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GRUPO DE ANÁLISE E PREVISÕES

GRUPO DE ANALISIS Y PREVISION

**REPORT BY THE
“ANALYSIS AND FORECASTING GROUP” (GAP)
ON OPEN NETWORK PROVISION
(ONP)
IN THE COMMUNITY**

BRUSSELS, January 20, 1988

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PREFACE

This report by GAP is the first attempt to develop common principles regarding the general conditions for Open Network Provision (ONP) by Telecommunications Administrations in the Community, in accordance with the mandate given by the Senior Officials Group for Telecommunications.

1. At the end of 1986, GAP was requested to analyse the Open Network Architecture (ONA) concept as presently being developed in the U.S. GAP was also asked to undertake comparative analysis of European concepts for network provision to users, taking special account of the evolving ISDN and OSI-architectures, and the requirements of value-added services. The considerations should include technical, economic and strategic aspects. The first report should include the consequences for international standardisation of future network interfaces and termination points.
2. At the SOGT meeting of July 2, 1987, it was agreed to extend this study period of GAP to the end of 1987, and that the report should concentrate in particular on the concept of ONP as described in the Green Paper which was published in June 1987 (COM (87) 290 final : Green Paper on the development of the common market for telecommunications services and equipment).

The content of the report is based on a large number of contributions from a variety of sources, including the following :

- documents provided by Telecommunications Administrations
- documents from the European Commission, in particular the Green Paper
- reports on the progress of ONA in the U.S., including the analysis made by a member of the French delegation and the GAP secretary after a visit to the U.S. in December 1986
- a presentation by the Commercial Action Committee of CEPT on Managed Data Network Services (MDNS)

- presentations made by major European manufacturing industries on the evolution of their telecommunication products
- presentations made by User Organisations, expressing the views of End Users and of Private Service Operators on Open Network Provision
- a joint meeting with Bellcore, AT&T and the RBOC's US WEST and NYNEX on actual developments on ONA
- a study carried out by SCS/SCICON under contract with DG XIII of the European Commission on Open Network Provision.
- a detailed contribution by the Danish delegation, called Elements of Open Network Provision.

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The present report is divided into the following main parts :

Chapters 1 and 2 describe the aims and the scope of ONP.

Chapter 3 looks at the relations of ONP with adjacent topics i.e. ONA, the OSI-model, MDNS.

In chapter 4 a general framework for ONP is given, while chapter 5 gives a first list of interfaces to which ONP can apply.

Annex 1 reports on a possible work programme for the development of ONP. For the development of such a complex concept as ONP, it is suggested that a working programme be established which allows the different issues involved to be tackled in the appropriate time frame.

Annex 2 provides information on the ONA concept and its development in the US.

SUMMARY

In 1987, the Commission issued a Green Paper ("Towards a dynamic European Economy : Green Paper on the Development of the Common Market for Telecommunications Services and Equipment", dated 30 June 1987) on the future regulation of telecommunications in Europe.

The Green Paper states that agreement should be achieved "to develop common principles regarding the general conditions for the provision of the network infrastructure by the Telecommunications Administrations to users and competitive service providers" under the term Open Network Provision (ONP).

This should be achieved by ensuring that there is convergence for a range of interfaces and access arrangements to be offered by the Telecommunications Administrations to users. This range will primarily serve the needs of Private Service Operators offering non-reserved or competitive services (including value-added services). By this means, it is expected that ONP will stimulate the development of Pan-European services throughout the Community.

The Telecommunications Administrations should investigate the possibility and practicality of offering a range of services under ONP which would complement their existing offerings. T.A.'s would continue their existing offerings and would extend them to include ONP offerings.

In time, the concept of ONP should be gradually updated on the basis of technological progress and telecommunications regulatory evolution, and studies would be carried out to determine the feasibility of applying ONP to other offerings of network infrastructure services of the Telecommunications Administrations.

It is envisaged that ONP could represent a new range of commercial offerings by the Telecommunications Administrations. These offerings may differ from existing offerings in terms of enhanced technical interfaces, usage conditions and/or tariff principles. Together these three issues form a reference framework. The usage conditions and tariff arrangements that apply to ONP offerings should be such as to make them attractive to Private Service Operators, taking account of TA's other operational and commercial constraints and obligations.

The technical interfaces adopted could typically have increased versatility over existing offerings. However, since Open Network Provision is seen as a natural evolution of the current offerings of the Telecommunications Administrations, existing technical and operational functions will be adopted wherever appropriate.

A proposal for a possible working programme for the development of ONP is given in Annex 1 and includes :

- access to Leased Lines under ONP
- access to Packet Switched Public Data networks under ONP
- access to ISDN under ONP

OPEN NETWORK PROVISION

1. AIMS OF OPEN NETWORK PROVISION

1.1 ONP and the Green Paper

In the EEC document : "Towards a dynamic European Economy : Green Paper on the Development of the Common Market for Telecommunications Services and Equipment"¹, it is stated that :

"... the Community will have to develop common principles regarding the general conditions for the provision of the network infrastructure by the Telecommunications Administrations to users and competitive service providers, in particular for trans-frontier service provision."²

This concept is known as Open Network Provision.

Because ONP is one of a number of proposed action lines in the Green Paper, it is essential that an efficient coordination with the other positions in the Green Paper is ensured.

1

The "Green Paper" referred to is the document entitled "Towards a Dynamic European Economy : Green Paper on the Development of the common Market for Telecommunications Services and Equipment", reference COM(87)290 final and dated 30 June 1987. This is referred to throughout this document as "the Green Paper".

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Chapter VI, Section 4.2.3 of the Green Paper.

1.2 The Concept of ONP

Open Network Provision is aimed at creating within Europe a mechanism by which the network infrastructure³ in the form of a number of switched services and non-switched transport services may be offered by the Telecommunications Administrations⁴ to users and competitive service providers. ONP is intended to maximize the utilisation of the network and to stimulate new market opportunities in the range of non-reserved services.

ONP is the mechanism

- to stimulate the development of non-reserved services, provided both by the Telecommunications Administrations and by Private Service Operators;
- to promote fair competition between Telecommunications Administrations and Private Service Operators in the market of non-reserved services.

ONP should not lead to the gradual erosion of the current position of the Telecommunications Administrations in the overall marketplace.

³ The term "Network Infrastructure" as used in this report refers to the provision of telecommunication services by means of T.A. networks delivered to Private Service Operators and other users at defined network termination points.

⁴ Throughout this document the phrase "Telecommunications Administrations" (or TA's) is used as a shorthand term to mean any telecommunications operator providing public services with special rights and duties, i.e. the Telecommunications Administrations, Recognised Private Operating Agencies (RPOA's) and other private operators operating as public administrations. All other operators are referred to as Private Service Operators (or PSO's). The use of the terms private and public refers to the services and in no way implies any fact about the ownership of the operating company (for example the Telecommunications Administrations may be in public or private ownership).

Both the TA's and Private Service Operators can offer all services other than those which are reserved. Therefore, ONP should promote a degree of commonality and standardisation within the Member States for a range of interfaces and access arrangements offered by the TA's to all users. This is primarily aimed at serving the needs of PSO's offering value-added services to third parties.

It is recognised that non-reserved services are essentially built on top of the basic offerings of the Telecommunications Administrations. Figure 1 shows the basic offerings by the Telecommunications Administrations for the provision of the network infrastructure. Non-reserved services can be built on top of these two basic offerings : non-switched transport services (in particular leased lines) and switched services.

Therefore

ONP aims at the definition of common interface arrangements for the provision of the network infrastructure. Currently two levels of service interfaces may be considered :

- interfaces to non-switched transport services (e.g. virtual or physical point-to-point connections, including leased lines)
- interfaces to a range of switched services.

This is shown by the two arrows in Figure 1.

