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Corporate telecommunication Networks (CN); Standardization analysis; Part 2: Enhanced voice and non-voice services

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Foreword

This ETSI Guide (EG) has been produced by ETSI Project Corporate telecommunication Networks (CN), and is now submitted for the ETSI standards Membership Approval Procedure (MAP).

The present document is part 2 of a multi-part EG describing the CN standardization analysis, as identified below:

Part 1: "Corporate telecommunication Networks (CN); Standardization analysis; Part 1: Strategy";

Part 2: "Corporate telecommunication Networks (CN); Standardization analysis; Part 2: Enhanced voice and non-voice services";

Part 3: "Corporate telecommunication Networks (CN); Standardization analysis; Part 3: Virtual private networks";

Part 4: "Corporate telecommunication Networks (CN); Standardization analysis; Part 4: Mobility".

Introduction

In 1988 the European Commission (EC) issued a standardization mandate (BC-IT-74 - 77) to CEN/CENELEC, in co-operation with CEPT, for the drafting of a set of European standards based on the work programme on private telecommunication networks (SOGITs No. 227). The main aims of this mandate were to provide for:

- an adequate level of interworking between private and public ISDN services, where the terminals that provide these services will have to operate in a "multi-vendor" type market; and
- interoperability within the private networks for private network services and related protocols, which will allow a multi-vendor environment (from a user point of view) with regard to terminals, ISPBXs and CENTREXs.

Responsibility for the mandate passed to ETSI in 1992 as a consequence of the agreement between ETSI and CENELEC on standardization for private networks. The present programme of standardization work for Corporate telecommunication Networks (CN) pursued by ETSI within the scope of BC-IT-74 -BC-IT-77 thus remains mandated standardization work.

In 1993 the EC confirmed that "*the political mandate to prepare a set of standards as defined in the standardization mandate from 1988 (e.g. SOGITs No. 227) continues to be applicable*". The Commission demonstrated this continuing political desire by forwarding a new mandate, BC-T-326 [1], to ETSI in mid-1995. This new mandate concerns "the establishment of voluntary standards covering the elements involved in Corporate telecommunication Networks".

Mandate BC-T-326 [1] recognizes the need to develop further standards in the area due to:

- the various interest groups involved (e.g. network operators, equipment manufacturers and end users);
- the changing environment of corporate telecommunications (e.g. increasing importance of Virtual Private Networking (VPN), changing regulatory environment, impact of the Bangemann report [15] etc.).

Responsibility for the mandate was allocated initially to TC-BTC and later transferred to the ETSI Project Corporate telecommunication Networks (CN). TC-BTC, and latterly EP CN, prepared a multipart EG, of which the present document is one part, to fulfil the first part of the new mandate with a proposal for a further work programme in the area.

1 Scope

The present document is part 2 of a multipart ETSI Guide (EG) containing the results of a strategic analysis, undertaken by ETSI CN PC, to satisfy the requirements of part 1 of the Standardization Mandate BC-T-326 [1].

Part 1 of the Mandate is concerned with the conduct by ETSI of a study into the future standardization work required to achieve the goal of covering all the elements involved in Corporate telecommunication Networks (CN), including aspects of interoperability between public and private domains and demonstration of that interoperability. This goal is the "Purpose" of the Mandate.

NOTE: The terms "private domain" and "public domain" should not be mixed up with the terms "private network" and "public network". Within the context the Mandate BC-T-326 [1] and the CN project, the terms "private domain" and "public domain" should be understood to mean (respectively), those parts of a CN that belong to a customer (i.e. the corporation) and that are usually on his premises, and those parts of a CN that are part of the public network infrastructure.

The analysis identifies:

- where ETSI is today in its work programme for CN (i.e. the content and status of the work programme known as the "CN project");
- where ETSI needs to be to have fulfilled the requirements of the mandate BC-T-326 [1];
- options and recommendations for moving from the present situation towards the objective; and
- proposals for the new work items required, and a plan for achieving them.

The analysis takes account of the fact that responsibility for CN standardization is shared between ETSI and ECMA through the Joint ETSI/ECMA Agreement [11]. It also takes into account that standardization work for CN may be sub-contracted to ETSI Technical Competence Centres.

The scope of the Mandate is wide ranging; however, the results presented in the present document are based on general considerations applicable to the 3 main subjects within the CN project. These subjects are:

- enhanced voice and non-voice services;
- virtual private networks (VPN); and
- mobility within a CN.

The present document contains the analysis of the specific enhanced voice and non-voice services subproject. It presents first the content and the status of this subproject, and then how standards can help to achieve interoperability of services in CNs. It gives recommendations as to the way of taking into account the functional continuity at the terminal interface, establishes a common minimum set of services for which all users require full interoperability within a CN, and proposes a method for achieving the interoperability of this set of services within different CN reference scenarios, by identifying new standardization work items.

2 References

References may be made to:

a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or

b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or

c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or

d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] BC-T-326 (1995): "Draft standardization mandate forwarded to CEN/CENELEC/ETSI in the field of information technology and telecommunications - Corporate Telecommunication Network Standardization".

[2] CIGREF (1995): "Proposal for a minimum set of interworking functions".

[3] EG 201 026-1 (1997): "Corporate telecommunication Networks (CN); Standardization analysis; Part 1: Strategy".

[4] EG 201 019 (1997): "Users' expectations for mobility".

[5] ETR 018 (1995): "Integrated Services Digital Network (ISDN); Application of the Bearer Capability (BC), High layer Compatibility (HLC) and Low Layer Compatibility (LLC) information elements by terminals supporting ISDN services".

[6] ETR 076 (1993): "Integrated Services Digital Network (ISDN); Standards Guide".

[7] ETR 299-1 (1996): "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Network Integration Testing (NIT); ISDN End-to-end testing; Part 1: Test Suite and Test Purposes (TSS&TP) specification".

[8] ETR 301 (1996): "Users' expectations for Virtual Private Networks".

[9] ETS 300 092 (1995): "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Calling Line Identification Presentation (CLIP) supplementary service; Part 1: Protocol specification".

[10] ETS 300 415 (1996): "Private Integrated Services Network (PISN); Terms and definitions", 2nd edition.

[11] ETSI & ECMA (1995): "Agreement on the co-operation between ECMA and ETSI on standardization in the field of telecommunications", 6 October 1995.

[12] IMIMG (1989): "Memorandum of Understanding on the coordinated introduction of ISDN in Europe".

[13] ISO/IEC 11571 (1994): "Information technology - Telecommunications and information exchange between systems - Numbering and sub-addressing in Private Integrated Services Networks".

[14] STATTEL Delgationen (1995): "SOTIP - The Swedish government Open Telecommunication systems Interconnection Profile".

[15] The Bangemann report (1994): "Europe and the global information society. Recommendations to the European Council".

[16] ETS 300 402-1: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Data link layer; Part 1: General aspects [ITU-T Recommendation Q.920 (1993), modified]".

[17] ETS 300 402-2: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Data link layer; Part 2: General protocol specification [ITU-T Recommendation Q.921 (1993), modified]".

[18] ETS 300 402-4: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Data link layer; Part 4: Protocol Implementation Conformance Statement (PICS) proforma specification for the general protocol".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the definitions contained in ETS 300 415 [10] apply. In addition, the following definitions apply:

behaviour guidelines: A profile defining the behaviour of two entities (e.g. terminal equipment, PINX, PISN) sharing a common interface, additional to the procedures specified at that common interface.

euro-ISDN terminal: A terminal equipment intended for attachment to the public ISDN service commonly known as "Euro-ISDN".

interconnection: A particular case of interoperability (the interoperability between two or more networks). Technically, interconnection is concerned with all the protocol "layers" at the Network-to-Network Interface (NNI), from the lower layers up to applications and supplementary services.

interface-to-interface interoperability relation: The interoperability relation between 2 interfaces.

Interoperability (IOP): The ability of several products, pieces of equipment, networks, to perform together a set of functions (i.e. perform a "service") defined in specifications. Interoperability can be qualified at different levels (e.g. protocol interoperability, service interoperability).

interoperability relation: An association or correspondence between one item and another, for the purpose of identifying and considering the interoperability between the items concerned.

interworking: The particular case of interconnection between heterogeneous networks. Interworking is achieved through "interworking functions", that realize protocol mappings between the two networks (e.g. GSM-ISDN interworking).

Interworking (MAPPING) specification: A specification describing the interworking of two protocols between which there is an interoperability.

peer-to-peer interoperability relation: The interoperability relation between 2 entities i.e. products, pieces of equipment, networks.

private domain: Those parts of a CN that belong to a customer (i.e. the corporation) and which are usually located on the customer's premises.

profile: A specification restricting the options in more general standards, to ensure interoperability between two implementations in a given context.

public domain: Those parts of a CN that are provided using the public network infrastructure.

3.2 Abbreviations

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

α	α reference point
AOC	Advice Of Charge supplementary service
ATM	Asynchronous Transfer Mode
ATS	Abstract Test Suite
BC	Bearer Capability
C	C reference point
CCBS	Call Completion Busy Subscriber supplementary service
CCNR	Call Completion No Reply supplementary service
CFB	Call Forwarding on Busy supplementary service
CFNR	Call Forwarding on No Reply supplementary service
CFU	Call Forwarding Unconditional supplementary service
CLI	Calling Line Identification supplementary service
CLIP	Calling Line Identification Presentation supplementary service
CLIR	Calling Line Identification Restriction supplementary service
CN	Corporate telecommunication Network
CONF	Conference call supplementary service
CT	Call Transfer supplementary service
CTM	Cordless Terminal Mobility
DECT	Digital Enhanced Cordless Telephone
DSS1	Digital Subscriber Signalling system no. 1
ECT	Explicit Call Transfer supplementary service
EURESCOM	European Institute for Research and Strategic Studies in Telecommunications
GSM	Global System for Mobile communication
HLC	High Layer Compatibility
ICN	InterConnecting Network
ICS	Implementation Conformance Statement
IOP	InterOPerability
ISDN	Integrated Services Digital Network
ISDN-BRA	Integrated Services Digital Network-Basic Rate Access
ISUP	ISDN Signalling User Part
IXIT	Implementation eXtra InformaTion
LLC	Low Layer Compatibility
MWI	Message Waiting Indication
N*	N* reference point
NNI	Network-to-Network Interface
No.	number
PABX	Private Automatic Branch eXchange
PAC	Programme Advisory Committee
PICS	Protocol Implementation Conformance Statement
PINX	Private Integrated services Network eXchange
PISN	Private Integrated Services Network
Q	Q reference point
QSIG	Q reference point SIGnalling system
S	S reference point
S/T	Coincident S/T reference point
SSIG	S reference point SIGnalling system
T	T reference point
T+	T+ reference point
TE	Terminal Equipment
UUS	User-User Signalling supplementary service
VPN	Virtual Private Network

4 Content and status of subproject

4.1 Scope of subproject

The enhanced voice and non-voice services subproject comprises work in four areas:

- basic call and generic procedures necessary for the operation of telecommunications services in corporate telecommunication networks;
- basic and supplementary service specifications for the support of voice and non-voice applications;
- interworking of these services with those of the public network; and
- interaction of these services with other services of the public and private domains.

These aspects are taken account of in service descriptions, signalling requirements and signalling protocols. Practically, this results in standards for:

- layer 2 protocol standards for operation across interfaces at the T, Q, and S reference points, including conformance test specifications, PICS, and PIXIT as appropriate;
- layer 3 basic call and generic procedures for D-channel protocol operation across interfaces at the T, Q, and S reference points; including conformance test specifications, PICS, and PIXIT as appropriate; and
- for each telecommunications service:
  - stage 1 description;
  - stage 2 description;
  - stage 3 description (layer 3 protocol standard, DSS1) for ISPBX/PISN access (via an interface at the T reference point) to the public ISDN;
  - stage 3 description (layer 3 protocol standards, QSIG) for inter-exchange signalling in PISN (via a notional interface at the Q reference point);
  - stage 3 description (layer 3 protocol standard, SSIG) for terminal access (via an interface at the S reference point) to the CN;
  - protocol implementation conformance statements (PICS) for each of the stage 3 description types (for both the user and network sides of the interface where applicable);
  - conformance test specifications, and protocol implementation extra information (PIXIT) for each of the stage 3 description types (where applicable).

With the exception of protocols at the T reference point, responsibility for standardization in this subproject lies with ECMA TC32. Protocols at the T reference point are the responsibility of TC-SPS, with close support from ECMA TC32 for aspects concerning interworking with PISNs.

The content of the enhanced voice and non-voice services subproject and its status is summarized in the following subclauses. For further detail, see the ISDN Standards Guide, ETR 076 [6].

A number of standards have been developed by ECMA and submitted both to ETSI to become ETSs and to ISO/IEC to become International Standards. In the process some technical misalignments have arisen between the 3 sets of standards. This has needed the so called "ETS/IS Alignment Programme" and the "ECMA-tization programme" to bring the 3 sets of documentation into alignment once more. At the same time, the "process" is being changed to ensure that such misalignments are minimized in the future.

4.2 Content and status of work items

4.2.1 Layer 2 protocol standards

The following layer 2 protocol standards have been published [16], [17] and [18]:

- ETS 300 402-1: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Data link layer; Part 1: General aspects"; and
- ETS 300 402-2: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Data link layer; Part 2: General protocol specification".
- ETS 300 402-4: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Data link layer; Part 4: Protocol Implementation Conformance Statement (PICS) proforma specification for the general protocol".

These standards incorporate data link layer requirements for both private and public networks, and supersede older standards where the requirements for private and public networks were dealt with separately. ETS 300 402-4 [18] contains the PICS proforma.

Conformance test specifications for the part applicable to the use of the data link layer protocol between two Private Integrated services Network eXchanges (PINX) at the Q reference point, including the PIXIT, are contained in the following ETSs:

- ETS 300 804-1: "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Circuit mode basic services; Data Link Layer (DLL); Part 1: Test Suite Structure and Test Purposes (TSS & TP)";
- ETS 300 804-2: "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Circuit mode basic services; Data Link Layer (DLL); Part 2: Abstract Test Suite Specification (ATS)".

These ETSs are expected to be published in May 1997.

4.2.2 Layer 3 basic protocol standards

The basic procedures for signalling in PISN are combined with the stage 1, 2, and 3 descriptions of circuit-mode bearer services, and teleservices. The stage 3 description of the Identification supplementary services is contained within the layer 3 basic procedures. The following standards have been published:

- ETS 300 171 (ECMA-142): "Private Integrated Services Network (PISN); Specification, functional models and information flows; Control aspects of circuit mode basic services";
- ETS 300 172 (ECMA-143): "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Circuit-mode basic services";
- ETS 300 190 (ECMA-156): "Private Telecommunication Network (PTN); Signalling at the S-reference point; Generic keypad protocol for the support of supplementary services";
- ETS 300 192 (ECMA-106): "Private Telecommunication Network (PTN); Signalling protocol at the S-reference point; Circuit mode basic services";
- ETS 300 239 (ECMA-165): "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Generic functional protocol for the support of supplementary services"; and
- ETS 300 240 (ECMA-161): "Private Telecommunication Network (PTN); Signalling at the S-reference point; Generic feature key management protocol for the control of supplementary services".

ETS 300 172, ETS 300 239, and ETS 300 240 all contain PICS proformas. ETS 300 192 does not contain a PICS proforma.

For the QSIG layer 3 (i.e. the protocol defined by ETS 300 172 and ETS 300 239), conformance test specifications, including the PIXITs, are contained in:

- ETS 300 805-1: "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Circuit mode basic services; Network Layer (NL); Part 1: Test Suite Structure and Test Purposes (TSS & TP)";
- ETS 300 805-2: "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Circuit mode basic services; Network Layer (NL)); Part 2: Abstract Test Suite Specification (ATS)";
- ETS 300 806-1: "Private Integrated Services Networks (PISN); Inter-exchange signalling protocol; Generic functional protocol for the support of supplementary services; Part 1: Test Suite Structure and Test Purposes (TSS & TP)";
- ETS 300 806-2: "Private Integrated Services Networks (PISN); Inter-exchange signalling protocol; Generic functional protocol for the support of supplementary services; Part 2: Abstract Test Suite Specification (ATS)".

These standards are expected to be published in May 1997.

4.2.3 Service descriptions (stage 1, 2, and 3) at the T reference point

A large number of standards containing the stage 1, 2, and 3 descriptions of basic and supplementary services for the public ISDN have been published. Where appropriate, these take account of the requirements applicable at the T reference point. For detailed information, see ETR 076 [6].

4.2.4 Service descriptions (stage 1, 2, and 3) at the Q reference point

Technical work on the services in the list below has been completed, and the information has been published by ECMA. As noted above, a number of services are documented as an integral part of the basic call procedures. All the standards for the services in the list have been submitted for publication as ETSs, either directly, or as endorsements of the equivalent International Standards. Those marked with an asterisk (*) are expected to be published during 1997; all others have already been published.

Bearer services

Circuit-mode 64 kbit/s unrestricted
Circuit-mode speech
Circuit-mode 3,1 kHz audio

Teleservices

Telephony 3,1 kHz
Telefax group 4
Videotex (circuit mode only)

Additional network features

Clock synchronization
Common information*
Path replacement
Transit counter*

Supplementary services

Advice of charge*
Call deflection
Call forwarding busy
Call forwarding no reply
Call forwarding unconditional
Call interception*
Call intrusion
Call offer
Call transfer
Calling line identification presentation
Calling line identification restriction
Calling name identification presentation
Calling/connected name identification restriction
Completion of calls on no reply
Completion of calls to busy subscriber
Connected line identification presentation
Connected name identification presentation
Do not disturb (override)
Message waiting*
Recall*

NOTE 1: There are no specific stage 1, 2, and 3 descriptions for the bearer services and teleservices. These services are documented as a part of basic call.

NOTE 2: A number of supplementary services, while supported at the S reference point, are either not applicable at the Q reference point, or are provided as part of basic call (e.g. Identification supplementary services).

NOTE 3: The terminal portability, call waiting, and call hold supplementary services have no explicit description, but provision is made for the relevant notifications where the service is operating elsewhere.

Standards for the following supplementary services are presently being drafted:

- Call distribution; and
- Call priority interruption.

4.2.5 Service descriptions (stage 1, 2, and 3) at the S reference point

As noted above, a number of services are documented as an integral part of the basic call procedures.

Specifications for the following services at the S reference point have been developed, and are documented as part of the basic call control procedures at the S reference point (see above):

Bearer services	**Supplementary services**
circuit-mode 64 kbit/s unrestricted	calling line identification presentation
circuit-mode speech	connected line identification presentation
circuit-mode 3,1 kHz audio	calling/connected line identification restriction
Teleservices	
telephony 3,1 kHz	
telefax group 4	
videotex (circuit-mode only)	

The subaddressing, multiple subscriber number, and terminal portability supplementary services are provided as an integral part of the basic call description (i.e. they are not recognized as supplementary services in their own right).

No other work is currently started on S reference point protocols due to priority being given to services at the Q reference point.

4.2.6 CN service interworking with the public ISDN services

CN service interworking with the public ISDN services at the T reference point is described in the stage 1, 2, and 3 standards for the relevant public ISDN services.

5 Standards for interoperability

5.1 The goal

A huge amount of standardization has been completed at the European level in the last 5 years, especially in the corporate network domain. Many standards are available (QSIG, DECT, ISDN, GSM) defining many features and supplementary services. But these standards have been completed in a vertical way for each type of network and architecture. Users today require global solutions based on combinations of different architectures, technologies, and carrier/manufacturer offerings; they face tremendous problems of horizontal interoperability. The future situation, with an increasingly competitive environment and increasing technical capabilities, will only bring additional difficulty. Therefore, in addition to new standards for new technologies (e.g. ATM, broadband), a first priority must be to improve the efficiency of existing standards by ensuring interoperability for a minimum set of services in a multi-carrier and multiple networks environment.

In a changing market sector the required result is that enhanced voice and non-voice services and applications, although provided through different technologies, should be presented in a way that gives the user a seamless environment. In the future, CN standards will need to focus on interoperability and open platforms as well as on the implementation technologies, i.e. a "transverse" approach, as well as a "vertical" approach.

"*Standards will have to assist the sector by enabling products and services based on the different technologies to work together constructively to meet CN customer requirements.*"

5.2 Achieving interoperability through the use of standards

Five principles have been defined in part 1 of EG 201 026-1 [3] for achieving interoperability by means of standards. Three of the "five golden rules" for achieving interoperability can be used as criteria for considering the extent to which interoperability exists in the enhanced voice and non-voice area. The three rules are:

1 - Having "enough" standards: All the interoperability relationships are covered. For instance, all the protocols involved at the various stages in establishing an end-to-end connection are covered by the standards.

3 - Having "bridges": Interworking specifications exist to specify the relationships between incompatible pieces of equipment, protocols, etc. Alternatively, differing technologies are designed in a co-ordinated and compatible manner (e.g. supplementary services for ISDN, CN, GSM, etc.).

4 - Having "functional standards": functional standards, or behaviour guidelines, restrict the choice of options in more general standards, to ensure real interoperability in a given functional context between two implementations.

NOTE: No work has been carried out with regard to the application of the second and fifth rules:

2 - Having "good" standards: The level of detail and the freedom from ambiguities is sufficient to ensure that interoperability does not depend on a common interpretation.

5 - Identifying, for each service, what the minimum level of interoperability is: Ensuring interoperability during the choice of equipment or during a commissioning phase can be facilitated by the availability of questionnaires allowing vendors to indicate clearly their support of standardized features and services (ICS/IXITs).

5.3 Demonstrations of interoperability

Identification of additional standardization work is based first on the analysis of existing standards (see above enough standards, bridges, functional standards), then demonstration of interoperability is taken into account for interoperability relations in the CN reference scenarios.

Demonstration of interoperability in the CN reference scenarios has been based on the following principles:

1) Production of test purposes for end-to-end testing, as much architecture-independent as possible.

2) Production of test specifications for conformance and compatibility testing (at the level of protocol) at a limited number of identified critical interfaces (network interconnection interfaces, in particular between public and private domains).

5.4 Specifications for functional continuity at the terminal interface

5.4.1 User requirements related to Euro-ISDN terminals in CN environment

User requirements for the use of public Euro-ISDN terminals in CN environment are related both to terminal interchangeability and functional continuity of services:

1) **Terminal interchangeability** corresponds to two different understandings by users:

   - "plug and play" systems which is very difficult and not possible to ensure in a CN context because of different addressing procedures (use of private numbering plan), use of specific CN supplementary services, requirements for call barring and control functions by the PINX;

   - capability to connect to a PINX at the S reference point a Euro-ISDN terminal equipment developed for S/T interface, with simple configuration operations, (e.g. easy migration of a ISDN PC board connection from a direct ISDN BRA connection to a connection behind a PINX);

2) **Functional continuity of services across public and private domains**:

   - for proprietary terminals: the functional continuity of services between CN and the public ISDN (at the T reference point) is ensured by the PINX. Functional continuity in respect of proprietary terminals is not considered further in this report;

   - for Euro-ISDN terminals (phone sets, ISDN interface boards, faxes, videotelephony terminals, data switches based on DSS1 interfaces, etc.) functional continuity of services is required both for voice and non-voice applications/terminals:

     - for non-voice applications/terminals, end-to-end continuity of services will concern Basic Call and CLIP/CLIR services;

     - for voice applications/terminals, end-to-end continuity of services will concern the end-user supplementary services of the common minimum set (see subclause 5.5) in addition to Basic Call and CLIP/CLIR services;

   - the use of Euro-ISDN terminals at the S reference point is facilitated by promoting homogeneous behaviours of PINX/PISN enabling the same activation of supplementary services as terminals directly connected to the public ISDN, in addition to the provision of specific PINX call control and barring functions;

   - since PINXs usually support stimulus terminals (which are not able to process a call by themselves), the connection of functional ISDN terminals (intelligent terminals with call processing capabilities) requires a more transparent PINX behaviour with those terminals and less interference in the protocol handling.

