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Executive summary

This ETSI Technical Report has been produced by Technical Committee BT. It is based upon the results of work by Project Team PT18V of the European Telecommunications Standards Institute (ETSI) in response to the CEC Works Order No 45139 and EFTA Order Voucher IT/167-part 2.

Other work, examining the possibility of harmonising testing methods for PSTN attachments, under the same study and investigation mandate has been co-ordinated by the ETSI PSTN Full Steering Group and managed by Technical Committee TE.

The report contains details of a study of a quantity of information supplied by twenty European countries about the way PBXs and similar complex apparatus are connected to the PSTN and the attachment requirements to be met by the customer premises equipment.

The Project Team was required to evaluate the feasibility and usefulness of preparing a document containing a structured collection of existing national approved requirements for access to those presentations of the PSTN that are outside the scope of ETS 300 001.

An analysis of the information supplied, supplemented by other sources, has resulted in a categorisation of the different technical interfaces, the extent of their use and forecasts for their future growth.

These results have led the Technical Committee to reach certain conclusions and to make a number of recommendations.

The main conclusions are as follows:

1) There are 34 interfaces to the analogue PSTN in 16 countries outside the scope of prETS 300 001. The method of providing DDI facilities varies considerably from one country to another but for PBXs which do not use DDI there is a high degree of similarity among the technical interfaces provided by the different countries.

   DDI facilities are provided in 14 countries on some six million lines. There are 8 million lines without DDI provided in 8 countries on specially engineered interfaces. (The total population of PSTN lines in Europe is around 200 million).

2) The extent of provision of service to PBXs appears to be related to the social, economic and regulatory environment of each country. The future importance of specially engineered interfaces for access by complex terminals is dependent upon changes to this environment. The impact of new technology adds a further complication to any attempt to predict accurately the future demand. The growth of ISDN, the availability of alternative services such as CENTREX and the implementation of the ONP leased lines Directive will all have a bearing on the future likely use of these special analogue interfaces.

3) The cost of producing a document containing a structured collection of all existing national approval requirements in a common format is likely to be high in relation to the potential benefits. Furthermore it is unlikely that the document could be produced in the time necessary before the window of opportunity closes.

4) Some countries permit PBXs and telephones to be connected to identical PSTN interfaces. It is desirable that ETS 300 001 is suitably modified to enable its consistent application across Europe for all types of terminal equipment, including PBXs.

5) Following such a modification a less comprehensive document containing, for non-DDI interfaces which are similar to the standard analogue interface defined in prETS 300 001, pointers to the parts of prETS 300 001 which apply plus details and test specifications for the additional requirements for both incoming and outgoing calls could be produced at lower cost.

   There is a general consensus that analogue access to the PSTN by non-DDI types of PBXs will remain important for many years.

   The direct effort required to produce such a "delta" document is estimated to be 5 man years using the final version of prETS 300 001. This could fall to 3 man years if the ETS is already modified to

cover unguarded-clear PBXs and to exclude non-essential requirements. In each case, indirect effort, supplied by the members of ETSI, is likely to be about 150% of the direct effort.

6) Benefit would be gained from the consistent application of Directive 83/189/EEC procedure to all national approval regulations for PBXs, including those not published by national standards bodies. Another document, which would list the national attachment specifications and give information about approval procedures for connection to these interfaces, should be prepared covering all the European countries.

The recommendations may be summarised as follows:

1) A document should be prepared containing in a structured form the attachment requirements for apparatus to be connected to specially engineered analogue interfaces using DTMF signalling and loop seizure but not providing DDI facilities, indicating which parts of prETS 300 001 apply and specifying in the document only those requirements which are not in ETS 300 001. It is recommended that the proposed action is delayed until other work on improving, stabilising and reducing to essential requirements ETS 300 001 is completed.

2) A document should be prepared containing, for all the specially engineered interfaces identified, information about the national attachment specifications and the national approval procedures as a means to the implementation of EEC Directive 83/189/EEC in relation to these regulations.

3) Work should be undertaken in the process of improving ETS 300 001 to combine the attachment requirements for PBXs to be connected to the standard analogue interface with the attachment requirements for telephones connected to the same type of interface.

4) Attention should be given to the different additional regulations (technical and non-technical), which vary from one country to another, considering the installation and operation of apparatus to be attached to the interfaces considered in this report.

Foreword

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

This ETR has been produced by the Business Telecommunications (BT) Technical Committee of the European Telecommunications Standards Institute (ETSI).

NOTE: In the progress report to TC-BT of May 1992 an early version of the tables in Annex H were presented where the five interfaces F2, F3, N3, N4 and P were present. They have been deleted from Annex H for the reasons given in subclause 5.2. It should also be noted that the interface "I1" has been changed to "I2" and "I2" to "I1". Furthermore, the interface "S4" has been changed to "S1" and S3" to "S2". The original interfaces "S1" and "S2" represented the one way versions of the both way interface "S4" and consequently the original "S1" and "S2" have been omitted.

This ETR was the result of the work performed during the period January to July 1992 by Project Team 18V, which was comprised of:

Michael Brenton	CommEd Publishing Limited (UK);
Jean Montenot	France Telecom (F);
Verner Tofting	Fischer and Lorenz ApS (DK).

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1 Scope

This ETR contains the Report of ETSI Project Team PT 18V. The terms of reference for PT 18V were approved by ETSI Technical Assembly (TA 11) at its meeting on 18 - 20 September 1991 in Document TA 11 (91) 15 Annex 2 and were subsequently amended by the ETSI PSTN Full Steering Group. Project Team 18V has undertaken a survey to evaluate the feasibility and usefulness of preparing a document containing a structured collection of existing national approval requirements for access to those presentations of the PSTN that are outside the scope of prETS 300 001. The document, if produced, would adopt a common format for those aspects of national requirements that fall within the definition of "essential requirements". The structure of such a document should be along the lines of prETS 300 001.

The Project Team has also considered other options within the context of the terms of reference which could produce the kind of benefits being sought.

Although the scope of this survey concerns interfaces outside the scope of prETS 300 001 the project team has also attempted to identify the degree of commonality of the interfaces identified with prETS 300 001.

The definitive terms of reference of PT 18V are annexed to this Report (see Annex A).

2 References

[1] Final draft prETS 300 001 (1992): "Attachments to the Public Switched Telephone Network (PSTN); General technical requirements for equipment connected to an analogue subscriber interface in the PSTN".

NOTE: Voting on the adoption of Final draft prETS 300 001 [1] as an ETS took place during the progress of the Project Team studies but, in order to avoid the possibility of diversion and delay, the Final draft text dated March 1992 was referenced throughout the work.

[2] I-ETS 300 003 (1991): "Business Telecommunication (BT); Transmission characteristics of digital Private Automatic Branch Exchanges (PABXs)".

[3] I-ETS 300 004 (1991): "Business Telecommunication (BT); Transmission characteristics at 2-wire analogue interfaces of a digital Private Automatic Branch Exchange (PABX)".

[4] I-ETS 300 005 (1991): "Business Telecommunication (BT); Transmission characteristics at 4-wire analogue interfaces of a digital Private Automatic Branch exchange (PABX)".

[5] Directive 91/263/EEC: "Council Directive of 29 April 1991 on the approximation of the laws of the Member States concerning telecommunications terminal equipment, including the mutual recognition of their conformity".

[6] ETR 034 (1991): "Business Telecommunications (BT): Approval requirements for complex customer premises apparatus and installations connected to the Public ISDN (including principles for the application of the essential requirements to any apparatus)".

[7] CEPT Yearbook (1990): CEPT Liaison Office, Bern.

[8] Yearbook of European Telecommunications (1991): Communications and Information Technology (CIT) Research Limited, London.

[9] CCITT, Blue Book, Volume VI - Fascicle VI.1 (1988): "General Recommendations on Telephone Switching and Signalling, Functions and Information Flows for Services in the ISDN, Supplements, Recommendations Q.1-Q.118bis".

[10] CCITT, Blue Book, Volume VI - Fascicle VI.4 (1988): "Specifications of Signalling Systems R1 and R2, Recommendations Q.310-Q.490".

[11] Directive 83/189/EEC: "Laying down a procedure for the provision of information in the field of technical standards and regulations".

3 Definitions and abbreviations

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

BT: Business Telecommunications.

CTR: Common Technical Regulation.

DDI: Direct Dialling In. The routing of a call to an extension of a PBX, or other call routing apparatus, without intervention of an operator and by means of a number forming part of the national numbering plan.

DTMF: Dual Tone Multi Frequency. A signalling method transferring digits and symbols from a terminal to a public exchange performed by means of a 2-out-of-8 multi frequency code. Of the two frequencies one is from a low- and one is from a high- frequency band each band having four frequencies. For further information see CCITT recommendation Q.23, blue book [9].

E and M: Ear and Mouth; which describes a form of inter-exchange signalling on separate wires, (E for incoming and M for outgoing; sometimes defined as Earth and Mark).

FSG: The ETSI PSTN Full Steering Group.

Guarded clear: A method of clearing that requires a signal from the PSTN to indicate that the distant party has cleared the connection.

Interface: A shared boundary between two functional units, defined by functional characteristics, common physical interconnection characteristics, signal characteristics, and other characteristics, as appropriate.

ISDN: Integrated Services Digital Network.

MFC: Multi Frequency Code; An inter-exchange signalling procedure performed by means of 2-out-of-5 voice-band multi frequency code with forward and backward compelled signalling.

MFPB: Multi Frequency Push Button. Same as DTMF.

PABX: Private Automatic Branch Exchange. An automatic telephone exchange connected to the PSTN and located at a customers premises.

PBX: Private Branch Exchange. A telephone exchange connected to the PSTN and located at a customers premises.

NOTE: The difference between a PABX and a PBX is that a PABX is explicitly an automatic exchange while a PBX is not. For example a PBX can also be a manually operated system.

PSTN: Public Switched Telephone Network. A generally used term for the nation-wide public telephone network comprising inter-connected telephone exchanges capable of switching telephone calls between telephones connected to the network (exchanges).

NOTE: In the context of this Report the analogue method of access to the network is implied. The network may consist of electro-mechanical or electronic switches and analogue or digital inter exchange transmission methods.

PT: Project Team established by ETSI.

PTN: Private Telecommunication Network.

PTO: Public Telecommunications Operator.

Subscriber line: Telephone line connecting the subscribers equipment to the exchange and having its own number in the national numbering plan.

NOTE: A standard subscriber line is described in prETS 300 001.

TC: Technical Committee.

TE: Terminal Equipment, which is defined as an equipment which is intended to be connected to a network termination point of the PSTN.

4 Methodology

An essential pre-requisite to the successful outcome of the work has been the co-operation of network operators and national approval and standards bodies. In order to obtain the information on which the Project Team was to base its studies a questionnaire was produced and sent to all countries represented at ETSI.

A letter from ETSI Director (see Annex B) to the lead delegate of each national administration was sent on 28 January 1992 inviting the nomination of a contact in each country to collaborate with the PT and to co-ordinate for their country the supply of information from the network operators, national approval bodies and national standards organisations.

The questionnaire prepared by PT18V was sent to the nominated contacts on 14 February (see Annex C). For those countries which had not supplied the name of a contact the questionnaire was sent to the lead delegate of the national administration with a cover note (see Annex D) emphasising the need for collaboration.

In general the collaboration has been good although it took a little longer than planned to obtain all the information required from some of the countries.

A list of national contact persons nominated to co-ordinate national co-operation with the Project Team was produced and updated when appropriate (see Annex E).

The results of a preliminary analysis of the information supplied was recorded in working documents which enabled the team to identify missing information and to follow up by means of telephone interviews and an interchange of fax messages with the contact person in each country.

Following the initial request for information a supplementary request for additional information (see Annex G) was sent to those countries which had reported that they provide interfaces within the scope of the PT 18V study. This was also followed by personal telephone contact where appropriate to clarify some issues.

The task assigned to PT18V was divided into three main phases;

i) Gathering and survey of information,

ii) Analysis and assessment of information,

iii) Preparation of conclusions and recommendations.

The results obtained from each phase are described in this ETR.

5 Results from the survey

5.1 Information obtained

Replies to the questionnaire were received eventually from 20 countries (out of 24 invited). Those countries which did not respond are: Iceland, Malta & Poland. Romania sent a preliminary reply but was not able to submit replies to the questionnaire in time to be included in the analysis. These four countries were considered to be of less importance than the others in the context of this study and time was not spent pressing them for a reply. Nevertheless a further letter was sent asking them to clarify their position in relation to the project (see Annex F).

A considerable amount of useful information was supplied through the co-operation of the contact person nominated by each collaborating country.

Table 1 shows a short form presentation of the most essential data for all the interfaces that were presented in the replies to the first questionnaire and indicates a preliminary categorisation.

Table 1: Short form presentation of interfaces

COUNTRY	Inter-face	No of wires	In/ Out/ Both way	DDI/ Non DDI	Number of lines installed	Cate-gory	Remarks
AUSTRIA	A1	2	Both way	DDI	190 k	4	
	A2	2	Both way	DDI	50 k	4	
BELGIUM	B1	2	Both way	Non DDI	285 k	1	
	B2	2	In	DDI		2	
CYPRUS	CY	2	In	DDI	1 k	2	
CZECHOSLO-VAKIA	CS1	2	Both way	Non DDI	130 k	1	
	CS2	3	In	DDI	10 k	5	
DENMARK							ETS 300 001 applies
FINLAND							ETS 300 001 applies
FRANCE	F1	2	In	DDI	500 k	2	
	F2	4	In	DDI	0 k	3	No longer provided
	F3	2	In	DDI	0 k	5	No longer provided
	F4	2	In	DDI	600 k	5	
	F5	4	In	DDI	10 k	3	
GERMANY	D1	2	Both way	DDI	2300 k	4	
	D2	2	In	*	6 k	6	* Not PBX interface
GREECE	GR	2	Both way	DDI	350 k	4	
ICELAND							No reply
IRELAND							ETS 300 001 applies
ITALY	I1	2	Both way	Non DDI	2000 k	1	
	I2	2	In	DDI	900 k	2	
LUXEMBOURG	L1	2	Both way	Non DDI	16 k	1	
	L2	2	Both way	DDI	5 k	4	
MALTA							No reply
NETHERLANDS	NL1	2	Both way	Non DDI	400 k	1	
	NL2	2	Both way	DDI		4	
NORWAY	N1	6	In	DDI	14 k	3	
	N2	8	In	DDI	3 k	3	
	N3	4	In	DDI	9 k	3	No longer provided
	N4	6	In	DDI	0 k	3	No longer provided
POLAND							No reply
PORTUGAL	P	2	Both way	Non DDI	1 k	1	No longer provided
ROMANIA							Info not available
SPAIN							ETS 300 001 applies
SWEDEN	S1	2	Both way	Non DDI	85 k	1	
	S2	2	In	DDI	15 k	2	
SWITZERLAND	CH	2	In	DDI	50 k	2	
TURKEY	TR	2	Both way	Non DDI	65 k	1	
UNITED KINGDOM	GB1	2	Both way	Non DDI		1	
	GB2	2	Both way	Non DDI	5000 k	1	
	GB3	2	Both way	Non DDI		1	
	GB4	2	In	DDI	1000 k	2	

Comments to table 1:

Interface refers to specially engineered interfaces used by e.g. PBX's or other complex terminals and does not include common telephone lines (standard analogue interface as defined in prETS 300 001).

The heading "In" refers to an "incoming calls only"- or "PSTN to PBX"-interface.

The heading "Out" refers to an "outgoing calls only"- or "PBX to PSTN"-interface.

The heading "Both way" refers to interfaces which enable the making and receiving of calls.

Number of lines installed refers to lines having their own number in the national numbering plan.

Number of lines installed are in several cases indicated by approximated figures due to lack of exact statistics.

Category nos. 1-6 refer to the division explained in subclause 5.2.

A total number of 34 interfaces in 16 different countries were identified after all replies had been analysed. All interfaces except one (D2) were interfaces used by PBX's.

Four countries, Denmark, Finland, Ireland and Spain, submitted no replies because all interfaces provided in these countries are declared within the scope of prETS 300 001.

Older equipment remains in use in some networks but since it is being phased out the particular attachment requirements are not included in the results of this survey. However a modern PBX approved for use with modern exchanges may not function correctly if connected to one of the older exchanges.

Supplementary information on procedures and policies which was supplied in response to the second questionnaire was tabulated (see Annex J).

Relevant information was obtained also from prETS 300 001 [1], ETR 034 [6], CEPT Yearbook 1990 [7], and the Yearbook of European Telecommunications 1991 [8].

Some countries were unable to provide all the details requested but sufficient has been obtained to allow a good view of the European scene to be taken in relation to the task of the Project Team.

5.2 Preliminary review

A more detailed table of the information gathered was created (see Annex H) and reviewed. The first review revealed that five interfaces, F2, F3, N3, N4 and P, were no longer provided and represented a negligible number of lines which will be phased out within a few years. Consequently these interfaces were not studied any further.

The result of the preliminary review led to the conclusion that the different types of interface could be categorised according to the technical characteristics of the interface. Three important categories and three of less importance were defined.

Category 1: Two-wire, one way or both way without DDI (see Annex H, table 1)

This general category is characterised by low frequency call indication and loop seizure but with a variety of clearing conditions. Three countries do not provide guarded clear.

Interfaces falling into this category are in use in eight countries: Belgium, Czechoslovakia, Italy, Luxembourg, Netherlands, Sweden, Turkey and United Kingdom.

Category 2: Two-wire, incoming with DDI, loop calling (see Annex H, table 2)

This general category is characterised by loop calling/clearing and decadic and/or DTMF signalling but with some significant variations in the use of battery reversals.

It is in use in seven countries with a fairly high level of commonality. The seven are Belgium, Czechoslovakia, Cyprus, France , Italy, Sweden and United Kingdom.

Category 3: E & M / R2 signalling, incoming with DDI (see Annex H, table 3)

This category is characterised by multi-wire presentation and R2, E & M signalling or a similar analogue method. There are several versions in use which are all subsets or variations of the signalling methods defined in CCITT Recommendations Q.400 and Q.440 - Q.490 [10].

Two countries (France and Norway) offer this type of interface. A number of versions catering for different traffic levels are available.

There is also another set of interfaces which were classified provisionally as minor categories (see Annex H, tables 4 - 6). These categories are characterised by:

Category 4: Two-wire, both way with DDI and non loop calling

Category 5: Two/three-wire, incoming with DDI and non loop calling

Category 6: Non PBX

The interfaces in these categories are available in seven countries (Austria, Czechoslovakia, France, Germany, Greece, Luxembourg, The Netherlands) and have particularly unique characteristics.

5.3 Detailed analysis

The preliminary review was followed by a more detailed analysis. The interfaces were divided into "incoming call" and "outgoing call" types so that "both way" interfaces had to be considered as two interfaces, one for each direction. This division arose from the realisation that there are substantial differences in the signalling characteristics between the incoming call side and the outgoing call side of a both way interface.

This led to a different basis for categorisation of the different interfaces and a table for each new category was produced (see Annex K).

The analysis shows that the "incoming calls"- or "PSTN to PBX"-interfaces were divided into five technical categories:

Category A: PSTN to PBX, non DDI, interfaces

Category B: PSTN to PBX, DDI, loop calling, interfaces

Category C: PSTN to PBX, DDI, E & M signalling, interfaces

Category D: PSTN to PBX, DDI, miscellaneous signalling, interfaces

Category E: Non PBX interfaces

The "outgoing calls"- or "PBX to PSTN"-interfaces were divided into two technical categories:

Category F: PBX to PSTN, loop calling, interfaces

Category G: PBX to PSTN, non loop calling, interfaces

Of these categories A, B and F exhibit a high degree of commonality between the interfaces in the category while in category C there is a lower degree of commonality.

5.4 Commonality with prETS 300 001

A study was made in order to assess the degree of commonality between the special PBX lines and the standard subscriber lines described in prETS 300 001 (see Annex P). The study did not involve category E which covers non PBX interfaces. The study is mainly based on the technical specifications and test requirements supplied to the PT.

A high level of commonality is encountered with respect to transmission characteristics, dialling functions (decadic and DTMF) and special functions such as register recall and meter pulse reception.

About 30% of the prETS 300 001 technical requirements have medium to high degree of commonality with the requirements for the special PBX interfaces taken as a whole.

About 40% of the prETS 300 001 testing methods have medium to high degree of commonality with the requirements for the special PBX interfaces taken as a whole.

The transmission characteristics requirements and the associated test methods in prETS 300 001 are not sufficient to cover all the special PBX interface requirements. In the case of digital (digitally encoded speech) PBX the ETSI standards I-ETS 300 003 [2], I-ETS 300 004 [3] and I-ETS 300 005 [4] may be appropriate but with respect to analogue PBX there appears to be a need for the definition of additional tests to cover all the requirements of some countries.

A higher degree of commonality is found in category A and F. By excluding four interfaces in category A & F (GB1i, A1o, A2o, NL2o) we are left with nine "both way" interfaces without DDI which exhibit the highest degree of commonality with prETS 300 001.

Categories F and G exhibit the highest degree of commonality with prETS 300 001. This is because the characteristics of "outgoing calls only" interfaces in general are more similar to standard subscriber line characteristics than the characteristics of "incoming calls only" interfaces.

In general, it may be seen that in categories A, F and G there is greatest similarity with ETS 300 001 in the area of call setup processes. The main differences occur in the DC Characteristics and the connection to the PSTN.

6 Results from the analysis and assessment

6.1 Interfaces to PSTN not covered by prETS 300 001

The terms of reference , as clarified by the FSG, required the Project Team to study those accesses to the PSTN that are outside the scope of prETS 300 001. PBX access to the PSTN by means of the standard analogue interface, which is within the scope of prETS 300 001, was therefore not considered.

As expected, a number of countries reported that they provide, in addition to the prETS 300 001 access, one or more specially engineered interfaces for the attachment of PBXs and similar complex installations.

Thirty four different interfaces in 16 different countries have been identified and the different attachment requirements analysed (see subclause 6.3). Thirty three of these interfaces are used by PBX's or other similar complex installations. After the 34 interfaces were identified 5 of them were eliminated as unimportant because they are no longer provided. They represent only a small population of lines. For further analysis 29 interfaces were then left.

6.2 Number of users and future importance

6.2.1 Overview

Each country was invited to provide details of the level of existing use of each of the specially engineered interfaces and to offer a prediction about its future use.

In addition each country was invited to report on the number of approvals granted for attachment to each special interface during the last two years and to predict the number of applications for approval during the next two years.

The information supplied by the participating countries was tabulated (see table 2).

Figures for lines installed have been rounded up to the nearest thousand. Percentages have been rounded to the nearest first decimal. Question marks indicate that information has not been supplied or is not available for other reasons.