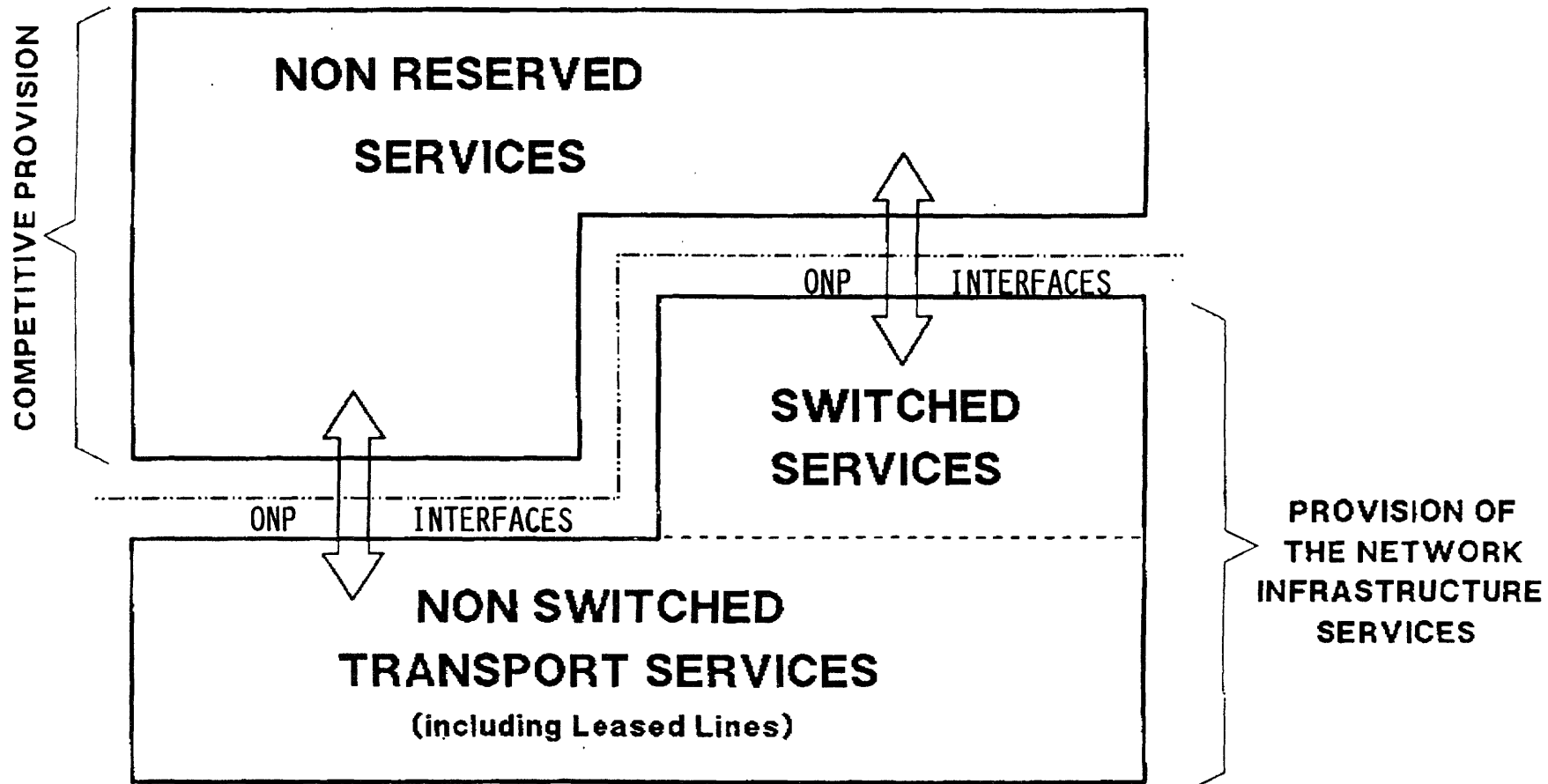


Figure 1

2. SCOPE OF OPEN NETWORK PROVISION

2.1 Scope in Time

Initially ONP would only be applied to certain reserved services provided by the Telecommunication Administrations.

If it is agreed that ONP is to be implemented, the TA's would gradually extend their offerings under ONP on the basis of technological progress, telecommunication regulatory evolution, market demand, and technical operational and commercial viability.

Offerings under ONP would potentially differ from existing offerings in technical interfaces, usage conditions and/or tariff principles. Open Network Provision is seen as a natural evolution of the current offerings of the Telecommunications Administrations, and, therefore, could adopt similar technical and operational functions wherever appropriate.

Initially, e.g. by 1992 (the deadline set for the internal market) it is proposed that some of the current services could be offered under ONP terms. These ONP offerings would be additional to the existing ordinary offerings which would remain unchanged.

Beyond 1992, the remaining current services which are still being offered under non-ONP terms would gradually be offered under ONP terms. At some stage, a point should be reached at which all current non-ONP services would be offered under ONP terms, and therefore the TA's would be able to market a complete range of ONP services in addition to their ordinary offerings. New services introduced at this time would be offered under ONP terms.

Whether the current services offered under non-ONP terms will continue or should be redefined as perhaps a subset of the ONP offerings should be left for further study.

Given the situation that network infrastructures differ in the Member States, that there are at present different reserved services in the Member States and that the evolution of the networks will not be uniform over time, ONP implementation should take this into account and should allow a certain degree of flexibility in the introduction in the different countries of the Community.

As ISDN will create important new opportunities for ONP offerings, the coordinated introduction of such a network is of great importance. ISDN offerings under ONP should be in line with the Council Recommendation on ISDN.

At the present stage, ONP should refer only to the offerings in the reserved area of the Telecommunication Administrations, which could also include new obligations to users. However, in the future, consideration may have to be given to the introduction of obligations for certain non-reserved offerings of the Telecommunication Administrations and Private Service Operators where either may hold a dominant position.

The areas of reserved services and competitive (non-reserved) services are shown in Figure 2.

