FINAL REPORT
ON
HARMONISED NATIONAL CONVENTIONS FOR NAMING AND ADDRESSING

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This study has been prepared by ETO for the Commission of the European Union.

This report does not necessarily reflect the views of the Commission, nor does the Commission accept responsibility for the accuracy of the information contained herein.

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This report has been prepared by Jack Nuijten and Marco Bernardi from ETO with the kind assistance of colleagues, the ECTRA Project Team on Numbering, ECMA, ETNO, ECTEL, EIIA, ETSI, INTUG Europe and GSM MoU EIG. It is to be noted, however, that the report does not necessarily reflect the official opinions of the said organisations.

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Executive summary

The purpose of this study is to propose conventions for national administration and management of numbers, names and addresses. Conventions for naming and addressing consist of naming and addressing plans and rules for their administration and management. The proposals provide a basis for harmonisation of conventions in CEPT[1].

This report proposes conventions for Data Country Code ATM[2] End System Addresses (DCC AESAs), International Mobile Subscriber Identities (IMSIs), National Signalling Point Codes (NSPCs), Individual TETRA[3] Subscriber Identities (ITSIs) and telex numbers.[4] It builds on earlier ETO[5] work[6] on conventions for telephone numbers[7], Data Network Identification Codes (DNICs) and International Signalling Point Codes (ISPCs).

In liberalised telecommunication markets, names and addresses are of concern for operators, service providers, users and other members of the industry community. ETO proposes that, for liberalised markets, NRAs[8] of CEPT countries establish national conventions based on the proposals summarised below:

A. General NRA responsibilities

The national naming and addressing plans should be adequately controlled by an NRA. Their administration and management should be carried out by an NRA or another national body independent of telecommunications organisations. The management should be carried out by a so-called Name and Address Plan Manager (NAPM) in an objective, non-discriminatory, equitable, proportionate, expeditious and transparent manner.

B. Consultation by NRAs

The NRA should consult interested parties or their representatives on important issues concerning naming and addressing conventions and on large-scale withdrawals of assigned names and addresses by the NAPM.

[1] European Conference of Postal and Telecommunications Administrations
[2] Asynchronous Transfer Mode
[3] TErrestial Trunked RAdio
[4] National conventions for telex numbers are only required where competition in telex services exists.
[5] European Telecommunications Office
[6] See Final report on Harmonised National Numbering Conventions, ETO, 23 October 1997.
[7] Telephone numbers are ITU-T Recommendation E.164 numbers. ITU-T is the International Telecommunication Union - Telecommunication Standardisation Sector
[8] NRAs – National Regulatory Authorities

C. Publicity and appeal

National naming and addressing conventions and relevant information on the names and addresses assigned by the NAPM should be published in an appropriate manner. Appropriate procedures should be laid down for appealing to an institution independent of the NAPM against management decisions by the NAPM.

D. Primary assignment[9] by the NAPM

Eligible applicants and the information required to decide on an application should be defined. Generally, the principle of "first come, first served" should be applied. When a decision on assignment has been taken, the NAPM should inform the applicant accordingly and provide information about the procedure for appeal. When assignment is refused, the NAPM should inform the applicant about the reasons for the refusal. The reasons for which assignment can be refused should be laid down.

E. Conditions of use after primary assignment

Assignment by the NAPM should only imply the granting of rights of use of names and addresses. All conditions needed to control the use of the names and addresses and to withdraw names and addresses if they are not used for the purpose or period required should be laid down. Any fees imposed by the NAPM as part of the assignment should seek only to cover administration, management and enforcement costs, but where scarce resources are to be used, these fees may reflect the need to ensure the optimal use of these resources. The assignee should not transfer or trade assigned names and addresses without the sanction of the NRA.

F. Withdrawal of names and addresses from assignees of primary assignment

The reasons for which assigned names and addresses can be withdrawn should be laid down. When the NAPM intends to withdraw assigned names and addresses, it should inform the assignee about its intention, the reasons and the timescales for withdrawal and the procedure for appeal. When a change of active names and addresses is imposed by the NAPM, the users of these active names and addresses should have the right to have the consequent disruption minimised.

G. Conditions for secondary and tertiary assignment[10]

Secondary and tertiary assignment should comply with the national naming and addressing plan. The conditions of use for primary assignment should also apply to secondary and tertiary assignment as far as the granting of the rights of use and transfer or trade of names and addresses are concerned. When a change of active names and addresses is imposed by the assigning body, the users of these active names and addresses should have the right to have the consequent disruption minimised.

[9] Primary assignment is assignment by the NPM to a market party which may be a network operator, a service provider or a user of telecommunications services.

[10] Secondary and tertiary assignment is only used where the NPM assigns blocks of names or addresses to network operators or service providers. The network operators or service providers make secondary assignment to their customers. If the customers are users of telecommunications services, the secondary assignment is the final assignment. The customers could, however, be service providers or even network operators again. They receive blocks again and, finally, make tertiary assignments to users.

From the country review which was done as part of the study, it was found that 18 out of 19 European countries have NRAs responsible for administration or management of IMSIs and NSPCs, 9 countries for telex numbers and 8 countries for DCC AESAs.[12] The low number of countries for telex numbers is probably related to the lack of competition in telex services. DCC AESAs are a newly emerging resource for ATM networks which probably explains the present low involvement of NRAs. ITSIs are used for TETRA networks which use at present is limited and mainly in private environments but is expected to develop and become more public.

ETO proposes the following regarding the foreseeable responsibilities of NRAs for the national administration and management of names and addresses:

1. NRAs need only to be responsible regarding X.400 names and X.500 names where no other satisfactorily functioning body is in charge of administration and management and competition in the services concerned is substantial.

2. NRAs do not need to be responsible regarding Internet names and NSAP (Network Service Access Point) addresses.

3. NRAs should not be responsible for national administration and management of IP addresses.

It should be noted that CEPT member states should, ultimately, always take responsibility where required for any type of naming or addressing resource. This implies that CEPT member states should survey administration and management of relevant naming and addressing resources which are not under the responsibility of NRAs. Also all bodies responsible for national administration and management of names or addresses should follow the principles underlying EU regulation[13].

From the country review it was found that in particular regarding Internet names and IP addresses non-NRAs have responsibility. The Internet has mainly developed without regulatory involvement. Because of the growing importance of Internet, CEPT member states should closely follow and guide Internet developments, in particular regarding Internet names.

ETO therefore proposes that ECTRA should participate in the activities dealing with Internet names and IP addresses around the newly formed ICANN[14] through the Governmental Advisory Committee.

ETO urges ECTRA to take action to follow up these proposals. The ECTRA Project Team on Numbering should prepare ECTRA Decisions or Recommendations based on the outcome of this report. ECTRA should pay particular regard to the harmonisation of national conventions for DCC AESAs, IMSIs, NSPCs, ITSIs and telex numbers in addition to the national conventions for telephone numbers, DNICs and ISPCs.

[12] The situation as regards ITSIs is not clear as ITSIs were not included in the review.

[13] The principles meant here are transparency, objectivity, non-discrimination and proportionality.

[14] Internet Corporation for Assigned Names and Numbers

1 Introduction

On the basis of ETO's proposals in the Final Report on Harmonised National Numbering Conventions (23 October 1997), the European Commission asked ETO to extend the study to naming and addressing conventions which had not yet been covered. The first-mentioned study was limited to telephone numbers, Data Network Identification Codes (DNICs) and International Signalling Point Codes (ISPCs). The purpose of the new study is to propose an extended framework of harmonised national conventions for numbering, naming and addressing which could be implemented by CEPT countries. Conventions for numbering, naming and addressing constitute a set of rules related to administration and management of numbers, names and addresses used in telecommunication services.

The work requirement as addressed to ETO by the European Commission is presented in Annex A. The methodology used, the work plan and the structure of the report are briefly described in Annex B.

The following sections address the need for the study and the scope of the study. The last sections of this chapter provide definitions and descriptions which are required for valid understanding of the study: definitions of number, name and address and descriptions regarding conventions, administration and management of naming and addressing plans including the assignment process.

1.1 Need for the study

Discussion of liberalisation of the telecommunications market in European countries and the role of EU member states has focussed on voice telephony services. In that context, the main naming and addressing resource for voice telephony, ITU-T Recommendation E.164 numbers, has received close attention. Other naming and addressing resources, whether also used for voice telephony or used for other telecommunication services such as those offered on the Internet, have received little attention. The consequence is that European countries differ with respect to the responsibilities recognised and assumed by national authorities.

Therefore, a major element in the development of an extended framework of naming and addressing conventions should be an investigation of what would be the appropriate role of the NRAs for each of the different types of name and address. It is only in cases of names and addresses for which extensive involvement of NRAs can be foreseen, that extension of the framework will be required.

It should be noted that CEPT member states should, ultimately, always take responsibility where required. Even where administration and management of names and addresses has been left to self-regulation by industry, either on a national or an international level, CEPT member states should take responsibility where this self-regulation fails. The same general principles should apply to administration and management of relevant names or addresses, whether carried out by NRAs or by non-NRAs .This implies that national authorities should be aware of the market developments concerned.

The framework of naming and addressing conventions will be a proposal for Europe-wide harmonisation. In a competitive environment, it is important to define these conventions and to harmonise them in order to facilitate Europe-wide non-discriminatory and transparent access to number, name and address resources for market parties. The framework should take existing EU regulation into account. It should be recognised that harmonisation in this context has its limits, otherwise there would be a risk of its results being actually harmful. The framework should allow room for specific national characteristics, for flexibility over time and for case by case treatments. It should also allow room for leaving solutions to market mechanisms as much as possible.

1.2 Scope of the study

The study is not aimed at proposing detailed national conventions but at the harmonisation of those conventions. Details of existing national conventions are provided in the country review where they have been received from individual countries.

The elements to be extensively considered for inclusion in the framework of naming and addressing conventions concern mainly the processes for assignment of:

- Internet names
- Internet Protocol (IP) addresses
- Network Service Access Point (NSAP) addresses
- ATM End System Addresses (AESAs)
- ITU-T Recommendation X.400 names
- ITU-T Recommendation X.500 names
- ITU-T Recommendation E.212 International Mobile Subscriber Identities (IMSIs)
- National Signalling Point Codes (NSPCs)
- ITU-T Recommendation F.69 telex numbers.

A useful reference is the ETO Final Report on a Long Term Strategic Plan for the Numbering and Addressing of Telecommunications Services in Europe. This report covers the effects of technical developments on the functioning of the major numbering, naming and addressing schemes including Internet names, IP addresses, NSAP addresses, AESAs and IMSIs.

The following types of resources are only briefly described:

- ITU-T Recommendation E.118 Issuer Identifier Numbers (IIN)
- ITU-T Recommendation X.660 Object identifiers
- ITU-T Recommendation X.180 Closed User Group Interlock Codes (CUGICs)
- Network Colour Codes (NCCs; ETSI standard ETS 300 523)
- Centrex Codes (only nationally defined).
- International TETRA Subscriber Identities (ITSIs; ETSI standard ETS 300-392-1)

These resources were originally estimated to be less relevant for NRAs. Most resources mentioned in the last list concern identifiers which are, strictly speaking, not names or addresses according to the definitions used in the report (see chapter 2). The descriptions are mainly intended for completeness and to inform NRAs about their existence. ITSIs have been included in the proposals as they appeared to be more important than anticipated.

1.3 Definitions of name, address and number

The definitions used in this report are in line with the definitions used in the ETO Final Report on Harmonised National Numbering Conventions and in the ETO Final Report on a Long Term Strategic Plan for the Numbering and Addressing of Telecommunications Services in Europe. Provisional definitions, currently under consideration by ITU-T Study Group 2, are, in ETO's view, not appropriate in all cases. Other definitions are therefore used here, although the intention of the ITU-T definitions is retained:

- A name is an alphanumeric identifier used for a telecommunication service to identify an end part of a communication. A name is used at the service level and may be required to be portable.

- An address is an alphanumeric identifier used for a telecommunication service to identify and locate an entity in a telecommunication network. An address is used at the routing level and is not required to be portable.

- A number is a name or an address consisting of digits only.

In traditional telecommunications a number has been used both as an address and as a name. In a modern telecommunications environment, names and addresses are used more separately.

1.4 Descriptions of conventions, administration and management

Conventions for naming and addressing consist of:

1. naming and addressing plans
2. rules for their administration
3. rules for their management.

Ad 1 Naming and addressing plans

A naming or addressing plan contains information on the use and the structure of the names or addresses concerned.
A national plan is based on a common global naming or addressing plan and may contain information in addition to the global plan. For example, the plan may distinguish groups of names or addresses according to different categories of use.

Ad 2 Administration

Administration of naming and addressing plans consists of the establishment of conventions for naming and addressing and of changes to those conventions.

Ad 3 Management

Management of naming and addressing plans consists of:

- assignment of names and addresses
- surveillance of use of assigned resources
- changes to conditions imposed on assignees
- withdrawal of assigned resources.

The term assignment is used in this report for all types of resources. It includes reservation of resources where reservation precedes the actual allocation. It should be noted that for resources such as X.400, X.500 and Internet names the term registration is commonly used instead of assignment.
It should also be noted that there are no generally accepted definitions for naming and addressing conventions, administration and management and that the definitions in this report may not apply elsewhere.

1.5 Descriptions of one-, two- and three-stage management processes

The body which carries out the management of the national naming and addressing plans is called Naming and Addressing Plan Manager (NAPM) in this report. The NAPM serves the market parties: the network operators, the service providers and the users of telecommunications services.

For certain resources, the national management process may be divided into two or even three stages leaving management responsibility for the second and the third stage to market parties. The subsequent stages of the assignment process are called primary assignment, secondary assignment and tertiary assignment respectively. The existing three options for dividing the national assignment process can then be described as follows:

1. *One-stage assignment process*

   Primary assignment by the NAPM to a market party which may be a network operator, a service provider or a user of telecommunications services. The market party keeps the resources for its own use, not for further assignment to customers.

2. *Two-stage assignment process*

   Primary assignment by the NAPM to a network operator or service provider, who makes secondary assignments to users.

3. *Three-stage assignment process*

   Primary assignment by the NAPM to a network operator or service provider, who makes secondary assignment to his customers. These customers could be service providers or even network operators again, who in their turn make tertiary assignments to users.

