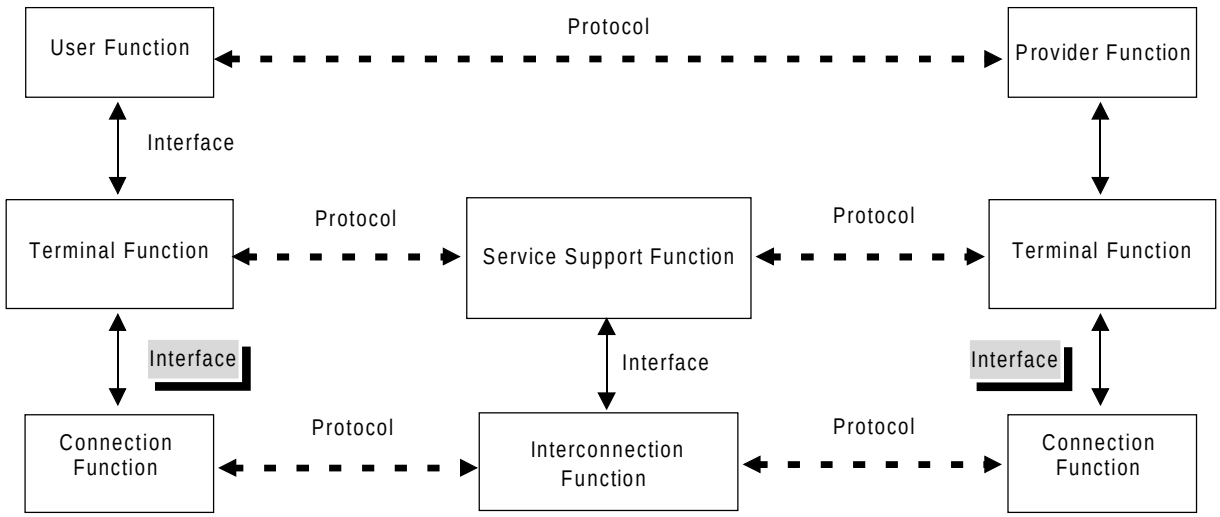

Figure 7: Terminal Interfaces to connection functions

5.3.2.1 Description

These interfaces offer Terminal Functions access to Connection Functions in a more consistent and "usable" manner. Thus, different implementations of particular Connection Functions will have the same interface.

5.3.2.2 Existing standards and work items

API general

Table 11

Document no.	Short Title	Comments
MMCF	Multimedia Communication Forum's "Transport Services Interface"	Model and concepts behind a network independent API
DAVIC A0	Process core to network interface.	Interface within a Set Top Box between the Set Top Unit and the Network Interface Unit.

Videotex interfacing to bearer services

Table 12

Document no.	Short Title	Comments
ETS 300 079	ISDN-Videotex Circuit Mode	Related to ITU-T T.102
ETS 300 218	Syntax Based Videotex Lower Layer Protocols for ISDN Packet Mode	Related to ITU-T T.103
ETS 300 221	Syntax Based Videotex Lower Layer Protocols using Packet Mode Access over the PSTN	Related to ITU-T T.104

PCI

Table 13

Document no.	Short Title	Comments
prETS 300 697 parts 1 to 4	PCI for Euro-ISDN conformance testing: prt 1: Test Suite Structure and Test Purposes for the PCI User Facility; prt 2: Abstract Test Suite of the PCI User Facility; prt 3: Test Suite Structure and Test Purposes for the Network Access Facility; prt 4: Abstract Test Suite of the Network Access Facility	Requirements specification: - provision of TSS & TP for PUF; - provision of ATS for PUF; - provision of TSS & TP for NAF; - provision of ATS fro NAF
DE/TE - 02032	PCI for Multimedia applications	Defining PCI applicable to Multimedia applications by taking of existing work on PCI.
prETS 300 325 (edition 2)	Provision of a harmonized PCI for Euro-ISDN	PCI provides facilities for accessing and administering services on B/D channels.
DTR/TE 02025	General architecture for PCIs	Definition of terminology, PUF & NAF taxonomies, interworking, portability, integration, testing.
MI/TE 02013	Enhancement of CCITT T.30 protocol T.30 - PCI	Including new functionalities

5.3.2.3 Assessment of standardization in this area

Standardization for Videotex is covered, and for other retrieval services work is in progress, however, standardization of interactive audio-visual retrieval services on narrow band networks without data facility has not been started. In addition, access to an enhanced Videotex service using a combined Videotex and Integrated Services Digital Network (ISDN) videotelephony terminal should also be considered. This gap is mentioned in subclause 8.1.5 (a).

At the time of publication, ETSI is studying the needs for a generic PCI (or several PCIs) for Multimedia. The work item for this study is DTR/TE-02034. The outcome of this study will structure the existing and future PCIs in accordance with existing PCI models and discusses briefly the need for future extension or creation of specific PCIs (see subclause 8.1.5 b)).

5.3.3 Protocols to service support

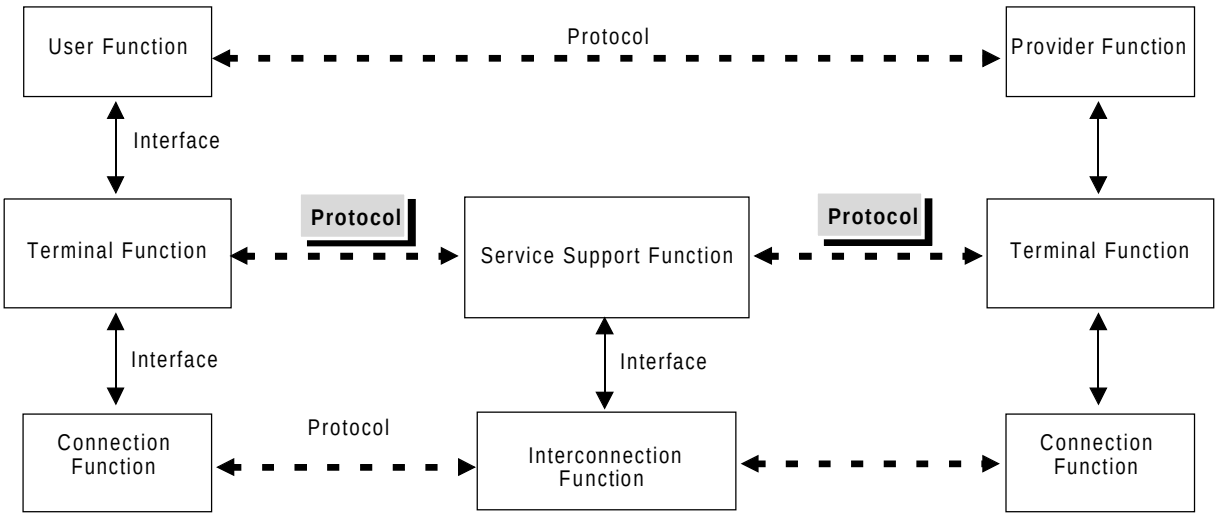

Figure 8: Terminal to service protocols

5.3.3.1 Description

Protocols from Terminal to Service, in general, deal with ensuring the format of information from the output of a Terminal Function complies with the format expected at the input to a Service Function. For example:

- session establishment/ termination;
- choice of service provider and principal service specific information (e.g. menu information flow);
- definition of quality of service parameters, resource requirements etc.

5.3.3.2 Existing standards and work items

Table 14

Document no.	Short Title	Comments
DAVIC S3	(Principal) service related control flow	Between Server and a "Core Network", and a "Core Network" and the Terminal
ETR 228	Broadband Multimedia Information retrieval services	Study of technical options in implementing MIRS and applicability of videotex over high-speed networks
ETR 075	Interchange representation of access restrictions to information within M&HIRS,	Not studied in ITU-T
ETR 162	Allocation of "service information" codes for DVB systems	Supplements ETS 300 468: - Network id; - Bouquet id; - Cond. access id, (encryption); - Country code
prETS 300 231	TV systems - specification of the domestic video Programme Delivery Control system,	Data broadcasting system; carries programme related info. for use by suitably equipped domestic VCRs.
ITU-T X.500	Directory Services	ISO/IEC 9594-1 to 9594-7
IETF	TCP/UDP	TCP in a connection-oriented or connection-less environment.
ISO DIS 13818- 6	MPEG-2 Digital Storage Media - Command and Control extension (DSM-CC), (User - Network)	Used for DAVIC S3, (see above).
OMG	IDL at Layer 6	Provides a complete formal description language which allows specification of APIs.
OMG	UNO Specification for negotiation of Layer 5 protocols	

Videotex

Table 15

Document no.	Short Title	Comments
ETS 300 223	Syntax-based Videotex Application Layer Protocol,	Related to ITU-T T.105
I-ETS 300 236	Syntax-based Videotex Protocol Terminal Conformance Testing	Not studied in ITU-T

File Transfer

Table 16

Document no.	Short Title	Comments
ETS 300 075	Videotex Processable Data	Extended to: - indicate size of a compressed file; - clarify the use of character sets; - identify new file contents
ETS 300 383	ISDN - File Transfer over ISDN. EUROFILE transfer profile	Not studied in ITU-T
ETS 300 388	ISDN - File Transfer over based on simple FTAM profile	Profile of ISO IS 8571, File Transfer & Access Management (FTAM)
I-ETS 300 490	Conformance test for file transfer over ISDN	Not studied in ITU-T
IETF	HTTP	

5.3.3.3 Assessment of standardization in this area

Standardization for Videotex is covered, however enhancements are possible.

For retrieval services under consideration by DAVIC, work is in progress. "MPEG-2 part 6 (DSM-CC) User-Network" is used between a Terminal Function and a Service Function (the term "User-Network" is not related to the Interconnection Function), (see subclause 8.1.6 b)).

Use of the T.120 series of ITU-T Recommendations in relation to retrieval services is regarded as a gap (see subclause 8.1.6 c)). ITU-T Recommendation H.245 was standardized by ITU-T as a "general multimedia control" recommendation. It is intended to cover both conversational and non-conversational services. The later might be in conflict with DSM-CC and the T.120 provided control. Several Multimedia multiplexing schemes were defined in a general manner by ITU-T (ITU-T Recommendations H.221, H.222, H.223 and H.225). These are intended to also cover non-conversational services.

5.3.4 Protocols to other terminal functions

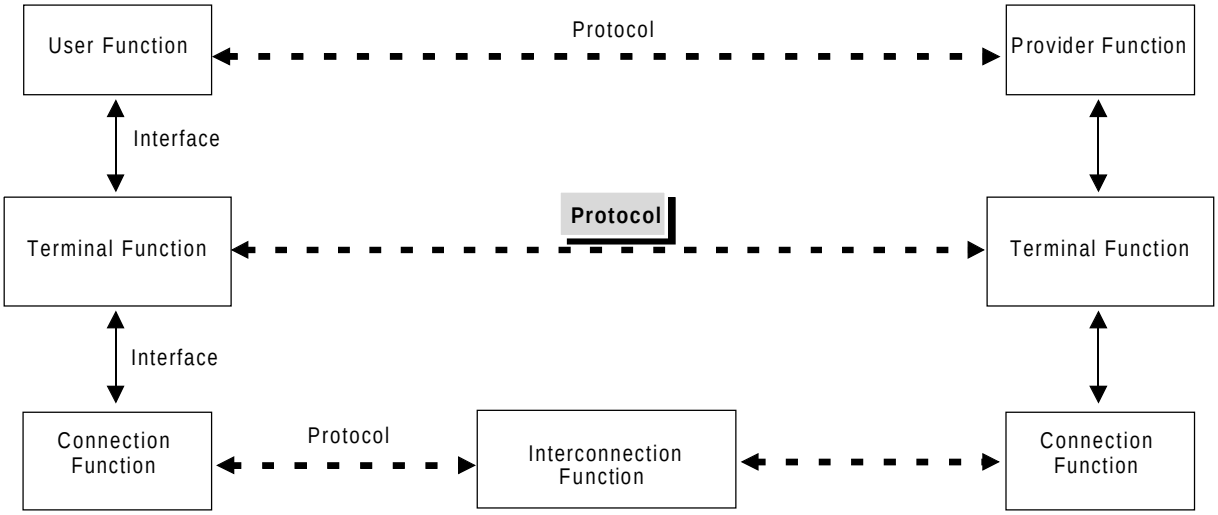

Figure 9: Terminal protocols to other terminal functions

5.3.4.1 Description

Protocols between Terminals, in general, deal with ensuring the format of information from the output of one Terminal Function complies with the format expected at the input to another Terminal Function. In this scenario a terminal is connected directly to a server without any intermediate Service Support Function. The protocols used in this case could be the same as mentioned in subclauses 5.2.3 and 5.3.3.

