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PROGRESS REPORT 1993

CONCERNING THE COORDINATED INTRODUCTION OF THE INTEGRATED SERVICES DIGITAL NETWORK (ISDN) IN THE EUROPEAN COMMUNITY

(presented by the Commission)

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0 EXECUTIVE SUMMARY

This *fourth* Progress Report has been prepared for submission to the Council and the European Parliament in accordance with Article 7 of the Council Recommendation on the "Coordinated Introduction of the Integrated Digital Services Network" (ISDN) in the European Community (86/659/EEC).

Since the previous report five further operators have been added to the list of commercial providers of ISDN offerings. ISDN is now available in nine Member States and there are about 350.000 ISDN accesses installed in these countries. All commercially opened networks in the Member States are interconnected. Only in Greece and Portugal no commercial ISDN offering exists currently. In Luxembourg, which will start its own ISDN early 1994, it is possible to obtain ISDN accesses from France Télécom. While current ISDN implementations are based on national specifications which have some differences, ETSI, the European Telecommunications Standards Institute, had finalised all harmonised EURO-ISDN requirement standards by the end of 1992.

Upon a proposal from the Commission, an event for the introduction of EURO-ISDN, EURIE '93, was successfully held in December 1993.

In its Resolution from 5 June 1992[1] the Council has recognised the importance of ISDN to be developed as a trans-European network. The Commission has meanwhile adopted a Communication and two proposals for Council Decisions[2] to this end. A rapid deployment of EURO - ISDN will facilitate the functioning of the single market.

Furthermore, on 05 June 1992 the Council adopted a Recommendation[3] concerning the application of the open network principles to ISDN.

In September 1993 the Commission submitted a proposal to the Council and the European Parliament for the development of ISDN as trans-European network. The White Paper for growth, competitiveness and employment, that was approved by the heads of state and government on 10/11 December, includes proposals for EURO-ISDN.

Issues raised in previous reports like the European User Forum (EIUF) and the ISDN terminal interconnection testing with Japan are further discussed.

Type approval standards for EURO-ISDN remain an issue for urgent resolution. Further work is also required for private ISDN networking.

Finally, importance is attached to the development possibilities of ISDN in the changing regulatory context. Telephony is an important service for ISDN and therefore the continued liberalisation (c/f Review '92[4]) has a direct bearing on ISDN.

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1 OJ No. C 158/1-2, 25.06.92

2 COM(93) 347, 1.9.93

3 OJ No. L 200/10, 18.07.92

4 COM(93) 159 final, 28.04.93

A general deployment of EURO-ISDN with a priority for its availability to all business users remains a key political objective of the Community's telecommunications policy for the coming years. Notably, small and medium sized enterprises (SME's) depend on the availability of a modern generally available telecommunications infrastructure, since SMEs (approx. 14 million in the Community) can typically not afford dedicated network solutions.

1 INTRODUCTION

In the beginning of 1993, a period of seven years of intensive efforts towards the achievement of the single market for goods and services, for capital and persons has been completed.

Also for the introduction of ISDN in the Community the change of the years 1992/1993 marks a turning point.

While so far the investments made in the Member States went into national versions of ISDN, all Public Network Operators (PNO's) in the Community have started in 1993 to introduce EURO-ISDN.

As for the single market, the efforts for a coordinated introduction of ISDN have been started eight years ago.

This *Coordinated* Introduction of ISDN in the Member States is the main objective of the Community's telecommunications policy in this field.

EURO-ISDN, is the implementation of a common set of compatible ISDN functionalities and services based on harmonised standards and with full interconnectivity between all Member States.

When analysing the policy efforts for ISDN in the Community, it is interesting to consider the impact of the changed regulatory environment on the ISDN introduction.

Two major aspects are of interest:

- the impact of the "separation of powers" between regulatory and operational functions and
- the impact of an eventual further liberalisation, notably of the public real time switched voice service.

While these aspects are further deepened later in this report, it is worth noting here, that the questions, whether ISDN remains a priority for the telecommunications policy in the Community, can be answered clearly.

Title XII of the Maastricht Treaty establishes the context between *the operation* of the single market and the trans-European networks: a proper functioning of the single market where the full benefits of the economic area without internal frontiers can be exploited, is only feasible on the basis of the availability of truly trans-European-networks (TEN).

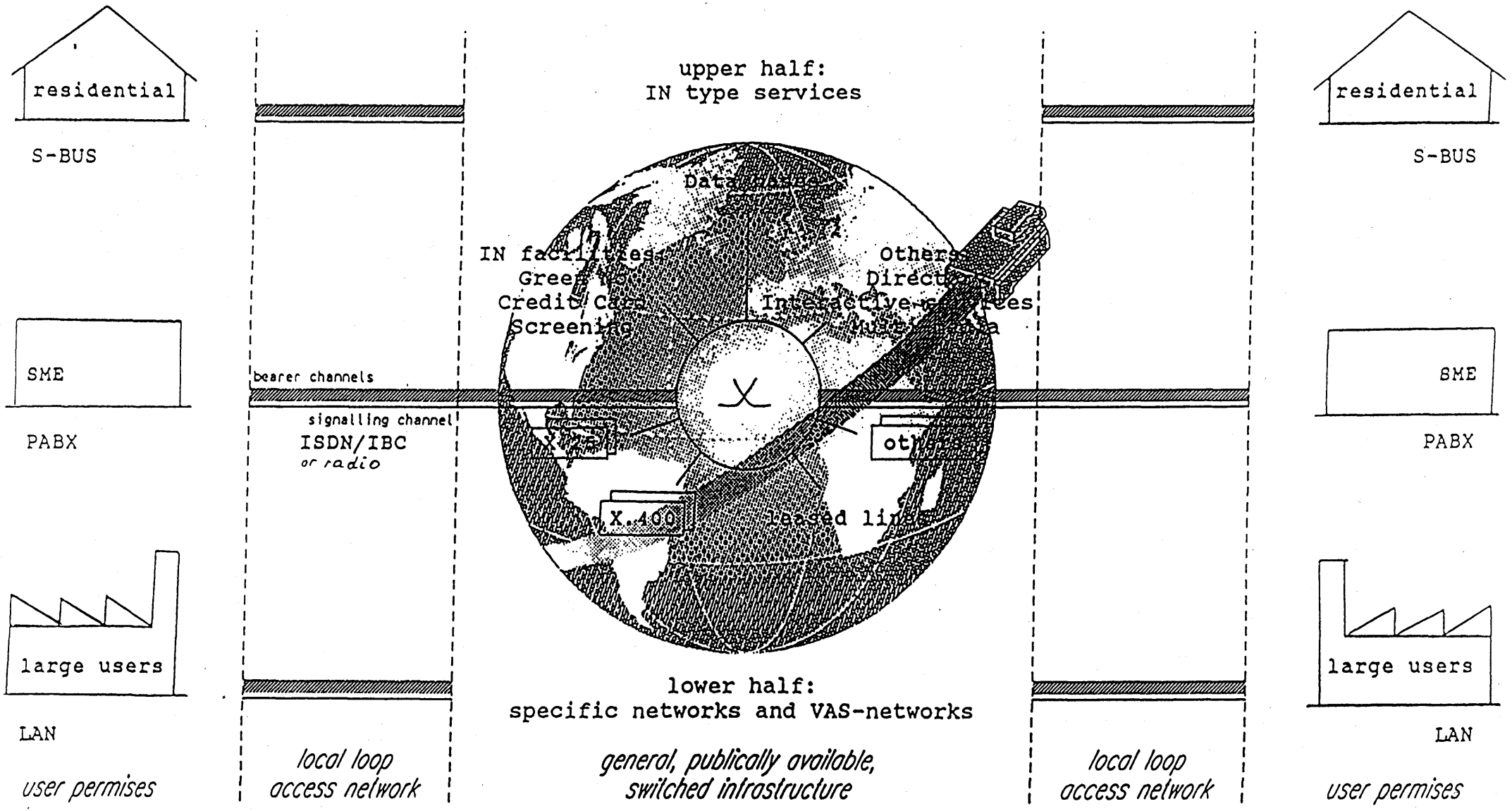
Given the nature of ISDN as the general switched infrastructure being developed as the successor of todays telephone network, **the right answer to the general (tele-) communications needs of the single market is EURO-ISDN.**

Owing to this universal vocation, ISDN is ideally suited (and targeted) to develop within a few years to a mass service which satisfies the needs in particular of small and medium sized businesses (SME's) which count for more than 14 million in the Community.

From the user and (third party) service provider perspective ISDN is of major interest also because of its role as "universal access and delivery platform" (see Figure 1) for services and other networks.

Figure 1

The universal multi-purpose access platform



Leading edge customers will equally benefit from the advantages of ISDN. At the same time they will also be able to make use of most advanced technical solutions which by their nature can neither be afforded (in an early period of their market availability) by small businesses nor is it feasible to reach rapidly a full coverage for those solutions for all businesses.

In line with the Resolution of the Council from 05 of June 1992 and without prejudice to further changes in the regulatory environment, the answer to the above question is therefore that, **ISDN continues to be a high priority of the Community's telecommunications policy.**

Consequently, the continued efforts for the introduction of ISDN aim at a rapid deployment of EURO-ISDN in the whole Community. These efforts will be addressed anew, by the initiatives currently prepared under the framework of TEN proposals.

The Recommendations of the Council on the application of the ONP principles to ISDN will contribute to the achievement of these objectives.

Owing to its nature of general public infrastructure, ISDN was included in the range of topics discussed in the context of the growth initiative. Following the Council meetings in Edinburgh and Copenhagen where the growth initiative was decided, several measures have been brought on its way. One important aspect of relevance also for telecommunications networks is the plan to shift expenditure to public infrastructure projects.

In order to promote this plan, a temporary lending instrument, in the first place with an envelope of 5 BECU and managed by the European Investment Bank was put in operation.

EURO-ISDN projects can benefit from this new instrument.

1.1 PURPOSE OF THIS REPORT

The purpose of this report is to give an account of the progress on the Council Recommendation 86/659/EEC of 22 December 1986 concerning: **"The Coordinated Introduction of the Integrated Services Digital Network (ISDN) in the Member States of the European Community"**.

It is the fourth Annual ISDN Report produced in accordance with Article 7 of the said Recommendation. The report provides information on:

Section 2: Progress of current implementations in the MS

Section 3: Progress in standardisation

Section 4: Introduction plans for EURO-ISDN

Section 5: Migration to EURO-ISDN: issues and problems

Section 6: ONP, Data protection, (Tariffs)

Section 7: Progress of ISDN in the less favoured regions: STAR, Telematique and future plans

Section 8: ISDN development outside the Community

Section 9: Initiatives and new proposals

2 PROGRESS OF ISDN IMPLEMENTATIONS IN THE MEMBER STATES

This Section concerns the progress of the implementations of the current ***pre-EURO-ISDN*** offerings in the Member States made until the end of 1993.

Current ISDN offerings are based on *national standards* which show some variations with regard to the options and range of services provided. The type of differences between the various current ISDN implementations and the reasons for them were described in more detail in the Third Annual ISDN Report and have not changed in essence (please refer Section 2.1 of that report).

Chapter 4 gives an account of the planning for the EURO-ISDN based on *harmonised European standards*.

ISDN has been offered in the Community since 1987 and by the end of 1992 seven Member States (B, D, DK, F, I, UK and NL) had commercial ISDN offerings.

Except Greece, the PNO's of all other Member States were operating ISDN pilots in the course of 1992.

By the end of 1993 the PNO's in three further Member States, Ireland Spain and Portugal had also introduced commercial ISDN services.

At the same time the operators of three countries (D, DK and F) provided full geographical coverage of their ISDN offerings (D: in the old Bundesländer), i.e., throughout the whole country the option to subscribe to ISDN existed in 1992.

Deutsche Bundespost TELEKOM and France TELECOM have achieved a significant penetration of ISDN. At the end of 1993, the Deutsche Bundespost TELEKOM counted 281 thousand subscribers of Basic Rate Accesses (BRA)[5] and 18 thousand Primary Rate Accesses (PRA). France TELECOM accounts showed 91 thousand users of the BRA and 12 thousand installed PRA.

With regard to the PRA, it is worth mentioning that almost 100 % of new PABX (beyond a certain size) are connected to ISDN, owing to the attractiveness of the tariffs in Germany for this connection type.