2 Principles for naming and addressing conventions

The point of departure for the study is the EU regulation concerned. The existing EU regulation will, however, require revision as it does not distinguish between different types of naming and addressing resources in relation to different levels of involvement of NRAs. This is explained below. Then, the principles underlying the EU regulation are described and discussed. The consequences of these principles for the level of involvement of NRAs and criteria to judge the appropriate level of involvement are presented.

2.1 EU regulation

It should be noted that the EU regulation relevant in the context of this study, in particular the Interconnection Directive, applies to numbering for all publicly available telecommunications services (see Annex F)[16]. According to the EU regulation, Member States shall ensure proper administration and management of numbering plans, including assignment of numbers.

The EU regulation concerned has been developed mainly with telephony services in mind and E.164 telephone numbers that are assigned to users. The focus on E.164 telephone numbers may be the reason why the existing EU regulation may require clarification and adjustment with regard to two aspects when considering other naming and addressing resources:

- EU regulation only concerns 'numbering' and does not mention 'naming' and 'addressing'. Therefore, one may question whether EU regulation covers names and addresses that are not numbers.

- EU regulation does not distinguish between different types of numbers while the different types may require a different approach. For example, telephone numbers are often used as names and are known to users, while some other types of numbers are solely used as addresses and are not visible to users. Use of numbers by users and visibility to the public increase, in general, the risk of anti-competitive use or other abuse of the resource concerned. They may, in addition, involve the need for some consumer protection.

Whatever interpretation is chosen, the EU regulation will require revision in order to ensure that the different types of resources are addressed in the appropriate way. The proposals resulting from this study provides input for such a revision.

[16] It should be noted that EU regulation on number portability and carrier selection only applies to E.164 numbers, which are mainly used as telephone numbers, and, therefore, lies beyond the scope of this study.

The general principles underlying the 1998 EU telecommunication liberalisation are: transparency, objectivity, non-discrimination and proportionality. These principles should be followed when establishing conventions for administration and management of naming and addressing plans. Harmonisation will promote the equal application of the principles in the different countries concerned.

A factor to be taken into account is the potential limitation of applicability of these principles as a result of conflict with principles of other regulations which may affect naming and addressing conventions. Relevant examples of such other regulations are competition law, data protection and Intellectual Property Right (IPR). ETO considers, however, that these other regulations are in general complementary to naming and addressing conventions rather than causing conflicts. IPR regulations may affect naming conventions, in particular where names are not just numbers but contain words which may represent for example a trademark. Trademark issues are well known in the Internet naming context. The same could be said of data protection regulations which prohibit the use of names that are misleading, offensive or obscene. Differences in national regulations may in some instances work against the achievement of transparency.

Globalisation of telecommunication services requires globalisation of telecommunications regulation. Internet names and addresses are a clear example of this. Administration and management of other naming and addressing resources also increasingly requires a global approach. ITU-T is experiencing substantial growth in the task of assigning names and addresses directly to market parties without involvement on a national level. This shift from national control to global control should not affect the applicability of the above-mentioned principles. In the process of internationalisation, CEPT member states and their national authorities need to participate in ensuring gradual evolution with continuing application of the principles.

Within the context of this study, the above-mentioned principles underlying EU regulation can be translated into the following main points of consideration for all types of names and addresses:

- availability of adequate names and addresses
- independent control over national plans for names and addresses
- publicising of national plans
- fair and transparent assignment procedures.

An additional major point of consideration is consumer protection, for example by minimising number plan changes, by harmonisation of number plans and by requiring portability of names between service providers. Portability of names may be beneficial to society as a whole. Portability should not be applied to addresses that are not visible to users.

2.2 Consequences for NRA involvement

It is envisaged that the different types of naming and addressing resources covered by this report may require different levels of involvement of NRAs. In this report the approach is taken that NRAs are involved only as far as market mechanisms or non-NRAs fail with regard to application of the principles mentioned in the previous section. This implies that the involvement of NRAs may change over time as the situation develops.
It should be realised that within a particular country more than one NRA could have a certain responsibility towards a specific naming or addressing resource. For example, administration may reside within a ministry while management is done by an agency quite separate from the ministry.

Two levels of possible NRA involvement are distinguished for the purpose of this study:

1. *Where NRAs are not responsible for a specific naming or addressing resource*

   Administration and management fully resides with non-NRAs. NRAs may not be involved at all or NRAs may monitor developments and, when required, may have a stimulating and facilitating role. It should be noted, however, that, even when no NRA involvement is foreseen, national authorities should, ultimately, always take responsibility where required.

2. *Where NRAs are responsible for a specific naming or addressing resource*

   This is the level of involvement required according to the EU regulation mentioned above. NRAs may however limit their involvement to supervising administration and management carried out by non-NRAs. NRAs may be more involved to the extent of carrying out some administration and management tasks themselves and delegating the remaining tasks to non-NRAs. The highest NRA involvement is achieved when all administration and management resides with NRAs, without delegation.

A non-NRA may be any body, dependent on telecommunications organisations or not. Examples are national standardisation bodies, associations of market parties and incumbent operators.

Having distinguished different levels of NRA involvement, the next question is how to choose the appropriate level for a specific naming or addressing resource. In order to decide on the level, criteria are required. Three categories of criteria are distinguished:

- *Criteria related to the nature of competition in telecommunications services*

  If the market has not been liberalised, NRA involvement in naming and addressing could be low. If competition is allowed, NRA involvement will depend on the nature of competition. If one market party is very dominant, much NRA involvement may be required. Little competition because of low market demand for the services concerned will require little NRA involvement as no large interests are at stake. A high level of competition, when several competing market parties have significant market shares or self-regulating market mechanisms have developed, will also require little NRA involvement.

- *Criteria related to the naming or addressing resources themselves*

  If competition exists, then scarcity of naming or addressing resources will require NRA involvement to ensure non-discriminatory access to the resources and efficient use of the resources. As already mentioned in section 2.4, names will in general require more NRA involvement than addresses.

- *Criteria related to the functioning of non-NRAs*

  If competition exists, the degree of involvement of non-NRAs may have an effect on the required NRA involvement. If non-NRAs are functioning satisfactorily, NRA involvement can be kept low. If there are no suitable non-NRAs in place, NRAs need to have a high level of involvement. The high level of involvement may be temporary until suitable non-NRAs have been created. Evaluation of whether non-NRAs carry out administration and management in a satisfactory way can be based on the four principles underlying EU regulation and the five main points for consideration mentioned in the previous section.

The criteria described will be used to assess the level of involvement of NRAs in the next chapter for each type of naming and addressing resource.

3 Country review and assessment

This chapter provides an overview and an assessment of the situation regarding naming and addressing conventions in European countries. The overview has been based on a questionnaire (see Annex H) completed with information from other sources (see Annexes B and E). Responses were received from 19 countries.

Each of the following sections addresses the national conventions for one type of name or address. The last section is devoted to types of resources which are neither covered by the questionnaire nor by the preceding study on numbering conventions. These types were originally estimated to be less relevant for NRAs.

It should be noted that CEPT member states should, ultimately, always take responsibility where required for any type of national naming or addressing resource. CEPT member states should ensure that national administration and management of naming and addressing resources are in line with the four principles underlying EU regulation (see section 2.1).

Before dealing with issues related to specific naming and addressing resources, ETO wishes to make the following general proposal, which assumes a liberalised market for the services using the naming and addressing resources concerned:

NRAs should encourage and, where responsible for administration and management of naming and addressing resources, ensure conformity with relevant standards such as ITU-T Recommendations, ETSI standards, IETF and ATM Forum specifications.

3.1 Internet names

3.1.1 Introduction

An Internet name is a string of alphanumeric digits used to identify a host. In addition to the Internet name one or more IP addresses are linked to the interface where the host is connected. The IP addresses are used to route the call to the called host through the IP platform. To set up a communication the Internet name of the called host is therefore translated into the corresponding IP addresses.

In the Internet there is then a clear separation between the name used at the application level to identify a host and the address used at the routing level to route the communication to the host interface. This distinction allows the use of Internet names which are not required to reflect the topology of the network and may meet other important requirements such as user friendliness, portability, etc.

An Internet name is structured in several levels: Top Level Domain (TLD), one or more subdomains and host name. The TLDs comprise two categories: generic TLDs such as .com, .org and geographic TLDs (ccTLDs) which are used to identify a specific country or territory.

Generic TDLs are administered at a global level; the whole process for administration and management of Generic TLDs is under revision and some substantial modifications are expected in the months to come. Chapter four provides a description of the global developments.

In this chapter we focus our attention on the administration and management of ccTLD resources.

3.1.2 National and international conventions

Today in Europe, NRAs, apart from a few exceptions such as Finland and Luxembourg, do not have any responsibility concerning geographic TLDs. Administration and management of ccTLDs is under the responsibility of national bodies, which will be referred to in this report as cc TLD Registries. CcTLD Registries derive their authority from the acceptance of their roles by the Internet community and in many cases they are not formally recognised by the national authorities.

At the end of 1997 a project called CENTR (Council of European National Top level domain Registries) was set up to establish an open Forum where the national ccTLD Registries exchange expertise and cooperate on issues of common interest. The creation of the CENTR project was facilitated by RIPE NCC (Reseaux IP Europeens Network Coordination Centre) which is an organisation based on the collaboration of various European Internet Service Providers. The mandate of RIPE NCC is to provide the required administrative and technical coordination for European IP networks including addressing and naming issues.

As mentioned before, ccTLD Registries are responsible both for administration and management of ccTLDs including the definition of the structure of the subdomains. As a consequence the structure of subdomains varies from country to country, ranging from a flat structure to well defined hierarchical structures. UK is a case where the secondary domain is clearly structured according to geographic areas or to marketing sectors whereas Germany and The Netherlands are two examples of flat secondary domains.

Considerable diversity between Registries exists in the matter of which words are allowed to be used as secondary domains. In addition to words containing obscenity, in some countries generic words such as taxi, hotel, train, illness are not allowed to be used. However there is not a common standard all around Europe to define what a generic word is and what it is not.

In terms of management of resources different rules are followed in different countries. As an example, in The Netherlands the registration of a name under the ccTLD .nl is only open to organisations which are legally registered in The Netherlands. In Luxembourg, on the other hand, any entity may register a name under .lu irrespective of whether the entity is located in or outside Luxembourg.

An important aspect is the use of company names or trademarks in Internet names. In some countries, such as Sweden and Spain, there are strict rules on this subject whereas in other countries such as UK or Denmark people are much more free to choose the names they like. Some organisations have exploited this relaxed regulation to procure many desirable names (such as BT or MARKS and SPENCER in the UK) and then try to sell these names to the interested parties. In some cases the names have been traded and in other cases the disputes have ended up with litigation in the courts.

Another example of diversity in the management of Internet name resources is the permission to register private individual names. In some countries, such as Denmark, Luxembourg and Ireland, private individual names can be registered as Internet names. In other countries, such as France and Spain, this registration of individual names is not allowed. Finally, in a few countries, such as Austria and Norway, private individual names are only allowed to be registered under the secondary domain 'priv'.

The registration of names under a ccTLD implies some fees. The charging mechanisms are usually based on a cost recovery model and comprise an initial fee plus an annual fee to be paid each year the name is used. The fees vary from country to country. As an example, in France there is a high initial fee (255 Euro) and a low annual fee (15 Euro), whereas in Germany the same fee (45 Euro) has to be paid as initial and annual fee. In some countries where ccTLD Registry is less developed, such as Greece, Yugoslavia and Ukraine, no fees have to be paid for the registration of names.

The main reasons for withdrawal of resources previously allocated are related to incorrect use of the domain or to a delay in the payment of the fees.

3.1.3 Assessment

In recent years the importance of ccTLD has grown significantly and today one third of all hosts connected to the Internet have a name registered under a geographic TLD. In consequence the rules for administration and management of ccTLD have gained increasing significance.

Looking at the current situation in Europe we can notice a clear difference between Western Europe and some countries in Eastern Europe or in the former Soviet Union. CcTLDs operating in Western Europe have the necessary human and technological resources to perform the task in an effective way. On the other hand in other parts of Europe and the former USSR, due to the limited resources available, administration and management of Internet names is carried out in a way that does not always meet the expectations of the customers. In particular to make the assignment process easier some of these ccTLD Registries use very strict rules which do not suit the demands of the Internet subscriber. One possible solution to overcome this problem is the introduction of a fee system (in some Eastern European countries names are assigned free of charge) which would allow Registries to perform their job with adequate resources.

In terms of rules for the assignment of Internet names the current trend in Europe is to move towards a system which is more relaxed and liberalised. The rules should meet the customers' requirement for names which are user friendly and have the right market appeal. This freedom may raise more issues, which need to be carefully investigated, in terms of trademark and misuse of names.

An aspect that at the moment seems to be a little underestimated is portability of names between ISPs. In many countries name portability is not provided, resulting in subscribers being tied to their Internet Service Providers. Bearing in mind the "commercial value" of an Internet name, name portability is likely to be something requested by the users, who should be allowed to move from one ISP to another while having the opportunity to retain their Internet names. It should be noted that name portability implies that the whole name and not just a portion of it is portable. In particular looking at the structure of Internet names the availability of name portability implies that the ISP names should not be used as subdomain names.

It is worth noting that the introduction of name portability, in terms of regulatory, operational and technical aspects, presents some differences from E.164 number portability. Therefore it is essential to study and develop specific solutions for name portability which limit as much as possible disruption to ISPs and customers and maximise the benefits. One of these solution is the solutions could be creation *of ad-hoc* subdomains where name portability will be initially provided to be later on extended to all subdomains.

In addition to name portability between different ISPs we can have a kind of geographic name portability (i.e. the ability to port a name when changing physical location). Geographic name portability should be encouraged within the borders of the country identified by the ccTLD but it should be excluded between countries.

The role played so far by NRAs in administration and management of ccTLDs has been marginal. At the moment it is debatable whether a greater involvement of NRAs would be beneficial. Mechanisms seem to be in place to encourage user-friendliness and fair competition. The rules for Internet governance are now under revision and it is certainly important that NRAs are aware of all the issues surrounding administration and management of Internet names.

3.1.4 Conclusions, proposals and remaining questions

ETO concludes that:

- the level of competition in Internet is high and there is a large market demand for Internet services,
- in the next few years a scarcity of resources for ccTLDs is not envisaged,
- in nearly all European countries administration and management of ccTLDs is under the responsibility of non-NRAs.