5.3.4.2 Existing standards and work items

All of subclauses 5.2.3.2 and 5.3.3.2.

5.3.4.3 Assessment of standardization in this area

As this scenario is not very likely to happen for Retrieval Services, there is no need for standardization in this particular area.

5.4 Service support functions

5.4.1 Functions

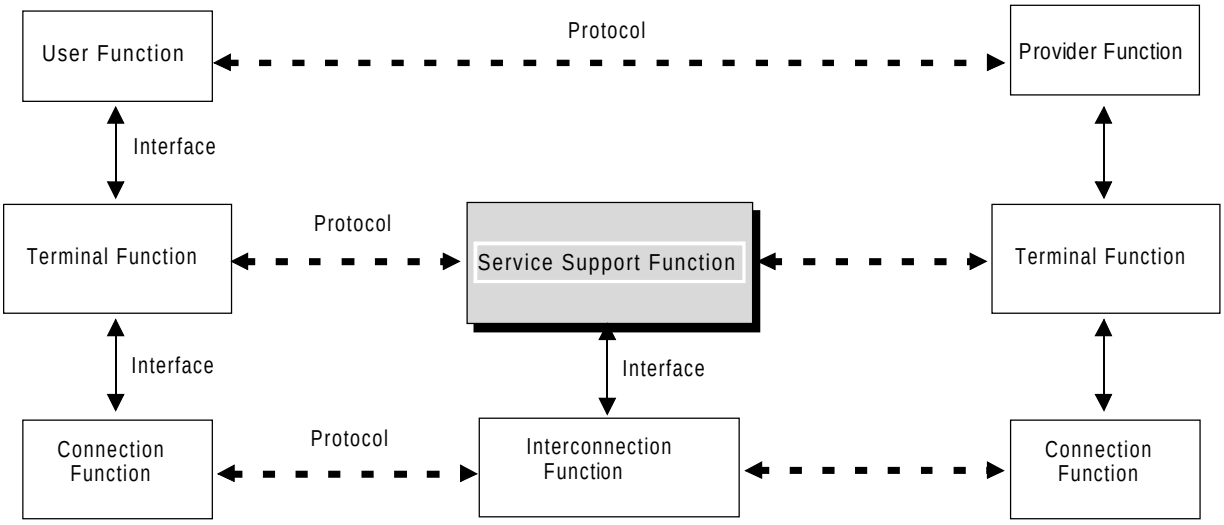

Figure 10: Service functions

5.4.1.1 Description

The category of Service Functions contains all functions which are independent of any particular transport technology.

5.4.1.2 Existing standards and work items

Table 17

Document no.	Short Title	Comments
DTR/TE 01065	Interworking between Videotex and Internet	
ETS 300 262	Syntax based Videotex service	Service Description
ETS 300 472	Specification for carrying Teletext in DVB bit-streams	Method, (and requirements), by which WST may be carried in DVB bit-streams.
ITU-T F.740	AudioVisual interactive services, general	

Messaging

Table 18

Document no.	Short Title	Comments
ISO/IEC 10611 **ISO/IEC 12062** **ISO/IE 12063**	MHS Profiles - Common Messaging - Interpersonal Messaging - EDI Messaging	Services of & communication between: - MTS entities - IPM entities - EDIMS entities
DTR/TE 03051	Provision for MHS base standard PICS proforma	To align X.400 and ISP PICS proformas, (necessary amendments).

5.4.1.3 Assessment of standardization in this area

Other Retrieval Services in this area not yet covered by standards are mentioned in subclause 8.1.3. Also, refer to assessment in subclause 5.4.3.3.

5.4.2 Interfaces to access the interconnection functions

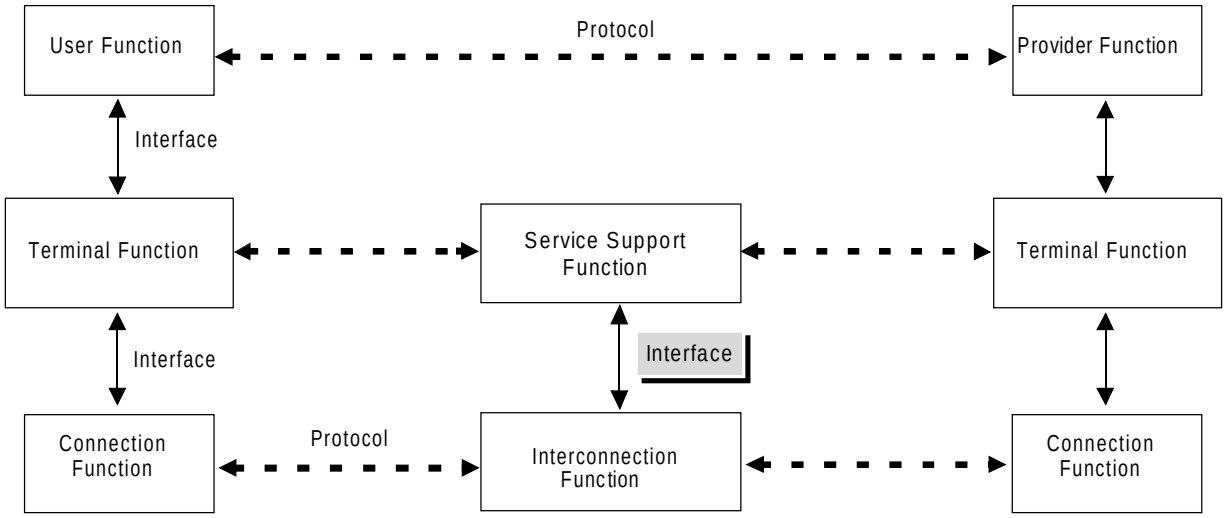

Figure 11: Service interfaces to interconnection functions

5.4.2.1 Description

The interface offers the services of the Interconnection Function to the Service Support Function. The Service Support Function can use the interface to control the Interconnection Function.

5.4.2.2 Existing standards and work items

The same as listed in subclause 5.3.2.2.

5.4.2.3 Assessment of standardization in this area

Standardization for Videotex is covered, for other retrieval services work is in progress. No specific gap is mentioned in subclause 8.1.5.

5.4.3 Protocols to other service support functions

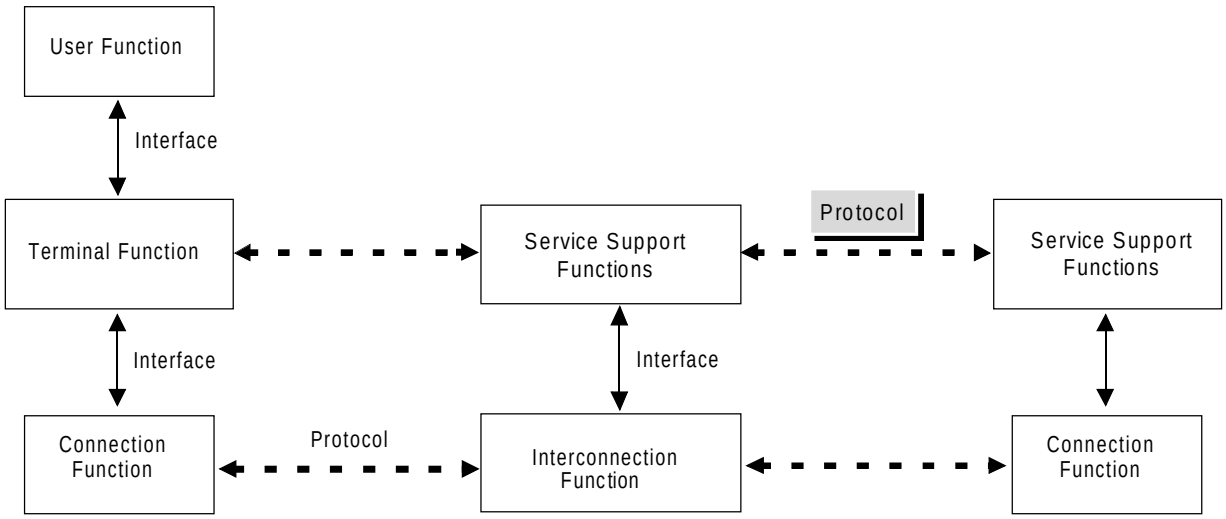

Figure 12: Service to service protocols

5.4.3.1 Description

Protocols between Services, in general, deal with ensuring the format of information from the output of one Service Function complies with the format expected at the input to another Service Function. The protocols have to fulfil requirements of the "distributed servers/distributed services" concept.

5.4.3.2 Existing standards and work items

Table 19

Document no.	Short Title	Comments
ETS 300 223	Syntax-based Videotex Application Layer Protocol	Related to ITU-T T.105
DTR/TE 03052	MHS, gateway behaviour	Spec. of general characteristics of a gateway (ITU-T X.400 to non-X.400). How functionalities are mapped & carried.

5.4.3.3 Assessment of standardization in this area

In the Videotex environment a "distributed server/distributed services" concept can be realized by using ETS 300 223. For other retrieval services investigations have started. This gap is mentioned in subclause 8.1.3 (c).

6 Teleconference services

6.1 General description

There exists a vast array of specifications and investigation work in the area of Teleconferencing Services, both in standards bodies and industry fora. In particular ITU-T has a strong base of specifications oriented mainly around Multimedia conferencing services over ISDN. Industry fora are in general attempting to become more infrastructure independent, and generally all bodies are making tentative steps towards Broadband platforms.

Components of the H.series and T.series of ITU-T Recommendations are mapped into the Functional Model in the following subclauses. The system specifications are mentioned here.

NOTE 1: For reasons of clarity, the numerous references to ITU-T publications shown in tables contained in the following subclauses are presented in a shortened format, e.g. ITU-T T.107 means ITU-T Recommendation T.107.

NOTE 2: References to ETSI work item numbers shown in tables contained in the following subclauses do not imply availability of the document, merely that the item is under study.

Table 20

Document number	Short Title
ITU-T H.310	Visual telephone systems and equipment for B-ISDN
ITU-T H.320	Visual telephone systems and equipment for ISDN
ITU-T H.321, (H.320 over ATM)	Visual telephone systems and equipment for ATM
ITU-T H.322	Visual telephone systems and equipment for LANs of guaranteed QoS
ITU-T H.323	Visual telephone systems and equipment for LANs without guaranteed QoS
ITU-T H.324	Visual telephone systems and equipment for PSTN
ITU-T H.32M	Visual telephone systems and equipment for mobile use
V.DSVD, (ITU-T V.70)	Digital Simultaneous Voice and Data, platform for PSTN
V.ASVD, (ITU-T V.60)	Analogue Simultaneous Voice and Data, platform for PSTN
ITU-T T.120	Architecture for Multipoint Multimedia datacommunications
ITU-T T.130 (under study)	Architecture for Real Time Multimedia conferencing

The equivalent of the above documents in ETSI is mentioned below. However, ETSI concentrates on ISDN. There is no ETSI equivalent of H.310, H.322/3. An ETSI equivalent of H.324 is proposed.

Table 21

Document no.	Short Title	Comments
DE/NA 010029 (stopped)	Broadband Videotelephony services; Service description	
ETS 300 111	ISDN - Telephony 3,1 kHz teleservice, Service description	
ETS 300 145	ISDN - Audio visual services; Videotelephony Systems and Terminal Equipment operating on one or two 64 kbit/s channels	Like ITU-T H.320 but so far only 1B/2B videotelephony; tighter wording and more on call transfer, etc. Edition 2 ~ end-95: Not so much change
ETS 300 263	ISDN - Telephony 7 kHz teleservice, Service description	Related to ITU-T F.721
ETS 300 264	ISDN - Videotelephony teleservice, Service description	Stage 1 description. Related to ITU-T F.700 series.
ETS 300 678	ISDN - Videoconference teleservice, Service description	Related to ITU-T F.730 and F.731
prETS 300 675	ISDN - Audiographic conference teleservice, Service description	Related to ITU-T F.710 and F.711

ITU-T service descriptions

Table 22

Document number	Short Title
ITU-T F.MDS	Multimedia Distribution Services
ITU-T F.MDV	Multimedia Delivery Services
ITU-T F.700	AudioVisual Multimedia services
ITU-T F.701	Teleconference service
ITU-T F.710	General principles for audiographic conference service
ITU-T F.711	Audiographic conference teleservice for ISDN
ITU-T F.720	Videotelephony services, general
ITU-T F.721	Videotelephony teleservice for ISDN
ITU-T F.722	Videotelephony teleservice for B-ISDN
ITU-T F.723	Videotelephony teleservice for PSTN
ITU-T F.730	Videoconference services, general
ITU-T F.731	Videoconference services for ISDN
ITU-T F.732	Videoconference services for B-ISDN

NOTE 3: Due to lack of contributions, the studies of ITU-T F.MDS, F.MDV, F.722, and F.732 could be stopped.