5.4.2 Enhancement of ISDN terminals to provide Centrex/PISN services

Use of Euro-ISDN terminals in Centrex installations or enhancement of such terminals for the support of PISN specific voice supplementary services (e.g. Call Intrusion, Call Offer, Do-Not-Disturb) is a commercial issue and concerns primarily voice terminals. However such enhancements requires further standardization work, which should be considered in addition to basic user requirements for the use of Euro-ISDN terminals in a CN environment, as described above.

Since the end-user supplementary services of the common minimum set (see subclause 5.5) corresponds to standardized Euro-ISDN supplementary services, and as far as the scope of this document is to improve existing standards efficiency, standardization of the protocols at the S reference point for the support of PISN specific supplementary services is not considered here.

Recommendation 1: Enhancements of public ISDN voice terminals to provide Centrex/PISN services is a specific issue that should be analysed by the CN VPN subproject

The following subclauses analyse the interworking requirements for the interoperability of the end-user supplementary services of the common minimum set for Euro-ISDN terminals in a CN environment.

5.4.3 Specifications for functional continuity/interchangeability at the S interface

Terminal interchangeability and continuity of service requirements impact both on the PISN protocol implementation/behaviour and on the terminal protocol implementation/processing.

5.4.3.1 Euro-ISDN terminal interchangeability at the S reference point

The terminal interchangeability requirements impact on terminal protocol implementation, addressing capabilities, and on PINX behaviour.

As presented in subclause 5.4.1, the capability to connect to a PINX at the S reference point a Euro-ISDN terminal equipment developed for S/T interface, with simple configuration operations requires:

- the capability for a Euro-ISDN terminal to support both private and public numbering plans (e.g. processing of number information coded with a Network Plan Indicator set (NPI) consistent with the Private Numbering Plan (PNP);

- the specification of a default configuration as used with a Euro-ISDN terminal at the S/T reference point when the PINX cannot identify the terminal, or when no specific configuration is required by the user. For this configuration, guidelines for the processing by the PINX of CLI information related to calling/called numbers for outgoing and incoming calls should be included.

5.4.3.2 Euro-ISDN terminal functional continuity at the S reference point

The terminal continuity of service requirements will impact on PINX protocol implementation and behaviour.

There are already functional standards applicable at the S reference point for the basic call and the generic functional procedures.

To fulfil the functional continuity between S and T reference points (possibly indirectly, as one or more Q reference points may also be involved), for the MoU of IMIMG (1989) [12] set of services with Euro-ISDN terminals, the major issue to address concerns the consistency between the behaviour of a public network and the behaviour of a PINX/PISN.

Compared to public networks, private networks/PISN and PABX/PINX have a different philosophy in completing a call: they will rely on private numbering plans, use extension numbers; for cost control and barring reasons each call request will be checked for authorization by the PABX. Other differences between private and public networks apply to numbering and to the provision of CLI information.

Therefore it seems difficult to impose on PINX/PISN a way of working identical to that of the public network for call establishment involving Euro-ISDN terminals behind PINX but it is possible to ensure functional continuity by recommending implementation guidelines.

Functional continuity between S and T reference points for Euro-ISDN terminals requires guidelines to advise on PINX behaviour and protocol implementation. These have to cover the following areas:

1) recommendations on processing the BC, HLC and LLC information elements of the terminal application:

   - transparency to the compatibility information elements (HLC, LLC) of the terminal application;

   - minimum control of the BC information provided by the terminal in order to ensure the consistency of the required Bearer Capability with the PINX capabilities;

As an example, the PINX should not cross-check the global consistency of the set of BC/LLC/HLC information elements provided by the terminal by comparing it to a subset of values registered in the PINX for current voice/data applications and reject the calls in case of inconsistency. This additional control could jeopardize the development of new applications or prevent, for example, from successful dropping back of group 4 faxes to group 3.

- for non-voice and multimedia applications the PINX should ensure the connection of different types of ISDN terminals and guarantee the diversity of applications that can be provided on these terminals (e.g. capability to provide on a PC with ISDN interface board file transfer, fax and videotelephony).

2) implementation advice for videotelephony services:

   These are needed in order to ensure consistency with usual PINX filtering functions (e.g. boss/secretary operation with a videophone at the boss and a phone set at the secretary):

   - at the moment no ISDN network nor PISN processes 2 simultaneous B channels, the provision of 128 kbits/s bandwidth requires two separate call establishments. Since the call is handled first on the secretary phoneset, there is a problem for handling the second call related to the second B channel;

   - HLC encoding for videotelephony services is not mandatory. In most cases videotelephony applications rely only on BC encoding (unrestricted bearer mode). In the US, videotelephony applications handle μ-law for voice coding: these cannot be recognized with the unique BC indicator and are transmitted transparently in the B channels. So again if the call is handled first on the secretary phone set, there is a problem to understand and decode μ-law by the phone set; and

   - as far as it is not possible during a call connection to change the BC values (from restricted/speech telephony service to restricted mode and vice versa), drop back problems may occur when a videotelephony call is put from the secretary to boss (e.g. from a phone set to a videotelephony terminal).

3) recommendations on cause values processing:

   - consistency between ISDN and PISN cause values should be ensured;

   - the PINX should provide reliable cause value to the distant interface (e.g. allowing the drop back of group 4 fax to group 3 by indicating precisely what is happening at the called party interface).

4) recommendations on processing the calling party/called party numbers for CLIP/CLIR services provision:

   - a number that allows a call to be returned should be provided;

   - an extension number in case of emergency services should be identified;

   - a number should be controlled for security purposes;

   - the calling party number presentation should be restricted;

   - break in/out issues should be taken into account (e.g. translation of the private number into a public number);

   - "special arrangements" should be taken into account (ETS 300 092 [9] on CLIP supplementary service protocol), where terminals connected to PINX at the S interface need to receive two different calling party number identifications (one provided by the remote terminal/user-provided, one indicating the remote PINX interface/network provided).

5) implementation advice on addressing issues for the support of calls with various NPI encoding (private numbering plan, unknown, ISDN/telephony numbering plan).

Recommendation 2: The definition of a default configuration to be supported by a PINX at the S reference point, and implementation guidelines for functional continuity between S and T reference points have already been carried out in France. We recommend that the same approach should be used at the European level to fulfil the functional continuity between S and T reference points for Euro-ISDN terminal equipment. Proprietary terminals should not fall under the scope of this additional standardization work.

Recommendation 3: Implementation guidelines for BC, HLC, LLC have been done for public ISDN in ETR 018 [5]. A new version of ETR 018 [5] should be completed in order to include:

- CN applications through the different CN scenarios and interfaces; and

- introduction of new HLC/LLC values for the support of new services such as ISDN router connection, INTERNET connection.

5.4.4 Addressing issues in a CN environment

As far as CN architectures in the future will be based on a complex combination of solutions (PISN, public networks, VPN, mobile networks), addressing will become a key issue for the future, especially on the following aspects:

- support of a combination of private and public numbering plans;
- provision of CLIP/CLIR services in CN with complex architectures involving a combination of PISN, VPN and public networks; and
- screening by the PINX/PISN of calling party number information in consistency with public networks/VPN information.

Recommendation 4: ETSI TC-NA and ECMA TC32 should work together (as they have already done) to standardize numbering/addressing issues and CLIP/CLIR services for the different CN reference scenarios.

5.5 Common minimum set of services

The common minimum set of services for which users require full interoperability within a CN (in particular between public and private domains) has been determined by using different information coming from different users source, such as ETR 301 (1996) [8] of the VPN User Group, the Mobility User Group [4], CIGREF [2], and SOTIP [14].

This set is composed of what we call the *end-user services*, the *network services*, and the engineering perspectives. (the terminology used is given along the document).

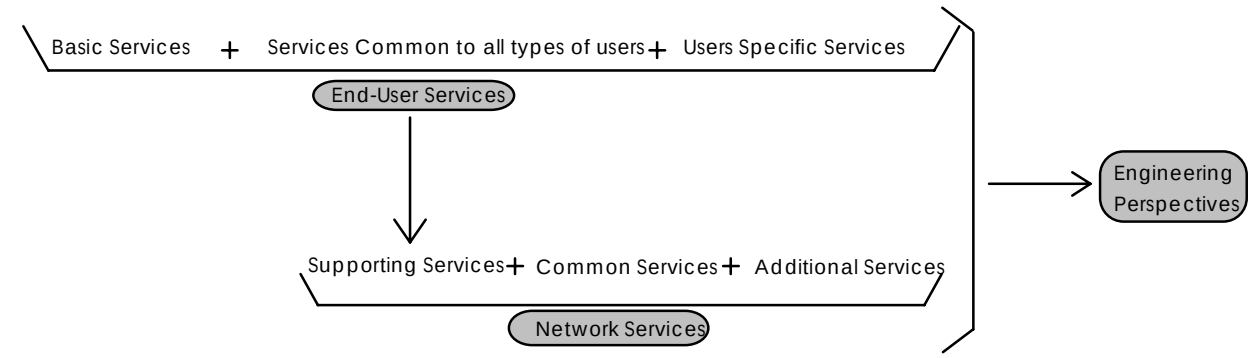
The first step has been to define the minimum set of *basic services* for which full-interoperability within a CN is required by users, and then the minimum set of *supplementary services* for which all types of users, and some specific types of users require full-interoperability within a CN. By adding these two sets, we obtain the common minimum set of *end-user services*, as viewed by the user. This set can be named the group of services according to the "end-user perspectives".

Within this first step, the definition of the common minimum set of *end-user supplementary services* has been done in two parts. The first part consists of taking account of the services which are required by all kinds of end-users. (some additional end-users services have been added to this first group which did not appear to be common to at least three groups of end-users requirements) The second part consists of taking account of the services for which full interoperability within a CN is required by specific types of users.

The second step, which has not yet been taken, is to determine which *network services* are necessary to support the minimum set of *end-user services*. *Network services* are those used to support the users as a functional group within an organization as a whole rather than as individuals. *Network services* are not visible to the end-user. Added to this group are other *network services* which are related to network features, but which do not appear to be necessary for the support of *end-user services*. The result is the minimum set of *network services.* This set can be named the group of services according to the "network perspectives".

The third step, which has not yet been taken, is to determine the contents of the "engineering perspectives", i.e. the technology dependent features needed to support the *end-user* and *network services* in different CN scenarios. By applying every service (*end-user* and *network*) to every CN scenario, the engineering services needed to support the end-users and network services in the scenario can be determined.

The process used to determine the final minimum set of services for which users require full interoperability within a CN is illustrated in figure 1.



Basic Services:	indicates both the bearer services and the teleservices.
Common Services:	indicates the end-user supplementary services which appear, in different information sources, to be the one for which the users require the most a full interoperability within a CN.
Users Specific Services:	indicates the services which do not appear in the common services, but are still very important for some types of end-users.
Additional Services:	indicates the services which do not appear in the common services, but are still very important for all end-users.
Supporting Services:	indicates the network services which are necessary to support the end-users services.

Figure 1: Process for determining minimum set of services

The term *basic services* is used to indicate both the bearer services and the teleservices. It is assumed that, as a minimum, full interoperability within a CN should be guaranteed for the following services:

- speech bearer service;
- 3,1 kHz audio bearer service;
- 64 kbits/s unrestricted bearer service;

and for the following teleservice:

- telephony 3,1 kHz.

5.5.1 End-User Services required by all types of end-users

From each of the users' information a list of services was extracted, representing either the most interesting supplementary services, or the supplementary services required for all types of end-users.

The four lists were crossed to obtain a new list of services corresponding to the most interesting ones from the users point of view (common to at least three groups of users), independently from the user group concerned.

Some services (Completion of Call to Busy Subscriber, Call Forwarding on No Reply, Call Forwarding on Busy, Call Forwarding on Not Reachable, Call Waiting, Message Waiting Indication) which did not appear to be common to at least three groups of users were added to this new list, because to us it seemed to be of high priority for the process of harmonization of standardization to ensure full interoperability within a Corporate telecommunication Network. It appears in dotted lines in the table.

The basic services (i.e. both bearer services and teleservices) for which it was assumed that, as a minimum, full interoperability within a CN should be guaranteed for these services were added.

The result of this work is shown in table 1 containing the "common minimum set of the end-users required by all types of end-users".

Table 1: Common minimum set of End-User services required by all types of end-users

Code	Explanation
BC	Basic Call (note 1)
AOC	Advice Of Charge
CC	Completion of Call to Busy Subscriber
CF (note 2)	Call Forwarding (Unconditional, No-Reply, Busy, Not Reachable)
CLIP	Calling Line Identity Presentation
CLIR	Calling Line Identity Restriction
CONF	Conference Call
CT	Call Transfer
DTMF	DTMF signalling
HOLD	Call Hold
MWI	Message Waiting Indication
UUS	User-to-User signalling
	Last External Number Redial
CW	Call Waiting
NOTE 1: Basic Call with support for private numbering plans, as specified in ISO/IEC 11571 [13]. Services supported are: - Speech Bearer Service; - 3,1 kHz audio Bearer Service; - 64 kbits/s unrestricted Bearer Service; - Telephony 3,1 kHz Teleservice. NOTE 2: CFU is common to at least three users groups.	

5.5.2 End-User Services required by specific types of end-users

In addition to the services required by all types of end-users, there are some other services that are needed by specific types of end-users.

Using the definitions of user types from SOTIP [14], we determined the corresponding minimum set of services for each.

5.5.2.1 Services required by end-users of type PI1

PI1 end-users are *individual persons* with a *self-determined availability*, i.e. people taking part in meetings or carrying out complicated work that requires a high level of concentration. They are in a position to decide when they are available to answer calls and require services that enable them to receive messages regarding incoming calls when they, themselves, are unavailable.

The minimum set of services for which PI1 end-users require full-interoperability within a CN are described in table 2.

Table 2: Services for end-users type PI1

Code	Explanation
	Call Filtering
	Co-ordination between different message services
	Message Waiting (light or signal)

5.5.2.2 Services required by end-users of type PI2

PI2 end-users are *individual persons* with a *permanent availability*, i.e. service personnel or others whose work keeps them on the move and who must be reachable by telephone at all times. These users require access to mobile communications equipment so that they can receive and respond to, for example, new orders or changes of plan.

The minimum set of services for which PI2 end-users require full-interoperability within a CN are described in table 3.

Table 3: Services for end-users type PI2

Code	Explanation
	Alarm Function

5.5.2.3 Services required by end-users of type PF1

PF1 end-users are *a group of persons* characterized by its *function*, i.e. call centre staff whose primary function is to answer calls in a rapid and efficient manner. They require services that support queue management, automatic and semi-automatic call handling and co-ordination between telecommunications and computerized information processing.

The minimum set of services for which PF1 end-users require full-interoperability within a CN are described in table 4.

Table 4: Services for end-users type PF1

Code	Explanation
MCID	Malicious Call Identification

5.5.2.4 Services required by end-users of type PF2

PF2 end-users are *persons* whose *function* is *an answering service*, i.e. secretarial staff who provide a "first-answer and filtering services" to other users. They require communications services that allow them to answer and process incoming calls even when they are at the photocopier or in the filing room.

The minimum set of services for which PF2 end-users require full-interoperability within a CN are described in table 5.

Table 5: Services for end-users type PF2

Code	Explanation
CI	Call Intrusion
COLP	Connected Line Identification Presentation
CPU	Call Pick-Up
CPK	Call Parking
	Co-ordination between different message services

5.5.2.5 Services required by end-users of type PF4

PF4 end-users are *persons* whose *function* is to work as *switchboard operators/attendants*. The traditional role of the switchboard operator is well known. Modern practices require that calls can be handled from any point within a network, that operator services can be bought-in from an external agency, and even that operators can work from home.

The minimum set of services for which PF4 end-users require full-interoperability within a CN are described in table 6.

Table 6: Services for end-users type PF4 (Attendant)

Code	Explanation
CI	Call Intrusion
CINT	Call Interception
NS	Night Service

5.5.3 Network Services

The same kind of work could be achieved with the network services. Examples of network services are:

- Integrated Numbering Plan;
- Breakout;
- Dual Identity Number (Virtual On-Net Calling);
- Number Conversion (Forced On-Net Calling);
- Fixed Off-Net Access;
- Authorization Codes and Passwords; and
- Path Replacement.

5.5.4 Engineering Perspectives

The same kind of work could be achieved with the engineering perspectives. Examples of engineering perspectives are:

- Narrow Band Network; and
- Broadband Network.

5.6 CN Reference scenarios and interoperability relations

5.6.1 Introduction

To apply the criteria for determining whether interoperability have been met (subclause 5.2), a systematic practical approach has been developed and tested on the common minimum set of services defined in subclause 5.5. The results show where further standardization work may be needed to achieve end-to-end interoperability for the common minimum set of services.

5.6.2 The approach

Using the general model of a CN illustrated in figure C.1 of part 1 of EG 201 026-1 [3] as a basis, "reference scenarios" are derived. Each scenario is a subset of the model and contains typical interoperability (IOP) relations that exist between various entities and reference points comprising that model.

NOTE 1: The reader should note that the selection of scenarios shown below is a representative selection, and not the complete set. In particular, further scenarios have to be developed that, for example:

- integrate VPN service entry points (a1, a2, a3, b, c, d) and include the VPN Public Service function; or
- take account of mobility aspects.

These further developments are not dealt with in this part of the EG.

The method for achieving end-to-end interoperability of services between two terminals consists of checking that standards are available at the relevant interfaces, then providing interworking and behaviour guideline standards along the network, and checking by means of end-to-end functional test purposes.

In order to achieve this end-to-end interoperability of services between two terminals, the whole end-to-end relationship is segmented into smaller interoperability relationships determined (or bounded) by the entities and the reference points. These relationships can be of two types: interface-to-interface across an entity, or peer entity-to-peer entity across an interface. Then the final end-to-end interoperability relationship could be realized by achieving the interoperability of each of the smaller relationships. And achieving the interoperability of an interface-to-interface relationship across an entity can consist of defining an interworking standard, whereas achieving the interoperability of a peer-to-peer entity relationship across an interface can consist of defining behaviour guidelines. Assuming that all standards are available at

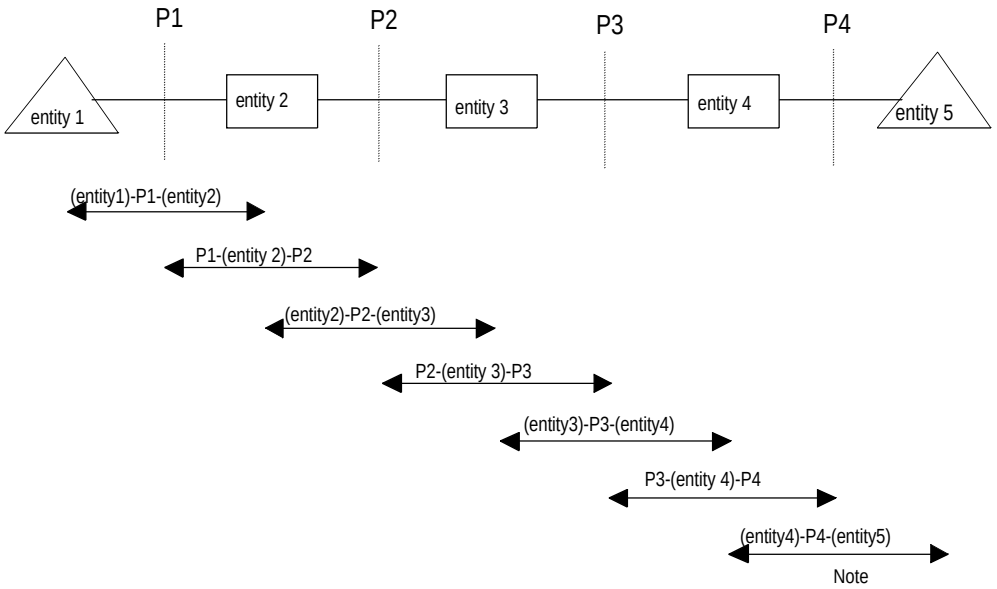
the relevant interfaces, the end-to-end interoperability of the basic services and the supplementary services of the common minimum set can be realized by achieving this interoperability for each of the previous smaller relationships.

To check the final end-to-end interoperability of services between two terminals, independently of the network architecture, functional test purposes are defined.

Let us take the example shown in figure 2. The goal is to achieve the end-to-end interoperability of services between two terminals (entities 1 and 5) across a network made of other entities (2, 3 and 4), all the entities being connected to one another at interfaces (P1, P2, P3 and P4). The whole end-to-end interoperability relationship, from entity 1 to entity 5, can be subdivided into the following smaller relationship:

- (entity 1)-P1-(entity 2);
- P1 -(entity 2)- P2;
- (entity 2)-P2-(entity 3);
- P2 -(entity 3)- P3;
- (entity 3)-P3-(entity 4);
- P3 -(entity 4)- P4;
- (entity 4)-P4-(entity 5).

And the final end-to-end interoperability relationship can be realized by achieving the interoperability of each of the previous relationships.



NOTE: In all the cases considered hereafter in the document, the entities 1 and 5 are Euro-ISDN terminals connected either to a PISN through S interface for entity 1 and entity 5, or to the public ISDN through S/T interface for entity 5. In the case where the entity 5 is connected to the public ISDN (i.e. P4 is 'S/T'), the peer-to-peer interoperability relation '(entity 4) -P4- (entity 5)' is a public concern only, and is outside the scope of this document. In the case where both entities are connected to a PINX (i.e. P1 and P4 are 'S'), the peer-to-peer interoperability relation 'entity 4 -P4- entity 5' is identical to 'entity 1 -P1- entity 2'.

Figure 2: Example of the achievement of an end-to-end interoperability relation

As one interface and one entity are common to a peer-to-peer entity relationship and to the interface-to-interface relationship which immediately follows it, there is an overlap between two subsequent interoperability relationships. Therefore the specification of the two corresponding behaviour guideline and interworking standards should be done by the same working group.

Moreover, the part of the profile related to the behaviour guideline concerning the interface and the entity which are common to both interoperability relations should be the basis for the specification of the interworking profile.

The behaviour guideline for the IOP relation «(entity 1) -P1- (entity 2)» will define a profile of the protocol at interface P1, and the interworking standard for the IOP relation «P1 -(entity 2)- P2», should specify the mapping of this profile onto the protocol at interface P2 (through entity 2), as shown in figure 3. These two specifications being strongly related, they should appear in the same standard.

The interworking standard for the IOP relation «P1- (entity 2) -P2» will define a subset of the protocol at interface P2. This subset should be used as a basis by the behaviour guideline for the IOP relation «(entity 2) -P2- (entity 3)» for defining a profile of the protocol at interface P2. And the interworking standard for the IOP relation «P2- (entity 3) -P3», should specify the mapping of this profile onto the protocol at interface P3 (through entity 3). This is shown in figure 3.