Assuming a liberalised market for Internet services, ETO therefore proposes that:

National conventions for Internet names should be established and publicised where this has not already been done.

NRAs do not need to be responsible for national administration and management of Internet names. NRAs should have a monitoring role and, as far as required, a stimulating role where the functioning of non-NRAs could be improved.

Name portability within ccTLDs should be encouraged. Some level of European harmonisation for the eligibility of applicants within ccTLDs should be encouraged.

The following questions remain:

How could name portability within ccTLDs be introduced in an effective way? To what extent would Europe-wide harmonisation of names and use of secondary domains within ccTLDs be feasible? To what extent should the eligibility of applicants within ccTLDs be harmonised across Europe?

These questions require a separate study.

3.2 Internet protocol (IP) addresses

3.2.1 Introduction

As described in Chapter 3.1, IP addresses are used to route calls through the IP platform. The IP version currently used in the Internet is called IPv4 and the address has a fixed length of 32 bits. The address consists of two parts: the first part, called Network Identifier, is used to identify an IP subnetwork, and the second part, called Host Identifier, is used to identify an interface of a host within the IP subnetwork.

At present a new version of IP, called IPv6, is ready to be gradually introduced in the Internet. In IPv6 there is a new address architecture which is expected to meet the new requirements in terms of addressing space and routing information. New IPv6 addresses which are 128 bits long are able to embed different addressing schemes and carry information on the topology of the network.

3.2.2 National and international conventions

IP addressing resources are not administered at national level. As described in more detail in Chapter four, IP addresses are under the responsibility of global and regional bodies which basically allocate addressing resources to Internet Service Providers. NRAs are not involved to any extent in this process.

3.2.3 Assessment

Today in Europe there are no national conventions dealing with administration and management of IP addresses. The assignment of IP addresses is done at the national level by Local Internet Registries (LIRs) which have to follow some rules defined by RIPE NCC. These rules aim at saving addressing resources and making routing feasible.

3.2.4 Conclusions, proposals and remaining questions

ETO concludes that in European countries:

- the level of competition in Internet is high and there is a large market demand for Internet services,
- with the introduction of IPv6 a scarcity of IP addressing resources is not envisaged,
- administration and management of IP addresses is under the responsibility of non-NRAs.

Assuming a liberalised market for Internet services, ETO therefore proposes that:

National conventions should not be established for IP addresses.

NRAs should not be responsible for national administration and management of IP addresses.

Saving IP addressing resources and favouring aggregation of the routing information should be the key principles of policies for assigning IP addresses.

The requirement of number portability should not be applied to IP addresses.

No relevant questions remain.

3.3 Network Service Access Point (NSAP) addresses

3.3.1 Introduction

The NSAP address is the information that the OSI Network service provider needs to identify a particular Network Service Access Point (NSAP). According to the OSI terminology NSAP is the access point between the OSI Network and Transport Layers.

The NSAP addressing scheme and its administration is based on the concept of the hierarchical addressing domain. An addressing domain is a portion of the global addressing domain including all the addresses assigned by the same authority. A domain can be further partitioned into subdomains.

The principle of the hierarchical addressing domains is reflected in the structure of the NSAP address. This implies that the initial part of the address identifies a subdomain and the authority associated with that subdomain is responsible for assigning the remaining part of the address.

There are different types of NSAP addresses depending on the content of the Initial Domain Part field (IDP field) which consists of the Authority and Format Identifier (AFI) and Initial Domain Identifier (IDI). The IDP identifies the addressing authority responsible for the assignment of the remaining part of NSAP called Domain Specific Part (DSP).

According to Rec. ITU-T X.213 the following IDI formats are allowed:

- X.121,
- ISO DCC (Data Country Code),
- F69,
- E.164,
- ISO ICD (International Code Designator),
- Local.

On the basis of the responses to the ETO questionnaire we are focussing our attention on the ISO DCC IDI format which is a resource administered at the national level.

3.3.2 National and international conventions

In the case of ISO DCC the IDI consists of a three-digit code used to identify countries according to ISO 3166 rules. The IDI codes and the responsibility for administration and management of the DSP addressing space are given to the national ISO member bodies. When such a body does not exist the code is assigned to a sponsored organisation. In some cases the national ISO member bodies can delegate administration and management of ISO DCC codes to other organisations.

Today in Europe, administration and management of ISO DCC codes is in some cases, such as Norway and Switzerland, under the direct responsibility of the NRA. In most countries, however, non-NRAs are responsible for these resources.

It should also be noted that in a number of European countries such as Spain, Italy, Poland, Luxembourg, etc. rules for administration and management of NSAP resources are still under consideration.

In countries where national conventions for NSAP addresses are in force there seems to be a certain degree of uniformity in the rules for assignment. The case of Norway, however, should be noted; no reasons have been defined there for refusal of NSAP addresses.

As for many other addressing resources a fee must be paid to the organisation responsible for the assignment. In some cases such as Switzerland the fee includes a one-off starting fee (300 Euro) plus an annual fee (60 Euro). In other cases such as Norway and Belgium there is only a single starting fee and no annual fee (for Norway the fee is 250 Euro whereas for Belgium it is 370 Euro).

3.3.3 Assessment

In some European countries clear and stable rules for the assignment of NSAP resources do not yet exist. One explanation for the lack of such rules is the current lack of demand from market parties for this kind of addressing resource.

3.3.4 Conclusions, proposals and remaining questions

ETO concludes that:

- the level of competition in OSI services is low and there is a low market demand for OSI services,
- a scarcity of resources for DCC NSAP addresses is not envisaged,
- in many European countries administration and management of NSAP addresses is under the responsibility of non-NRAs. The bodies responsible are the national ISO representatives.

Assuming a liberalised market for OSI services, ETO therefore proposes that:

National conventions for DCC NSAP addresses need not to be established.

NRAs do not need to be responsible for national administration and management of DCC NSAP addresses. NRAs should have a monitoring role and, as far as required, a stimulating role where the functioning of non-NRAs could be improved while competition in OSI services is substantial.

The requirement of number portability should not be applied to DCC NSAP addresses.

No relevant questions remain.

3.4 ATM End System Addresses (AESAs)

3.4.1 Introduction

Today most ATM networks use addressing schemes based on the AESA. The format of AESA is in accordance with OSI N-SAP address. Although AESA has the same format as NSAP addressing schemes it has different semantics. AESAs are currently used to identify User Network Interfaces. Such interfaces can be either public (Public UNI) or private (Private UNI).

In terms of AESAs to be used at the Public UNI three types are allowed:

- ICD AESA (International Code Designator)
- E.164 AESA
- DCC AESA (Data Country Code)

The ETO study deals with the administration and management of DCC AESA. As described in the case of DCC NSAP, DCC AESA is an address which contains in the IDI field a three digit ISO code used to identify countries all around the world.

3.4.2 National and international conventions

DCC AESAs are administered at the national level by national representatives of ISO. In many cases such organisations delegate administration and management of this addressing resource to other bodies.

Looking at the situation in Europe in almost all cases the same body is responsible for administration and management of both DCC NSAP addresses and DCC AESAs. In some cases the same rules are in force for the assignment of both DCC NSAP addresses and DCC AESAs. For example in Norway the same fees (625 Euro) are required for the assignment of an NSAP address or an AESA.

It should also be noted that the structure of a DCC AESA may vary from country to country. In fact in each country the organisation in charge of administering the DCC AESA addressing space is responsible for structuring the DSP, the remaining part of the address.

3.4.3 Assessment

AESAs constitute a relatively new addressing scheme and in many European countries the conventions and the rules for the management of AESAs are still under consideration. However in the years to come, with the expected deployment of ATM networks, the demand for AESA resources is likely to increase in a remarkable way.

It is worth pointing out that a DCC AESA and a DCC NSAP address have the same syntax (structure) but different semantics (meaning and scope). A DCC NSAP address is used to identify a Service Access Point between Layer 3 and Layer 4 in an OSI protocol stack. A DCC AESA identifies the interface to which the ATM connection has to be delivered. Using OSI terminology we can say that a DCC NSAP address is a Network address whereas DCC AESA is a subnetwork address. As a direct consequence DCC NSAP should not be used to identify interfaces to which ATM networks and/or ATM terminals are connected.

NRAs, or the bodies responsible for their administration, should ensure that DCC NSAP addresses and DCC AESAs are used in the correct way to avoid harmful clashes. In addition, any approach using the same rules for DCC NASP address and DCC AESA should be considered carefully in light of the different utilisations of the two addressing resources.

3.4.4 Conclusions, proposals and remaining questions

ETO concludes that:

- competition in ATM services is emerging and market demand for ATM services is growing
- in the next few years a scarcity of resources for DCC AESAs is not envisaged
- in many European countries administration and management of DCC AESAs is currently under the responsibility of non-NRAs. In some countries there are no bodies responsible.

Assuming a liberalised market for ATM services, ETO therefore proposes that:

National conventions for DCC AESAs should be established and publicised where this has not already been done. NRAs should be responsible for national administration and management of DCC AESAs. NRAs may either have a purely supervisory role or may carry out administration and management with possible delegation of some tasks. Number portability should not be applied to DCC AESAs.

The framework of harmonised national conventions presented in chapter 5 is applicable to DCC AESAs.

No relevant questions remain.

3.5 X.400 names

3.5.1 Introduction

X.400 names have the function of identifying users of Message Handling System services (MHS services). The X.400 naming plan uses so-called Management Domains on two different hierarchical levels: Administration Management Domains (ADMDs) and Private Management Domains (PRMDs). ADMD names are assigned to public MHS providers. Usually, the MHS providers assign PRMD names within their ADMD to users in particular organisations. The independent regulator may assign PRMD names to users directly. Within its own PRMD each organisation makes further subdivisions into names to identify its departments and its employees.

3.5.2 National conventions

Of the 19 countries which responded, 13 have NRAs responsible for administration or management of X.400 names. Most NRAs are agencies separate from the ministry, both for administration and management. Only five NRAs have an obligation to consult interested market parties on their national conventions. Nine NRAs have defined reasons for refusal of assignments and eight NRAs have defined usage conditions in their national conventions. The reason for refusal mentioned most frequently concerns the purpose of use of X.400 names. Two reasons, both mentioned by Germany and Poland, may be considered typical for ADMD names: they concern the obligation to interconnect with other ADMDs and intellectual property rights. Only Sweden mentioned the requirement that both ADMD names and PRMD names have to be unique in the country and have to be chosen from the same national naming space. As far as defined in the national conventions, applicants can choose their own X.400 names in all countries except Iceland.

The usage conditions reflect the reasons for refusal. In addition, most countries mention an obligation for the assignee to provide information required by the NRA. Activation of the X.400 names within 12 months after allocation and payment of fees were both mentioned by four countries. Denmark has an annual fee of 230 Euro for an ADMD name. Belgium and Norway have a one-off fee only, 370 and 250 Euro for an ADMD name respectively. In addition, Norway has a one-off fee of 125 Euro for a PRMD name. Switzerland has a one-off fee of 940 Euro plus an annual fee of 310 Euro for an ADMD name and a one-off fee of 310 Euro plus an annual fee of 60 Euro for a PRMD name.

3.5.3 Assessment

The structure of X.400 names implies that ADMD names should be unique within a country and that PRMD names should be unique within an ADMD. To allow portability of PRMD names between national ADMDs, a so-called national Single Space Convention may be considered. The Single Space Convention is an option whereby the ADMD name can be left blank in the Originator/Recipient (O/R) name, provided that:

- there is an agreement between all ADMD operators under the same Country Name
- all such ADMDs are connected together to form a backbone
- PRMD names used within that country are unique.

In addition, PRMD names could be allocated from the same naming space as ADMD names. If PRMDs later become ADMDs, the operators can continue to use the same name.
National coordination of assignment of names for X.400, X.500 and Internet should be encouraged to ensure that an organisation has the same name for the three different types of resources.

In 1992 the English consultancy firm Ovum made a number of recommendations to the Commission concerning X.400 naming conventions. Some of their main points are summarised below:

- Any organisation should be allowed to run an ADMD if:
  - providing or intending to provide a MHS service involving the operation of a Message Transfer Agent (MTA) in conformity with the X.400 series of ITU-T Recommendations
  - offering, or intending to offer, communication with other ADMDs and their subscribers.

- To facilitate the establishment of pan-European MHS and to enable users to include the name of their own country within their address, ADMD names should be unique throughout Europe and valid in combination with any Country Name in Europe so that they may operate in any European country.

- To facilitate competition between ADMDs and to enable the Single Space Convention to be adopted nationally if required, PRMD names that are used with national Country Names should be registered nationally, not with individual ADMDs.

In the meantime, the prospects for public use of X.400 have become uncertain because of the attractive alternatives offered by the Internet. Belgium reported that interest in X.400 names is very low. X.400 MHS is mainly used in business, for Inter-Personal Messaging (IPM) and Electronic Data Interchange (EDI). IPM is little used. EDI is used within closed user groups where X.400 name portability is not an issue. If EDI use is extended to open environments where name portability is more important, the use of X.500 directory services may be preferred instead of a Single Space Convention to create name portability.

3.5.4 Conclusions, proposals and remaining questions

ETO concludes that:

- the level of competition in X.400 MHS services stays low because of low market demand
- no scarcity of X.400 names is envisaged
- it is not clear to what extent non-NRAs are satisfactorily carrying out administration and management of X.400 names where NRAs are not carrying out these tasks.

Assuming a liberalised market for X.400 MHS services, ETO therefore proposes that:

National conventions for X.400 names need not to be established.

NRAs do not need to be responsible for national administration and management of X.400 names. NRAs should have a monitoring and, if necessary, a stimulating role where there are doubts about the functioning of non-NRAs and competition in X.400 MHS services is substantial. But NRAs should be responsible where no satisfactorily functioning non-NRA is in charge of administration and management and competition in X.400 MHS services is substantial.

The body assigning ADMD names should be encouraged to set, as a condition of use, that assignees should offer communication with other ADMDs and their users.

National coordination of assignment of names for X.400, X.500 and Internet should be encouraged where competition in the services concerned is substantial to ensure that an organisation can have the same name for the different types of resources.

A single national naming space for both ADMD names and PRMD names should be encouraged, but the need for a national Single Space Convention mainly depends on the need for portability of PRMD names between the national ADMDs.