Table 2: Number of lines and approvals

COUNTRY	Inter-face	Cate-gory	Number of PBX lines (1000)				Ratio - PBX lines to subsc. lines (%)	Approvals	
			Inst. last year	In oppr. now	In 5 years	In 10 years		Last 2 years	Next 2 years
AUSTRIA	A1	4	10	190	60	0	7,7	38	>38
	A2	4		50	240	390			
BELGIUM	B1	1	?	285	?	?	7,7	80	80
	B2	2	?		?	?		40	40
CYPRUS	CY	2	0	1	1	1	?	0	3
CZECHOSLO-	CS1	1	?	130	Up	Up	6,7	90	90
VAKIA	CS2	5	?	10	Up	Up		10	5
DENMARK	No interfaces declared outside the scope of prETS 300 001								
FINLAND	No interfaces declared outside the scope of prETS 300 001								
FRANCE	F1	2	0	500	0	0	4	100	?
	F2	3	0	0	0	0		0	0
	F3	5	0	0	0	0		0	0
	F4	5	175	600	690	Down		50	?
	F5	3	5	10	10	Down		50	?
GERMANY	D1	4	?	2300	Down	Down	7,1	?	?
	D2	6	0	6	Down	Down		?	?
GREECE	GR	4	6	350	500	1000	11,3	45	45
ICELAND	No reply								
IRELAND	No interfaces declared outside the scope of prETS 300 001								
ITALY	I1	1	?	2000	?	?	13,7	100	100
	I2	2	?	900	?	?			
LUXEMBOURG	L1	1	?	16	Stable	?	14	23	25
	L2	4	?	5	Down	Down		6	5
MALTA	No reply								
NETHERLAND S	NL1	1	?	400	400	400	6	98	120
	NL2	4	?						
NORWAY	N1	3	?	14	10	2	1,3	2	2
	N2	3	?	3	2	0		0	0
	N3	3	?	9	2	0		2	0
	N4	3	?	0	0	0		0	0
POLAND	No reply								
PORTUGAL	P	1	?	1	0	0	0,1	0	0
ROMANIA	Has replied preliminary but not submitted information in time								
SPAIN	No interfaces declared outside the scope of prETS 300 001								
SWEDEN	S1	1	9	85	70	40	1,8	11	<11
	S2	2	2	15	12	8		5	<5
SWITZERLAND	CH	2	?	50	Down	Down	1,4	5	7
TURKEY	TR	1	35	65	200	400	6,5	5	>5
UNITED	GB1	1	?		Up	Up	24	29	20
KINGDOM	GB2	1	?	5000	Down	Down			
	GB3	1	?		Up	Up			
	GB4	2	?	1000	Up	Up			15

Comments on table 2:

Some countries were unable to supply all the details requested. However, from the information which was supplied it has been possible to estimate with reasonable accuracy that the total number of PSTN access lines provided with a special interface is some 14 million of which the vast majority, approximately 88%, are in the four countries France, Germany, Italy and UK. The total population of PSTN lines in Europe is some 170 million, see "Yearbook of European Telecommunications" [8] so it may be seen that the special

lines are approximately 8 % of the total number of PSTN lines or 10% of the lines in those countries which provide specially engineered interfaces.

In the four countries mentioned above the special lines are about 12% of the PSTN population (24% in UK).

A difficulty for PBX suppliers is that the method of engineering these special lines , and therefore the attachment requirements, is significantly different from one country to another.

There is some commonality between the interfaces provided in Italy and UK (Interfaces coded I1 and GB2 in table 2) but together they cover less than half the special lines in the four countries.

France currently supports more than one million special analogue lines but forecasts that use of the interface coded F1 (MF Socotel) will decrease to zero within a few years and that growth in use of interfaces F4 (2-wire Colisee) and F5 (4-wire Colisee) will be trivial. The reason is that in France the analogue DDI interfaces will be replaced by the ISDN.

The DDI interface in Germany employs a signalling method which has little similarity with that used in the other countries. Germany also expects a net decrease in the use of analogue lines as the ISDN becomes more dominant.

6.2.2 Future use: general comment

On the likely future use of specially engineered analogue lines for PBXs, the responses from the different countries revealed quite contrary predictions. Ten countries are expecting an increase in approvals and three countries expect a decrease. The remainder expected no significant change in the near future.

A slightly different opinion was expressed on the expected growth of analogue access lines for use by PBXs. Six countries are expecting growth, six countries are expecting decline and four expect a generally stable situation (if these figures have attempted to take into account a decline due to migration to ISDN and therefore forecast the net effect then a substantial growth of new analogue users is being predicted).

6.2.3 Importance of each category

A more detailed analysis produced results for the different categories A - F (see subclause 5.3). This shows for each interface the number of lines in use now, predictions for future use, details about approvals in the last 2 years and expectations for the next 2 years (see Annex L).

a) Interfaces providing DDI

Interfaces providing DDI are available in 14 countries (Austria, Belgium, Switzerland, Czechoslovakia, Cyprus, Germany, France, Greece, Italy, Luxembourg, The Netherlands, Norway, Sweden and UK).

At least five countries have indicated that they expect a strong migration to the ISDN primary rate access from those customers with a large enough system to want DDI facilities. The study has indicated that there are quite significant differences between the way the DDI facility is engineered in each country (see Annex K).

Only two countries (France and Norway) provide a multi-wire system. These support a total of 30 000 PBX lines.

Six countries, with a gross population of 3,5 million PBX lines provide DDI by means of a variety of methods with little similarity between them

The eight countries which provide DDI by means of a two-wire, loop seizure, multi frequency signalling method serve a total population of some two million PBX lines (2,2% of the PSTN population in those countries). The greatest use of this method is in UK with about one million PBX lines (4% of the PSTN population in UK).

Most predictions are that analogue interfaces which provide DDI will be superseded by the ISDN.

b) Non-DDI interfaces

Considering non-DDI interfaces separately (see Annex L, table 1) reveals that seven of the 8 countries which provide special non-DDI interfaces for PBXs expect analogue access to remain important for the customers. This probably refers to the possible growth in the use of small/medium sized PBX and other call routing systems. Of the total of some 8 million non-DDI PBX lines now in use nearly 90% are in Italy and UK. The interfaces in the other countries have some significant technical differences. The ratio of this type of PBX access to the total PSTN population is 20% in UK and 10% or less in most other countries. Only Sweden expects to see a decrease in the use of this type of access.

The interfaces in this category have a number of requirements in common with prETS 300 001 (see subclause 5.4).

Categories A and F together describe nine both-way interfaces without DDI. About 8 million lines are in use which represents about 10% of the PSTN population in the eight countries concerned.

Although it is outside the scope of the study, it should be recognised that in many countries non-DDI PBXs will be attached to the standard analogue interface; in some cases with different attachment requirements from simple terminals, such as telephones.

6.2.4 Summary

An opinion, based upon the above analysis and in consultation with experts from Technical Committee BT, was formed by the Project Team on the importance of and future interest in each category of interface. However due to some doubts about the validity of the answers, possibly due to a misinterpretation of the question, and the divergent views expressed the opinion must be treated with some reserve.

There is a general consensus that medium/large PBXs and particularly those which require DDI facilities will migrate to the ISDN. But there is no consensus on the rate at which such migration will occur. It will probably depend upon the policy of the individual country on the introduction of ISDN.

The future importance of the non-DDI analogue interfaces (Category A) which are likely to be used by PBX at the smaller end of the range is accepted by seven of the eight countries which provide it. The other country (Sweden) expects growth of non-DDI access to occur on ISDN.

It was not particularly expressed but it seems likely that some growth of PBX access will occur on the standard analogue interface which is covered by prETS 300 001.

The DDI facility is not provided in all countries and in those where it is available plans exist to withdraw it on analogue interfaces in the near future. Currently about 6 million lines are provided with DDI.

For incoming calls to PBXs DDI is not used by a large number of users of special lines (around 8 million lines). Category A interfaces are therefore of great importance. The PT noted that the ratio of non-DDI PBX lines to ordinary telephone lines in several countries is significantly lower than that in the UK. This could be interpreted to mean that in such countries a new, liberalised environment, similar to that now existing in UK, will encourage the development of the market in PBXs which do not need DDI facilities. Alternatively, the interpretation could be that regulations in the UK prevent the widespread use of ordinary telephone lines on PBXs.

In the case of outgoing call interfaces, Category F is most important because it has most users at present. Five of the eight countries listed in Category F expressed the view that it will remain important. It has many requirements in common with prETS 300 001.

In the opinion of the PT the most important categories in the context of this study are Category A. and Category F. These two categories cover incoming and outgoing call interfaces. More than eight million lines are included (some 10% of the PSTN population of the countries concerned and some 60% of all PBX lines in Europe). It is likely they will be used by small/medium PBX systems in the future and a rapid growth could be experienced. About 20% of the PSTN population in UK is covered by interfaces in these categories. If other countries experience growth to that order of magnitude then an additional 7 million lines would be installed.

It was noted that in some of the countries which provide DDI facilities the standard analogue interface is used for outgoing calls. However, in some cases national testing requirements for the outgoing call interface are applied instead of prETS 300 001. This is because prETS 300 001 does not cover all the national testing requirements appropriate to a PBX. Other countries declared that all PBX attachment requirements are covered by prETS 300 001. The PT would have liked to pursue the apparent anomaly between those countries which exclude PBX testing from prETS 300 001 and those which claim that all PBX requirements are covered by prETS 300 001 but it was beyond our mandate and resources were not available.

6.3 Attachment requirements

Details of the national approval authority (Annex Q) and the national attachment requirements (Annex J) were listed.

In most cases standards which specify the technical requirements for attachment are in the public domain or are readily available to applicants for approval. In some countries no charge or a small charge is made.

All countries have referenced the appropriate documents which are available to the public and all except 2 have supplied copies to ETSI.

The documents have been an important source for the studies carried out by the PT. An analysis of the documents, their length, completeness, language and compliance with prETS 300 001 was done (see Annex M).

The length of the documents available varies significantly which is due to diversities in completeness and detailing. Several countries specify a rather limited number of technical requirements and approval tests as compared with standard prETS 300 001 subscriber lines. An analysis of the completeness of the documents with respect to technical, signalling, transmission and test requirements reveals that especially for test requirements several countries have no specifications and others have very few. This indicates that it is common to let the test laboratories decide how to test a PBX and alone determine whether technical, signalling and transmission requirements are satisfied.

The documents are available in each country's language but 6 countries can supply copies in English translation.

The documents were also studied in order to estimate the degree of commonality between the specified interfaces and prETS 300 001 (see Annex P). The content of the documents seems to vary from one country to another. Also some requirements which are mandatory in some countries are only advisory in others. Some of these requirements are not specified in standards. Several countries have taken steps to include "good practice" in installations and in network design as a condition of approval.

The method of obtaining approval to connect apparatus to the special interfaces varies from one country to another. A summary of the different attachment requirements being applied in the different countries was made (see Annex J). During this part of the analysis reference was also made to ETR 034 [6].

The results indicate that in at least ten countries the requirements leading to approval for the attachment of PBX and similar apparatus include laboratory testing of a sample of the product type, plus one or more additional requirements. At least eight countries require satisfactory testing of every installation; in some cases an acceptable arrangement for the maintenance of the PBX is a condition of approval. Also at least ten countries have technical regulations to govern the overall transmission performance when a Private Telecommunications Network (PTN) is connected to the PSTN.

In the United Kingdom, which is the largest national market, type approval is dependent upon satisfactory results from in-service observations and the registration of an approved maintainer as well as extensive laboratory tests. Furthermore, the installation on each site must be inspected and passed by an authorised person.

The PT has been informed that some approval authorities require an assurance that all products from the supplier conform to type. In some cases regular inspection of the factory is a condition of continuing approval.

Some advice from the regulatory authorities on the interpretation of the term Essential Requirements in Directive 91/263/EEC [5] was expected but it was not available in time to have any influence on this study.

6.4 Resources

An enquiry of the collaborating countries produced an indication that some expertise could be made available for work on the preparation of an ETS but, in the opinion of the Project Team, sufficient manpower in the scale required to prepare a representation of all the national specifications in a common form will be difficult to obtain.

7 Conclusions

7.1 Summary of findings

As a result of the survey the PT found:

1) that the total number of different interfaces identified as within the scope of the study is 34;

   and,

2) that the interfaces of special interest, i.e. those with a significant amount of users, are all interfaces used by PBX's or other similar complex installations;

   and,

3) that the population of special interfaces compared to the total population of PSTN lines is small on a European scale;

   but,

4) that the majority of such interfaces are provided in a small group of countries.

The analysis of the information supplied to the Project Team produced the following:

5) the different interfaces exhibit large diversities with respect to functionality; there is little commonality of requirements between all the interfaces identified;

6) the complete attachment requirements exhibit large diversities from one country to another; in most cases national requirements include installation and maintenance standards as well as laboratory testing;

7) certain categories of interfaces have been identified which have a high degree of commonality within the categories; it was discovered that an important group of interfaces also has some commonality with prETS 300 001;

8) the technical interface test requirements for PBX's to be attached to interfaces in categories A and F comply to some degree with prETS 300 001;

9) there is general agreement on the importance of analogue PBX lines without DDI during the next decade;

10) about 88% of the special interfaces now in use are in the four countries France, Germany, Italy and the United Kingdom but there is little similarity between their presentations.

Taking these findings into account a number of options was considered and assessed for their feasibility and practicability.

7.2 Options considered

With respect to recommendations the following possibilities are applicable and are discussed:

1) Produce a document containing a common presentation of the national technical requirements and test specifications for attachment of PBX's to the PSTN. This could be an ETS structured along the lines of prETS 300 001 and would include the requirements of all the interfaces identified.

2) Produce a document containing a common presentation of the attachment requirements for a selected set of the interfaces. This could be a separate ETS for each important category or a single ETS covering the most important categories.

3) Produce a document showing for each interface the appropriate parts of prETS 300 001 which apply and the variations from prETS 300 001 plus references to other ETSs such as I-ETSs 300 003 [2], 300 004 [3] and, 300 005 [4]. This could cover every individual interface or interfaces in the most important categories.

4) Produce a document containing a list of the relevant national specifications, details of national approval procedures and a national contact (similar to the CEPT Yearbook [8]).

7.3 Feasibility of a structured collection of national requirements

When considering the feasibility and usefulness of producing a document containing a common presentation of all the national technical requirements and test specifications for attachment of PBX's to the PSTN in all countries certain circumstances must be taken into account. Some of these are:

1) Amount of work required to produce a common presentation;
2) Need for extensive translation work in order to publish the ETS in English;
3) Availability of experts to do the work;
4) Possibilities for further harmonisation;
5) Number of lines involved;
6) Lifetime of the interfaces involved;
7) Benefits to be obtained.

7.4 Consideration of options available

7.4.1 Option 1: Common presentation of all national requirements

7.4.1.1 Amount of work

The experiences gained from producing prETS 300 001 show that a considerable amount of man years will be required but significantly less than has been needed to produce ETS 300 001. Presentation of national requirements varies considerably and some specifications would have to be completely re-structured. Some countries do not now have detailed test specifications. Since a common presentation will have significant similarities with prETS 300 001 the time consumption will be lower compared to producing prETS 300 001. The work will require several preferably full-time experts for a period of at least two years and a total resource requirement of up to 10 man years (see Annex N).

Furthermore a considerable amount of effort is required from the administrations and other technical experts in the ETSI-member countries. Another 15 man years of support activity should be assumed. If this option is chosen, a first step should be the creation of a structure for a new ETS; an activity which would require some 6 man-months of effort. This would involve an analysis of all the national specifications identifying common headings and proposing, for the approval of each national administration, a harmonised structure. The result of this activity could be used to produce a more precise estimate of the effort required to prepare the draft ETS.

This estimate does not include the effort involved in the implementation of the ETS in place of existing national standards and regulations.

7.4.1.2 Translation

The national specifications are in the language of the country concerned (see Annex M), but in some cases are also available in English translation. An ETSI publication would have to be in English. Therefore there would be a need for some translation work in order to publish the document entirely in English. The work would require expertise in both the technical requirements and linguistics.

7.4.1.3 The availability of experts

Most countries have indicated that suitable manpower could be made available. However the release of such experts for the amount of time required for the task might be a problem taking into account that the activity level in ETSI concerning telephony is expected to be high during the coming years and that there is increasing interest in the implementation of digital systems.

7.4.1.4 The possibilities for further harmonisation

The possibilities for further harmonisation of technical requirements and test methods for PBX's are doubtful because the engineering of the different special interfaces has great diversities between the interfaces although certain commonalties have been identified. If DDI interfaces are excluded the problem becomes less severe.

7.4.1.5 The number of analogue subscriber lines

The number of specially engineered analogue subscriber lines installed constitutes less than 10% of the total number of analogue subscriber lines in most of the countries concerned. In several of these countries the use of analogue interfaces by PBXs is expected to decrease rapidly.

Overall a slight yearly decrease in the number of such lines in the coming decade is predicted throughout Europe as ISDN becomes the dominant access method for business users.

However the information from seven countries (Belgium, Czechoslovakia, Italy, Luxembourg, Netherlands, Turkey and UK) with a total population of about 8 million special lines out of a PSTN population of around 75 million lines, indicates that the analogue PBX interfaces will be of significant importance for at least the next decade and probably for a longer period. There is some evidence that the policy of liberalisation of PBXs will encourage the development of products at the small-to-medium end of the range and that such products will be best served by analogue access methods.

7.4.1.6 The lifetime

In the opinion of the members of the Project Team, based upon discussions with experts in some countries, larger PBXs, especially those requiring DDI facilities, are likely to be connected to the public network through the ISDN Primary Rate Access. But in many countries PBXs at the smaller end of the market will continue for many years to use the PSTN Analogue access This scenario depends upon the policy of the individual countries on the introduction of ISDN.

Thus, the lifetime of some of the interfaces registered is likely to be rather short, but at least one major category may be considered as having a lifetime extending at least one decade. It must therefore be expected that approvals of PBX's requiring analogue attachment to the PSTN will have considerable importance for the next decade and therefore harmonisation of test methods could be considered.

We were informed that in some countries small PBXs which do not require DDI facilities and which are in compliance with prETS 300 001 or equivalent national specifications may be connected to the PSTN with no further testing. The market for such apparatus is likely to grow in the immediate future. It is not clear whether such apparatus will require specially engineered analogue access methods or whether the standard analogue interface covered by prETS 300 001 will be adequate in all countries.

7.4.1.7 Benefits

In general the advantages to be gained from the implementation of Option 1 would be the complete transparency of all the different national attachment requirements and the possibility to identify certain areas for harmonisation of test methods due to the diversities of the national requirements. It would be a complex document. Similar benefits could be obtained with Option 2 for the selected group of important interfaces with considerably less expenditure.

A discussion of the potential benefits to be gained from each of the options considered is reported in subclause 7.5.

7.4.2 Option 2: Common presentation of selected national requirements

The amount of work could be reduced by producing a document containing the attachment requirements of those interfaces which exhibit a high degree of commonality with one another. It would require the re-structuring and translation of the specifications concerned. If carefully selected the possibility of partial harmonisation within the smaller group would be improved and a large part (but not all) of the market could be covered.

Since the DDI facility is not available in all countries and in the 14 countries which provide it by means of specially engineered analogue interfaces it is expected to have a relatively short life and considering that there is wide diversity in the way these lines are engineered a common presentation of DDI interfaces is unlikely to produce significant benefits.

For the non-DDI interfaces there is a greater degree of similarity in the method of engineering the special interfaces. A common presentation could include the attachment requirements of eight countries covering both incoming and outgoing call procedures for ten of the interfaces. This type of interface is likely to be important in the longer term for the attachment of small/medium PBXs. Also it is similar to the standard analogue interface. Therefore it may be possible to include the requirements of those countries who have special attachment requirements for the connection of PBXs to the standard analogue interface. This estimate does not include the effort involved in the implementation of the ETS in place of existing national standards and regulations.

It is estimated that some 7,5 man years of direct effort would be needed to undertake this task plus support from the various countries involved of (say) 11 man years leading to a total cost equivalent to some 18,5 man years (see Annex N).

A discussion of the potential benefits to be gained from each of the options considered is reported in subclause 7.5.

7.4.3 Option 3: Variations from prETS 300 001

Four countries (Denmark, Finland, Ireland and Spain) have replied that their requirements for attachment of PBXs to PSTN analogue interfaces comply fully with prETS 300 001. The remaining sixteen countries have reported that their national requirements for attachment of certain complex apparatus to the PSTN are outside the scope of prETS 300 001. In those countries which provide a specially engineered interface for PBXs the national requirements for the special interfaces indicate a degree of commonality with prETS 300 001 where DDI is not provided.

A comparison of the Scope Clause of prETS 300 001 with the information supplied to the Project Team has indicated some apparent inconsistencies within some countries on PBX approvals. These issues were queried but could not be pursued since the matter is not within the terms of reference of this Project Team. The matter was referred to the FSG (see Annex S).

It should be noted that in prETS 300 001 six countries have made remarks that prETS 300 001 does not form the type approval requirements for PBX's or other complex installations connected to the PSTN. In our opinion it is desirable that ETS 300 001 be applied consistently to all type of terminal for attachment to the PSTN and should be modified if necessary to cover the requirements of all countries for the attachment of PBXs to the standard analogue interface.

A first step towards improving the procedure for type approval of PBX's could be to produce a document containing for each country and each available interface a presentation of the appropriate clauses of prETS 300 001 which apply and the variations and/or additions which are necessary. This would, for each

interface, specify a set of tests that are defined in prETS 300 001 and a set of additional tests that apply to that particular interface. Some of these are in I-ETS 300 004 [3]. Tests in prETS 300 001 which do not apply to PBXs would also be identified.

The information now available indicates that for several interfaces some part of the tests are also included in prETS 300 001 while only a small number of additional tests are required and some of the requirements in prETS 300 001 are not appropriate to PBX's.

The suggested document should also contain information of how and where to obtain details of additional national requirements, such as site inspections, maintenance regulations, etc., and other relevant information, how to apply for and obtain approval, other requirements to consider, etc.

Producing such a document will require less resources than producing a complete specification containing the national requirements in a common form. In the opinion of the Project Team the resources required will be about 4 man years plus some 6 man years of co-operation from the national administrations and other technical experts, making 10 man years in all. This estimate does not include the effort involved in the implementation of the ETS in place of existing national standards and regulations.

In general the advantages of this solution are the increased level of visibility through having all European requirements for this type of access in a single language and the opportunity this would give for further study of the testing arrangements possibly leading to greater harmonisation. The duplication of test requirements in ETS 300 001 and a separate ETS for PBX testing would be avoided.

A discussion of the potential benefits to be gained from each of the options considered is reported in subclause 7.5.

7.4.4 Option 4: Yearbook

The option of simply publishing a list of national specifications and their availability would require the minimum of resources which would be largely non-technical. Translation would not be necessary.

Already some enterprises have published such information as a commercial venture.

The official publication of such a document should be used to ensure that all national attachment requirements are completely published and are readily accessible.

The benefits would include transparency of national specifications and other attachment requirements (in the different languages) and details of the national procedure to be followed by an applicant for approval. By this means the procedures of Directive 83/189/EEC [11] could be applied effectively to the regulations concerning approval of complex apparatus and there would be some control over any changes to the national requirements.

Without additional activity there would be no change in the level or detail of national testing requirements nor the other aspects of conformity to national requirements. It is unlikely that further progress could be made towards harmonisation of testing nor mutual recognition of test results.

7.5 Benefits

The Project Team assessed the relative merits of the above options in relation to the benefit likely to be gained by the different groups involved in the application of telecommunications. Thus the aim was to balance the potential benefits of each option considered against its effect on the users, the PBX suppliers, the network operators and the approval authorities and test laboratories.

7.5.1 Benefit to users

User benefits are derived mainly from liberalisation of terminals supply (i.e. wider choice of supplier, competition leading to lower prices and better range of facilities) but the user could also benefit from any supplier benefits which are passed on in the form of lower costs and the speedier transfer of new designs to the market place.

7.5.2 Benefit to suppliers

The supplier benefits from the transparency of national requirements leading to a simpler approach to obtaining type approval leading in turn to lower costs and a means to become more competitive; This could encourage the entry into the market of smaller enterprises with more innovative products. However, there is no benefit from economies of scale without harmonisation of the technical requirements. Furthermore, scope for improving Extra-European exports (through reciprocal arrangements) is obtained through the opening of the home market by means of harmonisation.

The PT attempted to produce an estimate of the value to the industry of the potential benefits of the options considered but it was considered to be unsatisfactory. However, a subjective assessment was produced (see Annex R).

7.5.3 Benefit to PTO's

A more active market would result in a higher level of attachments which might lead to more traffic and greater revenue. There is some evidence of suppressed demand for PBX lines but the level of traffic may not be suppressed since it is currently being carried by non-PBX lines. An increase in PBX attachments would only be significant if attachment requirements are harmonised throughout the market but this may not necessarily result in an increase in traffic.

7.5.4 Benefit to approval authorities

The transparency of national requirements could lead to agreements in the longer term on some movement towards harmonisation of the degree of testing (agreement on essential requirements) and the possible mutual recognition of test results.

7.5.5 Benefit to test laboratories

Scope for market-wide business would improve as a result of greater transparency leading to greater competition but without harmonisation each laboratory would have to bear the cost of additional test equipment to handle the different national requirements.

7.5.6 Summary

The difficulty is to put some value on the possible benefits compared with the cost of obtaining them. The general benefits of a structured presentation containing all the different national requirements in a single language appear to be minimal in relation to the cost of producing such a presentation. The main benefits to the market come from harmonisation of requirements which lead to economies of scale in the design of new products.