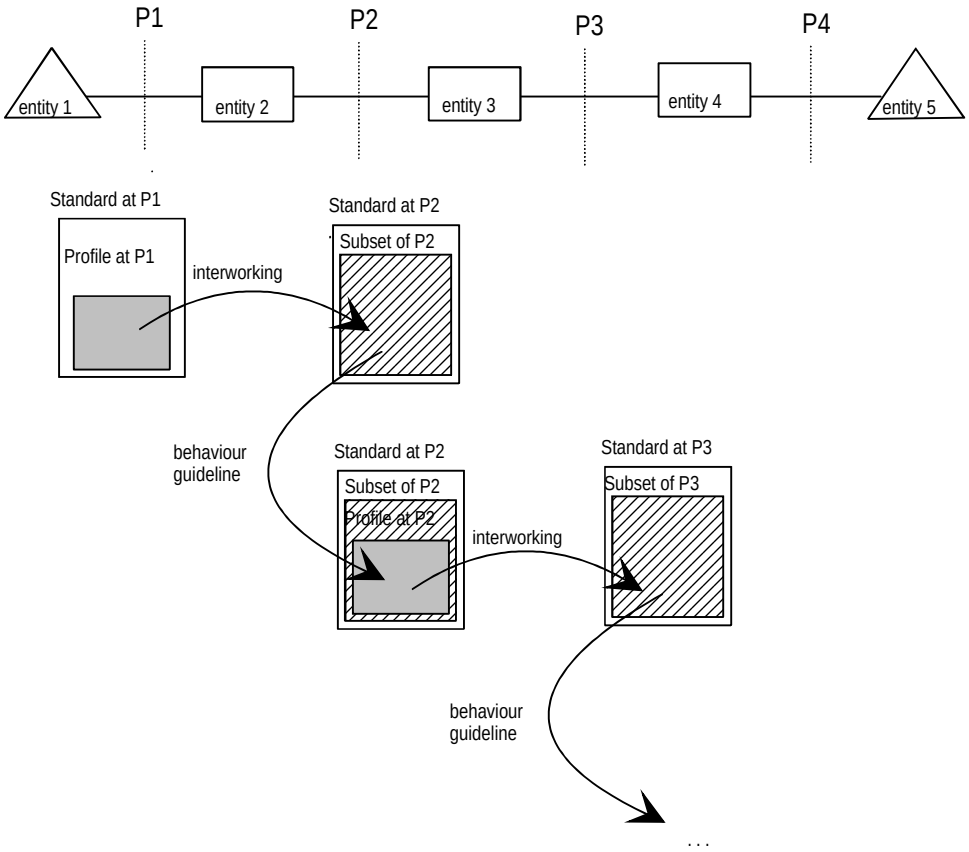


Figure 3: Application of the method to produce standards

This method can be described in a number of steps that are applied to each reference scenario, and at each point where standards are found to be missing, "tasks" are proposed. Not all tasks necessarily lead to corresponding work items, as there may be other influencing factors (e.g. commercial need, possibility of rationalizing several tasks within a single work item, etc.).

The steps are as follows:

Step 1: For each interface represented in the scenario:

a) check the existing standards for the interface, to ensure that standards are available for the basic services and for each of the supplementary services of the common minimum set;

b) check, in a similar manner, the corresponding conformance testing standards for the interface.

NOTE 2: The service standards tables in annex A identify the specific standards for each basic service and supplementary service belonging to the common minimum set.

Step 2: For each relevant functional entity, identify the interoperability relations between this entity and other entities of the scenario - the "peer-to-peer interoperability relations"; see figure 4.

NOTE 3: Interoperability relations involving terminals that are not Euro-ISDN terminals are excluded.

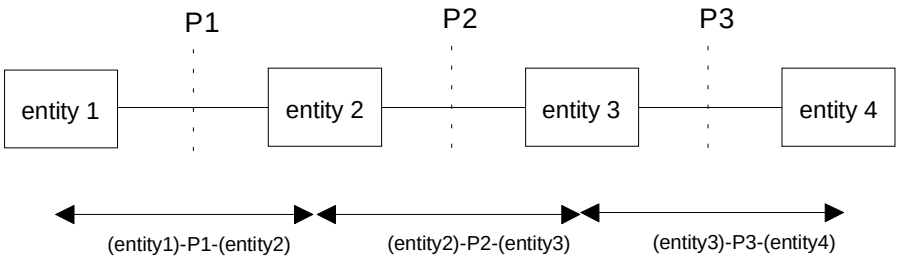


Figure 4: Example of peer-to-peer interoperability relations

Step 3: For each peer-to-peer interoperability relation, determine whether behaviour guidelines are available and/or may be needed.

Step 4: For each relevant interface, identify the interoperability relations between this interface and other interfaces of the scenario - the "interface-to-interface interoperability relations"; see figure 5.

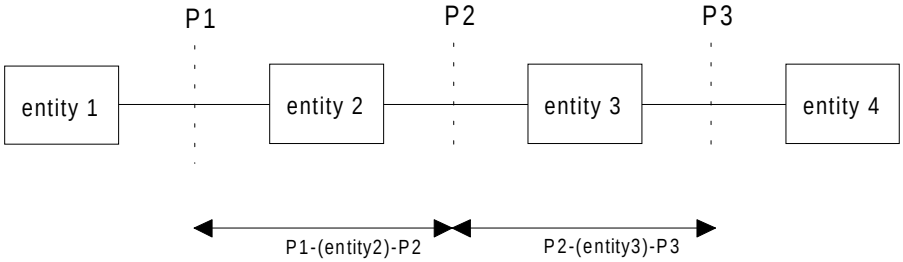


Figure 5: example of interface-to-interface interoperability relations

Step 5: For each interface-to-interface interoperability relation, determine whether mapping/interworking standards between the different protocols are available and/or may be needed.

Step 6: Identify the end-to-end interoperability relation and whether such interoperability has to be demonstrated for the relation (e.g. by using a set of architecture independent functional test purposes).

5.6.3 Presentation of the results

5.6.3.1 Table structure

Every scenario figure in subclause 5.6.4 is followed by four tables. The four tables are numbered in the form "Table N.1", "Table N.2", "Table N.3", and "Table N.4", where N is an Arabic numeral common to all 4 tables.

The results of step (1) above are presented in table N.1 of each scenario. For each interface, table N.1 indicates whether:

- the basic services and supplementary services are standardized, and/or need to be standardized;
- corresponding conformance testing standards exist and/or are needed.

The results of steps (2) and (3) are presented in table N.2 of each scenario. For each peer-to-peer interoperability relationship (i.e. between two functional entities), table N.2 indicates whether behaviour guidelines exist and/or may be needed.

The results of steps (4) and (5) are presented in table N.3 of each scenario. For each interface-to-interface interoperability relationship (i.e. between two reference points), table N.3 indicates whether mapping/interworking standards exist and/or may be needed for the basic services and the supplementary services.

A number n between brackets, i.e. $^{(n)}$, following the name of the relation in the first column indicates the order in which the specifications for behaviour guidelines and interworking should be developed.

The results of step (6) are presented in table N.4 of each scenario. For each end-to-end interoperability relationship (i.e. between two terminal equipment), table N.4 indicates whether functional test purposes exist and/or may be needed for demonstrating the interoperability relationship.

5.6.3.2 Tables and figures legend

Entries in the tables may be as follows:

"Yes" in the column "Existing" means that standards exist for the corresponding item;

"No" in the column "Existing" means that no standards exist for the corresponding item;

"N/A" in the column "Existing" means that the criterion: "existence of a standard" for the corresponding item is not applicable;

"Yes" in the column "Needed" means that standards may need to be developed for the corresponding item;

"-" in the column "Needed" means that no standards need to be developed for the corresponding item, because they already exist;

"No" in the column "Needed" means that no standards need to be developed for the corresponding item, because they are not required;

"N/A" in the column "Needed" means that the criterion: "need for a standard" for the corresponding item is not applicable.

The notation uses two kind of elements:

- the entities are indicated between brackets, i.e. (<entity>);
- the interfaces are indicated between hyphens, i.e. -<reference point>-.

The notation:

(<entity>) -<reference point>- ... -<reference point>- (<entity>)

is used in the end-to-end interoperability relation tables (N.4) to indicate the applicable interoperability relationships. For example, "(TE) -S- ... -S- (TE)" indicates an interoperability relationship between one terminal equipment, attached at the S reference point, and another terminal equipment, also attached at an S reference point.

5.6.4 The results

5.6.4.1 Notes to tables

The following notes apply to the tables:

NOTE 1: Requirements for interoperability between S and S/T reference points is a consequence of those for interoperability between S and T reference points, and for interoperability between T and S/T reference points.

NOTE 2: Requirements for interoperability between T and S/T reference points concern only the public domain, to be checked by SPS and NA TCs.

NOTE 3: Provision of DTMF and Last External Number Redial End-Users supplementary Services are not included in this analysis because they are not a signalling protocol issue. That is why no standards exist for these services.

NOTE 4: The requirements at the N* reference point for QSIG could be based on the specifications of the requirements for the transit functionalities included in QSIG Basic Call and Generic Functional Protocol standards. The corresponding conformance tests standards could therefore be also based on the conformance test standards for QSIG Basic Call and Generic Functional Protocol standards.

NOTE 5: DSS1 is currently being enhanced to support PISN signalling, but is not yet finalized.

NOTE 6: As far as Euro-ISDN terminals are concerned, DSS1 standards for the basic services and the supplementary services of the common minimum set at the S/T interface apply at the S interface. (The provision of the services may be done either by the PISN or by the public ISDN; implementation options).

NOTE 7: As far as Euro-ISDN terminals are concerned, the conformance tests standards for DSS1 at the S/T interface apply to the S interface as voluntary conformance test standards.

NOTE 8: As far as Euro-ISDN terminals are concerned, the interworking between the S interface (DSS1) and the T interface (DSS1) is direct.

NOTE 9: The different implementations options defined in QSIG supplementary services should be taken into account in these tasks (behaviour guidelines and interworking standards); they should include specific profiles for the supplementary services.

NOTE 10: The peer-to-peer IOP relation (TE) -S- (PISN) is technically equivalent to the relation (TE) -S- (PINX).

NOTE 11: The peer-to-peer IOP relation (PISN) -C- (ICN) is technically equivalent to the relation (PINX) -C- (PINX).

NOTE 12: The peer-to-peer IOP relation (ICN) -T- (ISDN) is technically equivalent to the relation (PINX) -T- (ISDN).

5.6.4.2 Simple ISDN case

The objective of this scenario is to ensure the functional continuity of services for a Euro-ISDN terminal connected behind a PINX and a Euro-ISDN terminal connected to a public ISDN.

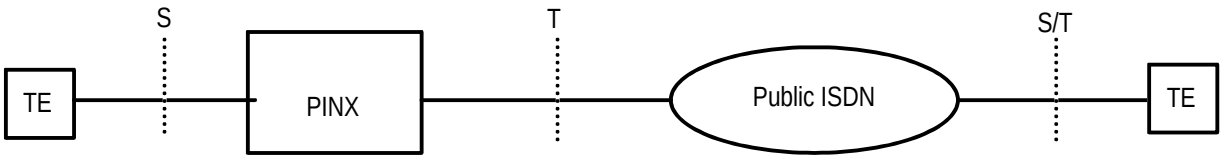


Figure 6: CN TE to public ISDN TE

Table 7.1: Simple ISDN case - interfaces

Interfaces	Standards		Conformance test standards	
	Existing	Needed	Existing	Needed
S	Yes note 6	- note 6	Yes note 6 note 7	- note 6 note 7
T	Yes note 3	-	Yes	-
S/T	Yes note 3	-	Yes	-

Table 7.2: Simple ISDN case - peer-to-peer IOP relations

Peer-to-peer interoperability relations	Behaviour guidelines	
	Existing	Needed
(TE) -S- (PINX) (1)	No	Yes (T1)
(PINX) -T- (ISDN) (3)	No	Yes (T2)
(ISDN) -S/T- (TE) (5)	note 2	note 2

Table 7.3: Simple ISDN case - interface-to-interface IOP relations

Interface-to-interface interoperability relations	Interworking specification	
	Existing	Needed
S -(PINX)- T (2)	No	Yes (T3) note 6 note 8
T -(ISDN)- S/T (4)	note 2	note 2

Table 7.4: Simple ISDN case - end-to-end IOP relations

End-to-end interoperability relations	Functional test purposes	
	Existing	Needed
(TE) -S- ... -S/T- (TE)	No	Yes (T4)

We can derive from these tables the following tasks:

T1: Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for a Euro-ISDN terminal and a PINX connected to one another at S interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set.

T2: Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for a PINX and an ISDN connected to one another at T interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, based on the subset of the protocol at T interface defined in T3, T22 and T11.

T3: Definition of an interworking standard between the S interface and the T interface through a PINX for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at S interface defined in T1.

NOTE: Tasks T3 and T1 can not be developed in isolation by two different groups. The point of these two tasks is to ensure continuity of the services between the Euro-ISDN terminal and the public ISDN, via the PINX to which the terminal is attached. This is the first step towards improving End-to-End interoperability.

T4: Definition of voluntary functional test purposes to demonstrate the end-to-end interoperability of the basic services and the supplementary services of the common minimum set, between the S interface and the S/T interface for Euro-ISDN terminals.

The behaviour guidelines and the interworking specifications should be developed in this order: T1 (1), T3 (2), T2 (3).

5.6.4.3 Concatenation scenario

The objective is to ensure the functional continuity of services for Euro-ISDN terminals, throughout a PINX, a public ISDN and another PINX (not necessarily in the same CN).

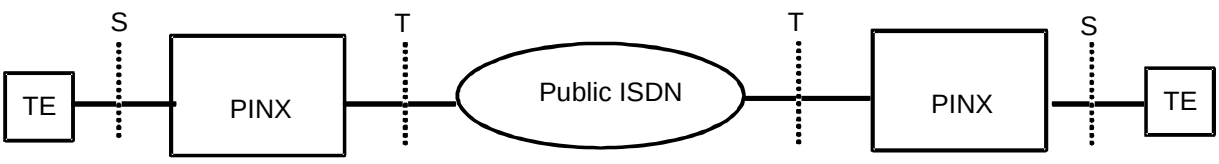


Figure 7: CN TE to CN TE via public ISDN

Table 8.1: Concatenation scenario - interfaces

Interfaces	Standards		Conformance test standards	
	Existing	Needed	Existing	Needed
S	See table 7.1	See table 7.1	See table 7.1	See table 7.1
T	See table 7.1	See table 7.1	See table 7.1	See table 7.1

Table 8.2: Concatenation scenario - peer-to-peer IOP relations

Peer-to-peer interoperability relations	Behaviour guidelines	
	Existing	Needed
(TE) -S- (PINX) (1)	See table 7.2	See table 7.2
(PINX) -T- (ISDN) (3)	See table 7.2	See table 7.2

Table 8.3: Concatenation scenario - interface-to-interface IOP relations

Interface-to-interface interoperability relations	Interworking specification	
	Existing	Needed
S -(PINX)- T (2)	See table 7.3	See table 7.3
T -(ISDN)- T	N/A	N/A

Table 8.4: Concatenation scenario - end-to-end IOP relations

End-to-end interoperability relations	Functional test purposes	
	Existing	Needed
(TE) -S- ... -S- (TE)	No	Yes (T5)

We can derive from these tables the following tasks:

T5: Definition of voluntary functional test purposes to demonstrate the end-to-end interoperability of the basic services and the supplementary services of the common minimum set, between two S interfaces for Euro-ISDN terminals connected behind a PINX.

5.6.4.4 Single PISN case

The objective of this scenario is to ensure the functional continuity of services for Euro-ISDN terminals, throughout a PISN.

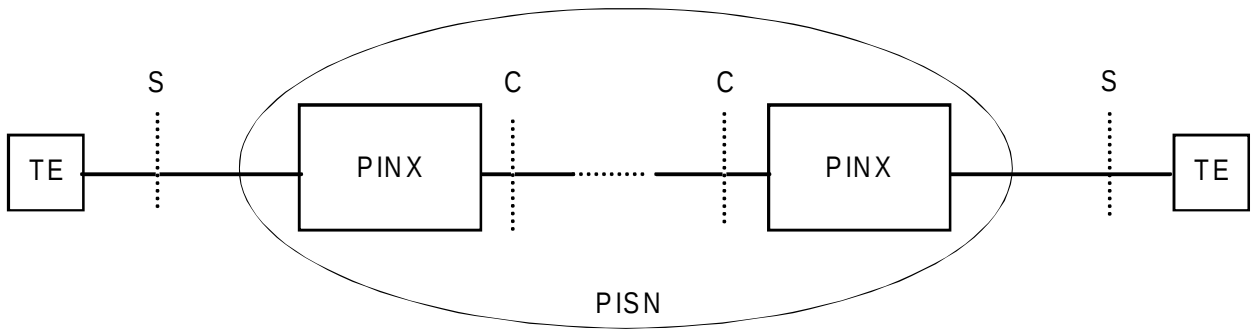


Figure 8: CN TE to CN TE of the same PISN

Table 9.1: Single PISN case - interfaces

Interfaces	Standards		Conformance test standards	
	Existing	Needed	Existing	Needed
S	See table 7.1	See table 7.1	See table 7.1	See table 7.1
C	Yes note 3	-	Yes for BC and CLIP/CLIR No for the other Supplementary Services	- for BC and CLIP/CLIR Yes for the other Supplementary Services (T6)

Table 9.2: Single PISN case - peer-to-peer IOP relations

Peer-to-peer interoperability relations	Behaviour guidelines	
	Existing	Needed
(TE) -S- (PINX) (1)	See table 7.2	See table 7.2
(PINX) -C- (PINX) (3)	No	Yes (T7)

Table 9.3: Single PISN case - interface-to-interface IOP relations

Interface-to-interface interoperability relations	Interworking specification	
	Existing	Needed
S -(PINX)- C (2)	No	Yes (T8) note 9
C -(PINX)- C	N/A	N/A

Table 9.4: Single PISN case - end-to-end IOP relations

End-to-end interoperability relations	Functional test purposes	
	Existing	Needed
(TE) -S- ... -S- (TE)	See table 8.4	See table 8.4

We can derive from these tables the following tasks:

T6: Definition of conformance test specification standards for the supplementary services of the common minimum set at the C interface, where QSIG is mapped on.

T7: Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for two PINXs connected to one another at C interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, based on the subset of the protocol at C interface defined in T8.

T8: Definition of an interworking standard between the S interface and QSIG mapped on the C interface through a PINX for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at S interface defined in T1.

NOTE: Tasks T8 and T1 can not be developed in isolation by two different groups. The point of these two tasks is to ensure continuity of the services between the Euro-ISDN terminal and the QSIG PISN, via the PINX to which the terminal is attached. This is the first step towards improving End-to-End interoperability.

The behaviour guidelines and the interworking specifications should be developed in this order: T1 (1), T8 (2), T7 (3).

5.6.4.5 ICN-public ISDN case

The objective of this scenario is to ensure the functional continuity of services for Euro-ISDN terminals, throughout a PISN, and a public ISDN.

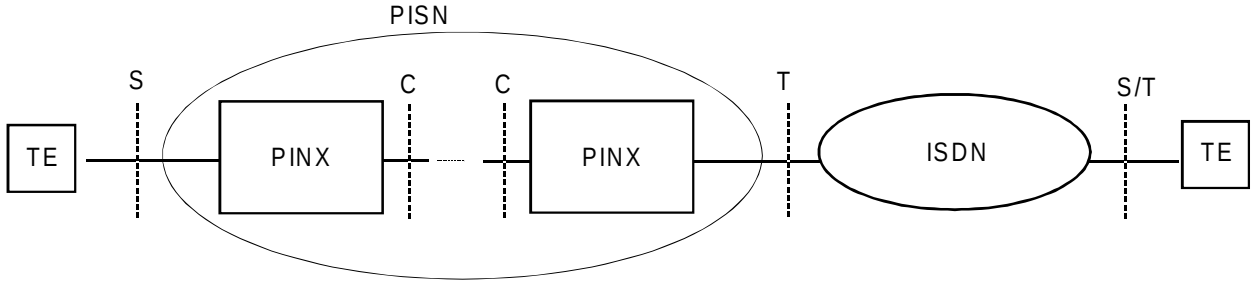


Figure 9: CN TE to public ISDN TE through a public ISDN

Table 10.1: ICN-public ISDN case - interfaces

Interfaces	Standards		Conformance test standards	
	Existing	Needed	Existing	Needed
S	See table 7.1	See table 7.1	See table 7.1	See table 7.1
C	See table 9.1	See table 9.1	See table 9.1	See table 9.1
T	See table 7.1	See table 7.1	See table 7.1	See table 7.1
S/T	See table 7.1	See table 7.1	See table 7.1	See table 7.1

Table 10.2: ICN-public ISDN case - peer-to-peer IOP relations

Peer-to-peer interoperability relations	Behaviour guidelines	
	Existing	Needed
(TE) -S- (PINX) (1)	See table 7.2	See table 7.2
(PINX) -C- (PINX) (3)	See table 9.2	See table 9.2
(PINX) -T- (ISDN) (5)	See table 7.2	See table 7.2
(ISDN) -S/T- (TE) (7)	See table 7.2	See table 7.2

Table 10.3: ICN-public ISDN case - interface-to-interface IOP relations

Interface-to-interface interoperability relations	Interworking specification	
	Existing	Needed
S -(PINX)- C (2)	See table 9.3	See table 9.3
C -(PINX)- C	N/A	N/A
C -(PINX)- T (4)	No	Yes (T9) note 9
T -(ISDN)- S/T (6)	See table 7.3	See table 7.3

Table 10.4: ICN-public ISDN case - end-to-end IOP relations

End-to-end interoperability relations	Functional test purposes	
	Existing	Needed
(TE) -S- ... -S/T- (TE)	See table 7.4	See table 7.4

We can derive from these tables the following tasks:

T9: Definition of an interworking standard between QSIG mapped on the C interface and DSS1 at the T interface through a PINX for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at C interface defined in T7.

NOTE: Tasks T9 and T7 can not be developed in isolation by two different groups. The point of these two tasks is to ensure continuity of the services between the QSIG PISN and the public ISDN. This is the first step towards improving End-to-End interoperability.

The behaviour guidelines and the interworking specifications should be developed in this order:
T1 (1), T8 (2), T7 (3), T9 (4), T2 (5).

5.6.4.6 QSIG Integrated scenario

The objective of this scenario is to ensure the functional continuity of services for public ISDN terminals, connected to two different CNs (PISN + QSIG ICN).