The establishment of unique pan-European ADMD names cannot be justified as long as the future prospects of X.400 MHS services are uncertain.

No relevant questions remain.

3.6 X.500 names

3.6.1 Introduction

X.500 names are have the function of identifying users, organisations in particular, in a X.500 directory. The original idea of one global, interconnected directory has not been realised, but separate interconnected directories have developed, including projects, services and corporate directories, without interconnection to other such directories. Most countries have no national X.500 directory service.
The idea is to store address information in different physical locations and to present the data to users as if constituting a single database. The database is hierarchically structured. The structure is defined by the so-called Directory Information Tree (DIT). Countries are usually defined on the highest level of the hierarchy. Downwards in the hierarchy, countries are, usually, followed by organisations and organisations by persons. The organisation names are assigned to the organisations which, for their domain, assign names to their employees.

3.6.2 National conventions

Of the 19 countries which responded, 6 have NRAs responsible for the administration or the management of X.500 names. Four of the NRAs are agencies separate from the ministries concerned, both for the administration and the management. Only the German NRA has an obligation to consult interested market parties on their national conventions. Only Belgium, Luxembourg and Switzerland have defined reasons for refusal of assignments and the same countries have defined usage conditions in their national conventions. The only reason for refusal mentioned twice, by Belgium and Switzerland, is the purpose of use of X.500 names. One reason, mentioned by Luxembourg only, may be considered characteristic of X.500 names: it concerns the quality of the X.500 directory service. In all four countries where national conventions have been defined, applicants can choose their own X.500 names.
The usage conditions reflect the reasons for refusal. In addition, Belgium and Switzerland mention an obligation for the assignee to provide information and to pay fees required by the NRA. Luxembourg has no fee, Belgium has a one-off fee of 370 Euro for an X.500 name. Switzerland has a one-off fee of 310 Euro plus an annual fee of 60 Euro for an X.500 name.

3.6.3 Assessment

Belgium and Luxembourg reported that interest in X.500 names is very low. Finland reported that service providers are changing from X.500 to Lightweight Directory Access Protocol (LDAP) which can be used via Internet access. The same development is reported by the national registration body Surfnet in The Netherlands.

Coopers & Lybrand conducted a study for the Commission on the implementation of a European Directory in 1997. The study provides an indication of barriers which also apply to offering a European X.500 directory service. In addition, X.500 is in competition with simpler alternatives as far as voice telephony directories are concerned. The most important commercial barriers are the absence of pricing mechanisms for directory data access across countries and the absence of national unified databases. Regulatory barriers are mainly a matter of lack of national regulation and harmonisation. National regulation could ensure fair and non-discriminatory access against cost-oriented tariffs. Harmonisation is a matter of alignment of national data sets and usages.
The report notes that X.500, although user-friendly, is considered immature within the industry.

In summary, the future of public X.500 directory services seems uncertain and partly dependent on regulation.

3.6.4 Conclusions, proposals and remaining questions

ETO concludes that:

- the level of competition in X.500 directory services stays low because of low market demand
- no scarcity of X.500 names is envisaged
- it is not clear to what extent non-NRAs are satisfactorily carrying out administration and management of X.500 names where NRAs are not carrying out these tasks.

Assuming a liberalised market for X.500 directory services, ETO therefore proposes that:

National conventions for X.500 names need not to be established.

NRAs do not need to be responsible for national administration and management of X.500 names. NRAs should have a monitoring and, if necessary, a stimulating role where the functioning of non-NRAs could be improved and competition in X.500 directory services is substantial. But NRAs should be responsible where no satisfactorily functioning non-NRA is in charge of administration and management and competition in X.500 directory services is substantial.

National coordination of assignment of names for X.400, X.500 and Internet should be encouraged where competition in the services concerned is substantial to ensure that an organisation can have the same name for the different types of resources.

The assignment of X.500 names requires that the national part of the DIT is defined and maintained.

No relevant questions remain.

3.7 International Mobile Subscriber Identities (IMSIs)

3.7.1 Introduction

IMSIs are used for unique international identification of mobile terminals and mobile users in order to enable these terminals and users to roam among public networks which offer mobility services. The national domain of the IMSI consists of a Mobile Network Code (MNC) followed by the Mobile Subscriber Identification Number (MSIN). The MNC consists of two or three digits. IMSIs are usually assigned to providers of mobility services in MNCs. The service providers use these blocks to program IMSIs in cards that are inserted in telephones such as the GSM Subscriber Identification Module (SIM) card. Older mobile telephones do not have cards but have the IMSI integrated into the hardware.
IMSIs for international networks are not managed at a national level but at a global level. Chapter four provides a short description concerning these IMSIs.

3.7.2 National conventions

Of the 19 countries which responded, 18 have NRAs responsible for the administration or the management of IMSIs. Most NRAs are agencies separate from the ministry, both for the administration and the management. Only seven NRAs have an obligation to consult interested market parties on their national conventions. Nine NRAs have defined reasons for refusal of assignments and ten NRAs have defined usage conditions in their national conventions. The reasons for refusal mentioned most frequently (by four countries) concern the purpose of use of the IMSIs and the effectiveness of the use. Some of the other reasons mentioned concern the eligibility of the applicant, the availability of the requested resource, the activation of the IMSIs within a certain timescale and the restriction of their use to the national territory. As far as defined in the national conventions, applicants can choose their own IMSIs in half of the countries. The usage conditions mentioned most frequently concern an obligation for the assignee to provide information required by the NRA (eight countries), the purpose of use of the IMSIs (seven countries), activation within a certain timescale (six countries), prohibition of trade and transfer (six countries) and payment of fees (five countries). Belgium has a one-off fee of 370 Euro per MNC. Denmark, Finland and Norway have an annual fee per MNC of 2300 Euro, 340 Euro and 1250 Euro respectively. Switzerland provisionally has a one-off fee of 310 Euro per MNC and an annual fee of 60 Euro per MNC. Four countries have no fee. In the remaining countries fees have not been defined.

3.7.3 Assessment

National conventions on IMSIs are considered important by NRAs. Some of the existing national conventions need further completion. Most countries which do not have established national conventions are preparing them. The same applies to fees. Some countries anticipate scarcity of IMSIs. The use of IMSIs is increasing with the growth of mobile services. In addition, ITU-T is broadening the purpose of use of IMSIs. Originally, this use was limited to mobile networks. Now all mobility services on fixed networks are included, for example Universal Personal Telecommunications (UPT). Most countries assign large blocks of two-digit MNCs. Finland has reserved part of the IMSI resources for three-digit MNCs. Sweden is considering in the long term the assignment of three-digit MNCs instead of two-digit MNCs. Germany is considering the same. Switzerland in principle assigns not more than one MNC per organisation. Although ITU-T Recommendation E.212 allows both two-digit and three-digit MNCs, a limitation to transferring from two to three-digit MNCs is imposed by the GSM standards which only allow two-digit MNCs.

3.7.4 Conclusions, proposals and remaining questions

ETO concludes that:

- the level of competition in mobility services using IMSIs is substantial and increasing
- increasing use of IMSIs requires efficient use of IMSIs to prevent scarcity in the future.
- no bodies other than NRAs exist which satisfactorily carry out administration and management of IMSIs in a competitive environment.

Assuming a liberalised market for services using IMSIs, ETO therefore proposes that:

National conventions for IMSIs should be established and publicised where this has not already been done. NRAs should be responsible for national administration and management of IMSIs. NRAs may either have a supervisory role only or carry out administration and management with possible delegation of some tasks. Efficient use of IMSIs should be ensured to prevent scarcity of IMSIs, amongst others by considering assignment of three-digit MNCs only. The requirement of number portability should not be applied to IMSIs.

The framework of harmonised national conventions presented in chapter 5 is applicable to IMSIs.

No relevant questions remain.

3.8 National Signalling Point Codes (NSPCs)

3.8.1 Introduction

Signalling Point Codes (SPCs) are used in public telephone networks using Signalling System no. 7 (SS#7). SS#7 is a modern protocol for information interchange between exchanges and other network nodes named signalling points. SPCs are the addresses of the signalling points. There are two types of SPCs: ISPCs and NSPCs. Each of those types constitutes an independent addressing scheme. ISPCs are used in international networks, to address for instance international exchanges. NSPCs are used in national networks. ISPCs and NSPCs are usually individually assigned to network operators.

3.8.2 National conventions

Of the 19 countries which responded, 18 have NRAs responsible for administration or management of NSPCs. Most NRAs are agencies separate from the ministries concerned, both for administration and management. Nine NRAs have an obligation to consult interested market parties on their national conventions. Ten NRAs have defined reasons for refusal of assignments and twelve NRAs have defined usage conditions in their national conventions. The reasons for refusal mentioned most frequently concern the effectiveness of the use (five countries), the eligibility of applicants (four countries), activation within a certain timescale (four countries), the restriction of use to the national territory (four countries) and the purpose of use of the IMSIs (three countries). As far as defined in the national conventions, applicants cannot choose their own NSPCs in most of the countries.

The usage conditions mentioned most frequently (by eight countries) concern an obligation for the assignee to provide information required by the NRA, the purpose of use of the NSPCs and prohibition of trade and transfer. Other usage conditions mentioned often (by seven countries) concern activation within a certain timescale and payment of fees. Belgium has a one-off fee of 370 Euro per NSPC. Finland and Norway have an annual fee per NSPC of 3 Euro and 1250 Euro respectively. Switzerland has a one-off fee of 310 Euro per NSPC and an annual fee of 60 Euro per NSPC. The Netherlands also has a combination of one-off fees and annual fees. It distinguishes between reservation and allocation. Its one-off fee is 110 Euro per NSPC for reservation or allocation, with an additional 55 Euro per NSPC when a reservation is changed into an allocation. Its annual fee is 55 Euro per allocated NSPC and 30 Euro per reserved NSPC. Three countries have no fee. In the remaining countries fees have not been defined.

3.8.3 Assessment

National conventions on NSPCs are considered important by NRAs. Some of the existing national conventions need to be completed. Most countries which do not have established national conventions are preparing them. Although the use of NSPCs is increasing, in general no scarcity of NSPCs is to be expected. However, if use of NSPCs is extended, for example outside the national territory, then scarcity of NSPCs may become an issue.

3.8.4 Conclusions, proposals and remaining questions

ETO concludes that:

- the level of competition in services using NSPCs is substantial and increasing
- increasing use of NSPCs may require efficient use of NSPCs to prevent scarcity
- no bodies other than NRAs exist which satisfactorily carry out administration and management of NSPCs in a competitive environment.

Assuming a liberalised market for services using NSPCs, ETO therefore proposes that:

National conventions for NSPCs should be established and publicised where this has not already been done.

NRAs should be responsible for national administration and management of NSPCs. NRAs may either have a supervisory role only or carry out administration and management with possible delegation of some tasks.

The purpose of NSPCs should be kept limited to prevent scarcity of NSPCs.

The requirement of number portability should not be applied to NSPCs.

The framework of harmonised national conventions presented in chapter 5 is applicable to IMSIs.

No relevant questions remain.

3.9 Telex numbers

3.9.1 Introduction

Telex numbers are strings of digits used on dedicated telex networks for identification of network termination points. They are hierarchically structured and consist of a telex destination code followed by a national telex number. There are no restrictions to the length of the national telex number. If there is an Naming and Addressing Plan Manager (NAPM), blocks of telex numbers are assigned to telex network operators which assign individual numbers from their blocks to users.

3.9.2 National conventions

Of the 19 countries which responded, only nine have NRAs responsible for the administration or the management of telex numbers. Four of the responsible NRAs have left administration and management tasks to the incumbent operators. The administration bodies of three countries have an obligation to consult interested market parties on their national conventions. Only The Netherlands and Switzerland have defined reasons for refusal of assignments and have defined usage conditions in their national conventions. The only reason for refusal mentioned by both countries concerns fee payment. The only usage condition mentioned by both countries is an obligation for the assignee to provide information regarding the use of the assigned telex numbers. Sweden is the only country where applicants can choose their own telex numbers. Only The Netherlands has established fees for telex numbers. It has a combination of one-off fees and annual fees. It distinguishes between reservation and allocation. Its one-off fee is 225 Euro for reservation or allocation of 10,000 telex numbers, with an additional 95 Euro per 10,000 telex numbers when a reservation is changed into an allocation. Its annual fee is 225 Euro per 10,000 allocated telex numbers and 95 Euro per 10,000 reserved telex numbers.

3.9.3 Assessment

National conventions on telex numbers have a low priority with NRAs. Telex is a fading market in Europe and not attractive for competition. Switzerland has delegated administration and management tasks to the incumbent operator, which is the only telex network operator in the country. The delegation is made on condition that the incumbent submits a list of assigned telex numbers to the NRA annually, monitors their use annually and makes proposals regarding the national telex numbering plan.

3.9.4 Conclusions, proposals and remaining questions

ETO concludes that:

- the level of competition in telex services has stayed low because of low market demand
- no scarcity of telex numbers is envisaged.
- no bodies other than NRAs exist which satisfactorily carry out administration and management of telex numbers in a competitive environment.

Assuming a liberalised market for telex services, ETO therefore proposes that:

Where competition in telex services exists, national conventions for telex numbers should be established and publicised where this has not already been done. NRAs should be responsible for national administration and management of telex numbers. Administration and management could be carried out by the incumbent network operator where no competition in telex services exists.

The framework of harmonised national conventions presented in chapter 5 is applicable to telex numbers.

No relevant questions remain.

3.10 Other identifiers

Other identifiers which were originally estimated to be less relevant for NRAs to study in terms of harmonisation are briefly described in this section. Strictly speaking, not all these identifiers are names or addresses.

For ITSIs it appeared during the study that they will become more relevant than anticipated. Proposals for ITSIs have therefore been included.

3.10.1 Issuer Identifier Numbers (IINs)

IINs are assigned to providers of international telecommunication charge card services for identification of these providers. The IIN is part of the Primary Account Number which is assigned by the provider to the user. The IINs enable providers to charge each other for the charge card services offered to each others' customers. The remaining part of the Primary Account Number enables the providers to charge their own customers. IINs are defined in ITU-T Recommendation E.118.

IINs are assigned in Danmark by the NRA.