Owing to the later introduction and to some other reasons the numbers of ISDN accesses in operation in the other Member States are lower (also in comparative terms).

Interconnections exist, either direct or in transit, between all Member States with commercial ISDN offerings. This is remarkable in so far as interconnectivity for newly introduced networks is frequently a problem.

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5 please refer to the *Glossary of Technical Terms* (Annex 6) for explanation

Table 1 provides an overview comprising the following type of data per Member State and PNO (geographical coverage, number of subscriptions, terminal addressing, migration to EURO-ISDN).

Table 2 provides an overview of the status of international interconnections and the signalling protocol in use.

Table 3 provides an overview of the services provided nationally and internationally.

Acknowledgement

All information provided here concerning the state of implementation of ISDN has been furnished by the PNO's concerned. The CEC thanks the PNO's for their kind collaboration.

Table 1: ISDN coverage - subsribtions - migration to EURO-ISDN

	territorial coverage		number of subscribtions		terminal addressing				migration to EURO-ISDN		
	BRA (%)	PRA (%)	BRA	PRA	E 164 (DDI)	MSN	HLC	Subaddr.	offering existing ISDN until	offering EURO-ISDN from	tariffs fixed
Belgium	15	100	1500	15	yes	yes	no	yes	end 1994	1993	1993
Denmark Tele Denmark	100	100	1217	62	yes	yes	yes	yes	only EURO-ISDN	Jan-92	Jan-92
France	100	100	91000	12000	yes	yes		yes	upgrade	Dec-93	
Germany			281000	18000	yes	yes	yes	no	2000	1993	Apr-93
old Laender new Laender	70 ded. cities	70 ded. cities									
Greece	—	—	—	—	—	—	—	—	—	early-94	no
Ireland		pilot ISDN subscribers			commercial start of ISDN in July 93					Dec-93	Dec-93
Italy	37	37	1000	20	yes	yes	yes	in 1994	Nov-93	Nov-93	Nov-93
Luxembourg	only aera of the city of Luxembourg		12		commercial start of ISDN begin 1994					early-94	no
Netherlands	(70% end 1994) 40	40	850	42	yes	yes	yes	yes	1998	Jun-93	Apr-93
Portugal		pilot ISDN subscribers									
TLP	40	40	68	16	yes	yes	yes	yes	only EURO-ISDN	end 1992	latest end 1993
CPRM											
		pilot ISDN subscribers									
TP	50	50	100	15	yes	yes	yes	yes	only EURO-ISDN	end 1992	latest end 1993
Spain		pilot ISDN subscribers			commercial start of ISDN in June 93						
	10	10	150		yes	yes	yes	yes			
UK											
BT	< 90	100	44000	6000	yes	yes	limited	yes	2000	Oct-93	Jul-93
Mercury											

Status: 01.01.93 (some of the data are updated towards the end of 1993)

Table 2: International ISDN connections - protocols

	international ISDN connections from EC countries / protocol											
	Belgium	Denmark	France	Germany	Greece	Ireland	Italy	Luxembourg	Netherlands	Portugal	Spain	UK
Belgium		TUPj		TUPj	2)	TUPj (10-93)		3)	TUPj	ISUP V.1	TUPj	
Denmark	TUPj			TUP+	2)			3)	TUP+	ISIP V.1	TUPj	
France	TUPj	TUP+		TUP+	2)	TUPj (9-93)	TUP+	3)	TUP+		TUPj	
Germany	TUPj	TUP+			2)		TUP+	3)	TUP+	ISUP V.1	TUPj	
Greece					2)			3)				
Ireland					2)			3)				
Italy				TUP+	2)			3)				
Luxembourg					2)			3)				
Netherlands	TUPj	TUP+		TUP+	2)		TUPj	3)		ISUP V.1	TUPj	
Portugal					2)			3)				
Spain	TUPj	TUPj		TUPj	2)		TUPj	3)	TUPj			
UK	TUPj	TUP+		TUP+	2)	ISUP (11-93)	TUP+	3)	TUP+	ISUP V.1		
Japan	TUPj	TUPj		TUPj	2)	TUPj (9-93)		3)	TUPj		TUPj	
USA	TUPj			TUPj	2)	TUPj		3)	TUPj		TUPj	
Switzerland		TUPj		TUPj	2)			3)	TUPj	ISUP V.1 1)		
Finland	TUPj	TUPj		TUPj	2)			3)	TUPj		TUPj	
Sweden		TUPj		TUPj	2)		TUPj	3)	TUPj	ISUP V.1 1)	TUPj	
Norway		TUPj		TUPj	2)		TUPj	3)	TUPj			
Austria					2)			3)				
Singapore	TUPj			TUPj	2)			3)	TUPj		TUPj	
Australia	TUPj	TUPj		TUPj	2)			3)	TUPj		TUPj	
Hong Kong	TUPj	TUPj			2)			3)				

1) to be set up until the end of 1993
2) ISUP is now installing in Greek network
3) Pre-ISDN in cooperation with France Telecom

Status: 01.01.93

Table 3: National and international supported services-

	national (N) and international (I) supported services																
	Belgium	Denmark		France	Germany	Greece	Ireland (Dec 93)	Italy	Luxembourg	Netherlands	Portugal			Spain	UK		
		PTT T.	TeleD.								TLP	CPRM	TP		BT	Mercury	
64 Kbit/s unr.	N,I		N,I		N,I	N	N,I	N,I	N,I	N,I	N,I	I	N,I	N,I	N,I		
3.1 KHz audio	N,I		N,I		N,I	N	N,I	N,I		N	N,I	I	N,I	N	N,I		
speech	N,I		N,I		N,I	N	N,I	N,I			N,I	I	N,I	N	N,I		
X.31	N				N,I	N	N				N		N				
Teleph. 3.1 KHz	N		N,I		N,I		N,I	N,I		N	N,I	I	N,I				
FAX gr 4	N		N,I		N,I		N,I	N,I		N,I	N	I	N	N			
Teletex			N,I										N	N			
Telephony 7 KHz	N		N					N,I									
Videotex			N		N,I					I	N	I	N	N			
Videotelephony	N		N		N,I		N,I	N,I		I	N		N				
CLIP	N		N,I		N,I		N	N,I		N,I	N,I	I	N,I	N	N,I		
CLIR	N		N,I		N,I		N	N,I		N,I	N,I	I	N,I	N	N,I		
DDI	N		N		N,I		N	N,I		N	N,I	I	N,I	N	N		
MSN	N		N		N,I		N	N,I		N	N,I	I	N,I	N	N		
TP	N		N,I		N,I		N	N,I		N	N	I	N,I	N			
CW	N		N		N,I			N,I			N,I		N,I	N			
CCBS																	
CUG	N		I		N,I						N,I	I	N,I				
UUS	N		N,I				N,I				N,I	I	N,I	N			
SUB	N		N,I								N,I	I	N,I	N	N		
3PTY					N,I												
AOC	N				N,I			N,I		N	N		N	N			
COLP	N							N,I			N	I	N	N	N		
COLR	N							N,I			N	I	N	N	N		
MCID	N				N,I			N,I			N		N				
CONF																	
MMC																	
FPH																	
ECT																	
CFB											N,I		N,I				
CFNR					N,I						N,I		N,I				
CFU	N				N,I						N,I		N,I	N			
CD																	
HOLD					N,I												

Status: 01.01.93

3 PROGRESS IN STANDARDISATION

3.1 INTRODUCTION

The transition from the national ISDN offerings to EURO-ISDN depends as one prerequisite on the availability of a complete set of basic standards which enable the implementation of EURO-ISDN in an unambiguous and compatible manner throughout Europe.

ETSI, the European Telecommunications Standards Institute is responsible for all standards related to EURO-ISDN.

A detailed description of the method adopted by ETSI to organise this huge standardisation task, notably with the creation of the ISDN Standards Management (ISM) committee has been given in the preceding report.

ISM, which's mandate was confined to the management of the standards related to the EURO-ISDN has come with its 13th meeting in November 1991 to the end of its terms. Its successor, the new ISDN Management and Coordination Committee (IMCC), which had taken over the responsibilities of ISM and which's tasks had been enlarged to cover in particular also the interest of standardisation for private ISDN networks, finished its work after the 6th meeting.

3.2 STATUS OF EURO-ISDN STANDARDS

The scope of work in relation to the EURO-ISDN comprises 180 standards devided into 196 work items. These standards cover areas like network aspects, interfaces, services, test standards a.o.m.

These EURO-ISDN standards including the technical reports which go along with them fill several thousand pages.

A comprehensive overview on those standards is given in the ETR[6] 10 which can be procured from ETSI. The address of ETSI is found in Annex 1.

In order to describe the status of ISDN standards, ETSI documents identify 12 "Status classes" indicating the progress of a standards towards completion (from "No draft available" to "publication of the standard").

According to the prevailing interpretation, standards which are in status class 8 (= approval by relevant Technical Committee) or higher are considered as technically stable and suitable as basis for implementation.

From Figure 2 it can be seen that 165 work items (equals 84 %) are in status class 8 or higher.

All standards required for the implementation of EURO-ISDN were finished by the end of 1992.

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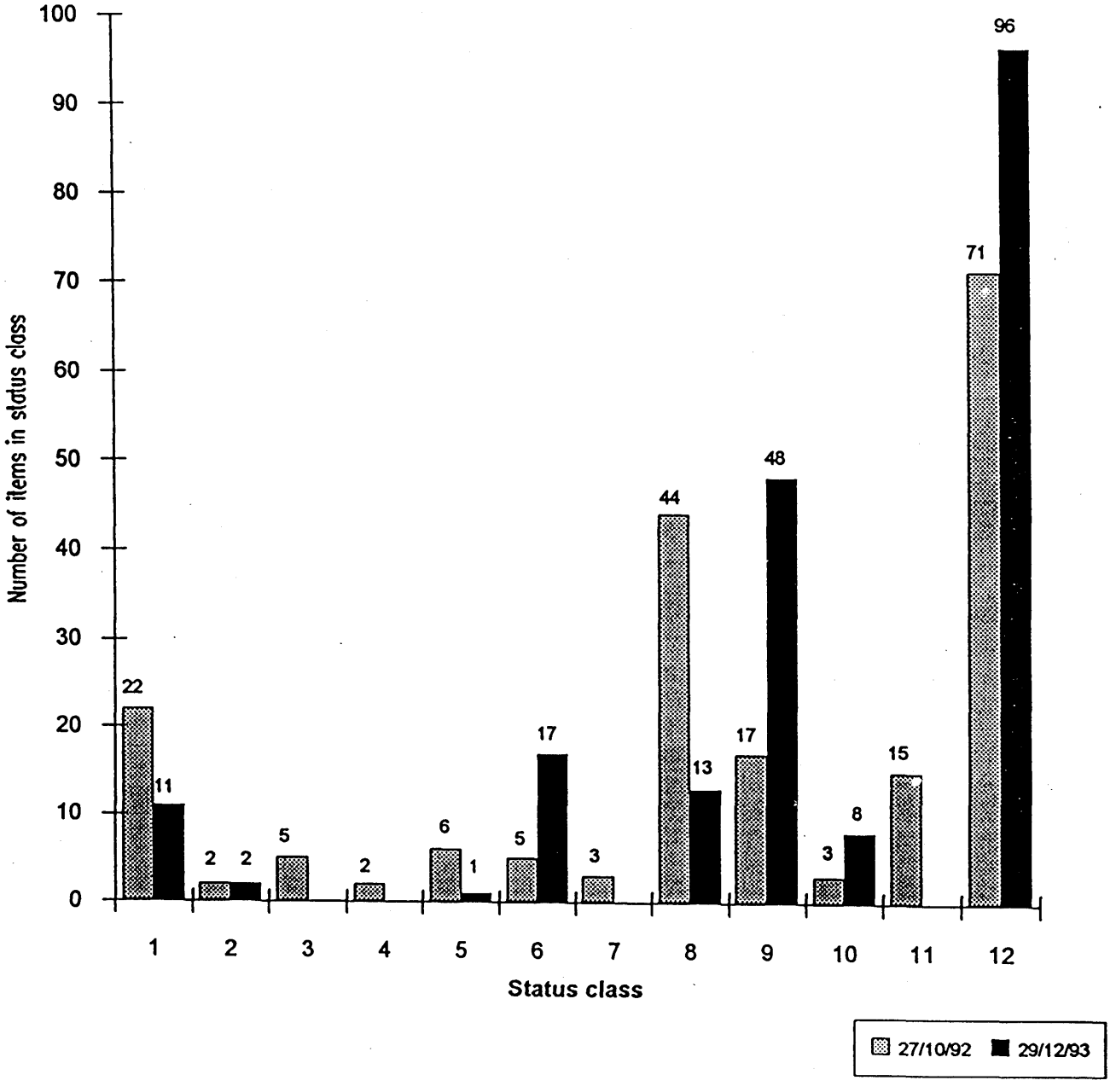
6 ETSI Technical Report

Fig. 2: Progress towards completion of ISM standards



From the remaining 31 work items, 24 concern test standards, which have often been started later and 7 relate to general and interworking aspects which are not required for implementation purposes.