The value of transparency is difficult to calculate. The value is probably low in all cases except in the case of simplifying for the supplier the mechanics of the approvals process. However the benefit to an individual, well established company may be trivial or even negative.

The interfaces concerned have been in use for some years and in most cases the suppliers have already overcome the difficulties imposed by different national requirements and approval procedures. The knowledge is part of their intellectual property which also has a value. It is not clear that the opportunity to benefit will exist for a period as long as 10 years.

There appears to be little scope for harmonisation of requirements in the cases studied by PT 18V because of the major differences in the designs of the specially engineered interfaces.

Nevertheless greater transparency could assist the entry of newcomers to the market, could lead to some further progress on harmonisation of testing arrangements and could encourage greater competition between test laboratories.

In the case of PSTN analogue access which does not include the DDI facility there is a relatively high level of similarity between the different national requirements and some commonality with the attachment requirements for the standard analogue interface covered by prETS 300 001.

7.6 General conclusions

The following general conclusions were reached:

1) The importance of the provision of special analogue access to the PSTN for use by PBXs and similar apparatus depends upon the rate of change to the social, economical and regulatory environment in each country. The impact of new technology adds a further complication to any attempt to predict accurately the future demand.

2) The development of a common specification, harmonised sufficiently to be applied as the national attachment requirement in each country, is not practicable now and therefore a CTR as defined in Directive 91/263/EEC [5] cannot be considered as an option. It has not been possible to take into account the work in TRAC on the interpretation of essential requirements because the expected information was not available to the PT.

3) To produce a document containing a common presentation of national requirements and test specifications in all countries will require considerable resources as pointed out in subclause 7.4.1. Taking into account the amount of man years required, the possible problems of obtaining the release of available experts, the limited number of lines and the decreasing importance of specially engineered analogue PBX interfaces with DDI facilities, this option is considered not practicable.

   It would be a complex document and its usefulness would not be commensurate with its cost. The technical differences between the various interfaces are quite significant and the expected life is relatively short because of the growth of ISDN. The preparation of a new ETS for all these interfaces would not be worthwhile.

4) A document as described above but including only a subset of the totality, selecting those interfaces which have a high degree of similarity, is more attractive but again in the opinion of the PT the cost is prohibitive in relation to the potential benefits bearing in mind the time needed to produce it and the short time span for obtaining the benefits.

5) To produce a document (in English) containing a description of each interface and detailing its commonality with and variations from prETS 300 001 is more applicable because the resource requirement is smaller. This could lead to a simplification of the national specifications in several countries and might eventually lead to consideration of harmonising testing requirements. The mutual recognition of test results (between at least some countries) for PBX apparatus could then be investigated. This option appears even more attractive if only a defined subset of interfaces is included. The cost of implementing this option is estimated at less than 10 man years (4 man years direct manpower) with a potential benefit to the suppliers of small/medium PBXs and the test laboratories.

6) Another recommendation has been considered. It is to publish a list of the national requirements giving sufficient detail about national procedures to enable the supplier of the apparatus to obtain type approval more readily. A further study could lead to some harmonisation of requirements and their testing and hence simplify entry into the market. This assumes that such harmonisation could be achieved during the lifetime of a significant market. The window of opportunity may be open for only a little longer than the period of time needed to achieve the necessary agreements.

7) A final option, which has to be considered is to "do nothing", leaving things as they are because the cost of any further work cannot be justified in relation to the benefits.

   There would be no serious disadvantages from taking no action, because the market now functions quite satisfactorily; but such a negative approach does nothing to encourage new entrants to the market-place. Some benefits would certainly accrue from achieving at least some improvements provided these may be obtained at acceptable cost. One of the most important benefits may be to enable a more rapid transfer of new, innovative designs to the market, especially in the area of small PBX systems. We have not been able to put a value on this.

8 Recommendations

Taking account of the above conclusions and noting in particular that the cost of preparing a document containing a structured collection of all national approval requirements is likely to be some 25 man years of effort, the potential benefits to be obtained are not commensurate with the cost. The expected short lifetime of the analogue interfaces which provide DDI facilities and therefore the short window of opportunity to obtain benefits confirms the view that the production of such a document cannot be justified.

If further work on reducing ETS 300 001 to essential requirements and harmonising testing methods is undertaken then further study of the requirements to enable the consistent application of the ETS to all kinds of terminal equipment, including PBXs, is desirable.

It is recommended;

1) that action be taken to prepare a single document, similar to prETS 300 001, containing, in a structured form, the attachment requirements for all kinds of complex apparatus to be connected to the PSTN by certain interfaces, which are different from that specified in prETS 300 001. For the specially engineered interfaces defined in Categories A and F in this Report those attachment requirements which are in any way different from those specified in prETS 300 001 should be set out in a common format and in a single language. The document would also indicate those requirements specified in ETS 300 001 which do not apply. Benefits will be gained in the reduced cost to suppliers and test laboratories of obtaining all the information needed about the national requirements for these interfaces.

   The cost of this part of the recommendation is likely to be some 4 man years directly applied plus another 6 man years of effort within the organisations participating in the work, making a total of 10 man years. Less effort would be required if ETS 300 001 has already been improved. It is therefore recommended that the proposed action is delayed until other work on improving, stabilising and reducing to essential requirements ETS 300 001 is completed.

2) that for all those specially engineered interfaces defined in this Report a document should be published identifying for each the main features, the specifications defining the national attachment requirements and details of the national procedure for obtaining approval to connect apparatus. The cost is relatively small.

It is also recommended;

3) that consideration be given, in the process of improving ETS 300 001, to combining the attachment requirements for PBXs to be connected to the standard analogue interface with the attachment requirements for other apparatus, such as telephones, connected to the same type of interface.

It is further recommended;

4) that attention be given to the different attachment requirements in the different countries (e.g. use of field trials and private network planning rules) and the different regulations concerning site inspections and maintenance of PBXs.

Annex A: Terms of reference for project team 18V (as amended by FSG)

1 Reasons for proposing a Project Team:

The work to be undertaken by this Project Team is required as soon as possible in order to meet the time scale proposed in the Mandate from the Commission and to maximise the possible benefits from further work in this area.

2 Consequences if not agreed:

Failure to complete the Mandate and loss of possible benefits to industry and users from improvements in the availability and possible further harmonisation of PSTN access requirements in the areas to be covered.

3 Detailed description

3.1 Subject title:

Analogue access not covered by prETS 300 001.

3.2 Reference TC:

BT.

3.3 Other interested TC (if any):

NA, TE.

3.4 Duration:

6 months, for completion by TA 12 (March, 1992).

3.5 Target date for start of work:

October 1991.

3.6 Necessary manpower:

8 man months and co-operation from network operators and national approval and standards bodies.

3.7 Context of the study:

The European Commission has issued a Mandate for an examination of the possibility of harmonising testing methods for PSTN attachments. To facilitate this work a survey is to be undertaken to evaluate the feasibility and usefulness of preparing a document containing a structured collection of existing national approval requirements for access to those presentations of the PSTN that are outside the scope of ETS 300 001 (aspects related to ETS 300 001 are being covered by a separate Project Team). The document, if produced, would adopt a common format for those aspects of national requirements that fall within the definition of "essential requirements".

The project Team will be managed by an Ad Hoc Group of BT2. Experts from Technical Committees NA and TE will be invited to attend this group. The full PSTN Steering Group, responsible to TC TE, is the overall supervisor of this work.

3.8 Related activities in other bodies and necessary co-ordination of schedules:

Account should be taken of the work of the TRAC Ad Hoc Group that is interpreting the Essential Requirements in Directive 91/263/EEC.

3.9 Scope of the Terms of Reference and relevant study items:

The Project Team should:

- identify the different interfaces (analogue only) to the PSTN not covered in ETS 300 001 available in different countries, and the approximate number of customers for each type of interface,

- identify the different standards or attachment requirements in different countries, their length, degree of completeness, the languages that they are available in, the ease with which the information can be obtained, and the availability of appropriately skilled manpower to work on a representation of the standard,

- for the types of interface with the largest number of users, assess the work necessary to convert each standard or requirement into a common form, and estimate the future useful life of the standard/requirement,

- recommend the interfaces for which having standards readily available in a common form would be expected to produce the greatest benefit.

Priority should be given to those presentations of the PSTN that are used by PBXs.

3.10 Reference specification(s) and existing documents including member contributions:

prETS 300 001

Relevant national requirements and test specifications

Directive 91/263/EEC

Draft BT2 Technical Report (BT-2009) on Type Approvals (later published as ETR 034)

3.11 Part of the ETSI Work Programme (EWP) for which the PT is required:

DTR/BT-2014

An ETR containing the results of the survey, interviews and analysis, and recommendations, together with a list of the interfaces for which further work on a re-presentation of standards would yield the greatest benefits. The Project Team should identify the scale and feasibility of whatever further work it recommends.

Annex B: Letter from director to administrations

WPM/54/91/AB/hg Sophia Antipolis, 28 January 1992

TO: ALL HEADS OF DELEGATION OF NATIONAL ADMINISTRATIONS

Dear Sir,
Dear Madam,

At its meeting on 9 - 11 October 1990 (TA 8), the ETSI Technical Assembly accepted the Study and Investigation Mandate proposed by the European Commission for work on the further harmonisation of PSTN Access and related services.

Furthermore the Technical Assembly, at its meeting on 18 - 20 September 1991 (TA 11), approved the Terms of Reference for Project Team PT 18V which is to undertake a task under the mandate, which will cover existing national requirements for access to those presentations of the PSTN that are outside the scope of ETS 300 001; that is interfaces which are not of the form "loop seizure, unguarded clear".

The Project Team has now been established under the Voluntary Work Programme and is about to start work. The work is under the management of Technical Committee BT.

In order for the Project Team to make rapid progress, I should like to invite you to nominate a contact person for your country who will be available to collaborate with the Project Team, supplying relevant information as required from the network operators, national approval bodies and national standards organisation.

The information to be collected will involve the issue by the Project Team of a questionnaire for which replies form each country will be required by end of March 1992 and also the possibility of later supplementary questions on an individual basis.

This work is considered to be most urgent and is already behind schedule.

Would you please send me, if possible, and not later than 14 February 1992, the name, address and telephone/fax numbers of a suitable person to assist with the conduction of this survey.

Yours faithfully,

K. H. ROSENBROCK
Director

Annex C: Questionnaire concerning analogue interfaces to the PSTN not covered by prETS 300 001

WPM/36/92/AB/vt **Sophia Antipolis, 14 February 1992**

TO: ALL CONTACT PERSONS TO ETSI PROJECT TEAM PT 18V CONCERNING ANALOG INTERFACES TO THE PSTN NOT COVERED BY prETS 300 001.

Dear Sir,
Dear Madam,

At its meeting on 9 - 11 October 1990 (TA8) the ETSI Technical Assembly accepted the study and investigation mandate proposed by the European Commission for work on the further harmonisation of PSTN access and related services.

Furthermore the Technical Assembly, at its meeting on 18 - 20 September 1991 (TA 11), approved the terms of reference for Project Team PT 18V, which is to undertake a task under the mandate, which will cover existing national requirements for access to those presentations of the PSTN, that are outside the scope of ETS 300 001. That is interfaces which are not of the form "loop seizure, unguarded clear".

After its establishment the Project Team contacted the national administrations and asked them to nominated a contact person for each country, who will be able to collaborate with the Project Team, supplying relevant information as required from the network operators, national approval bodies and national standards organisation.

As you have been appointed as contact person for your country the Project Team looks forward to collaborate with you. The Project Team has issued a questionnaire, which you will find enclosed. Please answer the questionnaire carefully and return it to us not later than 27. March. It is essential for the outcome of the Project Teams work that the replies are as complete as possible but please do not delay your replies if some information is not available. In its further work the project team might need some additional information and therefore you might be contacted by us later on for further consultations.

Please be free to contact one of the Project Team members if you have any clarifying questions about the questionnaire. The Project Team members are

M. Brenton (England)	Tel:	44 728 68 56 37
	Fax:	44 728 68 55 95
J. Montenot (France)	Tel:	33 92 94 42 67
	Fax:	33 93 95 84 51
V. Toefting (Denmark)	Tel:	45 31 54 86 96 (Until 27 March)
	Tel:	33 92 94 42 68 (After 27 March)
	Fax:	33 93 95 84 51 (After 27 March)

We look forward to your kind collaboration.

Yours faithfully

M. BRENTON
Project Team Leader

ETSI PT 18V (92) 002
10-Feb-92

SOURCE: PT 18V
TITLE: QUESTIONNAIRE
DOCUMENT FOR: FURTHER ACTION
****

QUESTIONNAIRE CONCERNING ANALOG INTERFACES TO THE PSTN NOT COVERED BY prETS 300 001.

O SCOPE

This questionnaire deals with analogue interfaces to the Public Switched Telephone Network (PSTN), that are not in the scope of prETS 300 001 (candidate NET4). That is interfaces which are not of the form "loop seizure, unguarded clear".

We are seeking to identify all methods of analogue access to the PSTN where the interface concerned is in the national numbering plan. Of special interest are interfaces that are used by PBXs.

We shall then consider the feasibility and usefulness of having a document prepared containing a structured collection of the national approval requirements.

You are kindly requested to identify and describe the different relevant interfaces in operation in your country according to the guide-lines in this questionnaire, and you are most welcome to comment on the replies in order to make them as clear as possible.

Examples of exchange line types of interest are lines providing Direct Dialling In (DDI), or exchange lines without DDI where the public exchange provides additional signals indicating the state of the distant party such as answer and clearing signals, excluding the reverse polarity signalling.

In case you are not able to give a precise answer to a question, then give the best estimate instead or refer to another contact person that can give a more elaborate and complete answer.

In ANNEX A is shown two examples of how the general and the technical part of a completed questionnaire can look like.

When you are returning the replies you are kindly requested to include copies of relevant national standards, technical requirements and test specifications. It will be an advantage if your replies and the documents you send us are available in an English language version.

1 GENERAL

For each type of interface please specify:

1.1 Exchange line type and designation (type code).

1.2 A brief description of the interface.

1.3 Types of terminal equipment and other customer premises equipment connected to the interface.

1.4 Number of wires presented at the interface including signalling circuits (2 wire/ 4 wire/....).

1.5 Signalling systems.

1.6 Direction (incoming/ outgoing/ both way).

1.7 Number of interfaces installed .

The interface should be considered as the interconnection between the customers premises equipment and the PSTN.

2 TECHNICAL SPECIFICATIONS FOR ATTACHMENTS.

For each type of interface please specify:

2.1 The DC-conditions with special attention to:
- a. Main power supply origin (PSTN/ PBX/ TE).
- b. Voltage range.
- c. Current range.
- d. Other conditions.

2.2 The procedure for terminating incoming calls to a PBX/TE with special attention to
- a. Direct Dialling In (DDI/ non DDI).
- b. Call indication signal (from the PSTN).
- c. Address information (dialling) signals (only for DDI).
- d. Call progress tones (from the PBX/TE).
- e. Answer signal.
- f. On-line state.
- g. Clear signal from the PBX/TE.
- h. Clear signal from the PSTN.

2.3 The procedure for generating outgoing calls from a PBX/TE with special attention to
- a. Seize signal.
- b. Dial tone (from the PSTN).
- c. Dialling signals.
- d. End of dialling signal (from the PSTN).
- e. Call progress tones (from the PSTN).
- f. Answer signal (from the PSTN).
- g. On-line state.
- h. Charging (metering) signals (from the PSTN).
- i. Clear signal from the PSTN.
- j. Clear signal from the PBX/TE.

3 LINES IN OPERATION.

For each type of interface please specify:

3.1 Your opinion on the number of lines in operation during the next 5 years.
Will the number increase, decrease or maintain the existing level.
Explain your answer briefly.

3.2 The following information will also be helpful in order to achieve our analysis of the future useful life of the interface.

The best estimates of:
- a. Number of lines installed last year.
- b. Number of lines in operation at present.
- c. Number of lines in operation in 5 years.
- d. Number of lines in operation in 10 years.

A line should be considered as having its own number in the national numbering plan.

4 APPROVAL PROCEDURE.

For each type of interface please specify:

4.1 The authority for granting approval to connect.

4.2 The available technical requirements and test specifications, including:

- a. Reference number.
- b. Title.
- c. Date of issue.
- d. Whether the documents are under review for amendment or reissue.

4.3 Where there is no published standard or test specification, please indicate how terminal equipment is approved.

4.4 Number of approvals within the last two years.

4.5 Estimated number of approvals within the next two years.

5 MISCELLANEOUS.

For each type of interface please specify other relevant information.

ANNEX A: EXAMPLES OF COMPLETED QUESTIONNAIRES.

Example 1.

1.1 DDI exchange line.

1.2 A one-way interface for Direct Dialling In to PBXs.

1.3 PBXs

1.4 2-wire.

1.5 Loop (connect/ disconnect/ battery reversal)

1.6 Incoming only

1.7.....

2.1.a PBX.
2.1.b 44- 52 V.
2.1.c 20- 100 mA
2.1.d .....

2.2.a DDI.
2.2.b Loop connect at public exchange.
2.2.c Loop disconnect signals (10 pulses per second).
2.2.d Ring-back tone: 350 Hz+ 440 Hz; 0.4 s on, 0.2 s off, 0.4 s on, 2.0 s off.
Busy tone: 400 Hz; 0.375 s on, 0.375 s off.
2.2.e Battery reversal.
2.2.f Continuation of answer signal.
2.2.g Restoration of battery polarity.
2.2.h Loop disconnect .

2.3 No outgoing calls.

3.1 ...

Example 2.

1.1 Loop calling, guarded clearing exchange line.

1.2 A two-way interface for PBXs without DDI.

1.3 PBXs .

1.4 2-wire.

1.5 Loop, DTMF and 50 Hz pulses .

1.6 Both way.

1.7 .....

2.1.a PSTN .
2.1.b 44- 52 V
2.1.c 20- 100 mA
2.1.d .....

2.2.a Non-DDI.
2.2.b Ringing approx. 30 - 80 V; 17 Hz or 25 Hz; 0.4 s on, 0.2 s off, 0.4 s on, 2.0 s off.
2.2.c Not applicable.
2.2.d Not applicable .
2.2.e Loop at PBX.

2.2.f Loop.
2.2.g Low current loop (approx. . 2 mA) .
2.2.h Low current feed (<1 mA).

2.3.a Loop at PBX.
2.3.b 350 Hz + 440 Hz continuous.
2.3.c Loop disconnect or DTMF (similar to prETS 300 001).
2.3.d Not provided.
2.3.e Ring-back tone: 400 Hz+450 Hz; cadence as for 2.2.b.
Busy tone: 400 Hz; 0.375 s on, 0.375 s off.
2.3.f Battery reversal.
2.3.g Loop.
2.3.h 50 Hz longitudinal up to 40 V; 100 ms to 1 s duration (optional) .
2.3.i Low current feed (<1 mA).
2.3.j Low current loop (approx. 2 mA).

3.1 .....

Annex D: Follow up letter to administrations who had not nominated a contact

WPM/100/92/MB/pg **Sophia Antipolis, 18 February 1992**

TO: **HEADS OF DELEGATION OF NATIONAL ADMINISTRATIONS WHO HAVE NOT YET NOMINATED A CONTACT PERSON TO COLLABORATE WITH ETSI PT18V**

Dear Sir,
Dear Madam,

In his letter of 28 January 1992 (Ref: WPM/54/91/AB/hg) the Director invited you to nominate a contact person who will be available to collaborate with ETSI/PT18V on work approved by the Technical Assembly last September.

Unfortunately, I do not appear to have received a nomination from your country and this could hinder the progress of the work. Should you have provided one in the meanwhile, would you please disregard this letter.

I also enclose a copy of a questionnaire which the project team has prepared in the meanwhile in order to obtain relevant information. May I ask you, as a matter of urgency, to ensure that the questions are dealt with and the replies sent to ETSI in the shortest delay.

It is in the best interest of the ETSI Members that the conclusion of the work is based upon as wide a range of information as it is possible to obtain. The information about PSTN Accesses in your country is therefore an important contribution to our studies and I look forward to your co-operation in supplying the answers we need.

The countries having contributed to this survey will be mentioned in the report of the project team.

Yours faithfully,

M. E. Brenton
Leader ETSI/PT18V

Annex E: Contact persons

COUNTRY	CONTACT PERSON	QUESTIONNAIRE SENT OUT	QUESTIONNAIRE RECEIVED
AUSTRIA	Manfred Berger Austrian-PTT Postgasse 8 A-1011 Vienna Tel: +43 1 515 51 22 31 Fax: +43 1 512 99 48	19.02.1992	15.04.92
BELGIUM	Mr. Bouzin Bd. De l'Imperatrice 17-19 B-1000 Bruxelles Tel: +32 2 502 72 88 Fax: +32 2 921 02 65	16.03.1992	07.05.1992
CYPRUS	George Aristis Administration & Control Dept. Cyprus Communications Authority P.O. Box 4929 CY-Nicosia Tel: +357 23 10 497 Fax: +357 24 97 155	14.02.1992	31.03.1992
CZEKOSLOVAKIA	Mrs. Eva Ptackova Research Institute of PTT Standardization Dept. Hvozdanska 3 CS-14950 Praha 4 Tel: +42 2 76 71 89 Fax: +42 2 79 92 318	17.02.1992	30.4.1992
DENMARK	Poul Taekker National Telecom Agency Holsteinsgade 63 DK-2100 Copenhagen O Tel: +45 35 43 03 03 Fax: +45 35 43 14 34	14.02.1992	30.03.1992
FINLAND	Antero Saarinen Telecommunications Administration Centre-Inspection Dept. P.O. Box 53 SF-00211 Helsinki Tel: +358 0 69 66 867 Fax: +358 0 69 66 873	14.02.1992	30.03.1992
FRANCE	Yves Delaigue France Telecom/ CNET Dept. PAA/SRE/CRE 38 Rue du Gal Leclerc F-92131 Issy Les Moulineaux Tel: +33 161 45 29 59 64 Fax: +33 161 45 29 65 17	19.02.1992	07.04.1992
GERMANY	Heinz A. Paul FZT, F1 Postfach 10 00 03 D-6100 Darmstadt Tel: +49 61 51 83 23 00 Fax: +49 61 51 83 45 77	14.02.1992	30.03.1992

COUNTRY	CONTACT PERSON	QUESTIONNAIRE SENT OUT	QUESTIONNAIRE RECEIVED
GREECE	Mr. K. Riziotis Hellenic Telecom Organization 99 Kifissias Ave. GR-15124 Maroussi Athens Tel: +30 1 611 83 04 Fax: +30 1 805 50 55	19.02.1992 05.05.1992	22.06.1992
ICELAND		19.02.1992	
IRELAND	T.B. Newe Dept. of Tourism, Transport & Communication Scotch House Hawkins St. IR-Dublin 2 Tel: +353 1 71 82 11 Fax: +353 1 67 98 834	14.02.1992	14.04.1992
ITALY	Mr. Ferrazza-Manzi Instituto Superiore P.T. Viale Europa 190 I-00144 Roma Tel: +39 6 59 58 23 80 Fax: +39 6 54 10 904	19.02.1992	30.03.1992
LUXEMBOURG	Mr. Roland Reinesch Division des Telecommunications Service des Centraux L-2999 Luxembourg Tel: +352 49 91 696 Fax: +352 49 12 21	16.03.1992	06.04.1992
MALTA		19.02.1992	
NETHERLANDS	Mr. M. S. Nasrullah Ministry of Transport and Public Works P.O. Box 20901 NL-2500 EX The Hague Tel: +31 703 516 171 Fax: +31 703 516 505	16.03.1992 08.04.1992	15.07.1992
NORWAY	Mr. Kjell G. Haga Norwegian Telecommunications Regulatory Authority Parkveien 57 P.O. Box 2592, Solli N-0203 Oslo Tel: +47 2 92 66 74 Fax: +47 2 44 11 77	14.02.1992	25.03.92
POLAND		19.02.1992	
PORTUGAL	J. Ilharco De Moura Instituto das Comunicacoes de Portugal STDS & Approvals Direction Av. Jose Malhoa Lote 1683 P-1000 Lisboa Tel: +351 1 726 92 23 Fax: +351 1 726 22 82	19.02.1992	03.04.1992

COUNTRY	CONTACT PERSON	QUESTIONNAIRE SENT OUT	QUESTIONNAIRE RECEIVED
ROMANIA	Mr. Alexandru Anghel Institutul Roman de Standardizare 13, Jean Louis Calderon RO-70201 Bucharest 2 Tel: +400 11 40 43 Fax: +400 12 08 23	19.02.1992	Preliminary reply 15.07.1992
SPAIN	Mr. Salvador Soriano Direccion General de Telecommunicaciones Palacio de Communicaciones Pta Y 5e Pta Plaza de Cibeles s/n E-28014 Madrid Tel: +34 1 34 61 500 ext. 22 95 Fax: +34 1 34 61 567	25.02.1992	30.03.1992
SWEDEN	Mr. Bo-Lennart Berglund IB 10:35 Swedish Telecom Networks S-12386 Farsta Tel: +46 8 713 38 20 Fax: +46 8 94 91 88	17.02.1992	31.03.1992
SWITZERLAND	Mr. H.U. Gerber GDPTT, VTI TZV CH-3000 Bern 29 Tel: +41 31 62 52 74 Fax: +41 31 62 57 47	19.02.1992	27.4.1992
TURKEY	Dr. Halil T. Eyyuboglu PTT AR-GE Mudurlugu Dikmen Santral Binasi TR-06450 Ankara Tel: +90 4 36 63 700 01 Fax: +90 4 36 63 705	19.02.1992	22.04.1992
UNITED KINGDOM	Michael E. Brenton Department of Trade and Industry TP Division "Bull's Barn" Ashfield Stowmarket IP 14 6LX U. K. Tel: +44 728 685 637 Fax: +44 728 685 595	19.02.1992	30.03.1992

Annex F: Follow up letter to administrations who had not replied to the questionnaire

FAX MESSAGE

TO :

FROM : M.E. BRENTON /PT 18V

DATE : 26 June 1992

Dear Sir

ANALOGUE INTERFACES TO THE PSTN NOT COVERED BY pr ETS 300 001

On 14 February 1992 I invited you to arrange for the supply of certain information to ETSI according to guidelines in an enclosed questionnaire under the above title.