3.10.2 Object Identifiers

Object identifiers constitute a global system for unique identification of any object. Within the global system, countries have their own domain which they can manage and structure themselves. Object identifiers can in principle be assigned to anybody for any purpose. The most relevant ITU-T Recommendation for Object Identifiers is X.208.

Examples of possible applications are the unique identification of X.500 names used in Switzerland and the unique identification of network nodes for charging purposes planned in Germany.

3.10.3 Closed User Group Interlock Code (CUGICs)

CUGICs are used for the formation of Closed User Groups (CUGs) on data networks and telephone networks. On telephone networks they are transmitted using Signalling System no. 7. The most relevant ITU-T Recommendation for CUGICs is X.180.

A CUGIC consists of a part A of four decimal digits and a part B of five decimal digits (actually 16 binary digits). Part A contains the E.164 country code for telephone networks or the X.121 DNIC for data networks. Part B is a CUG identifier.
The NRA does not assign CUGICs where part A is a DNIC. Any operator assigned a DNIC can use the CUGICs identified by its DNIC without prior assignment.
CUGICs for telephone networks are usually assigned in blocks to network operators which then assign individual CUGICs from their blocks to their customers.

CUGICs are assigned in Finland by the NRA for 17 Euro (100 FIM) per group of 10 codes. Switzerland has established assignment procedures for CUGICs. The Swiss NRA assigns blocks of 100 CUGICs to operators. The usage conditions are:

- the use should only be for CUGs to which the assignee provides service and of which at least one member is located within the assignees network
- the assignee should allow the CUGICs to be used by other operators which have members of the CUG concerned on their networks
- activation of CUGICs from a block of CUGICs should start within half a year after allocation of the block
- the assignee should provide information required by the NRA
- a block of CUGICs should be returned immediately if it is no longer used
- the assignee should pay the fee required by the NRA.

3.10.4 NCCs

NCCs are used in Base Station Identity Codes for GSM-systems to separate GSM-network operators of different countries in border areas. They are assigned to GSM network operators.

NCCs are assigned in Finland by the NRA for 170 Euro (1,000 FIM) per code.

3.10.5 Centrex Codes

Centrex Codes are used in country wide Centrex (virtual private network) systems to separate customers belonging to different Centrex groups. They are usually assigned in blocks to network operators which then assign individual Centrex Codes from their blocks to their customers.

Centrex Codes are assigned in Finland by the NRA for 34 Euro (200 FIM) per code.

3.10.6 Individual TETRA Subscriber Identities (ITSIs)

Introduction

ITSIs are used to identify subscribers in TETRA networks. Due to the current limited roll out of TETRA networks demand for ITSIs has developed in only a few European countries. However in the years to come TETRA networks are expected to develop in many European countries creating a need for clear rules for administration and management of ITSIs.

At present in almost all European countries the rules for the administration of ITSIs are still under consideration. One of the difficulties in defining these rules is related to the different nature of TETRA networks. Because of the different national licensing regimes, in most European countries TETRA networks are regarded as private networks and are thus entitled to obtain private naming and addressing resources. In some countries TETRA networks are assimilated to public networks and then public addressing and addressing resources are assigned.

According to the ETSI specifications, in particular ETSI standard ETS 300-392-1, the ITSI consists of three fields: the Mobile Country Code (MCC), the Mobile Network Code (MNC) and the Short Subscriber Identity (SSI).

The ITSI structure is similar but not equal to the IMSI structure. The same MCCs are used, but the MNC for ITSIs is four digits long whereas the MNC for IMSI is two or three digits in length.

Apart from their different length, the two types of MNCs have different uses. A single IMSI MNC is assigned to each operator whereas in the TETRA environment multiple ITSI MNCs have to be assigned to a licensed operator running a TETRA network using nodes of different suppliers. Another important difference between IMSIs and ITSIs is that IMSIs are not diallable by the calling parties whereas ITSIs are.

The MNCs for IMSIs and ITSIs should not be confused as ITSIs and IMSIs are used for different purposes.

Assessment

In many European countries national conventions for ITSIs are still under study. NRAs should take the appropriate steps to ensure as soon as possible the establishment of national conventions.

Conclusions, proposals and remaining questions

ETO concludes that:

- competition in TETRA services is beginning to develop and there is a growing market demand for TETRA services,
- in next few years no scarcity of resources for ITSIs is envisaged,
- in many European countries administration and management of ITSIs is under the responsibility of non-NRAs. In many countries there are no bodies responsible.

Assuming a liberalised market for TETRA services, ETO therefore proposes that:

National conventions for ITSIs should be established and publicised where this has not already been done.

NRAs should be responsible for national administration and management of ITSIs. NRAs may either have a supervisory role only or carry out administration and management with possible delegation of some tasks depending on the existence of satisfactorily functioning non-NRAs.

The framework of harmonised national conventions presented in chapter 5 is applicable to ITSIs.

No relevant questions remain.

4 The international context

This chapter covers the international (global or regional) context of administration and management of naming and addressing resources. International administration and management of naming and addressing resources is always carried out by non-NRAs. This requires a special role for CEPT member states, possibly involving NRAs.

The international context is relevant for Internet names and IP addresses in particular, but also for AESAs and IMSIs. Each of these resources is subsequently addressed in the sections which follow.

It should be noted that CEPT member states should, ultimately, always take responsibility where required for any type of international naming or addressing resource used by its national parties. CEPT member states should require that administration and management of relevant international naming and addressing resources is in line with the four principles underlying EU regulation (see section 2.1).

4.1 Internet naming

In addition to the ccTLDs, which are administered at the national level there are seven generic TLD (gTLD), of which five (.com, .edu, .int, .net, .org) have been administered at the global level by IANA in conjunction with other agencies.

Following the issue of the White Paper on "Management of Internet names and addresses" new rules are under development for administration and management of gTLDs.

One the most important actions taken in the wake of the issue of the White Paper has been the establishment of ICANN (Internet Corporation for Assigned Names and Numbers). ICANN is a non-profit organisation which was formed in autumn '98 to take over responsibility for IP addressing administration, protocol parameters assignment and DNS management from IANA and other agencies.

The current ICANN structure includes a Board of Directors (BoD) and three Supporting Organisations (SOs).

The BoD is the main executive body of ICANN and it has the support of a secretariat and a number of advisory committees. One of these committees is the Governmental Advisory Committee (GAC) which has as its members national governments, multinational governmental and treaty organisations including ITU, WIPO (World Intellectual Property Organisation), OECD (Organisation for Economic Co-operation and Development) and the EU. The mandate of GAC is to provide advice on ICANN activities that concern governments and multinational governmental organisations in particular for issues where there may be an interaction between ICANN decisions and national and international laws and agreements. GAC is not a decision-making body.

Reporting to the BoD are three SOs:

- DNSO (Domain Names Supporting Organisation)
- ASO (Address Supporting Organisation)
- PSO (Protocol Supporting Organisation).

The structures and the membership of these SOs is taking shape. In particular for the DNSO there are six constituencies which are organisations or groupings already representing the interests of their members regarding Internet numbering and naming. There are currently six constituencies:

- ccTLD registries
- commercial and business entities
- gTLD registries
- intellectual property
- Internet Service Providers (ISPs) and connectivity providers
- registrars.

The DNSO consists of an executive body, the Names Committee (NC), and a working body, the General Assembly (GA). Each constituency can elect three members to the NC.

Returning to the issues of administration of gTLDs, in order to promote competition in the registration of the Sub Level Domains and the management of TLDs a distinction between Registry and Registrar has been introduced. The Registry is the entity responsible for maintaining the databases pertaining to a specific TLD, whereas the Registrar is in charge of registering TLD clients and is a kind of interface between the clients and the Registry. A Registrar can offer his services under more than one Registry, competing with other Registrars.

ICANN is in charge of defining the criteria as to how the Registrars can compete between each other without affecting the stability of the Internet. In addition, ICANN should decide whether and to what extent competition should take place between the different Registries. At present there are different views on the opportunity of introducing competition at the Registry level. Some observers believe that the creation of profit-making Registries competing at a world-wide level may seriously damage the stability of the Internet. Registries should be non-profit organisations operating on the basis of cost recovery for the benefit of the whole Internet community. Other observers think the introduction of competition between Registries can improve the quality of the services offered and the range of customer choice.

Another outstanding issue which needs to be discussed at the global level is the creation of new TLDs. As indicated in the White Paper ICANN has been identified as the right body to define rules for the establishment of TLDs. Such rules have to ensure that new TLDs satisfy the emerging users' demands without putting in danger the stability of the whole Internet. Some observers believe it would be wise to have a slow initial expansion of TLDs introducing a limited and controlled number of new TLDs at a time.

Finally mention should be made of the idea of creating a new TLD (e.g. .eu) to identify Europe. TLD .eu must not be regarded as a new TLD where current European ccTLDs are used as secondary domains but as a new TLD in parallel to the existing ccTLD. For any organisation which would like to have a European connotation the availability of a TLD indicating Europe may represent an interesting opportunity. The creation of the TLD .eu can be compared to the establishment of the ETNS (European Telephony Numbering Space) based on the use of Country Code 388, with an important difference: in terms of commercial information carried in a identifier (e.g. name or number), an Internet name is much more important and attractive than an E.164 number.

ETO proposes that:

ECTRA should participate actively in ICANN activities dealing with administration and management of Internet names. The Governmental Advisory Committee is the most appropriate group in which ECTRA could undertake functions within ICANN. The creation of a TLD for Europe (.eu) should be encouraged.

A relevant remaining question is:

How could the TLD .eu be realised?

4.2 IP addressing

ICANN is today the body responsible for administration and management of IP addressing resources at global level. As mentioned before, the establishment of this new organisation is one of the proposals contained in the US White Paper about the reorganisation of the management of the Internet names and IP addressing.

Under ICANN there are three Regional Internet Registries (RIRs) which are responsible for assignment of IP addresses at the regional level. RIPE NCC (Reseaux IP Europeens Network Coordination Centre) is the body operating in Europe, North Africa and part of the Middle East , APNIC (Area Pacific Network Information Center) is responsible for the Asia Pacific area and finally the rest of the world is under responsibility of ARIN (American Registry for Internet Numbers).

RIPE NCC is responsible for the allocation of blocks of IP addresses to LIRs. LIRs are essentially ISPs who offer Internet connection and services to their end users. LIR can then either assign the addresses to their own end users or use the addresses for their own IP platforms.

It should be noted that in the context of distribution of IP addressing resources two specific terms are used in ways which differ from their use in this report:

- Allocation means that an LIR receives a block of addresses from RIPE NCC. The LIR is entitled to advertise the block as one route to the rest of the Internet. IP addresses must be allocated by RIPE NCC in a unique way (the same block of IP addresses cannot be allocated to two LIRs).

- Assignment means that an end user receives a block of addresses from his own LIR. IP addresses must be assigned by LIR in a unique way (the same IP address cannot be assigned to two end users).

The rules that RIPE NCC follows for allocating blocks of addresses to LIRs are based on two principles: saving addressing resources and favouring aggregation of the routing information. It should be noted, however, that in some cases the two principles are mutually contradictory.

Saving addressing resources in particular is extremely important in the case of IPv4, due to the limited address space and the risk of running out of available addresses. On the other hand, in the case of IPv6, due to the extended addressing capacity, the main concern is the ability to aggregate the routing information exchanged by routers. To perform this aggregation it is essential that addresses are assigned to reflect as closely as possible the topology of the network.

Initially the same number of IP addresses is allocated to each LIR. Subsequently addressing resources are allocated in order to allow each LIR to cope with the demands he has received for address assignment.

RIPE NCC allocates IP address blocks free of charge. However to become an LIR a fee must be paid to RIPE NCC. The fee consists of a single initial payment plus an annual fee based on the size of the LIR.

IP addresses are assigned to the end users by LIRs. To obtain IP addressing resources the end user must produce technical documentation explaining the request. Usually the documentation includes information on the addressing requirements, current address usage, network infrastructure, and so on. In assigning IP addresses LIRs have to find a compromise between the end users' requests and the goal of saving addressing resources. In order to optimize the use of addressing resources end users are not allowed to reserve address space.

Each LIR has a so-called "assignment window". This window indicates the maximum number of addresses which an LIR can assign to an end user without requiring approval from RIPE NCC. Any assignment which exceeds this limit must be endorsed by RIPE NCC.

The current management of the IP address space with RIPE NCC and LIRs working in a close co-operation is a good example of an efficient administration of addressing resources at a global and a regional level.

ETO proposes that:

ECTRA should have a monitoring role in ICANN activities dealing with administration and management of IP addresses. The Governmental Advisory Committee is the most appropriate group in which ECTRA could undertake functions within ICANN.

4.3 AESAs

The trend of having resources administered and managed at a global level is also relevant to addressing in ATM networks. In addition to the existing IOTA AESAs, which is a subset of the ICD AESAs and is administered by BSI, ITU-T SG2 is working on the development of a new type of AESA called International Network Designator (ITU-IND).

According to the current proposal a new AFI value will be allocated to ITU-T and ITU-T will be responsible for administration and management of this new addressing resource. ITU-IND AESAs will be assigned directly by ITU-T to ATM Service Providers. In particular ITU-T will be in charge of assigning the AESA Identifier Code (AIC) to ATM Service Providers who request for ITU-IND AESAs. In other words AIC is a code assigned by ITU-T and it is used to identify on a global basis the ATM Service Providers. The DPS, the remaining part of the AESA, will be under responsibility of the ATM Service Provider identified by the AIC. NRAs or national bodies in general are not involved in administration and management of those AESAs. At present the rules which ITU will follow to manage ITU-IND AESAs are still to be defined.

One of the advantages of having a new type of AESA administered at the global level is the improvement of the address aggregation in ATM networks. This improvement is achieved by defining "global rules" for the assignment of addresses which meet the aggregation requirements.

4.4 IMSIs

The ITU assigns Mobile Country Codes (MCCs) to countries leaving the responsibility for further assignments of Mobile Network Codes (MNCs) behind the MCCs to the countries. The ITU also assigns MCCs to be shared by international networks. Countries or international networks may be assigned additional MCCs or shared MCCs respectively in anticipation of the exhaustion of assigned codes.