In conclusion, all requirement standards related to the MoU services and network aspects are stabilised. The difficulties which have existed for the standards concerning two supplementary services, CCBS[7] and ECT[8] have been resolved. It remains in essence to finalise part of the test standards.

The CEC has substantially contributed to this work programme, also by two standardisation mandates.

3.3 FREEZING OF EURO-ISDN STANDARDS

Upon a proposal from the CEC, DG XIII ETSI has worked out and decided about a freezing of EURO-ISDN standards.

The purpose of the freezing of EURO-ISDN standards is to enable a stable implementation of the EURO-ISDN facilities, so that at least for a certain period the compatibility of the functionalities concerned (first and foremost the user/network interfaces but also services) can be ensured.

Normal maintenance of the concerned standards, work on compatible extensions and work on other standards (not concerned by the freezing) will continue.

It was decided that the period of freezing is three years ending in June 1995.

3.4 FURTHER ISDN STANDARDISATION

In the area of public ISDN standardisation work continues related to services not covered by the MoU on ISDN (sometimes referred to as "Priority 3" standards). Further ongoing work is related to private ISDNs.

As it was referred to above, the task of the successor committee IMCC has been enlarged by the interests for private ISDN networks taken over from CENELEC[9]. Also this work programme which started in 1988 in CENELEC was covered by a mandate from the CEC.

This mandate (BC-IT-74 to BC-IT-77) aimed at an adequate level of interworking between private and public ISDN services enabling interoperability of terminals, ISPBX's and CENTREXs in a multi-vendor environment. A taxonomy for the standardisation aspects of this area is given in M-IT-05.

The programme of work in this area is of a similar size and complexity as the one for EURO-ISDN. While the existing EURO-ISDN standards take account of private and public ISDN interworking in particular for ISDN bearer services and ISDN telematic services, more elaborated requirements from the private ISDN area have meanwhile been put forward in the standardisation committees.

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7 Completion of Calls to Busy Subscribers

8 Explicit Call Transfer

9 Comité Européen de Normalisation Electrotechnique

ECMA[10] and the IPNS[11] Forum have and continue to contribute for a good deal of this work area for which within ETSI the Technical Committee Business Telecommunications (BT) is formally responsible.

As it can be derived already from the sheer size of the task, it will not be possible to finalise these work items within a short period of time.

In order to permit an orderly coexistence of public and private ISDNs, two scenario's have been described.

The overlay scenario means that the intervening network (IVN), eg. the public ISDN is used to provide transparent end-to-end connections between private networks (PTN). The IVN does not take part in the call establishment of the PTN or in the service provision of the PTN. In other words the public ISDN as IVN is working according to the definition of the existing interface standards. Hence, this scenario does not imply any significant modifications or upgrades to the existing EURO-ISDN standards.

In contrast, the second scenario, called integrated scenario, assumes that a public and a private ISDN *interwork* in a way where the signalling protocols defined for the interface between the two networks are adapted to the specific/additional requirements stemming from the private network. Those specific requirements arise in particular from the (richer set of) services features of the private side. For this second scenario, the ETSI work programme contains a pre-normative work item which is examining the conceptual aspects and the standards required.

Figure 3 provides a schematic overview on the private and public ISDN interworking.

The Commission recognised the importance of ISDN standards for private network with the continued political validity of the standardisation mandates BC 74-77 (c/f Section 3.5 of the 3rd Annual Progress Report).

A proper interworking between public and private ISDNs is important, already for the reason that today the vast majority of ISDN user is connected to an ISPBX, the most common form of a private ISDN.

However, it must be avoided that the EURO-ISDN standards are destabilised by the new requirements, since this would jeopardise their implementation, if not the credibility of EURO-ISDN as such.

Therefore, the sector actors have voluntarily agreed on the freezing discussed above.

Finally, one further most important standardisation aspect, EURO-ISDN type approval standards, is not mentioned. ETSI, which has the responsibility for the production of the technical basis for such type approval standards, foresees to finalise them only by October 1994. Adding the necessary administrative times for adoption by the formal committees and their publication leads to their availability in spring 1995. This presents a major drawback for the introduction of EURO-ISDN terminals.

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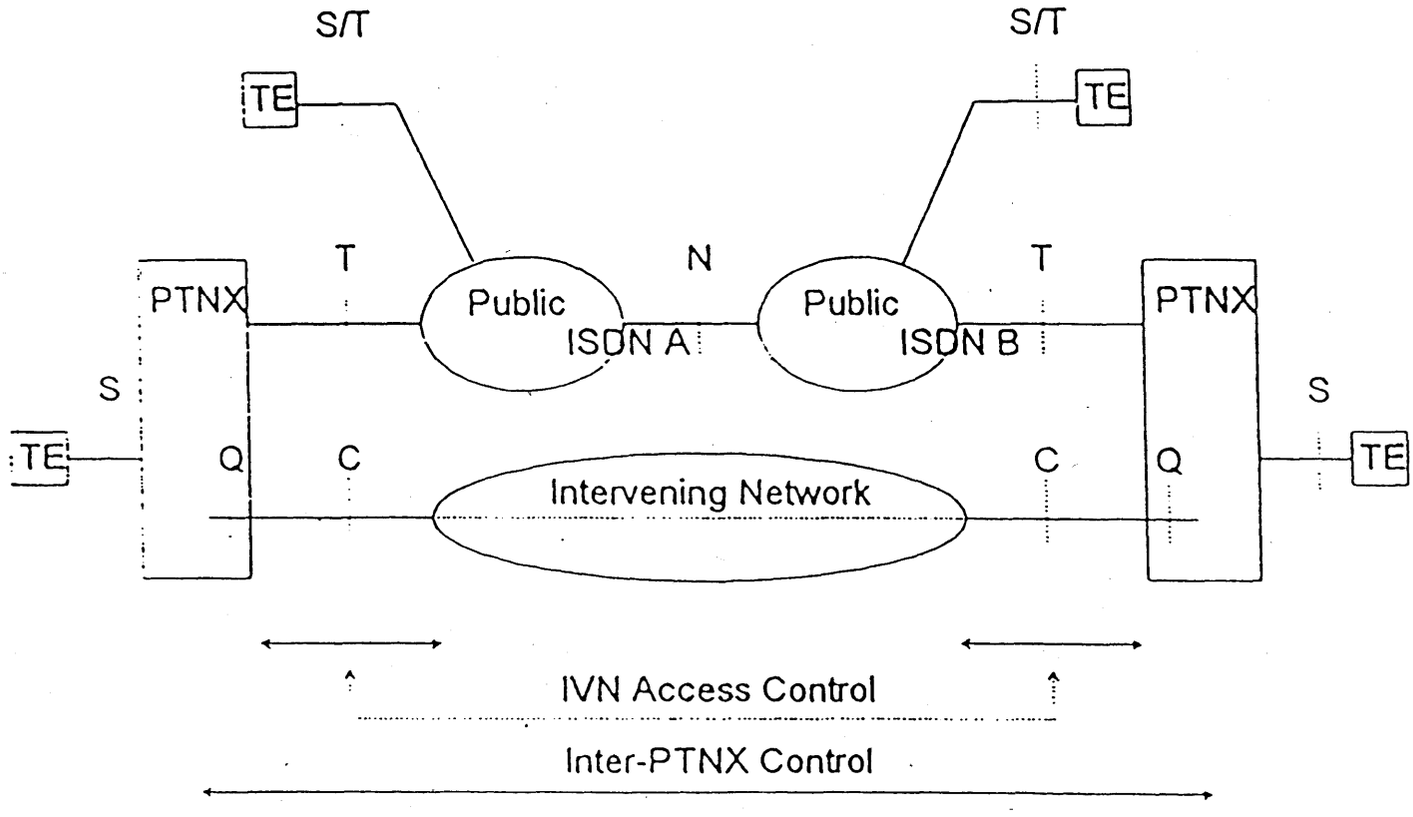
10 European Computers Manufacturers Association

11 ISDN Private Networking and Signalling

Figure 3


S/T
S/T
TE
TE
T
N
T
PTNX
Public
ISDN A
Public
ISDN B
PTNX
S
S
TE
Q
C
C
Q
TE
Intervening Network
IVN Access Control
Inter-PTNX Control

3.5 SOFTWARE INTERFACES FOR ISDN TERMINALS

One standardisation aspect which is crucial for the ISDN terminal development in Europe but which is not included in the scope of the EURO-ISDN standards, is the so-called "Programmable Communication Interface" (PCI).

A PCI is a software interface which allows to have common access methods to ISDN services from a PC (or another type of computer) which implements an interface for ISDN. In practice a harmonised PCI would allow to install software from various sources on an existing hardware platform (eg. ISDN access card for a PC). In technical terms this capability is called software portability.

Network related and telematic services related PCI's are distinguished. Standardised PCI's are a prerequisite for the portability of application software, eg. for a telematic service like file transfer and hence are important for the development of a truly multi-vendor ISDN terminal market.

ETSI, again with the support of the Commission is developing currently PCI standards.

The rapid availability and implementation of this type of interface in ISDN terminal equipment is required.

Following a mandate from the Commission, in the meantime ETSI has prepared a standard which was also accepted as a base for the international standardisation work in that area.

3.6 CONCLUSION ON STANDARDISATION

In conclusion it can be said that ETSI has mastered the huge task of the production of the EURO-ISDN standards successfully.

Apart from some test standards, all standards required for the implementation are stabilised.

ETSI has a clear leading position in ISDN standardisation in the world-wide context, which will also contribute to a leading position of Europe with respect to deployment of ISDN.

In order to accomplish this success also in terms of commercial offerings available to users throughout Europe, it is required that those standards are now fully implemented.

3.7 ISDN TEST STANDARDS AND CONFORMITY TESTING

As mentioned in the preceding section, test standards for ISDN now account for an important part of the ongoing EURO-ISDN standardisation work in ETSI. For the implementation of these (and other) test standards the CEC launched in 1985 the Conformance Testing Services (CTS) programme with the aim of supporting the development, and provision of services which will test conformity of manufacturers' equipment to standards. Applicable standards comprise (inter alia): ISO norms, CCITT recommendations, ETSI ETSs and CEN/CENELEC ENVs and ENs.

All these European standards have a voluntary status and the Conformance Testing Services are thus also conducted on a voluntary basis.

Preference and priority are given to relevant European standards where available. Moreover, strong emphasis is given to harmonisation and testing equivalence aspects so that the services offered by different laboratories involved in each CTS project can be recognised as equivalent.

In the context of type approval of telecommunications terminal equipment obligatory testing is used. For this purpose technical regulations (known as CTRs[12] and, where these are not yet available, NETs[13]) are derived as subsets from the corresponding harmonised standards.

The following CTS projects concern particularly the definition of test specifications and the establishment of testing centres in the ISDN area:

CTS 2	ISDN-BA	(ISDN Basic Access)
CTS 2	ISDN-TA	(ISDN Terminal Adaptors)
CTS 2bis	ISDN-PA	(ISDN Primary Access)
CTS 2bis	ISDN-RA	(ISDN Rate Adaptor)
CTS 3	ISDN-VP	(ISDN Video Phone)
CTS 3	NI-ISUP	(Network Interworking - ISUP+X.75)
CTS 4	ISDN-SS	(ISDN Supplementary Services)
CTS 4	ISDN-VTX	(ISDN Videotex)
CTS 4	SS7	(Signalling System no. 7)

Table 4: Current CTS projects relevant to ISDN

The total CEC commitment for these ISDN projects is 10.6 MECU.