ONP FROM THE REGULATORY VIEWPOINT

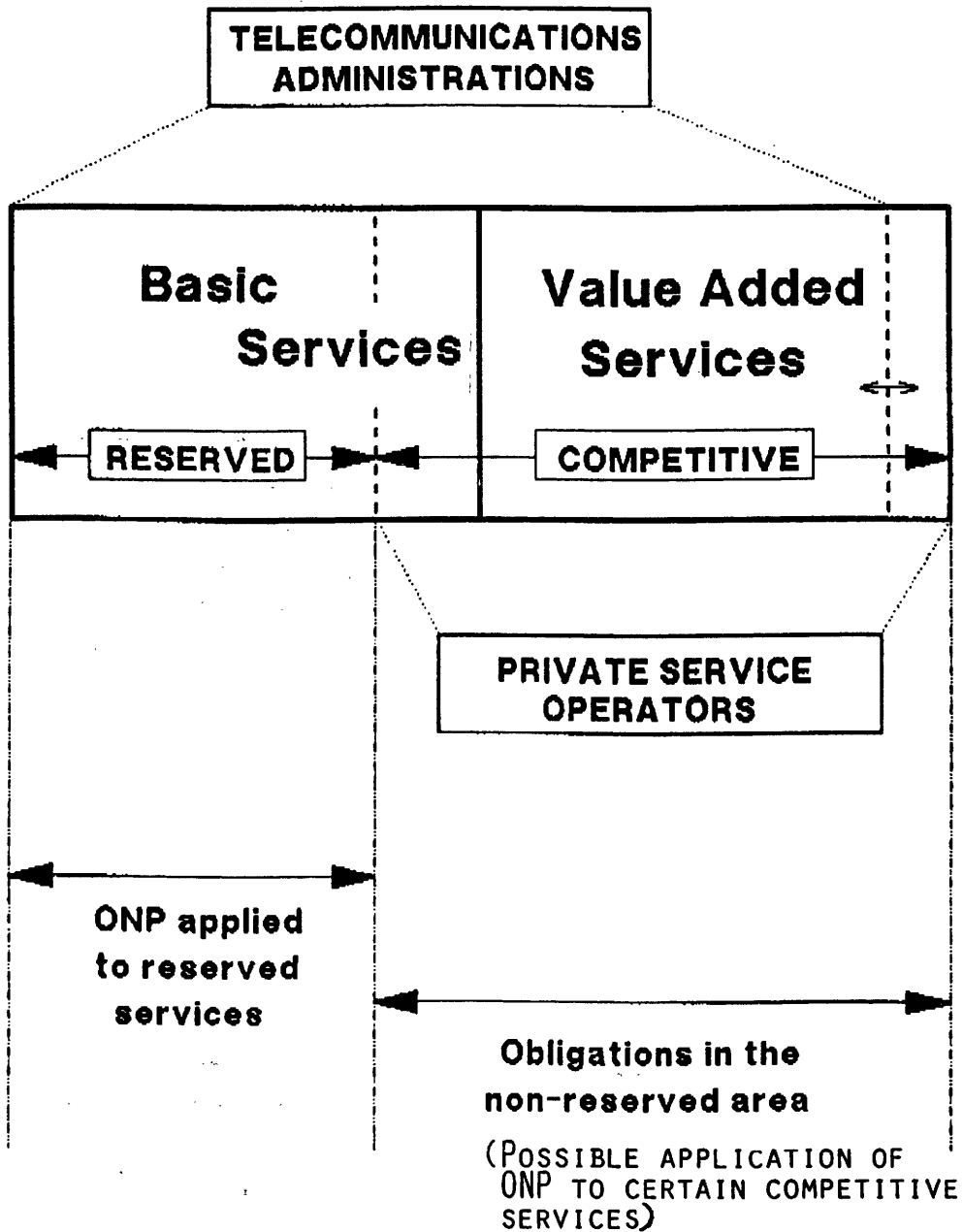


Figure 2

2.2 The Scope of ONP offerings

The current offerings of the Telecommunications Administrations basically fall into two categories :

- subscriber lines (in this context a subscriber line is an access to a service, such as telephony or telex, offered at the network termination point);
- leased lines (fixed point to point connections between users premises).

A new type of access arrangement is proposed, and will be referred to as Open Network Offerings. In the first phase of ONP, these offerings would be provided in addition to the existing two categories of offerings of the Telecommunications Administrations.

ONP should respect international standards and should be provided as far as possible by means of existing network elements and functions. At the same time, offerings under ONP should reflect customer needs.

It should be noted however, that certain principles in the present D-series Recommendations of CCITT are not in line with the current trends in the regulatory environment.¹

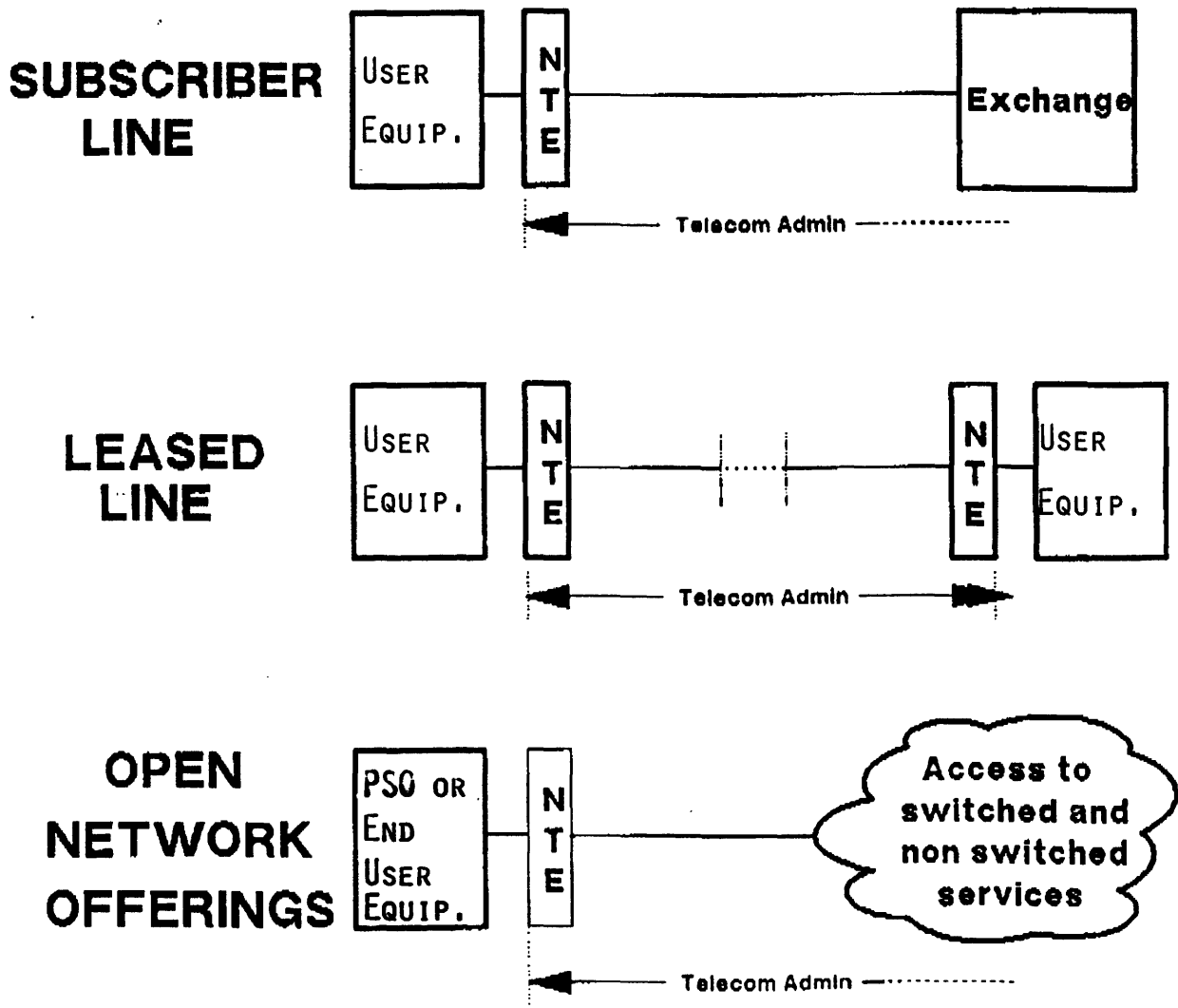
Open Network Offerings would be the new access mechanism to the offerings under ONP (non-switched and switched services) of the Telecommunications Administrations and would primarily be used by Private Service Providers in the provision of non-reserved services for third parties. However, Open Network Offerings should be available for all users.

In the first phase of ONP, Open Network Offerings could be made available in addition to existing offerings of Telecommunications Administrations.

This is illustrated in Figure 3.

¹ Refer to Green Paper, Chapter XI-Section 4.2 and Appendix 4, Section 3.3.2

TELECOMMUNICATIONS ADMINISTRATIONS OFFERINGS



NOTE ; NTE = NETWORK TERMINATION EQUIPMENT

Figure 3

2.3 The ONP Trilogy

Open Network Offerings can be defined in terms of :

- technical interfaces
- usage conditions
- tariff principles.

These will typically be "interlinked" and may differ from the equivalent conditions for existing offerings. In some cases existing technical interfaces will be adopted, having different usage conditions and tariff principles.

ONP offerings are intended to meet the specific needs of providers of non-reserved services and would define the technical interfaces together with the stipulated usage and tariff conditions.

The terms and conditions that would be applied to Open Network Offerings are aimed at ensuring a large degree of "openness"² for these offerings. It is foreseen that Telecommunication Administrations will retain their existing offerings. Consequently, Open Network Provision would provide an additional range of choice for the telecommunications user, suited, in particular, to Private Service Operators.

The telecommunications users would have a choice : either to continue to use leased lines and switched services under the existing terms and conditions (and thus retain, for example, existing interconnection constraints); or to use Open Network Offerings.

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"Openness" in this context means : well-defined and published conditions of supply and usage for the services offered at the network termination point.

The usage conditions and tariff arrangements that apply to Open Network Offerings should be such that they will tend to make these lines attractive, in particular to Private Service Operators . Even so, it is anticipated that not all Private Service Operators in all circumstances will find Open Network Offerings attractive.

It is expected that only a proportion of users would adopt Open Network Offerings and that many users will continue to use existing Telecommunications Administrations' offerings (and thus will retain existing technical interfaces, usage conditions and tariffs).