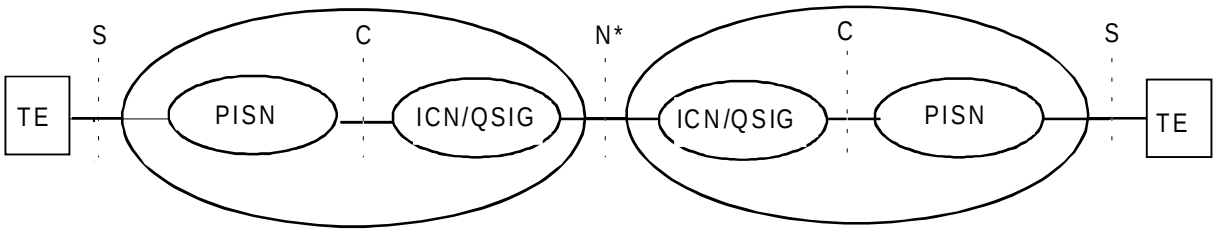


Figure 10: CN TE to CN TE; two different QSIG CNs

Table 11.1: QSIG Integrated scenario - interfaces

Interfaces	Standards		Conformance test standards	
	Existing	Needed	Existing	Needed
S	See table 7.1	See table 7.1	See table 7.1	See table 7.1
C	Yes note 3	-	See table 7.1	See table 7.1
N*	No note 4	Yes note 4 (T10)	No note 4	Yes note 4 (T11)

Table 11.2: QSIG Integrated scenario - peer-to-peer IOP relations

Peer-to-peer interoperability relations	Behaviour guidelines	
	Existing	Needed
(TE) -S- (PISN) (1)	See table 7.2 note 10	See table 7.2 note 10
(PISN) -C- (ICN) (3)	See table 9.2 note 11	See table 9.2 note 11
(ICN) -N*- (ICN) (5)	No	Yes (T12)

Table 11.3: QSIG Integrated scenario - interface-to-interface IOP relations

Interface-to-interface interoperability relations	Interworking specification	
	Existing	Needed
S -(PISN)- C (2)	No	Yes note 9 (T13)
C -(ICN)- N* (4)	No	Yes (T14)

Table 11.4: QSIG Integrated scenario - end-to-end IOP relations

End-to-end interoperability relations	Functional test purposes	
	Existing	Needed
(TE) -S- ... -S- (TE)	See table 8.4	See table 8.4

We can derive from these tables the following tasks:

T10: Definition of a protocol specification standard for the basic services and a mechanism for the support of the supplementary services of the common minimum set at the N* interface, between two QSIG ICNs.

T11: Definition of conformance test specification standards for the basic services and a mechanism for the support of the supplementary services of the common minimum set at the N* interface, between two QSIG ICNs.

T12: Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for two QSIG ICNs connected to one another at N* interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, based on the subset of the protocol at N* interface defined in T14.

T13: Definition of an interworking standard between QSIG mapped on the C interface and the S interface through a QSIG ICN for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at S interface defined in T1.

NOTE 1: Tasks T13 and T1 can not be developed in isolation by two different groups. The point of these two tasks is to ensure continuity of the services between the Euro-ISDN terminal and a QSIG ICN through a QSIG PISN. This is the first step towards improving end-to-end interoperability.

T14: Definition of an interworking standard between QSIG mapped on the C interface and the N* interface for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at C interface defined in T7.

NOTE 2: Tasks T14 and T7 can not be developed in isolation by two different groups. The point of these two tasks is to ensure continuity of the services between a PISN and a QSIG ICN through a different QSIG ICN. This is the first step towards improving end-to-end interoperability.

The behaviour guidelines and the interworking specifications should be developed in this order:
T1 (1), T13 (2), T7 (3), T14 (4), T12 (5).

5.6.4.7 DSS1 Integrated scenario

The objective of this scenario is to ensure the functional continuity of services for public ISDN terminals, connected to two different CNs (PISN + DSS1 ICN).

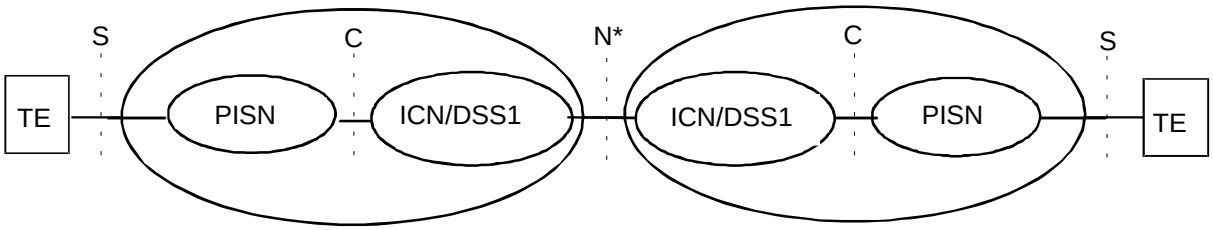


Figure 11: CN TE to CN TE; two different DSS1 CNs

Table 12.1: DSS1 Integrated scenario - interfaces

Interfaces	Standards		Conformance test standards	
	Existing	Needed	Existing	Needed
S	See table 7.1	See table 7.1	See table 7.1	See table 7.1
C	Yes note 5	-	No	Yes (T15)
N*	No	Yes (T16)	No	Yes (T17)

Table 12.2: DSS1 Integrated scenario - peer-to-peer IOP relations

Peer-to-peer interoperability relations	Behaviour guidelines	
	Existing	Needed
(TE) -S- (PISN) (1)	See table 7.2 note 10	See table 7.2 note 10
(PISN) -C- (ICN) (3)	No	Yes (T18)
(ICN) -N*- (ICN) (5)	No	Yes (T19)

Table 12.3: DSS1 Integrated scenario - interface-to-interface IOP relations

Interface-to-interface interoperability relations	Interworking specification	
	Existing	Needed
S -(PISN)- C (2)	No	Yes (T20)
C -(ICN)- N* (4)	No	Yes (T21)

Table 12.4: DSS1 Integrated scenario - end-to-end IOP relations

End-to-end interoperability relations	Functional test purposes	
	Existing	Needed
(TE) -S- ... -S- (TE)	See table 8.4	See table 8.4

We can derive from these tables the following tasks:

T15: Definition of conformance test specification standards for the basic services and the supplementary services of the common minimum set at the C interface, where DSS1 is mapped on.

T16: Definition of a protocol specification standard for the basic services and a mechanism for the support of the supplementary services of the common minimum set at the N* interface, between two DSS1 ICNs.

T17: Definition of conformance test specification standard for the basic services and a mechanism for the support of the supplementary services of the common minimum set at the N* interface, between two DSS1 ICNs.

T18: Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for a PISN and an ICN connected to one another at C interface using DSS1, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, based on the subset of the protocol at C interface defined in T20.

T19: Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for two DSS1 ICNs connected to one another at N* interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, based on the subset of the protocol at N* interface defined in T21.

T20: Definition of an interworking standard between the S interface and DSS1 mapped on the C interface through a DSS1 ICN for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at S interface defined in T1.

NOTE 1: Tasks T20 and T1 can not be developed in isolation by two different groups. The point of these two tasks is to ensure continuity of the services between the Euro-ISDN terminal and a DSS1 PISN to which the terminal is attached. This is the first step towards improving end-to-end interoperability.

T21: Definition of an interworking standard between DSS1 mapped on the C interface and the N* interface for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at C interface defined in T18.

NOTE 2: Tasks T21 and T18 can not be developed in isolation by two different groups. The point of these two tasks is to ensure continuity of the services between a PISN and a DSS1 ICN through a different DSS1 ICN. This is the first step towards improving end-to-end interoperability.

The behaviour guidelines and the interworking specifications should be developed in this order:
T1 (1), T20 (2), T18 (3), T21 (4), T19 (5).

5.6.4.8 QSIG Integrated scenario with break in/out to the public ISDN

The objective of this scenario is to ensure the functional continuity of services for public ISDN terminals, for the break in/out operation between a QSIG ICN and a public ISDN.

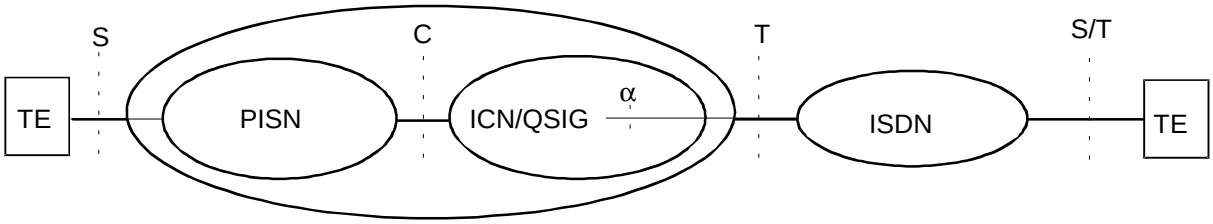


Figure 12: CN TE to public ISDN TE - QSIG integrated scenario with break in/out

NOTE 1: If the ICN provider and the ISDN provider are not identical, the α interface is considered to be internal to the ICN, and the interface between ICN and ISDN will most probably be T.

If the ICN provider and the ISDN provider are identical, α is an internal interface of the global package (ICN + ISDN).

The case described here is the one with two different providers for the ICN and the public ISDN.

Table 13.1: QSIG Integrated scenario with break in/out to the public ISDN - interfaces

Interfaces	Standards		Conformance test standards	
	Existing	Needed	Existing	Needed
S	See table 7.1	See table 7.1	See table 7.1	See table 7.1
C	See table 11.1	See table 11.1	See table 11.1	See table 11.1
T	See table 7.1	See table 7.1	See table 7.1	See table 7.1
S/T	See table 7.1	See table 7.1	See table 7.1	See table 7.1

Table 13.2: QSIG Integrated scenario with break in/out to the public ISDN - peer-to-peer IOP relations

Peer-to-peer interoperability relations	Behaviour guidelines	
	Existing	Needed
(TE) -S- (PISN) (1)	See table 7.2 note 10	See table 7.2 note 10
(PISN) -C- (ICN) (3)	See table 9.2 note 11	See table 9.2 note 11
(ICN) -T- (ISDN) (5)	See table 7.2 note 12	See table 7.2 note 12
(ISDN) -S/T-(TE) (7)	See table 7.2	See table 7.2

Table 13.3: QSIG Integrated scenario with break in/out to the public ISDN - interface-to-interface IOP relations

Interface-to-interface interoperability relations	Interworking specification	
	Existing	Needed
S -(PISN)- C (2)	See table 11.3	See table 11.3
C -(ICN)- T (4)	No	Yes note 9 (T22)
T -(ISDN)- S/T (6)	See table 7.3	See table 7.3

Table 13.4: QSIG Integrated scenario with break in/out to the public ISDN - end-to-end IOP relations

End-to-end interoperability relations	Functional test purposes	
	Existing	Needed
(TE) -S- ... -S/T- (TE)	See table 7.4	See table 7.4

We can derive from these tables the following tasks:

T22: Definition of an interworking standard between QSIG mapped on the C interface and DSS1 at the T interface through a QSIG ICN for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at C interface defined in T7.

NOTE 2: Tasks T22 and T7 can not be developed in isolation by two different groups. The point of these two tasks is to ensure continuity of the services between a PISN and the public ISDN through a QSIG ICN. This is the first step towards improving end-to-end interoperability.

The behaviour guidelines and the interworking specifications should be developed in this order:
T1 (1), T13 (2), T7 (3), T22 (4), T2 (5).

5.6.4.9 DSS1 Integrated scenario with break in/out to the public ISDN

The objective of this scenario is to ensure the functional continuity of services for public ISDN terminals, for the break in/out operation between a DSS1 ICN and a public ISDN.

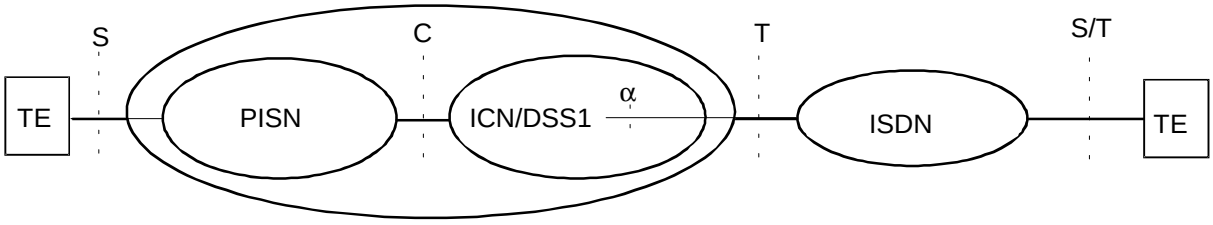


Figure 13: CN TE to public ISDN TE - DSS1 integrated scenario with break in/out

NOTE 1: If the ICN provider and the ISDN provider are not identical, the α interface is considered to be internal to the ICN, and the interface between ICN and ISDN will most probably be T.

If the ICN provider and the ISDN provider are identical, α is an internal interface of the global package (ICN + ISDN).

The case described here is the one with two different providers for the ICN and the public ISDN.

Table 14.1: DSS1 Integrated scenario with break in/out to the public ISDN - interfaces

Interfaces	Standards		Conformance test standards	
	Existing	Needed	Existing	Needed
S	See table 7.1	See table 7.1	See table 7.1	See table 7.1
C	See table 12.1	See table 12.1	See table 12.1	See table 12.1
T	See table 7.1	See table 7.1	See table 7.1	See table 7.1
S/T	See table 7.1	See table 7.1	See table 7.1	See table 7.1

Table 14.2: DSS1 Integrated scenario with break in/out to the public ISDN - peer-to-peer IOP relations

Peer-to-peer interoperability relations	Behaviour guidelines	
	Existing	Needed
(TE) -S- (PISN) (1)	See table 7.2 note 10	See table 7.2 note 10
(PISN) -C- (ICN) (3)	See table 12.2	See table 12.2
(ICN) -T- (ISDN) (5)	No	Yes (T23)
(ISDN) -S/T- (TE) (7)	See table 7.2	See table 7.2

Table 14.3: DSS1 Integrated scenario with break in/out to the public ISDN - interface-to-interface IOP relations

Interface-to-interface interoperability relations	Interworking specification	
	Existing	Needed
S -(PISN)- C (2)	See table 12.3	See table 12.3
C -(ICN)- T (4)	No	Yes (T24)
T -(ISDN)- S/T (6)	See table 7.3	See table 7.3

Table 14.4: DSS1 Integrated scenario with break in/out to the public ISDN - end-to-end IOP relations

End-to-end interoperability relations	Functional test purposes	
	Existing	Needed
(TE) -S- ... -S/T- (TE)	See table 7.4	See table 7.4

We can derive from these tables the following tasks:

T23: Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for a DSS1 ICN and a public ISDN connected to one another at T interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, based on the subset of the protocol at T interface defined in T24.

T24: Definition of an interworking standard between DSS1 mapped on the C interface and DSS1 at the T interface for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at C interface defined in T18.

NOTE 2: Tasks T24 and T18 can not be developed in isolation by two different groups. The point of these two tasks is to ensure continuity of the services between a PISN and the public ISDN through a DSS1 ICN. This is the first step towards improving end-to-end interoperability.

The behaviour guidelines and the interworking specifications should be developed in this order:
T1 (1), T20 (2), T18 (3), T24 (4), T23 (5).

5.6.5 Standardization work

Considering the various tasks derived previously, we can gather them according to the type of work to be done. As protocol standards and conformance tests standards are related to an interface, these two kinds of tasks should be developed together.

Similarly, a behaviour guideline and an interworking standard are both related to the same type of relationship: interoperability. Therefore, they should be developed together.

Then the demonstration of end-to-end interoperability between two Euro-ISDN terminals can be performed by defining functional test purposes, independently of the architecture involved in between.

The work items described hereafter are generic, as they apply to every basic service, and/or to every supplementary service of the common minimum set. By applying systematically every work item to every service (basic and/or supplementary) of the common minimum set, we would obtain all the standards to be realized in order to achieve end-to-end interoperability of the basic services, and/or the supplementary services of the common minimum set. But it could happen that several work items would generate similar normative requirements, or no additional normative requirements. In that case, they should be specified in the same standard.

For example, applying the work item 6 to three bearer services (speech, 3,1 kHz audio and 64 kbits/s unrestricted) might lead to similar interworking normative requirements. Therefore, these three bearer services should be covered in the same standard, instead of three different ones.

Similarly, applying the work items 4 and 5 to supplementary services to derive a mechanism for supporting each service at the N* interface may result in the same mechanism in each case - a generic mechanism, that has to be specified only once.

We recommend to process the following generic work items by applying them to every service of the common minimum set where relevant. Then all the individual work items obtained (i.e. specific to one service) should be analysed (i.e. could they be grouped in a single standard because the normative requirements are similar, is there a real need of new normative technical requirements, etc.) and derived in a set of work items, with a lower number of elements than the initial set of individual work items, each corresponding to a new standard.

5.6.5.1 Protocol and conformance testing specifications

1) Interface S

None.

2) Interface C

T6: Definition of conformance test specification standards for the supplementary services of the common minimum set at the C interface, where QSIG is mapped on.

Work Item 1:	Definition of conformance test specification standards for the supplementary services of the common minimum set at the C interface, where QSIG is mapped on.

T15: Definition of conformance test specification standards for the basic services and the supplementary services of the common minimum set at the C interface, where DSS1 is mapped on.

Work Item 2:	Definition of conformance test specification standards for the basic services and the supplementary services of the common minimum set at the C interface, where DSS1 is mapped on.

3) Interface N*

T10: Definition of a protocol specification standard for the basic services and a mechanism for the support of the supplementary services of the common minimum set at the N* interface, between two QSIG ICNs.

T11: Definition of conformance test specification standards for the basic services and a mechanism for the support of the supplementary services of the common minimum set at the N* interface, between two QSIG ICNs.

T16: Definition of a protocol specification standard for the basic services and a mechanism for the support of the supplementary services of the common minimum set at the N* interface, between two DSS1 ICNs.

T17: Definition of conformance test specification standard for the basic services and a mechanism for the support of the supplementary services of the common minimum set at the N* interface, between two DSS1 ICNs.

NOTE: Tasks similar to those in T10, T11, T16 and T17 above can be derived for the case where the ICNs on each side of the N* interface are a QSIG ICN and a DSS1 ICN. This case can also be covered by work items 4 and 5 below.

Work Item 3:	Definition of a protocol specification standard for the basic services and a mechanism for the support of the supplementary services of the common minimum set at the N* interface, between two ICNs, where the ICNs could be QSIG or DSS1. (the relevant cases of combination QSIG/DSS1 will have to be considered)

Work Item 4:	Definition of conformance test specification standards for the basic services and a mechanism for the support of the supplementary services of the common minimum set at the N* interface, between two ICNs, where the ICNs could be QSIG or DSS1. This work item will directly depend on work item 3.

5.6.5.2 Interworking specification and behaviour guidelines

1) Behaviour guideline for (TE) -S- (PINX) or (TE) -S- (PISN), and interworking specifications derived between S and T, S and C where QSIG is mapped on, S and C where DSS1 is mapped on, based on the profile of the protocol at S interface.

The behaviour guidelines indicating the implementation options and the behaviour to adopt for a Euro-ISDN terminal and a PINX connected to one another at S interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, i.e. a profile at the S interface (as described in task T1), will be defined first, and will be used as a basis for the specification of interworking standards between the S interface and respectively the T interface (as described in task T3), the C interface where QSIG is mapped on (through a PINX and through a PISN) (as described in tasks T8 and T13), the C interface where DSS1 is mapped on (as described in task T20).

T1: Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for a Euro-ISDN terminal and a PINX connected to one another at S interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set.

T3: Definition of an interworking standard between the S interface and the T interface through a PINX for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at S interface defined in T1.

T8: Definition of an interworking standard between the S interface and QSIG mapped on the C interface through a PINX for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at S interface defined in T1.

T13: Definition of an interworking standard between QSIG mapped on the C interface and the S interface through a QSIG PISN for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at S interface defined in T1.

T20: Definition of an interworking standard between the S interface and DSS1 mapped on the C interface through a DSS1 PISN for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at S interface defined in T1.

Work Item 5:	Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for a Euro-ISDN terminal and a PINX connected to one another at S interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, i.e. a profile at the S interface. This standard will include three clauses containing the interworking requirements based on this profile, between the S interface and the following cases: - DSS1 at the T interface through a PINX; - QSIG at the C interface through a PINX and through a PISN; - DSS1 at the C interface through a PISN.

2) Behaviour guideline for (PINX) -C- (PINX) where QSIG is mapped on C interface, and interworking specifications derived between C and T, C and N*.

The behaviour guidelines indicating the implementation options and the behaviour to adopt for two QSIG PINXs connected to one another at C interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, i.e. a QSIG profile at the C interface (as described in task T7), will be defined first and will be based on the subset of the QSIG protocol at C interface defined in tasks T8 and T13, and will be used as a basis for the specification of interworking standards between the C interface where QSIG is mapped on and respectively the T interface (through a PINX and through an ICN) (as described in tasks T9 and T14), the N* interface (as described in task T22).

T7: Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for two PINXs connected to one another at C interface where QSIG is mapped on, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, based on the subset of the protocol at C interface defined in T8 and T13.

T9: Definition of an interworking standard between QSIG mapped on the C interface and DSS1 at the T interface through a PINX for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at C interface defined in T7.

T14: Definition of an interworking standard between QSIG mapped on the C interface and the N* interface for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at C interface defined in T7.

T22: Definition of an interworking standard between QSIG mapped on the C interface and DSS1 at the T interface through a QSIG ICN for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at C interface defined in T7.

Work Item 6:	Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for two PINXs connected to one another at C interface where QSIG is mapped on, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, i.e. a QSIG profile at the C interface. This standard will include two clauses containing the interworking requirements based on this profile, between the C interface and the following cases: - DSS1 at the T interface through a PINX and through an ICN; - the protocol at the N* interface through an ICN.

3) Behaviour guideline for (PISN) -C- (PINX) where DSS1 is mapped on C interface, and interworking specifications derived between C and T, C and N*.

The behaviour guidelines indicating the implementation options and the behaviour to adopt for a DSS1 PISN and a DSS1 ICN connected to one another at C interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, i.e. a DSS1 profile at the C interface (as described in task T18), will be defined first and will be based on the subset of the DSS1 protocol at C interface defined in task T20, and will be used as a basis for the specification of interworking standards between the C interface where DSS1 is mapped on and respectively the T interface (through an ICN) (as described in tasks T21), the N* interface (as described in task T24).

T18: Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for a PISN and an ICN connected to one another at C interface using DSS1, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, based on the subset of the protocol at C interface defined in T20.

T21: Definition of an interworking standard between DSS1 mapped on the C interface and the N* interface for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at C interface defined in T18.

T24: Definition of an interworking standard between DSS1 mapped on the C interface and DSS1 at the T interface for the basic services and the supplementary services of the common minimum set, based on the profile of the protocol at C interface defined in T18.

Work Item 7:	Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for a PISN and an ICN connected to one another at C interface using DSS1, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, i.e. a DSS1 profile at the C interface. This standard will include two clauses containing the interworking requirements based on this profile, between the C interface and the following cases: - DSS1 at the T interface through an ICN; - the protocol at the N* interface through an ICN.

4) Behaviour guideline for (PINX) -T- (ISDN).

The behaviour guidelines indicating the implementation options and the behaviour to adopt for a PINX and an ISDN connected to one another at T interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, i.e. a DSS1 profile at the T interface (as described in task T2), will be defined first and will be based on the subsets of the DSS1 protocol at T interface defined in tasks T3, T22, T9, T24 and T23. This could be used as a basis for the specification of interworking standards between the T interface and the S/T interface, but this is not relevant for the CN project.

T2: Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for a PINX and an ISDN connected to one another at T interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, based on the subsets of the protocol at T interface defined in T3, T22, T9, T24 and T23.

Work Item 8:	Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for a PINX and an ISDN connected to one another at T interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, i.e. a DSS1 profile at the T interface.

5) Behaviour guideline for (ICN) -N*- (ICN).

The behaviour guidelines indicating the implementation options and the behaviour to adopt for two ICNs (QSIG or DSS1) connected to one another at N* interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, i.e. a profile at the N* interface (as described in tasks T12 and T19), will be defined first and will be based on the subsets of the protocol at N* interface defined in tasks T14 and T21.