This enquiry followed the letter of explanation and request for co-operation sent by the Director of ETSI on 28 January to all Heads of Delegation of National Administrations.

No reply has been received in ETSI from you and I should be grateful if you would kindly let me know whether I can expect the relevant information from your country or whether I should allow the work to proceed without your input.

The information is required to assist in the preparation of a report to the Commission of the European Communities and the EFTA Secretariat on the feasibility of taking appropriate steps towards opening the market in Europe for terminal apparatus designed for attachment to the public switched telephone network by means of accesses not covered by pr ETS 300 001 (NET 4). The report is scheduled for mid-July this year and in order to achieve this objective all information should be in my hands as soon as possible and by the end of June at the latest.

I look forward to receiving your advice.

Yours faithfully

M E Brenton

Leader

ETSI Project Team 18V

Annex G: Additional questions to the administrations

European Telecommunications Standards Institute **PT 18V (92) 017**
ETSI **1 June 1992**

SOURCE : PT 18V
TITLE : QUESTIONNAIRE CONCERNING PBX ATTACHMENT TO THE PSTN

Please answer the following questions and send the replies to ETSI as soon as possible and not later than 19 June.

1. Concerning the procedure that an applicant for approval to attach a PBX to the PSTN shall follow, please answer the following questions by yes or no and comment if elaboration is required:

   a. Shall the applicant apply to approvals authority for copy of type approval requirements and test specifications?

   b. Shall the applicant apply for type approval test in authorised laboratory?

   c. Shall the applicant when delivering an apparatus for test also
   - deliver all necessary supporting information? And if yes
   - what information is required?

   d. Shall the applicant interact with the test laboratory in case of problems?

   e. After a successful approval test, does the applicant obtain a written authority to attach the type of PBX to the PSTN?

   f. Shall the applicant apply to the network operator for provision of service?

   g. Shall the applicant satisfy the network operators requirements for connection of PBX to the PSTN with respect to
   - transmission aspects
   - wiring rules/ code of practice
   - traffic handling requirements
   - other aspects?

   h. If yes to g, how is this achieved?

   2. Are the standards and technical specifications applying to the attachment of PBX's to the PSTN free available to the public, and how and where does an ordinary member of the public obtain a copy of the relevant documents?

   3. An essential part of PT18V's work is to assess the feasibility of producing a document similar to prETS 300 001 covering analogue attachments not covered by prETS 300 001, especially interfaces used by PBX's. If it is decided to produce such a document it will require assistance from the telecommunication administrations and national standards bodies. Please give the name, address, telephone & fax no. of one or preferably several experts who can assist ETSI in producing such a document.

   4. For each interface you have described in the reply to the first questionnaire please specify the main variations from a prETS 300 001 interface. What additional testing is required for a PBX compared to a prETS 300 001 terminal ?

All interfaces (1 of 4)

General			DC-conditions			Signalling for incoming calls to a PBX						Signalling for outgoing calls from a PBX								Number of lines				Approvals	
In-terface	No. of wire	In/ out/ both	Origin	Voltage (V)	Current (mA	Call ind. sig.	DDI adr. inf.	Answer sig.	On-line stat.	Clr. from pbx	Clr. from pstn	Seize sig.	Dial tone	Dialling sig.	Answer sig.	On-line stat.	Chg. sig.	Clr. from pstn	Clr. from pbx	Inst. last year	In opr. now	In 5 year	In 10 year	Last 2 year	Next 2 year
	1.4.	1.6	2.1a	2.1b	2.1c	2.2b	2.2c	2.2e	2.2f	2.2g	2.2h	2.3a	2.3b	2.3c	2.3f	2.3g	2.3h	2.3i	2.3j	3.2a	3.2b	3.2c	3.2d	4.4	4.5
A1. Sys. W48	2	Both way	Pstn	56-64	19-60	60V 50 Hz	Neg. puls. on b-w.	N.A.	Loop	Loop disc.	Loop disc. puls.	Loop con. at pbx	400-500 Hz cont	De-ca-dic	N.A.	Loop	12 kHz pul-ses	Loop dis-con. puls.	Loop dis-connect	A1& A2: 10k	190 k	60k	0	A1& A2: 38	A1& A2: >38
A2. Sys. OES /UFS	2	Both way	Pbx	50-64	19-60	12 kHz	Disc of 12 kHz	Loop puls. at pbx	Loop	Loop disc.	Loop disc. puls.	Loop con. at pbx	400-500 Hz cont	De-cad. /DT MF	N.A.	Loop	12 kHz pul-ses	Loop dis-con. puls.	Loop dis-connect	A1& A2: 10k	50k	240 k	390 k	A1& A2: 38	A1& A2: >38
B1. L.cll. G.clr line	2	Both way	Pstn	44,5 -53	20-90	Loop con. at pstn	Non DDI	Loop con. at pbx	Loop	Low cur-rent loop	Cur-rent drop	Loop con. at pbx	425/ 450 Hz cont	De-cad. /DT MF	N.A.	Loop	16 kHz pul-ses	N.A.	Loop dis-connect	?	B1& B2: 285 k	?	?	80	80
B2. DDI exch line	2	In	Pstn	44,5 -53	2,5-100	Bat-tery re-vers	MFC -R2	Loop con. at pbx	Loop	Low cur-rent loop	Bat-tery re-stor.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	?	B1& B2: 285 k	?	?	40	40
CH. DDI exch line	2	In	Pstn / pbx	43-66/ 43-57	<60 / <10	Loop con. at pstn	De-cad/ MFC -R2	Loop con. at pbx	Loop	Low cur-rent loop	Loop dis-con-nect	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	50k	de-cre-ases	de-cre-ases	5	Apr. 7
CS1 Sig. sys. U	2	Both way	Pstn	48/ 60	18-68	50-90V 25/ 50H	Non DDI	Loop con. at pbx	Loop	Low cur-rent loop	N.A.	Loop con. at pbx	425 HZ con-tin.	De-cad. /DT MF	N.A.	Loop	16 kHz pul-ses	N.A.	Low cur-rent loop	?	Apr. 130 k	? in-cre-ases	? in-cre-ases	Apr. 90	Apr. 90
CS2 Sig. sys. P	3	In	Pstn & pbx	54-66/ 58-64	10-90	Eth. on c-wire	Eth. on a-w/ MFC	Neg. b-wire	Neg. b-wire	N.A.	Dis-con. c-wire	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	?	Apr. 10k	? in-cre-ases	? in-cre-ases	Apr. 10	Apr. 5
CY. DDI exch line	2	In	Pstn	44-52	20-100	Loop con. at pstn	MFC -R1	Loop con. at pbx	Loop & Bat. rev.	Low cur-rent loop	Loop disc. Bat. rest.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	35	173	470	550	0	3

All interfaces (2 of 4)

General			DC-conditions			Signalling for incoming calls to a PBX						Signalling for outgoing calls from a PBX								Number of lines				Approvals	
In-terface	No. of wire	In/ out/ both	Origin	Voltage (V)	Current (mA	Call ind. sig.	DDI adr. inf.	Answer sig.	On-line stat.	Clr. from pbx	Clr. from pstn	Seize sig.	Dial tone	Dialling sig.	Answer sig.	On-line stat.	Chg. sig.	Clr. from pstn	Clr. from pbx	Inst. last year	In opr. now	In 5 year	In 10 year	Last 2 year	Next 2 year
	1.4.	1.6	2.1a	2.1b	2.1c	2.2b	2.2c	2.2e	2.2f	2.2g	2.2h	2.3a	2.3b	2.3c	2.3f	2.3g	2.3h	2.3i	2.3j	3.2a	3.2b	3.2c	3.2d	4.4	4.5
D1. DDI exch line	2	Both way	Pstn / pbx	60/ 48 or 60	20-70/ 20-70	Neg. puls. on b-w.	Eth. puls. on a-w.	Bat. rev./ neg. b-w.	Neg. b-wire	Puls. on a&b wire	AC-puls.	Neg. puls. on a-w.	425/ 450 Hz cont	De-cadic	Disc ring back tone	Loop	16 kHz pul-ses	N.A.	Loop dis-con-nect	Not yet av.	Apr. 2,3 M	? de-creases	? de-creases	Not yet av.	Not yet av.
D2. Em. call line	2	In	Pstn	60	20-70	50 Hz	N.A.	Loop con. at pbx	Loop	Loop disc.	Clr. sig.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	?	6k	De-creases	De-creases	Not yet av.	Not yet av.
F1. MF soc-otel	2	In	Pbx	43-53	15-50	Loop con. at pstn	Nat. MFC (R2)	Bat-tery re-vers	Loop & Bat. rev.	Bat-tery re-stor.	Loop dis-con-nect	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0	500 k	0	0	Apr. 100	?
F4. Typ. Coli-see	2	In	N.A.	N.A.	N.A.	Low freq. puls.	MF PB (Q. 23)	Low freq. puls.	No sig-nal	Low freq. puls	Low freq. puls	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	175 k	600 k	690 k	De-creases	50	?
F5. Typ. Coli-see	4 (2 for sig.)	In	Pbx & pstn	43-53	<50	Eth. puls. on E&M wire	MF PB (Q. 23)	Eth. puls. on E&M wire	No sig-nal	Eth. puls. on E&M wire	Eth. puls. on E&M wire	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	5 k	10 k	Apr. 10 k	De-creases	50	?
GB1 E.cll. G.clr line	2	Both way	Pstn	40-57/ 0-70	0-125/ 40	63-100 25 Hz	Non DDI	Loop con. at pbx	Loop	Loop dis-con-nect	Low cur-rent loop	Eth. on b-wire	350, 440 Hz cont	De-cad. /DT MF	Bat-tery re-vers	Loop	N.A.	Low cur-rent loop	Loop dis-con-nect	?	GB 1-3: apr. 5M	Incr. apr. 1% p.y	Incr. apr. 1% p.y	GB 1-3: 17	GB 1-3: 20
GB2 L.cll. D.clr line	2	Both way	Pstn	40-57/ 0-70	0-125/ 40	63-100 25 Hz	Non DDI	Loop con. at pbx	Loop	Loop dis-con-nect	Loop dis-con-nect	Loop con. at pbx	350, 440 Hz cont	De-cad. /DT MF	Bat-tery re-vers	Loop	N.A.	Loop dis-con-nect	Low cur-rent loop	?	GB 1-3: apr. 5M	De-creases	De-creases	GB 1-3: 17	GB 1-3: 20
GB3 L.cll. G.clr line	2	Both way	Pstn	40-57/ 0-70	0-125/ 40	63-100 25 Hz	Non DDI	Loop con. at pbx	Loop	Low cur-rent loop	Low cur-rent loop	Loop con. at pbx	350, 440 Hz cont	De-cad. /DT MF	Bat-tery re-vers	Loop	N.A.	Low cur-rent loop	Low cur-rent loop	?	GB 1-3: apr. 5M	Incr. apr. 1% p.y	Incr. apr. 1% p.y.	GB 1-3: 17	GB 1-3: 20

All interfaces (3 of 4)

General			DC-conditions			Signalling for incoming calls to a PBX						Signalling for outgoing calls from a PBX								Number of lines				Approvals	
In-terface	No. of wire	In/ out/ both	Origin	Voltage (V)	Current (mA	Call ind. sig.	DDI adr. inf.	Answer sig.	On-line stat.	Clr. from pbx	Clr. from pstn	Seize sig.	Dial tone	Dialling sig.	Answer sig.	On-line stat.	Chg. sig.	Clr. from pstn	Clr. from pbx	Inst. last year	In opr. now	In 5 year	In 10 year	Last 2 year	Next 2 year
	1.4.	1.6	2.1a	2.1b	2.1c	2.2b	2.2c	2.2e	2.2f	2.2g	2.2h	2.3a	2.3b	2.3c	2.3f	2.3g	2.3h	2.3i	2.3j	3.2a	3.2b	3.2c	3.2d	4.4	4.5
GB4 DDI exch line	2	In	Pbx	46-57	16-100	Loop con. at pstn	De-cad. /DT MF	Bat-tery re-vers	Loop & bat. rev.	Loop disc. bat. rest.	Low cur-rent loop	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	?	Apr. 1 M	Incr. apr. 1% p.y.	Incr. apr. 1% p.y.	12	15
GR. DDI exch line	2	Both way	Pstn	48/ 60	20-80	Neg. puls. on b-w.	Eth. puls. on a-w.	Bat. rev./ neg. b-w.	Neg. b-wire	Puls. on a&b wire	AC-puls.	Neg. puls. on a-w.	400/ 475 Hz cont	De-ca-dic	N.A.	Loop	16 kHz pul-ses	N.A.	Loop dis-con-nect	6 k	350 k	500 k	1 M	45	Apr. 45
I1. L.cll. G.clr line	2	Both way	Pstn	44-52	18-80	40-80V 25 Hz	Non DDI	Loop con. at pbx	Loop	Low cur-rent loop	Low cur-rent loop	Loop con. at PBX	410-440 Hz disc.	De-cad. /DT MF	N.A.	Loop	N.A.	Low cur-rent loop	Low cur-rent loop	?	2 M	?	?	I1-2: 100, 25 new	I1-2: 100, 25 new
I2. DDI exch line	2	In	Pstn	44-52	0-40	Loop at pstn Bat. rev.	De-ca-dic	Loop con. at pbx	Loop & bat. rev.	Low cur-rent loop	Low cur-rent loop	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	?	0,9 M	?	?	I1-2: 100, 25 new	I1-2: 100, 25 new
L1. L.cll. U.clr line	2	Both way	Pstn	58-66	14-60	55-75V 25 Hz	Non DDI	Loop con. at pbx	Loop	Loop dis-con-nect	N.A.	Loop con. at pbx	425/ 450 Hz cont	De-cad. /DT MF	N.A.	Loop	50 Hz/ 16 kHz	N.A.	Loop dis-con-nect	?	15,7 k	Im-por-tant	?	23	25
L2. DDI exch line	2	Both way	Pstn /pbx	58-66	14-60	Cur. var. on b-w.	De-ca-dic	Cur. on b-w.	Cur. on a&b wire	Dis-con-nect a-w.	50 Hz disc. sig.	Cur. var. on a-w.	425/ 450 Hz cont	De-ca-dic	N.A.	Loop	50 Hz/ 16 kHz	N.A.	Loop dis-con-nect	?	4,4 k	De-cre-ases	De-cre-ases	6	5
N1. Int.-face K41	6 (2 for sig.)	In	N.A.	N.A.	N.A.	Sig. on E&M wire	Nat. MFC -R2	Sig. on E&M wire	Idle E&M wire	Sig. on E&M wire	Sig. on E&M wire	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	?	12,5 -16k	De-cre-ase 30%	De-cre-ase 90%	2	1-2
N2. Int.-face K42	8 (4 for sig.)	In	N.A.	N.A.	N.A.	Dig. R2 line sig.	Nat. MFC -R2	Dig. R2 line sig.	Idle E&M wire	Dig. R2 line sig.	Dig. R2 line sig.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	?	2-3k	De-cre-ase 30%	De-cre-ase 90%	0	0

All interfaces (4 of 4)

General			DC-conditions			Signalling for incoming calls to a PBX						Signalling for outgoing calls from a PBX								Number of lines				Approvals	
Interface	No. of wire	In/ out/ both	Origin	Voltage (V)	Current (mA	Call ind. sig.	DDI adr. inf.	Answer sig.	On-line stat.	Clr. from pbx	Clr. from pstn	Seize sig.	Dial tone	Dialling sig.	Answer sig.	On-line stat.	Chg. sig.	Clr. from pstn	Clr. from pbx	Inst. last year	In opr. now	In 5 year	In 10 year	Last 2 year	Next 2 year
	1.4.	1.6	2.1a	2.1b	2.1c	2.2b	2.2c	2.2e	2.2f	2.2g	2.2h	2.3a	2.3b	2.3c	2.3f	2.3g	2.3h	2.3i	2.3j	3.2a	3.2b	3.2c	3.2d	4.4	4.5
NL1. L.cll. G.clr line	2	Both way	Pstn	43-53	16-80	Bat. rev. Ring cur.	Non DDI	Loop con. at pbx	Loop	Low current loop	Battery restor.	Loop con. at pbx	150/ 450 Hz cont	Decad. /DTMF	N.A.	Loop	48-52 Hz	Battery revers	Low current loop	?	NL1-2: 3-500 k	NL1-2: 3-500 k	NL1-2: 3-500 k	NL1-2: 98	NL1-2: 120
NL2. DDI exch line	2	Both way	Pstn	43-53	16-80	Battery revers	Decad. /DTMF	Loop con. at pbx	Loop	Low current loop		Loop con. at pbx	150/ 450 Hz cont	Decad. /DTMF	N.A.	Loop	48-52 Hz	Battery revers	Low current loop	?	NL1-2: 3-500 k	NL1-2: 3-500 k	NL1-2: 3-500 k	NL1-2: 98	NL1-2: 120
S1. L.cll. G.clr line	2	Both way	Pstn	48/ 36	10-30/ 10-36	80V 25 Hz	Non DDI	Loop con. at pbx	Loop	Low current loop	Bat. revers puls.	Loop con. at pbx	425 Hz contin.	Decad. /DTMF	Bat. rev.	Loop	12 kHz puls.	Bat. rev.	Low current loop	8,5k	85k	70k	40k	11	<11
S2. DDI exch line	2	In	Pstn	48/ 36	10-30/ 10-36	Loop con. at pstn	Decad. /DTMF	Loop con. at pbx	Loop & bat. rev.	Low current loop	Loop disc. bat. rest.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	1,5k	15k	12k	7,5k	5	< 5
TR. L.cll. U.clr line	2	Both way	Pstn	44-52	20-100	75V 25 Hz	Non DDI	Loop con. at pbx	Loop	Low current loop	Low current loop	Loop con. at pbx	450 Hz contin.	Decad. /DTMF	N.A.	Loop	12 kHz pulses	Low current loop	Low current loop	35k	65k	200 k	400 k	Apr. 5	>5

Table 1 Category 1: PBX, non DDI, 2-wire, both way, interfaces (1 of 2)

General			DC-conditions			Signalling for incoming calls to a PBX						Signalling for outgoing calls from a PBX								Number of lines				Approvals	
In-ter-face	No. of wire	In/ out/ both	Ori-gin	Vol-tage (V)	Cur-rent (mA	Call ind. sig.	DDI adr. inf.	Ans-wer sig.	On-line stat.	Clr. from pbx	Clr. from pstn	Sei-ze sig.	Dial tone	Dial-ling sig.	Ans-wer sig.	On-line stat.	Chg. sig.	Clr. from pstn	Clr. from pbx	Inst. last year	In opr. now	In 5 year	In 10 year	Last 2 year	Next 2 year
	1.4.	1.6	2.1a	2.1b	2.1c	2.2b	2.2c	2.2e	2.2f	2.2g	2.2h	2.3a	2.3b	2.3c	2.3f	2.3g	2.3h	2.3i	2.3j	3.2a	3.2b	3.2c	3.2d	4.4	4.5
B1. L.cll. G.clr line	2	Both way	Pstn	44,5 -53	20-90	Loop con. at pstn	Non DDI	Loop con. at pbx	Loop	Low cur-rent loop	Cur-rent drop	Loop con. at pbx	425/ 450 Hz cont	De-cad. /DT MF	N.A.	Loop	16 kHz pul-ses	N.A.	Loop dis-con-nect	?	?	?	?	80	80
CS1 Sig. sys. U	2	Both way	Pstn	48/ 60	18-68	50-90V 25/ 50H	Non DDI	Loop con. at pbx	Loop	Low cur-rent loop	N.A.	Loop con. at pbx	425 HZ con-tin.	De-cad. /DT MF	N.A.	Loop	16 kHz pul-ses	N.A.	Low cur-rent loop	?	Apr. 130 k	? in-cre-ases	? in-cre-ases	Apr. 90	Apr. 90
GB1 E.cll. G.clr line	2	Both way	Pstn	40-57/ 0-70	0-125/ 40	63-100 25 Hz	Non DDI	Loop con. at pbx	Loop	Loop dis-con-nect	Low cur-rent loop	Eth. on b-wire	350, 440 Hz cont	De-cad. /DT MF	Bat-tery re-vers	Loop	N.A.	Low cur-rent loop	Loop dis-con-nect	?	GB 1-3: apr. 5M	Incr. apr. 1% p.y	Incr. apr. 1% p.y	GB 1-3: 17	GB 1-3: 20
GB2 L.cll. D.clr line	2	Both way	Pstn	40-57/ 0-70	0-125/ 40	63-100 25 Hz	Non DDI	Loop con. at pbx	Loop	Loop dis-con-nect	Loop dis-con-nect	Loop con. at pbx	350, 440 Hz cont	De-cad. /DT MF	Bat-tery re-vers	Loop	N.A.	Loop dis-con-nect	Low cur-rent loop	?	GB 1-3: apr. 5M	De-cre-ases	De-cre-ases	GB 1-3: 17	GB 1-3: 20
GB3 L.cll. G.clr line	2	Both way	Pstn	40-57/ 0-70	0-125/ 40	63-100 25 Hz	Non DDI	Loop con. at pbx	Loop	Low cur-rent loop	Low cur-rent loop	Loop con. at pbx	350, 440 Hz cont	De-cad. /DT MF	Bat-tery re-vers	Loop	N.A.	Low cur-rent loop	Low cur-rent loop	?	GB 1-3: apr. 5M	Incr. apr. 1% p.y	Incr. apr. 1% p.y.	GB 1-3: 17	GB 1-3: 20
I1. L.cll. G.clr line	2	Both way	Pstn	44-52	18-80	40-80V 25 Hz	Non DDI	Loop con. at pbx	Loop	Low cur-rent loop	Low cur-rent loop	Loop con. at PBX	410-440 Hz disc.	De-cad. /DT MF	N.A.	Loop	N.A.	?	?	?	2 M	?	?	I1-2: 100, 25 new	I1-2: 100, 25 new
L1. L.cll. U.clr line	2	Both way	Pstn	58-66	14-60	55-75V 25 Hz	Non DDI	Loop con. at pbx	Loop	Loop dis-con-nect	N.A.	Loop con. at pbx	425/ 450 Hz cont	De-cad. /DT MF	N.A.	Loop	50 Hz/ 16 kHz	N.A.	Loop dis-con-nect	?	15,7 k	Im-por-tant	?	23	25
NL1. L.cll. G.clr line	2	Both way	Pstn	43-53	16-80	Bat. rev. Ring cur.	Non DDI	Loop con. at pbx	Loop	Low cur-rent loop	Bat-tery re-stor.	Loop con. at pbx	150/ 450 Hz cont	De-cad. /DT MF	N.A.	Loop	48-52 Hz	Bat-tery re-vers	Low cur-rent loop	?	NL1-2: 3-500 k	NL1-2: 3-500 k	NL1-2: 3-500 k	NL1-2: 98	NL1-2: 120