5 Framework of naming and addressing conventions

This framework of naming and addressing conventions is an extension of the CEPT/ECTRA Recommendation of 25 June 1998 on harmonised national numbering conventions regarding ITU-T Recommendation E.164 numbers, which are mainly used as telephone numbers. This Recommendation is in line with the relevant EU regulation on numbering and its principles and is actually an more detailed extension of it. The Recommendation is based on the framework of guidelines proposed in the ETO Final Report on Harmonised National Numbering Conventions.

The difference between the framework below and the Recommendation is that parts of the Recommendation which are specific for E.164 numbers have been amended in order to make the framework generally applicable to the relevant types of naming and addressing resources. The framework easily allows future extension of the conventions to other types of numbers, names, addresses and other identifiers used for telecommunications networks and services.

Assuming a liberalised market for the services concerned, ETO proposes that:

NRAs should apply the framework of naming and addressing conventions not only to telephone numbers, DNICs and ISPCs, but also to DCC AESAs, IMSIs, NSPCs, ITSIs and, where competition in telex services exists, to telex numbers.

A. General NRA responsibilities

1. The national naming and addressing plans should be controlled by a National Regulatory Authority (NRA). Their administration should be carried out by an NRA or another national body independent of telecommunications organisations.

2. The national naming and addressing plans should:
   - provide sufficient capacity in both the short term and the long term,
   - enable fair and open competition,
   - be in line with the relevant ITU-T Recommendations.

3. The management of the national naming and addressing plans should be controlled by an NRA. The Naming and Addressing Plan Manager (NAPM) should be an NRA or another national body independent of telecommunications organisations. If the national management process is divided up into a number of stages (primary, secondary or tertiary), the primary management should be carried out by the NAPM, while the secondary and tertiary management are to be handled by market parties.

4. The management (primary, secondary and tertiary) should be carried out in an objective, non-discriminatory, equitable, proportionate, timely and transparent manner.

B. Consultation by NRAs

5. The NRA should consult interested parties or their representatives, for instance by means of a consultation body, on important issues concerning naming and addressing conventions and on large-scale withdrawals of assigned names and addresses by the NAPM.

C. Publicity and appeal

6. Up-to-date information on the following items, if applicable, should be published in an appropriate manner:
   - the national naming and addressing conventions,
   - the names and addresses assigned by the NAPM,
   - the status of each of these names and addresses.

7. Appropriate procedures should be laid down for appealing to an institution independent of the NAPM against management decisions by the NAPM.

8. Publicity announcing any change in a substantial part of the active national names should be well co-ordinated and started in good time in order to allow market parties to prepare for the change.

D. Applications for primary assignment

9. Eligible applicants should be defined.

10. The information required to decide on an application should be defined. Additional information may be required depending on the specific application. The required information should not place an undue burden on the applicant.

E. Primary assignment

11. Generally, the principle of “first come, first served” should be applied.

12. The assignee should have the right to use names that are not frequently chosen by accident when starting a communication, for example by misdialling or mistyping.

13. When assignment is granted, the NAPM should inform the applicant accordingly and provide information about the procedure for appeal.

F. Refusal of primary assignment

14. When assignment is refused, the NAPM should inform the applicant about the refusal, the reasons for the refusal and the procedure for appeal.

15. The reasons for which assignment can be refused should be laid down.

G. Conditions of use after primary assignment

16. Assignment by the NAPM should only imply the granting of rights of use of names and addresses.

17. All conditions needed to control the use of the names and addresses and to withdraw names and addresses if they are not used for the purpose or period required should be laid down.

18. Any fees imposed by the NAPM as part of the assignment should seek only to cover administration, management and enforcement costs. The fees for categories of assigned names and addresses should be proportionate to the work involved.

19. Notwithstanding paragraph 18, where scarce resources are to be used, these fees may reflect the need to ensure the optimal use of these resources.

20. The assignee should not transfer or trade assigned names and addresses without the sanction of the NRA. An exception may be made for mergers, acquisitions and joint ventures, in which case the NAPM should be notified.

21. The assignee should not use names and addresses which do not belong to a certain national naming or addressing plan in a way that may cause interference with names and addresses that do belong to the national naming or addressing plan.

H. Withdrawal of names and addresses from assignees of primary assignment

22. The reasons for which assigned names and addresses can be withdrawn should be laid down.

23. Before any decision on a large-scale withdrawal is taken, the overall implications of the withdrawal, the timescales and the number changes involved should be carefully considered.

24. When the NAPM intends to withdraw assigned names and addresses, it should inform the assignee about its intention, the reasons and the timescales for withdrawal and the procedure for appeal.

25. When active names and addresses are withdrawn because of the need for naming and addressing capacity, fair and open competition or international harmonisation, the assignee should have the names and addresses simultaneously replaced.

26. When a change of active names and addresses is imposed by the NAPM, the users of these active names and addresses should have the right to have the consequent disruption minimised.

I. Conditions for secondary and tertiary assignment

27. Secondary and tertiary assignment should comply with the national naming and addressing plan.

1.10

28. The following conditions of use for primary assignment should also apply to secondary and tertiary assignment:
    - Assignment should not imply transfer of ownership but should only imply the granting of the rights of use of names and addresses.
    - The assignee should not transfer or trade assigned names and addresses without the sanction of the NRA. An exception may be made for mergers, acquisitions and joint ventures.

29. The assignee should have the right of use of names and addresses that are not frequently misdialled.

30. When a change of active names and addresses is imposed by the assigning body, the users of these active names and addresses should have the right to have the consequent disruption minimised.

6 Proposals and remaining questions

6.1 Proposals

The proposals provide an indication of the level of involvement of NRAs for each type of name and address investigated in this study. Where it is proposed that NRAs should have a high level of involvement, the framework of naming and addressing conventions presented in chapter 5 should be applied.

The proposals provide input to the revision of EU telecommunications policy in 1999, in particular the revision of the Interconnection Directive.

It should be noted that CEPT member states should, ultimately, always take responsibility where required for any type of naming or addressing resource. CEPT member states should ensure that administration and management of relevant national naming and addressing resources is in line with the four principles underlying EU regulation: transparency, objectivity, non-discrimination and proportionality. They should also require that administration and management of relevant international naming and addressing resources is in line with these four principles.

Assuming a liberalised market for the services using the naming and addressing resources concerned, ETO makes the following proposals:

1 General

1.1 National conventions for Internet names, DCC AESAs, IMSIs, NSPCs, ITSIs and, where competition in telex services exists, to telex numbers should be established and publicised where this has not already been done.

1.2 NRAs should be responsible for national administration and management of DCC AESAs, IMSIs, NSPCs, ITSIs and telex numbers. NRAs may either have a supervisory role only or carry out administration and management with possible delegation of some tasks. Where no competition in telex services exists, the administration and management of telex numbers could be carried out by the incumbent operator.

1.3 NRAs do not need to be responsible for national administration and management of Internet names, X.400 names, X.500 names and DCC NSAP addresses. NRAs should have a monitoring role and, if necessary, a stimulating role where the functioning of non-NRAs could be improved. But concerning X.400 names and X.500 names, NRAs should be responsible where no satisfactorily functioning non-NRA is in charge of administration and management and competition in the services concerned is substantial.

1.4 NRAs should not be responsible for national administration and management of IP addresses.

1.5 NRAs should encourage and, where responsible for administration and management of naming and addressing resources, ensure conformity with relevant standards such as ITU-T Recommendations, ETSI standards, IETF and ATM Forum specifications.

1.6 The requirement of number portability should not be applied to IP addresses, NSAP addresses, DCC AESAs, IMSIs and NSPCs.

2 Internet names

2.1 Name portability within ccTLDs should be encouraged.

2.2 Some level of European harmonisation for the eligibility of applicants within ccTLDs should be encouraged.

2.3 ECTRA should participate actively in ICANN activities dealing with administration and management of Internet names. The Governmental Advisory Committee is the most appropriate group in which ECTRA could undertake functions within ICANN.

2.4 The creation of a TLD for Europe (.eu) should be encouraged.

3 IP addresses

3.1 Saving IP addressing resources and favouring aggregation of the routing information should be the key principles of policies for assigning IP addresses.

3.2 ECTRA should have a monitoring role in ICANN activities dealing with administration and management of IP addresses. The Governmental Advisory Committee is the most appropriate group in which ECTRA could undertake functions within ICANN.

4 X.400 names

4.1 The body assigning ADMD names should be encouraged to set, as a condition of use, that assignees should offer communication with other ADMDs and their users.

4.2 National coordination of assignment of names for X.400, X.500 and Internet should be encouraged where competition in the services concerned is substantial to ensure that an organisation has the same name for the different types of resources.

4.3 A single national naming space for both ADMD names and PRMD names should be encouraged, but the need for a national Single Space Convention mainly depends on the need for portability of PRMD names between the national ADMDs.

4.4 The establishment of unique pan-European ADMD names can not be justified as long as the future prospects of X.400 MHS services are uncertain.

5 X.500 names

5.1 National coordination of assignment of names for X.400, X.500 and Internet should be encouraged where competition in the services concerned is substantial to ensure that an organisation has the same name for the different types of resources.

5.2 The assignment of X.500 names requires that the national part of the DIT is defined and maintained.

6 IMSIs

6.1 Efficient use of IMSIs should be ensured to prevent scarcity of IMSIs, amongst others by considering assignment of three-digit MNCs only.

7 NSPCs

7.1 The purpose of NSPCs should be kept limited to prevent scarcity of NSPCs.

6.2 Remaining questions

The relevant questions that remain concern Internet names:

1. How could name portability within ccTLDs be introduced in an effective way?

2. To what extent would Europe-wide harmonisation of names and use of secondary domains within ccTLDs be feasible?

3. To what extent should the eligibility of applicants within ccTLDs be harmonised across Europe?

4. How could the TLD .eu be realised?

For these questions a separate study is required.

ANNEXES

Annex A Work requirement nr 48262

1. Subject: Harmonised National Conventions for Naming and Addressing

2. Purpose

The purpose of the study is to propose an extended framework of harmonised national conventions for numbering, naming and addressing that CEPT countries could implement.

3. Background and justifications

Besides numbers and signalling point codes, the allocation of names and addresses for new networks and applications (including the Internet) is likely to become a responsibility for national administrations. Following an earlier study where ETO derived common guidelines (conventions) for the allocation of numbers and signalling point codes, this study will extend these conventions into the domain of naming and addressing.

Conventions for numbering, naming and addressing constitute a set of rules related to the management and use of numbers, names, and addresses for the identification of telecommunications services. The main part of these conventions concerns the assignment process regarding X.400 names, X.500 names, E.118 numbers, NSPCs, MNCs, NSAP addresses, and AESA addresses. Other important aspects relate to the naming structure and interrelation of Internet, X.400 and X.500 names.

In a competitive environment, it is important to enable non-discriminatory and transparent access to number, name and address resources and to define the basic rights of all parties involved.

4. Work Requirement

1. To study the current rules and practices of the use of numbers, names and addresses in European countries
2. To define issues to be included in a framework of harmonised national numbering conventions
3. To prepare a detailed proposal for this framework

4. To analyse the global context of developments of Internet naming and addressing
5. To survey current allocation procedures and fees with regard to Internet

5. Methodology

1. In order to collect information ETO will formulate a questionnaire, which it will send to NRAs in CEPT countries.

2. ETO will complete the information received with interviews of some NRAs.

3. NRAs will check the information received and ETO will subsequently correct it.

4. ETO will compile a first interim report and use this as a basis for the consultation mentioned below (January 1999).

5. Consultation with the industry through the European Numbering Forum (ENF) will be organised in order to obtain its perspective.

6. ETO will present the second interim report in a Workshop organised with the EC and the ENF. The objective will be to obtain views from the industry on the framework of harmonised national numbering conventions presented within the study. These views will be included in the final report (July 1999).

6. Execution and Manpower

Two interim reports and one final report shall be delivered.

The first interim report in December 1998 containing an assessment of current rules and practices of the use of numbers, names, and addresses in European countries.

The second interim report (which ETO will produce in April 1999) shall contain the draft findings and proposals, as ETO will submit them to ECTRA for approval.

The final report shall contain the findings and proposals, as approved by ECTRA and will include any comments that individual ECTRA members have. ETO will make the final report on this work requirement in July 1999.

All reports shall be available in the draft form one month before a liaison meeting at which the results will be discussed and approval can be given for their release.

The Commission shall receive three copies of the interim reports, while the final report shall be made available in 15 bounds copies, one unbound copy and one on floppy disk in word for windows format. ETO will make graphics available on separate hard copies.

Annex B Methodology, work plan and report structure

1 Methodology and work plan

In the first phase of the study, a review was made of the current situation in CEPT countries regarding conventions for the nine types of naming and addressing resources of the first list in the preceding section on the scope of the study. The review was based on a questionnaire which was distributed to all CEPT countries and was completed with interviews conducted in some NRAs and other relevant organisations.

Additional information was collected from ITU-T Recommendations, consultancy reports, relevant Internet websites and from respondents and some other experts. The bibliography in Annex E of the report contains the details regarding sources that have been consulted.

Two meetings for interviews were arranged:

- with Fay Howard and Daniel Karrenberg of RIPE in Amsterdam on Internet names and IP addresses
- with Mark Ballan of Tele Danmark in Copenhagen on X.500 names.

The first interim report presented the review and an assessment of current rules and practices concerning the use of numbers, names and addresses in European countries. The first interim report was sent to the Commission, ECTRA/PTN and ENF members for comments.

It was used as a basis for an ETO workshop with industry representatives organised through the European Numbering Forum (ENF), the Commission and ECTRA/PTN on 20 November 1998.

The workshop provided valuable input for the second interim report which contained draft findings and proposals. The report was sent to the Commission, ECTRA/PTN and ENF members for comments again.

The draft final report of the study was, after approval by the Commission, distributed for approval by ECTRA in October 1999. It has comments annexed from some individual ENF members. During the ECTRA approval process no individual ECTRA members required their comments to be annexed. After ECTRA approval the final report was delivered to the Commission in December 1999.

2 Structure of the report

Chapter one with an introduction including definitions and chapter two about the principles for naming and addressing conventions constitute a basis for the report. Chapter three provides a review of the situation in European countries and an assessment of the situation. Chapter four is devoted to a review and assessment of the global context, in particular of Internet naming, IP addressing and AESAs. Chapter five contains the framework of naming and addressing conventions based upon the ECTRA Recommendation on Harmonised National Numbering Conventions regarding E.164 numbers, which are mainly used as telephone numbers. The framework is used as a basis for extension to naming and addressing conventions. Chapter six summarises the proposals.