All the above documents are mentioned in this introductory subclause, because they do not map directly into any one particular area of the Function Model, but give overall system functionality.

6.2 User

6.2.1 Functions

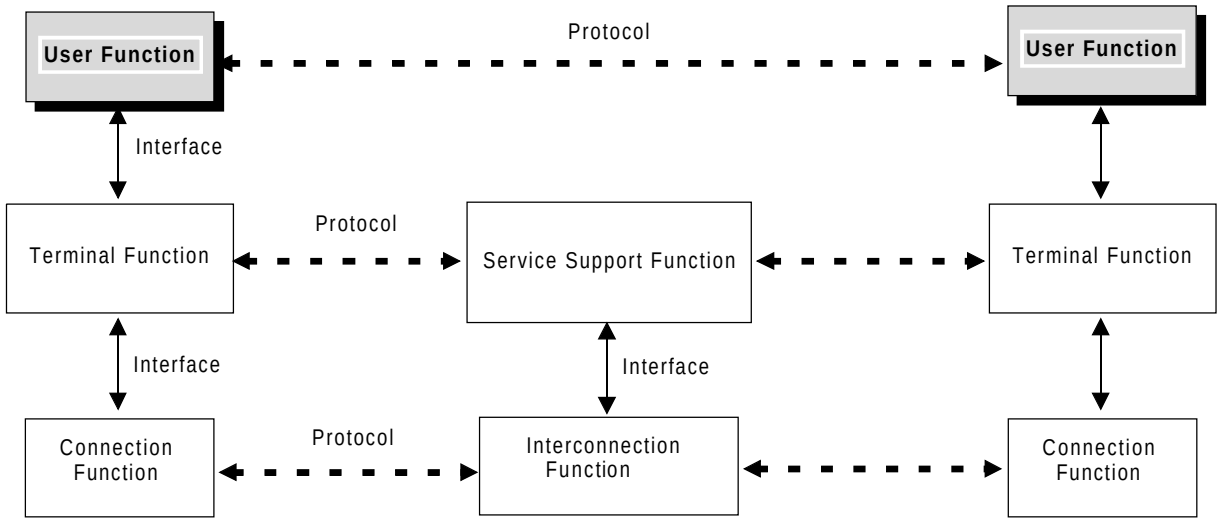

Figure 13: User Functions

6.2.1.1 Description

The category of User Functions are implementations of software applications of any of the Terminal, Service and Connection and Interconnection Functions.

6.2.1.2 Existing standards and work items

Table 23

Document no.	Short Title	Comments
ETR 297	Human factors in Videotelephony, (Part 2).	Aspects of controls and indications in videotelephony, within an emphasis on usability.
ETR 160	Human factors aspects of multimedia telecommunications	
DTR/HF 01019 (stopped)	Human factors issues in PSTN Videotelephony.	To define & comment on design and usability issues.
TC TR 005	Videotelephony for conference interpreters.	Not studied in ITU-T
ETR 198	User trials of user control procedures in ISDN video telephony	Summary of PT16V work. Evaluation studies and recommendations. Not studied in ITU-T
DTR/HF 03004 (stopped)	Usability checklist for videophone terminals	Concerns physical characteristics and dialogue design principles. Not studied in ITU-T
ITU-T E.121	Pictograms, symbols and icons to assist users of the telephone service	
prETS 300 375	Pictograms for point-to-point Videotelephony	Symbols and icons to assist users of the telephone service
prI-ETS 300 302	ISDN Videotelephony teleservice - Audio aspects - Electroacoustic characteristics for 3,1 kHz bandwidth handset terminals. - Electroacoustic characteristics for 3,1 kHz bandwidth loudspeaking and hands-free terminals - Wideband handset - Wideband coding and loudspeaking or hands - free function	videotelephony terminals using ITU-T G.711, G.722, G.728

6.2.1.3 Assessment of standardization in this area

This area is mostly proprietary, in which developers create functions dependent on the type of application, however some media conversion functions could be considered for standardization, (as in the retrieval area). See subclause 8.2.1 a).

Some human factor considerations are available in ETSI. Audio characteristics (sensitivity, noise, etc.) for Videotelephony are already specified by ETSI. Echo control, voice switching and voice signal processing need further consideration (see subclause 8.2.1 b)).

In addition, there are a number of issues concerning Co-operative Document Handling applications, mentioned in subclause 8.2.1 c).

6.2.2 Interfaces to the Terminal

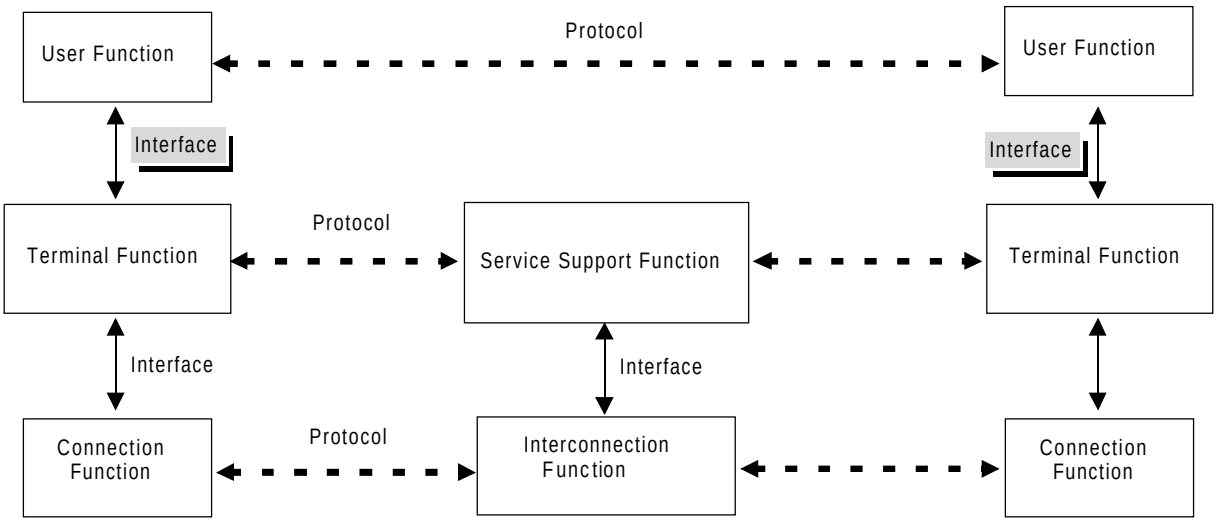

Figure 14: User interfaces to the terminal

6.2.2.1 Description

These interfaces offer access to Terminal Functions in a more consistent and "usable" manner. Thus, different implementations of a particular Terminal Functions will have the same interface.

6.2.2.2 Existing standards and work items

Table 24

Document no.	Short Title	Comments
ETS 300 243-1	PCI for fax, teletex and telex services	Easy access from local applications to communication applications.
DE/TE 01043	API for simple file transfer over ISDN,	Service definition for 2 protocol stacks: ETS 300 075/EN 41216, (ISP10607), "Simple FTAM". Not studied in ITU-T
ITU-T T.121	Generic application template	a guide rather than a recommendation

6.2.2.3 Assessment of standardization in this area

This is an area of concern within ETSI. Proprietary interfaces have been derived in this area, since terminal architectures vary with different implementations (see subclause 8.2.4).

A real application is likely to involve software in the PC environment: operating system, libraries, windows, menus, and so on. There may be standards in this area, (in fact the user will have incompatibility problems if not), but they are not likely to be set in the ITU or ETSI. It is better to go for "openness" at this level, to encourage a wide range of applications-software writers to provide for different market sectors. However, the question of APIs and, more generally, software interfaces, is a serious one for multimedia vendors and users - study now under way (see also MPEG/Audio Visual Information (AVI) and API).

6.2.3 Protocols to other user functions

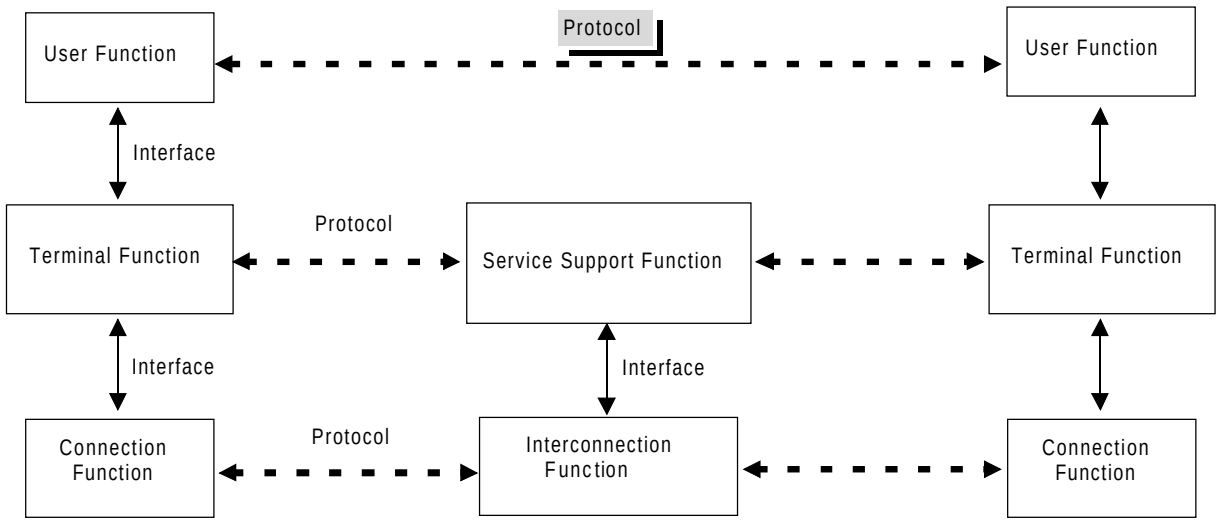

Figure 15: User protocols to other user functions

6.2.3.1 Description

Protocols between Users are considered to be an abstraction of Terminal to Terminal protocols, i.e. a sensible sequence of events. The term "procedures" is commonly used at this level.

6.2.3.2 Existing standards and work items

Table 25

Document no.	Short Title	Comments
ETR 175	User procedures for multipoint Videotelephony	Consistency with point to point videotelephony

6.2.3.3 Assessment of standardization in this area

There is a need for Human Factors recommendations and guidelines in the area of User procedures. It is possible that some "User to User protocols" are covered within the specifications mentioned in subclause 6.2.1.2.

6.3 Terminal

6.3.1 Functions

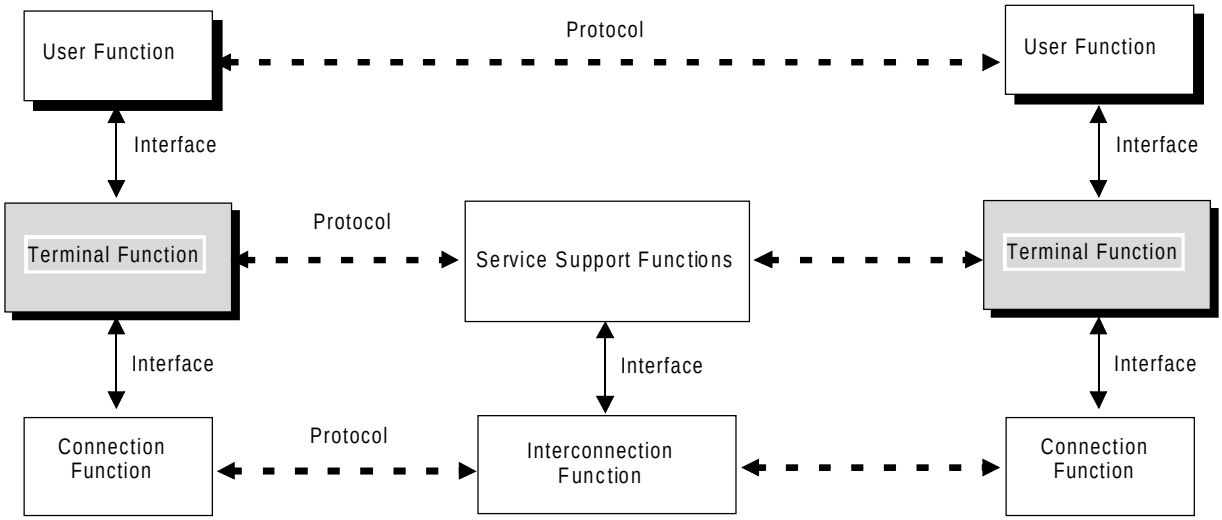

Figure 16: Terminal functions

6.3.1.1 Description

The category of Terminal contains all functions which are independent of any particular transport technology. For example, "codecs" are a major part of Terminal Functions, (although codecs are often optimized or even just intended towards a particular type of transport).