T12: Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for two QSIG PISNs connected to one another at N* interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, based on the subset of the protocol at N* interface defined in T14.

T19: Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for two DSS1 PISNs connected to one another at N* interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, based on the subset of the protocol at N* interface defined in T21.

Work Item 9:	Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for two ICNs (QSIG or DSS1) connected to one another at N* interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, i.e. a protocol profile at the N* interface.

5.6.5.3 End-to-end functional test purposes

T4: Definition of voluntary functional test purposes to demonstrate the end-to-end interoperability of the basic services and the supplementary services of the common minimum set, between the S interface and the S/T interface for Euro-ISDN terminals.

T5: Definition of voluntary functional test purposes to demonstrate the end-to-end interoperability of the basic services and the supplementary services of the common minimum set, between two S interfaces for Euro-ISDN terminals connected behind a PINX.

Work item 10:	Definition of voluntary functional test purposes to demonstrate the end-to-end interoperability of the basic services and the supplementary services of the common minimum set, between two Euro-ISDN terminals connected behind PINX to one another at S interface and/or connected to the public ISDN to one another at S/T interface. The approach used in ETR 299-1 [7] for the public ISDN (which is the result of EURESCOM projects P.104 and P.412) should be followed.

6 Conclusions and recommendations

6.1 Summary of recommendations

In summary, this study makes the following recommendations:

Recommendation 1: Enhancements of public ISDN voice terminals to provide Centrex/PISN services is a specific issue that should be analysed by the CN VPN subproject.

Recommendation 2: The definition of a default configuration to be supported by a PINX at the S reference point, and implementation guidelines for functional continuity between S and T reference points have already been carried out in France. We recommend that the same approach should be used at the European level to fulfil the functional continuity between S and T reference points for Euro-ISDN terminal equipment. Proprietary terminals should not fall under the scope of this additional standardization work.

Recommendation 3: Implementation guidelines for BC, HLC, LLC have been done for public ISDN in ETR 018 [5]. A new version of ETR 018 [5] should be completed in order to include:

- CN applications through the different CN scenarios and interfaces; and
- introduction of new HLC/LLC values for the support of new services such as ISDN router connection, INTERNET connection.

Recommendation 4: ETSI TC-NA and ECMA TC32 should work together (as they have already done) to standardize numbering/addressing issues and CLIP/CLIR services for the different CN reference scenarios.

Recommendation 5: We recommend to process the following generic work items by applying them to every service of the common minimum set where relevant. Then all the individual work items obtained (i.e. specific to one service) should be analysed (i.e. could they be grouped in a single standard because the normative requirements are similar, is there a real need of new normative technical requirements, etc.) and derived in a set of work items, with a lower number of elements than the initial set of individual work items, each corresponding to a new standard.

6.2 Application of generic work item proposals to common minimum set

6.2.1 General

A number of generic work items have been identified in this study. These can be applied to the common minimum set of end-user services required by all types of user to give specific work items. The following subclauses identify these work items.

NOTE: Where CLIP and CLIR are not explicitly mentioned they are covered by the circuit-mode BC service.

The work items have been grouped as shown in table 15 below.

Table 15: Work item groupings

Derived from generic work item no.	Group name	Description
1	IT1	Inter-exchange signalling protocol (QSIG) (CTs)
2	IT2	Enhanced Digital Subscriber Signalling System No.1 protocol for VPN (DSS1) (CTs)
3 & 4	IT3/4	Signalling protocol for ICN Interconnection at the N* reference point (Base and CTs)
5	IT5	Profile at S reference point for interoperability between a Euro-ISDN terminal and a PINX
6	IT6	Profile at C reference point where QSIG is mapped on for interoperability between 2 PINXs
7	IT7	Profile at C reference point where DSS1 is mapped on for interoperability between 2 PINXs
8	IT8	Profile at T reference point for interoperability between a PINX and an ISDN
9	IT9	Profile at N* reference point for interoperability between 2 ICNs
10	IT10	Signalling System Digital Subscriber No.1 protocol (DSS1);Network Integration Testing
NOTE: Base stands for the basic protocol signalling and CTs stands for Conformance Testing made of TSS & TP and ATS & PIXIT		

As a result of the work distribution, three Technical Competence Centres have been identified for carrying out this standardization work. They are:

- ECMA TC 32 TG14, responsible for 55 WIs;
- ETSI STC SPS1, responsible for 44 WIs; and
- ETSI STC SPS5, responsible for 43 WIs.

6.2.2 Work items derived from generic work item 1

Work Item 1:	Definition of conformance test specification standards for the supplementary services of the common minimum set at the C interface, where QSIG is mapped on.

Name:

IT1 Inter-exchange signalling protocol (QSIG) (CTs)

Scope:

Definition of conformance test specification standards for the following supplementary services at the C interface, where QSIG is mapped on:

- Part 1: Test Suite Structure and Test Purposes TSS & TP.
- Part 2: Abstract Test Suite and Protocol Implementation eXtra Information for Testing ATS & PIXIT.

Services:

- Advice Of Charge (AOC)
- Call Completion (CC)
- Call Forwarding (CF)
- Conference Call (CONF)
- Call Transfer (CT)
- Call Waiting (CW)
- Hold (HOLD)
- Message Waiting Indication (MWI)
- User-User-Signalling (UUS)

Output:

For each service, two ENs shall be drafted by PT "EC". In total, 18 work items to be carried out by ECMA TC32 TG14.

6.2.3 Work items derived from generic work item 2

Work Item 2:	Definition of conformance test specification standards for the basic services and the supplementary services of the common minimum set at the C interface, where DSS1 is mapped on.

Name:

IT2 Enhanced Digital Subscriber Signalling System No.1 protocol for VPN (DSS1) (CTs)

Scope:

Definition of conformance test specification standards for the following services at the C interface, where DSS1 is mapped on:

- Part 1: Test Suite Structure and Test Purposes TSS & TP.
- Part 2: Abstract Test Suite and Protocol Implementation eXtra Information for Testing ATS & PIXIT.

Services:

- Circuit-mode Basic Call (including the calling line identification/restriction feature) (BC)
  - Advice Of Charge (AOC)
- Call Completion (CC)
- Call Forwarding (CF)
- Conference Call (CONF)
- Call Transfer (CT)
- Call Waiting (CW)
- Hold (HOLD)
- Message Waiting Indication (MWI)
- User-User-Signalling (UUS)

Outputs:

For each service, two ENs shall be drafted by PT "EC". In total, 20 work items to be processed by STC SPS5.

6.2.4 Work items derived from generic work item 3

Work Item 3:	Definition of a protocol specification standard for the basic services and the supplementary services of the common minimum set at the N* interface, between two ICNs, where the ICNs could be QSIG or DSS1 (the relevant cases of combination QSIG/DSS1 will have to be considered).

Name:

IT3/4 Signalling protocol for ICN Interconnection at the N* reference point (Base and CTs)

Scope:

Definition of an Inter-network Signalling protocol at the N* reference point for the support of the following VPN bearer services. This covers the cases where QSIG or DSS1 is used as access protocol.

This work shall be combined with the relevant Conformance Testing activity.

Services:

- Circuit-mode Basic Call (including the calling line identification/restriction feature) (BC)
- Generic functional protocol for the support of supplementary services (GF)
- Advice Of Charge (AOC)
- Call Completion (CC)
- Call Forwarding (CF)
- Conference Call (CONF)
- Call Transfer (CT)
- Call Waiting (CW)
- Hold (HOLD)
- Message Waiting Indication (MWI)
- User-User-Signalling (UUS)

Outputs:

For each service, one EN is drafted by the relevant Technical Competence Centre. In total, 11 work items to be carried out by STC SPS1.

6.2.5 Work items derived from generic work item 4

Work Item 4:	Definition of conformance test specification standards for the basic services and the supplementary services of the common minimum set at the N* interface, between two ICNs, where the ICNs could be QSIG or DSS1. This work item will directly depend on work item 4.

Name:

IT3/4 Signalling protocol for ICN Interconnection at the N* reference point (Base and CTs)

Scope:

Definition of conformance test specification standards for the following services at the C interface, where DSS1 is mapped on:

- Part 1: Test Suite Structure and Test Purposes TSS & TP.
- Part 2: Abstract Test Suite and Protocol Implementation eXtra Information for Testing ATS & PIXIT.

This work shall be combined with the relevant basic standards protocol.

Services:

- Circuit-mode Basic Call (including the calling line identification/restriction feature) (BC)
- Generic functional protocol for the support of supplementary services (GF)
- Advice Of Charge (AOC)
- Call Completion (CC)
- Call Forwarding (CF)
- Conference Call (CONF)
- Call Transfer (CT)
- Call Waiting (CW)
- Hold (HOLD)
- Message Waiting Indication (MWI)
- User-User-Signalling (UUS)

Outputs:

For each service, two ENs are drafted by PT "EC". In total, 22 work items to be carried out by STC SPS1.

6.2.6 Work items derived from generic work item 5

Work Item 5:	Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for a Euro-ISDN terminal and a PINX connected to one another at S interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, i.e. a profile at the S interface. This standard will include three clauses containing the interworking requirements based on this profile, between the S interface and the following cases: - DSS1 at the T interface through a PINX; - QSIG at the C interface through a PINX and through a PISN; - DSS1 at the C interface through a PISN.

Name:

IT5 Profile at S reference point for interoperability between a Euro-ISDN terminal and a PINX

Scope:

Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for a Euro-ISDN terminal and a PINX connected to one another at S interface, in order to achieve peer-to-peer interoperability of the following EURO-ISDN Bearer services, i.e. a profile at the S interface.

This standard will include three clauses containing the interworking requirements based on this profile, between the S interface and the following cases:

- DSS1 at the T interface through a PINX;

- QSIG at the C interface through a PINX and through a PISN; and

- DSS1 at the C interface through a PISN.

Services:

- Circuit-mode Basic Call (including the calling line identification/restriction feature) (BC)
- Generic functional protocol for the support of supplementary services (GF)
- Advice Of Charge (AOC)
- Call Completion (CC)
- Call Forwarding (CF)
- Calling Line Identification Presentation (CLIP)
- Calling Line Identification Restriction (CLIR)
- Conference Call (CONF)
- Call Transfer (CT)
- Call Waiting (CW)
- Hold (HOLD)
- Message Waiting Indication (MWI)
- User-User-Signalling (UUS)

Outputs:

For each service, one EN is drafted by the relevant Technical Competence Centre. In total, 13 work items to be proceed by ECMA TC32 TG14.

6.2.7 Work items derived from generic work item 6

Work Item 6:	Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for two PINXs connected to one another at C interface where QSIG is mapped on, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, i.e. a QSIG profile at the C interface. This standard will include two clauses containing the interworking requirements based on this profile, between the C interface and the following cases: - DSS1 at the T interface through a PINX and through an ICN; - the protocol at the N* interface through an ICN.

Name:

IT6 Profile at C reference point where QSIG is mapped on for interoperability between 2 PINXs

Scope:

Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for two PINXs connected to one another at C interface where QSIG is mapped on, in order to achieve peer-to-peer interoperability of the following Euro-ISDN Bearer services, i.e. a QSIG profile at the C interface.

This standard will include two clauses containing the interworking requirements based on this profile, between the C interface and the following cases: DSS1 at the T interface through a PINX and through an ICN; and the protocol at the N* interface through an ICN.

Services:

- Circuit-mode Basic Call (including the calling line identification/restriction feature) (BC)
- Generic functional protocol for the support of supplementary services (GF)
- Advice Of Charge (AOC)
- Call Completion (CC)
- Call Forwarding (CF)
- Conference Call (CONF)
- Call Transfer (CT)
- Call Waiting (CW)
- Hold (HOLD)
- Message Waiting Indication (MWI)
- User-User-Signalling (UUS)

Outputs:

For each service, one EN is drafted by the relevant Technical Competence Centre. In total, 11 work items to be proceed by ECMA TC32 TG14.

6.2.8 Work items derived from generic work item 7

Work Item 7:	Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for a DSS1 PISN and a DSS1 ICN connected to one another at C interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, i.e. a DSS1 profile at the C interface. This standard will include two clauses containing the interworking requirements based on this profile, between the C interface and the following cases: - DSS1 at the T interface through an ICN; - the protocol at the N* interface through an ICN.

Name:

IT7 Profile at C reference point where DSS1 is mapped on for interoperability between 2 PINXs

Scope:

Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for a DSS1 PISN and a DSS1 ICN connected to one another at C interface, in order to achieve peer-to-peer interoperability of the following Euro-ISDN services, i.e. a DSS1 profile at the C interface.

This standard will include two clauses containing interworking requirements based on this profile, between the C interface and the following cases:

Section 1: DSS1 at the T interface through an ICN;

Section 2: protocol at the N* interface through an ICN.

Services:

- Circuit-mode Basic Call (including the calling line identification/restriction feature) (BC)
- Advice Of Charge (AOC)
- Call Completion (CC)
- Call Forwarding (CF)
- Conference Call (CONF)
- Call Transfer (CT)
- Call Waiting (CW)
- Hold (HOLD)
- Message Waiting Indication (MWI)
- User-User-Signalling (UUS)

Outputs:

For each service, one EN is drafted by PT "EC". In total, 10 work items to be proceed by STC SPS5.

6.2.9 Work items derived from generic work item 8

Work Item 8:	Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for a PINX and an ISDN connected to one another at T interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, i.e. a DSS1 profile at the T interface.

Name:

IT8 Profile at T reference point for interoperability between a PINX and an ISDN

Scope:

Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for a PINX and an ISDN connected to one another at T interface, in order to achieve peer-to-peer interoperability of the following Euro-ISDN services, i.e. a DSS1 profile at the T interface.

Services:

- Circuit-mode Basic Call (BC)
- Generic Functional Protocol (GF)
- Advice Of Charge (AOC)
- Call Completion (CC)
- Call Forwarding (CF)
- Calling Line Identification Presentation (CLIP)
- Calling Line Identification Restriction (CLIR)
- Conference Call (CONF)
- Call Transfer (CT)
- Call Waiting (CW)
- Hold (HOLD)
- Message Waiting Indication (MWI)
- User-User-Signalling (UUS)

Outputs:

For each service, one EN is drafted by PT "EC". In total, 13 work items to be proceed by STC SPS5.

6.2.10 Work items derived from generic work item 9

Work Item 9:	Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for two ICNs (QSIG or DSS1) connected to one another at N* interface, in order to achieve peer-to-peer interoperability of the Euro-ISDN basic services and the supplementary services of the common minimum set, i.e. a protocol profile at the N* interface.

Name:

IT9 Profile at N* reference point for interoperability between 2 ICNs

Scope:

Definition of behaviour guidelines indicating the implementation options and the behaviour to adopt for two ICNs (QSIG or DSS1) connected to one another at N* interface, in order to achieve peer-to-peer interoperability of the following Euro-ISDN services, i.e. a protocol profile at the N* interface.

Services:

- Circuit-mode Basic Call (including the calling line identification/restriction feature) (BC)
- Generic functional protocol for the support of supplementary services (GF)
- Advice Of Charge (AOC)
- Call Completion (CC)
- Call Forwarding (CF)
- Conference Call (CONF)
- Call Transfer (CT)
- Call Waiting (CW)
- Hold (HOLD)
- Message Waiting Indication (MWI)
- User-User-Signalling (UUS)

Outputs:

For each service, one EN is drafted by PT "EC". In total, 11 work items to be proceed by STC SPS1.

6.2.11 Work items derived from generic work item 10

Work item 10:	Definition of voluntary functional test purposes to demonstrate the end-to-end interoperability of the basic services and the supplementary services of the common minimum set, between two Euro-ISDN terminals connected behind PINX to one another at S interface and/or connected to the public ISDN to one another at S/T interface. The approach used in ETR 299-1 [7] (which is the result of EURESCOM projects P.104 and P.412) should be followed.

Name:

IT10 Signalling System Digital Subscriber No.1 protocol (DSS1);Network Integration Testing.

Scope:

Definition of voluntary functional test purposes to demonstrate the end-to-end interoperability of the following services, between two Euro-ISDN terminals, one connected behind PINX at S interface and the other connected to the public ISDN at S/T interface.

End-to-end testing of circuit-mode basic services in a configuration where one terminal is connected to ISDN via a PINX.

Services:

- Circuit-mode Basic Call (BC)
- Generic functional protocol (GF)
- Advice Of Charge (AOC)
- Call Completion (CC)
- Call Forwarding (CF)
- Calling Line Identification Presentation (CLIP)
- Calling Line Identification Restriction (CLIR)
- Conference Call (CONF)
- Call Transfer (CT)
- Call Waiting (CW)
- Hold (HOLD)
- Message Waiting Indication (MWI)
- User-User-Signalling (UUS)

Outputs:

For each service, one EN is drafted by PT "EC". In total, 13 work items to be proceed by ECMA TC32 TG14.

6.2.12 Summary of work

Table 16 below gives the number of work items needed to be created to fulfil all the recommendations on Enhanced voice services. For each type of Profile and/or Protocol the number against the Euro-ISDN service indicates the number of work items needed.

Table 16: Distribution of work items

Services	IT1	IT2	IT3/4	IT5	IT6	IT7	IT8	IT9	IT10
AOC	2	2	3	1	1	1	1	1	1
BC		2	3	1	1	1	1	1	1
CC	2	2	3	1	1	1	1	1	1
CF	2	2	3	1	1	1	1	1	1
CLIP				1			1		1
CONF	2	2	3	1	1	1	1	1	1
CLIR				1			1		1
CT	2	2	3	1	1	1	1	1	1
CW	2	2	3	1	1	1	1	1	1
GF			3	1	1		1	1	1
HOLD	2	2	3	1	1	1	1	1	1
MWI	2	2	3	1	1	1	1	1	1
UUS	2	2	3	1	1	1	1	1	1
Total	**18**	**20**	**33**	**13**	**11**	**10**	**13**	**11**	**13**
TCC	ECMA	SPS5	SPS1	ECMA	ECMA	SPS5	SPS5	SPS1	ECMA

Annex A:
Services standardization status

A.1 Introduction

The following tables indicate for each service the status of the standardization for public network and private networks. The tables have been extracted from the ETR 076 [6] (February 1995), and the information included have been updated.

A.1.1 Tables and figures legend

The following figures describe the architectures referred to in the tables in terms of reference points.

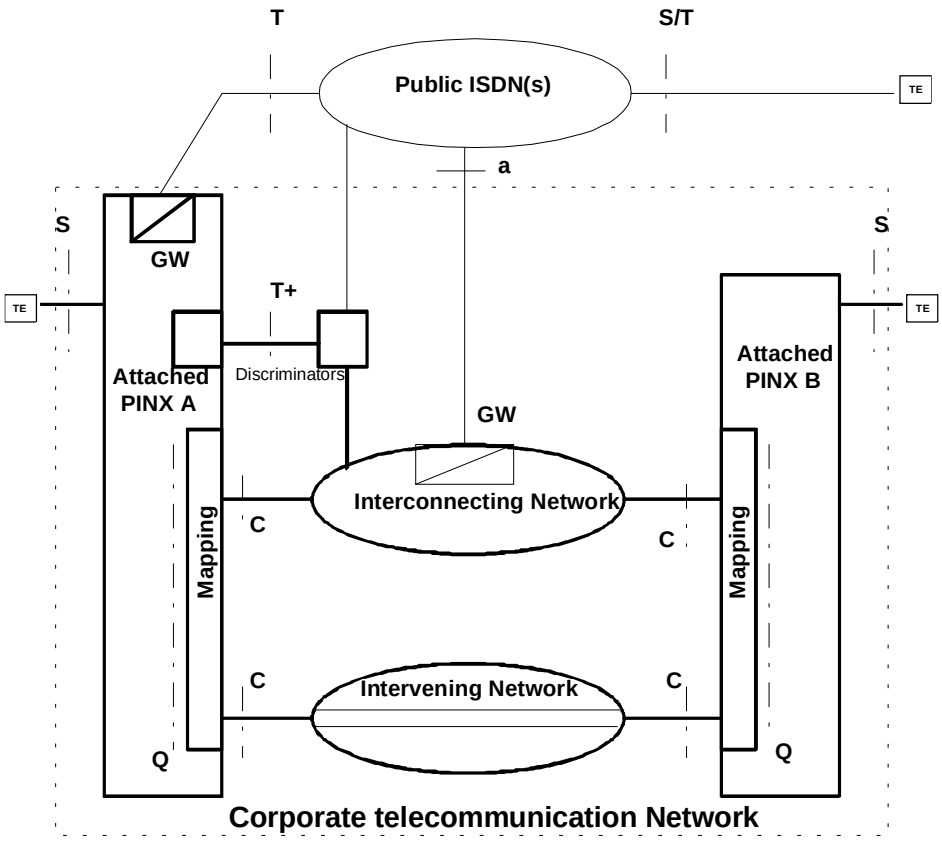


Figure A.1: Overview of a principal CN (simplified example)

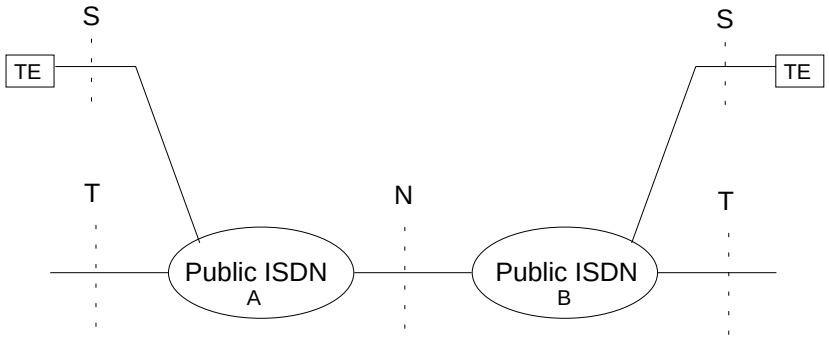


Figure A.2: N reference point

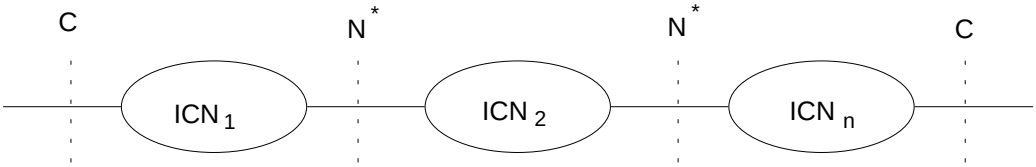


Figure A.3: N* reference point

The different stages used in the first column of the tables uses the following terms.

Stage 1

This part is an overall description from the user's standpoint. The contents of the entry can vary as follows:

- where the service is only applicable to the public ISDN or only to the private ISDN, then the appropriate standard or work item for the stage 1 description of the service is given;
- where the service is applicable to both the public ISDN and to the private ISDN, and a common stage 1 description exists, this is listed;
- where the service is applicable to both the public ISDN and to the private ISDN, and different stage 1 descriptions exist for each case, each stage 1 description is identified. The stage 1 description for the public ISDN is listed before the stage 1 description for the private ISDN.

  A stage 1 description may exist for the public ISDN case and not the private ISDN case, or vice versa. In this case, the existing description is listed and the non-existent description is indicated by use of the "none" symbol, (- -). As above, the public ISDN case is listed first.

Stage 2

This part is an overall description of the organization of the network functions and the information flows between them to map service requirements into network capabilities.

The format of the matrix entry follows the same rules as for stage 1 descriptions.

Stage 3S

This part is the definition of switching and signalling capabilities needed to support services at the access to a private network (S stands for S reference point). This entry is not included for tables where the service relates only to the public ISDN (see figure A.1).