Table 1 Category 1: PBX, non DDI, 2-wire, both way, interfaces (2 of 2)

General			DC-conditions			Signalling for incoming calls to a PBX						Signalling for outgoing calls from a PBX								Number of lines				Approvals	
Inter-face	No. of wire	In/ out/ both	Ori-gin	Vol-tage (V)	Cur-rent (mA	Call ind. sig.	DDI adr. inf.	Ans-wer sig.	On-line stat.	Clr. from pbx	Clr. from pstn	Sei-ze sig.	Dial tone	Dial-ling sig.	Ans-wer sig.	On-line stat.	Chg. sig.	Clr. from pstn	Clr. from pbx	Inst. last year	In opr. now	In 5 year	In 10 year	Last 2 year	Next 2 year
	1.4.	1.6	2.1a	2.1b	2.1c	2.2b	2.2c	2.2e	2.2f	2.2g	2.2h	2.3a	2.3b	2.3c	2.3f	2.3g	2.3h	2.3i	2.3j	3.2a	3.2b	3.2c	3.2d	4.4	4.5
S1. L.cll. G.clr line	2	Both way	Pstn	48/ 36	10-30/ 10-36	80V 25 Hz	Non DDI	Loop con. at pbx	Loop	Low cur-rent loop	Bat. re-vers puls.	Loop con. at pbx	425 Hz con-tin.	De-cad. /DT MF	Bat. rev.	Loop	12 kHz puls.	Bat. rev.	Low cur-rent loop	8,5k	85k	70k	40k	11	<11
TR. L.cll. U.clr line	2	Both way	Pstn	44-52	20-100	75V 25 Hz	Non DDI	Loop con. at pbx	Loop	Low cur-rent loop	Low cur-rent loop	Loop con. at pbx	450 Hz con-tin.	De-cad. /DT MF	N.A.	Loop	12 kHz pul-ses	Low cur-rent loop	Low cur-rent loop	35k	65k	200 k	400 k	Apr. 5	>5

Table 2 Category 2: PBX, DDI, 2-wire, PSTN to PBX, loop calling, interfaces

General			DC-conditions			Signalling for incoming calls to a PBX						Signalling for outgoing calls from a PBX								Number of lines				Approvals	
In-terface	No. of wire	In/ out/ both	Origin	Voltage (V)	Current (mA	Call ind. sig.	DDI adr. inf.	Answer sig.	On-line stat.	Clr. from pbx	Clr. from pstn	Seize sig.	Dial tone	Dialling sig.	Answer sig.	On-line stat.	Chg. sig.	Clr. from pstn	Clr. from pbx	Inst. last year	In opr. now	In 5 year	In 10 year	Last 2 year	Next 2 year
	1.4.	1.6	2.1a	2.1b	2.1c	2.2b	2.2c	2.2e	2.2f	2.2g	2.2h	2.3a	2.3b	2.3c	2.3f	2.3g	2.3h	2.3i	2.3j	3.2a	3.2b	3.2c	3.2d	4.4	4.5
B2. DDI exch line	2	In	Pstn	44,5 -53	2,5-100	Bat-tery re-vers	MFC -R2	Loop con. at pbx	Loop	Low cur-rent loop	Bat-tery re-stor.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	?	?	?	?	40	40
CH. DDI exch line	2	In	Pstn / pbx	43-66/ 43-57	<60 / <10	Loop con. at pstn	De-cad/ MFC -R2	Loop con. at pbx	Loop	Low cur-rent loop	Loop dis-con-nect	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	?	50k	? de-cre-ases	? de-cre-ases	5	Apr. 7
CY. DDI exch line	2	In	Pstn	44-52	20-100	Loop con. at pstn	MFC -R1	Loop con. at pbx	Loop & Bat. rev.	Low cur-rent loop	Loop disc. Bat. rest.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	35	173	470	550	0	3
F1. MF soc-otel	2	In	Pbx	43-53	15-50	Loop con. at pstn	Nat. MFC (R2)	Bat-tery re-vers	Loop & Bat. rev.	Bat-tery re-stor.	Loop dis-con-nect	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0	500 k	0	0	Apr. 100	?
GB4 DDI exch line	2	In	Pbx	46-57	16-100	Loop con. at pstn	De-cad. /DT MF	Bat-tery re-vers	Loop & bat. rev.	Loop disc. bat. rest.	Low cur-rent loop	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	?	Apr. 1 M	Incr. apr. 1% p.y.	Incr. apr. 1% p.y.	12	15
I2. DDI exch line	2	In	Pstn	44-52	0-40	Loop at pstn Bat. rev.	De-ca-dic	Loop con. at pbx	Loop & bat. rev.	Low cur-rent loop	Low cur-rent loop	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	?	0,9 M	?	?	I1-2: 100, 25 new	I1-2: 100, 25 new
S2. DDI exch line	2	In	Pstn	48/ 36	10-30/ 10-36	Loop con. at pstn	De-cad. /DT MF	Loop con. at pbx	Loop & bat. rev.	Low cur-rent loop	Loop disc. bat. rest.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	1,5k	15k	12k	7,5k	5	< 5

Table 3 Category 3: PBX, DDI, E&M signalling, interfaces

General			DC-conditions			Signalling for incoming calls to a PBX						Signalling for outgoing calls from a PBX								Number of lines				Approvals	
In-terface	No. of wire	In/ out/ both	Origin	Voltage (V)	Current (mA	Call ind. sig.	DDI adr. inf.	Answer sig.	On-line stat.	Clr. from pbx	Clr. from pstn	Seize sig.	Dial tone	Dialling sig.	Answer sig.	On-line stat.	Chg. sig.	Clr. from pstn	Clr. from pbx	Inst. last year	In opr. now	In 5 year	In 10 year	Last 2 year	Next 2 year
	1.4.	1.6	2.1a	2.1b	2.1c	2.2b	2.2c	2.2e	2.2f	2.2g	2.2h	2.3a	2.3b	2.3c	2.3f	2.3g	2.3h	2.3i	2.3j	3.2a	3.2b	3.2c	3.2d	4.4	4.5
F5. Typ. Coli-see	4 (2 for sig.)	In	Pbx & pstn	43-53	<50	Eth. puls. on E&M wire	MF PB (Q. 23)	Eth. puls. on E&M wire	No sig-nal	Eth. puls. on E&M wire	Eth. puls. on E&M wire	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	5 k	10 k	Apr. 10 k	De-cre-ases	50	?
N1. Int.-face K41	6 (2 for sig.)	In	N.A.	N.A.	N.A.	Sig. on E&M wire	Nat. MFC -R2	Sig. on E&M wire	Idle E&M wire	Sig. on E&M wire	Sig. on E&M wire	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	?	12,5 -16k	De-cre-ase 30%	De-cre-ase 90%	2	1-2
N2. Int.-face K42	8 (4 for sig.)	In	N.A.	N.A.	N.A.	Dig. R2 line sig.	Nat. MFC -R2	Dig. R2 line sig.	Idle E&M wire	Dig. R2 line sig.	Dig. R2 line sig.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	?	2-3k	De-cre-ase 30%	De-cre-ase 90%	0	0

Table 4 Category 4: PBX, DDI, 2-wire, both way, non loop calling, interfaces

General			DC-conditions			Signalling for incoming calls to a PBX						Signalling for outgoing calls from a PBX								Number of lines				Approvals	
Interface	No. of wire	In/ out/ both	Origin	Voltage (V)	Current (mA	Call ind. sig.	DDI adr. inf.	Answer sig.	On-line stat.	Clr. from pbx	Clr. from pstn	Seize sig.	Dial tone	Dialling sig.	Answer sig.	On-line stat.	Chg. sig.	Clr. from pstn	Clr. from pbx	Inst. last year	In opr. now	In 5 year	In 10 year	Last 2 year	Next 2 year
	1.4.	1.6	2.1a	2.1b	2.1c	2.2b	2.2c	2.2e	2.2f	2.2g	2.2h	2.3a	2.3b	2.3c	2.3f	2.3g	2.3h	2.3i	2.3j	3.2a	3.2b	3.2c	3.2d	4.4	4.5
A1. Sys. W48	2	Both way	Pstn	56-64	19-60	60V 50 Hz	Neg. puls. on b-w.	N.A.	Loop	Loop disc.	Loop disc. puls.	Loop con. at pbx	400-500 Hz cont	De-ca-dic	N.A.	Loop	12 kHz pul-ses	Loop dis-con. puls.	Loop dis-con-nect	A1& A2: 10k	190 k	60k	0	A1& A2: 38	A1& A2: >38
A2. Sys. OES /UFS	2	Both way	Pbx	50-64	19-60	12 kHz	Disc of 12 kHz	Loop puls. at pbx	Loop	Loop disc.	Loop disc. puls.	Loop con. at pbx	400-500 Hz cont	De-cad. /DT MF	N.A.	Loop	12 kHz pul-ses	Loop dis-con. puls.	Loop dis-con-nect	A1& A2: 10k	50k	240 k	390 k	A1& A2: 38	A1& A2: >38
D1. DDI exch line	2	Both way	Pstn / pbx	60/ 48 or 60	20-70/ 20-70	Neg. puls. on b-w.	Eth. puls. on a-w.	Bat. rev./ neg. b-w.	Neg. b-wire	Puls. on a&b wire	AC-puls.	Neg. puls. on a-w.	425/ 450 Hz cont	De-ca-dic	Disc ring back tone	Loop	16 kHz pul-ses	N.A.	Loop dis-con-nect	Not yet av.	Apr. 2,3 M	? de-cre-ases	? de-cre-ases	Not yet av.	Not yet av.
GR. DDI exch line	2	Both way	Pstn	48/ 60	20-80	Neg. puls. on b-w.	Eth. puls. on a-w.	Bat. rev./ neg. b-w.	Neg. b-wire	Puls. on a&b wire	AC-puls.	Neg. puls. on a-w.	400/ 475 Hz cont	De-ca-dic	N.A.	Loop	16 kHz pul-ses	N.A.	Loop dis-con-nect	6 k	350 k	500 k	1 M	45	Apr. 45
L2. DDI exch line	2	Both way	Pstn /pbx	58-66	14-60	Cur. var. on b-w.	De-ca-dic	Cur. on b-w.	Cur. on a&b wire	Dis-con-nect a-w.	50 Hz disc. sig.	Cur. var. on a-w.	425/ 450 Hz cont	De-ca-dic	N.A.	Loop	50 Hz/ 16 kHz	N.A.	Loop dis-con-nect	?	4,4 k	De-cre-ases	De-cre-ases	6	5
NL2. DDI exch line	2	Both way	Pstn	43-53	16-80	Bat-tery re-vers	De-cad. /DT MF	Loop con. at pbx	Loop	Low cur-rent loop		Loop con. at pbx	150/ 450 Hz cont	De-cad. /DT MF	N.A.	Loop	48-52 Hz	Bat-tery re-vers	Low cur-rent loop	?	NL1-2: 3-500 k	NL1-2: 3-500 k	NL1-2: 3-500 k	NL1-2: 98	NL1-2: 120

Table 5 Category 5: PBX, DDI, 2/3 wire, PSTN to PBX, non loop calling, interfaces

General			DC-conditions			Signalling for incoming calls to a PBX						Signalling for outgoing calls from a PBX								Number of lines				Approvals	
Interface	No. of wire	In/ out/ both	Origin	Voltage (V)	Current (mA	Call ind. sig.	DDI adr. inf.	Answer sig.	On-line stat.	Clr. from pbx	Clr. from pstn	Seize sig.	Dial tone	Dialling sig.	Answer sig.	On-line stat.	Chg. sig.	Clr. from pstn	Clr. from pbx	Inst. last year	In opr. now	In 5 year	In 10 year	Last 2 year	Next 2 year
	1.4.	1.6	2.1a	2.1b	2.1c	2.2b	2.2c	2.2e	2.2f	2.2g	2.2h	2.3a	2.3b	2.3c	2.3f	2.3g	2.3h	2.3i	2.3j	3.2a	3.2b	3.2c	3.2d	4.4	4.5
CS2 Sig. sys. P	3	In	Pstn & pbx	54-66/ 58-64	10-90	Eth. on c-wire	Eth. on a-w/ MFC	Neg. b-wire	Neg. b-wire	N.A.	Dis-con. c-wire	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	?	Apr. 10k	? in-cre-ases	? in-cre-ases	Apr. 10	Apr. 5
F4. Typ. Coli-see	2	In	N.A.	N.A.	N.A.	Low freq. puls.	MF PB (Q. 23)	Low freq. puls.	No sig-nal	Low freq. puls	Low freq. puls	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	175 k	600 k	690 k	De-cre-ases	50	?

Table 6 Category 6: Non PBX interfaces

General			DC-conditions			Signalling for incoming calls to a PBX						Signalling for outgoing calls from a PBX								Number of lines				Approvals	
Interface	No. of wire	In/ out/ both	Origin	Voltage (V)	Current (mA	Call ind. sig.	DDI adr. inf.	Answer sig.	On-line stat.	Clr. from pbx	Clr. from pstn	Seize sig.	Dial tone	Dialling sig.	Answer sig.	On-line stat.	Chg. sig.	Clr. from pstn	Clr. from pbx	Inst. last year	In opr. now	In 5 year	In 10 year	Last 2 year	Next 2 year
	1.4.	1.6	2.1a	2.1b	2.1c	2.2b	2.2c	2.2e	2.2f	2.2g	2.2h	2.3a	2.3b	2.3c	2.3f	2.3g	2.3h	2.3i	2.3j	3.2a	3.2b	3.2c	3.2d	4.4	4.5
D2. Em. call line	2	In	Pstn	60	20-70	50 Hz	N.A.	Loop con. at pbx	Loop	Loop disc.	Clr. sig.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	?	6k	De-cre-ases	De-cre-ases	Not yet av.	Not yet av.

Annex J: National attachment requirements for PBX

This analysis indicates the full process for attachment approval in each country. In most cases a laboratory test is the first step towards gaining permission to attach apparatus to the PSTN. "Y" in a column shows which requirements must be met as a condition of attachment. "?" indicates uncertainty from the information supplied to PT 18V.

Reference has been made to ETR 034 [6] if necessary.

Column (d) refers to the need for an approved maintenance arrangement as part of the approval requirements.

COUNTRY	Lab Test (a)	Field Trial (b)	Site Insp'n (c)	Mainten-ance. (d)	PTN Rules (e)	REMARKS
AUSTRIA	Y	N	Y	Y	Y	(a) & (c): By PTO
BELGIUM	Y	N	Y	?	Y	
CYPRUS	Y	N	Y	?	N	(c): By PTO
CZECHOSLOVAKIA	Y	N	N	N	N	New procedures still evolving
DENMARK						No i/f in PT18V scope
FINLAND						No i/f in PT18V scope
FRANCE	Y	?	?	?	?	Info not supplied
GERMANY	Y	N	?	?	Y	
GREECE	N	N	Y	?	Y	No type approval
ICELAND						No reply
IRELAND						No i/f in PT18V scope
ITALY	Y	N	Y	Y	Y	Installation testing is separate from type approval
LUXEMBOURG	N	N	Y	Y	?	No type approval
MALTA						No reply
NETHERLANDS	Y	N	N	N	Y	(e): Not as in ETR34
NORWAY	Y	N	N	Y	Y	
POLAND						No reply
PORTUGAL						Analogue access phased out
ROMANIA						Info not available
SPAIN						No i/f in PT18V scope
SWEDEN	Y	N	N	N	Y	Transmission requts included in type approval
SWITZERLAND	Y	N	N	N	Y*	* Overall transmission performance rules are recommended
TURKEY	Y	N	Y	?	Y	(e): Transmission aspects only
UNITED KINGDOM	Y	Y	Y	Y	N	(e): Voluntary std. (d): Approval is dependent upon registration of an approved maintainer

Annex K: Detailed technical analysis of interfaces

K.1 General

A total number of 34 interfaces have been identified during PT18V's survey of interfaces that are outside the scope of ETS 300 001. Of these are 33 interfaces that are used by PBX's and other complex installations. In the preliminary review 5 interfaces, two from France, two from Norway and one from Portugal, was excluded because these interfaces are no longer provided and only represents a small number of lines.

Of the 29 interfaces left in the analysis 16 are "both way"-types while 13 are "incoming only"-types. A "both way"-interface can be considered as two interfaces, an "incoming only"-type and an "outgoing only"-type. Since the characteristics of the two interfaces varies significantly - especially with respect to signalling - it is convenient to separate the analysis of "both way"-interfaces into two parts.

Therefore the analysis is divided in an "incoming only"-part comprising 29 interfaces and an "outgoing only"-part comprising 16 interfaces. Consequently the "both way"-interfaces are included in both analysis.

K.2 DC-Conditions and PSTN to PBX Interfaces

The following scheme shows the DC-conditions and the signalling characteristics for all "incoming only" or "PSTN to PBX" interfaces. Since all "outgoing only" or "PBX to PSTN" interfaces are both way these interfaces DC-conditions are also covered by this scheme.

Each interface is identified by a country designation and in case of more than one interface for a country also by a figure. For both way interfaces is furthermore indicated an i for the incoming interface and an o for the outgoing interface.

The country designations are:

A=Austria, B=Belgium, CH=Switzerland, CS=Czechoslovakia, CY=Cyprus, D=Germany, DK=Denmark, E=Spain, F=France, GB=United Kingdom, GR=Greece, I=Italy, IRL=Ireland, IS=Iceland, L=Luxembourg, M=Malta, N=Norway, NL=Netherlands, P=Portugal, PL=Poland, R=Romania, S=Sweden, SF=Finland, TR=Turkey.

Denmark, Finland, Ireland and Spain have not supplied any technical information, because they have no interfaces outside the scope of prETS 300 001. Iceland, Malta & Poland have not responded at all while Romania have submitted a preliminary reply but have not been able to reply in time to the questionnaire.

Table K.1 (1 of 3): All PSTN to PBX interfaces

General			DC-conditions			Signalling for incoming calls to a PBX					
Inter-face	Number of wires	In/ out/ both way	Power supply origin	Voltage range (V)	Current range (mA)	Call indicat. signal	DDI address inform.	Answer signal	On-line state	Clear from PBX	Clear from PSTN
	1.4.	1.6	2.1.a	2.1.b	2.1.c	2.2.b	2.2.c	2.2.e	2.2.f	2.2.g	2.2.h
A1i. System W48	2	Both way	Pstn	56 - 64	19 - 60	60 V 50 Hz 1 s/ 5 s cadence	Neg. current pulse on b-wire	N.A.	Loop	Loop discon-nect	Loop discon. pulse (250ms)
A2i. System OES/ UFS	2	Both way	Pbx	50 - 64	19 - 60	12 kHz	Disc. of 12 kHz signal (10/ s)	Loop pulse at pbx (60 ms)	Loop	Loop discon-nect	Loop discon. pulse (250ms)
B1i. Loop cll. Gua. clr line	2	Both way	Pstn	44,5 - 53	20 - 90	Loop connect at pstn	Non DDI	Loop connect at pbx	Loop	Low current loop	Slight current drop
B2. DDI exch. line	2	In	Pstn	44,5 -53	2,5 -100	Battery reversal	MFC-R2	Loop connect at pbx	Loop & battery reversal	Low current loop	Battery restore
CH. DDI exch. line	2	In	Pstn (normal) / pbx (block.)	43 - 66 (pstn) / 43 - 57 (pbx)	$\leq$ 60 (pstn) / $\leq$ 10 (pbx)	Loop connect at pstn	Decadic (10/ s)/ MFC-R2	Loop connect at pbx	Loop	Low current loop	Loop discon-nect
CS1i. Signal system U	2	Both way	Pstn	45 - 53/ 54 - 66/ 58 - 64	18 - 68	50-90 V 25/ 50 Hz 1 s/ 4 s	Non DDI	Loop connect at pbx	Loop	Low current loop	N.A.
CS2. Signal system P	3	In	Pstn & pbx	54 - 66/ 58 - 64	10 - 90	Earth on c-wire	Earth puls. on a-wire/ MFC-R2	Neg. b-wire	Neg. b-wire	N.A.	Discon-nect c-wire
CY. DDI exch. line	2	In	Pstn	44 - 52	20 - 100	Loop connect at pstn	MFC-R1	Loop connect at pbx	Loop & battery reversal	Low current loop	Loop discon. Battery restore
D1i. DDI exch. line	2	Both way	Pstn & pbx	60 (pstn)/ 48 / 60 (pbx)	20 - 70	Neg. pulse on b-wire	Earth puls. on a-wire (10/ s)	Bat. rev pulse/ neg. b-wire	Neg. b-wire	Eth-puls on a-w. neg-puls on b-w.	AC-puls 90V, 50 Hz, 80 - 200 ms
D2. Emerg. call line	2	In	Pstn	60	20 - 70	50 Hz 1 s/ 5 s Eth. on call-wire	N.A.	Loop connect Eth. on ans.-w.	Loop Eth. on answer-wire	Loop discon-nect	Stan-dard clear. signal
F1. MF Socotel signal.	2	In	Pbx	43 - 53	15 - 50	Loop connect at pstn	National MFC (similar to R2)	Battery reversal	Loop & battery reversal	Battery restore	Loop discon-nect
F4. Type Colisee signal.	2	In	N.A.	N.A.	N.A.	Low fre-quency pulse, 100 ms	MFPB (CCITT Q.23)	Low fre-quency pulse, 100 ms	No change	Low fre-quency pulse, 625 ms	Low fre-quency pulse, 1500ms