6.3.1.2 Existing standards and work items

Table 26

Audio	Std. body	Technique	Bit rate	Quality	Application
MPEG-1	ISO/IEC	sub.encoding	64-192 kbps	20 kHz	Video stereo
MPEG-2	ISO/IEC	sub.encoding	>64 kbps	20 kHz	5.1 channel
MPEG-4	ISO/IEC	under study	from 10 kbit/s up	no impl. yet	Mobile, fixed, interactive, conversational
ITU-T G.711	ITU-T	PCM	64 kbps	3,1 kHz	Telephony
ITU-T G.721	ITU-T	PCM	32 kbps	3,1 kHz	Telephony
ITU-T G.722	ITU-T	ADPCM	within 64 kbps	7 kHz	Extended b/w
ITU-T G.723.1	ITU-T	LD-CELP	5,3 and 6,3 Kbps	3,1 kHz	PSTN videotelephony
ITU-T G.726	ITU-T	ADPCM	32 kbps	3,1 kHz	Telephony
ITU-T G.728	ITU-T	LD-CELP	16 kbps	3,1 kHz	ISDN AudioVisual
ITU-T G.729	ITU-T	LD-CELP	8 kbps	3,1 kHz	Telephony
ITU-T G.729, annex A	ITU-T	under study	8 kbps	3,1 kHz	DSVD modem
ITU-T G.4kbit	ITU-T	under study	4 kbps	3,1 kHz	PSTN videotelephony
ITU-T G.WB	ITU-T	under study	16/24 kbps	7 kHz	Extended b/w

Table 27

Video	Std. body	Technique	Bit rate	Quality	Application
ETS300 142 (H.261)	ETSI (ITU-T)	DCT	64-2 048 kbps	CIF/QCIF	Videoconferencing, Videotelephony
H.263, H.263+	ITU-T	DCT	9,6k - 2 Mbit/s	CIF, QCIF, subQCIF, 4CIF, 16CIF	PSTN, ISDN Videotelephony, Videoconferencing
H.264	ITU-T	under study	LBR	Low Delay	Mobile, PSTN, ISDN
M-JPEG	proprietary	DCT	HBR	High definition	Editing video
MPEG-1	ISO	DCT	1,5 Mbps	640x480	CD-ROM
MPEG-2 (H.262)	ISO (ITU-T)	DCT	2-40 Mbps	up to HDTV	Broadcast / Conversational
MPEG-4	ISO	(tbd)	9,6-28,8 kbps	no impl. yet	Mobile, Retrieval

Table 28

Image	Std. body	Technique	Bit rate	Quality	Application
JBIG, (T.82)	ISO/ITU-T	TCM	250:1	lossless	Bi-level image (e.g. fax)
JPEG, (T.81)	ISO/ITU-T	DCT	30-80 : 1 (lossy) 2 : 1 (lossless)	variable (image qual. vs compression)	continuous tone, colour images

Application specific activities

Table 29

Document no.	Short Title	Comments
MI/NA 051107 (stopped)	Studies related to ISO/MPEG activities in relation to the CCITT video coding work	Related to ITU-T H.262
DE/NA 51106 (stopped)	Conformance tests for ETS 300 142	
DI/NA 051105	Video coding for ATM environments	Studies for ATM & B-ISDN networks. Related to ITU-T H262, (ISO/IEC 13818-2)
DI/NA 051110 (stopped)	Video source encoding for digital TV	Studies for digital TV applications
DTR/TE 04113	Videotelephone reference terminal - Technical report	Description of characteristics, taking into account audio/video/human factors

ISDN related

Table 30

Document no.	Short Title	Comments
ETR 018	Application of the BC, HLC-, LLC- information elements by terminals supporting ISDN services	
ETS 300 442	ISDN Videotelephony teleservice, terminal characteristics	mostly, but not all, cross-references
I-ETS 300 245	ISDN Technical characteristics of telephony terminals: Part 1: General Part 2: PCM A-law handset Part 3: PCM A-law loudspeaking and hands free Part 4: Additional Equipment Interface Part 5: Wideband (7 kHz) handset telephony Part 6: Wideband (7 kHz) hands free telephony Part 7: Locally generated information tones	

B-ISDN related

Table 31

Document no.	Short Title	Comments
MI/TE 05038	Terminal aspects for Broadband ISDN	Surveying other STC work; identify the need for TE standards
ITU-T H.321	Adaption of H.320 terminals for B-ISDN	Specifies how to run ITU-T H.320 compatible systems over ATM nets
DE/JTC-MACCODEC	TV systems - MAC codec (HDMAC, D/D2MAC) for use at bit rates around 140 Mbit/s	

PSTN related

Table 32

Document no.	Short Title	Comments
DI/TE-04033	PSTN - AudioVisual applications. Videotelephony systems and terminal equipment	Requirements spec. Includes: - Modems - Media coding - Interworking with ISDN - Access to Value Added Services Related to ITU-T H.324, ITU-T F.723
ITU-T H.324	Videophone systems operating at very low bitrates	

Multiplexing

Table 33

Document no.	Short Title	Comments
ETS 300 763	Conformance testing for ETS 300 142, and ETS 300 144	Specifies conformance to sequences and procedures. Not studied in ITU-T
ETS 300 143	ISDN; AudioVisual services, inband signalling procedure for AudioVisual terminals using digital channels up to 2 048 kbit/s	Like ITU-T H.242; tighter; more on fault recovery. Next rev. Jan. "96, add new material coming up in H.242
ETS 300 144	ISDN; AudioVisual services, frame structure for a 64 to 1 920 kbps channel and associated syntax for inband signalling	Like ITU-T H.221 and H.230 combined. Next rev. Jan. "96, add new material coming up in H.221
ETS 300 472	Digital Broadcasting Systems for Television, Sound and Data Services: Specification for conveying ITU-R System B Teletext in DVB bit-streams	Requirements spec. Method by which WST can be carried in DVB bit-streams
ISO/IEC 13818-1	ISO MPEG-2 systems	
ITU-T H.221.0	Multiplexing	
ITU-T H.222	Multiplexing for services in ATM	
ITU-T H.223	Multiplexing for LBR conversational Multimedia	
ITU-T H.225	Multiplexing for services on LANs without guaranteed QoS,	
V.GMUX, (V.75)	Multiplexing for V.DSVD, (V.70)	Different from ITU-T H.223. Not suitable for video.

Conference

Table 34

Document no.	Short Title	Comments
DE/TE 04043	ISDN; Conference Services. Conference terminal video and audio characteristics	Standardize terminal characteristics. Includes practical installation guide in permanent conference rooms.
ITU-T T.122 & T.125	MCS, service definition and protocol specification	Provides a transport service in a multipoint environment; i.e. application need know nothing about ITU-T H.221 or MCUs. MCS knows nothing about applications.
ITU-T T.124	Generic Conference Control	deals with overall multipoint management, including the chairman and reservation functions

Adaption and conversion services

Table 35

Document no.	Short Title	Comments
ITU-T J.52	System and sound-programme channels on ISDN	Adoption of ITU-T H.221 frame structure for sending MPEG audio over multiple dial-up ISDN
ITU-T J.82	Transport of CBR television signals in B-ISDN	MPEG-2 systems applied to carrying broadcast TV; aligned with ITU-T H.222.1

Cryptography

Table 36

Document no.	Short Title	Comments
SAGE-TR	European encryption algorithm for the use in AudioVisual systems	Hardware oriented, distribution controlled and restricted.

Management services

Table 37

Document no.	Short Title	Comments
ITU-T T.132	Real Time Link Management	(under study)

6.3.1.3 Assessment of standardization in this area

There are several limitations to ITU-T Recommendation H.320. The most important is that the terminals participating in a conference must work in the same mode, the Selected Communication Mode (SCM). The SCM defines symmetrical rates for audio, video and any data path. If one terminal operating at maximum 2B is participating in conference where all other terminals can operate in a 6B mode, there are two options:

- all terminals are working in the common 2B mode;
- the 2B terminal operates in an audio only mode, the other terminals operate in a common 6B mode.

In general, work on audio, video and still image coding algorithms cover all aspects currently required, except from a need for an algorithm or procedure for creating a split screen presentation, (e.g. 2 to 4 images in one bit-stream). This is an activity which could improve the quality of multipoint multimedia conferences where the image from several sites or sources could form a single presentation on a screen.

In the ITU-T Public Switched telephone Network (PSTN) Multimedia standardization work several incompatible Multimedia Platforms have emerged: ITU-T Recommendations H.324, V.60, V.70. H.324 are suitable for effectively carrying AudioVisual information, while V.60 and V.70 are not. There is no compatibility between any of the systems. Direct interworking is only possible by gateways or dual/triple mode implementations.

However there is a certain level of compatibility among the AudioVisual centric multimedia platforms (ITU-T Recommendations H.324, H.310, H.321, H.322, H.323) (e.g. use of ITU-T Recommendations H.261, H.263, H.245), that allows easier interworking among them. In ETSI the use of ITU-T Recommendations V.60 and V.70 as multimedia platforms is discouraged.

These gaps are summarized in subclause 8.2.2.

6.3.2 Interfaces to access the connection functions

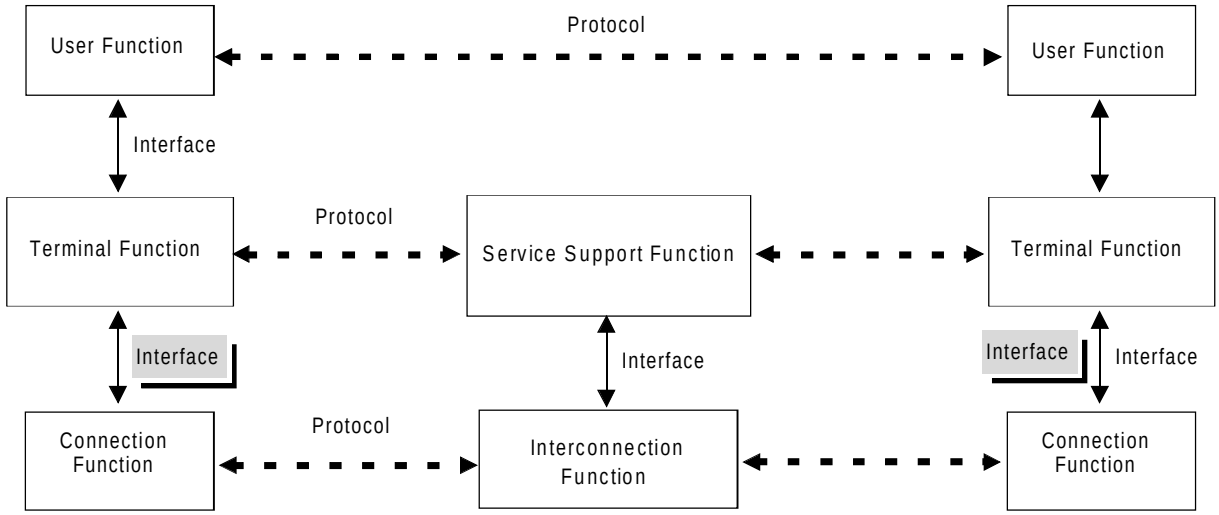

Figure 17: Terminal interfaces to connection functions

6.3.2.1 Description

These interfaces offer Terminal Functions access to Connection Functions in a more consistent and "usable" manner. Thus, different implementations of particular Connection Functions will have the same interface.

6.3.2.2 Existing standards and work items

API general

Table 38

Document no.	Short Title	Comments
DAVIC A0 interface	Process core to network interface.	
DI/HF 01018	User control procedures for ISDN Videotelephony	Convert HF-TR 002-1 to an I-ETS
ETR 170	Generic User Control procedures in ISDN terminal services	
ITU-T T.134 (under study)	Network Dependant Interface Management for PSTN	Mapping of ITU-T T.133 and T.131 Control onto PSTN. Specifies interactions and functional procedures.
ITU-T T.135 (under study)	Network Dependant Interface Management for ISDN	Mapping of ITU-T T.133 and T.131 Control onto ISDN. Specifies interactions and functional procedures.
ITU-T T.136 (under study)	Network Dependant Interface Management for LAN	Mapping of ITU-T T.133 and T.131 Control onto LAN. Specifies interactions and functional procedures.
ITU-T T.137 (under study)	Network Dependant Interface Management for ATM	Mapping of ITU-T T.133 and T.131 Control onto ATM. Specifies interactions and functional procedures.