The availability to the users of this choice between Open Network Offerings or existing offerings would have an impact on the size and planning of the network elements and the marketing approach of the Telecommunications Administrations.

The introduction of Open Network Offerings would ensure that there would be uniformity in the usage conditions and tariff principles and that the technical interfaces would, as far as possible, be common throughout the Member States.

This would permit Private Service Operators, to provide their services in a manner that allows free and fair competition between all operators. By this means, Open Network Provision could stimulate the development of value-added services throughout the Community and in particular the development of pan-European value-added services.

3. RELATIONSHIP OF ONP WITH OTHER ISSUES

3.1 ONP and ONA

The idea of Open Network Architecture has its background in the evolving regulatory framework for telecommunications in the USA, and in particular the transition from the Computer II regulation to the Computer III regulation.

To avoid any misunderstanding on ONA, one has therefore to keep in mind the following :

- Open Network Architecture will be a set of technical, economic and regulatory arrangements aimed at ensuring as much competition as possible in the fields of telecommunications, information provision and value-added services, and with the overriding target to avoid any misuse of dominant or monopoly market positions by existing telecommunications carriers, in particular by AT&T and by the Regional Bell Operating Companies (RBOC's).
- Open Network Architecture will not just be a technical concept (in particular, and despite its name, it is not an architecture and is therefore unlike OSI or SNA for example).

The two most important issues in ONA are the following :

- ONA requires from the RBOC's that they offer equivalent opportunities of access to all users of their networks and that they unbundle their basic offerings (using Basic Service elements);
- ONA opens the way to remove the restrictions hitherto imposed on RBOC's (specifically the prohibition on offering enhanced services, unless structural separation is implemented).

A more detailed description of the ONA concept and its development is given in Annex 2 to this report.

The concepts of ONA in the US and ONP in Europe have much in common. In particular, the most important similarity between ONP and ONA is that both concepts aim at creating the best possible conditions for innovative development of value-added services in a competitive environment.

To achieve this objective, in both cases it will be necessary to agree on common principles which apply when telecommunication operators make their network infrastructure services available to customers : in the US under ONA and in Europe under ONP. Both in Europe and in the US, these common principles will comprise technical, regulatory and economic aspects.

Nevertheless, despite apparent similarities between ONA and ONP there are also a number of significant differences. These result from different aims of ONA and ONP, the different starting conditions and in particular the different regulatory environments.

The major differences between the ONP concept and ONA relate to the following aspects :

- Whereas in the US, interexchange services and intra-LATA services are structurally separated, generally in Europe both local and trunk networks are nationally provided by the Telecommunications Administrations.
Transfrontier value-added services in Europe will, however, require the involvement of more than one TA and more than one national regulatory system.
- Whereas in the US there is a historical separation between the provision of voice services and the provision of text and data transmission and switching services, there is no such separation in the Community.
- Whereas AT&T and the BOCs can not enter the value-added services market unless under structural separation, the Telecommunications Administrations within the Community are more or less already involved in value-added services offerings.

- Whereas in the US there is a long experience in the implementation of cost-based tariffs and in the re-balancing of local and trunk tariffs, there is as yet very little experience in Europe either in the application of cost-based tariffs or in the re-balancing of tariffs between trunk and local networks.
- The development of ONA stemmed first of all from regulatory considerations, while the development of ONP is part and parcel of a common policy within the Community. Thus ONP in Europe is a concept aimed at stimulating the development of a European-wide market for value-added services and information services, also taking into consideration end user benefits.
- In the US, individual ONA plans were to be submitted by RBOC's and by AT&T (with limited requirements for AT&T) on February 1, 1988. With regard to technical aspects these plans take into account the list of network capabilities (or Basic Service Elements) requested by enhanced service providers. Such a list was compiled by Bellcore, and was also made available to GAP. In the Community, the main thrust for ONP is to agree on common principles for Community-wide network provision.
- In the US ONA applies only to RBOC's and AT&T offerings. In the future, the Community may have to consider introducing obligations to certain non-reserved offerings of Telecommunication Administrations and Private Service Operators.

3.2 ONP and the Integrated Services Digital Network (ISDN)

With the introduction of ISDN, Private Service Operators will be able to access via standardized interfaces many enhanced (intelligent) network features which should provide a good opportunity for Private Service Operators to build up and develop new innovative services.

Access to the ISDN Services

It is recognized that a complete set of standards for ISDN is not yet available, and that the tariffs for ISDN are not yet defined within all the Member States.

Nevertheless, there is a firm commitment by both the Member States and the European Commission to develop ISDN and implement it on a Europe-wide basis (refer to Green Paper, Chapter VII, section 2.2 and the Council Recommendation 86/659 on the coordinated introduction of ISDN). Therefore, to prevent the unnecessary proliferation of new interfaces, the basic rate access and the primary rate access at the S/T reference point (as specified by CCITT and CEPT) will certainly be used for Open Network Provision wherever practical.

Access to network capabilities in ISDN

For ISDN it will be appropriate to investigate whether it is necessary to provide, in addition to the standard access referred above, the means for accessing special network capabilities on an ONP basis.

A number of these capabilities may, in the future, be accessed through new interfaces which are indicated in the I-series CCITT recommendations as the M and P interfaces (Rec. I. 310), if use of basic and primary rate accesses are found to be unpractical.

A programme of work for further development of ONP could include a time-frame for development of these interfaces, taking into account the expressed user needs and the commercial and technical considerations of TA's. The definition of the interfaces and the features/capabilities to be carried over these interfaces should be handled by the appropriate standardisation bodies.

3.3 ONP and the OSI-model

In 1977, it became apparent that individual manufacturers of new information processing and information exchange systems were developing proprietary solutions which were mutually incompatible and were leading to the creation of communication islands. In an attempt to overcome this situation the International Standards Organisation (ISO) established a work programme on

"Standardisation in the area of open systems as it relates to systems interconnection. This will include the development of standards required for the reference model of Open Systems Interconnection (OSI) and for exchange of information between open systems."

By 1983 an OSI 7 Layered Reference Model had been developed which has now been accepted worldwide as the method to structure protocol design so as to allow for ease of interconnecting a wide range of distributed information processing and information exchange systems.

The objective of this work is in line with the Community's policy in the telecommunications sector and it has been expressively supported by the Commission and by all major European manufacturers.

Even though the Reference Model is not a protocol standard itself, it has become the accepted architecture for the development of standards for protocols and interfaces by all major standardisation institutions. A wide range of "basic standards" and "functional standards" have already been developed.

For this reason it is appropriate to use the OSI-Reference Model as an important input for the definition of the provision of the network infrastructure and services as required for ONP.

Initially it is proposed that ONP should be implemented for a defined set of Network Layer services which offer addressability and interworking for both local and global networks.

In the future, it is appropriate to consider the application of ONP to higher standards (eg X.400).

For completeness it will be necessary to ensure compliance between ONP and the following 3 important aspects of standardisation in the telematics field :

- a. European profiles (EN's, NET's, etc.) as well as ISO's work on functional standards
- b. ISO-CCITT and EC's test suites for conformance testing
- c. European obligation to follow European norm proposals.

In summary,

ONP aims to provide a network foundation (i.e. layers 1-3) on which OSI services, in accordance with Community IT development initiatives, may be built.

3.4 ONP and Managed Data Network Services

Short Description of MDNS

GAP invited a representative of the CAC/MDNS Permanent Nucleus to outline the characteristics of MDNS. Although the concept is not yet completely defined, it is expected that MDNS will have the following characteristics :

- Managed Data Network Services is a concept currently being developed by CEPT Members, under which these Telecommunications Administrations will offer uniform data communications services and facilities on a joint European basis.
- It is a package of service offerings (including all necessary hardware and software components) designed to cater for an optimum utilisation of existing Public Switched Telecommunication Networks in combination with other data communications services, facilities and related support necessary to satisfy individual user demand for international data communications.
- In an initial phase, MDNS will utilise the principle of "one-stop shopping". This will enable a customer who operates internationally to address a single national Telecommunication Administration for the provision of international facilities. A future objective may be the principle of "one-stop billing".