Table K.1 (2 of 3): All PSTN to PBX interfaces

General			DC-conditions			Signalling for incoming calls to a PBX					
Inter-face	Number of wires	In/ out/ both way	Power supply origin	Voltage range (V)	Current range (mA)	Call indicat. signal	DDI address inform.	Answer signal	On-line state	Clear from PBX	Clear from PSTN
	1.4	1.6	2.1.a	2.1.b	2.1.c	2.2.b	2.2.c	2.2.e	2.2.f	2.2.g	2.2.h
F5. Type Colisee signal.	4 (2 for signal, RON & TRON)	In	Pbx & pstn, (sign. li-nes only	43 - 53	≤ 50	Earth pulse on RON-wire, 100 ms	MFPB (CCITT Q.23)	Earth pulse on TRON-wire, 100 ms	No change	Earth pulse on TRON-wire, 625 ms	Earth pulse on RON-wire, 1500ms
GB1i. Eth. cll. Gua. clr line	2	Both way	Pstn	40 - 57 / 0 - 70	0 - 125 / 40	63 - 100 V 25 Hz (+1, -5)	Non DDI	Loop connect at pbx	Loop	Loop discon-nect	Low current loop
GB2i. Loop cll. Disc. clr line	2	Both way	Pstn	40 - 57 / 0 - 70	0 - 125 / 40	63 - 100 V 25 Hz (+1, -5)	Non DDI	Loop connect at pbx	Loop	Loop discon-nect	Loop discon-nect
GB3i. Loop cll. Gua. clr line	2	Both way	Pstn	40 - 57 / 0 - 70	0 - 125 / 40	63 - 100 V 25 Hz (+1, -5)	Non DDI	Loop connect at pbx	Loop	Low current loop	Low current loop
GB4. DDI exch. line	2	In	Pbx	46 - 57	16 - 100	Loop connect at pstn	Decadic (7 - 12/ s) /DTMF	Battery reversal	Loop & battery reversal	Loop disc. & battery restore	Low current loop
GRi. DDI exch. line	2	Both way	Pstn	48/ 60	20 - 80	Neg. pulse on b-wire	Earth puls. on a-wire (10/ s)	Bat. rev pulse/ neg. b-wire	Neg. b-wire	Eth-puls on a-w. neg-puls on b-w.	AC-puls 90V, 50 Hz, 80 - 200 ms
I1i. Loop cll. Gua. clr line	2	Both way	Pstn	44 - 52	18 - 80	40 - 80 V 25 Hz	Non DDI	Loop connect at pbx	Loop	Low current loop	Low current loop
I2. DDI exch. line	2	In	Pstn	44 - 52	0 - 40	Loop at pstn & battery reversal	Decadic (10/ s)	Loop connect at pbx	Loop & battery reversal	Low current loop	Low current loop
L1i. Loop cll. Ung. clr line	2	Both way	Pstn	58 - 66	14 - 60	55 - 75 V 25 Hz	Non DDI	Loop connect at pbx	Loop	Loop discon-nect	N.A.
L2i. DDI exch. line	2	Both way	Pstn/ pbx	58 - 66	14 - 60	Current variati-on on b-wire	Decadic (10/ s)	Current on b-wire	Current on a & b wire	Discon-nect a-wire	Disc. signal 90 V 50 Hz
N1. Inter-face K41	6 (2 for discont. R2-E&M signal.)	In	N.A.	N.A.	N.A.	Pulse on E-wire, 150 ms	National MFC-R2	Pulse on M-wire, 150 ms	Idle E & M wires	Pulse on M-wire, 600 ms	Pulse on E-wire 600 ms
N2. Inter-face K42	8 (4 for digital R2-E&M signal.)	In	N.A.	N.A.	N.A.	af = 0 bf = 0 ab = 1 bb = 0	National MFC-R2	af = 0 bf = 0 ab = 0 bb = 1	af = 0 bf = 0 ab = 0 bb = 1	af = 0 bf = 0 ab = 1 bb = 1	af = 1 bf = 0 ab = 0 bb = 1

Table K.1 (3 of 3): All PSTN to PBX interfaces

General			DC-conditions			Signalling for incoming calls to a PBX					
Inter-face	Number of wires	In/ out/ both way	Power supply origin	Voltage range (V)	Current range (mA)	Call indicat. signal	DDI address inform.	Answer signal	On-line state	Clear from PBX	Clear from PSTN
	1.4	1.6	2.1.a	2.1.b	2.1.c	2.2.b	2.2.c	2.2.e	2.2.f	2.2.g	2.2.h
NL1i. Loop cll. Gua. clr line	2	Both way	Pstn	43 - 53	16 - 80	Battery reversal, 35-90 V 25 Hz	Non DDI	Loop connect at pbx	Loop	Low current loop	Battery restore
NL2i. DDI exch. line	2	Both way	Pstn	43 - 53	16 - 80	Battery reversal	Decadic /DTMF	Loop connect at pbx	Loop	Low current loop	Battery restore
S1i. Loop cll. Gua. clr line	2	Both way	Pstn	48 / 36	10 - 30 / 10 - 36	80 V 25 Hz	Non DDI	Loop connect at pbx	Loop	Low current loop	Battery reversal pulse
S2. DDI exch. line	2	In	Pstn	48 / 36	10 - 30 / 10 - 36	Loop connect at pstn	Decadic /DTMF	Loop connect at pbx	Loop & battery reversal	Low current loop	Loop disc. & battery restore
TRi. Loop cll. Ung. clr line	2	Both way	Pstn	44 - 52	20 - 100	70 - 105 V 20 - 50 Hz	Non DDI	Loop connect at pbx	Loop	Low current loop	Low current loop

Out from the scheme the commonalities between the interfaces are identified and the interfaces are divided into 5 categories:

Category A: PSTN to PBX, non DDI, interfaces.

Category B: PSTN to PBX, DDI, loop calling, interfaces.

Category C: PSTN to PBX, DDI, E&M signalling, interfaces.

Category D: PSTN to PBX, DDI, miscellaneous signalling, interfaces.

Category E: Non PBX interfaces.

The interfaces in category A & B have a high degree of commonalities within the categories. Category C have certain commonalities while the interfaces in category D have very little in common. Category E only contains one interface.

Table K.2: Category A: PSTN to PBX, non DDI, interfaces

General			DC-conditions			Signalling for incoming calls to a PBX					
Inter-face	Number of wires	In/ out/ both way	Power supply origin	Voltage range (V)	Current range (mA)	Call indicat. signal	DDI address inform.	Answer signal	On-line state	Clear from PBX	Clear from PSTN
	1.4.	1.6	2.1a	2.1b	2.1c	2.2b	2.2c	2.2e	2.2f	2.2g	2.2h
B1i. Loop cll. Gua. clr line	2	Both way	Pstn	44,5 - 53	20 - 90	Loop connect at pstn	Non DDI	Loop connect at pbx	Loop	Low current loop	Slight current drop
CS1i. Signal system U	2	Both way	Pstn	45 - 53/ 54 - 66/ 58 - 64	18 - 68	50-90 V 25/ 50 Hz 1 s/ 4 s	Non DDI	Loop connect at pbx	Loop	Low current loop	N.A.
GB1i. Eth. cll. Gua. clr line	2	Both way	Pstn	40 - 57 / 0 - 70	0 - 125 / 40	63 - 100 V 25 Hz (+1, -5)	Non DDI	Loop connect at pbx	Loop	Loop discon-nect	Low current loop
GB2i. Loop cll. Disc. clr line	2	Both way	Pstn	40 - 57 / 0 - 70	0 - 125 / 40	63 - 100 V 25 Hz (+1, -5)	Non DDI	Loop connect at pbx	Loop	Loop discon-nect	Loop discon-nect
GB3i. Loop cll. Gua. clr line	2	Both way	Pstn	40 - 57 / 0 - 70	0 - 125 / 40	63 - 100 V 25 Hz (+1, -5)	Non DDI	Loop connect at pbx	Loop	Low current loop	Low current loop
I1i. Loop cll. Gua. clr line	2	Both way	Pstn	44 - 52	18 - 80	40 - 80 V 25 Hz	Non DDI	Loop connect at pbx	Loop	Low current loop	Low current loop
L1i. Loop cll. Ung. clr line	2	Both way	Pstn	58 - 66	14 - 60	55 - 75 V 25 Hz	Non DDI	Loop connect at pbx	Loop	Loop discon-nect	N.A.
NL1i. Loop cll. Gua. clr line	2	Both way	Pstn	43 - 53	16 - 80	Battery reversal, 35-90 V 25 Hz	Non DDI	Loop connect at pbx	Loop	Low current loop	Battery restore
S1i. Loop cll. Gua. clr line	2	Both way	Pstn	48 / 36	10 - 30 / 10 - 36	80 V 25 Hz	Non DDI	Loop connect at pbx	Loop	Low current loop	Battery reversal pulse
TRi. Loop cll. Ung. clr line	2	Both way	Pstn	44 - 52	20 - 100	70 - 105 V 20 - 50 Hz	Non DDI	Loop connect at pbx	Loop	Low current loop	Low current loop

Comments to Category A:

These interfaces are characterised as PSTN to PBX, non DDI, interfaces and are classical PBX interfaces without DDI and in general based at a standard subscriber line. For some of these interfaces it is rather unclear whether they are outside the scope of prETS 300 001 or not. In the questionnaire it was stated that the interfaces of interest are those that are not of the type "loop seizure, unguarded clear" type, but obviously some of the interfaces are of that type. A further study of the relevant national requirements is necessary to clarify that point.

In general there is a high degree of commonalities between the interfaces but with some significant variations for particular interfaces.

The main commonalities are:

PSTN to PBX, non DDI, interfaces.

2 wires.

Part of a two way system.

Power supply from the PSTN.

Call indication for incoming calls to the PBX by low frequency AC-voltage.

Loop seizure at the PBX as answer to incoming calls and for generating outgoing calls.

DC loop condition for the on-line state.

Guarded or disconnect clear.

The main variations are:

There are significant variations in the DC voltages and currents for the loop condition.

B1i uses loop calling for incoming calls to the PBX.

CS1i, L1i & TRi are of the unguarded clear type.

NL1i uses battery reversal for call indication and clear from PSTN.

S1i uses battery reversal pulse as clear from the PSTN.

Table K.3: Category B: PSTN to PBX, DDI, loop calling, interfaces

General			DC-conditions			Signalling for incoming calls to a PBX					
Inter-face	Number of wires	In/ out/ both way	Power supply origin	Voltage range (V)	Current range (mA)	Call indicat. signal	DDI address inform.	Answer signal	On-line state	Clear from PBX	Clear from PSTN
	1.4.	1.6	2.1a	2.1b	2.1c	2.2b	2.2c	2.2e	2.2f	2.2g	2.2h
B2. DDI exch. line	2	In	Pstn	44,5 -53	2,5 -100	Battery reversal	MFC-R2	Loop connect at pbx	Loop & battery reversal	Low current loop	Battery restore
CH. DDI exch. line	2	In	Pstn (normal) / pbx (block.)	43 - 66 (pstn) / 43 - 57 (pbx)	$\leq$ 60 (pstn) / $\leq$ 10 (pbx)	Loop connect at pstn	Decadic (10/ s)/ MFC-R2	Loop connect at pbx	Loop	Low current loop	Loop discon-nect
CY. DDI exch. line	2	In	Pstn	44 - 52	20 - 100	Loop connect at pstn	MFC-R1	Loop connect at pbx	Loop & battery reversal	Low current loop	Loop discon. Battery restore
F1. MF Socotel signal.	2	In	Pbx	43 - 53	15 - 50	Loop connect at pstn	National MFC (similar to R2)	Battery reversal	Loop & battery reversal	Battery restore	Loop discon-nect
GB4. DDI exch. line	2	In	Pbx	46 - 57	16 - 100	Loop connect at pstn	Decadic (7 - 12/ s) /DTMF	Battery reversal	Loop & battery reversal	Loop disc. & battery restore	Low current loop
I2. DDI exch. line	2	In	Pstn	44 - 52	0 - 40	Loop at pstn & battery reversal	Decadic (10/ s)	Loop connect at pbx	Loop & battery reversal	Low current loop	Low current loop
NL2i. DDI exch. line	2	Both way	Pstn	43 - 53	16 - 80	Battery reversal	Decadic /DTMF	Loop connect at pbx	Loop	Low current loop	Battery restore
S2. DDI exch. line	2	In	Pstn	48 / 36	10 - 30 / 10 - 36	Loop connect at pstn	Decadic /DTMF	Loop connect at pbx	Loop & battery reversal	Low current loop	Loop disc. & battery restore

Comments to Category B:

These interfaces are characterised as PSTN to PBX, DDI, loop calling interfaces.

In general there is some degree of commonalities between the interfaces but with some significant variations for particular interfaces.

The main commonalities are:

PBX, DDI, 2-wire, PSTN to PBX, loop calling interfaces.

Call indication by loop seizure at the PSTN.

DDI address information as national MFC (DTMF).

DC loop condition with battery reversal for the on-line state.

Guarded or disconnect clear.

The main variations are:

B2, CY, I2, NL2i & S2 have the power supply placed at the PSTN.

F1 & GB4 have the power supply placed at the PBX.

CH has the power supply at the PSTN for the normal condition and at the PBX for the blocking condition.

There are significant variations in the DC voltages and currents for the loop condition.

B2 I2 & NL2i use battery reversal as call indication signal.

CH, GB4 & S2 use both MFC and loop disconnect pulses for DDI address information.

B2, CH, CY, I2 & S3 use loop seizure at the PBX as the answer signal.

F1 & GB4 use battery reversal as the answer signal.

CH don't use battery reversal for the on-line state.

Table K.4: Category C: PSTN to PBX, DDI, E&M signalling, interfaces

General			DC-conditions			Signalling for incoming calls to a PBX					
Inter-face	Number of wires	In/ out/ both way	Power supply origin	Voltage range (V)	Current range (mA)	Call indicat. signal	DDI address inform.	Answer signal	On-line state	Clear from PBX	Clear from PSTN
	1.4.	1.6	2.1a	2.1b	2.1c	2.2b	2.2c	2.2e	2.2f	2.2g	2.2h
F5. Type Colisee signal.	4 (2 for signal, RON & TRON)	In	Pbx & pstn, (sign. li-nes only	43 - 53	$\leq$ 50	Earth pulse on RON-wire, 100 ms	MFPB (CCITT Q.23)	Earth pulse on TRON-wire, 100 ms	No change	Earth pulse on TRON-wire, 625 ms	Earth pulse on RON-wire, 1500ms
N1. Inter-face K41	6 (2 for discont. R2-E&M signal.)	In	N.A.	N.A.	N.A.	Pulse on E-wire, 150 ms	National MFC-R2	Pulse on M-wire, 150 ms	Idle E & M wires	Pulse on M-wire, 600 ms	Pulse on E-wire 600 ms
N2. Inter-face K42	8 (4 for digital R2-E&M signal.)	In	N.A.	N.A.	N.A.	af = 0 bf = 0 ab = 1 bb = 0	National MFC-R2	af = 0 bf = 0 ab = 0 bb = 1	af = 0 bf = 0 ab = 0 bb = 1	af = 0 bf = 0 ab = 1 bb = 1	af = 1 bf = 0 ab = 0 bb = 1

Comments to Category C:

These interfaces are characterised as PSTN to PBX, DDI, E&M signalling interfaces. Each interface have 4 - 8 wires of which some are dedicated for signalling. The signalling systems are similar to or subsets of the CCITT R2 signalling system.

E&M (Ear & Mouth) signalling involves channels dedicated for signalling, one for incoming signalling (ear) and one for outgoing signalling (mouth).

In general there is some degree of commonalities between the interfaces but with some significant variations for particular interfaces.

The main commonalities are:

PSTN to PBX, DDI, E&M signalling interfaces.

Signalling systems similar to or subsets of CCITT R2 signalling system.

One way PSTN to PBX interfaces.

"Guarded clear" type interfaces.

The main variations are:

F5 have 4 wires, 2 for speech transmission and 2 for E&M signalling.

N1 has 6 wires, 4 for speech transmission and 2 for E&M signalling.

N2 has 8 wires, 4 for speech transmission and 4 for E&M signalling.

F5 & **N1** use discontinuous or pulsed DC-signalling for the E&M signalling.

N2 uses digital R2 line signalling system for the E&M signalling in accordance with CCITT Recommendations Q.400, Q.421 and Q.422 of the Blue Books with some national requirements added.

F5 uses MFPB (Multi Frequency Push Button) signalling as defined in CCITT Recommendation Q.23 for transferring DDI address information from the PSTN to the PBX.

N1 & N2 uses NMFC (National Multi Frequency Compelled) inter register signalling, which is a subset of R2 MFC as defined in CCITT Recommendation Q.400 & Q.440-Q.490 in the Blue Books.

Table K.5: Category D: PSTN to PBX, DDI, miscellaneous signalling, interfaces

General			DC-conditions			Signalling for incoming calls to a PBX					
Inter-face	Number of wires	In/ out/ both way	Power supply origin	Voltage range (V)	Current range (mA)	Call indicat. signal	DDI address inform.	Answer signal	On-line state	Clear from PBX	Clear from PSTN
	1.4.	1.6	2.1a	2.1b	2.1c	2.2b	2.2c	2.2e	2.2f	2.2g	2.2h
A1i. System W48	2	Both way	Pstn	56 - 64	19 - 60	60 V 50 Hz 1 s/ 5 s cadence	Neg. current pulse on b-wire	N.A.	Loop	Loop discon-nect	Loop discon. pulse (250ms)
A2i. System OES/ UFS	2	Both way	Pbx	50 - 64	19 - 60	12 kHz	Disc. of 12 kHz signal (10/ s)	Loop pulse at pbx (60 ms)	Loop	Loop discon-nect	Loop discon. pulse (250ms)
CS2. Signal system P	3	In	Pstn & pbx	54 - 66/ 58 - 64	10 - 90	Earth on c-wire	Earth puls. on a-wire/ MFC-R2	Neg. b-wire	Neg. b-wire	N.A.	Discon-nect c-wire
D1i. DDI exch. line	2	Both way	Pstn & pbx	60 (pstn)/ 48 / 60 (pbx)	20 - 70	Neg. pulse on b-wire	Earth puls. on a-wire (10/ s)	Bat. rev pulse/ neg. b-wire	Neg. b-wire	Eth-puls on a-w. neg-puls on b-w.	AC-puls 90V, 50 Hz, 80 - 200 ms
F4. Type Colisee signal.	2	In	N.A.	N.A.	N.A.	Low fre-quency pulse, 100 ms	MFPB (CCITT Q.23)	Low fre-quency pulse, 100 ms	No change	Low fre-quency pulse, 625 ms	Low fre-quency pulse, 1500ms
GRi. DDI exch. line	2	Both way	Pstn	48/ 60	20 - 80	Neg. pulse on b-wire	Earth puls. on a-wire (10/ s)	Bat. rev pulse/ neg. b-wire	Neg. b-wire	Eth-puls on a-w. neg-puls on b-w.	AC-puls 90V, 50 Hz, 80 - 200 ms
L2i. DDI exch. line	2	Both way	Pstn/ pbx	58 - 66	14 - 60	Current variati-on on b-wire	Decadic (10/ s)	Current on b-wire	Current on a & b wire	Discon-nect a-wire	Disc. signal 90 V 50 Hz

Comments to Category D:

These interfaces are characterised as PSTN to PBX, DDI, miscellaneous signalling, interfaces.

There are very few commonalities and very significant variations between these interfaces and therefore no analysis of commonalities and variations have been made.

Table K.6: Category E: Non PBX interfaces

General			DC-conditions			Signalling for incoming calls to a PBX					
Inter-face	Number of wires	In/ out/ both way	Power supply origin	Voltage range (V)	Current range (mA)	Call indicat. signal	DDI address inform.	Answer signal	On-line state	Clear from PBX	Clear from PSTN
	1.4.	1.6	2.1a	2.1b	2.1c	2.2b	2.2c	2.2e	2.2f	2.2g	2.2h
D2. Emerg. call line	2	In	Pstn	60	20 - 70	50 Hz 1 s/ 5 s Eth. on call-wire	N.A.	Loop connect Eth. on ans.-w.	Loop Eth. on answer-wire	Loop discon-nect	Stan-dard clear. signal

Comments to Category E:

This is the only non PBX interface. It is a 2-wire, one way, emergency calls interface with standardised universal numbers (110 or 112). It is terminated at emergency calls attendants equipment in one end and in the other end at special emergency call units connected to pay phones (for emergency calls without coins) or at special emergency call telephone sets. The emergency calling terminals can be identified by the attendants in order to locate the calling person.

K.3 PBX to PSTN interfaces

The following scheme shows the signalling characteristics for all PBX to PSTN interfaces.

Table K.7 (1 of 2): All PBX to PSTN interfaces (1 of 2)

General			Signalling for outgoing calls from a PBX							
Inter-face	Number of wires	In/ out/ both way	Seize signal	Dial tone	Dialling signal	Answer signal	On-line state	Char-ging signals	Clear from PSTN	Clear from PBX
	1.4	1.6	2.3.a	2.3.b	2.3.c	2.3.f	2.3.g	2.3.h	2.3.i	2.3.j
A1o. System W48	2	Both way	Loop connect at pbx	400-500 Hz conti-nuous	Decadic	N.A.	Loop	12 kHz pulses	Loop discon-nect pulse	Loop discon-nect
A2o. System OES/ UFS	2	Both way	Loop connect at pbx	400-500 Hz conti-nuous	Decadic/ DTMF	N.A.	Loop	12 kHz pulses	Loop discon-nect pulse	Loop discon-nect
B1o. Loop cll. Gua. clr line	2	Both way	Loop connect at pbx	425/ 450 Hz conti-nuous	Decadic/ DTMF	N.A.	Loop	16 kHz pulses	N.A.	Loop discon-nect
CS1o. Signal system U	2	Both way	Loop connect at pbx	425 Hz conti-nuous	Decadic/ DTMF	N.A.	Loop	16 kHz pulses	N.A.	Low current loop
D1o. DDI exch. line	2	Both way	Neg. pulse on a-wire	425/ 450 Hz conti-nuous	Decadic	N.A.	Loop	16 kHz pulses	N.A.	Loop discon-nect
GB1o. Eth. cll. Gua. clr line	2	Both way	Earth on b-wire	350/ 440 Hz conti-nuous	Decadic/ DTMF	Battery reversal	Loop	N.A.	Low current loop	Loop discon-nect
GB2o. Loop cll. Disc. clr line	2	Both way	Loop connect at pbx	350/ 440 Hz conti-nuous	Decadic/ DTMF	Battery reversal	Loop	N.A.	Loop discon-nect	Low current loop
GB3o. Loop cll. Gua. clr line	2	Both way	Loop connect at pbx	350/ 440 Hz conti-nuous	Decadic/ DTMF	Battery reversal	Loop	N.A.	Low current loop	Low current loop
GRo. DDI exch. line	2	Both way	Neg. pulse on a-wire & loop	400/ 475 Hz conti-nuous	Decadic	N.A.	Loop	16 kHz pulses	N.A.	Loop discon-nect

Table K.7 (2 of 2): All PBX to PSTN interfaces

General			Signalling for outgoing calls from a PBX							
Inter-face	Number of wires	In/ out/ both way	Seize signal	Dial tone	Dialling signal	Answer signal	On-line state	Char-ging signals	Clear from PSTN	Clear from PBX
	1.4	1.6	2.3.a	2.3.b	2.3.c	2.3.f	2.3.g	2.3.h	2.3.i	2.3.j
I1o. Loop cll. Gua. clr line	2	Both way	Loop connect at pbx	410-440 Hz 0,6 s on /1 s off	Decadic/ DTMF	N.A.	Loop	N.A.	?	?
L1o. Loop cll. Ung. clr line	2	Both way	Loop connect at pbx	425/ 450 Hz conti-nuous	Decadic/ DTMF	N.A.	Loop	50 Hz/ 16 kHz pulses	N.A.	Loop discon-nect
L2o. DDI exch. line	2	Both way	Current variati-on on a-wire	425/ 450 Hz conti-nuous	Decadic	N.A.	Loop	50 Hz/ 16 kHz pulses	N.A.	Loop discon-nect
NL1o. Loop cll. Gua. clr line	2	Both way	Loop connect at pbx	150/ 450 Hz conti-nuous	Decadic/ DTMF	N.A.	Loop	48 - 52 Hz pulses	Battery reversal	Low current loop
NL2o. DDI exch. line	2	Both way	Loop connect at pbx	150/ 450 Hz conti-nuous	Decadic/ DTMF	N.A.	Loop	48 - 52 Hz pulses	Battery reversal	Low current loop
S1o. Loop cll. Gua. clr line	2	Both way	Loop connect at pbx	425 Hz conti-nuous	Decadic/ DTMF	Battery reversal	Loop	12 kHz pulses	Battery reversal	Low current loop
TRo. Loop cll. Ung. clr line	2	Both way	Loop connect at pbx	450 Hz conti-nuous	Decadic/ DTMF	N.A.	Loop	12 kHz pulses	Low current loop	Low current loop

Out from the scheme the commonalities between the interfaces are identified and the interfaces are divided into 2 categories:

Category F: PBX to PSTN, loop calling, interfaces;

Category G: PBX to PSTN, non loop calling, interfaces.

The interfaces in category F have a high degree of commonalities while category G have few commonalities.