PCI

Table 39

Document no.	Short Title	Comments
ETS 300 697 parts 1 to 4	PCI for Euro-ISDN conformance testing: - Test suite structure and purposes for the PCI User Facility - Abstract test suite of the PCI User Facility - Test suite structure and purposes for the Network Access Facility - Abstract test suite of the Network Access Facility	Requirements specification: - provision of TSS & TP for PUF - provision of ATS for PUF - provision of TSS & TP for NAF - provision of ATS fro NAF
DE/TE 02032	PCI for Multimedia applications,	Defining PCI applicable to Multimedia applications by taking of existing work on PCI
DTR/TE 02034	Generic PCI for Multimedia applications: Identification of PCIs needed	Taking into account existing work
ETS 300 325, (edition 2)	Provision of a harmonized PCI for Euro-ISDN, (Enhanced functions),	PCI provides facilities for accessing and administering services on B/D channels
DTR/TE 02025bis	General architecture for PCIs,	Definition of terminology, PUF & NAF taxonomies, interworking, portability, integration, testing
MI/TE 02013	Enhancement of CCITT T.30 protocol T.30 - PCI	Including new functionality's
MMCF	Multimedia Communication Forum's "Transport Service Interface", (TSI) concept	Model and concepts behind a network independent API

6.3.2.3 Assessment of standardization in this area

At the moment ETSI is studying the needs for a generic PCI (or several PCIs) for Multimedia. The work item for this study is DTR/TE 02034. The outcome of this study will structure the existing and future PCIs in accordance with existing PCI models and discusses briefly the need for future extension or creation of specific PCIs (see subclause 8.2.5 a)).

6.3.3 Protocols to other terminal functions

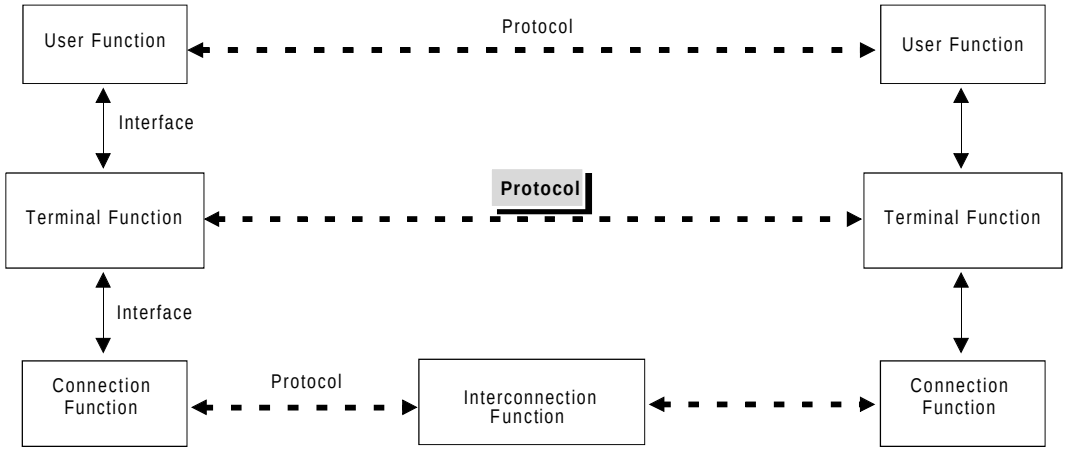

Figure 18: Terminal protocols to other terminal functions

6.3.3.1 Description

Protocols between Terminals, in general deal with ensuring the format of information from the output of one Terminal Function complies with the format expected at the input to another Terminal Function. In this scenario, a terminal is connected directly to another terminal without any intermediate Services Support function.

6.3.3.2 Existing standards and work items

Table 40

Document no.	Short Title	Comments
CD8613-15	Part 15: Video content and architectures	
ETS 300 762	Videotelephone reference terminal - data comm. using in-band signalling principles	Data communication aspects, based on prETS 300 143/144
ETS 300 763	Conformance testing for ETS 300 142, and ETS 300 144	Specifies conformance to sequences and procedures. Not studied in ITU-T
ETS 300 143	ISDN; AudioVisual services, inband signalling procedure for AudioVisual terminals using digital channels up to 2 048 kbit/s	Like ITU-T H.242; tighter; more on fault recovery. Next rev. Jan. "96, add new material coming up in H.242
ETS 300 144	ISDN; AudioVisual services, frame structure for a 64 to 1 920 kbps channel and associated syntax for inband signalling	Like ITU-T H.221 and H.230 combined. Next rev. Jan. "96, add new material coming up in H.221
ISO/IEC 10166-1 10166-2	IT - Text and Office systems - Document Filing and Retrieval. Part 1: Service definitions Part 2: Protocol Specifications	
ISO/IEC ISP 10610-1 11181-1 11182-1	IT - International Standardize d profile - FOD: - Simple document structure - Enhanced document structure - Extended document structure	- character only - char/raster/graphics/geometric - char/raster/graphics/geometric
ISO/IEC ISP 12069	IT - International Standardize d profiles - ADF. Three parts	Application profiles for document filing and retrieval.
ISO/IEC ISP	IT - International Standardize d profiles - AOD	Application profiles for ODA - profiles for interactive manipulation of ODA
ITU-T T.90rev	ISDN; lower layer protocols for telematic terminals	In-band initialisation protocols for Multimedia on ISDN
ITU-T T.126	Multipoint still image and annotation protocol	The still-image coding package: includes JPEG still-TV, JBIG binary images, G3 fax and whiteboard/mouse functions.
ITU-T T.127	Multipoint Binary File Transfer Protocol	File transfer suitable for the conference environment, not for terminal-server (search/retrieve) operations.
ITU-T T.133 (under study)	Multipoint real-time stream control service	multipoint mixing, switching, side-conference functions, remote control of cameras and other sources. Will be in several parts
ITU-T T.190	Co-operative Document Handling: Framework and basic services	
ITU-T T.191	Co-operative Document Handling: Joint Synchronous Editing, (point-to-point).	
ITU-T H.221	Frame Structure for a 64- 1 920 kbit/s channel in AudioVisual teleservices	Self contained in respect of framing and aggregation, but needs H.242 for BAS procedures. Includes flexibility in telematic/data paths, provision for sound programme circuits
ITU-T H.242	Point to point communication between AudioVisual terminals on ISDN	Procedures for the use of all the BAS facilities of H.221; enhancements for "restricted" network operation, and other facilities
ITU-T H.245	Multimedia system control	for H.222 and H.223 -based systems

(continued)

Table 40 (concluded)

Document no.	Short Title	Comments
ITU-T: **T.411,** **T.412,** **T.413,** **T.414,** **T.415,** **T.416,** **T.417,** **T.418,** **T.419**	IT - ODA and interchange format. Part 1: Introduction and general principles Part 2: Document structures Part 3: Abstract interface for the manipulation of ODA documents. Part 4: Document profile Part 5: Open Document Interchange Format Part 6: Character content architectures Part 7: Raster graphics content architectures Part 8: Geometric graphics content architectures Part 9: Audio content architectures	ISO/IEC 8613 - 1 to 9
ITU-T: T.422	Part 12: Identification of document fragments	ISO/IEC 8613 - 12
ITU-T: T.424	Part 14: Temporal relationships and non-linear structures	ISO/IEC 8613 - 14
ITU-T: T.425	Part 15: Video content architectures	ISO/IEC 8613 - 15
ITU-T: T.434	Binary file transfer format	
ITU-T: **T.435,** **T.436**	DTAM Services and Protocols	Abstract service definition and procedures for confirmed document manipulation. Protocol specifications for confirmed document manipulation.
ITU-T: T.522	Communication application profile BT1 for document bulk transfer	
prETS 300 080-1	ISDN; lower layer protocols for telematic terminals	
prETS 300 498	ODA communication service profile(s) Part 1: Basic Services Part 2: Complex Services	

6.3.3.3 Assessment of standardization in this area

ITU-T Recommendation H.324 standardization is leading to some 2nd generation videophone components: H.263, H.245, H.223 and G.723.1. This was followed by the H.310 and the H.323 standardization picking up some of these components as common blocks: H.245, H.263 and G.723.1.

In ITU-T Recommendation H.323 a similar type of "packet media multiplexing" is applied: H.225.

Migration will now occur in terms of a second generation of ITU-T Recommendation H.320 terminals, (downwards compatible to H.320) using the developed components: "H.221new", H.263, H.245, G.723.1 - target: 1998.

ETSI standards according to T.120 Recommendations framework for multipoint facilities, procedures and frame structure for Data Services in a Videoconferencing environment using n x 64 Kbps are urgently needed (see subclause 8.2.6 a)).

As for the time being, work-group computing is mostly proprietary, as "generalized application sharing", (except for ITU-T Recommendation T.126 for still images and T.127 for file transfer) is currently missing from the ITU-T Recommendations T.120, T.130 series. However, this area is under study within standards bodies.

Additionally, ETSI has developed basic ODA communication services and is developing parts of complex ODA communication services. Refer to subclause 6.2.1.3. Identified gaps are specified in subclauses 8.2.6 c), d), e).

6.3.4 Protocols to service support functions

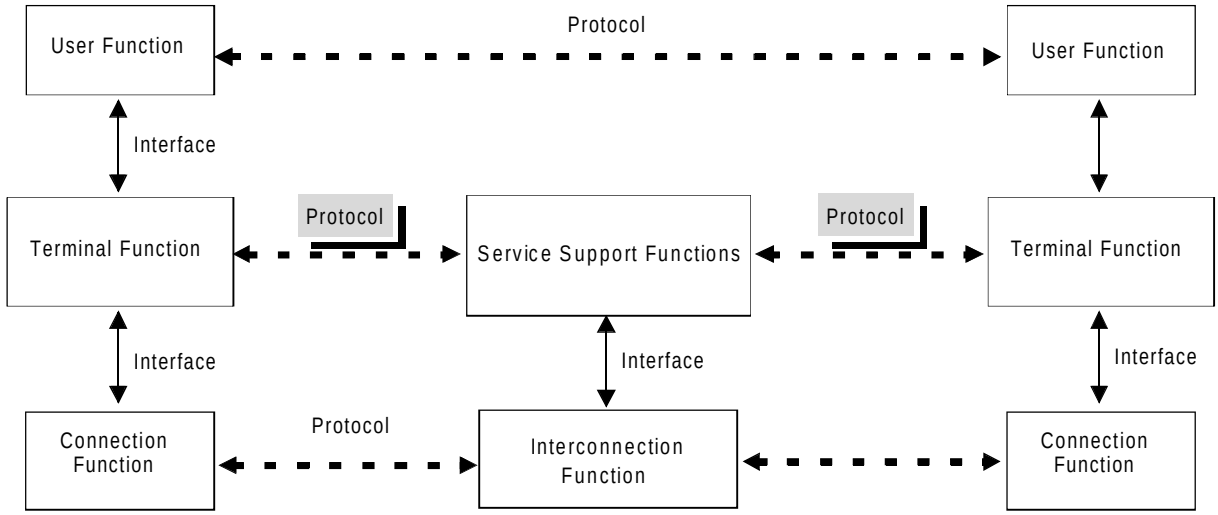

Figure 19: Terminal to service protocols

6.3.4.1 Description

Protocols from Terminal to Service, in general, deal with ensuring the format of information from the output of a Terminal Function complies with the format expected at the input to a Service Function.

6.3.4.2 Existing standards and work items

Table 41

Document no.	Short Title	Comments
MI/TE 04035	In-band signalling to be applied when invoking ECT by AudioVisual terminals	Modifying the existing standard of ECT for ISDN.
MI/TE 04034	In-band signalling to be applied when invoking ISDN supp. services by AudioVisual terminals	Modifying the existing standardized supplementary services for ISDN.
ITU-T H.224	Remote camera control	Fast protocol for remote camera control
ITU-T H.243	Communication procedures for MCUs	Procedures are described for - numbering the terminals and MCUs - chairman-control facilities - simplex data broadcast - user facilities ITU-T H.243 is being extended to cover continuous-presence multipoint.
ITU-T H.281	Far-end camera control	Closely linked to ITU-T H.224. A unidirectional scheme for telecommand of cameras, the feedback being the picture
ITU-T T.122 & T.125	MCS, service definition and protocol specification	Provides a transport service in a multipoint environment; i.e. application need know nothing about ITU-T H.221 or MCUs. MCS knows nothing about applications.
ITU-T T.133	Audio Video control application protocol	multipoint mixing, switching, side-conference functions, remote control of cameras and other sources.