Stage 3S/T

This part is the definition of switching and signalling capabilities needed to support services at the access to a public ISDN used by a terminal (S/T stands for coincident S and T reference point) This entry is not included for tables where the service relates only to Private ISDNs (see figure A.1).

Stage 3T

This part is the definition of switching and signalling capabilities needed to support services at the access to a public ISDN used by private network (T stands for T reference point). This entry is not included for tables where the service relates only to Private ISDNs (see figure A.1).

Stage 3Q

This part is the definition of switching and signalling capabilities needed to support services within a private network (Q stands for Q reference point). This entry is not included for tables where the service relates only to the public ISDN (see figure A.1).

Stage 3T+

This part is the definition of switching and signalling capabilities needed to support services at the access to a public network infrastructure used by a private network (T+ stands for T+ reference point) both for access to a public ISDN and for access to an ICN (see figure A.1).

NOTE 1: The stage 3a is covered by the stage 3T (a standardized physical interface is not required at a reference point, i.e. no need of Layer 1 and Layer 2 specifications, etc.) (see figure A.1).

Stage 3N

This part is the definition of switching and signalling capabilities needed to support services within or between public ISDNs (N stands for network). This entry is not included for tables where the service relates only to Private ISDNs (see figure A.2).

Stage 3N*

This part is the definition of switching and signalling capabilities needed to support services within or between ICNs (N* stands for N* reference point) (see figure A.3).

NOTE 2: The stage 3P (P stands for the P reference point in CTM terminology) will be treated separately as other Supplementary Services which are specific to mobility are necessary to support the minimum set of services of phase 1.

End-to-end protocol

Under this item only user-plane protocol specifications are listed. This item is only included for bearer services, teleservices and terminal application of bearer services.

Terminal functions

Under this part, standards appropriate to terminals that implement this service or feature, but that are not included in the previous entries, are covered, This entry is only included for teleservices, terminal application of bearer services, and some relevant supplementary services.

Special terminal functions

Under this part, standards appropriate to some terminals designed for special purposes, that implement this service or feature are covered. Note that in some cases, these are listed only for the service or feature for which they were primarily intended; they may be of secondary application to other services or features. This part is only included when appropriate.

A.1.2 Notes to tables of annex A

The following notes are referred to in the following tables:

NOTE 1: Generic procedures for supplementary services at stage 3S/T are included in ETS 300 122-1 (see ETS 300 122-2 for PICS) and ETS 300 196-1 (see ETS 300 196-2 for PICS). Conformance tests are contained in ETS 300 122-3 to ETS 300 122-6 and ETS 300 196-3 to ETS 300 196-6 respectively.

NOTE 2: Generic procedures for supplementary services at stage 3T are included in ETS 300 196-1 (see ETS 300 196-2 for PICS). Conformance tests are contained in ETS 300 196-3 to ETS 300 196-6.

NOTE 3: Generic procedures for supplementary services at stage 3S are included in ETS 300 190 (ECMA-156), ETS 300 240 (ECMA-161). Conformance tests for these standards have not yet been identified. Interactions of supplementary services at stage 3S have not been specified. A work item DE/ECMA-00026 has been stopped, but could be restarted in the future.

Priority for Private ISDN protocol work is being given to standards applicable at the Q reference point. Work items have not yet been created for standards applicable at the S reference point to avoid standstill being applied.

The generic procedures specified in ETS 300 190 (ECMA-156), ETS 300 240 (ECMA-161) may be used as the basis of proprietary implementation.

NOTE 4: Generic procedures for supplementary services at stage 3Q are included in ETS 300 239 (ed.2) (ECMA-165). Conformance tests are contained in ETS 300 806-1 and ETS 300 806-2 (which have been TC approved in June 96).

NOTE 5: For identification of appropriate PICS and PIXIT proformas, see annex B subclauses B.4.1 and B.4.2. (not used in the following tables).

NOTE 6: Interactions of supplementary services at stage 3S/T and at stage 3T are covered in ETS 300 195-1 (see ETS 300 195-2 for PICS proforma; ETS 300 195-3 to ETS 300 195-6 for ATS and PIXIT proforma).

NOTE 7: Interactions of supplementary services at stage 3Q are covered in ETS 300 427 (ECMA-204).

NOTE 8: General principles for the provision of telecommunication services to private networks at the T reference point are covered in ETS 300 345.

NOTE 9: References are given to standards for both Signalling System No. 7 ISUP version 1 and ISUP version 2.

NOTE 10: Generic procedures, additional to those in ISUP version 2 basic call, for use in supplementary services are contained in ETS 300 356-2.

NOTE 11: ETS 300 242 is a PISN standard, but it may be used at the ISDN user-network interface.

NOTE 12 Information to support the call hold supplementary service needs to be transferred across an interface at the Q reference point; this is taken care of in the notification indicators defined in ETS 300 239 (ECMA-165).

NOTE 13: Information to support the call waiting supplementary service needs to be transferred across an interface at the Q reference point; this is taken care of in the notification indicators defined in ETS 300 239 (ECMA-165).

NOTE 14: There are no additional requirements over and above the basic call control requirements specified in ETS 300 102-1.

NOTE 15: From the private ISDN viewpoint the multiple subscriber number supplementary service is considered to be an integral part of the basic call description; no separate supplementary service ETSs exist in this case.

NOTE 16: From the private ISDN viewpoint the subaddressing supplementary service is considered to be an integral part of the basic call description; no separate supplementary service ETSs exist in this case.

NOTE 17: From the private ISDN viewpoint the terminal portability supplementary service is considered to be an integral part of the basic call description; no separate supplementary service ETSs exist in this case.

NOTE 18: Information to support the terminal portability supplementary service needs to be transferred across an interface at the Q reference point; this is taken care of in the notification indicators defined in ETS 300 239 (ECMA-165).

NOTE 19: In private ISDNs, the functionality provided by this supplementary service is offered by the conference call, add-on supplementary service.

NOTE 20: A generic Programming Communication Interface (PCI) for the Euro-ISDN is provided in ETS 300 325. Additional functionality is provided in ETS 300 325R1. Conformance testing is covered by DEN/TE-02028-1 and ETS 300 697-1 to ETS 300 697-4.

NOTE 21: The standardization status of this interface will have to be established in the working group which will deal with VPN.

A.2 Basic Services

A.2.1 Speech Bearer Service

Type: Bearer Applicable to: Public ISDN, Private ISDN

Table A.1: Circuit-mode speech bearer service

Aspect	Base standard	Conformance test standard
Stage 1	ETS 300 109: ISDN, Circuit-mode 64 kbits/s 8 kHz structured bearer service category usable for speech information transfer covered ETS 300 171 (ed.2): PISN, Circuit-mode basic services (ECMA-142)	N/A
Stage 2	ETS 300 350: ISDN, Basic Call control procedures for circuit switched bearer services ETS 300 171 (ECMA-142)	N/A
Stage 3S	ETS 300 192: PTN, S ref. point signalling, circuit-mode basic services (ECMA-106) ETS 300 192/A1: Amendment	- -
Stage 3S/T	ETS 300 102-1: ISDN, User-Network interface layer 3, Basic call ETS 300 102-1/A1: Amendment ETS 300 102-1/A2: Amendment ETS 300 102-2: ISDN, User-Network interface layer 3, Basic call, SDL ETS 300 403-1 (ed.2): ISDN, DSS1, Signalling network layer for circuit mode basic call ETS 300 403-1/C1: Corrigendum ETS 300 403-2: ISDN, DSS1, Signalling network layer for circuit mode basic call, SDL ETS 300 403-3 (ed.2): ISDN, DSS1, Signalling network layer for circuit mode basic call, PICS ETS 300 485: ISDN, DSS1, SS7, ISUP, Definition and usage of cause and location ETR 018 (ed.5): ISDN, application of BC, HLC, LLC IE by terminals supporting ISDN services	I-ETS 300 322: ISDN, DSS1, Signalling network layer for circuit mode basic call, ATS, User ETS 300 403-4: ISDN, DSS1, Signalling network layer for circuit mode basic call, TSS&TP, User side ETS 300 403-5: ISDN, DSS1, Signalling network layer for circuit mode basic call, ATS, User side ETS 300 403-6: ISDN, DSS1, Signalling network layer for circuit mode basic call, TSS&TP, Network side ETS 300 403-7: ISDN, DSS1, Signalling network layer for circuit mode basic call, ATS, Network side

(continued)

Table A.1 (concluded): Circuit-mode speech bearer service

Aspect	Base standard	Conformance test standard
Stage 3T (note 8)	ETS 300 102-1 ETS 300 102-1/A1 ETS 300 102-1/A2 ETS 300 102-2 ETS 300 403-1 ETS 300 403-2 ETS 300 403-3 ETS 300 485 ETR 018	I-ETS 300 322 ETS 300 403-4 ETS 300 403-5 ETS 300 403-6 ETS 300 403-7
Stage 3T+ (note 21)	- -	- -
Stage 3Q	ETS 300 172 (ed.3): PISN, Circuit-mode Basic Services, QSIG (ECMA-143)	ETS 300 805-1: PISN, Circuit-mode Basic Services, QSIG, TSS&TP ETS 300 805-2: PISN, Circuit-mode Basic Services, QSIG, ATS
Stage 3N	ETS 300 121: ISDN, SS7, ISUP v.1 ETS 300 356-1: ISDN, SS7, ISUP v.2, Basic Services ETS 300 356-31: ISDN, SS7, ISUP v.2, PICS for Basic Services	ETS 300 335: ISDN, SS7, ISUP v.1, Test Specification ETS 300 356-32: ISDN, SS7, ISUP v.2, TSS&TP for Basic Services ETS 300 356-33: ISDN, SS7, ISUP v.2, ATS for Basic Services
Stage 3N* (note 21)	- -	- -
End-to-end protocol	ETS 300 083: ISDN, Circuit-mode structured bearer service for speech info transfer, end-to-end compatibility	ETS 300 083
Special terminal function (note 20)	- -	- -

A.2.2 3,1 kHz audio Bearer Service

Type: Bearer Applicable to: Public ISDN, Private ISDN

Table A.2: Circuit-mode 3,1 kHz audio bearer service

Aspect	Base standard	Conformance test standard
Stage 1	ETS 300 110: ISDN, circuit-mode 64 kbits/s 8 kHz structured bearer service for 3,1 kHz audio info transfer ETS 300 171 (ed.2): PISN, Circuit-mode basic services (ECMA-142)	N/A
Stage 2	ETS 300 350: ISDN, Basic Call control procedures for circuit switched bearer services ETS 300 171 (ECMA-142)	N/A

(continued)

Table A.2 (concluded): Circuit-mode 3,1 kHz audio bearer service

Aspect	Base standard	Conformance test standard
Stage 3S	ETS 300 192: PTN, S ref. point signalling, circuit-mode basic services (ECMA-106) ETS 300 192/A1: Amendment	- -
Stage 3S/T	ETS 300 102-1: ISDN, User-Network interface layer 3, Basic call ETS 300 102-1/A1: Amendment ETS 300 102-1/A2: Amendment ETS 300 102-2: ISDN, User-Network interface layer 3, Basic call, SDL ETS 300 403-1 (ed.2): ISDN, DSS1, Signalling network layer for circuit-mode basic call ETS 300 403-1/C1: Corrigendum ETS 300 403-2: ISDN, DSS1, Signalling network layer for circuit mode basic call, SDL ETS 300 403-3 (ed.2): ISDN, DSS1, Signalling network layer for circuit mode basic call, PICS ETS 300 485: ISDN, DSS1, SS7, ISUP, Definition and usage of cause and location ETR 018 (ed.5): ISDN, application of BC, HLC, LLC IE by terminals supporting ISDN services	I-ETS 300 322: ISDN, DSS1, Signalling network layer for circuit mode basic call, ATS, User ETS 300 403-4: ISDN, DSS1, Signalling network layer for circuit mode basic call, TSS&TP, User side ETS 300 403-5: ISDN, DSS1, Signalling network layer for circuit mode basic call, ATS, User side ETS 300 403-6: ISDN, DSS1, Signalling network layer for circuit mode basic call, TSS&TP, Network side ETS 300 403-7: ISDN, DSS1, Signalling network layer for circuit mode basic call, ATS, Network side
Stage 3T (note 8)	ETS 300 102-1 ETS 300 102-1/A1 ETS 300 102-1/A2 ETS 300 102-2 ETS 300 403-1 ETS 300 403-2 ETS 300 403-3 ETS 300 485 ETR 018	I-ETS 300 322 ETS 300 403-4 ETS 300 403-5 ETS 300 403-6 ETS 300 403-7
Stage 3T+ (note 21)	- -	- -
Stage 3Q	ETS 300 172 (ed.3): PISN, Circuit Mode Basic Services, QSIG (ECMA-143)	ETS 300 805-1: PISN, Circuit Mode Basic Services, QSIG, TSS&TP ETS 300 805-2: PISN, Circuit Mode Basic Services, QSIG, ATS
Stage 3N	ETS 300 121: ISDN, SS7, ISUP v.1 ETS 300 356-1: ISDN, SS7, ISUP v.2, Basic Services ETS 300 356-31: ISDN, SS7, ISUP v.2, PICS for Basic Services	ETS 300 335: ISDN, SS7, ISUP v.1, Test Specification ETS 300 356-32: ISDN, SS7, ISUP v.2, TSS&TP for Basic Services ETS 300 356-33: ISDN, SS7, ISUP v.2, ATS for Basic Services
Stage 3N* (note 21)	- -	- -
End-to-end protocol	ETS 300 084: ISDN, Circuit-mode structured bearer service for 3,1 kHz audio info transfer, end-to-end compatibility	ETS 300 084
Special terminal functions (note 20)	- -	- -

A.2.3 64 kbits/s unrestricted Bearer Service

Type: Bearer Applicable to: Public ISDN, Private ISDN

Table A.3: Circuit-mode 64 kbit/s unrestricted bearer service

Aspect	Base standard	Conformance test standard
Stage 1	ETS 300 108: ISDN, circuit-mode 64 kbits/s unrestricted 8 kHz structured bearer service ETS 300 171 (ed.2): PISN, Circuit-mode basic services (ECMA-142)	N/A
Stage 2	ETS 300 350: ISDN, Basic Call control procedures for circuit switched bearer services ETS 300 171 (ECMA-142)	N/A
Stage 3S	ETS 300 192: PTN, S ref. point signalling, circuit-mode basic services (ECMA-106) ETS 300 192/A1: Amendment	- -
Stage 3S/T	ETS 300 102-1: ISDN, User-Network interface layer 3, basic call ETS 300 102-1/A1: Amendment ETS 300 102-1/A2: Amendment ETS 300 102-2: ISDN, User-Network interface layer 3, basic call, SDL ETS 300 403-1 (ed.2): ISDN, DSS1, Signalling network layer for circuit mode basic call ETS 300 403-1/C1: Corrigendum ETS 300 403-2: ISDN, DSS1, Signalling network layer for circuit mode basic call, SDL ETS 300 403-3 (ed.2): ISDN, DSS1, Signalling network layer for circuit mode basic call, PICS ETS 300 485: ISDN, DSS1, SS7, ISUP, Definition and usage of cause and location ETR 018 (ed.5): ISDN, application of BC, HLC, LLC IE by terminals supporting ISDN services	I-ETS 300 322: ISDN, DSS1, Signalling network layer for circuit mode basic call, ATS, User ETS 300 403-4: ISDN, DSS1, Signalling network layer for circuit mode basic call, TSS&TP, User side ETS 300 403-5: ISDN, DSS1, Signalling network layer for circuit mode basic call, ATS, User side ETS 300 403-6: ISDN, DSS1, Signalling network layer for circuit mode basic call, TSS&TP, Network side ETS 300 403-7: ISDN, DSS1, Signalling network layer for circuit mode basic call, ATS, Network side
Stage 3T (note 8)	ETS 300 102-1 ETS 300 102-1/A1 ETS 300 102-1/A2 ETS 300 102-2 ETS 300 403-1 ETS 300 403-2 ETS 300 403-3 ETS 300 485 ETR 018	I-ETS 300 322 ETS 300 403-4 ETS 300 403-5 ETS 300 403-6 ETS 300 403-7

(continued)

Table A.3 (concluded): Circuit-mode 64 kbit/s unrestricted bearer service

Aspect	Base standard	Conformance test standard
Stage 3T+ (note 21)	- -	- -
Stage 3Q	ETS 300 172 (ed.3): PISN, Circuit Mode Basic Services, QSIG (ECMA-143)	ETS 300 805-1: PISN, Circuit Mode Basic Services, QSIG, TSS&TP ETS 300 805-2: PISN, Circuit Mode Basic Services, QSIG, ATS
Stage 3N	ETS 300 121: ISDN, SS7, ISUP v.1 ETS 300 356-1: ISDN, SS7, ISUP v.2, Basic Services ETS 300 356-31: ISDN, SS7, ISUP v.2, PICS for Basic Services	ETS 300 335: ISDN, SS7, ISUP v.1, Test Specification ETS 300 356-32: ISDN, SS7, ISUP v.2, TSS&TP for Basic Services ETS 300 356-33: ISDN, SS7, ISUP v.2, ATS for Basic Services
Stage 3N* (note 21)	- -	- -
End-to-end protocol	N/A	N/A
Special terminal function (note 20)	- -	- -

A.2.4 Packet-mode (X.31 case B) B- and D-channel

Type: Bearer Applicable to: Public ISDN, Private ISDN

Table A.4: Packet-mode (X.31 case B) B- and D- channel bearer service

Aspect	Base standard	Conformance test standard
Stage 1	ETS 300 048 ETS 300 049	
Stage 2	- -	N/A
Stage 3S	- -	- -
Stage 3S/T	ETS 300 007: ISDN, Support of a packet-mode terminal equipment by an ISDN	DEN/SPS-05003: Conformance test specification for ETS 300 007
Stage 3T (note 8)	ETS 300 007	DEN/SPS-05003
Stage 3T+ (note 21)	- -	- -
Stage 3Q	- -	- -
End-to-end protocol	ETS 300 007	DEN/SPS-05003
Special terminal functions (note 20)	- -	- -

A.2.5 Telephony 3,1 kHz teleservice

Type: Teleservice Applicable to: Public ISDN, Private ISDN

Table A.5: Telephony 3,1 kHz teleservice

Aspect	Base standard	Conformance test standard
Stage 1	ETS 300 111: ISDN, Telephony 3,1 kHz teleservice ETS 300 171 (ed.2): PISN, Circuit-mode basic services (ECMA-142)	N/A
Stage 2	ETS 300 350: ISDN, Basic Call control procedures for circuit switched bearer services ETS 300 171 (ECMA-142)	N/A
Stage 3S	ETS 300 192: PTN, S ref. point signalling, circuit-mode basic services (ECMA-106) ETS 300 192/A1: Amendment	- -
Stage 3S/T	ETS 300 102-1: ISDN, User-Network interface layer 3, basic call ETS 300 102-1/A1: Amendment ETS 300 102-1/A2: Amendment ETS 300 102-2: ISDN, User-Network interface layer 3, basic call, SDL ETS 300 403-1 (ed.2): ISDN, DSS1, Signalling network layer for circuit mode basic call ETS 300 403-1/C1: Corrigendum ETS 300 403-2: ISDN, DSS1, Signalling network layer for circuit mode basic call, SDL ETS 300 403-3 (ed.2): ISDN, DSS1, Signalling network layer for circuit mode basic call, PICS ETS 300 485: ISDN, DSS1, SS7, ISUP, Definition and usage of cause and location ETR 018 (ed.5): ISDN, application of BC, HLC, LLC IE by terminals supporting ISDN services	I-ETS 300 322: ISDN, DSS1, Signalling network layer for circuit mode basic call, ATS, User ETS 300 403-4: ISDN, DSS1, Signalling network layer for circuit mode basic call, TSS&TP, User side ETS 300 403-5: ISDN, DSS1, Signalling network layer for circuit mode basic call, ATS, User side ETS 300 403-6: ISDN, DSS1, Signalling network layer for circuit mode basic call, TSS&TP, Network side ETS 300 403-7: ISDN, DSS1, Signalling network layer for circuit mode basic call, ATS, Network side
Stage 3T (note 8)	ETS 300 102-1 ETS 300 102-1/A1 ETS 300 102-1/A2 ETS 300 102-2 ETS 300 403-1 ETS 300 403-2 ETS 300 403-3 ETS 300 485 ETR 018	I-ETS 300 322 ETS 300 403-4 ETS 300 403-5 ETS 300 403-6 ETS 300 403-7

(continued)

Table A.5 (concluded): Telephony 3,1 kHz teleservice

Aspect	Base standard	Conformance test standard
Stage 3T+ (note 21)	- -	- -
Stage 3Q	ETS 300 172 (ed.3): PISN, Circuit Mode Basic Services, QSIG (ECMA-143)	ETS 300 805-1: PISN, Circuit Mode Basic Services, QSIG, TSS&TP ETS 300 805-2: PISN, Circuit Mode Basic Services, QSIG, ATS
Stage 3N (note 9)	ETS 300 121: ISDN, SS7, ISUP v.1 ETS 300 356-1: ISDN, SS7, ISUP v.2, Basic Services ETS 300 356-31: ISDN, SS7, ISUP v.2, PICS for Basic Services	ETS 300 335: ISDN, SS7, ISUP v.1, Test Specification ETS 300 356-32: ISDN, SS7, ISUP v.2, TSS&TP for Basic Services ETS 300 356-33: ISDN, SS7, ISUP v.2, ATS for Basic Services
Stage 3N* (note 21)	- -	- -
End-to-end protocol	ETS 300 082: ISDN, 3,1 kHz telephony teleservice, end-to-end compatibility (note 21)	ETS 300 082 (note 22)
Terminal functions	I-ETS 300 245-1 (ed.2): ISDN, technical characteristics of telephony terminals, general I-ETS 300 245-2 (ed.2): ISDN, technical characteristics of telephony terminals, PCM A-law	I-ETS 300 245-1 (ed.2) I-ETS 300 245-2 (ed.2)
Special terminal functions (note 20)	I-ETS 300 245-3 I-ETS 300 245-4 I-ETS 300 245-7 ETS 300 295 ETS 300 381 I-ETS 300 400 ETS 300 488	I-ETS 300 245-3 I-ETS 300 245-4 I-ETS 300 245-7

A.3 End-User Services required by all types of end-users

A.3.1 Advice Of Charge

Type: Supplementary Applicable to: Public ISDN, Private ISDN

Table A.6: Advice Of Charge (AOC) supplementary service

Aspect	Base standard	Conformance test standard
Stage 1	ETS 300 178: ISDN, AOC-S ETS 300 179: ISDN, AOC-D ETS 300 180: ISDN, AOC-E DEN/ECMA-00009: AOC (ECMA-211)	N/A
Stage 2	ETS 300 181: ISDN, AOC DEN/ECMA-00009 (ECMA-211)	N/A
Stage 3S (note 3)	- -	- -
Stage 3S/T (note 1) (note 6)	ETS 300 182-1: ISDN, AOC, DSS1 ETS 300 182-1/C1: corrigendum ETS 300 182-1/C2: corrigendum ETS 300 182-2: ISDN, AOC, DSS1 PICS	ETS 300 182-3: ISDN, AOC, DSS1, TSS&TP, User side ETS 300 182-4: ISDN, AOC, DSS1, ATS, User side ETS 300 182-5: ISDN, AOC, DSS1, TSS&TP, Network side ETS 300 182-6: ISDN, AOC, DSS1, ATS, Network side
Stage 3T (note 2) (note 6) (note 8)	ETS 300 182-1 ETS 300 182-1/C1: corrigendum ETS 300 182-1/C2: corrigendum ETS 300 182-2	ETS 300 182-3 ETS 300 182-4 ETS 300 182-5 ETS 300 182-6
Stage 3T+ (note 21)	- -	- -
Stage 3Q (note 4) note 7)	DEN/ECMA-00051: PISN, AOC, QSIG (ECMA-212)	- -
Stage 3N (note 9)	N/A	N/A
Stage 3N* (note 21)	- -	- -
Special terminal functions (note 20)	- -	- -