During 1992 the latest phase of CTS (CTS 5) was launched and technically acceptable proposals were received in the following areas:

ISDN-PCI	(Programmable Communications Interface for ISDN)
CTR-DNET	(CTR Testing for Digital Networks; CTRs 2,3,4,8)

Negotiations (subject to budgetary limitations) have taken place which have lead to the placing of contracts with the consortia for ISDN-PCI and CTR-DNET.

One of the objectives of the CTS projects is the contribution of the relevant Abstract Test Specifications (ATS) to the European and world standardization bodies concerned, where they will serve as a primary input for future test standards. So far, the Abstract Test Suites (ATSs) developed in the ISDN-BA, ISDN-TA, ISDN-PA, ISDN-RA projects have been submitted to ETSI, while the ISDN-BA and ISDN-SS projects have cabled submissions to CCITT S.G. XI. The uptake of the CTS material by ETSI has been sporadic but improved cooperation procedures are being developed which should make this process more effective in future.

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12 Common Technical Regulation

13 Norme Européenne de Télécommunications

Another objective of the CTS ISDN projects, particularly where they support clearly different profiles, is the provision of a "modular" testing service. A kernel service is offered which involves the testing to the obligatory technical regulations (NETs and CTRs); however full conformity testing to the voluntary standards will also be offered.

In a carefully coordinated and complementary manner to the CTS programme, a series of mandates for the standardisation of ISDN test specifications has been placed with ETSI. Prominent amongst those are:

BC-T-234	Test specifications for	D-channel signalling
BC-T-245		QSIG
BC-T-246		ISDN telematic services
BC-T-293		ISUP protocols
BC-T-294		ISDN videophone
BC-T-296		ISDN PCI

Table 5 shows the laboratories that will provide the testing service and the scheduled availability:

Project	*Testing service provided by organisation (country)*	*Availability*
ISDN-BA	CET (P), CNET (F), CSELT (I), EOLAS (IRL), FTZ (D), PTT-NL (NL), TID (E), TD (DK)	mid-1993
ISDN-TA	CET (P), EOLAS (IRL)	end - 1992
ISDN-PA	CNET (F), CSELT (I), EOLAS (IRL) FTZ (D), TID (E), TD (DK)	end- 1993
ISDN-RA	CET (P), EOLAS (IRL)	end - 1993
ISDN-VP	CSELT (I), EOLAS (IRL)	mid - 1993
NI-ISUP	CSELT (I), NCSR (GR)	end - 1993
ISDN-SS	CNET (F), CSELT (I), EOLAS (IRL), FTZ (D), TD (DK), TELEVERKET (S)	mid - 1993
ISDN-VTX	SEMA (F), TID (E), ISPT (I)	mid - 1994
SS7	BT (UK), CSELT (I), NCSR (GR)	mid - 1995

Table 5: CTS test laboratories

4 INTRODUCTION PLANS FOR EURO-ISDN

This Section concerns the plans of the PNO's for the introduction of EURO-ISDN.

The term EURO-ISDN is used to refer to the ISDN introduction as defined in the respective Memorandum of Understanding (MoU) signed by 26 PNO's from 20 European countries.

EURO-ISDN means the introduction of a common set of compatible ISDN interfaces and services implemented on the basis of harmonised standards (discussed in Section 3).

With the start of the commercial offering of EURO-ISDN during EURIE '93 a major milestone of the Community's telecommunications policy efforts since 1985 towards the "Coordinated Introduction of ISDN" was accomplished.

The following sections will describe in more detail the scope of EURO-ISDN and the deployment plans of the PNO's for this harmonised network.

4.1 SCOPE OF EURO-ISDN

The scope of the EURO-ISDN is defined in the MoU mentioned earlier.

A group called IMIMG[14] consisting of the PNO's which have signed the MoU coordinates the measurers to ensure the introduction of EURO-ISDN.

Table 6 lists the essential elements which are an integral part of EURO-ISDN. This services and facilities are the agreed minimum which will be offered by all parties.

User/network interfaces:	Basic Rate Access (BRA) Primary Rate Access (PRA)
International Interface:	ISDN User Part, Version 1
Bearer Services (BS):	Circuit mode 64kbit/s unrestricted BS Circuit mode 3.1kHz audio BS
Supplementary Services:	Calling Line Identification Presentation Calling Line Identification Restriction Direct Dialling In Multiple Subscriber Number Terminal Portability
Tele-Services:	the ISDN includes capabilities to support a number of teleservices

Table 6: Scope of EURO-ISDN

Beyond this minimum list of offerings, many of the PNO's will offer further harmonised services. Annex 2 provides an overview of them.

14 ISDN MoU Implementation and Management Group

4.2 DEPLOYMENT PLANS FOR EURO-ISDN

From the Working Group TEN-ISDN (WG TEN-ISDN)[15] information from the PNO's concerning the timing and geographical coverage of the roll-out of EURO-ISDN are available.

It is noted that the approaches of the operators regarding the introduction of EURO-ISDN vary.

One way of introducing EURO-ISDN is to install a second software capability (the one of EURO-ISDN) into the local ISDN switch which will (during a certain period of time) co-exist with the software for the existing national ISDN service.

Another migration strategy is to upgrade in steps the existing ISDN software to become (gradually) conformant to the definition of the EURO-ISDN standards.

Consequently, it may be the case that some of the data indicated below, refer to a software capability which is very close but not 100% identical (at a given point in time) to the harmonised standards. It is, however, assumed, that in all cases the software capability referred to below will cater for terminal interchangeability (one of the prime objectives of the EURO-ISDN standardisation).

Deployment timing

All PNOs participated in EURIE' 93 with demonstrations of EURO-ISDN implementations. By the end of 1993, all Member States were offering commercial EURO-ISDN, except for Greece and Luxembourg. EURO-ISDN service will be launched in Luxembourg in March 1994. Geographical coverage will already be achieved some months later. A EURO-ISDN Pilot project will be implemented in Greece in 1994.

Table 7 gives detailed information related to the introduction of EURO-ISDN.

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15 The Working Group TEN ISDN was established for the elaboration of the proposal to develop ISDN as a trans-European network and had delegates from the public network operators and Member States (see also section 9.4).

Table 7: EURO-ISDN in the EC

Basic Rate Access[16]	Geographical Coverage			
	21-40 %	bis 60 %	bis 80 %	100 %
Belgium	_____		01/94	01/95
Denmark	_____			01/94
France	_____	07/94	_____	01/95
Germany	_____	01/94	_____	01/95
Greece	07/95	07/96	01/98	n. pl.
Ireland	01/94	_____	07/94	01/97
Italy	01/94	01/95	07/95	01/96
Luxembourg	_____	_____	_____	07/94
Netherlands	01/94	_____	01/95	01/96
Portugal	_____	_____	01/94	01/95
Spain	01/94	07/94	01/96	
UK	_____	_____	_____	01/94

n. pl.: no planning data exists

>blank<: information not available

16 conformant to ETS 300.153

With the start of EURO-ISDN the efforts for the coordinated introduction of this infrastructure are not finalised yet.

The following sections discuss further issues and problems (eg. migration problems) related to the successful introduction of EURO-ISDN.

Reference is made to the proposals developed in the context of TEN (see also Section 9.4) which will allow to address part of these issues and problems.

5 MIGRATION TO EURO-ISDN: ISSUES AND PROBLEMS

It is evident that migration problems as such essentially concern the PNO's which have already pre-EURO-ISDN offerings in service. The dimension of the problem is influenced, amongst other factors by the number of current ISDN users.

There are some problems related to the migration which impact also on the other PNO's, eg, terminal related matters.

Regarding the pure migration problems two categories, network and terminal/user related aspects can be distinguished.

5.1 MIGRATION: NETWORK RELATED ASPECTS

Section 4.2 above has already discussed the principal approaches regarding the transition from national offerings to EURO-ISDN. The existing networks are either (step by step) upgraded or EURO-ISDN functionalities are offered in coexistence with current implementations.

The latter strategy is mainly useful if the set of functionalities of the current ISDN service is richer than the initial set of services of EURO-ISDN. It depends also on the number and nature of differences between the two implementations.

A crucial question of this latter strategy is during which period the current offering will co-exist with the EURO-ISDN service.

5.2 MIGRATION: USER/TERMINAL RELATED ASPECTS

From the perspective of an user of national ISDN offerings, the main questions are:

- whether existing ISDN terminal equipment can be used in connection with EURO-ISDN and
- which services which have been used so far, are offered on the EURO-ISDN.

The first question, in technical terms, relates to the objective of terminal interchangeability, i.e., the usage of ISDN terminal equipment at either network implementation.

Depending on the approach adopted on the network side the following options occur:

- existing terminals cannot be used on EURO-ISDN
- existing terminals can be used with some restrictions
- existing terminals can be used without restrictions.

It is evident that in the case where an existing network is upgraded in steps, these questions depends on the version which is implemented in the terminal equipment.

Usage with restriction may typically mean that basic (eg. telephone or facsimile connections) can be set up, but not all of the facilities (eg. a supplementary service) may be available (or compatible) with the current implementation.

To current users of ISDN which have further questions related to this issue, it is recommended to address to the customer service of their respective operator.

5.3 PRIVATE ISDN NETWORKING

As mentioned in Section 3.4 (Further Standardisation) ISPBX are important for the development of ISDN per se, because the majority of ISDN terminal equipment (which generate the traffic) is connected to them.

While ISPBX - for example in the context of type approval - are considered as attachments (to the public network), from the perspective of the user, they can be regarded as (private) networks.

Like a public switching node, an ISPBX is essentially a switching and call processing apparatus and can consist of several nodes (PTNX).

PTNX can be interconnected by various transmission means, by leased lines, by satellite connections or for example by public switched networks like the ISDN.

The interworking of public and private ISDN nodes is subject to further standardisation efforts.

All major PABX manufacturers have products with ISDN capabilities (ISPBX), typically with a number of additional features.

For PABX manufacturers the current differences of the public ISDN interfaces (c/f. Chapter 2) imply as for the producers of other terminal equipment additional development efforts.

Owing to the often very diverse needs of business users, the (I)PBX manufacturers have implemented proprietary interfaces on the extension line side. This has in principle the disadvantage that terminals from other manufacturers cannot be used. However, (I)PBX manufacturers will now implement harmonised interfaces on the extension line side.

The achievement of a harmonised interface (in the case of a PABX at the T-Reference Point) at the public as well as at the private network for the sake of terminal interchangeability is a prime target.

According to a position of the European ISDN User Forum (EIUF) the harmonised interface should be available on all ISPBX.

In the nearer future public ISDN may offer an enhanced set of features aimed at business users similar as this is today the case with ISPBX. Feature compatibility is therefore another objective. Features which are newly introduced in the public ISDN should be aligned with the features used in private ISDNs which are based on public standards.

5.4 SPEED OF DEPLOYMENT AND RANGE OF SERVICES

A further general issue related to the introduction of EURO-ISDN is the timing of its roll-out, i.e., its geographical availability over time.

Section 4.2 provides a general overview on the roll-out schedule of EURO-ISDN.

With reference to the important role of a modern general telecommunications infrastructure for the functioning of the single market, ideally a fully fledged ISDN would have been required for 1993.

While, notably in central parts of the Community, EURO-ISDN is available, many of the less favoured regions will again be disadvantaged by a roll- out which may extend to the year 2000 and after.

A third aspect is the range of services of national ISDN versions compared to the offering of services of EURO-ISDN.

For example, there will be cases where the current ISDN offers a richer set of services than available with the initial offering of EURO-ISDN. Some supplementary services may also be implemented on the basis of differing standards. Again, it is recommended to ISDN customers who face this kind of question to obtain details from their operator.

Reference is made again to the concept to develop ISDN under the TEN framework, which contains proposals which address this problem.

Given the volume of investment which is required, but looking also to the macro-economic effects (eg. growth initiative) of this type of investment, particular efforts from the side of the structural funds will be required to narrow this new infrastructural gap.

5.5 ISDN TARIFF ISSUES

From the perspective of a user, the tariffs, beside the question of terminal availability, are probably the most important factor influencing the choice of networking offerings to which one may subscribe.

Some PNO's, at the occasion of the introduction of EURO-ISDN have lowered eg. the monthly subscription as compared to existing offerings.