6.3.4.3 Assessment of standardization in this area

This area is well covered by ITU-T Recommendation T.120 (see subclause 8.2.6 c), d), e)).

Standards should be defined for the scheduling of resources in a conference session (see subclause 8.2.6 f)).

6.4 Service support function

6.4.1 Functions

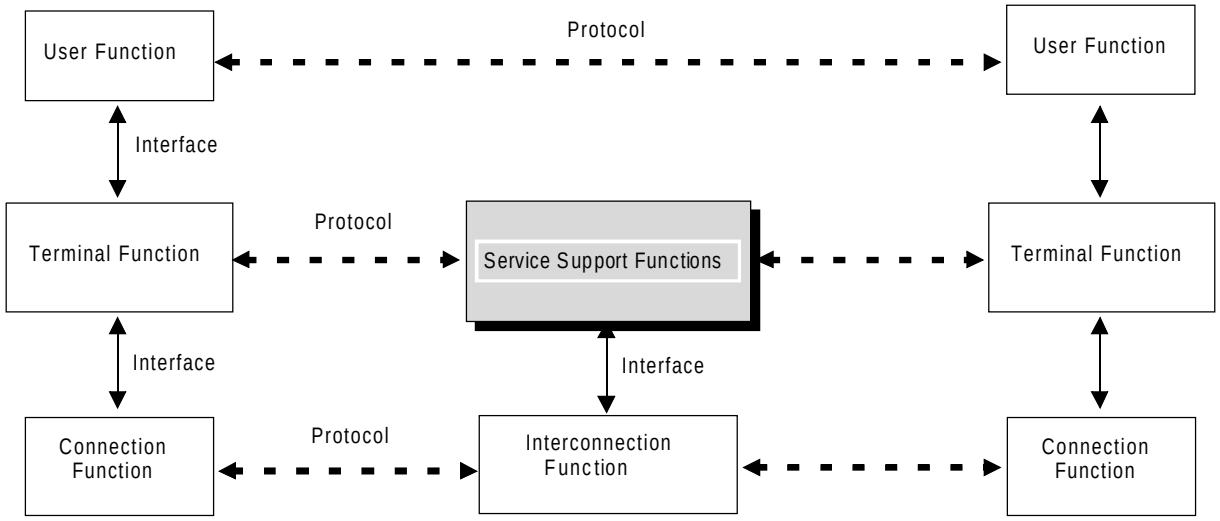

Figure 20: Service support functions

6.4.1.1 Description

The category of Service Functions contains all functions which are independent of any particular transport technology. An example of Service Functions are "multipoint" functions.

6.4.1.2 Existing standards and work items

Audiographic

This term implies a connection between two or more terminals, exchanging audio and graphic information only.

Table 42

Document no.	Short Title	Comments
ITU-T F.761	Telewriting application	
ITU-T: T.122 & T.125	MCS, service definition and protocol specification	Provides a transport service in a multipoint environment; i.e. application need know nothing about ITU-T H.221 or MCUs. MCS knows nothing about applications.
ITU-T T.124	Generic conference control	deals with overall multipoint management, including the chairman and reservation functions
ITU-T T.RES	Reservations for conference	

Videoconference/Videotelephony

The term Videotelephony implies a connection between two terminals only. The term Videoconference implies a connection between two or more terminals. The terminals are normally exchanging audio/video/graphic information

Table 43

prETS 300 483	AudioVisual services. MCU	Multipoint, like ITU-T H.231/243, but without the optional sections which clash with the ITU-T T.120 series
ETR 197	Base document on Multimedia services	Related to F.AVMM
ITU-T T.133 (under study)	Multipoint real-time stream control service	multipoint mixing, switching, side-conference functions, remote control of cameras and other sources... Will be in several parts
ITU-T H.231	MCUs for AudioVisual systems	Multipoint communication between AudioVisual terminals on ISDN. Related to ETS 300 83 ITU-T H.231 extends ITU-T H.221/230/242, clarifying what an MCU is or can be, how it can mix or switch audio and video, how to classify an MCU
ITU-T H.331	Dial-up information services from videophones	Modified ITU-T H.242 scheme, to access information services by ISDN number

Encryption

Table 44

Document no.	Short Title	Comments
ITU-T H.233	Confidentiality system	Method for encrypting all signals carried in ITU-T H.221 frames, using one of a choice of algorithms listed in ISO 9979 register.
ITU-T H.234	Encryption key management and Authentication system for AV services	Shows how to use ISO 8732, Diffie-Hellman and RSA; intended for use with ITU-T H.233, but could be more widely applicable

Management services

Table 45

Document no.	Short Title	Comments
ITU-T T.132 (under study)	Real Time Link Management	
ITU-T H.245	Multimedia system control	for ITU-T H.222 and H.223 -based systems

6.4.1.3 Assessment of standardization in this area

The concept of several information sources producing data which is sent out in different directions over networks of various kinds, and then processed by several physically separated "information sinks" is a complex one. Multipoint is not just a simple matter of extending the point to point case. Standardization should attempt to bring together the various aspects of conferencing:

1) Network level, (the "MCU"): providing the capability to replicate information at certain points in the networks so that replication is optimized;

2) Access: centralized floor, (or token), passing mechanisms, versus distributed mechanisms, such as "collision sensing";

3) Coding: combining information, (voice or video or data or combinations), processing, and perhaps separating it out again, so as to retain the integrity of the information.

ITU-T Recommendation H.231 (75101) describes a multipoint control unit. The recommendation defines several types of MCU and the minimum functional requirements of each type. The main idea is that all terminals conforming to ITU-T Recommendation H.320 and/or ETS 300 145 can participate in a conference.

The generation of video signals distributed to the participants of a conference is based on switching techniques:

1) the signal broadcast to conferees is the picture of the current speaker (largest audio input signal); in this case the signal sent to the current speaker is the signal received from the previous speaker;

2) the signal sent to the conferees is selected according to a special operating mode:

   - a terminal requires broadcasting its video to all other conferees (one at a time);

   - the broadcasting of the video signal is controlled by a conference chair.

Most MCUs on the markets today are based on alternative 1. This is also a consequence of the fact that there are few terminals on the market that support functions that are required for alternative 2.

ETS 300 483 is an ETSI standard specifying the basic requirements to an MCU. The requirements are based on requirements and procedures specified in the ITU-T Recommendations H.231 and H.243. An informative annex to this standard describes basic and enhanced functionalities applicable to AudioVisual terminals participating in a multipoint conference.

The new standardization areas related to multipoint functions and MCUs are:

- heterogeneous multipoint services, i.e. conferences where the requirements to the capabilities of the terminals participating in a conference are less than the present requirement;

- multipoint access control, participant verification and security;

- split image functions;

- identification and development of standards fitting the ITU-T Recommendation T.120 framework.

The ITU-T T.120 series of Recommendations specifies protocols and applications for Multipoint conferencing. The protocol stack is described for several networks, PSTN, Circuit Switched Public Data Network (CSPDN), Packet Switched Public Data Network (PSPDN), ISDN. The ISDN protocol stack is based on the framing specified in ITU-T Recommendation H.221/ETS 300 144 using the Multi Layer Protocol (MLP)/H-MLP logical channel. A provisional protocol stack for Broadband-ISDN (B-ISDN) is described in an annex to ITU-T Recommendation T.123.

The ITU-T T.120 series of recommendations are being extended to incorporate Real Time Audio-Video extensions, (ITU-T Recommendation T.130 series), (see subclause 8.2.6 b)). The MCUs of the ITU-T Recommendations H.231/H.243 and the T.120/T.130 worlds have to be brought together in a harmonized manner. Potential overlap of functions and standards between H.231/H.243 and the future T.130 series must be avoided.

6.4.2 Interfaces to access the interconnection functions

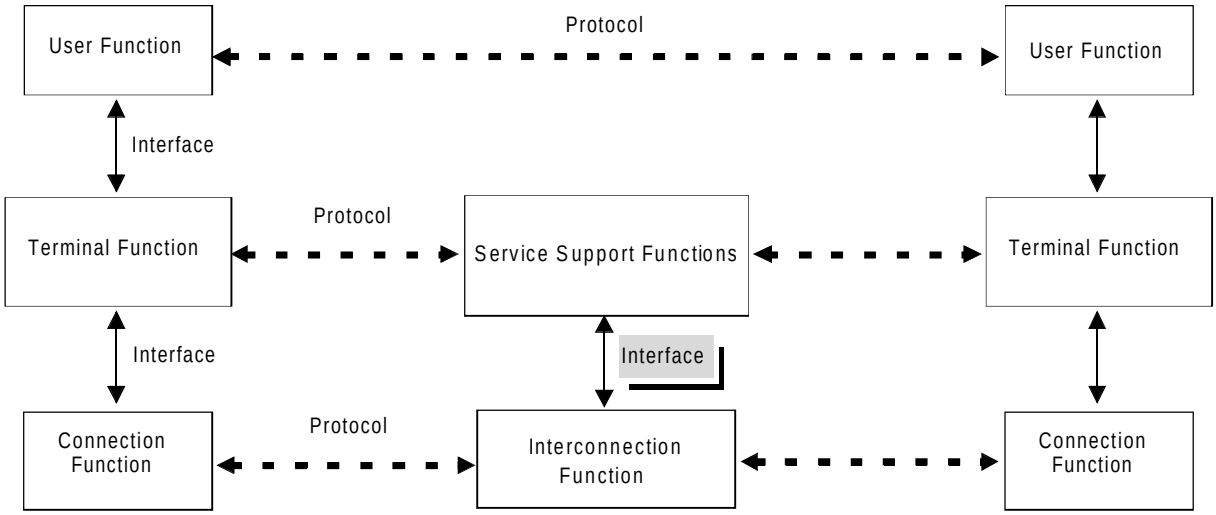

Figure 21: Service interfaces to interconnection functions

6.4.2.1 Description

These interfaces offer Terminal Functions access to Interconnection Functions in a more consistent and "usable" manner. Thus, different implementations of a particular Interconnection Functions will have the same interface.

6.4.2.2 Existing standards and work items

The same as listed in subclause 6.3.2.2.

6.4.2.3 Assessment of standardization in this area

The future extension or creation of specific PCIs will give an indication of the areas needed for standardization (see subclause 8.2.5 a)).

6.4.3 Protocols to other service support

6.4.3.1 Description

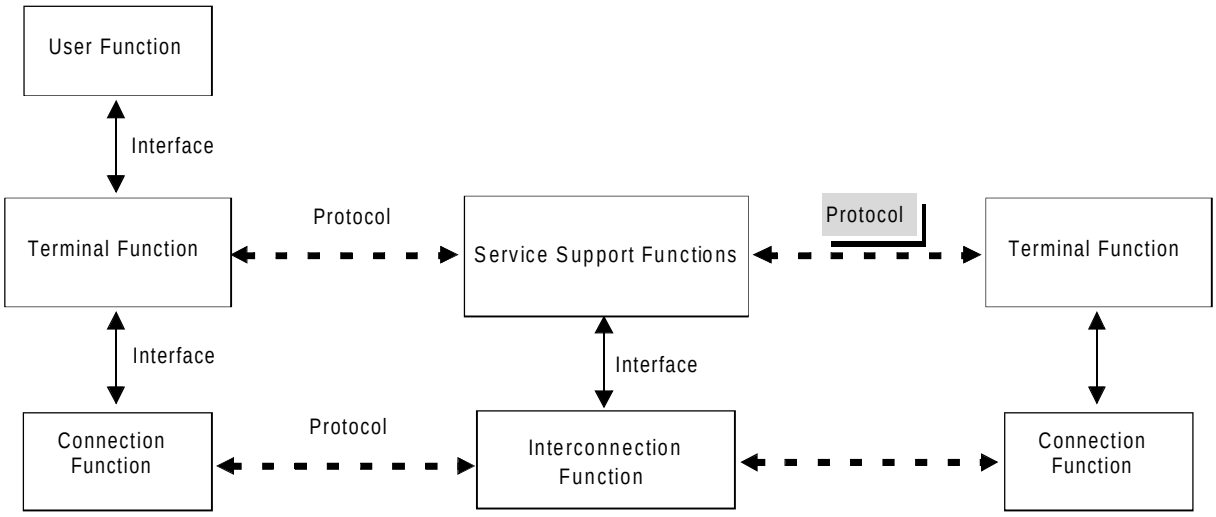

Figure 22: Service to service protocols

Protocols between Services, in general, deal with ensuring the format of information from the output of one Service Function complies with the format expected at the input to another Service Function. One example is the concatenation of MCUs in a teleconference configuration.