Fifteen European TAs (of which ten operate in EC Member States) have initiated the joint development of MDNS offerings.

The product line description of MDNS includes :

- user standardized interfaces (CCITT, CEPT and ISO interfaces)
- user non-standardized interfaces when required
- applications like file transfer, message handling and electronic data interchange (MHS based on X400, FTAM, VT, JTM and others when required)
- gateway possibilities from public and private networks to MDNS
- network management (monitoring, configuration control, fault location and restoration, accounting and billing, directory service).

MDNS offerings in relation to Open Network Provision

MDNS is a concept presently under study by CEPT and an example of a Pan-European service whereby the Telecommunications Administrations offer in combination with their basic offerings, for which they have in many cases "special rights and obligations" (eg switched bearer services, leased lines), a set of non-reserved services which are or could be supplied by Private Service Operators.

One of the aims of ONP precisely refers to this issue :

"ONP is the mechanism to promote fair competition between TA's and PSO's in the market of non-reserved services" (refer to page 7 : Aims of ONP).

In conclusion, it can be stated that in view of the appearance of MDNS the application of ONP to the provision of network infrastructure services could be a suitable mechanism for fair competition with Private Service Operators.

4. THE REFERENCE FRAMEWORK FOR ONP

4.1 The Scope of the Reference Framework

The Green Paper on the development of the common market for Telecommunication Services and Equipment initiates a new action line on ONP¹ :

" COMMON DEFINITION OF AN AGREED SET OF CONDITIONS FOR OPEN NETWORK PROVISION ("O N P") TO SERVICE PROVIDERS AND USERS.

Working out in common the principles of the provision of the network to competitive service providers is a necessary requirement for a Community-wide competitive market for terminal equipment and for competitive services, including in particular value-added services, if a long period of case-to-case decisions is to be avoided.

This concerns in particular the definition of clear Europe-wide network termination points, usage conditions and tariff principles and availability of frequencies where relevant."

In this chapter, GAP outlines a general approach to this concept by specifying criteria and attributes for Europe-wide technical interfaces (at appropriate network termination points); usage conditions; and tariff principles.

These criteria and attributes would form together the Reference Framework for ONP.

The general principles in the reference framework would, in turn, be applied to the reserved offerings of the Telecommunications Administrations for which Open Network Provision is to be implemented (Figure 4), and it may lead to necessary obligations for non-reserved services offered by TA's or PSO's.

1

Chapter X - Section 4.2 Initiation of new Action Lines

ONP therefore introduces a new way in which existing or new services could be offered.

Potential areas to which ONP could be applied are :

- leased lines
- a range of switched services :
 - = telephony
 - = telex
 - = circuit switched data
 - = packet switched data
 - = ISDN - services
 - = Mobile/paging services
 - = Broadband services

In the future the scope of Open Network Provision may be extended to certain services which might have the character of a basic service (eg videotex in certain countries) and for which TA's or PSO'S could hold a dominant position in the market place.

OPEN NETWORK PROVISION COMPONENTS

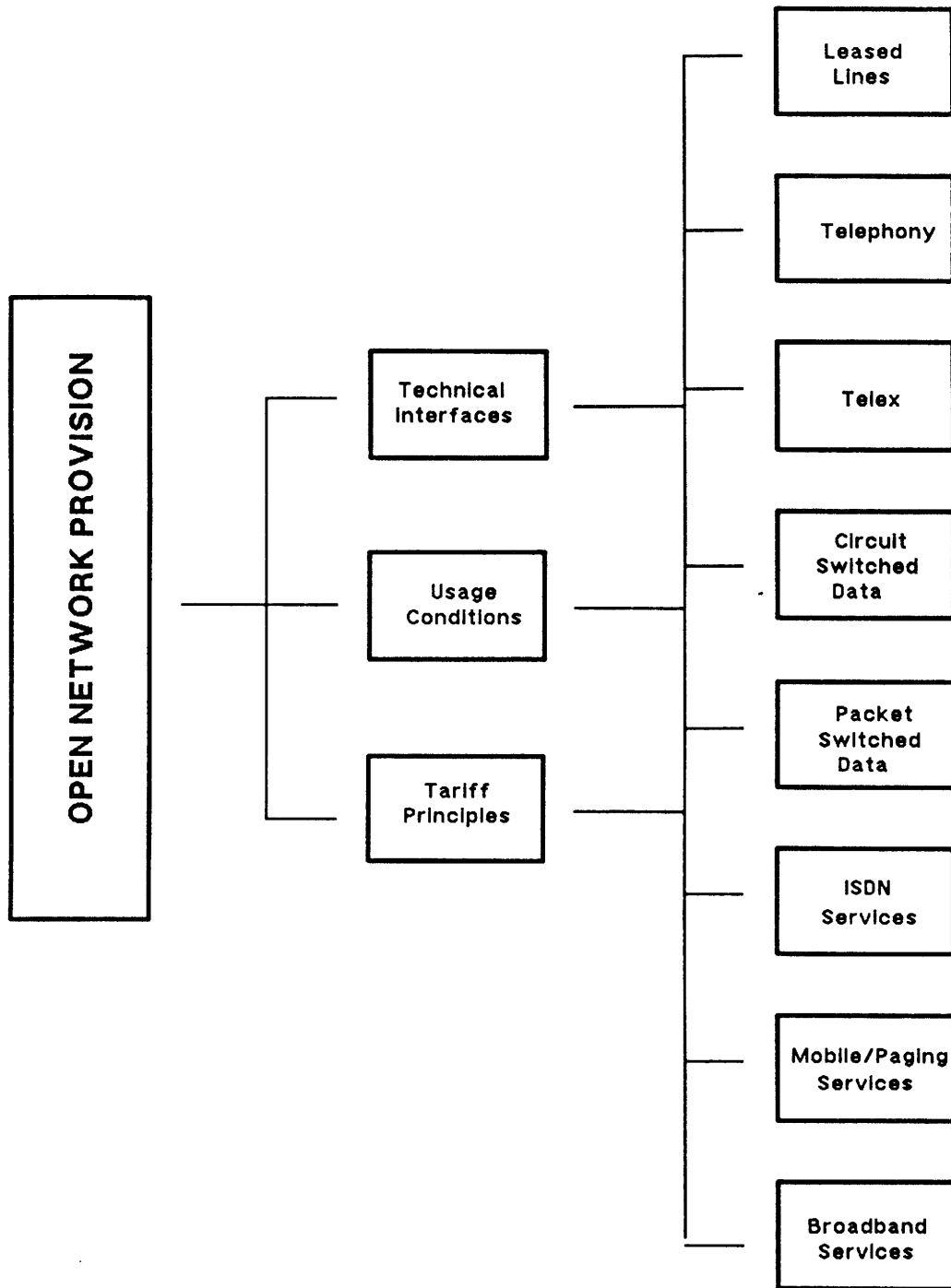


Figure 4

4.2 Criteria and attributes in the Reference Framework

In the following sections the criteria and attributes to be considered in the ONP Reference Framework will be introduced.

4.2.1 Technical Interfaces

Evolution from the present offerings

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For Open Network Offerings the following scheme should be taken into account for the definition of technical interfaces at the network termination points.

- a) For existing services, existing interfaces should be adopted. Enhancement of such interfaces may be considered for additional capabilities.
- b) For entirely new services existing interfaces should also be adopted. When existing interfaces are not suitable, then enhancements, or a new interface, will have to be specified.
- c) For services and networks that are yet to be introduced, but for which the standardisation program has already commenced (eg ISDN), ONP requirements should be taken into account when specifying new interfaces. ONP requirements will be, wherever possible, in line with the ongoing work on CCITT and CEPT recommendations.

Community-wide Uniformity

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Under certain circumstances where no Community-wide standard for an interface to be adopted under ONP is available, the appropriate standardisation bodies should be requested to elaborate such an interface within a given time frame. When existing national interface standards have to be utilized by Telecommunications Administrations, these should be published throughout the Community, in accordance with the existing Community legislation in this field (in particular Directive 83/189 EEC, aiming to prevent the introduction of new national regulations potentially impeding intra-Community Trade).