Since ISDN (BRA) provides two independent B-channels (comparable to two telephone lines, but with the speed and other advantages inherent to ISDN), it should be envisaged that the tariff (monthly subscription) approaches the level of the subscription of a double telephone line (which is often cheaper than twice a single line). On the longer run, such a tariff policy would stimulate the residential subscriber market to migrate to ISDN.

Table 8 provides a summary of the current ISDN tariffs.

The EURIE '93 handbook that was produced by OVUM reveals a number of tariff anomalies between Member States. These anomalies apply to both monthly rental charges and call charges.

ISDN tariffs in Belgium

Table 8

The tariffs are in Belgian francs. VAT is additional at 20.5 %

	One off connection	BA Monthly rental	Usage	One off connection	PA Monthly rental	Usage
Access	5900; or 3500 for converting an existing line	1050		391,625	29,000 Cheaper rates for longer rental periods	
Bearer services						
- circuit mode						
- 3.1 kHz audio			5 per time unit			As via BA
- speech			5 per time unit			
- call attempt (for unsuccessful calls)			0.5			As via BA
- unrestricted			2 + 1 per 1/5 time unit			
- packet mode						
-X31 case B (D channel)			In discussion			As via BA

ISDN tariffs in Denmark

The tariffs are in Danish kroner. VAT is additional at 25%

	One off connection	BA Monthly rental	Usage	One off connection	PA Monthly rental	Usage
Access	1520	160		15,200	1597	
Bearer services						
- circuit mode						
- 3.1 kHz audio			As PSTN plus 0.04			As via BA
- unrestricted			per call or attempted call			
- speech						
- packet mode			Not available			As via BA

ISDN tariffs in France

The tariffs are in French francs. VAT is additional at 18.6%

	One off connection	BA Monthly rental	Usage	One off connection	PA Monthly rental	Usage
Access	675	300		4200	3120	
Bearer services						
- circuit mode						
- 3.1 kHz audio			As PSTN			As via BA
- speech			As PSTN			As via BA
- unrestricted			PSTN plus 40% (calls over 100 km)			As via BA
- packet mode						
-X.31 case B (B channel)			As Transpac plus speed-dependent charge per minute			As via BA
-X.31 case B (D channel)	2200	400	.06 per kilooctet, plus Transpac charges			As via BA

ISDN tariffs in Germany

The tariffs are in German marks and are not subject to tax

	One off connection	BA Monthly rental	Usage	One off connection	PA Monthly rental	Usage
Access	130	59		200	498	
Bearer services						
- circuit mode						
- 3.1 kHz audio			As PSTN			As via BA
- unrestricted			(no call set up)			
- speech						
- packet mode			Not available			Not available
-X31 case B (B channel)						

ISDN tariffs in Ireland

The tariffs are in Irish pounds. VAT is additional at 21%

	One off connection	BA Monthly rental	Usage	One off connection	PA Monthly rental	Usage
Access	420	35		4200	350	
Bearer services						
- circuit mode						
- 3.1 kHz audio			As PSTN (no call set up charge)			As via BA
- speech			As PSTN			As via BA
- unrestricted			1.25 times PSTN rates for national calls. 1.5 times PSTN rates for international calls			As via BA

ISDN tariffs in Italy

The tariffs are in lira. VAT is additional at 19% for business users

	One off connection	BA Monthly rental	Usage	One off connection	PA Monthly rental	Usage
Access	400,000	50,000		600,000	690,000	
Bearer services						
circuit mode - 3.1 kHz audio			As PSTN (incl call set up 127)			As via BA
- speech			As PSTN (incl call set up 127)			As via BA
- unrestricted			Double PSTN rates (national calls), PSTN +10%-30% for international calls			As via BA
- packet mode -X31 case B (B channel)		20,000 (up to 9.6kbit/s), 100,000 (up to 64kbit/s)	As PSPDN		As via BA	As via BA

ISDN tariffs in the Netherlands

The tariffs are in Dutch guilders and are not subject to tax

	One off connection	BA Monthly rental	Usage	One off connection	PA Monthly rental	Usage
Access	600	85		8000	850	
Bearer services						
- circuit mode - 3.1 kHz audio - unrestricted - speech			As PSTN (including 0.0825 for call set up)			As via BA
- packet mode			Not available			Not available
- call set up			0.0688 for local calls to 0.15 for international calls			As via BA

ISDN tariffs in Spain

The tariffs are in pesetas. VAT is additional at 15%

	One off connection	BA Monthly rental	Usage	One off connection	PA Monthly rental	Usage
Access	45,000	8000		1,254,652	146,583	
Bearer services						
- circuit mode - 3.1 kHz audio - unrestricted - speech			As PSTN (no call set up)			As via BA
- packet mode -X31 case B (B channel)			Not available			Not available

ISDN tariffs in Portugal

The tariffs are in Portuguese Escudos. VAT is additional at 16%

	One off connection	BA Monthly rental	Usage	One off connection	PA Monthly rental	Usage
Access	30,172	4310		129,310	36,638	
Bearer services						
- circuit mode - 3.1 kHz audio - unrestricted - speech			As PSTN (no call set up charge)			As via BA
- packet mode -X31 case A (B channel)			In discussion			As via BA

ISDN tariffs in the UK - BT

The tariffs are in pounds sterling. VAT is additional at 17.5%

	One off connection	BA Monthly rental	Usage	One off connection	PA Monthly rental	Usage
Access	400	28		2970	338.7	
Bearer services						
- circuit mode - 3.1 kHz audio			As PSTN			As via BA
- speech			As PSTN			
- unrestricted			As PSTN for national calls. At least 2.5 times PSTN rate for international calls. Set up charge to North America 0.546			
- packet mode -X31 case B (B channel)			Not available			

Rentals

There are three significant ratios to be considered:

- the ratio of the monthly rentals for ISDN basic rate access against a single PSTN exchange line
- the ratio between the monthly rentals for ISDN Primary rate access against a single PSTN exchange line.
- the ratio between the monthly rentals for ISDN primary rate access and basic rate access.

The first two ratios are crucial factors for users to consider in assessing the benefits of migrating from the PSTN to ISDN. The third indicates the internal consistency in the ISDN tariffs.

The table below indicates differences between Member States in these ratios. The large differences indicate that tariffs for ISDN are far from being cost oriented in some Member States, as required under ONP Principles (see also Section 6).

As pointed out in the preceding report, there are also differences in the tariff structures of the current ISDN offerings.

Country	ISDN BA/PSTN	ISDN PRA/PSTN	ISDN PRA/BA
BE	3,1	85	28
GE	2,4	20	8
DK	2,0	20	10
FR	3,7	39	10
NL	4,0	40	10
UK	2,6	32	12

Table 9: ISDN Tariff ratios in Member States

In conclusion, the introduction of EURO-ISDN has certainly been a good opportunity to revise the tariffs and tariff principles for ISDN.

5.6 THE "TELEMATIC GAP" IN ISDN

As it is well known, the "S" in ISDN stands for "Services". Services integration via one user/network interface is one of the key features of ISDN. Three categories of services are usually distinguished in the context of ISDN:

- bearer services;
- teleservices and
- supplementary services[17].

In EURO-ISDN, these three categories of services are fully harmonised services, and , if implemented, then on the basis of common standards.

Beside these categories of services, there is a further category usually referred to as applications. Applications may be standardised or may be of proprietary nature (not standardised, i.e., incompatible with other applications).

While the bearer services generally do not present problems in terms of availability and compatibility and there is a good number of well defined supplementary services, there is a lack of compatible non-voice telematic services.

Non-voice telematic services are for example facsimile, text services, videotex, file transfer, electronic mail a.o.m.

> While it cannot be denied that all of these services are offered somewhere and somehow, the problem is that apart from facsimile group 3 (which is rather a telephone network service, but an ISDN service), non of these services is offered on a harmonised and European-wide basis.

This absence of non-voice telematic services is referred to as the **"Telematic Gap in ISDN"**.

The reasons for this telematic gap are manifold. One crucial factor apparently is the question of the "responsibility" for the provision of them.

In order to discuss this problem in more detail, a further distinction needs to be introduced.

Regarding such tele(matic) services two categories can be distinguished:

- end-to-end services and
- services with added functionalities (VAS)[18].

Services of the first category, are transparent for the network, which means that the functionality specific to a given service, say facsimile, is implemented (solely) in the end system.

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17 please refer to the Glossary of terms for explanation

18 Value Added Services

In the other category, additional functionalities like store and forward mechanisms, database or conversion facilities are added to the network or between the network and the end system.

To simplify the analysis of the "telematic gap", here only the first category is further discussed.

One pre-requisite for the development of telematic services as basic services for the general public at large (eg. all businesses), is the ensurance of their end-to-end compatibility in a multi-vendor environment.

Given that in the case of the first category the specific telematic functionality is implemented (only) in the end system (eg. telecom terminal), the terminal manufacturers decide with their designs whether the products are multi-vendor compatible or not.

The negative experience of the past years shows, that apart from facsimile group 3, where the design leadership is in the hands of Japanese manufacturers, there is not a single new compatible non-voice basic telematic service which has any tangible European penetration.

In other words, the forces of the markets have not led to achieve end-to-end interoperability for basic services.

A typical example is file transfer, a basic mechanism for the transfer of data, which is of interest to be "re-used" in many applications.

Already from the recognised standardisation organisations in Europe currently five different standards/profiles for file transfer exist. On top of that there is a large variety of proprietary implementations. In essence, most of these protocols are incompatible which each other. This situation also prevents that a mass market can develop; the market stays fragmented.

"*Averages* users" suffer from this failure of absence of compatible end-to-end services available throughout Europe.

In discussions of this point in the European ISDN User Forum (EIUF), users have made clear, that end-to-end interoperability is a key issue for them. At the same time this is a key objective of the Community's telecommunications policy.

The major reason for this failure is apparently the enormous competitive pressure under which terminal manufacturers operate. It is clear, that in a competitive environment, the market participants will attempt to differentiate their products. Differentiation of products leads in a digital and software oriented environment necessarily to incompatibility.

Manufacturers of such equipment pursue their own product strategy.

Also the work of the standardisation organisations have not allowed to remedy this situation because the problem is rather an implementation problem than a standardisation problem.

On the other hand, **the public** network operators, who's general **networks are indispensable as delivery mechanism for basic services**, are hesitating to take the lead for the solution of this problem.

One simple reason for that is that, their end-to-end networks, as said before, are physically not concerned with the implementation of such services. Secondly, the provision of such basic telematic services, where the public network operators would act as a service provider would raise a number of questions relevant to competition right (mixed status: network is in monopoly, services are in competition but service functionality is independent from network).

Consequently, the provision of terminals and the offering of telematic services were excluded from the scope of the activities of the MoU on the introduction of EURO-ISDN.

On the other hand, a general network like ISDN is indispensable for the access/ delivery of any basic service, i.e., for which the aim is ubiquity.

In view of these problems, the Commission and the PNO's of the Community, under the heading of the TEN have taken now the initiative to create the conditions which will allow to achieve a market of compatible telematic services and terminals across Europe.

For example (refer to Section 5.3 for more details), this problem of incompatibility is today the predominant situation in a specific important ISDN sector, the one of the private ISDN (ISPBXs). Almost every ISPBX manufacturer has a propriety solution already at the level of the interface for the attachment of terminals, which means for the user, that once he has chosen a ISPBX, he cannot, in principle, connect terminals from another manufacturer to it.

It is therefore necessary, that in particular all public procurements of such equipment, require the provision of standardised interfaces for the attachment of terminal equipment.

5.7 ISDN AND THE "REVIEW 92"

As an introductory remark, it is to be noted that the ISDN is a general switched public infrastructure designed to carry voice and other services.

Voice over ISDN will remain at least for another ten years the main source of traffic (it is assumed that by the year 2000 still more than 60% of the traffic on ISDN is voice traffic).

In other words, the regulatory regime applicable to the voice service, which cannot be dissociated from the underlying network, will be fully applicable to ISDN.

For this reason it is necessary to study fully the implications of eventual changes of the regulatory regime for ISDN.

It is worth repeating, that a particular interesting part of the "real time switched voice market" makes already today extensively use of ISDN (and not of the PSTN), viz, the market for voice served by ISPBX. Taking the important example of Germany (important in the sense that approx. 50% of all current ISDN subscribers are connected to the German ISDN), almost 100% of all new PABX (apart from very small PABX) are connected to ISDN. In other words, a rapidly increasing part of the business subscribers rely on ISDN for voice delivery.