6.4.3.2 Existing standards and work items

Table 46

Document no.	Short Title	Comments
DTR/NA-051109 (stopped)	Support of video & Multimedia services in B-ISDN	Related to ITU-T I.374. Defines multiplexing & establishment of multimedia services on B-ISDN.
ITU-T H.245	Communication procedures for PSTN Multimedia services	General multimedia control for several type of comm. networks
ITU-T H.245	Communication procedures for Broadband Multimedia services	General multimedia control for several type of comm. networks
ITU-T T.122 & T.125	MCS, service definition and protocol specification	Provides a transport service in a multipoint environment; i.e. application need know nothing about ITU-T H.221 or MCUs. MCS knows nothing about applications.

6.4.3.3 Assessment of standardization in this area

This area is well covered by ITU-T Recommendation T.120 (see subclause 8.2.6 c), d), e)).

Standards should be defined for the scheduling of resources in a conference session (see subclause 8.2.6 g), h)).

7 Interconnection

7.1 Description

The purpose of this clause is to identify standardization areas concerning present and emerging telecommunications platforms as far as support of the relationships among Terminal and Service Support Functions, with a strict focus on the needs of multimedia services and associated applications. These platforms correspond to the "lower layer" of Telecommunication Networks, (i.e. transport and control capabilities).

NOTE 1: For reasons of clarity, the numerous references to ITU-T publications shown in tables contained in the following subclauses are presented in a shortened format, e.g. ITU-T T.107 means ITU-T Recommendation T.107.

NOTE 2: References to ETSI work item numbers shown in the tables contained in the following subclauses do not imply availability of the document, merely that the item is under study.

7.2 Functions

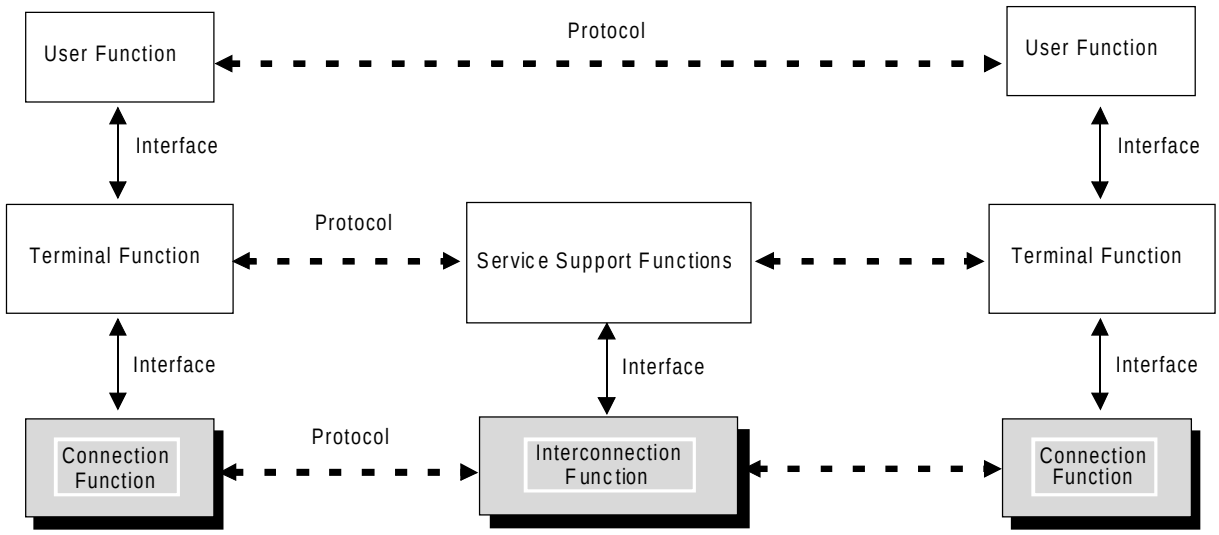

Figure 23: Interconnection functions

7.2.1 Description

The category of Interconnection Functions contains all functions which are tied to a particular type of transport technology, (i.e. 64 Kbit transport, Modem, LAN, ATM, etc.). In other words, the implementation of an Interconnection Function is dependant upon the type of transport mechanism being used.

7.2.2 Existing standards and work items

Session control

Table 47

Document no.	Short Title	Comments
ITU-T H.MMIW	Interworking of Multimedia and non-Multimedia terminals on N-ISDN.	Multimedia capability exchange and selection on ISDN
ITU-T V.8bis	In-band initialisation protocols for Multimedia on PSTN	Multimedia capability exchange and selection on N-ISDN
ITU-T Q.2939	Call control for Videotelephony on B-ISDN	
ITU-T Q.939	Call control for Videotelephony on ISDN	Describes D-channel "hand-shaking".

Connection control

Table 48

Document no.	Short Title	Comments
ETS 300 267-x	Conformance test specification for ISDN UNI for the 7 kHz telephony and Videotelephony teleservices DSS1 protocol	- Protocol Specification - TSS & TP for the user side - ATS & PIXIT for the user side - TSS & TP for the network side - ATS & PIXIT for the network side - PICS proforma Related to ITU-T X.291, X.292
prETS 300 267	ISDN; Telephony 7 kHz and Videotelephony teleservices: - Part1: DSS1 protocol - Part2: PICS proforma	Stage 3 description: D-channelling signalling for 1B/2B videotelephony. Related to ITU-T Q.931/Q.939
DTR/NA 052620 (stopped)	AAL types for the support of video and Multimedia services	Defines the AAL types for the support of CBR & VBR video & multimedia services. Related to ITU-T I.361, I.362, I.363, H.222
ETS 300 481	Channel aggregation of B-channels. Procedures and terminal requirements	Related to ITU-T H.244
ITU-T H.230	Frame-synchronous control and indication signals for AudioVisual systems	Control and indications (C&I) for ITU-T H.221-based systems.
ITU-T H.244	Synchronized aggregation of ISDN channels	How to use multiple dial-up on ISDN to get higher bit-rate connections for ITU-T H.320 terminals. includes cross-reference to ISO/IEC 13871 ("Bonding")
ITU-T I.361	B-ISDN ATM adaption layer specification	Related to DTR/NA-052620
ITU-T I.362	B-ISDN ATM layer Function Description	Related to DTR/NA-052620
ITU-T I.363x, I.363y	B-ISDN AAL types 1, 2, 3, 4, 5	Related to DTR/NA-052620
ITU-T X.291	Conformance testing ATS	Related to DE/SPS-05048
ITU-T X.292	Conformance testing TTCN	Related to DE/SPS-05048

General

Table 49

Document no.	Short Title	Comments
ETS 300 265	ISDN; Telephony 7 kHz teleservice. Functional capabilities and information flows	
ETS 300 266	ISDN; Videotelephony teleservice. . Functional capabilities and information flows	Videotelephony, stage 2 description.
ATM Forum, AAL1	CBR service	
ATM Forum, AAL5	High speed data transfer service	
DAVIC S4	Connection control	S4 is the control information flow, normally in the control plane, from a Network Service layer source object to a peer destination object
DTR/NA-051109 (stopped)	Support of video & Multimedia services in B-ISDN	Defines multiplexing & establishment of multimedia services on B-ISDN. Related to ITU-T I.374.
DTR/NA 051102 (stopped)	Impact of video coding requirements on B-ISDN design	(ITU-T H262, ISO/IEC 13818-2). Related to ITU-T I.375
ITU-T I.374	Network capabilities to support multimedia services	
ITU-T I.375	Multimedia network requirements	

7.2.3 Assessment of standardization in this area

Aspects of Connection and Interconnection Functions for PSTN, ISDN, PSPN are well covered both in ETSI and ITU-T.

Concerning ISDN Bearer Services, bandwidth negotiation, (nx64 dynamic allocation, control and synchronisation) is under consideration, as is Connection Handling.

Conformance testing is covered for existing standards.

Studies whether or not ETSs are needed to ensure successful Call Transfer between Terminals using more than one B channel in ISDN, should be performed (see subclause 8.3.1, a)).

7.3 Protocols to other interconnection functions

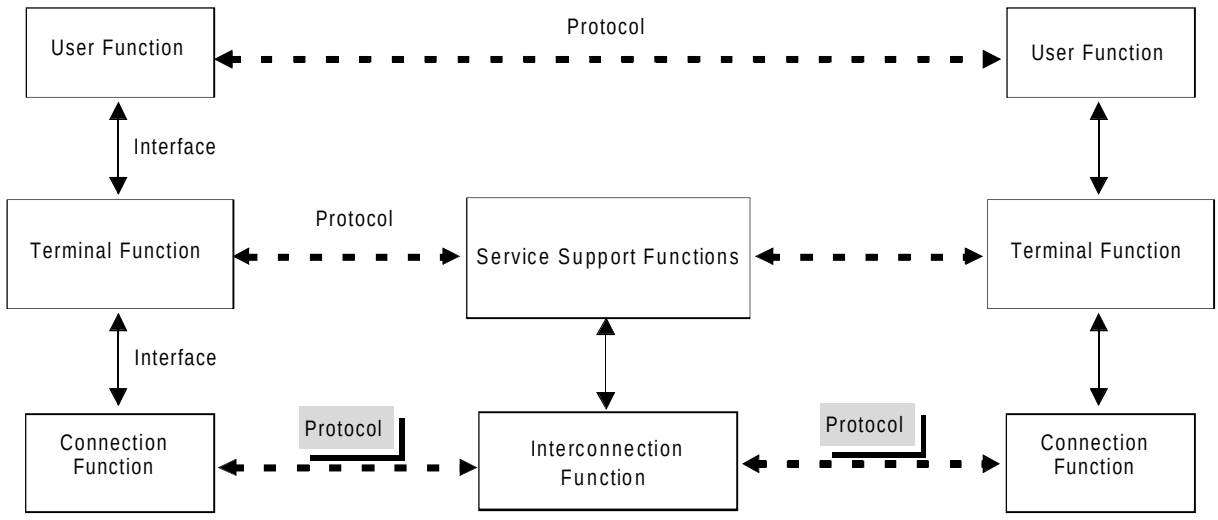

Figure 24: Protocols between interconnection functions

7.3.1 Description

The protocol between Interconnection Functions deals with aspects such as "In-band signalling", or, "communication procedures", or "interworking" between transport mechanisms.

7.3.2 Existing standards and work items

ISDN

Table 50

Document no.	Short Title	Comments
prETS 300 080, (edition 2)	ISDN; lower layer protocols for telematic terminals	- 64 kbit/s unrestricted bearer service - document list to test implementation - TP & test cases - System Conformance Test Report - ATS to check conformance - ATS to CCITT T.70 - PICS proforma
prETS 300 389	ISDN-Circuit-mode multiple-rate unrestricted 8 KHz structured bearer service category Service Description	
DE/TE-04111	Videotelephone reference terminal-ISDN basic access signalling aspects	Related to ITU-T Q.939
ITU-T T.90rev	ISDN; lower layer protocols for telematic terminals	In-band initialisation protocols for Multimedia on ISDN
ITU-T H.MMIW	Interworking of Multimedia and non-Multimedia terminals on N-ISDN.	Multimedia capability exchange and selection on ISDN

B-ISDN

Table 51

Document no.	Short Title	Comments
DE/NA-010019	Broadband Connection Oriented Bearer services	- Overview - Procedures for permanent mode - Procedures for reserved mode - Procedures for on-demand mode - Specific service aspects Related to ITU-T F.811
DTR/NA-051109 (stopped)	Support of video & Multimedia services in B-ISDN	Related to I.374. Defines multiplexing & establishment of multimedia services on B-ISDN.
ETR 228	Real-Time transmission of moving video on high-speed interactive networks, (around 1,5 Mbit/s)	Not studied in ITU-T
ETS 300 455	Virtual path service for reserved and permanent communications	Description of a semi-permanent virtual path bearer service in B-ISDN. Related to ITU-T F.812
ITU-T F.811	Broadband Connection Oriented Bearer services	Related to DE/NA-010019
ITU-T F.812	Broadband Connection-less Data Bearer services	Related to DE/NA-010020
ITU-T I.432	B-ISDN User-Network Interface layer 1 specification	
ITU-T Q.2120	B-ISDN, Service Specific Connection Oriented Protocol (SSCOP), specification	
ITU-T Q.2130	B-ISDN, Service Specific Co-ordination Function (SSCF), for signalling at the UNI	
ITU-T Q.2140	B-ISDN, Service Specific Co-ordination Function (SSCF), for signalling at the NNI	
ITU-T Q.2931	B-ISDN Digital Subscriber Signalling System No.2, Signalling for Basic Call/Connection Control	