A major concern raised by Private Service Operators is the lack of common technical conditions and service aspects for existing services among the Telecommunications Administrations in Europe. A natural conclusion is that the existing programme for harmonisation of these services should be maintained, and reinforced in the areas, which are of special interest to PSO's.

Additional features offered by ONP

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Open Network Offerings should in general present increased versatility compared with existing offerings.

Additional features may be identified particularly with reference to some switched services (e.g. automatic number identification, reversed charging, access to test facilities and diagnostics).

Whenever any of such features will meet criteria ensuring that it can be identified as a well defined item, it can be considered as part of the offering associated with a specific interface.

Under ONP such additional features may be classified as :

- inclusive if it is provided associated with a specific interface and it is included in the standard tariff
- optional if it can be requested as an option with a specific Open Network Offerings, and it is associated with an additional tariff.

Such additional features (either inclusive or optional) should in principle be made available to all users on equal terms.

It is acknowledged that the implementation of such additional features will not always be possible over the whole of a geographical area by a single date. In such cases, it would be acceptable that the implementation takes place in accordance with an announced time schedule.

Also it is possible that certain features, for example related to the access to the Telecommunications Administrations public data base services, would require certain safeguards. For example, user privacy, the commercial confidentiality of information and network integrity must be ensured.

Further studies will need to be carried out to assess the viability of providing access to TA's data base services.

4.2.2 Usage conditions

A basic assumption for Open Network Provision is that VAS-providers will, in general, be utilizing telecommunications facilities to sell their own offerings.

Until now the Telecommunications Administrations in the European Community have been offering their services mainly to end-users, who are normally subject to certain usage restrictions according to national regulations.

In this new situation, the usage conditions which apply Community-wide to the basic offerings of TA's will have to be reconsidered.

The common usage conditions should be studied and could include a set of attributes such as :

- maximum provision time (delivery period)
- minimum contractual period
- quality of service, where commercially viable and if requested by the users. Some examples are :
 - = availability (as defined in the relevant specification, for example of the CCITT)
 - = repair call out time
 - = mean time to repair; and
 - = transmission quality (if applicable)
- maintenance and fault reporting : for certain services to clients the following facilities could be made available :
 - = access to network maintenance facilities
 - = access to network diagnostic facilities
 - = access to network fault reporting facilities.These will be service-specific and by request of the user;

- conditions for resale of capacity (the retention of a prohibition of Simple Resale for voice is recognised, for the time being, by the Green Paper as being necessary for tariff arbitrage in the voice network that could cause significant harm to the revenues of Telecommunications Administrations).
- conditions for shared use
- conditions for third party use
- conditions for interconnection with public and private networks.

4.2.3 Tariff principles

Common tariff principles have been recognized as a major issue in the concept of ONP. They could affect the financial viability of TAs, as well as the conditions for the development of new value-added services.

As this far-reaching issue of common tariff principles could not be analysed and discussed in depth, GAP restricts itself to the presentation of a number of guidelines which are essentially in line with the positions developed in the Green Paper.

GAP proposes that the issue of common tariff principles be tackled with high priority at the appropriate level. The following guidelines could be used as a starting point for this work :

ONP tariffs should be in general cost-based.

ONP tariff principles should aim at encouraging private offerings that add genuine value to the basic offerings of the Telecommunications Administrations, while at the same time discouraging privately-offered services that in effect only duplicate these basic offerings.

Cost-based tariffs are expected to reduce the incentive to resell basic offerings.

If greatly differing degrees of cross-subsidisation in the Member States exist, these could hamper the aims of a Europe-wide concept of Open Network Provision.

Cost-based pricing of a set of basic services and facilities that will be offered to all users on a non-discriminatory basis should foster the spirit of competition in telecommunication services within the Community. The likely developments of the Green Paper initiatives should lead to further discussions on the concept and definition of harmonized tariff principles and how these may be introduced.

The above statement clearly does not mean that the absolute values of the tariffs need to be uniform.

The tariffs applied to ONP offerings can depend amongst others on the usage conditions applied. In particular an additional charge can be imposed to reflect the additional cost of the TA's in the provision of Open Network Offerings.

Where a bulk supply of services to large users results in lower cost to the operator, it seems appropriate that the reduced cost is reflected in the tariffs.

5. TECHNICAL INTERFACES FOR ONP

5.1 General Requirements

ONP interfaces would differ from existing non ONP interfaces only in so far as adaptations are necessary to support :

- increased versatility
- functionality required for service specific features
- new usage conditions on both sides of the interface.

This last feature recognises that :

the user must observe :

- type approval conditions (set by the national regulatory authorities, in particular with regard to type approval in accordance with Community Legislation¹);
- correct operation of the terminal
- safety requirements

and the

Telecoms Administrations must observe :

- correct service provision given type approval of the terminal apparatus;
- quality of service requirements; and
- safety requirements.

1

Ref. to COUNCIL DIRECTIVE OF 24 JULY 1986 on the initial stage of the mutual recognition of type approval for telecommunications terminal equipment (86/361/EEC).

and the COUNCIL DECISION OF 22 DECEMBER 1986 on standardisation in the field of information technology and telecommunications (87/95/EEC).

In this chapter, a first inventory is given of the technical interfaces to which ONP can be applied.

The major subdivision is :

- access to leased lines
- access to basic switched services.
- new type of access to the local network infrastructure

5.2 Leased Line interfaces in ONP

Leased lines or "permanent" circuits are presently being used for a wide range of applications, including low speed telegraphy, telephony, voice band data, high speed data, sound programmes etc.

The configurations in which they are applied include symmetrical point-to-point applications (ie the interfaces at both ends have the same characteristics), multi-drop lines (with a number of circuits connected together at one point in a star configuration), and multiplexed lines, where a number of low speed circuits are multiplexed together within the network.

There exists a wide variety of leased lines interface characteristics which are currently in use in the Community.

For analogue circuits, ONP should certainly include the performance criteria as documented in the relevant CCITT Recommendations :

- M.1020 (voice band data)
- M.1025 (voice band data)
- M.1030 (private telephony)
- M.1040 (public telephony)

For digital circuits the electrical interface details and the performance characteristics should be in line with the appropriate CCITT Recommendations (e.g. G703 for circuits of 64kbit/s and above).

A complete description of technical interfaces for leased lines, in combination with the usage conditions and tariff principles to be applied, is a complex and far-reaching task, that could be carried out in the work programme for the development of ONP (refer to Annex 1 of this document), subject to a decision by SOG-T. This would require that the competent specialists in the Member States were assigned to this task.

5.3 Access to Packet Switched Public Data Services under ONP

From the range of switching services shown in Figure 4, the interfaces to the Packet Switched Data Network are of particular importance due to their wide application in the offerings of PSO's.

The access arrangement made available should include :

- X.25 lines
- synchronous access at speeds up to 64 kbit/s
- asynchronous access at speeds below 9.6 kbit/s

The interface characteristics shall be in accordance with NET 2 and CCITT Recommendation X.25 ie :

the mechanical, electrical and procedural characteristics shall meet the requirements specified in Recommendation X.21, X.21 bis and the V-series.

Other access arrangements must meet the access capabilities specified in the X-series

- e.g. X.32 for dialled access,
- X.3, X.28 and X.29 for asynchronous terminal access.

The development of ONP for access to the PSPDN is included in the possible work programme given in Annex 1.

A complete development of this matter is a complex and far-reaching task that, subject to a decision by SOG-T, would require the assignment of the competent specialists in the Member States.

5.4 Interfaces to the ISDN under ONP

5.4.1 ONP ISDN Interfaces

The access to ISDN will be determined essentially by the Reference points defined in the framework of the CCITT I-series Recommendations. Where these Recommendations do not support the functionality required for ONP implementation, are incomplete or where they provide for options, the European Commission should agree with CEPT to develop the appropriate standards for Europe.

GAP notes that the required organisational framework is already in place through the Memorandum of Understanding and the yearly Work Programme agreed between the E.C. and CEPT (and in future ETSI).