Table K.8: PBX to PSTN, loop calling, interfaces

General			Signalling for outgoing calls from a PBX							
Inter-face	Number of wires	In/ out/ both way	Seize signal	Dial tone	Dialling signal	Answer signal	On-line state	Char-ging signals	Clear from PSTN	Clear from PBX
	1.4	1.6	2.3.a	2.3.b	2.3.c	2.3.f	2.3.g	2.3.h	2.3.i	2.3.j
A1o. System W48	2	Both way	Loop connect at pbx	400-500 Hz conti-nuous	Decadic	N.A.	Loop	12 kHz pulses	Loop discon-nect pulse	Loop discon-nect
A2o. System OES/ UFS	2	Both way	Loop connect at pbx	400-500 Hz conti-nuous	Decadic/ DTMF	N.A.	Loop	12 kHz pulses	Loop discon-nect pulse	Loop discon-nect
B1o. Loop cll. Gua. clr line	2	Both way	Loop connect at pbx	425/ 450 Hz conti-nuous	Decadic/ DTMF	N.A.	Loop	16 kHz pulses	N.A.	Loop discon-nect
CS1o. Signal system U	2	Both way	Loop connect at pbx	425 Hz conti-nuous	Decadic/ DTMF	N.A.	Loop	16 kHz pulses	N.A.	Low current loop
GB2o. Loop cll. Disc. clr line	2	Both way	Loop connect at pbx	350/ 440 Hz conti-nuous	Decadic/ DTMF	Battery reversal	Loop	N.A.	Loop discon-nect	Low current loop
GB3o. Loop cll. Gua. clr line	2	Both way	Loop connect at pbx	350/ 440 Hz conti-nuous	Decadic/ DTMF	Battery reversal	Loop	N.A.	Low current loop	Low current loop
I1o. Loop cll. Gua. clr line	2	Both way	Loop connect at pbx	410-440 Hz 0,6 s on /1 s off	Decadic/ DTMF	N.A.	Loop	N.A.	?	?
L1o. Loop cll. Ung. clr line	2	Both way	Loop connect at pbx	425/ 450 Hz conti-nuous	Decadic/ DTMF	N.A.	Loop	50 Hz/ 16 kHz pulses	N.A.	Loop discon-nect
NL1o. Loop cll. Gua. clr line	2	Both way	Loop connect at pbx	150/ 450 Hz conti-nuous	Decadic/ DTMF	N.A.	Loop	48 - 52 Hz pulses	Battery reversal	Low current loop
NL2o. DDI exch. line	2	Both way	Loop connect at pbx	150/ 450 Hz conti-nuous	Decadic/ DTMF	N.A.	Loop	48 - 52 Hz pulses	Battery reversal	Low current loop
S1o. Loop cll. Gua. clr line	2	Both way	Loop connect at pbx	425 Hz conti-nuous	Decadic/ DTMF	Battery reversal	Loop	12 kHz pulses	Battery reversal	Low current loop
TRo. Loop cll. Ung. clr line	2	Both way	Loop connect at pbx	450 Hz conti-nuous	Decadic/ DTMF	N.A.	Loop	12 kHz pulses	Low current loop	Low current loop

Comments to Category F:

These interfaces are characterised as PBX to PSTN, loop calling interfaces and are classical PBX interfaces which to a high degree comply with prETS 300 001.

In general there is a high degree of commonalities between the interfaces but with some significant variations for particular interfaces.

The main commonalities are:

PBX to PSTN, loop calling interfaces.

2 wires.

Decadic or DTMF dialling.

DC loop condition for the on-line state.

12 or 16 kHz charging pulses from the PSTN when provided.

Guarded or disconnect clear.

The main variations are:

A1o has only decadic dialling and not DTMF.

GB2o, **GB3o** & **S1o** use battery reversal at the PSTN as answer signal while the other interfaces don't supply any answer signal.

L1o uses 50 Hz charging signals from mechanical exchanges in the PSTN.

NL1o & **NL2o** uses 50 Hz charging signals.

CS1o, **L1o** & **TRo** are of the unguarded clear type.

Table K.9: Category G: PBX to PSTN, non loop calling, interfaces

General			Signalling for outgoing calls from a PBX							
Inter-face	Number of wires	In/ out/ both way	Seize signal	Dial tone	Dialling signal	Answer signal	On-line state	Char-ging signals	Clear from PSTN	Clear from PBX
	1.4	1.6	2.3.a	2.3.b	2.3.c	2.3.f	2.3.g	2.3.h	2.3.i	2.3.j
D1o. DDI exch. line	2	Both way	Neg. pulse on a-wire	425/ 450 Hz conti-nuous	Decadic	N.A.	Loop	16 kHz pulses	N.A.	Loop discon-nect
GB1o. Eth. cll. Gua. clr line	2	Both way	Earth on b-wire	350/ 440 Hz conti-nuous	Decadic/ DTMF	Battery reversal	Loop	N.A.	Low current loop	Loop discon-nect
GRo. DDI exch. line	2	Both way	Neg. pulse on a-wire & loop	400/ 475 Hz conti-nuous	Decadic	N.A.	Loop	16 kHz pulses	N.A.	Loop discon-nect
L2o. DDI exch. line	2	Both way	Current variati-on on a-wire	425/ 450 Hz conti-nuous	Decadic	N.A.	Loop	50 Hz/ 16 kHz pulses	N.A.	Loop discon-nect

Comments to Category G:

These interfaces are characterised as PBX to PSTN, non loop calling, interfaces.

There are very few commonalities and very significant variations between these interfaces and therefore no analysis of commonalities and variations have been made.

K.4 CONCLUSION

The analysis shows that the PSTN to PBX interfaces are logically divided into five categories:

Category A: PSTN to PBX, non DDI, interfaces;

Category B: PSTN to PBX, DDI, loop calling, interfaces;

Category C: PSTN to PBX, DDI, E&M signalling, interfaces;

Category D: PSTN to PBX, DDI, miscellaneous signalling, interfaces;

Category E: Non PBX interfaces.

The PBX to PSTN interfaces are logically divided into two categories:

Category F: PBX to PSTN, loop calling, interfaces;

Category G: PBX to PSTN, non loop calling, interfaces.

Of these categories A, B and F exhibits a high degree of commonality between the interfaces in the category while in category C there is a lower degree of commonality.

Annex L: Number of lines and approvals

This ETR consists of six tables which contain for each category of interest an assessment of the number of lines in use, the predicted future use and an estimate of the number of new approvals to be handled.

For each country the ratio of specially engineered PBX lines to ordinary subscriber lines has been computed. A comparison of the ratio in each country could give an indication of any latent demand which should be taken into account in estimating future use of the PBX interface.

In some cases figures apply to the totals for all the interfaces in each country. They are repeated in each table for the purpose of the assessment. It would be misleading to take the sum of these figures to represent national totals.

Table L.1 Category A: PSTN to PBX, non DDI, interfaces

Table L.2 Category B: PSTN to PBX, DDI, loop calling, interfaces

Table L.3 Category C: PSTN to PBX, DDI, E&M signalling, interfaces

Table L.4 Category D: PSTN to PBX, DDI, miscellaneous signalling, interfaces

Table L.5 Category F: PBX to PSTN, loop calling, interfaces

Table L.6 Category G: PBX to PSTN, non loop calling, interfaces

Category E (Non-PBX interface) is not assessed.

Interfaces coded F2, F3, N3, N4, P in the preliminary analysis are not included because they are no longer provided.

Table L.1: Category A: PSTN to PBX, non DDI, interfaces

General			Number of lines				Approvals		Remarks
Inter-face	Initial cate-gory	Method for out-going calls	PBX lines in ope-ration now	Ratio - PBX lines to subs lines	PBX lines in 5 years	PBX lines in 10 years	Last 2 years	Next 2 years	PBX lines = specially engineered interface for PBX access to PSTN
			3.2b		3.2c	3.2d	4.4	4.5	
B1i. Loop cll. Gua. clr line	1	Both-way	285k	0.09	?	?	80	80	Total PBX lines for B1 and B2.
CS1i. Signal system U	1	Both-way	Approx. 130 k	0.07	Increa-ses	Increa-ses	Approx. 90	Approx. 90	
GB1i. Eth. cll. Gua. clr line	1	Both-way	GB1-3: approx. 5 M	0.2	(1)	(1)	GB1-3: approx. 17	GB1-3: 20	(1) No figures supplied but comment that an increase of some 1% per year is expected.
GB2i. Loop cll. Disc. clr line	1	Both-way			Decrea-ses	Decrea-ses			The total for GB 1 - 4 is 6 M installed 29 approvals in last 2 years 35 approvals in next 2 years.
GB3i. Loop cll. Gua. clr line	1	Both-way			(1)	(1)			
I1i. Loop cll. Gua. clr line	1	Both-way	2 M	0.1	?	?	100 (2)	100 (2)	(2) Applies to I1 and I2 25 of the approvals are for new systems.
L1i. Loop cll. Ung. clr line	1	Both-way	15,7 k	0.1	(3)	?	23	25	(3) Figures not supplied but comment is that this access will remain important.
NL1i. Loop cll. Gua. clr line	1	Both-way	400k	0.06	(4)	?	98	120	(4) Figures not supplied but comment is that growth is expected on ISDN.
S1i. Loop cll. Gua. clr line	1	Both-way	85 k	0.02	70 k	40 k	11	Decrea-se slightly eg 10	No approvals after 5 years.
TRi. Loop cll. Ung. clr line	1	Both-way	65 k	(0.07) ?	200 k	400 k	Appr. 5	>5 eg 6	Number of subs lines has been estimated.
General totals			8 M. 11% of PSTN popula-tion				424	451	Total population of PSTN lines in these countries is about 72 M.

Table L.2: Category B: PSTN to PBX, DDI, loop calling, interfaces

General			Number of lines				Approvals		Remarks
Inter-face	Initial cate-gory	Method for out-going calls	PBX lines in ope-ration now	Ratio - PBX lines to subs lines	PBX lines in 5 years	PBX lines in 10 years	Last 2 years	Next 2 years	PBX lines = specially engineered interface for PBX access to PSTN
			3.2b		3.2c	3.2d	4.4	4.5	
B2. DDI exch. line	2	B1o	285k	0.09	?	?	40	40	Total PBX lines = B1 and B2.
CH. DDI exch. line	2	Stand-ard PSTN line	50 k	0.014	(1)	(1)	5	Approx. 7	(1) No figures supplied but comment that a decrease is expected.
CY. DDI exch. line	2	Stand-ard PSTN line	173	Not availa-ble	470	550	0	3	
F1. MF Socotel signal.	2	Stand-ard PSTN line	500k	0.02	(2)	0	approx.100	? eg 70 ?	(2) Number of analogue lines is expected to decrease to zero in 5 - 10 years.
GB4. DDI exch. line	2	GB1o GB2o GB3o	Approx 1 M	0.04	(3)	(3)	approx 12	15	(3) No figures supplied but comment that Increase of some 1% per. year is expected.
I2. DDI exch. line	2	I1o	0.9 M	0.04	Not supplied	Not supplied	(2)	(3)	(2) The total for I1 and I2 is 100. (3) The total for I1 and I2 is 100.
NL2i. DDI exch. line	4	Both-way	Approx 400k	0.06	(4)	(4)	98	120	(4) Figures not supplied but comment is that growth is expected on ISDN.
S2. DDI exch. line	2	S1o	15 k	0.003	12 k	7,5 k	5	Decrea-se slightly	No approvals after 5 years.
General totals			3.1 M. 3.3% of PSTN popula-tion				360	355	Continuing to decrease with increasing importance of ISDN access. Total population of PSTN lines in these countries is about 95 M.

Table L.3: Category C: PSTN to PBX (incoming calls), DDI, E&M signalling, interfaces

General			Number of lines				Approvals		Remarks
Inter-face	Initial cate-gory	Method for out-going calls	PBX lines in ope-ration now	Ratio - PBX lines to subs lines	PBX lines in 5 years	PBX lines in 10 years	Last 2 years	Next 2 years	PBX lines = specially engineered interface for PBX access to PSTN
			3.2b		3.2c	3.2d	4.4	4.5	
F5. Type Colisee signal.	3	Stand-ard PSTN line	10k	0.0004	approx.10k	Dec-reasing	50	? (40 ?)	
N1. Inter-face K41	3	Stand-ard PSTN line	12,5-16 k	0.008	Decrea-se 30%	Decrea-se 90%	2	1-2	
N2. Inter-face K42	3	Stand-ard PSTN line	2-3 k	0.002	Decrea-se 30%	Decrea-se 90%	0	0	
General totals			Approx. 30k. 0,1% of PSTN popula-tion				52	42 (?)	Total population of PSTN lines in these countries is about 30 M.

Table L.4: Category D: PSTN to PBX, DDI, miscellaneous signalling, interfaces

General			Number of lines				Approvals		Remarks
Inter-face	Initial cate-gory	Method for out-going calls	PBX lines in ope-ration now	Ratio - PBX lines to subs lines	PBX lines in 5 years	PBX lines in 10 years	Last 2 years	Next 2 years	PBX lines = specially engineered interface for PBX access to PSTN
			3.2b		3.2c	3.2d	4.4	4.5	
A1i. System W48	4	Both-way	190 k	0.06	60 k	0	A1 & A2: 38	A1 & A2: >38	
A2i. System OES/ UFS	4	Both-way	50 k	0.02	240 k	390 k			
CS2. Signal system P	5	CS1o	Approx. 10 k	0.005	Increa-ses	Increa-ses	Approx. 10	Approx. 5	
D1i. DDI exch. line	4	Both-way	Approx. 2,3 M	0.07	(1)	?	Not availa-ble	Not availa-ble	(1) No. of analogue lines will decrease .Expect that new approvals will be for ISPBX.
F4. Type Colisee signal.	5	Stand-ard PSTN line	600k	0.02	690k	Decrea-ses	50	> 50	
GRi. DDI exch. line	4	Both-way	350 k	0.1	500 k	1000 k	45	Appr. 45	
L2i. DDI exch. line	4	Both way	4,4 k	0.03	Decrea-ses	Decrea-ses	6	5	
General totals			Approx. 3,5 M. 5% of PSTN popula-tion				150	>150	Totals for approvals excludes D1. Total population of PSTN lines in these countries is about 70 M.

Table L.5 (1 of 2): Category F: PBX to PSTN, loop calling, interfaces

General			Number of lines				Approvals		Remarks
Inter-face	Initial cate-gory	Method for in-coming calls ?	PBX lines in ope-ration now	Ratio - PBX lines to subs lines	PBX lines in 5 years	PBX lines in 10 years	Last 2 years	Next 2 years	PBX lines = specially engineered interface for PBX access to PSTN
			3.2b		3.2c	3.2d	4.4	4.5	
A1o. System W48	4	Both-way	190 k	0.06	60 k	0	A1 & A2: 38	A1 & A2: >38	
A2o. System OES/ UFS	4	Both way	50 k	0.02	240 k	390 k			
B1o. Loop cll. Gua. clr line	1	Both-way	285k (1)	0.08	?	?	80	80	(1) B1 + B2 = 285k
CS1o. Signal system U	1	Both-way	Approx. 130 k	0.07	? increa-ses	? increa-ses	Approx. 90	Approx. 90	
GB2o. Loop cll. Disc. clr line	1	Both-way /GB2	GB1-3: appr. 5 M	GB1-3: 0.2	Decrea-ses	Decrea-ses	GB1-3: 17	GB1-3: 20	
GB3o. Loop cll. Gua. clr line	1	Both-way /GB4	GB1-3: appr. 5 M		Increase apr. 1% pr. year	Increase apr. 1% pr. year	GB1-3: 17	GB1-3: 20	
I1o. Loop cll. Gua. clr line	5	Both-way	2M	0.1	?	?	100 (?)	100 (?)	
L1o. Loop cll. Ung. clr line	1	Both-way	15,7 k	0.1	(2)	(2)	23	25	(2) Figures not supplied but comment is that this access will remain important.
NL1o. Loop cll. Gua. clr line	1	Both-way	NL1 and NL2: 300-500 k	0.06	NL1 and NL2: 300-500 k	NL1 and NL2: 300-500 k	98	120	
NL2o. DDI exch. line	4	Both-way	eg 400k		eg 400k	eg 400k			
S1o. Loop cll. Gua. clr line	1	Both-way	85 k	0.02	70 k	40 k	11	Decrea-se slightly	No approvals after 5 years.
TRo. Loop cll. Ung. clr line	1	Both-way	65 k	(0.07) ?	200 k	400 k	Appr. 5	>5 (7 ?)	

Table L.5 (2 of 2): Category F: PBX to PSTN, loop calling, interfaces

General			Number of lines				Approvals		Remarks
Inter-face	Initial cate-gory	Method for in-coming calls ?	PBX lines in ope-ration now	Ratio - PBX lines to subs lines	PBX lines in 5 years	PBX lines in 10 years	Last 2 years	Next 2 years	PBX lines = specially engineered interface for PBX access to PSTN
			3.2b		3.2c	3.2d	4.4	4.5	
General totals			Approx. 9 M. 8% of PSTN popula-tion				525	560	Total population of PSTN lines in these countries is about 110 M.

Table L.6: Category G: PBX to PSTN, non loop calling interfaces

General			Number of lines				Approvals		Remarks
Inter-face	Initial cate-gory	Method for in-coming calls ?	PBX lines in ope-ration now	Ratio - PBX lines to subs lines	PBX lines in 5 years	PBX lines in 10 years	Last 2 years	Next 2 years	PBX lines = specially engineered interface for PBX access to PSTN
			3.2b		3.2c	3.2d	4.4	4.5	
D1o. DDI exch. line	4	Both-way	2,3 M	0.07	(1)	(1)	Not avail-able	Not avail-able	(1) The number of analogue lines is expected to decrease. New approvals will be for ISPBX.
GB1o. Eth. cll. Gua. clr line	1	Both-way /GB4	1 M (?) (2)	0.04	(3)	(3)	Approx. 17 (4)	20 (4)	(2) GB 1 - 3 = 5M approx. (3) No figures supplied but comment that an increase of some 1% per year is expected. (4) Figures are for GB 1 - 3.
GRo. DDI exch. line	4	Both-way	350k	0.1	500k	1000k	45	45	
L2o. DDI exch. line	4	Both-way	4,4k	0.03	Decrea-ses	Decrea-ses	6	5	
General totals			Approx. 3,6 M. 6% of PSTN popula-tion				Approx. 70	Approx. 70	Total population of PSTN lines in these countries is about 61 M.

Annex M: Analysis of national standards, technical requirements and test specifications

COUNTRY	AVAILABLE DOCUMENTS	UNDER REVIEW	LENGTH	COMPLETENESS OF REQUIREMENTS				LAN-GUAGE	REMARKS (see Annex P)
				TECH-NICAL	SIGNAL-LING	TRANS-MISS.	TEST		
AUSTRIA	1. FZA-Dbh III 0166 2. FZA-Dbh III 0192 3. FZA-Dbh III 0210	No No No	200 p.	Yes	Yes	Yes	Yes	German	prETS 300 001 applies to a high degree
BELGIUM	CT/1-87	Yes	31 p.	Yes	Yes	Yes	Partly	French	prETS 300 001 applies to a medi-um degree
CYPRUS	Technical Requirements for Subscriber Terminal Equipment and Network Interfaces	No	30 p.	Yes	Yes	Partly	No	English	prETS 300 001 applies to a high degree
CZEKOSLO-VAKIA	Technical Specification of PABX interfaces in Czechoslovak Telecom-munication Network	Yes	40 p.	Yes	Yes	Yes	No	English	prETS 300 001 applies to a medi-um degree
DENMARK	prETS 300 001								prETS 300 001 applies completely
FINLAND	prETS 300 001								prETS 300 001 applies completely
FRANCE	ST/PAA/TPA/AGH/1022 ST/PAA/TPA/CRE/1768	Yes	35 p.	Yes	Yes	No	No	French	prETS 300 001 applies to a medi-um degree
GERMANY	1. FTZ-Richtlinie 123 R1 Teil 3, 7 & 13 2. FTZ-Richtlinie 128 R2	Yes							Documents not received
GREECE	Beschreibung der Schaltkennzeichen auf Durchwahlleitung im Netz der OTE		8 p.	Partly	Yes	No	No	German & Greek	prETS 300 001 applies to a high degree
ICELAND									No reply
IRELAND	prETS 300 001								prETS 300 001 applies completely
ITALY	103-1: Internal telephone installations	Yes	130 p.	Yes	Yes	Yes	Yes	Italian	prETS 300 001 applies to a high degree

COUNTRY	AVAILABLE DOCUMENTS	UNDER REVIEW	LENGTH	COMPLETENESS OF REQUIREMENTS				LAN-GUAGE	REMARKS (see Annex P)
				TECH-NICAL	SIGNAL-LING	TRANS-MISS.	TEST		
LUXEM-BOURG	Interface entre le reseau telephonique public et les centraux telephoniques prives avec ou sans selection directe	No	34 p.	Yes	Yes	No	No	French	prETS 300 001 applies to a high degree
MALTA									No reply
NETHER-LANDS	1. T 11-50 2. T 11-51 3. T 11-52 4. T 11-54		30 p.	Yes	Yes	No	Yes	English & Dutch	prETS 300 001 applies to a high degree
NORWAY	Type approval regulation for switching apparatus	Yes	90 p.	Yes	Yes	Yes	Yes	English	prETS 300 001 applies to a medi-um degree
POLAND									No reply
PORTUGAL	NT.CET. 101.01								No longer provided
ROMANIA									No reply
SPAIN	prETS 300 001								prETS 300 001 applies completely
SWEDEN	1. SS 63 63 22 2. SS 63 63 24 3. SS 63 63 25 4. SS 63 63 47		120 p.	Yes	Yes	Yes	Yes	English & Swe-dish	prETS 300 001 applies to a medi-um degree
SWITZER-LAND	Grundforderungen fur die Telefon-Vermitt-lungstechnik (partly).	Yes	65 p.	Yes	Yes	Yes	No	German	prETS 300 001 applies to a medi-um degree
TURKEY	Technical Requirements for PBX's.								prETS 300 001 applies to a medi-um degree
UNITED KINGDOM	BS 6450 (partly) BABT/SITS/90/44 BABT 501	Yes	160 p.	Yes	Yes	Yes	Yes	English	prETS 300 001 applies to a medi-um degree

Annex N: Manpower requirements

This Annex contains an estimate of resources required

N.1 A document containing a common, structured presentation of the attachment requirements of all countries

Based upon experience with ETS 300 001, and taking account of the lessons to be learned we may assume that if the work is undertaken by a similar method the following will apply. The task will be simpler because the national specifications already exist and the regulatory environment has changed and is better understood.

Drafting and preparation of ETS to TC Approval:

30 meetings of 4 days each with 20 experts participating (on average) = 2400 man-days, i.e. approximately 10 man years (including travelling).

If we assume 8 meetings per year then the elapsed time would be four years.

Alternatively the result could be achieved in around two years by five experts working full-time (assuming such experts can be made available). However the approval process could be delayed if all countries are not heavily involved throughout.

Considering the need for analysis and review in each country leading to TC Approval a further 10-15 man years of effort should be assumed with the cost being subsumed in the organisations participating in the approval.

The total cost is therefore in the region of 20-25 man years.

NOTE: After TC Approval additional resources would be needed to proceed to ETS adoption.

N.2 A document containing a common, structured presentation of the attachment requirements of selected interfaces in certain countries

The amount of work could be reduced by producing a document containing the attachment requirements of those interfaces which exhibit a high level of commonality with one another.

Since fewer countries would be involved and the differences would be less significant it may be assumed that the work required to reach the TC approval stage would be 7.5 man years of direct manpower with a further 11 man years to cover analysis and review in each country.

The total cost is therefore in the region of 18,5 man years.

As for option 1, after TC approval resources would be needed to proceed to ETS adoption.

N.3 A document containing a description of each national interface (in English)

This document would point to those requirements in ETS 300 001 which are also applied for attachment to the special interface and would contain details of any additional tests to be applied. The amount of work could be minimised by selecting those interfaces which exhibit a high level of commonality with one another and which are similar to the standard analogue interface defined in prETS 300 001.

If ETS 300 001 has been modified to include the attachment requirements of unguarded-clearing PBXs the direct effort required for producing this "delta" standard would be some 4 man years. otherwise, the estimated effort required to produce the document is 5 man years.

The effort needed may be reduced to (say) 3 man years if ETS 300 001 has been reduced by the exclusion of non-essential requirements.

In each case an overhead of some 150% must be added for indirect support.

The total cost is therefore from 7,5 up to 12,5 man years depending upon the contents of the relevant version of ETS 300 001.

N.4 A document listing all national specifications and giving information about national type approval procedures.