5.8 UNIVERSALITY OF THE ISDN OFFERING

On 7.12.93 the Commission adopted a Resolution on universal service principles in a competitive environment.

This Resolution also includes ISDN as recommended offering for the definition of such a universal service.

5.9 NETWORK INTEGRITY

One essential requirement defined in Community legislation regarding the public switched network infrastructure is network integrity.

Network integrity is defined equally in the services and the ONP framework directive as one of the essential requirements meaning non-economic reasons in the general interest which have to be taken into account.

It is therefore urgently required to come to a clear definition of what is understood by network integrity. This will be the subject of one or two key studies planned by the Commission.

Without prejudice to any future definition of this key essential requirement regarding the public switched networks, it can be noted, that the non-economic implications of this issue go way beyond the question of the definition of "points of presence" as this is required in certain scenario's for the interconnection of networks.

For example, one such aspect concerns the question of the performance budgeting between various network in an interconnect scenario. For the time being there is no established answer to this type of problem.

6 ONP, DATA PROTECTION (TARIFFS)

6.1 PROGRESS WITH OPEN NETWORK PROVISION (ONP) AND ISDN

ISDN is one of the priority areas for the application of Open Network Provision (ONP) under the ONP framework Directive[19].

ONP aims to stimulate the development and growth of a wide range of competitive services in Europe, by ensuring that the conditions for access and use of public telecommunications networks and services are harmonised. This includes not just technical specifications, but such aspects as the conditions under which services are supplied, and tariff conditions.

On 5 June 1992, the Council of Ministers adopted a Recommendation on the application of ONP to ISDN[20], which seeks to strengthen the implementation of ISDN in the Community. Major features of the Recommendation are described below.

1) Minimum set of offerings

The Recommendation call for a ....nimum set of ISDN offerings to be made available in all MS. These offerings are divided into two categories, those which are to be made available by 1 January 1994, and those which are to be provided as soon as the demand in an individual Member State justifies it. For this second category, target dates for the provision of the facilities have to be published. Tables 10 & 11 list the facilities in the two categories; those in Table 10 coincide with priority facilities in the ISDN MoU; those in Table 11 emerged as priorities during the consultation carried out by the Commission on the ISDN *Analysis Report*[21].

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19 Council Directive 90/387/EEC of 28 June 1990 on the establishment of the internal market for telecommunications services through the implementation of open network provision (OJ No. L192, 24.07.90)

20 OJ No. L200, 18.07.92, p.10

21 See ISDN 3rd annual report, section 5.1

Table 10: Offerings that should be available in all Member States by 1.1.94

ACCESS ARRANGEMENTS	Basic rate access (2B+D) at the S/T reference point; Primary rate access (30B+D) at the S/T reference point
BEARER SERVICES	Circuit mode 64 kbit/s unrestricted bearer service; Circuit mode 3.1 kHz audio bearer service
SUPPLEMENTARY SERVICES	Calling Line Identification Presentation (CLIP) Calling Line Identification Restriction (CLIR); Direct Dialling In (DDI) Multiple Subscriber Number (MSN); Terminal Portability (TP).
TELESERVICES	Telephony, 3.1 kHz.

Table 11: Minimum set of ISDN Offerings, to be provided according to published target dates and the availability of international standards

BEARER SERVICES	Circuit mode 64 kbit/s unrestricted bearer service on reserved or permanent mode; Packet mode bearer service provided over the B and/or D channels
SUPPLEMENTARY SERVICES	Call transfer services Call forwarding services Reverse charging; Freephone/green number Kiosk billing or equivalent features; Closed user group User to user signalling Malicious call identification

2) Additional offerings

In addition to the offerings identified in Table 10 & 11, the recommendation seeks to ensure that certain other ISDN offerings, when provided, conform to European standards. Table 12 lists the facilities in this category.

Table 12: Additional offerings which may be implemented in accordance with progress in international standardisation

SUPPLEMENTARY SERVICES	Advice of charge (AOC) services; Number Identification services (COLP, COLR); Call waiting (CW); Completion of calls to busy subscribers (CCBS); Conference services; Sub addressing (SUB); Three party service (3PTY). Network management services

3) Publication of information

'Transparency' is one of the major principles of ONP, and the Recommendation calls for publication of a wide range of information for the user. This includes information about tariffs, technical characteristics, contractual conditions, supply and usage conditions, terminal attachment, and quality of service parameters.

4) Quality of service

The Recommendation calls for annual publication of quality of service statistics, starting in 1994. The Commission has also given ETSI a mandate to develop definitions and measurement methods for a harmonised set of quality of service indicators suitable for ISDN.

The target date for implementation of these harmonised quality of service parameters is 1 January 1995, so that after this date comparison of the performance of different ISDN networks will be possible.

5) 'One stop shopping' facilities

A number of important user facilities require cooperation between network operators, and the Recommendation calls on Member States to encourage the following facilities, in consultation with users:

- a common ordering procedure for ISDN throughout the Community
- a one stop ordering procedure
- a one-stop-billing procedure
- a one-stop-maintenance procedure

Other pan-European facilities include green numbers/freephone and kiosk billing (premium rate services).

6) Tariffs

ISDN tariffs are to be based on objective criteria, independent of the type of application implemented by the user where the same type of offering is used and in principle oriented towards cost. Offerings should be sufficiently unbundled, with each ISDN offering tariffed in principle on an individual basis, so that a user does not have to pay for facilities not required.

7) Itemised Billing

Target dates are to be set for the provision of itemised billing, to be made available to users on request, and subject to technical feasibility.

8) Oversight by the national regulatory authority

The national regulatory authority (NRA) in each Member State is expected to exercise regulatory oversight of ISDN operators. Specifically this includes ensuring that there is no discrimination in the provision of ISDN offerings, checking usage conditions, approving tariff elements, and exercising control of ISDN numbering plans so as to ensure fair competition. They are also called upon to establish simple procedures for users to invoke with regard to difficulties encountered in relation to the application of the Recommendation.

In addition to this recommendation on ONP/ISDN, the Commission has published a proposal for a directive on the application of ONP to voice telephony. The provisions of this directive will apply to ISDN when used for voice telephony, and for many telecommunications organisations, ISDN will offer the best means of providing some of the features called for in this directive.

6.2 DATA PROTECTION AND USER PRIVACY

The Commission will shortly submit a "Modified proposal for a Council Directive on the protection of personal data and privacy in the context of digital telecommunications networks, in particular the Integrated Services Digital Network (ISDN) and digital mobile networks".

The initial proposal of a specific data protection directive for the ISDN was issued by the Commission in 1990 as part of a package of data protection measures and in particular alongside a proposal for a Directive on data protection in general.[22] The Economic and Social Committee adopted its opinion on these proposals on 24 April 1991.[23] In the framework of the cooperation procedure the European Parliament has on 11 March 1992 adopted a favourable opinion on both proposals for directives.

An amended proposal for a general directive on the protection of personal data was presented by the Commission on the 15 October 1992.[24)]

The proposed modified Directive on data protection in the ISDN will contain data protection provisions specific to the telecommunications sector. It will be complementary to the proposed general directive on data protection.

For the purposes of the modified proposal the initial Commission proposal of 1990 will be substantially simplified. All redundancies with regard to the general directive will be removed and in addition, more flexible solutions introduced in a number of Articles. The new draft avoids where possible to impose specific technical solutions upon the Member States and leaves the greatest possible degree of freedom to the Member States for implementation.

The main issues related to ISDN that will have to be dealt with in the proposal are:

1. Itemized Billing

The amended proposal will establish the obligation to preserve the privacy of both calling users and called subscribers in itemized call statements.

2. Calling line identification

According to the Commission's proposal subscribers will have to have the possibility to ask for an elimination of the transmission of the subscriber number on a per-call basis and on a per-line basis. Subscribers will also have to have the possibility to apply for permanent elimination of identification of all incoming calls.

3. Call forwarding

Calls will not have to be forwarded to a third party unless this party will have agreed to the forwarding and will be able to stop it.

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22 COM (90) 314 final, 13.9.90

23 OJ No C 159, 17.6.1991, p. 38

24 Amended proposal for a Council Directive on the protection of individuals with regard to the processing of personal data and on the free movement of such data, COM (92) 422 final, 15.10.92

7 PROGRESS OF ISDN IN THE LESS FAVOURED REGIONS: STAR, TELEMATIQUE AND FUTURE PLANS

7.1 CONTRIBUTION OF THE STAR PROGRAMME IN THE IMPLEMENTATION OF ISDN

Star was a 5-year Community programme (1987-1991) with a total budget of approximately 1455 million ECU, half of which was provided by the European Regional Development Fund. STAR's objective was to give improved access to advanced telecommunications services to assist in the economic development of the less favoured regions of the Community.

STAR aimed to develop basic infrastructure for advanced services and to promote the supply and demand for these services with a view to increasing the competitiveness of SMEs in developing areas of the Community.

Several areas of STAR activity were relevant to the implementation of ISDN:

- infrastructure
- applications
- ISDN pilot networks

a) Infrastructure

STAR made a significant contribution to infrastructural development, thereby improving regional access to the major European networks. Acceleration of the digitalization of switching and transmission equipment, which is a prerequisite for the introduction of ISDN, was the central objective of STAR.

In fact, all the "STAR" Member States had, even before STAR, planned the digitalization of their networks with priority given to the most developed regions. STAR, in boosting the investments for digitalization in the developing regions (increase of 5% to 10% due to STAR), helped to provide major digital links not only between these regions and the core of Europe, but also between the regions themselves.

STAR thus contributed to a better balance in modern telecommunications infrastructure between the core areas and the peripheral regions of the Community (cohesion) with a view to preparing these regions for the "information technology era" and improving the competitiveness of their enterprises.

The projects financed under STAR mainly concerned digitalization of local and trunk switching, transmission, signalling and synchronization. All these elements constitute the basic prerequisites for the introduction of ISDN.

Some specific STAR actions:

- International/inter-regional optical fibre or satellite: France (Corsica), Greece, Italy, Ireland and Portugal
- Acceleration of digitalization (switching and transmission): all countries
- CCITT No 7 signalling: Ireland and Corsica
- Networks synchronization: Ireland and study in Greece

b) Applications

Various application projects were produced for and by SMEs through STAR, and a significant number of them were based on digital "bearer" services, often with a view to migrating to ISDN when it is more widely available in these regions.

Examples in STAR

- Tele-CAD/CAM and multimedia applications: Spain, Greece, Italy
- Graphic data transfer applications: Portugal, Greece
- Distance working applications: Ireland, Spain
- Tele-action applications: Italy, Greece

c) ISDN pilot networks

Under STAR several countries set up ISDN trials. The objectives of these trials were to analyse market reactions to the new service and to draw up commercial recommendations.

7.2 ERDF OPERATIONAL PROGRAMMES IN TELECOMMUNICATIONS

Most of these regional programmes in telecommunications deal with basic infrastructure. Guidance from DG XIII (Telecommunication Policy Directorate) has ensured that only digital equipment has been financed.

7.3 TELEMATIQUE

The TELEMATIQUE initiative adopted by the Commission in January 1991, is building on the achievements of STAR, specifically in the area of services, by encouraging the regional development of data communications through the funding of, notably, ISDN applications. The two-year operational phase runs until the end of 1993.

Where countries have had an inadequate infrastructure in place, for example in Portugal, a limited amount of direct funding of the PNO's to improve ISDN access has been allowed, to facilitate the various public and private sector applications which have been proposed and which will ultimately run on ISDN.

In other countries, the work of STAR-launched ISDN demonstration centres is being continued and even expanded to include broadband networking demonstrations.

Finally, ISDN services demonstration projects are being run either on existing ISDN networks or on PNO trial networks.

7.4 IMPLEMENTATION OF THE MOU ON ISDN IN THE LESS FAVOURED REGIONS

The telecommunications operators are committed through the ISDN MoU to implement in their respective countries a minimum set of ISDN services and facilities.

Developing regions should not be excluded from the scope of these commitments. Furthermore, assistance could be given to operators who are willing to invest in and operate ISDN services in these regions.

Such assistance may be supported by current or future structural funds such as ERDF[25], EAGGF-G, etc.