A list of abbreviations is provided in Annex C, a list of definitions in Annex D. A bibliography of consulted documents can be found in Annex E. Annex F provides the text of EU regulation concerning numbers. Annex G contains the technical descriptions of the relevant types of names and addresses. Annex H provides an overview of responses to the questionnaire completed with information obtained by interviews.

Annex C List of abbreviations

ADMD	Administrative Management Domain
AESA	ATM End System Address
AFI	Authority and Format identifier
ANSI	American National Standards Institute
ARIN	American Registry for Internet Numbers
APNIC	Area Pacific Network Information Centre
ASCII	
ASP	ATM Service Provider
ATM	Asynchronous Transfer Mode
BSI	British Standards Institute
CcTLD	Country Code Top Level Domain
CENTR	Council of European National Top level domain Registries
CEPT	European Conference of Postal and Telecommunications Administrations
CUGIC	Closed User Group Interlock Code
DAP	Directory Access Protocol
DCC	Data Country Code
DIT	Directory Information Tree
DNIC	Data Network Identification Code
DNS	Domain Name System
DNSO	Domain Names Supporting Organisation
DSA	Directory System Agent
DSP	Domain Specific Part or Directory System Protocol
DUA	Directory User Agent
ECMA	European body standardising information and communication systems
ECTEL	European Telecommunications and Professional Electronic Industry
ECTRA	European Committee on Telecommunications Regulatory Affairs
ECTRA/PTN	ECTRA Project Team on Numbering
EDI	Electronic Data Interchange
EEMA	European Electronic Messaging Association
EIDQ	European International Directory Enquiry Group
EIIA	European Information Industry Association
ENF	European Numbering Forum
ESD	End System Designator
ESI	End System Identifier
ETNO	European Public Telecommunications Network Operators' Association
ETO	European Telecommunications Office
ETSI	European Telecommunication Standardisation Institute
ETSI/NA	ETSI Network Aspects
EU	European Union
EWOS	
GAC	Governmental Advisory Committee
GSM	Global System for Mobile

GTLD	Generic Top Level Domain
IAB	Internet Architecture Board
IANA	Internet Assigned Network Authority
ICANN	Internet Corporation for Assigned Names and Numbers
ICD	International Code Designator
IDI	Initial Domain Identifier
IDP	Initial Domain Part
IEC	
IETF	Internet Engineering Task Force
IIN	Issuer Identifier Number
IMSI	International Mobile Subscriber Identity
IND	International Network Designator
InterNIC	Internet Network Information Center
IP	Internet Protocol
IPM	Inter Personal Messaging
IPR	Intellectual Property Right
IR	Internet Registry
ISO	International Standards Organisation
ISOC	Internet Society Community
ISP	Internet Service Provider
ISPC	International Signalling Point Code
ITSI	Individual TETRA Subscriber Identity
ITU	International Telecommunication Union
ITU-T	ITU Telecommunication Standardisation Sector
LDAP	Lightweight Directory Access Protocol
LIR	Local Internet Registry
MCC	Mobile Country Code
MHS	Message Handling System
MIME	Multimedia Internet Mail Extensions
MNC	Mobile Network Code
MSIN	Mobile Subscriber Identification Number
MT	Message Transfer
MTA	Message Transfer Agent
MTS	Message Transfer System
NCC	Network Colour Code
NI	Network Identification
NAPM	Naming and Addressing Plan Manager
NPM	National Plan Manager
NRA	National Regulatory Authority
NSAP	Network Service Access Point
NSI	Network Solution Incorporated
NSPC	National Signalling Point Code
OECD	
OSI	Open System Interconnection
PRMD	Private Management Domain
PUI	Personal User Identity
RIR	Regional Internet Registry
RIPE NCC	Reseaux IP Europeens Network Coordination Centre
SANC	Signalling Area/Network Code
SEL	Selector

SIM	Subscriber Identification Module
SLD	Second Level Domain
SMTP	Simple Mail Transfer Protocol
SS#7	Signalling System No. 7
STP	Site Topology Partition
TCP	Transport Control Protocol
TETRA	TErrestrial Trunked RAdio
TLD	Top Level Domain
UC	UPT User Code
UPT	Universal Personal Telecommunications

Annex D List of definitions

Activation	Activation is the bringing into service of numbers, names or addresses by network operators and service providers.
Address	An address is an alphanumeric identifier used for a telecommunication service to identify and locate an entity in a telecommunication network. An address is used at the routing level and is not required to be portable.
Administration	Administration of naming and addressing plans is the establishment of conventions for naming and addressing and of subsequent changes to those conventions.
Allocation	Allocation is the granting of the rights of use of numbers, names or addresses to individual network operators, service providers or users. Allocation may be preceded by reservation.
Assignment	Assignment is the combined process of allocation and preceding reservation. If there is no reservation, assignment is equivalent to allocation.
Conventions	Conventions for numbering, naming or addressing consist of: - numbering, naming or addressing plans respectively - rules for the administration of these plans - rules for the management of these plans.
Management	Management of naming and addressing plans consists of: - assignment of names and addresses - surveillance of use of assigned resources - changes in the conditions imposed on assignees - withdrawal of assigned resources.
Name	A name is an alphanumeric identifier used for a telecommunication service to identify the end part of a communication. A name is used at the service level and may be required to be portable.
Naming or addressing plan	A naming or addressing plan contains information on the use and the structure of the names or addresses concerned. A national plan is based on a common global naming or addressing plan and may contain information in addition to the global plan. For example, the plan may distinguish groups of names or addresses according to different categories of use.

Naming and Addressing Plan Manager (NAPM)	An NAPM is a national body that carries out the national numbering, naming or addressing plan management.
National Plan Manager (NPM)	See Naming and Addressing Plan Manager (NAPM)
National Regulatory Authority (NRA)	An NRA is a national body independent of telecommunications organisations that has formally been recognised as such by the state and authorised to administer or manage national numbering, naming or addressing plans.
Number	A number is a name or an address (or both) consisting of digits only.
Primary assignment	Primary assignment is the assignment of numbers, names or addresses by the Naming and Addressing Plan Manager (NAPM) to individual network operators, service providers or users.
Reservation	Reservation is the reservation of the rights of use of numbers, names or addresses for individual network operators, service providers or users. Reservation is intended to precede allocation.
Secondary assignment	Secondary assignment is the assignment of numbers, names or addresses by market parties to their customers following primary allocation of these resources.
Tertiary assignment	Tertiary assignment is the assignment of numbers, names or addresses by market parties to their customers following secondary allocation of these resources.

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Annex F EU regulation on numbering

The EU regulation which is relevant to the study on the harmonisation of naming and addressing conventions is quoted below.

According to Article 12 of the Directive 97/33/EC of the European Parliament and of the Council:

7.2

"Member States shall ensure the provision of adequate numbers and numbering ranges for all publicly available telecommunications services."

"Member States shall ensure that national telecommunications numbering plans are controlled by the national regulatory authority, in order to guarantee independence from organizations providing telecommunications networks or telecommunications services and facilitate number portability. In order to ensure effective competition, national regulatory authorities shall ensure that the procedures for allocating individual numbers and/or numbering ranges are transparent, equitable and timely and the allocation is carried out in an objective, transparent and non-discriminatory manner."

"National regulatory authorities shall ensure that the main elements of the national numbering plans, and all subsequent additions or amendments to them, are published in accordance with Article 14 (1), subject only to limitations imposed on the grounds of national security."

According to Article 14 (1), "… national regulatory authorities shall ensure that up-to-date information is published in an appropriate manner in order to provide easy access to that information for interested parties. Reference shall be made in the national Official Gazette of the Member State concerned to the manner in which the information is published."

"National regulatory authorities shall ensure that numbering plans and procedures are applied in a manner that gives fair and equal treatment to all providers of publicly available telecommunications services. In particular, Member States shall ensure that an organization allocated a range of numbers shall avoid undue discrimination in the number sequences used to give access to the services of other telecommunications operators."

According to Commission Directives 90/388/EEC and its amendment 96/19/EC:

7.3

"Member States shall ensure … that adequate numbers are available for all telecommunications services. They shall ensure that numbers are allocated in an objective, non-discriminatory, proportionate and transparent manner, in particular on the basis of individual application procedures."

"Member States shall ensure that ... the assignment of … numbers, as well as the surveillance of usage conditions are carried out by a body independent of the telecommunications organisations."

Annex G Descriptions of name and address systems

The following name and address systems are described in the subsequent sections:
1. Internet names
2. IP addresses
3. NSAP addresses
4. AESAs
5. X.400 names
6. X.500 names
7. IMSIs
8. NSPCs
9. Telex numbers.

1 Internet names

An Internet name is a structured alphanumeric string of characters used to identify a host.

In an Internet name we can identify three hierarchical levels: Top-Level Domain (TLD), domain and subdomain, and host name. These hierarchical levels mirror a hierarchical structure in the administration of the naming resources.

The existing TLDs belong to one of the two categories: generic TLD and geographic TLD.

Today there are seven defined generic TLDs : .com, .edu, .net, .org,. int, .gov, .mil

- .com This domain is intended for commercial companies
- .edu This domain is intended for educational institutions
- .gov This domain is intended for US government offices or agencies
- .mil This domain is intended for US military use
- .int This domain is intended for organisations established by international treaties
- .net This domain is for networks
- .org This domain is intended as the miscellaneous TLD

.com is the TLD domain most used and its management in the last few years has caused some problems. In order to make possible better management of the existing generic TLDs and increase the resources available, the creation of new TLDs is under discussion.

The structure of domains and subdomains is not the same for all generic TLDs.

Geographic TLDs are two-letter country codes according to ISO Standard 3166, used to identify single countries and/or territories all around the world. As an example .uk is the geographic TLD to identify the United Kingdom.

In the case of geographic TLD the structure of the Internet name after the top level domain is left to the competent regional and national authorities. As a result the structure of names with geographic TLD may vary from country to country. In some cases the structure is quite flat, in others it reflects political, geographic or generic categories.

The names are used to identify hosts in a user-friendly way. However, to establish communication with the called host the name of the host must be mapped into the IP address associated with the host. This translation, called name resolution, is performed by the DNS (Domain Name System). In the DNS the names and IP addresses of every system registered in the Internet are stored.

DNS is a hierarchical network of distributed databases called DNS servers. At the top of this hierarchy are the root zone servers which know all the names and IP addresses of the DNS servers for each domain under the TLD. With a recursive process each DNS server knows the names and IP addresses of all the entities in its subdomain.

When a name needs to be translated into an IP address the local DNS is the first to be interrogated . If the local DNS is not able to perform this translation the query is sent to the DNS server at the superior hierarchical level. This process continues until the appropriate DNS is found. The appropriate DNS server is then queried and the result of this query is the IP address associated with the name.

It should be noted that one name can correspond to more than one IP address and vice versa. This implies that there is not one-to-one mapping between names and addresses.

2 IP addresses

Networks running Internet Protocol use IP addresses to identify and locate interfaces to which nodes and hosts are connected.

IP addresses are divided into three categories: unicast, multicast, anycast. The unicast address is the identifier of a single interface. A packet sent to a unicast address is delivered to the interface identified by the address. The multicast address is the identifier for a set of interfaces. A packet sent to a multicast address is delivered to all the interfaces identified by that address. The anycast address is the identifier for a set of interfaces. A packet sent to an anycast address is delivered to one of the interfaces identified by that address (the nearest according to the routeing protocols).
Anycast is provided only by the IPv6, whereas unicast and multicast addresses exist both

in IPv4 and IPv6 (IPv6 is the new version of the existing IP (usually called IPv4), the definition of which is currently being formulated by IETF).

An IPv4 address has a fixed length of 32 bits and consists of two parts: Network identifier (Netid) followed by the Host identifier (Hostid) (figure 1).

The Hostid identifies the interface of a host within the IP subnetwork identified by Netid.

Figure 1: IPv4 address format

IPv4 addresses are categorised in four classes: Class A, Class B, Class C and Class D. The first three classes are based on the different lengths of the Netid field. Class D is reserved for multicast addresses.

In order to improve the performances of current IP a new version of the protocol called IPv6 has been specified by IETF. One of the distinguishing points of IPv6 is a new addressing architecture. IPv6 addresses have a fixed length of 128 bits and the first field of the address is a variable length field called Format Prefix (FP). The value of the Format Prefix indicates the various types of IPv6 address (e.g. unicast, anycast, multicast, local, global, etc.). The improvement of IPv6 addressing does not only relate to the bigger size of addresses but also includes a highly flexible structure which allows, by using the FP field, the accommodation of different address formats such as N-SAP or IPX Novell addresses.

Among the various types of address it is important to mention the provider-based unicast address that will be widely used in networks running IPv6. In this IPv6 address (see figure 2) we have three levels of hierarchy: registry, provider and subscriber.

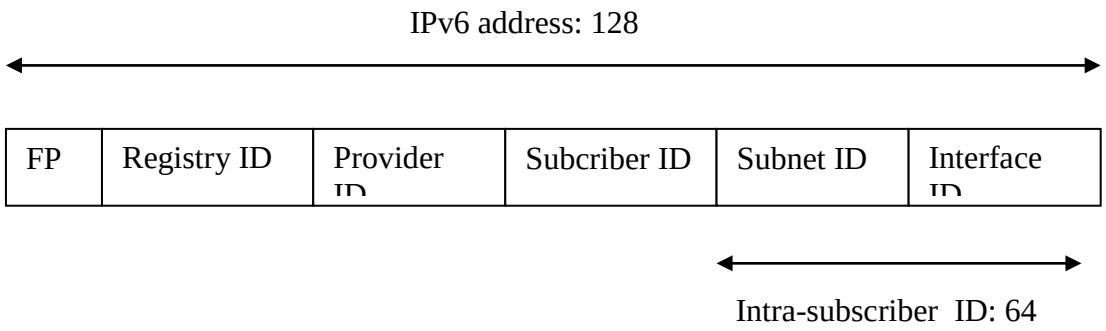

Figure 2: Provider based unicast IP address

The Registry ID is the identification of the regional Internet Registry authority responsible for assignment and management of the IP address. The Registry ID is intended as a broad geographic address allocation. The Provider ID identifies the Internet Service Provider "owning" the IP address. The Subscriber ID identifies one specific subscriber among those connected to the Internet Service Provider specified by the Provider ID. The last portion of the address is used to address the IP subscriber subnetwork and then the specific interface to which a host is connected.