The S/T reference points will be the main traffic carrying accesses to ISDN. This includes the basic rate access at 144 kbit/s and the primary rate access at 2 Mbit/s.

The Council Recommendation on ISDN states that for basic access the NTL equipment should be provided by the Telecommunications Administrations and that the interface at the S reference point should be supported within the Community member countries.

The standardisation process for the S/T reference points is not complete : for example the D-channel packet access has not been specified in CCITT or CEPT.

The M and P reference points for "specialised service providers" and for "Network Specialised resource" have not been specified by CCITT yet. In the highly competitive market of ISDN exchanges it is not clear whether uniform standardised reference points M and P can be defined.

Taking into account user needs, it may prove necessary when further work on the application of ONP to ISDN is undertaken, that CCITT and CEPT should be encouraged to develop standards for these reference points. This would permit the principles of ONP to be applied in a way that will allow Private Service Operators to get non discriminatory access to special network resources.

5.4.2 The CCITT Signalling System Nr. 7

The CCITT signalling system nr. 7 will be an essential requirement for the deployment of ISDN.

With the introduction of CCS CCITT nr. 7 new services and higher network performance will become available.

The CCS nr. 7 is considered as part of the network infrastructure and not as an access to network resources.

Should such access be necessary, the development of the interfaces at the M and P reference points will be required and standardized interfaces could be offered to service providers.

5.4.3 Conclusion

The remaining standardisation issues in ISDN, and the access to service support capabilities, could be subject of study in the working programme for the development of ONP (see Annex 1), subject to a decision by SOG-T. This complex task would require the assignment of the competent specialists in the Member States.

5.5 New types of access to the local network infrastructure

Under ONP it is envisaged that End-users and PSO's may request access to the circuits connecting subscribers premises to the Telecommunications Administrations exchange which are provided to support a basic service (eg telephony, telex etc). At present this part of the network is inaccessible to users other than as access to a basic service. Under the terms of Open Network Provision, consideration might be given as to whether users might be able to obtain shared access to this part of the network infrastructure. An example of such direct access is the use of a telephone subscriber's line to convey, in addition to the basic service of telephony, a low bit rate data channel multiplexed onto the circuit without disruption to the basic service.

This access recognises the monopoly control exercised by the Telecommunications Administrations over the network infrastructure.

The service provided by this access arrangement would provide low bandwidth point to point or point to multi-point service between :

- the premises of the user of the basic service; and
- the premises of a Private Service Operator receiving a multiplexed stream from a number of such users, multiplexed together at the cable distribution point (typically within an exchange building) and extended to his access point (typically a building within the normal area served by that exchange).

The technical interfaces applicable to this type application can be :

- 2 wire analogue bandwidth translated to baseband; or
- V.24 data terminations.

ANNEXES :

1. PROPOSAL FOR A POSSIBLE WORKING PROGRAM FOR THE DEVELOPMENT OF ONP
2. OPEN NETWORK ARCHITECTURE : THE U.S. CONCEPT
3. LIST OF PARTICIPANTS

PROPOSAL FOR A POSSIBLE WORKING PROGRAM FOR THE DEVELOPMENT OF ONP

The analysis of GAP has made it clear that the complex issue of Open Network Provision can not be dealt with in all its aspects in one study period. Where GAP in its report sets the guidelines for an ONP framework, the application of the framework to different areas of telecommunication provision could be dealt with in future study periods, on the basis of new terms of reference from SOG-T.

Moreover the technological evolution and the ongoing regulatory developments may require regular updating of the ONP-concept.

In addition, the range of services to which the principles of ONP are to be applied may change with time.

A working programme, including a time schedule for the development of ONP for specific areas, is required.

1. Working method for the development of ONP

A step-by-step approach for the development of ONP is necessary. This will allow the Commission to break the complex issues in smaller parts and to assign the appropriate level of expertise. The work needs to be carried out in close cooperation with the appropriate CEPT committees and ETSI. In this process it is also essential to include participation of the TA's, End Users, PSO's and where required Industry, in order to arrive at proposals which reflect the positions of all parties involved.

As it is difficult to have participation of all parties which may have an interest in ONP, it is suggested that the proposals on ONP will also be made available for public comment during a fixed period.

It is proposed that the first task which GAP should undertake is to establish a methodology, to identify the resources in the appropriate bodies and to produce a detailed time schedule.

2. Time schedule for the further development of ONP

The priorities for the development of ONP should be based on current possibilities of the TA networks and the perceived needs of Private Service Operators.

A time schedule should be decided upon in SOG-T, and could include the following areas of study :

- access to Leased Lines under ONP
- access to Packet Switched Public Data Networks under ONP
- access to ISDN under ONP.

Additional access to other public networks and services, and the provision of frequencies where relevant, can be dealt with in subsequent periods, in accordance with the priorities set in SOG-T.

GAP suggests that the provision of Leased Lines would be the most suitable area of study to be undertaken in 1988.

OPEN NETWORK ARCHITECTURE

THE U.S. CONCEPT

The Open Network Architecture (ONA) concept was born in the U.S. regulatory environment and in the wake of the public comments starting with the Computer III Notice of Proposed Rulemaking (Released August 16, 1985).

The main issue under consideration all along the Computer inquiry III process was to **remove structural separation** imposed on AT&T and the BOCs by Computer II decision and to replace it by **non structural safeguards**. ONA is one of these safeguards. Others are the interim concept of Comparably Efficient Interconnection (CEI), allocation of joint and common costs, disclosure of network information and access to "Customer Proprietary Network Information".

Regulatory situation in U.S. before Computer III Report and Order (released : June 16, 1986).

Under Computer II regulation, all services were divided into basic transmission services, enhanced services and the supply of terminal equipment (Customer Premises Equipment - CPE).

The Bell Operating companies (BOCs) had a regional monopoly on the first category, and their tariffs were regulated. **They could not offer other services except through structurally separated subsidiaries.**

At the same time, by the terms of the Modified Final Judgment (MFJ), they were excluded from providing :

- interexchange telecommunication services
- information services
- international telecommunication services
- manufacturing of equipment
- customer premises equipment (CPE)
- any other product or service that is not a natural monopoly service regulated by tariff.

In practice, upon court approval of a specific waiver, BOCs were allowed to offer one or another of the so-called enhanced services.

Relief from structural separation requirements

The costs of Computer II structural separation were very high. Under Computer II rules, AT&T and the BOCs actually had to separate offices, to maintain separate accounting books, to employ separate personnel for operation, installation and maintenance, to undertake its own marketing, including all advertising, to deal with any affiliated manufacturing entity on an arm's length basis and to utilise separate computer facilities in the provision of any enhanced services. The subsidiaries were prohibited from owning any network or local distribution facilities and equipment and from providing any basic services.

Thereby, these requirements made it impossible for AT&T and the BOCs to offer services which combine, even partly, the functions of transmitting and switching of information with the functions of storing, converting and processing of information.

However, with the technological developments towards digitalisation, the technical boundary lines between telecommunications, electronic data processing and office equipment functions have disappeared. Therefore, the traditional regulatory boundary lines between voice, text and data, or between transferring information and storing, converting, processing information, do not make sense today.

Therefore, all regulatory steps to find clear definitions for, or to establish boundary lines between "basic telecommunications services" and "value-added telecommunications services" could not be successful because of these technical trends.

Thus, the costs of structural separation stifled innovation and was an obstacle to exploiting the advantages of technical integration of new services which were both technically and economically possible. It led to duplication of facilities and an ineffective waiver process.

Instead of structural separation, non structural safeguards were proposed as being best suited to the U.S. competitive telecommunications markets, to directly address the discrimination problem and to focus on cross-subsidisation.

Aims of ONA requirements

ONA and other non structural safeguards are designed :

- to promote the efficiency of the telecommunications network by permitting the technical integration of basic and enhanced services,
- to preserve competition in the enhanced services market, through the control of potential anticompetitive behaviour by dominant carriers.

Under ONA, dominant carriers have to provide features to other enhanced services providers with the same availability and efficiency that they provide themselves in their offering of enhanced services.