7.5 FUTURE PLANS

Both STAR and TELEMATIQUE emphasise the role of advanced telecommunication systems in the harmonised development of the EC's regions by supporting regional actions toward, notably, the implementation of a "pan-regional" EURO-ISDN.

In the light of the evaluation of STAR, currently nearing completion, and of appropriate studies in the field, future actions initiated either by the Member States or the Commission will aim to continue the improvement of Community cohesion in the field of telecommunications, particularly through an accelerated introduction of the European ISDN (infrastructure and applications).

Reference is made to the 'Review 92' in which it is estimated that in the order of 40 BECU will be required for upgrading (to reach the level of the developed regions) the telecommunications infrastructure in the LFR's until the year 2000.

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25 European Regional Development Fund

8 ISDN DEVELOPMENT OUTSIDE THE COMMUNITY

This Section provides some information on the development of ISDN in the EFTA countries, in the U.S. and in Japan.

8.1 ISDN IN THE EFTA COUNTRIES

Full ISDN interconnectivity between EC and EFTA countries with commercial offerings is provided. The five countries mentioned already have the harmonised international signalling proposal ISUP. V. 1.

This implies that those countries have benefited from the introduction of EURO-ISDN during the same period as the EC Member States (during 1993) and their offerings are aligned with those in the EC.

In 1992 commercial ISDN offerings existed in Finland, Norway, Switzerland and Sweden. Austria has followed from the beginning of 1993. Switzerland has already achieved a full geographical coverage. Austria and Norway plan for the year 1995 for complete coverage. For Sweden the year 2000 is indicated.

With the exception of Iceland all operators from the other EFTA countries have signed the MoU on ISDN (please refer to Chapter 4).

8.2 ISDN IN THE U.S.

The initial development of ISDN in the U.S. in terms of commitment of the players for a nation-wide deployment and harmonised interoperable equipment was difficult.

Until the beginning of the nineties there were doubts concerning the commitment of the RBOC's for full introduction of ISDN.

ISDN was developed in a little coordinated manner by the various carriers, aggravated by the diverging interests between the RBOC's and AT&T (the AT&T by-pass versus the RBOC's CENTREX). Roughly until 1990 the ISDN offerings offered by the Local Exchange Carriers (LEC) have not been interconnected via the networks of the interexchange carriers (IEC)(so called ISDN -Islands).

Moreover, AT&T has a lot of Signalling System No.6 installed which is not suited to support ISDN and hence, country-wide ISDN interconnectivity is only possible when SS7 ubiquity is achieved.

Pushed by the switch manufacturers present on the North American market, the carries have during 1991 agreed on the National ISDN ONE (N-1), (see Annex 3 for more details on N-1), a kind of programme of coordinated introduction of ISDN services and facilities (to be followed by N-2, N-3) comparable with the efforts on coordination started in Europe around 1984.

N-1 consists only of one of the two ISDN access types, viz, the Basic Rate Interface (BRI) and a number of supplementary services.

The basic call procedures of N-1 are based on the ANSI specs. (ANS 605), (there is one important exception, the automatic initialisation) while ANSI has no specs. on supplementary services.

In principle the N-1 specs. are prepared by BellCore and have received "the blessing" of the North American ISDN User Forum (NIUF).

The Department of Commerce (of which NIST is an affiliation) refers to these NIUF-approved specs. as FIPS[26] (i.e., to be used in the context of public procurements).

8.3 ISDN IN JAPAN

Commercial ISDN services are offered by NTT since April 1988.

End of 1993, NTT counted 210.000 BRAs and 4.500 PRAs. NTT's BRA is the 64kbit/s version while PRA is the 23B + D version with 1.5 Mbit/s (Europe uses the 2Mbit/s version).

KDD is responsible for international ISDN services firstly opened in June 1989 (to Hong Kong). KDD offers also subscriber accesses for direct access to the international network.

With regard to the PRA, KDD offers both 1.5 Mbit/s and 2Mbit/s.

First international ISDN connections with Europe were opened in April 1990 with France. Meanwhile all European countries with an ISDN offering are connected to Japan.

The Japanese ISDN is homogeneous, given that domestic services are offered by NTT. NTT's ISDN is based on the TTC standards with some additional NTT specificities.

Also, some of the "New Common Carriers" (NCC's) started ISDN offerings including international services. Annex 4 provides some further information on ISDN in Japan.

Japan has an very active "scene" for the promotion of compatible ISDN services. The "Conference of the Harmonization of Advanced Telecommunications Systems" (HATS) and the "Foundation for Promotion of Telecommunications Services" are the most important entities in this respect.

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26 Federal Information Processing Standards

9 INITIATIVES AND NEW PROPOSALS

This Chapter reports on the progress of initiatives contained in earlier Annual ISDN Progress Reports and on a "EURO-ISDN Inauguration Event, EURIE '93".

9.1 EUROPEAN ISDN USER FORUM (EIUF)

EIUF has meanwhile developed in a widely recognised "voice" in the discussion of the shaping of the ISDN development in Europe.

Created on 21 September 1990, EIUF has successfully organised six Plenary Meetings, the main event of EIUF. While the first four meetings have been organised in Brussels, the Plenary Meetings are now held in major cities in different European countries.

A steady increase in the number of participants and the percentage of users is attracted by these events.

Major topics of the last meeting included:

- ISDN and multi-media applications;
- networking issues;
- security;
- business aspects of ISDN
- a.o.m.

The structure of the meetings is organised in a way that the discussions are based on *User*-input. Most of the time during the Plenaries is dedicated to Work Shops which are the nucleus for the establishment of EIUF Position Papers.

Several Position Papers on issues like EuroFileTransfer, User/Network-Interfaces, Multi-Functional PC-based ISDN Terminal a.o.m. have been adopted during the last Plenaries of EIUF and are forwarded to other organisations like ETSI.

Owing to the growing size and impact of EIUF, the need to stabilize the organisational basis of EIUF was recognised. It is therefore discussed to turn EIUF into an entity with legal personality (eg. a non-profit-making association acc. to Belgian law).

The address of EIUF is found in Annex 1.

9.2 EC - JAPAN ISDN INTERCONNECTION EXPERIMENT (EJIX)

The improvement of the interoperability of world-wide communications using ISDN is the objective of the EJIX.

The proposal for such an experiment has been agreed in the Network Working Group, a sub group of the annual EC - Japan Plenary Meetings in telecommunications.

With the direct support from the manufacturing and operating industry in Europe a first series of tests was carried out successfully on 5 February 1993. At current, a comparative analysis of relevant European and Japanese standards are carried out.

Further tests, with extended industry participation, are planned for the beginning of 1994.

9.3 EURO-ISDN EVENT (EURIE 93)

Raising the awareness of the public at large about the introduction of the new European-wide general telecommunications infrastructure EURO-ISDN was the objective of this proposal.

The event was held in 60 cities on 14-16 December 1993 and was supported by 22 EURO-ISDN operators, by manufacturers and by the Commission.

All participating operators organised 75 ISDN showrooms where various applications were demonstrated. A key aspect was the ISDN-interconnectivity between all sites.

The compatible working of four services,

- videophony,
- facsimile group 4,
- EuroFile Transfer and
- 7 kHz telephone

between the sites was shown to the 25 000 visitors.

Seminars and conferences were organised alongside with the exhibitions.

Beside these "distributed" events, a central opening ceremony was held in Brussels on 14 December 1993. Main purpose of this event in Brussels was the information of the media.

EURIE '93 had a very positive echo in the press.

9.4 ISDN AS TRANS-EUROPEAN NETWORK

At the issue of 3rd Annual ISDN Progress Report the Council has adopted a Resolution "On the development of ISDN in the Community as a European-wide telecommunications infrastructure for 1993 and beyond".

In this Resolution the Council stresses the importance of developing ISDN in the context of trans-European networks (TEN).

Following the political agreement reached on the Treaty of the European Union, the Commission has decided to start the elaboration of proposals for the development of TEN concerning three telecommunications aspects:

- telematic networks between administrations;
- ISDN and
- Integrated Broadband Communications (IBC).

For the preparation of the proposal concerning ISDN a Working Group with participation from the PNO's and also from the Member States was established and a report summarises the results of the discussion in this group.

The group has achieved a broad consensus on a framework of potential measures in favour of ISDN which fully reflects the principle of subsidiarity.

Subsequently, the Commission has converted the essence of this report into a Communication to the Council and into two proposals for Council Decisions which will establish a legal basis for the commitments connected to the implementation of the TEN-ISDN proposals. The first proposed decision defined a series of guidelines including the objectives, priorities and broadline of measures for the development of ISDN as TEN.

In the second proposal for a Council Decision the possible Community contribution for projects of common interest which are eligible under the guidelines is described.

The Commission has approved these proposals on 1.9.93. Support under TEN will promote ISDN projects fully in line with EURO-ISDN requirements.

The Commission will also explore and contribute to a maximisation of potential synergy effects between the Telematic Networks between Administrations (TNA)[27] and ISDN in interconnecting where feasible TNA applications via EURO - ISDN. Dedicated feasibility studies will be conducted to this end.

After having been adopted by the Commission, the proposals for TEN - ISDN were forwarded to the Council and the European Parliament under the Belgian Presidency.

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27 COM (93) 69 final, 12.09.93

9.5 EVALUATION OF APPLICATIONS FROM OTHER PROGRAMMES

With the increasing availability of ISDN in Europe, a number of projects in Research, Development and Technology (RD&T) actions in the Commission of the European Communities, Directorate-General XIII (DG XIII), plan to use, or are already using ISDN for interconnecting their applications.

Promotion for ISDN application is provided within a number of Research Programmes of the Community like RACE and ESPRIT but also by other projects like ENS (European Nervous System) or other telematic programmes.

Annex 5 provides an overview of ISDN related projects from those other activities. Further information on those projects can be obtained from the Commission.

10 CONCLUSIONS

Since the preceding report (issued on 26.11.1991) five further operators have been added to the list of those with commercially available ISDN offerings. Only Greece and Luxembourg are still missing.

A large variety of ISDN terminals and applications are now available and these products have matured considerably.

The standardisation for EURO-ISDN (with the exception of some test and type approval standards) were completed by the end of 1992 by ETSI. ETSI has a leading position in the world-wide ISDN standardisation.

The Council in its Resolution from 05 June 1992 has given further guidance for the development of ISDN in the Community and ISDN will be developed as trans-European network.

With a steadily increasing appearance of alternative types of networks (eg. new technologies for corporate networks) ISDN technology faces more competition.

The further success of ISDN will depend on the possibility to continue the general deployment of ISDN under stable and long-term predictable conditions.

This implies long-term investments for which the financial stability of the investors must be maintained. Otherwise, the objective of a general coverage cannot be achieved.

A general roll-out of ISDN in the Member States is a priority of the Community's telecommunications policy. Beyond the mere roll-out of the physical infrastructure, the promotion of European - wide compatible basic services is an urgent requirement. The co-ordinated introduction of EURO- ISDN requires the co-operation of the concerned sector actors. The Commission supports the co-operation necessary for a harmonised introduction of EURO - ISDN offerings including for basic services (e.g the one's mentioned in the proposal for a Council Decision[28]). Notably, projects of common interest in the frame work of the envisaged Community - action TEN - ISDN should be based on joint proposals from the sector actors.

Given the infrastructural nature of ISDN, ISDN has been included into the Council Resolution on a "Universal Service".

Cordless accesses and the offering of virtual private networks via EURO-ISDN are other main requirements.

VPN means a software defined network allowing to specify, for example, own numbering plans for closed user groups on the basis of a given physical network (e.g. ISDN).

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28 COM (93) 347/2, 01.09.93

This report has been prepared by the Commission of the European Communities and will be submitted to the Council and the European Parliament.

A major goal as defined in the MoU for ISDN has been reached with the launch of EURO-ISDN in the end of 1993. At the same time a new phase in the development of ISDN was started; the phase of the full deployment of EURO-ISDN and the further development of the set of services.

Therefore, the Commission proposes that the public network operators continue their work in the framework of IMIMG. The Community will intensify its support for the continuation of the development of EURO-ISDN in the framework of the TEN-ISDN action.