A.3.2 Completion of Call on No-Reply

Type: Supplementary Applicable to: Public ISDN, Private ISDN

Table A.7: Completion of Calls on No Reply (CCNR) supplementary service

Aspect	Base standard	Conformance test standard
Stage 1	DE/NA-010027: ISDN, CCNR ETS 300 365 (ed.2): PISN, CC (ECMA-185)	N/A
Stage 2	DEN/SPS-01036: ISDN, CCNR ETS 300 365 (ed.2) (ECMA-185)	N/A
Stage 3S (note 3)	- -	- -
Stage 3S/T (note 1) (note 6)	DEN/SPS-05115-1: ISDN, CCNR, DSS1 DEN/SPS-05115-2: ISDN, CCNR, DSS1 PICS	- -
Stage 3T (note 2) (note 6) (note 8)	DEN/SPS-05115-1 DEN/SPS-05115-2	- -
Stage 3T+ (note 21)	- -	- -
Stage 3Q (note 4) (note 7)	ETS 300 366 (ed.2): PISN, CC, QSIG (ECMA-186)	- -
Stage 3N (note 9) (note10)	ETS 300 356-34: ISDN, SS7, ISUP v.2, PICS for Sup. Services	ETS 300 356-35: ISDN, SS7, ISUP v.2, TSS&TP for Sup. Services ETS 300 356-36: ISDN, SS7, ISUP v.2, ATS for Sup. Services
Stage 3N* (note 21)	- -	- -

A.3.3 Completion of Calls to Busy Subscriber

Type: Supplementary Applicable to: Public ISDN, Private ISDN

Table A.8: Completion of Calls to Busy Subscriber (CCBS) supplementary service

Aspect	Base standard	Conformance test standard
Stage 1	ETS 300 357: ISDN, CCBS ETS 300 365 (ed.2): PISN, CC (ECMA-185)	N/A
Stage 2	ETS 300 358: ISDN, CCBS ETS 300 365 (ed.2) (ECMA-185)	N/A
Stage 3S (note 3)	- -	- -
Stage 3S/T (note 1) (note 6)	ETS 300 359-1: ISDN, CCBS, DSS1 ETS 300 359-2: ISDN, CCBS, DSS1, PICS	ETS 300 359-3: ISDN, CCBS, DSS1, TSS&TP, User side ETS 300 359-4: ISDN, CCBS, DSS1, ATS, User side ETS 300 359-5: ISDN, CCBS, DSS1, TSS&TP, Network side ETS 300 359-6: ISDN, CCBS, DSS1, ATS, Network side
Stage 3T (note 2) (note 6) (note 8)	ETS 300 359-1 ETS 300 359-2	ETS 300 359-3 ETS 300 359-4 ETS 300 359-5 ETS 300 359-6
Stage 3T+ (note 21)	- -	- -
Stage 3Q (note 4) (note 7)	ETS 300 366 (ed.2): PISN, CC, QSIG (ECMA-186)	- -
Stage 3N (note 9) (note 10)	ETS 300 356-18: ISDN, SS7, ISUP v.2, CCBS ETS 300 356-34: ISDN, SS7, ISUP v.2, PICS for Sup. Services	ETS 300 356-35: ISDN, SS7, ISUP v.2, TSS&TP for Sup. Services ETS 300 356-36: ISDN, SS7, ISUP v.2, ATS for Sup. Services
Stage 3N* (note 21)	- -	- -

A.3.4 Call Forwarding Unconditional

Type: Supplementary Applicable to: Public ISDN, Private ISDN

Table A.9: Call Forwarding Unconditional (CFU) supplementary service

Aspect	Base standard	Conformance test standard
Stage 1	ETS 300 200: ISDN, CFU ETS 300 256 (ed.2): PISN, Diversion (ECMA-173)	N/A
Stage 2	ETS 300 204: ISDN, CFU ETS 300 256 (ed.2) (ECMA-173)	N/A
Stage 3S (note 3)	- -	- -
Stage 3S/T (note 1) (note 6)	ETS 300 207-1: ISDN, Diversion, DSS1 ETS 300 207-1/C1: corrigendum ETS 300 207-2: ISDN, Diversion, DSS1, PICS	ETS 300 207-3: ISDN, Diversion, DSS1, TSS&TP, User Side ETS 300 207-4: ISDN, Diversion, DSS1, ATS, User Side ETS 300 207-5: ISDN, Diversion, DSS1, TSS&TP, Network Side ETS 300 207-6: ISDN, Diversion, DSS1, ATS, Network Side
Stage 3T (note 2) (note 6) (note 8)	ETS 300 207-1 ETS 300 207-1/C1 ETS 300 207-2	ETS 300 207-3 ETS 300 207-4 ETS 300 207-5 ETS 300 207-6
Stage 3T+ (note 21)	- -	- -
Stage 3Q (note 4) (note 7)	ETS 300 257 (ed.2): PISN, Diversion, QSIG (ECMA-174)	- -
Stage 3N (note 9) (note 10)	ETS 300 356-15: ISDN, SS7, ISUP v.2, Diversion ETS 300 356-34: ISDN, SS7, ISUP v.2, PICS for Sup. Services	ETS 300 356-35: ISDN, SS7, ISUP v.2, TSS&TP for Sup. Services ETS 300 356-36: ISDN, SS7, ISUP v.2, ATS for Sup. Services
Stage 3N* (note 21)	- -	- -

A.3.5 Call Forwarding Busy

Type: Supplementary Applicable to: Public ISDN, Private ISDN

Table A.10: Call Forwarding Busy (CFB) supplementary service

Aspect	Base standard	Conformance test standard
Stage 1	ETS 300 199: ISDN, CFB ETS 300 256 (ed.2): PISN, Diversion (ECMA-173)	N/A
Stage 2	ETS 300 203: ISDN, CFB ETS 300 256 (ed.2) (ECMA-173)	N/A
Stage 3S (note 3)	- -	- -
Stage 3S/T (note 1) (note 6)	ETS 300 207-1: ISDN, Diversion, DSS1 ETS 300 207-1/C1: corrigendum ETS 300 207-2: ISDN, Diversion, DSS1, PICS	ETS 300 207-3: ISDN, Diversion, DSS1, TSS&TP, User Side ETS 300 207-4: ISDN, Diversion, DSS1, ATS, User Side ETS 300 207-5: ISDN, Diversion, DSS1, TSS&TP, Network Side ETS 300 207-6: ISDN, Diversion, DSS1, ATS, Network Side
Stage 3T (note 2) (note 6) (note 8)	ETS 300 207-1 ETS 300 207-1/C1 ETS 300 207-2	ETS 300 207-3 ETS 300 207-4 ETS 300 207-5 ETS 300 207-6
Stage 3T+ (note 21)	- -	- -
Stage 3Q (note 4) (note 7)	ETS 300 257 (ed.2): PISN, Diversion, QSIG (ECMA-174)	- -
Stage 3N (note 9) (note 10)	ETS 300 356-15: ISDN, SS7, ISUP v.2, Diversion ETS 300 356-34: ISDN, SS7, ISUP v.2, PICS for Sup. Services	ETS 300 356-35: ISDN, SS7, ISUP v.2, TSS&TP for Sup. Services ETS 300 356-36: ISDN, SS7, ISUP v.2, ATS for Sup. Services
Stage 3N* (note 21)	- -	- -

A.3.6 Call Forwarding No Reply

Type: Supplementary Applicable to: Public ISDN, Private ISDN

Table A.11: Call Forwarding No Reply (CFNR) supplementary service

Aspect	Base standard	Conformance test standard
Stage 1	ETS 300 201: ISDN, CFNR ETS 300 201/prA1: amendment ETS 300 256 (ed.2): PISN, Diversion (ECMA-173)	N/A
Stage 2	ETS 300 205: ISDN, CFNR ETS 300 256 (ed.2) (ECMA-173)	N/A
Stage 3S (note 3)	- -	- -
Stage 3S/T (note 1) (note 6)	ETS 300 207-1: ISDN, Diversion, DSS1 ETS 300 207-1/C1: corrigendum ETS 300 207-2: ISDN, Diversion, DSS1, PICS	ETS 300 207-3: ISDN, Diversion, DSS1, TSS&TP, User Side ETS 300 207-4: ISDN, Diversion, DSS1, ATS, User Side ETS 300 207-5: ISDN, Diversion, DSS1, TSS&TP, Network Side ETS 300 207-6: ISDN, Diversion, DSS1, ATS, Network Side
Stage 3T (note 2) (note 6) (note 8)	ETS 300 207-1 ETS 300 207-1/C1 ETS 300 207-2	ETS 300 207-3 ETS 300 207-4 ETS 300 207-5 ETS 300 207-6
Stage 3T+ (note 21)	- -	- -
Stage 3Q (note 4) (note 7)	ETS 300 257 (ed.2): PISN, Diversion, QSIG (ECMA-174)	- -
Stage 3N (note 9) (note 10)	ETS 300 356-15: ISDN, SS7, ISUP v.2, Diversion ETS 300 356-34: ISDN, SS7, ISUP v.2, PICS for Sup. Services	ETS 300 356-35: ISDN, SS7, ISUP v.2, TSS&TP for Sup. Services ETS 300 356-36: ISDN, SS7, ISUP v.2, ATS for Sup. Services
Stage 3N* (note 21)	- -	- -

A.3.7 Calling Line Identification Presentation

Type: Supplementary Applicable to: Public ISDN, Private ISDN

Table A.12: Calling Line Identification Presentation (CLIP) supplementary service

Aspect	Base standard	Conformance test standard
Stage 1	ETS 300 089: ISDN, CLIP ETS 300 173 (ed.2): PISN, Identification	N/A
Stage 2	ETS 300 091: ISDN, CLIP/CLIR ETS 300 173 (ed.2) (ECMA-148)	N/A
Stage 3S (note 3)	ETS 300 191: PTN, Identification, S ref point signalling (ECMA-157)	- -
Stage 3S/T (note 1) (note 6)	ETS 300 092-1: ISDN, CLIP, DSS1 ETS 300 092-1/A1: Amendment 1 ETS 300 092-1/A2: Amendment 2 ETS 300 092-2: ISDN, CLIP, DSS1 PICS	ETS 300 092-3: ISDN, CLIP, DSS1, TSS&TP, User Side ETS 300 092-4: ISDN, CLIP, DSS1, ATS, User Side ETS 300 092-5: ISDN, CLIP, DSS1, TSS&TP, Network Side ETS 300 092-6: ISDN, CLIP, DSS1, ATS, Network Side
Stage 3T (note 6) (note 8)	ETS 300 092-1 ETS 300 092-1/A1 ETS 300 092-1/A2 ETS 300 092-2	ETS 300 092-3 ETS 300 092-4 ETS 300 092-5 ETS 300 092-6
Stage 3T+ (note 21)	- -	- -
Stage 3Q (note 7)	ETS 300 172 (ed.3): PISN, Circuit Mode Basic Services, QSIG (ECMA-143)	ETS 300 805-1: PISN, Circuit Mode Basic Services, QSIG, TSS&TP ETS 300 805-2: PISN, Circuit Mode Basic Services, QSIG, ATS
Stage 3N (note 9) (note 10)	ETS 300 121: ISDN, SS7, ISUP v.1 ETS 300 356-3: ISDN, SS7, ISUP v.2, CLIP ETS 300 356-34: ISDN, SS7, ISUP v.2, PICS for Sup. Services	ETS 300 335: ISDN, SS7, ISUP v.1, Test specification ETS 300 356-35: ISDN, SS7, ISUP v.2, TSS&TP for Sup. Services ETS 300 356-36: ISDN, SS7, ISUP v.2, ATS for Sup. Services
Stage 3N* (note 21)	- -	- -
Special terminal functions (note 20)	- -	- -

A.3.8 Calling Line Identification Restriction

Type: Supplementary Applicable to: Public ISDN, Private ISDN

Table A.13: Calling Line Identification Restriction (CLIR) supplementary service

Aspect	Base standard	Conformance test standard
Stage 1	ETS 300 090: ISDN, CLIR ETS 300 173 (ed.2): PISN, Identification	N/A
Stage 2	ETS 300 091: ISDN, CLIP/CLIR ETS 300 173 (ed.2) (ECMA-148)	N/A
Stage 3S (note 3)	ETS 300 191: PTN, Identification, S ref point signalling (ECMA-157)	- -
Stage 3S/T (note 1) (note 6)	ETS 300 093-1: ISDN, CLIR, DSS1 ETS 300 093-2: ISDN, CLIR, DSS1 PICS	ETS 300 093-3: ISDN, CLIR, DSS1, TSS&TP, User Side ETS 300 093-4: ISDN, CLIR, DSS1, ATS, User Side ETS 300 093-5: ISDN, CLIR, DSS1, TSS&TP, Network Side ETS 300 093-6: ISDN, CLIR, DSS1, ATS, Network Side
Stage 3T (note 6) (note 8)	ETS 300 093-1 ETS 300 093-2	ETS 300 093-3 ETS 300 093-4 ETS 300 093-5 ETS 300 093-6
Stage 3T+ (note 21)	- -	- -
Stage 3Q (note 7)	ETS 300 172 (ed.3): PISN, Circuit Mode Basic Services, QSIG (ECMA-143)	ETS 300 805-1: PISN, Circuit-mode Basic Services, QSIG, TSS&TP ETS 300 805-2: PISN, Circuit-mode Basic Services, QSIG, ATS
Stage 3N (note 9) (note 10)	ETS 300 121: ISDN, SS7, ISUP v.1 ETS 300 356-4: ISDN, SS7, ISUP v.2, CLIR ETS 300 356-34: ISDN, SS7, ISUP v.2, PICS for sup. services	ETS 300 335: ISDN, SS7, ISUP v.1, Test specification ETS 300 356-35: ISDN, SS7, ISUP v.2, TSS&TP for Sup. Services ETS 300 356-36: ISDN, SS7, ISUP v.2, ATS for Sup. Services
Stage 3N* (note 21)	- -	- -
Special terminal functions (note 20)	- -	- -

A.3.9 Conference Call

Type: Supplementary Applicable to: Public ISDN, Private ISDN

Table A.14: Conference Call, Add On (CONF) supplementary service

Aspect	Base standard	Conformance test standard
Stage 1	ETS 300 183: ISDN, CONF DEN/ECMA-00011: PISN, CONF (ECMA-CONFSD)	N/A
Stage 2	ETS 300 184: ISDN, CONF DEN/ECMA-00011 (ECMA-CONFSD)	N/A
Stage 3S (note 3)	- -	- -
Stage 3S/T (note 1) (note 6)	ETS 300 185-1: ISDN, CONF, DSS1 ETS 300 185-1/A1: Amendment ETS 300 185-2: ISDN, CONF, DSS1, PICS	ETS 300 185-3: ISDN, CONF, DSS1, TSS&TP, User side ETS 300 185-4: ISDN, CONF, DSS1, ATS, User side ETS 300 185-5: ISDN, CONF, DSS1, TSS&TP, Network side ETS 300 185-6: ISDN, CONF, DSS1, ATS, Network side
Stage 3T (note 2) (note 6) (note 8)	ETS 300 185-1 ETS 300 185-1/A1 ETS 300 185-2	ETS 300 185-3 ETS 300 185-4 ETS 300 185-5 ETS 300 185-6
Stage 3T+ (note 21)	- -	- -
Stage 3Q (note 4) (note 7)	DEN/ECMA-00050	- -
Stage 3N (note 9) (note 10)	ETS 300 356-12: ISDN, SS7, ISUP v.2, CONF ETS 300 356-34: ISDN, SS7, ISUP v.2, PICS for Sup. Services	ETS 300 335: ISDN, SS7, ISUP v.1, Test specification ETS 300 356-35: ISDN, SS7, ISUP v.2, TSS&TP for Sup. Services ETS 300 356-36: ISDN, SS7, ISUP v.2, ATS for Sup. Services
Stage 3N* (note 21)	- -	- -

A.3.10 Call Transfer

Type: Supplementary Applicable to: Public ISDN, Private ISDN

Table A.15: Call Transfer (CT) supplementary service

Aspect	Base standard	Conformance test standard
Stage 1	ETS 300 367: ISDN, ECT ETS 300 260 (ed.2): PISN, CT (ECMA-177)	N/A
Stage 2	ETS 300 368: ISDN, ECT ETS 300 260 (ECMA-177)	N/A
Stage 3S (note 3)	- -	- -
Stage 3S/T (note 1) (note 6)	ETS 300 369-1(ed.2): ISDN, ECT, DSS1 ETS 300 369-2 (ed.2): ISDN, ECT, DSS1, PICS	ETS 300 369-3: ISDN, ECT, DSS1, TSS&TP, User side ETS 300 369-4: ISDN, ECT, DSS1, ATS, User side ETS 300 369-5: ISDN, ECT, DSS1, TSS&TP, Network side ETS 300 369-6: ISDN, ECT, DSS1, ATS, Network side
Stage 3T (note 2) (note 6) (note 8)	ETS 300 369-1 ETS 300 369-2	ETS 300 369-3 ETS 300 369-4 ETS 300 369-5 ETS 300 369-6
Stage 3T+ (note 21)	- -	- -
Stage 3Q (note 4) (note 7)	ETS 300 261 (ed.2): PISN, CT, QSIG (ECMA-178)	- -
Stage 3N (note 9) (note 10)	ETS 300 356-14: ISDN, SS7, ISUP v.2, ECT ETS 300 356-34: ISDN, SS7, ISUP v.2, PICS for Sup. Services	ETS 300 335: ISDN, SS7, ISUP v.1, Test specification ETS 300 356-35: ISDN, SS7, ISUP v.2, TSS&TP for Sup. Services ETS 300 356-36: ISDN, SS7, ISUP v.2, ATS for Sup. Services
Stage 3N* (note 21)	- -	- -

NOTE: This supplementary service is called "Explicit Call Transfer (ECT)" supplementary service in public ISDNs.

A.3.11 DTMF Signalling

There is no standard specifying the activation of DTMF signalling from a digital terminal.

A.3.12 Call Hold

Type: Supplementary Applicable to: Public ISDN, Private ISDN

Table A.16: Call Hold (HOLD) supplementary service

Aspect	Base standard	Conformance test standard
Stage 1	ETS 300 139: ISDN, HOLD	N/A
Stage 2	ETS 300 140: ISDN, HOLD	N/A
Stage 3S (note 3)	- -	- -
Stage 3S/T (note 1) (note 6)	ETS 300 141-1: ISDN, HOLD, DSS1 ETS 300 141-2: ISDN, HOLD, DSS1, PICS	ETS 300 141-3: ISDN, HOLD, DSS1, TSS&TP, User side ETS 300 141-4: ISDN, HOLD, DSS1, ATS, User side ETS 300 141-5: ISDN, HOLD, DSS1, TSS&TP, Network side ETS 300 141-6: ISDN, HOLD, DSS1, ATS, Network side
Stage 3T (note 2) (note 6) (note 8)	ETS 300 141-1 ETS 300 141-2	ETS 300 141-3 ETS 300 141-4 ETS 300 141-5 ETS 300 141-6
Stage 3T+ (note 21)	- -	- -
Stage 3Q (note 4) (note 7)	- - (NOTE 12)	- -
Stage 3N (note 9) (note 10)	ETS 300 356-16: ISDN, SS7, ISUP v.2, HOLD ETS 300 356-34: ISDN, SS7, ISUP v.2, PICS for Sup. Services	ETS 300 335: ISDN, SS7, ISUP v.1, Test specification ETS 300 356-35: ISDN, SS7, ISUP v.2, TSS&TP for Sup. Services ETS 300 356-36: ISDN, SS7, ISUP v.2, ATS for Sup. Services
Stage 3N* (note 21)	- -	- -

A.3.13 User-to-User Signalling

Type: Supplementary Applicable to: Public ISDN, Private ISDN

Table A.17: User-to-User Signalling (UUS) supplementary service

Aspect	Base standard	Conformance test standard
Stage 1	ETS 300 284: ISDN, UUS DEN/ECMA-00021: PISN, UUS (ECMA-UUSD)	N/A
Stage 2	ETS 300 285: ISDN, UUS DEN/ECMA-00021 (ECMA-UUSD)	N/A
Stage 3S (note 3)	- -	- -
Stage 3S/T (note 1) (note 6)	ETS 300 286-1: ISDN, UUS, DSS1 ETS 300 286-2: ISDN, UUS, DSS1, PICS	ETS 300 286-3: ISDN, UUS, DSS1, TSS&TP, User side ETS 300 286-4: ISDN, UUS, DSS1, ATS, User side ETS 300 286-5: ISDN, UUS, DSS1, TSS&TP, Network side ETS 300 286-6: ISDN, UUS, DSS1, ATS, Network side
Stage 3T (note 2) (note 6) (note 8)	ETS 300 286-1 ETS 300 286-2	ETS 300 286-3 ETS 300 286-4 ETS 300 286-5 ETS 300 286-6
Stage 3T+ (note 21)	- -	- -
Stage 3Q (note 4) (note 7)	DEN/ECMA-00074	- -
Stage 3N (note 9) (note 10)	ETS 300 121: ISDN, SS7, ISUP v.1 ETS 300 356-8: ISDN, SS7, ISUP v.2, UUS ETS 300 356-34: ISDN, SS7, ISUP v.2, PICS for Sup. Services	ETS 300 335: ISDN, SS7, ISUP v.1, Test specification ETS 300 356-35: ISDN, SS7, ISUP v.2, TSS&TP for Sup. Services ETS 300 356-36: ISDN, SS7, ISUP v.2, ATS for Sup. Services
Stage 3N* (note 21)	- -	- -
Special terminal functions (note 20)	- -	- -

A.4 Other services

The work of establishment of the standardization status which was realized for the basic services and for the end-user services required by all types of end-users could be done in the same way for the end-user services required by specific types of end-users, for the network services, and for the engineering perspectives.