PSTN

Table 52

Document no.	Short Title	Comments
ITU-T H.245	Communication procedures for PSTN Multimedia services	
ITU-T V.8bis	In-band initialisation protocols for Multimedia on PSTN	Multimedia capability exchange and selection on ISDN

Wireless

Table 53

Document no.	Short Title	Comments
ETS 300 421	Digital Broadcasting Systems for Television, Sound and Data Services: Framing structure, channel coding and modulation for 11/12 GHz satellite services	
ETS 300 429	Digital Broadcasting Systems for Television, Sound and Data Services: Framing structure, channel coding and modulation for cable systems	Complementary to ETS 300 473
DTR/SES 02020 (stopped)	QOS in satellite transmission of Multimedia services at or above 2 Mbit/s	
DTR/SMG 050701	Selection procedures for the choice of video/channel coding principles for the UMTS	
ETS 300 473	Digital Broadcasting Systems for Television, Sound and Data Services: SMATV distribution systems	Complementary to ETS 300 429. Based on MPEG-2, with FEC added
ETS 300 421	DVB, Part 6 - Channel coding and modulation for 11/12 GHz satellite service	
ETS 300 652	Architecture of HIPERLAN for Time Bound Services and Multimedia	ITU-T H.320 adapted to LANs
ETS 300 444	DECT Generic access profile	
ETR 226	High Performance Radio LAN (HIPERLAN), Technical characteristics	
TCR-TR 015	Special Mobile Group Work programme for the standardization of the UMTS	Supplement to ITU-T F.720

Other

Table 54

Document no.	Short Title	Comments
DAVIC A4	Interface between core network and access network	
ETS 300 429	DVB, Part 7 - Channel coding and modulation for CATV cable distribution of corresponding services	
ETS 300 744	DVB, Part 8 - Channel coding and modulation for terrestrial distribution of corresponding services	
ETR 262	Video on Demand network aspects	Identify the impact of multimedia services on network architectures. Addresses application of ATM. Requirements for access network, services control, etc.
prETS 300 163	TV systems - NICAM 728: specification for transmission of two channel digital sound with terrestrial television systems B, G, H and I	
prETS 300 294	TV systems - 625 line television Wide Screen Signalling, (WSS)	

Interworking

Table 55

Document no.	Short Title	Comments
ETR 176	Interworking of retrieval services with AudioVisual services	

7.3.3 Assessment of standardization in this area

Supplementary services in the ISDN are used in association with basic bearer services and with basic teleservices. There are several groups of supplementary services:

- Call diversion supplementary services;
- Call completion supplementary services;
- Multiparty supplementary services;
- Community of interest supplementary services;
- Charging supplementary services;
- Additional Information Transfer supplementary services.

The definition of the basic standards for the protocols is well advanced. Both for PSTN, ISDN and ATM the basic services and supplementary services for normal connection management have largely been completed or are well advanced.

For PSTN and ISDN however, the scope of defining the standards has been largely on the normal connection management. The effects of Multimedia on the relevant standards still has to be addressed (see subclause 8.3.2 a), b)).

8 Proposal of work areas covering the identified standardization gaps

During the preparation of this ETR an assessment was carried out of the relevant standardization already existing in the different topic areas. Following the completion of this work, it could be concluded that no harmonized standardization exists regarding multimedia because many elements are incompatible. This has led to considerable difficulties for the members of MMG in actually identifying standardization gaps, but nevertheless clause 8 contains the final recommendations of MMG regarding which areas should be addressed.

This situation is understandable considering that the different monomedia areas were standardized separately in the past, and enhancing these areas in order to put them together to form multimedia applications has led to incompatible solutions. As a consequence, the following "crystallisation points" for multimedia telecommunications can be observed:

- conversational multimedia services coming from the ITU-T Recommendation H.3xx series;

- multimedia conferencing services coming from the ITU-T Recommendation T.120/T.130 series;

- co-operative multimedia document handling coming from the ITU-T Recommendation T.400/T.500/T.190 series;

- non-conversational store and retrieval services coming from the ITU-T Recommendation T.100/T.170 series and DAVIC;

- non-conversational store and forward services coming from the ITU-T Recommendation X.400/X.500 series;

- multimedia and hypermedia coding coming form the ISO/IEC SC29 MPEG/MHEG work.

As this "crystallisation" process continues, the risk of potential overlapping is unfortunately growing. For this reason, bodies involved in multimedia standardization work should carefully evaluate whether or not they can incorporate components already standardized elsewhere.

From the ETSI point of view, an explanation for this situation may be that the ETSI Multimedia Project was started too late to influence the standards in the earlier phases, but in any case it can be observed that applications which are only slightly different have resulted in different solutions.

The problem may be solved by the creation of a set of standards that provide interworking between the different approaches in those areas demanded by the market, or alternatively the market place itself will decide which of the incompatible standards will survive.

8.1 Retrieval services

8.1.1 User function

a) media conversion (e.g. text to graphics, text to speech): mechanisms for negotiating the insertion of protocol converters in the delivery chain. The actual conversion may be proprietary, but standards are needed to enable wider use.

8.1.2 Terminal functions

Other retrieval services not yet covered:

a) guaranteed quality of services (delivery, delay, integrity): mechanisms to establish service priorities to assure appropriate quality of service (maximize channel utilisation without sacrificing quality);

b) definition of a "VEMMI-API".

8.1.3 Service support functions

Other retrieval services not yet covered:

a) transaction security: financial and other value exchange activities must be secured;

b) service scalability: services need to scale from low bandwidth delivery to high, from low resolution displays to high, and this should be achieved in the future without modifying the semantics of the content;

c) distributed servers/distributed services, in the context of:

- broadband multimedia;
- extension of Internet/Word Wide Web;
- search agents.

DAVIC 1.0 solves the problem of a single client with a single server. One requirement is to expand this concept so that a client can access multiple servers, which operate in a co-ordinated way to provide distributed services. For example, in a competitive environment, it may be desirable for a customer to obtain services from more than one value-added service provider and to move between them in a seamless manner, as with the World Wide Web. Compatibility with the Internet is essential.

8.1.4 Interface to terminal functions

a) definition of an interface between VEMMI and DSM-CC;

b) definition of the mapping between Videotex systems, (VEMMI), and MHEG-5 to enable interworking (access VEMMI applications via TV-platform);

c) definition of a mapping between MHEG-5 and DSM-CC;

d) definition of a mapping between MHEG-5 and HTML (access Internet via TV-platform).

e) conformance testing for:

- MHEG-3 (Script Interchange Representation);
- MHEG-5 (Subset for base level implementation);
- VEMMI.(Enhanced MMI for Videotex and M&HIRS);
- DSM-CC.

8.1.5 Interface to connection functions

a) To define standards for interactive audio-visual retrieval services on narrow band networks without data facility:

- to define "access for ISDN or PSTN videotelephony terminals to an audio-visual database using Dual Tone Multiple Frequencies (DTMF)";
- to define standards for interworking between Videotex and audio-visual services.

b) The future extension or creation of specific PCIs will give an indication of the areas needed for standardization.

8.1.6 Protocols

a) definition of profiles from the MPEG-2 part 6 (DSM-CC), user-user, for base level implementation;

b) more advanced services than DAVIC 1.1; i.e. standardization of the protocol between the Set-Top-Box and the Video Server. Identify omissions/errors in the DAVIC specifications and jointly progress the standards.

c) to define how the ITU-T Recommendation T.120 series can be used as an interactive protocol for audio-visual information retrieval services, based on PSTN and ISDN videotelephony terminals, and define a subset of ITU-T Recommendations T.126, and / or T.133, tools which should be used for a standardized audio-visual retrieval service. Furthermore, it should be investigated whether DSM-CC can be incorporated in this scenario for narrow band audio-visual retrieval services.

8.2 Teleconference services

8.2.1 User function

a) media conversion (e.g. text to graphics, text to speech): mechanisms for negotiating the insertion of protocol converters in the delivery chain. The actual conversion may be proprietary, but standards are needed to enable wider use;

b) echo control, voice switching and voice signal processing need further consideration;

c) to define features which need to be performed for documents by groups of users in a distributed environment, (e.g. remote document reading or processing or editing, document conferencing, etc.), and specify the appropriate characteristics to support such co-operative document handling applications:

- joint synchronous editing, (point-to-point and multipoint), including joint document presentation and viewing;
- asynchronous document production, (group communication);
- sequential document production, (workflow).

8.2.2 Terminal functions

a) in general, work on audio, video and still image coding algorithms cover all aspects currently required, except from a need for an algorithm or procedure from creating a split screen presentation, (e.g. 2 to 4 images in one bit-stream);

b) Interworking between ITU-T Recommendation H.324 and V.60/V.70 is only possible by dual-mode devices (in the terminal or the network). Therefore ITU-T Recommendation V.60/V.70 is not suggested by ETSI for Multimedia communication.

8.2.3 Service support functions

a) to define standards which provide scheduling of the management and control of the various resources involved in a conference session;

b) security features, (such as access, encryption, authorisation, key distribution, transaction security, etc.), are currently missing from the ITU-T Recommendation T.120/T.130 series of recommendations.

8.2.4 Interface to terminal functions

a) studies should result in the definition of common access structures for point-to-point and multipoint communication to guarantee portability of Co-operative Document Handling applications;

b) APIs to components of the ITU-T Recommendation T.120/T.130 series of recommendations.

8.2.5 Interface to connection functions

a) the future extension or creation of specific PCIs will give an indication of the areas needed for standardization.

8.2.6 Protocols

a) Videoconference Services: standards according to the ITU-T Recommendation T.120 recommendations framework for Multipoint facilities, procedures, and frame structure for Data;

b) real-time audio-video extensions to T.120 series of recommendations: to define the control of audio and video communication within an ITU-T Recommendation T.120 conference environment:

- to specify the protocol for network specify mapping of real time Audio-Video elements;
- to define management service for real time stream control;
- to define an application protocol of real time media distribution, QoS, management, remote devices and network services.

c) enhancements of ITU-T Recommendation T.434, (Binary File Transfer), to cope with further requirements, (e.g. interactivity) of the services using ITU-T Recommendation T.434;

d) enhancements of ITU-T Recommendation T.435, T.436, (Services and Protocols for confirmed Document Manipulation), to be operated in a multipoint environment and to include support for isochronous data streams, (audio and video);

e) provide new communication modules, e.g. a multipoint Remote Procedure Call, that are to be used especially in Document Handling applications.

f) protocols between a "Reservation Terminal" and a "Reservation System";

g) protocols between a "Reservation System" and an MCU;

h) protocols between "Reservation Systems".

8.3 For connection and interconnection

In general, when referring to the "lower layers", it is important to identify:

1) which aspects are specifically oriented towards Multimedia;

2) which aspects can simply be used in a Multimedia context because of its generic nature.

Considering ITU-T Recommendations I.374 "Network capabilities to support Multimedia Services", and I.375, "Multimedia Network Requirements", this work could possibly progress to cover points 1 and 2 listed above.

8.3.1 Functions

a) For all Multimedia applications in ISDN; standards to ensure the successful call forwarding between terminals using more than one B-channel.

8.3.2 Protocols

a) protocols among connection and interconnection functions need particular attention. Activities are on-going both in ETSI and ITU-T, but the scope of the work and the actual progress of work makes it difficult to assess its status;

b) for point-to-point teleconferencing there is a need for consideration of interaction between D-channel procedures and in-band signalling procedures when invoking some supplementary services. It is mainly the groups where the call is manipulated, i.e. Call diversion, Call completion, Call Hold and Three Party supplementary services, where these issues need to be considered. At present the AudioVisual services aspects are studied in ETSI, but the need for widening the scope for this work should be analyzed.

8.4 Interworking

There is no specific reference from clauses 5, 6 or 7 to this subclause. The following list of gaps is a consequence of examining the relationships between services used in both Retrieval and Teleconferencing applications:

a) interworking of Retrieval Services and Teleconference Services in point-to-point and multipoint configurations;

b) there is a strong correlation between Teleconference Services and Work-group computing, in so far as a combination of both services would allow for both conferencing and document retrieval/editing. Thus, the possible convergence between the two areas should be investigated.

History

Document history	
July 1996	First Edition

ISBN 2-7437-0776-3
Dépôt légal : Juillet 1996