This would be a relatively simple administrative task. A comparison with the latest CEPT Yearbook should be undertaken. Liaison with the Approval authorities in each country might reveal an intention to continue to publish a YEARBOOK which could include information on PBX attachment as well as other attachments.

Annex P: Degree of commonality with respect to prETS 300 001

P.1 General

The purpose of this annex is to estimate the degree of commonality of the interfaces out of the scope of prETS 300 001, grouped in 6 categories A, B, C, D, F, G, with respect to the common part of the requirements and testing methods specified in prETS 300 001.

The degree of commonality is expressed as levels indicated by high (**H**), medium (**M**), low (**L**), nil (**no**), or replaced by the symbol (**na**) where the prETS 300 001 Clause is not applicable .

Although since the beginning prETS 300 001 was intended to cover the PSTN access for any terminal equipment, including PBXs, the structure of this prETS 300 001 appear not suitable to include the specification of complex equipment such a PBXs, and bearing in mind that the present interfaces are defined as "Interfaces out of the scope of the prETS 300 001", it is not possible to find an exact similarity.

Although the interfaces have a high degree of commonality within some categories, in most cases the prETS 300 001 Clause only applies to a part of the category population. Therefore the level of the degree of commonality is an estimate which is made up of the interface percentage, on which the prETS 300 001 Clause applies, and the similarity magnitude about the description of interface specification with respect to the prETS 300 001 Clause content, with the expert valuation (human factor) making the final weighting.

A prETS 300 001 Clause is understood as both requirement and test method description as well.

P.2 Summary

P.2.1 With respect to requirements

- 21.8% of the prETS 300 001 requirements have High degree of commonality with the requirements of all the interfaces in categories A, B, C, D, F, G.
- 6.6% of the prETS 300 001 requirements have Medium degree of commonality with the requirements of all the interfaces in categories A, B, C, D, F, G.
- 9.6% of the prETS 300 001 requirements have Low degree of commonality with the requirements of all the interfaces in categories A, B, C, D, F, G.
- 3.6% of the prETS 300 001 requirements have no commonality with the requirements of all the interfaces in categories A, B, C, D, F, G.
- 58% of the prETS 300 001 requirements are not applicable to any categories A, B, C, D, F, G.

Number and commonality weight of prETS 300 001 requirement by category

		Interface category											
		A		B		C		D		F		G	
Commonality level	Weight factor	No	Wed	No	Wed	No	Wed	No	Wed	No	Wed	No	Wed
High (H)	10	17	170	13	130	13	130	13	130	51	510	42	420
Medium (M)	6	9	54	5	30	4	24	15	30	13	78	10	60
Low (L)	2	9	18	11	22	4	8	15	30	8	16	19	38
nil (no)	1	3	3	3	3	9	9	3	3	3	3	4	4
Not applicable (na)	0	76	0	82	0	84	0	78	0	39	0	39	0
Weigted total		**245**		185		171		193		607		532	

P.2.2 With respect to testing methods

- 23% of the prETS 300 001 testing methods have High degree of commonality with the testing methods of all the interfaces in categories A, B, C, D, F, G.

- 14% of the prETS 300 001 testing methods have Medium degree of commonality with the testing methods of all the interfaces in categories A, B, C, D, F, G.

- 1.4% of the prETS 300 001 testing methods have Low degree of commonality with the testing methods of all the interfaces in categories A, B, C, D, F, G.

- 3.2% of the prETS 300 001 testing methods have no commonality with the testing methods of all the interfaces in categories A, B, C, D, F, G.

- 58% of the prETS 300 001 testing methods are not applicable to any categories A, B, C, D, F, G.

Number and commonality weight of prETS 300 001 test method by category

		Interface category											
		A		B		C		D		F		G	
Commonality level	Weight factor	No	Wed	No	Wed	No	Wed	No	Wed	No	Wed	No	Wed
High (H)	10	21	210	15	150	10	100	17	170	54	540	44	440
Medium (M)	6	14	84	14	84	11	66	14	84	16	96	27	162
Low (L)	2	0	0	0	0	0	0	2	4	8	16	0	0
nil (no)	1	3	3	3	3	7	7	3	3	3	3	4	4
Not applicable (na)	0	76	0	82	0	84	0	78	0	39	0	39	0
Weigted total		297		237		173		261		655		606	

The categories F and G exhibit the highest number of prETS 300 001 Clauses with Medium to High degree of commonality because in the outgoing call direction the calling features and some special functions are added to the transmission characteristic clauses which apply in the both ways, although the ringing signal characteristic clauses do not apply in that way.

The categories A and F gather the same interfaces, excepted for four of them (GB1i, A1o, A2o, NL2o) and so exhibit together a high degree of commonality with prETS 300 001.

The category C shows a less requirement commonality

The remainder of the categories exhibit a certain degree of commonality but within the category the prETS 300 001 commonalities apply to only some interfaces which have considerable differences with each other.

Clauses	prETS 300 001 HEADING prETS 300 001 COMMON REQUIREMENT	Degree of commonalities for each PBX-interface category Categ A	Categ B	Categ C	Categ D	Categ F	Categ G	Comments
2	**DC CHARACTERISTIC**							
2 1	Polarity	M	L	no	L	M	L	
2 2	Insulation resistance							
2 2 1	TE in quiescent condition							
2 2 1 1	Line terminal to line terminal	L	L	no	L	L	no	
2 2 1 2	Line terminal to signal earth	M	M	M	M	M	M	
2 2 1 3	Line terminals to user accessible parts	no	no	no	no	no	no	
2 2 2	TE in loop condition							
2 2 2 1	Line terminal to signal earth	M	M	M	M	M	M	
2 2 2 2	Line terminals to user accessible parts	no	no	no	no	no	no	
2 3	DC current and loop resistance	M	L	no	L	M	L	
2 4	Transient response of loop condition							
2 4 1	Quiescent to loop state	M	L	na	L	M	H	
2 4 2	Loop current transfer	na	na	na	na	na	na	
2 5	Series resistance	na	na	na	na	na	na	
2 6	DC overload susceptibility	M	M	na	M	M	M	
3	**RINGING SIGNAL CHARACTERISTIC**							
3 1	Input voltage - current characteristics							
3 1 1	Ringing detectors producing electrical signals	M	na	na	L	na	na	
3 1 2	Ringing detectors producing discernible signals	na	na	na	na	na	na	
3 1 3	TE without ringing signal detection facilities	na	na	na	na	na	na	
3 2	Overload suceptibility	L	na	na	L	na	na	
4	**TRANSMISSION CHARACTERISTIC**							
4 1	Input impedance							
4 1 1	Input impedance of TE in quiescent condition	L	L	no	L	L	L	
4 1 2	Input impedance of TE in loop condition	H	H	H	H	H	H	
4 2	Degree of unbalance about earth							
4 2 1	Longitudinal conversion loss of a one-port TE (LCL)							
4 2 1 1	Quiescent condition	H	H	H	H	H	H	
4 2 1 2	Loop condition	H	H	H	H	H	H	
4 2 2	LCL and LCTL of a series-connected TE							
4 2 2 1	Quiescent condition	H	H	H	H	H	H	
4 2 2 2	Loop condition	H	H	H	H	H	H	
4 3	Series-connected TE insertion loss	H	H	H	H	H	H	
4 4	Transmission levels							
4 4 1	Maximum transmission levels	H	H	H	H	H	H	
4 4 2	Speech band power levels of signals sent to line							
4 4 2 1	Levels of recorded, synthetic or live, speech or music	H	H	H	H	H	H	
4 4 2 2	Levels of data or code signals	H	H	H	H	H	H	
4 4 3	Unwanted outband signal levels sent to line							
4 4 3 1	Levels of recorded, synthetic or live, speech or music	H	H	H	H	H	H	
4 4 3 2	Levels of data or code signals	H	H	H	H	H	H	
4 5	Noise level							
4 5 1	Inband noise (phosphometrically weighted)	H	H	H	H	H	H	
4 5 2	Outband noise (Unweighted)	H	H	H	H	H	H	

Clauses	prETS 300 001 HEADING prETS 300 001 COMMON REQUIREMENT	Degree of commonalities for each PBX-interface category Categ A	Categ B	Categ C	Categ D	Categ F	Categ G	Comments
5	**CALLING FUNCTION**							**OUTGOING**
5 1	General							CALL
5 2	Dial tone detector							ONLY
5 2 1	Dial tone detector sensitivity	na	na	na	na	H	H	
5 2 2	Dial tone detector insensitivity	na	na	na	na	H	H	
5 3	Decadic dialling (loop pulsing)							
5 3 1	Format and timing							
5 3 1 1	Dial numbering	na	na	na	na	H	H	
5 3 1 2	Dialling pulse timing	na	na	na	na	H	H	
5 3 2	Pre-pulsing period current and loop resistance	na	na	na	na	H	H	
5 3 3	Pulsing period current and loop resistance							
5 3 3 1	Break pulse period current and loop resistance	na	na	na	na	H	H	
5 3 3 2	Make pulse period current and loop resistance	na	na	na	na	H	H	
5 3 4	Interpulsing period							
5 3 4 1	Interdigital pause							
5 3 4 1 1	Automatic or stored digit outpulsing	na	na	na	na	H	H	
5 3 4 1 2	Real time outpulsing	na	na	na	na	H	H	
5 3 4 2	Current and loop resistance	na	na	na	na	H	H	
5 3 5	Post pulsing period	na	na	na	na	H	H	
5 3 6	Spark quenching	na	na	na	na	H	H	
5 4	Dialling with MFPB (DTMF) tone bursts					**	**	
5 4 1	General requirements	na	na	na	na	H	L	
5 4 2	Signalling frequencies and format	na	na	na	na	H	L	
5 4 3	Signalling code	na	na	na	na	H	L	
5 4 4	Sending levels	na	na	na	na	H	L	
5 4 5	Unwanted frequency components	na	na	na	na	H	L	
5 4 6	MFPB transient timing							
5 4 6 1	MFPB signal rise time	na	na	na	na	H	L	
5 4 6 2	MFPB signal fall time	na	na	na	na	H	L	
5 4 7	MFPB output signal duration							
5 4 7 1	MFPB senders with manually-controlled output times	na	na	na	na	na	na	
5 4 7 2	MFPB senders with automatic operation	na	na	na	na	H	H	
5 4 8	Suppression of unassociated signals	na	na	na	na	H	H	
5 5	Switching after dialling condition	na	na	na	na	H	H	
5 6	Automatic calling functions							
5 6 1	General requirements							
5 6 1 1	Hardware/software realisation	na	na	na	na	M	M	
5 6 1 2	Call-up from memory	na	na	na	na	H	H	
5 6 1 3	Call progress monitoring	na	na	na	na	na	na	
5 6 2	Automatic checking of line condition	na	na	na	na	na	na	
5 6 3	Initiation of dialling							
5 6 3 1	Automatic initiation of dialling	na	na	na	na	M	M	
5 6 3 2	Manual initiation of dialling	na	na	na	na	M	M	
5 6 4	Automatic control of call progress	na	na	na	na	H	H	
5 6 5	Initiation of transmission							
5 6 5 1	Automatic initiation of transmission	na	na	na	na	na	na	
5 6 5 2	Manual initiation of transmission	na	na	na	na	na	na	

Clauses	prETS 300 001 HEADING prETS 300 001 COMMON REQUIREMENT	Degree of commonalities for each PBX-interface category Categ A	Categ B	Categ C	Categ D	Categ F	Categ G	Comments
5 6 6	Transmission duration control							
5 6 6 1	Automatic transmission duration control	na	na	na	na	na	na	
5 6 6 2	Manual transmission duration control	na	na	na	na	na	na	
5 6 7	Automatic repeat function							
5 6 7 1	Repeat call attempts	na	na	na	na	na	na	
5 6 7 2	Number of repeat call attempts	na	na	na	na	na	na	
5 7	Identification signals							
5 7 1	Data related tones	na	na	na	na	na	na	
5 7 2	Speech or other non-data related tones	na	na	na	na	na	na	
6	**ANSWERING FUNCTION**							
6 1	General							
6 2	Ringing signal reception							
6 2 1	Ringing signal detector sensitivity	H	na	na	L	na	na	
6 2 2	Ringing signal insensitivity	H	na	na	L	na	na	
6 2 3	Immunity to decadic dialling from a parallel TE	na	na	na	na	na	na	
6 3	Automatic answering function							
6 3 1	Automatic establishment of loop condition	na	na	na	na	na	na	
6 3 2	Insensitivity to ringing signals	na	na	na	na	na	na	
6 3 3	Answering signal	na	na	na	na	na	na	
6 4	Automatic control of loop condition							
6 4 1	TE without information related control of loop condition	na	na	na	na	na	na	
6 4 2	TE with information related control of loop condition							
6 4 2 1	Data or code signal related control	na	na	na	na	na	na	
6 4 2 2	Incoming speech or other non data signal related control	na	na	na	na	na	na	
6 4 2 3	Remotely transmitted control signals	na	na	na	na	na	na	
6 4 3	TE with network tone related control of loop condition	na	na	na	na	na	na	
6 4 4	TE with control of loop condition related to certain network DC conditions	na	na	na	na	na	na	
7	**POWER FAILURE**							
7 1	Power failure with TE in quiescent condition	M	M	M	M	M	M	
7 2	Power failure with TE in condition other than quiescent condition	M	M	M	M	M	M	
8	**CONNECTION METHODS**							
8 1	Network termination point for the PSTN	L	L	no	L	L	L	
8 2	Single terminal connection for PSTN access	L	L	no	L	L	L	
8 3	Simple multiple terminal connection for PSTN access	no	no	no	no	no	no	

Clauses	prETS 300 001 HEADING prETS 300 001 COMMON REQUIREMENT	Degree of commonalities for each PBX-interface category Categ A	Categ B	Categ C	Categ D	Categ F	Categ G	Comments
9	**SPECIAL FUNCTIONS**							
9 1	Register recall							
9 1 1	Break period	na	na	na	na	M	M	
9 1 2	Pre-break and post-break period	na	na	na	na	M	M	
9 2	Meter pulse reception							
9 2 1	12 or 16 kHz meter pulses							
9 2 1 1	Sensitivity and selectivity	na	na	na	na	H	H	
9 2 1 2	Timing	na	na	na	na	H	H	
9 2 1 3	Attenuation at meter pulse frequencies for series connected TE	na	na	na	na	H	H	
9 2 1 4	Return loss at meter pulse frequencies	na	na	na	na	H	H	
9 2 2	50 Hz meter pulses							
9 2 2 1	Input longitudinal impedance at 50 Hz	na	na	na	na	H	H	
9 2 2 2	Sensitivity	na	na	na	na	H	H	
9 2 2 3	Insensitivity	na	na	na	na	H	H	
9 3	Disabling of echo control devices	na	na	na	na	na	na	
9 4	Loop current detection							
9 4 1	Loop current detector D1							
9 4 1 1	Series connected TE with switch 5 in position 1	L	L	L	L	L	L	
9 4 1 2	Series connected TE with switch 5 in position 2							
9 4 1 2 1	Type A	L	L	L	L	L	L	
9 4 1 2 2	Type B	L	L	L	L	L	L	
9 4 2	Loop current detector D2	L	L	L	L	L	L	
9 5	PSTN tone detection							
9 5 1	Dial tone detection	na	na	na	na	H	H	
9 5 2	Special dial tone detection							
9 5 2 1	Special dial tone detector sensitivity	na	na	na	na	H	H	
9 5 2 2	Special dial tone detector insensitivity	na	na	na	na	H	H	
9 5 3	Busy tone detection							
9 5 3 1	Busy tone detector sensitivity	na	na	na	na	H	H	
9 5 3 2	Busy tone detector insensitivity	na	na	na	na	H	H	
9 5 4	Congestion tone detection							
9 5 4 1	Congestion tone detector sensitivity	na	na	na	na	H	H	
9 5 4 2	Congestion tone detector insensitivity	na	na	na	na	H	H	
9 5 5	Ringing tone detection							
9 5 5 1	Ringing tone detector sensitivity	H	na	na	na	na	na	
9 5 5 2	Ringing tone detector insensitivity	H	na	na	na	na	na	
9 5 6	Special information tone detection							
9 5 6 1	Special information tone detector sensitivity	na	na	na	na	na	na	
9 5 6 2	Special information tone detector insensitivity	na	na	na	na	na	na	
9 6	Detection of remote party signal							
9 6 1	Answering tone detection							
9 6 1 1	Answering tone detector sensitivity	na	na	na	na	na	na	
9 6 1 2	Answering tone detector insensitivity	na	na	na	na	na	na	
9 6 2	Speech signal detection	na	na	na	na	na	na	
9 6 3	Data signal detection	na	na	na	na	na	na	
9 6 4	Remote activation tone detection	na	na	na	na	na	na	

Annex Q: National approval authorities

COUNTRY	APPROVAL AUTHORITY	REMARKS
AUSTRIA	Austrian - PTT Postgasse 8 A-1011 Vienna	
BELGIUM	Minister of Telecoms, advised by RTT-BELGACOM Labo DT Bd. de l'Impératrice 17-19 B-1000 Bruxelles	
CYPRUS	CTA Cyprus Communications Authority PO Box 4929 CY-142-Nicosia	
CZEKOSLOVAKIA	PTT Research Institute, advised by PTT Homologation centre Hvozdanska 3 CS-14950 Praha 4	
DENMARK	National Telecom Agency Holsteinsgade 63 DK-2100 Copenhagen	As for ETS 300 001 terminals
FINLAND	Telecommunications Administration Centre-Inspection Dept. PO Box 53 SF-00211 Helsinki	As for ETS 300 001 terminals
FRANCE	France Telecom/CNET Dept. PAA/SRE/CRE 38 rue du Gal Leclerc F-92131 Issy les Moulineaux	
GERMANY	BZT Talstrasse 34-42 Postfach 3050 D-6600 Saarbrücken	
GREECE	OTE (PBX department) 2 Galaxia Street 117 45 Athens	
ICELAND	Teleinspectorate Malarhofdl 2 112 Reykjavik	No reply
IRELAND	Dept. of Tourism, Transport & Communication Scotch House Hawkins St. IR-Dublin 2	As for ETS 300 001 terminals
ITALY	IGT Divisione III Viale Europa 190 00144 Roma	
LUXEMBOURG	PTT Division des Télécommunications Service des Centraux L-2999 Luxembourg	
MALTA	Address not available	No reply
NETHERLANDS	HDPT Ministry of Transport and Public Works PO Box 450 NL-9700 AL Gronigen	

NORWAY	NTRA Norwegian Telecom Parkveien 57 PO Box 2592, Solli N-0203 Oslo	
POLAND	Address not available	No reply
PORTUGAL	Instituto das Comunicacoes de Portugal STDS & Approvals Direction Av. Jose Malhoa Lote 1683 P-1000 Lisboa	
ROMANIA	Institutul Roman de Standardizare 13, Jean Louis Calderon RO-70201 Bucharest 2	Information not avaible
SPAIN	Ministerio de Obras Publicas y Transportes Direccion General de Telecommunicaciones Palacio de Communicaciones Pta Y 5e Pta Plaza de Cibeles s/n E-28014 Madrid	As for ETS 300 001 terminals
SWEDEN	Swedish Telecom Networks S-12386 Farsta	
SWITZERLAND	BAKOM GDPTT, VTI TZV CH-3000 Bern 29	From 1.5.92
TURKEY	General Directorate of PTT (TO & M Dept) PTT AR-GE Müdürlügü Dikmen Santral Binasi TR-06450 Ankara	
UNITED KINGDOM	Department of Trade and Industry TP Division "Bull's Barn" Ashfield Stowmarket IP 14 6LX - UK	Approval given after type examination + field trial.

Annex R: An estimate of the value of the potential benefits

The Value of Benefits

This Annex contains a subjective assessment of the potential benefits.

The Project Team attempted to place a value on the benefits to be obtained from producing a new ETS but a satisfactory result could not be achieved.

The most important benefit to be gained from the publication of a document containing in a common form a structured collection of existing national attachment requirements is the savings to the equipment supplier in obtaining all the information needed to achieve type approval in all the European countries.

An ETS containing all the required information in a single language and in a structured form will reduce the time needed to study the different national requirements leading to greater efficiency and competitiveness in supply. This may be of greater significance to new entrants to the market and new suppliers may therefore be encouraged.

Test houses will be able more easily to interprete the requirements and to carry out the tests which will satisfy the approval authorities of more countries and so competition between laboratories is likely to increase.

More competition in equipment supply and approvals testing will benefit users indirectly. However, existing established suppliers and test houses will have to adjust to the use of the new standard. Existing knowledge will have less value. New test equipment may be needed.

A further benefit may accrue from the increased stability of national requirements. The improved availability of requirements may help users to refer to standards in procurement contracts. The effective extent of public procurement requirements will increase and so efficiency and competitiveness of procurement will increase.

Annex S: Preliminary comparison of the position of each country on the approval of PBX and other complex apparatus to the PSTN

European Telecommunications Standards Institute **PSTN FSG 3 (92). 7**

ETSI

3rd Meeting

PSTN Access Mandate Full Steering Group

London, 29 - 30 April 1992

Editor's NOTE: Changes have been made to the entries for Norway and Switzerland at the request of STC BT2 WP-G on 28th October 1992.

SOURCE : Leaders of Project Teams PT 17V and PT18V

TITLE : Preliminary comparison of the position of each country on the approval of PBX and other complex apparatus to the PSTN

This analysis has been made from a review of prETS 300 001 (March 1992) Chapter 1.2 and the replies received in response to the PT18V questionaire. It reveals some uncertainty about the requirements of some countries for access to the analogue interface by PBX.

COUNTRY	**COMPARISON :** **ETS 300 001 Chapt. 1.2 (scope statement) and PT18V reply**	**REMARKS** *** Need to separate type approval from connection approval (ie for individual installations)**
AUSTRIA	No additional testing of PBX connected to ETS 300 001 interface. 2 cases of special interface for PBX	
BELGIUM		no reply yet
CYPRUS	No additional testing of PBX connected to ETS 300 001 interface Special DDI interface	
CZEKOSLOVAKIA		no reply yet

DENMARK	National requirements apply for TE which are part of PBX or other complex installations All analogue interfaces provided are within the scope of ETS 300 001.	
FINLAND	No additional testing of PBX connected to ETS 300 001 interface. Interfaces N2 and R2 have been provided for attachment of PBX. PBX is not subject to type approval.	No longer provided *
FRANCE	National values in ETS 300 001 do not apply to complex installation 5 cases of special interface for PABX etc	Ref . TE 10-01 and TE 10-02 + national standards
GERMANY	Special regulations apply for certain PABX and other complex apparatus attached to ETS 300 001 interface. 2 cases of special interface for PABX, and Emergency calls	Peculiarities of ex-GDR network to be considered
GREECE		no reply yet
ICELAND		no reply yet
IRELAND	ETS 300 001: no additional testing for PABX also no special interface	
ITALY	For ETS 300 001 interface, national requirements apply to TE containing call routing or switching functions 2 cases of special interface for PABX etc	
LUXEMBOURG	For ETS 300 001 interface, no additional testing of PBX. 2 cases of special interface for PABX etc	
MALTA		no reply yet
NETHERLANDS		no reply yet
NORWAY	National requirements apply for TE which includes call routing and switching functions and which provides local loop current on the extension side when connected to an ETS 300 001 interface. 2 cases of 2 wire interface in use (but now discontinued) and 2 cases of 4 wire interface for PABX etc	

POLAND		no reply yet
PORTUGAL	No additional testing of PBX connected to ETS 300 001 interface. 2 wire interface without DDI for PBX	
ROMANIA		no reply yet
SPAIN	No interface provided outside scope of ETS 300 001. No additional testing of PBX.	
SWEDEN	No additional testing of PBX connected to ETS 300 001 interface. 4 cases of special interfaces for PBX etc	1 case is bothway version of other two 1 case is for DDI
SWITZERLAND	For ETS 300 001 interface; no additional testing for PBX. 2-wire DDI interface provided.	
TURKEY	No entry in ETS 300 001 2-wire interface without DDI for PBX	std subs line
UNITED KINGDOM	National requirements apply for TE that contains certain call routing and certain switching functions when connected to a ETS 300 001 interface. 4 cases of special interface for PBX etc	1 case is for DDI

History

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