ONA General Principles

Open Network Architecture plans have to be built on two general principles :

- "equal access" which was first imposed by CEI requirements,
- "unbundling".

Under CEI requirements, dominant carriers must provide interconnection opportunities to others on "equal access" basis. This decision requires the basic services functions including technical specifications, functional capabilities and other quality and operational characteristics such as installation and maintenance time, to be equal to these provided in the carrier's own enhanced service offerings.

The equal access principle aims to prevent undue exploitation of the dominant position by control of bottleneck or discriminatory practices.

Under ONA requirements, a dominant carrier "must unbundle key components of its basic services, regardless of whether its enhanced services utilise the unbundled components. These components, such as trunk side interconnections, may utilise subcomponents that are themselves offered on an unbundled basis, such as separate channel signalling...".

"Unbundled basic service building blocks" (basic service elements - BSEs) must be offered to all others on a tariffed basis".

These BSEs will be developed by carriers themselves with input from the whole industry, through ONA Forums proposed by FCC. ONA Forums are taking place, organized by Bellcore on a nationwide basis and by RBOCs on a regional basis.

Steps towards implementation of ONA

AT&T and the RBOCs have filed their ONA plans on February 1, 1988. These plans describe their compliance with Computer III requirements and list their initial set of Basic Service Elements. The plans will be subject to public comments and FCC approval.

Therefore, definitions of a set of BSEs is the first step towards implementation of ONA. The FCC directed the RBOCs to develop the initial set of BSEs with enhanced service competitors participation through an ONA Forum (ONAF 2 on March 30 - April 2, 1987) where the RBOCs collected requests from enhanced services providers and other users.

- The BSEs filed on February 1, 1988 have to be implemented within one year of acceptance of the filing by the FCC. Consequently, in practice, it is expected that BSE's will only be specified for existing networks (i.e. they will be largely based on voice services).
- Each RBOC has to file his own ONA plan. The problem of producing a nation-wide uniform plan has not yet been solved, and it is expected that different plans will be filed.

- ONA plans must meet CEI parameters and other CEI requirements.
 - CEI parameters deal with :
 - . interface functionality (standardized hardware and software interfaces),
 - . unbundling of basic services,
 - . resale environment,
 - . technical characteristics,
 - . installation and maintenance procedure,
 - . unbundled end-user access,
 - . availability (on the same date as offering for own services)
 - . minimisation of transport costs,
 - . recipients of CEI (general availability, not restricted to any class of customer)

- The other CEI requirements primarily deal with pricing. This is a key issue to determine the real conditions of fair competition in the enhanced services market between the RBOCs and Competitors, and to determine who will reap the benefits of integration.

CEI pricing principles distinguish distance-sensitive transmission costs, interconnection costs, traffic concentration costs and network usage costs; each of them should appear as an unbundled rate element in the RBOC's tariff. The operating companies have to set terms for tariffs and usage conditions which comply with these requirements.

- After implementing an Open Network Architecture, a RBOC which wishes to offer new basic service elements must file an amendment in its first ONA plan at least 90 days prior to offering that enhanced service. If necessary, the FCC shall request public comments on the amendments.

Position of the parties on ONA

The parties involved in the US regulatory process are very numerous : the most important being the FCC which initiated the process, but also the Department of Justice as regulation source at the federal level. The Public Utility Commissions intervene at the state level. Congress, Department of Defense, Department of Commerce, gave advice and were involved to a certain degree.

On the side of the operating companies, there are the RBOCs and the independants at the local level, AT&T and its competitors in the long distance market, and all the resellers.

Enhanced services providers and information service providers are the third category of parties involved.

Then there are the telecommunication and computer manufacturers and finally the end-users, the largest of them being very important participants.

The FCC

The FCC which initiated Computer Inquiry III supports ONA in the following terms (Computer Inquiry III, Report and Order) :

"ONA is the key to developing the enhanced services marketplace in a pro-competitive way by permitting the exchange carriers to offer these services in an integrated manner and at the same time assuring that other service provider companies can utilise the basic network capabilities on comparable terms and conditions".

"We require each carrier to develop an initial set of key basic elements that can be used in a wide variety of enhanced services. We would expect such a set to contain unbundled basic services functions that could be commonly used in the provision of enhanced services to the extent technologically feasible".

The Department of Justice (DOJ)

The Department of Justice view of ONA is very similar : (Judge Greene's Opinion and Order Regarding Proposed Modification of the MFJ - September 10, 1987).

"ONA permits all would be providers of competitive service, including the company that presently holds the bottleneck monopoly, to provide service on the basis of relatively equal costs of interconnection to the bottleneck".

Nevertheless, in his decision of September 10, 1987, Judge Greene rejects most of the proposed modifications to the MFJ. His main reason is that there is no sign that the RBOC's can prove that the line-of-business restrictions in the MFJ should be lifted because there is "no substantial possibility" for them to misuse their monopoly power in the inter-exchange service markets.

Under this decision the RBOCs are still excluded from the information services market. They should only transmit "information services", but are still barred from setting up own information services. They are permitted to offer protocol conversion and enhanced services, but cannot enter the inter-exchange market.

The RBOCs

The Regional Bell Operating Companies accept ONA as a new concept by which they hope to achieve the following targets :

- Relief from current line-of-business restrictions which prohibit the RBOCs from providing enhanced services except on a structurally separate basis.
- Identification, development and stimulation of new markets and market opportunities.
- Increased profits and improved earnings by maximising the utilisation of the basic network infrastructure.
- Maintain their existing revenue base.
- Minimise by-pass.

In a general sense, ONA is viewed as a trade off between the openness of the network and the entry in the enhanced services market.

AT&T

In the view of AT&T, from the beginning of the process, the requirements imposed on it by CEI and ONA are unnecessary, inappropriate and the cost involved will outweigh the benefits of being allowed to integrate enhanced services.

AT&T argue that it is already in a competitive environment and is by its nature motivated to serve all enhanced services providers.

AT&T filed a "Petition for Reconsideration". A Reconsideration Order (March 1987), modified CEI/ONA requirements for AT&T. It will only have to file service specific CEI plans, to offer transparent transport critical to national ONA uniformity and to consult with RBOCs for transport of BSEs.

Services providers and end-users

(views of the "coalition of ONA parties", CONAP)

These views are interesting as they represent a quite complete comment on ONA issues.

For services providers and end-users, the basic goal of the ONA plan should be to ensure the widespread availability of network functions that are or should be integral to the national common carrier telecommunications networks. Currently, network functions are "bundled" by end-user tariff services.

Enhanced services providers (ESP) normally do not need these bundled functions of the network, but require single elements of services which are called Basic Service Elements (BSE). Recognising that excessive granularity in the definition of unbundled network functions may have the effect of increasing the aggregate cost of providing all network services and functions, any BSE structure must be based on a reasonable balance between the goals of maximum availability of network functionality and overall network efficiency.

In this context, CONAP propose the following specific principles should underlie any ONA plan :

- National uniformity extended to administrative procedures, tariff structures, ordering, installation, testing, maintenance of services and functions.
- Neutrality of access to ensure that no one, including the RBOCs, should be afforded pre-emptive control of any entry point or gateway.
- Demand for unbundled network functionalities. The RBOCs must propose a specific process for determining when and under what circumstances an expressed desire for a given network functionality will be translated into the offering of one or more BSEs to provide that functionality.

Conclusions on ONA developments in the USA

The following tentative conclusions can be drawn concerning the ONA developments in the USA.

- ONA will be a continuous process which will be strongly influenced by the technical development in the existing networks, eg the development towards ISDN.
- The integration of enhanced services functions in modern exchanges will not be hindered by ONA despite the demand for "neutrality" of technical interfaces for all providers of value-added services (ie RBOCs, ESPs and all other users).
- The demand oriented policy of individual RBOC ONA plans raises the problem of standardisation for nationwide or global uniformity.
- The "fair competition" in the value-added services market will only be expressed by non technical means (eg tariffs and usage conditions).
- The next step for ONA studies is now February 1, 1988, when real ONA plans are available and open for public comment.

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