ANNEX 1

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ANNEX 2

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Bearer Services Circuit-mode 64 kbit/s unrestricted * Circuit-mode 3,1 kHz audio * Packet-mode (X.31 case B) B- and D-channel Circuit-mode speech
Teleservices Telephony 3,1 kHz Facsimile group 4 class 1 Teletex Telephony 7 kHz Syntax-based videotex Videotelephony
Supplementary Services Calling Line Identification Presentation (CLIP) * Calling Line Identification Restriction (CLIR) * Direct Dialling In (DDI) * Multiple Subscriber Number (MSN) * Terminal Portability (TP) * Call Waiting (CW) Completion of Calls to Busy Subscriber (CCBS) Closed User Group (CUG) User-to-User Signalling (UUS) Subaddressing (SUB) Three Party (3PTY) Advice of Charge (AOC) Connected Line Identification Presentation (COLP) Connected Line Identification Restriction (COLR) Malicious Call Identification (MCID) Add On Conference Call (CONF) Meet Me Conference (MMC) Freephone (FPH) Explicit Call Transfer (ECT) Call Forwarding Busy (CFB) Call Forwarding No Reply (CFNR) Call Forwarding Unconditional (CFU) Call Deflection (CD) Call Hold (HOLD)
Basic access and Primary rate access user-network interfaces
ISDN interconnection interfaces for the services identified above
End-to-end protocols for the services mentioned above
Network capabilities for the services mentioned above

ANNEX 3

SUMMARY DEFINITION OF NATIONAL ISDN-1

National ISDN-1 is defined in detail in Special Report SR-NWT-001937, in terms of Bellcore Technical References (TRs) and other specifications. The following features characterize National ISDN-1:

- A standard network interface comprising control of interoffice calls, including support of the SS7 protocol and procedures, and call routing
- Protocol portability for Basic Rate Access
- Support of single-user configuration with multiple applications on a single 2B + D interface
- Support of single interface sharing by two users, with possible restriction of each user to a single B channel, or restriction to one user with access to a single B channel
- Access to select analog POTS and Centrex features
- Support of Primary Rate Access (vendor specific implementations)
- Initial operations support
- Selected basic subfeatures for the following supplementary services:
  - Call Forwarding (voice & circuit switched data-CSD)
  - Automatic Callback (voice)
  - Call Hold (voice & CSD)
  - Additional Call Offering (voice & CSD)
  - Flexible Calling (voice)
  - Calling Number Identification Services (voice & CSD)
  - Message Service (voice & CSD)
  - Display Service (voice & CSD)
  - Electronic Key Telephone Service (voice)
  - Multiline Hunt Groups (voice & CSD)
  - Business Group Dial Access Features (voice & CSD)
  - Call Pick-up (voice)
  - Station Message Detail Recording (vendor specific)
- Standard recording to support billing for the following ISDN capabilities and services:
  - Basic call control
  - Signaling capabilities
  - Basic Business Group
  - Calling Number Delivery

CURRENT STATUS OF NTT'S ISDN SERVICES (Jan. '93)

1 The number of acces lines (Jan. 1993)

- Basic Rate Access (INS-64 service) ..... 141,644 lines
- Primary Rate Access (INS-1500 service) ..... 2,816 lines

2 Applications

- Basic Rate Access ..... Leased circuit back up
  LAN interconnection
  Remote security surveillance system
  Consumer clinic system, etc.
- Primary Rate Access ..... Leased circuit back up
  LAN interconnection
  CAD/CAM communication system
  Video conference system, etc.

CURRENT STATUS OF KDD'S ISDN SERVICES

1 Number of access lines (Dec. 1992)

- Basic Rate Access ..... 1,387 lines
- Primary Rate Access ..... 63 lines

2 International ISDN

June 1989	USA, UK
Dec. 1989	Singapore
Jan. 1990	Australia
Apr. 1990	France
Dec. 1990	Italy, Vatican, San Marino
Apr. 1991	Hong Kong, Germany, Belgium
May 1992	Spain
June 1992	Netherlands
Aug. 1992	Sweden
Nov. 1992	Switzerland, Liechtenstein
Dec. 1992	Denmark, New Zealand

ANNEX 5

ISDN related projects of the Community

1. ENS

In the European Nervous System (ENS) programme projects plan to use ISDN for telematic services relating to environmental issues, cross-border postal functions and standardization.

CAPE (E2004),
proposing ISDN communications on a national basis.

ENVIRONET (E2008),
envisaging to consider ISDN in complementarity with other telecommunication services (Telephony with modems, X.25, X.400) in the pending specified requirements.

RISE (E2012),
implementing two experiments with Euro-ISDN
- for VSAT distribution (RISE-Pilot1), an ISDN connection is used to feed the Hub (Paris, F) from the information providers premises, ETSI (Nice, F) in the first step and then every National Standard Organisations, two tests will be implemented
* on Numeris (French ISDN) with the following protocols: ISDN, TCP/IP, FTP, Pathworks (Digital proprietary software),
* between German and Dutch ISDN with the following protocols: ISDN, OSI stack with DTAM,
The results of these two tests will be taken into account to be integrated inside the detailed specifications of this Pilot2.

2. DELTA

Aim of the Developing European Learning through Technical Advance (DELTA) programme is to stimulate incremental research and development which will enable new technologies to be incorporated in the tools and infrastructure supporting advanced learning, in particular open and distance learning, in the Community. A number of projects are looking at ISDN as a basic carrier service for various training-related applications. These applications can be split into the following classes: video-conferencing (1), audio-conferencing (2), file-transfer (3), transaction-oriented (4) applications.

Project name	1	2	3	4
SMILE (D2002)	no	yes	yes	no
DEDICATED (D2014)	no	no	yes	no
CO-LEARN (D2005)	no	yes	yes	no
MALIBU (D2013)	yes	no	no	yes
ACT (D2020)	yes	yes	yes	yes
MTS (D2021)	yes	yes	yes	yes
ECOLE (D2004)	no	no	yes	yes
JANUS (D2003)	no	no	yes	yes
JITOL (D1015)	no	no	yes	yes
OSCAR (D2006)	no	no	yes	yes
COSYS (D2011)	no	no	yes	yes
EAST (D2016)	no	no	yes	yes
MATHESIS (D2009)	no	no	yes	no

More detailed explanation is available on request.

3. AIM

The Advanced Informatics in Medicine (AIM) programme is a pre-competitive/pre-normative R&D programme which is designed to develop new technology, specifically information and communications technologies, and to bring benefits from these developments into Medicine and Health Care, in order to improve the quality and cost-effectiveness of the services provided and to strengthen the competitiveness of the European I&CT industry. For twelve projects the usage of ISDN is considered, subject to its availability and a reasonable cost level.

EMDIS (A2006),
interconnection of 12 national transplant registries.

EPIC (A2007),
general surveillance of house bound people.

DILEMMA (A2005).
pediatric ontology (related to laboratory flow, realtime requirements between laboratory and clinics).

ISSAAC (A2013),
ISDN between hospital and general practitioners to transmit referral notes, hospital discharge notes, laboratory results and imaging data as well.

ESTEEM (A2010),
exchange of EMG between the physicians and expert systems (no real-time requirements).

GEHR (A2014), PROCAS (A2003),
exchanging alpha-numeric data in the shortest possible time between physicians and hospital.

EURIPACS (A2009),
image "mail-box" service between hospitals of different kinds, specialists and General Practitioners.

FEST (A2011),
services in telemedicine.

OEDIPE (A2026),
data intercharge and processing for electrocardiography

IMPACT (A2017),
interactive telepathology, teleconsultation, transfer of images between two pathological laboratories on almost real-time. Decision on carcinoma during the operation of patient.

SHINE (A2035),
investigation for the most effective application of telematic services for Regional Health Care.

4. LIBRARY

A certain attention is given to ISDN in the **LIBRARY** programme mainly in connection with interconnection of and access to image banks of libraries. For the access to information services and the transfer of information some use of ISDN is also envisaged.

EDIL (1042),
intends to use ISDN at least in France, perhaps in connection with UK.

JUKEBOX (1049),
only if international connections are available, otherwise research networks.

ELISE (1008),
establishing full colour image banks of library materials (slides, maps) will develop specifications and model for international (FR, UK, NL) interconnection via ISDN.

VANEYCK (1054).
interconnection image banks Art Photographic libraries through ISDN network, development of network under Research into Advanced Communications technologies for Europe (RACE) project RAMA (R2043). First ISDN links between UK-NL, later in project between UK-NL-IRL.

5. ESPRIT

Also the usage of ISDN in the domain of business systems and house automation under the European Strategic Programme for Research and development in Information Technology (ESPRIT) programme is worthwhile to be mentioned. Here, the usage of ISDN is foreseen in several projects to enable pilot experiments.
Aim of ESPRIT is to improve the competitiveness of the microelectronics industrial sector so as to enable it to provide the IT industry with full systems capability based on the state of the art semiconductor technology.

6. TEDIS

Under the umbrella of the telecommunications actions of its phase II, the Trade Electronic Data Interchange System (TEDIS) programme has awarded a study on "EDI & ISDN" as a result of its last call for proposals to the Danish consultancy firm Fisher & Lorenz with XCOMS Int'l from Belgium as a subcontractor.
The awaited results are a prioritized list of new forms of EDI which can benefit of ISDN, taking economic and operational considerations into account and a rational of the applicability of TEDIS sponsored One Stop Shop concept to the commercial interconnection of ISDNs in Europe.

7. RACE

Research and development in Advanced Communications technologies for Europe (RACE). Aim of RACE is to promote the competitiveness of the Community's telecommunications industry, operators and service providers in order to make available to final users the services which will sustain the competitiveness of the European economy and contribute to maintaining and creating employment in Europe.

ANNEX 6

GLOSSARY OF TECHNICAL TERMS

Addressing	The process by which a calling user indicates the identity of the called user on a particular call. It includes a network addressing (numbering) component to identify the called user-network interface and may include further information (sub-address) to identify a particular terminal beyond the public network.
"B"-channel	For user-to-user information transport.
Basic access	Physical interface structure available at S or T reference point: 2x64 kbit/s "B" channels and 1x16 kbit/s "D" channel. In some configurations S and T reference points are joined.
Bearer Service	A type of telecommunications service that provides the capability for the transmission of signals between user network interfaces.
Bit rate	Number of bits (units of messages) transmitted per second.
Calling Line Identification	Indicates the identification of the calling user line.
CCITT	International Telephone and Telegraph Consultative Committee (ITU).
CCITT Blue Book	Series of CCITT publications due to be adopted by the CCITT Plenary Assembly in 1988, in Melbourne.
CEPT	European Conference of Postal and Telecommunications Administrations
"D"-channel	For user-to-user and user-network signalling information transport
ETS	European Telecommunications Standard
ETSI	European Telecommunications Standards Institute, established in March 1988 and located in Sophia-Antipolis near Nice
GAP	Analysis and Forecasting Group (subgroup of SOGT). Issued a report on ISDN in 1985 as a basis for the Council Recommendation.

Green Paper	Green Paper on the Development of the Common Market for Telecommunications Services and Equipment [COM(87)290], published in June 1987. Outlines the Commission's position on the development of the Community's telecommunications policy and the proposals to reach the 1992 target in this sector, including required regulatory change at EC level.
ISDN	Integrated Services Digital Network
ISPBX	private Automatic Branch Exchange for Integrated Services
ISUP or ISDN-UP	ISDN User Part = part of the N° 7 signalling systems allowing ISDN facilities.
NET	("Normes Européennes des Télécommunications") an approved technical specification recommendation
Numbering	see "Addressing"
ONP	Open Network Provision, concept for the definition of general requirements for the use of the Telecommunications Administrations' network infrastructure and/or services including technical interfaces, tariff principles and conditions of use.
Primary access	Physical interface at T reference point
PSPDN	Packet Switched Public Data Network
Quadripartite Collaboration	Close collaboration for the co-ordinated introduction of ISDN between the Telecommunications Administrations of France, FRG, Italy and UK
Reference Point	A conceptual point at the conjunction of functional groups of the telecommunications network
Signalling System N° 7	The new CCITT system allowing two switching centres to exchange information, e.g. information needed for establishing a telephone call
SOGT	Senior Officials Group on Telecommunications (EEC)
S/T reference Point	Possible location of access for Bearer Services supported by an ISDN
TUP	Telephone User Part = part of the N° 7 signalling system allowing telephony
TUP+	Extended TUP, allowing in addition to traditional telephony use of a 64 kbit/s bearer service.

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