Annex B: Bibliography

- DEN/ECMA-00009: "Private Integrated Services Network (PISN); Specification, functional models and information flows; Advice of charge supplementary service; ECMA-AOCSD".
- DEN/ECMA-00021: "Private Integrated Services Network (PISN); Specification, functional models and information flows; User-to-user signalling supplementary service; ECMA-UUSD".
- DEN/ECMA-00051: "Private Integrated Services Network (PISN); Inter-exchange signalling; Advice of charge supplementary service; ECMA-QSIG-AOC".
- DE/NA-010027: "Integrated Services Digital Network (ISDN); Completion of Calls on No Reply (CCNR) supplementary service; Service description".
- DEN/SPS-01036: "Integrated Services Digital Network (ISDN); Signalling System No.7 ISUP version 3 Completion of Call to subscriber Not Responding (CCNR) supplementary service".
- DEN/SPS-05115-1: "Integrated Services Digital Network (ISDN); Completion of Calls on No Reply (CCNR) supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".
- DEN/SPS-05115-2: "Integrated Services Digital Network (ISDN); Completion of Calls on No Reply (CCNR) supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".
- ETR 018 (Edition 5): "Integrated Services Digital Network (ISDN); Application of the BC-, HLC-, LLC- information elements by terminals supporting ISDN services".
- ETS 300 007: "Integrated Services Digital Network (ISDN); Support of packet-mode terminal equipment by an ISDN".
- ETS 300 048: "Integrated Services Digital Network (ISDN); ISDN Packet Mode Bearer Services (PMBS) ISDN Virtual Call (VC) and Permanent Virtual Call (PVC) bearer services provided by the B-channel of the user access - basic and primary rate".
- ETS 300 049: "Integrated Services Digital Network (ISDN); ISDN Packet Mode Bearer Services (PMBS) ISDN Virtual Call (VC) and Permanent Virtual Call (PVC) bearer services provided by the D-channel of the user access - basic and primary rate".
- ETS 300 082: "Integrated Services Digital Network (ISDN); 3,1 kHz telephony teleservice End-to-end compatibility".
- ETS 300 083: "Integrated Services Digital Network (ISDN); Circuit mode structured bearer service category usable for speech information transfer Terminal requirements for end-to-end compatibility".
- ETS 300 089: "Integrated Services Digital Network (ISDN); Calling Line Identification Presentation (CLIP) supplementary service Service description".
- ETS 300 090: "Integrated Services Digital Network (ISDN); Calling Line Identification Restriction (CLIR) supplementary service Service description".
- ETS 300 091: "Integrated Services Digital Network (ISDN); Calling Line Identification Presentation (CLIP) and Calling Line Identification Restriction (CLIR) supplementary services Functional capabilities and information flows".
- ETS 300 092-1/A1: "Integrated Services Digital Network (ISDN); Calling Line Identification Presentation (CLIP) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".
- ETS 300 092-1/A2: "Integrated Services Digital Network (ISDN); Calling Line Identification Presentation (CLIP) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

- ETS 300 092-1: "Integrated Services Digital Network (ISDN); Calling Line Identification Presentation (CLIP) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

- ETS 300 092-2: "Integrated Services Digital Network (ISDN); Calling Line Identification Presentation (CLIP) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".

- ETS 300 092-3: "Integrated Services Digital Network (ISDN); Calling Line Identification Presentation (CLIP) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 3: Test Suite Structure and Test Purposes (TSS&TP) specification for the user".

- ETS 300 092-4: "Integrated Services Digital Network (ISDN); Calling Line Identification Presentation (CLIP) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 4: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the user".

- ETS 300 092-5: "Integrated Services Digital Network (ISDN); Calling Line Identification Presentation (CLIP) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 5: Test Suite Structure and Test Purposes (TSS&TP) specification for the network".

- ETS 300 092-6: "Integrated Services Digital Network (ISDN); Calling Line Identification Presentation (CLIP); supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 6: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network".

- ETS 300 093-1: "Integrated Services Digital Network (ISDN); Calling Line Identification Restriction (CLIR) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

- ETS 300 093-2: "Integrated Services Digital Network (ISDN); Calling Line Identification Restriction (CLIR) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".

- ETS 300 093-3: "Integrated Services Digital Network (ISDN); Calling Line Identification Restriction (CLIR) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 3: Test Suite Structure and Test Purposes (TSS&TP) specification for the user".

- ETS 300 093-4: "Integrated Services Digital Network (ISDN); Calling Line Identification Restriction (CLIR) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 4: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the user".

- ETS 300 093-5: "Integrated Services Digital Network (ISDN); Calling Line Identification Restriction (CLIR) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 5: Test Suite Structure and Test Purposes (TSS&TP) specification for the network".

- ETS 300 093-6: "Integrated Services Digital Network (ISDN); Calling Line Identification Restriction (CLIR); supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 6: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network".

- ETS 300 102-1: "Integrated Services Digital Network (ISDN); User-network interface layer 3 Specifications for basic call control".

- ETS 300 102-2: "Integrated Services Digital Network (ISDN); User-network interface layer 3 Specifications for basic call control Specification Description Language (SDL) diagrams".

- ETS 300 108: "Integrated Services Digital Network (ISDN); Circuit-mode 64 kbit/s unrestricted 8 kHz structured bearer service category Service description".

- ETS 300 109: "Integrated Services Digital Network (ISDN); Circuit-mode 64 kbit/s 8 kHz structured bearer service category usable for speech information transfer Service description".

- ETS 300 110: "Integrated Services Digital Network (ISDN); Circuit-mode 64 kbit/s 8 kHz structured bearer service category usable for 3,1 kHz audio information transfer Service description".
- ETS 300 111: "Integrated Services Digital Network (ISDN); Telephony 3,1 kHz teleservice Service description".
- ETS 300 121: "Integrated Services Digital Network (ISDN); Application of the ISDN User Part (ISUP) of CCITT Signalling System No.7 for international ISDN interconnections (ISUP version 1)".
- ETS 300 139: "Integrated Services Digital Network (ISDN); Call Hold (HOLD) supplementary service Service description".
- ETS 300 140: "Integrated Services Digital Network (ISDN); Call Hold (HOLD) supplementary service Functional capabilities and information flows".
- ETS 300 141-1: "Integrated Services Digital Network (ISDN); Call Hold (HOLD) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".
- ETS 300 141-2: "Integrated Services Digital Network (ISDN); Call Hold (HOLD) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".
- ETS 300 141-3: "Integrated Services Digital Network (ISDN); Call Hold (HOLD) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 3: Test Suite Structure and Test Purposes (TSS&TP) specification for the user".
- ETS 300 141-4: "Integrated Services Digital Network (ISDN); Call Hold (HOLD) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 4: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the user".
- ETS 300 141-5: "Integrated Services Digital Network (ISDN); Call Hold (HOLD) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 5: Test Suite Structure and Test Purposes (TSS&TP) specification for the network".
- ETS 300 141-6: "Integrated Services Digital Network (ISDN); Call Hold (HOLD) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 6: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network".
- ETS 300 171: "Private Telecommunication Network (PTN); Specification, functional models and information flows; Control aspects of circuit mode basic services; ECMA-BCSD".
- ETS 300 172 (Third Edition): "Private Telecommunication Network (PTN); Inter-exchange signalling protocol Circuit mode basic services".
- ETS 300 173 (Second Edition): "Private Integrated Services Network (PISN); Specification, functional models and information flows; Identification supplementary services".
- ETS 300 178: "Integrated Services Digital Network (ISDN); Advice Of Charge: charging information at call set-up time (AOC-S) supplementary service Service description".
- ETS 300 179: "Integrated Services Digital Network (ISDN); Advice Of Charge: charging information during the call (AOC-D) supplementary service Service description".
- ETS 300 180: "Integrated Services Digital Network (ISDN); Advice Of Charge: charging information at the end of the call (AOC-E) supplementary service Service description".
- ETS 300 181: "Integrated Services Digital Network (ISDN); Advice Of Charge (AOC) supplementary service Functional capabilities and information flows".
- ETS 300 182-1: "Integrated Services Digital Network (ISDN); Advice Of Charge (AOC) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".
- ETS 300 182-2: "Integrated Services Digital Network (ISDN); Advice Of Charge (AOC) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".

- ETS 300 182-3: "Integrated Services Digital Network (ISDN); Advice Of Charge (AOC) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 3: Test Suite Structure and Test Purposes (TSS&TP) specification for the user".

- ETS 300 182-4: "Integrated Services Digital Network (ISDN); Advice Of Charge (AOC) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 4: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the user".

- ETS 300 182-5: "Integrated Services Digital Network (ISDN); Advice Of Charge (AOC) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 5: Test Suite Structure and Test Purposes (TSS&TP) specification for the network".

- ETS 300 182-6: "Integrated Services Digital Network (ISDN); Advice Of Charge (AOC) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 6: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network".

- ETS 300 183: "Integrated Services Digital Network (ISDN); Conference call, add-on (CONF) supplementary service Service description".

- ETS 300 184: "Integrated Services Digital Network (ISDN); Conference call, add-on (CONF) supplementary service Functional capabilities and information flows".

- ETS 300 185-1/A1: "Integrated Services Digital Network (ISDN); Conference call, add-on (CONF) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

- ETS 300 185-1: "Integrated Services Digital Network (ISDN); Conference call, add-on (CONF) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

- ETS 300 185-2: "Integrated Services Digital Network (ISDN); Conference call, add-on (CONF) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".

- ETS 300 185-3: "Integrated Services Digital Network (ISDN); Conference call, add-on (CONF) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 3: Test Suite Structure and Test Purposes (TSS&TP) specification for the user".

- ETS 300 185-4: "Integrated Services Digital Network (ISDN); Conference call, add-on (CONF) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 4: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the user".

- ETS 300 185-5: "Integrated Services Digital Network (ISDN); Conference call, add-on (CONF) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 5: Test Suite Structure and Test Purposes (TSS&TP) specification for the network".

- ETS 300 185-6: "Integrated Services Digital Network (ISDN); Conference call, add-on (CONF) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 6: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network".

- ETS 300 190: "Private Telecommunication Network (PTN); Signalling at the S-reference point; Generic keypad protocol for the support of supplementary services; ECMA-SSIG-KP".

- ETS 300 191: "Private Telecommunication Network (PTN); Signalling at the S-reference point; Identification supplementary services; ECMA-SSIG-ID".

- ETS 300 192/A1: "Private Telecommunication Network (PTN); Signalling protocol at the S-reference point; Circuit mode basic services".

- ETS 300 192: "Private Telecommunication Network (PTN); Signalling protocol at the S-reference point; Circuit mode basic services; ECMA-SSIG-BC".

- ETS 300 195-1: "Integrated Services Digital Network (ISDN); Supplementary service interactions; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

- ETS 300 195-2: "Integrated Services Digital Network (ISDN); Supplementary service interactions; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".

- ETS 300 195-3: "Integrated Services Digital Network (ISDN); Supplementary service interactions; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 3: Test Suite Structure and Test Purposes (TSS&TP) specification for the user".

- ETS 300 195-4: "Integrated Services Digital Network (ISDN); Supplementary service interactions; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 4: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma for the user".

- ETS 300 195-5: "Integrated Services Digital Network (ISDN); Supplementary service interactions; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 5: Test Suite Structure and Test Purposes (TSS&TP) specification for the network".

- ETS 300 195-6: "Integrated Services Digital Network (ISDN); Supplementary service interactions Digital Subscriber Signalling System No. one (DSS1) protocol Part 6: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma for the network side".

- ETS 300 199: "Integrated Services Digital Network (ISDN); Call Forwarding Busy (CFB) supplementary service Service description".

- ETS 300 200: "Integrated Services Digital Network (ISDN); Call Forwarding Unconditional (CFU) supplementary service Service description".

- ETS 300 201/A1: "Integrated Services Digital Network (ISDN); Call Forwarding No Reply (CFNR) supplementary service; Service description".

- ETS 300 201: "Integrated Services Digital Network (ISDN); Call Forwarding No Reply (CFNR) supplementary service Service description".

- ETS 300 203: "Integrated Services Digital Network (ISDN); Call Forwarding Busy (CFB) supplementary service Functional capabilities and information flows".

- ETS 300 205: "Integrated Services Digital Network (ISDN); Call Forwarding No Reply (CFNR) supplementary service Functional capabilities and information flows".

- ETS 300 207-1: "Integrated Services Digital Network (ISDN); Diversion supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

- ETS 300 207-1/C1: "Integrated Services Digital Network (ISDN); Diversion supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

- ETS 300 207-2: "Integrated Services Digital Network (ISDN); Diversion supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".

- ETS 300 207-3: "Integrated Services Digital Network (ISDN); Diversion supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".

- ETS 300 207-4: "Integrated Services Digital Network (ISDN); Diversion supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 4: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the user".

- ETS 300 207-5: "Integrated Services Digital Network (ISDN); Diversion supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 5: Test Suite Structure and Test Purposes (TSS&TP) specification for the network".

- ETS 300 207-6: "Integrated Services Digital Network (ISDN); Diversion supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 6: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network".

- ETS 300 239: "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Generic functional protocol for the support of supplementary services [ISO/IEC 11582 (1995), modified]".
- ETS 300 240: "Private Telecommunication Network (PTN); Signalling at the S-reference point; Generic feature key management protocol for the control of supplementary services".
- I-ETS 300 245-1 (Second Edition): "Integrated Services Digital Network (ISDN); Technical characteristics of telephony terminals; Part 1: General".
- I-ETS 300 245-2 (Second Edition): "Integrated Services Digital Network (ISDN); Technical characteristics of telephony terminals; Part 2: PCM A-law handset telephony".
- I-ETS 300 245-3: "Integrated Services Digital Network (ISDN); Technical characteristics of telephony terminals Part 3: Pulse Code Modulation (PCM) A-law, loudspeaking and handsfree telephony".
- I-ETS 300 245-4: "Integrated Services Digital Network (ISDN); Technical characteristics of telephony terminals; Part 4: Additional Equipment Interface (AEI)".
- I-ETS 300 245-7: "Integrated Services Digital Network (ISDN); Technical characteristics of telephony terminals; Part 7: Locally generated information tones".
- ETS 300 256 (Second Edition): "Private Integrated Services Network (PISN); Specification, functional models and information flows; Diversion supplementary services".
- ETS 300 257 (Second Edition): "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Diversion supplementary services [ISO/IEC 13873 (1995) modified]".
- ETS 300 260: "Private Telecommunication Network (PTN); Specification, functional models and information flows Call transfer supplementary service".
- ETS 300 261 (Second Edition): "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Call transfer supplementary service [ISO/IEC 13869 (1995) modified]".
- ETS 300 284: "Integrated Services Digital Network (ISDN); User-to-User Signalling (UUS) supplementary service Service description".
- ETS 300 285: "Integrated Services Digital Network (ISDN); User-to-User Signalling (UUS) supplementary service Specification, functional models and information flows".
- ETS 300 286-1: "Integrated Services Digital Network (ISDN); User-to-User Signalling (UUS) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".
- ETS 300 286-2: "Integrated Services Digital Network (ISDN); User-to-User Signalling (UUS) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".
- ETS 300 286-3: "Integrated Services Digital Network (ISDN); User-to-User Signalling (UUS) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 3: Test Suite Structure and Test Purposes (TSS&TP) specification for the user".
- ETS 300 286-4: "Integrated Services Digital Network (ISDN); User-to-User Signalling (UUS) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 4: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the user".
- ETS 300 286-5: "Integrated Services Digital Network (ISDN); User-to-User Signalling (UUS) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 5: Test Suite Structure and Test Purposes (TSS&TP) specification for the network".
- ETS 300 286-6: "Integrated Services Digital Network (ISDN); User-to-User Signalling (UUS) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 6: Abstract Test Suite (ATS) and Protocol Implementation eXtra Information for Testing (PIXIT) proforma for the network side".
- I-ETS 300 322: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1); Abstract Test Suite (ATS) specification for signalling network layer protocol for circuit-mode basic call control (user)".

- ETS 300 325: "Integrated Services Digital Network (ISDN); Programming Communication Interface (PCI) for Euro-ISDN".

- ETS 300 335: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 1; Test specification".

- ETS 300 345: "Integrated Services Digital Network (ISDN); Interworking between public ISDNs and private ISDNs for the provision of telecommunication services; General aspects".

- ETS 300 350: "Integrated Services Digital Network (ISDN); Basic call control procedures for circuit-switched bearer services; Functional capabilities and information flows [ITU-T Recommendation Q.71 (1993), modified]".

- ETS 300 356-1:"Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 2 for the international interface; Part 1: Basic services [ITU-T Recommendations Q.761 to Q.764 (1993), modified]".

- ETS 300 356-12: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 2 for the international interface; Part 12: Conference call, add-on (CONF) supplementary service [ITU-T Recommendation Q.734, clause 1 (1993), modified]".

- ETS 300 356-14: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 2 for the international interface; Part 14: Explicit Call Transfer (ECT) supplementary service".

- ETS 300 356-15: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 2 for the international interface; Part 15: Diversion supplementary services [ITU-T Recommendation Q.732, clauses 2 to 5 (1993), modified]".

- ETS 300 356-16: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 2 for the international interface; Part 16: Call Hold (HOLD) supplementary service [ITU-T Recommendation Q.733, clause 2 (1993), modified]".

- ETS 300 356-18: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 2 for the international interface; Part 18: Completion of Calls to Busy Subscriber (CCBS) supplementary service".

- ETS 300 356-2: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 2: Supplementary services [ITU-T Recommendation Q.730 (1997), modified]".

- ETS 300 356-3: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 3: Calling Line Identification Presentation (CLIP) supplementary service [ITU-T Recommendation Q.731 clause 3 (1993) modified]".

- ETS 300 356-31: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 2 for the international interface; Part 31: Protocol Implementation Conformance Statement (PICS) proforma specification for basic services [ITU-T Recommendation Q.784.2, clauses 2, 3 and 9, and annex A, modified]".

- ETS 300 356-32: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 2 for the international interface; Part 32: Test Suite Structure and Test Purposes (TSS&TP) specification for basic services [ITU-T Recommendation Q.784.2, clauses 2, 3 and 6 to 8, modified]".

- ETS 300 356-33: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 2 for the international interface; Part 33: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for basic services [ITU-T Recommendation Q.784.2, clauses 2 to 4 and annexes B to D".

- ETS 300 356-34: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 2 for the international interface; Part 34: Protocol Implementation Conformance Statement (PICS) proforma specification for supplementary services".

- ETS 300 356-35: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 2 for the international interface; Part 35: Test Suite Structure and Test Purposes (TSS&TP) specification for supplementary services".

- ETS 300 356-36: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 2; Part 36: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for supplementary services".

- ETS 300 356-8: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 8: User-to-User Signalling (UUS) supplementary service [ITU-T Recommendation Q.737 clause 6 (1993) modified]".

- ETS 300 357: "Integrated Services Digital Network (ISDN); Completion of Calls to Busy Subscriber (CCBS) supplementary service Service description".

- ETS 300 358: "Integrated Services Digital Network (ISDN); Completion of Calls to Busy Subscriber (CCBS) supplementary service; Functional capabilities and information flows".

- ETS 300 359-1: "Integrated Services Digital Network (ISDN); Completion of Calls to Busy Subscriber (CCBS) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

- ETS 300 359-2: "Integrated Services Digital Network (ISDN); Completion of Calls to Busy Subscriber (CCBS) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".

- ETS 300 359-3: "Integrated Services Digital Network (ISDN); Completion of Calls to Busy Subscriber (CCBS) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 3: Test Suite Structure and Test Purposes (TSS&TP) specification for the user".

- ETS 300 359-4: "Integrated Services Digital Network (ISDN); Completion of Calls to Busy Subscriber (CCBS) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 4: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the user".

- ETS 300 359-5: "Integrated Services Digital Network (ISDN); Completion of Calls to Busy Subscriber (CCBS) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 5: Test Suite Structure and Test Purposes (TSS&TP) specification for the network".

- ETS 300 359-6: "Integrated Services Digital Network (ISDN); Completion of Calls to Busy Subscriber (CCBS) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 6: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network".

- ETS 300 365: "Private Telecommunication Network (PTN); Specification, functional models and information flows Call completion supplementary services".

- ETS 300 366: "Private Telecommunication Network (PTN); Inter-exchange signalling protocol Call completion supplementary services; ECMA-QSIG-CC".

- ETS 300 367: "Integrated Services Digital Network (ISDN); Explicit Call Transfer (ECT) supplementary service Service description".

- ETS 300 368: "Integrated Services Digital Network (ISDN); Explicit Call Transfer (ECT) supplementary service Functional capabilities and information flows".

- ETS 300 369-1 (Second Edition): "Integrated Services Digital Network (ISDN); Explicit Call Transfer (ECT) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

- ETS 300 369-2 (Second Edtion): "Integrated Services Digital Network (ISDN); Explicit Call Transfer (ECT) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".

- ETS 300 369-3: "Integrated Services Digital Network (ISDN); Explicit Call Transfer (ECT) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 3: Test Suite Structure and Test Purposes (TSS&TP) specification for the user".

- ETS 300 369-4: "Integrated Services Digital Network (ISDN); Explicit Call Transfer (ECT) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 4: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the user".

- ETS 300 369-5: "Integrated Services Digital Network (ISDN); Explicit Call Transfer (ECT) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 5: Test Suite Structure and Test Purposes (TSS&TP) specification for the network".

- ETS 300 369-6: "Integrated Services Digital Network (ISDN); Explicit Call Transfer (ECT) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 6: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network".

- ETS 300 381: "Telephony for hearing impaired people; Inductive coupling of telephone earphones to hearing aids".

- I-ETS 300 400: "Integrated Services Digital Network (ISDN); Telephony terminals; Payphones".

-- ETS 300 403-1: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification [ITU-T Recommendation Q.931 (1993), modified]".

- ETS 300 403-2: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 2: Specification and Description Language (SDL) diagrams".

- ETS 300 403-3: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 3: Protocol Implementation Conformance Statement (PICS) proforma specification".

- ETS 300 403-4: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 4: Test Suite Structure and Test Purposes (TSS&TP) specification for the user".

- ETS 300 403-5: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 5: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the user".

- ETS 300 403-6: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 6: Test Suite Structure and Test Purposes (TSS&TP) specification for the network".

- ETS 300 403-7: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 7: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network".

- ETS 300 485: "Integrated Services Digital Network (ISDN); Definition and usage of cause and location in Digital Subscriber Signalling System No. one (DSS1) and Signalling System No.7 ISDN User Part (ISUP) (ITU-T Recommendation Q.850 (1993), modified)".

- ETS 300 488: "Terminal Equipment (TE); Telephony for hearing impaired people; Characteristics of telephone sets that provide additional receiving amplification for the benefit of the hearing impaired".

- ETS 300 697-1: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Test Case Library (TCL); Part 1: Test Suite Structure (TSS) and Test Purposes (TP) for Medium Access Control (MAC) layer".

- ETS 300 697-4: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Test Case Library (TCL); Part 4: Test Suite Structure (TSS) and Test Purposes (TP) - Data Link Control (DLC) layer".

- ETS 300 804-1: "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Circuit mode basic services; Data Link Layer (DLL); Part1: Test Suite Structure and Test Purposes (TSS&TP)".

- ETS 300 804-2: "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Circuit mode basic services; Data Link Layer (DLL); Part 2: Abstract Test Suite Specification (ATS)".

- ETS 300 805-1: "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Circuit mode basic services; Network Layer (NL); Part 1: Test Suite Structure and Test Purposes (TSS&TP)".

- ETS 300 805-2: "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Circuit mode basic services; Network Layer (NL); Part 2: Abstract Test Suite Specification (ATS)".

- ETS 300 806-1: "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Generic functional protocol for the support of supplementary services; Part 1: Test Suite Structure and Test Purposes (TSS&TP)".

- ETS 300 806-2: "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Generic Functional Protocol for the support of supplementary services; Part 2: Abstract Test Suite specification (ATS)".

- ETS 300 242: "Terminal Equipment (TE); Group 3 facsimile equipment".

- I-ETS 300 322: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1); Abstract Test Suite (ATS) specification for signalling network layer protocol for circuit-mode basic call control (user)".

History

Document history				
V1.1.1	May 1997	Membership Approval Procedure	MV 9730:	1997-05-27 to 1997-07-25