The main advantage of this type of IPv6 address is the ability to reflect into the address format some topological information which allows an aggregation of the routing information exchanged between routers.

In order to allow a smooth transition between IPv4 and IPv6 a specific IPv6 address able to embed IPv4 addresses has been defined. In this case the IPv4 address is carried in the low order 32 bits of the IPv6 address and this allows routers and hosts to dynamically tunnel IPv6 packets over IPv4 routing platforms.

In addition to the above mentioned types of IPv6 address there are many others with specific scope (e.g. addresses valid on a link , on a site) and specific purpose (e.g. configuration, testing, etc..)

3 NSAP addresses

N-SAP addresses are used in OSI networks to identify access points between OSI Network and Transport layers. According to the OSI terminology the N-SAP address is an OSI Network address and must not be confused with other types of address like X.121 and E.164, which are sub-network addresses (a sub-network is defined as a collection of transmission media and switching nodes providing a data transfer service). Therefore X.121, E.164 are sub-network addresses used to identify the point at which an end system is attached to the sub-network or the sub-network service is offered.

ITU-T Rec. X.213 describes the abstract syntax and the semantics of the N-SAP address which as shown in figure 3 consists of an Initial Domain Part (IDP) followed by a Domain Specific Part (DSP). The N-SAP has a maximum length of 20 bytes.

Figure 3: N-SAP address format

The IDP is a network addressing domain identifier. The IDP defines a subdomain of the global network addressing domain and identifies the network addressing authority responsible for assigning N-SAP addresses in the specified subdomain. The DSP is the corresponding subdomain address. The authority identified by the IDP may define a further substructure of the DSP

The IDP consists of Authority and Format Identifier (AFI) followed by Initial Domain Identifier (IDI). The AFI indicates the format of IDI, the network addressing authority responsible for allocating values of the IDI and the abstract syntax of the DSP.

The IDI specifies the network addressing domain from which values of the DSP are allocated and the network addressing authority responsible for allocating values of the DSP from that domain. In other words the IDI is a valid address within the domain indicated by the AFI. As indicated in ITU-T Rec. X.213 the following types of addresses are allowed in the IDI field: X.121, ISO DCC, F69, E.164, ISO ICD, local.

The Domain Specific Part (DSP) represents a sub-domain in the addressing domain identified by the IDI. The semantics of the DSP are determined by the network addressing authority identified by the IDI. In many cases, however; the DSP is subdivided into a High Order DSP(HO-DSP) part and a Low Order (LO-DSP) part which may consist of the End System Identifier (ESI) and Selector (SEL).

The coding of the HO-DSP is under the responsibility of the authority identified by the IDP. This authority specifies how identifiers will be assigned and interpreted within the DSP. The ESI identifies an end system in a specific subnetwork. The uniqueness of ESI permits the movement of an end system from a subnetwork to another one without any address contention.

The SEL is not used for routing purposes and is available for use by the end system.

4 AESA

The ATM End System Address (AESA) is the addressing scheme adopted to identify User Network Interfaces (UNI) in ATM networks. The format of an AESA is derived from OSI Network Service Access Point (N-SAP) (see figure 3). The AESA address is 20 bytes long.

There are two types of AESA: individual and group. An individual AESA is used to identify a single UNI whereas a group ASEA is used to identify one or more UNIs.

It is worth noting that AESA has the same format as N-SAP but the semantics are completely different. The AESA is used to identify an interface, either public or private, whereas a N-SAP identifies an access point between two layers in a protocol stack (access point between layer 3 and 4 according to the OSI model).

The ATM Forum has defined 4 types of AESAs: E.164 format, ICD format, DCC format and local format

In the case of E.164 AESA the IDI field consists of an E.164 international number which identifies the authority responsible for allocating and assigning values of DSP. The E.164 number is allocated according to ITU-T Rec. E.164. The IDI field is eight octets long and the E.164 number is encoded in binary coded decimal syntax. If the E.164 number is shorter than 15 digits the IDI field is padded with as many leading semi-octects 0000 as needed to obtain the maximum length of 15 digits. A single semi-octect 1111 is then added at the endd to obtain an integral number of octects.

In the case of ICD AESA the IDI field consists of a four digits ICD allocated according to ISO 6523. The ICD identifies a particular organisational coding scheme which is responsible for allocating and assigning values of the DSP. The IDI field is two octets long and the ICD code is encoded in binary coded decimal syntax.

It should be noted that ICD is intended for the construction of recognised schemes such as the merchandise bar code system. In order to satisfy the needs of organisations requiring ATM addresses a specific scheme, called IOTA (Identifiers for Organisation for Telecommunication Addressing) has been recently introduced. IOTA based on ICD value 0124 binary coded decimal is intended for organisations located anywhere in the world.

In the case of DCC AESA the IDI field consists of a three digit code allocated according to ISO 3166. The DCC specifies the country in which the DSP of the AESA address is registered. The IDI field is two octets long and the DCC code is encoded in binary coded decimal syntax.

Finally in the case of Local AESA the IDI field is empty. The AFI field is immediately followed by the DSP whose structure is under the direct responsibility of the user. Local AESA are used in ATM networks not interconnected to other ATM networks or ATM Service Providers (ASP).

In addition to the above mentioned 4 types other formats of AESA such X.121, F69, etc. can , by mutual agreement, be supported.

In order to make routing in ATM networks easier, AESAs have been divided into two categories: ATM Service provider address and Customer owned ATM address.

An ATM service provider address is an address from a block of addresses allocated to an ASP by a recognised national or international organisation. The ASP can suballocate part of its addressing space to its customers.

A Customer owned ATM address is an address allocated directly to a customer by a recognised national or international organisation.

ATM service provider addresses meet important requirements in terms of address prefix and aggregation of the routing information and therefore it is expected that only ATM service provider addresses will be allowed to be used to route calls between ASPs.

5 X.400 names

This section addresses the uses of X.400 names and the standards for X.400 names.

5.1 Uses of X.400

Message Handling System (MHS) services operate at the application layer of the OSI reference model. At its heart is the Message Transfer Service (MTS) which provides an application-independent system for exchanging messages. The Message Transfer Service consists of a number of interconnected Message Transfer Agents (MTAs) which pass messages to one another in store-and-forward mode. Users may submit messages to an MTA for transfer via a user agent or operate their own MTA.

The OSI X.400 MHS provides a wider range of functions than the systems used for Internet, Simple Mail Transfer protocol (SMTP) and its later extension Multimedia Internet Mail Extensions (MIME). X.400 is mainly used for Inter-Personal Messaging (IPM) in business, message interchange with reliability requirements higher than provided by SMTP/MIME. X.400 can also be used for transfer of Electronic Data Interchange (EDI) messages.

Opinions on the future of X.400 MHS services differ. The prospects are uncertain because of attractive alternatives created by the rise and development of the Internet. Its use is limited to IPM and EDI in business. IPM is little used because of the complexity of the X.400 naming scheme, the lack of name portability and the cost level.

5.2 X.400 standards

The X.400 series of ITU-T Recommendations and the equivalent ISO/IEC 10021 standard have been available since 1984. They have been revised three times since. The most important parts of an X.400 MHS are:

- the User Agent (UA), a system available for each user
- the Message Transfer System (MTS) which takes care of message transfer between UAs
- the Message Transfer Agent (MTA) which takes care of message transfer as part of the MTS
- the Message Store where messages are stored until collected by a UA.

Three types of protocols have been defined:
- the P1 protocol for transfer of messages between MTAs
- the P3 and P7 protocol for access to system parts
- the Pc protocols on message content of messages exchanged between UAs: the protocol for e-mail between persons is P2 and the protocol for EDI is Pedi.

A collection of one or more MTAs comprises a Management Domain (MD). There are two types of MD:
- Administration Management Domains (ADMDs). ADMDs offer public MHS services and usually interconnect to other ADMDs
- Private Management Domains (PRMDs) offering MHS services within an organisation. PRMDs often use ADMDs to relay messages to other PRMDs.

Users of MHS services are identified by Originator/Recipient (O/R) names. An O/R name consists of a Directory name, an O/R address or both. In all cases the O/R name is linked to an O/R address, either directly or via a directory service.
In theory, the O/R address could take a number of forms. The relevant form in the context of this report is the mnemonic form. Other forms are based on existing address types such as X.121 numbers for data networks or postal addresses.

The mnemonic form consists of:
- a Country Name, which generally relates to the country where the MHS service is operated
- an ADMD name which relates to the MHS service provider
- a PRMD name which relates to the organisation using the MHS
- optionally: an organisation name, an organisational unit name, a personal name.

6 X.500 names

This section addresses the uses of X.500 names and the standards for X.500 names.

6.1 Uses of X.500

The X.500 Directory Service uses a distributed approach to realise a world wide directory service of electronic telephone directories or 'yellow pages'. The original idea of one global directory has not been realised but separate stand-alone systems have been developed, particularly in big companies. Most countries have no national X.500 directory service.
The idea is to store address information in different physical locations in so-called Directory Service Agents (DSAs) and to present the data to users as if constituting a single database. A DSA contains a database which uses an externally visible naming structure specified in the standard. This allows unique identification of information and communication when the DSA is interrogated by a users application or another DSA, for instance about an e-mail address which is stored in another DSA.

The special structure is defined by the so-called Directory Information Tree (DIT) by which the entries of the Directory are hierarchically fixed. The highest level of the DIT consists of a root under which countries usually are defined. Downwards in the hierarchy, countries are, usually, followed by geographical units or by organisations and organisations by persons. The national section for each country indicates how the Directory is organised within that country, for example according to geographic location, to organisation or to service provider.

Every DSA contains the data of a part of the DIT. The way DSAs communicate amongst each other is defined in the X.500 standards. These standards support a wide range of locally defined information objects and accompanying attributes. This makes it possible for DSAs to have different functions, such as a telephone directory with e-mail addresses or a state almanac with function descriptions.

Products based on the X.500 standards of 1988 are available from a limited number of suppliers. The X.500 products of the 1993 standards are offered by a much larger group of suppliers. The growing acceptance of X.500 in the Internet environment is important.

X.500 has been designed to support a wide range of objects and accompanying attributes. This freedom within the standards implies that many additonal factors have to be dealt with in order to allow exploitation of a world wide distributed directory service offered by different service providers.
When different service providers start offering X.500 services, coordination problems emerge. These problems need to be solved by additional harmonisation and exploitation measures. Harmonisation measures concern design and maintenance of the national DIT and registration of unique names. Exploitation measures concern management of the national root and quality guarantee of the directory content.

In the European context a distributed directory, consisting of a combination of nationally organised directory services, is coordinated by Dante, a European service organisation for research communities. Dante exploits the European root of the DIT for that purpose.
The European Electronic Messaging Association (EEMA) and the European standardisation commission CEN/ISSS (formerly EWOS) have analysed the problems to achieve a distributed X.500 service on a European scale.

The European International Directory Enquiry Group (EIDQ) is another European initiative which may lead towards the provision of an X.500 directory service. EIDQ was set up to provide a framework for the development and implementation of enhanced International Directory Enquiry Services for telephone number information and the harmonisation of these services and of the new facilities to be provided. EIDQ consists of 27. These were originally incumbent operators in their own countries. More recently a number of new operators and directory service providers have joined or shown an interest in joining. These companies have interconnected their directory databases using ITU-T Recommendation E.115 for information exchange. E.115 is a technically simple solution compared with X.500, but X.500 ultimately offers the required new functionality, flexibility and openness to new operators and providers. At present, EIDQ is considering moving from E.115 to X.500 and extending access to its service to end users. The X.500 directory service envisaged, however, first requires revision of the X.500 series Recommendations.

The Final Report 'Study on the Barriers to and Problems with the Implementation of a European Directory' by Coopers & Lybrand for the European Commission provides an indication of barriers which also apply to offering a European X.500 directory service. Three categories of barriers are distinguished: commercial barriers, regulatory barriers and technical barriers. The most important commercial barriers are the absence of pricing mechanisms for directory data access across countries and the absence of national unified databases. Regulatory barriers mainly concern lack of national regulation and harmonisation. In addition, X.500 is in competition with simpler alternatives as far as voice telephony directories are concerned.
The report notes that X.500, although user-friendly, is considered immature within the industry.

In summary, the future of X.500 directory services seems uncertain and partly dependent on regulation.

6.2 X.500 standards

The X.500 series of ITU-T Recommendations and the equivalent ISO/IEC 9594 standards have been jointly developed by ITU-T and ISO/IEC. They comprise a model for X.500 Directory Systems, its data structure , protocols and security. The standards were first established in 1988 and extended in 1993 and 1997. At present, a revision is proposed in order to, among other things, allow conformity with services developed by EIDQ.
The architecture consists of a Directory User Agent (DUA), which supports the user in consultation and maintenance, and the Directory which consists of a collection of DSAs. The structure of the DSAs is defined in a model, the DIT. The Directory Information Base consists of all information stored in a DSA implementation. The DUAs access the Directory by using the Directory Access Protocol of OSI (DAP/OSI) or Light Weight Directory Access Protocol of the Transport Control Part of the Internet Protocol (LDAP/TCP-IP). DSAs communicate with each other using the Directory System Protocol (DSP).

The structure of the DIT is not defined in the X.500-series Directory standard, but rather in a functional standard which has since become the international standardised profile:

- ISO Standard ISO ISP 10616 (FDI11) Directory Data Definitions - Common Directory Use.
  This refers to the proposals for the naming of objects in
- ITU-T Recommendation X.521: The Directory-selected Object Classes.

7 IMSIs

This section addresses the uses of IMSIs and the standards for IMSIs.

7.1 Uses of IMSIs

IMSIs are used in public networks, in particular mobile networks at present, for identification of mobile terminals and mobile users. They are required in addition to E.164 numbers for identification of these terminals and users when roaming between networks which offer mobility services other than their home network. Contrary to E.164 telephone numbers, IMSIs are not made known to the users. IMSIs are programmed in cards that are inserted in telephones such as the GSM (Subscriber Identification Module) SIM card. The older mobile telephones do not have cards but have the IMSI integrated into the hardware.

At present there is no scarcity of IMSI resources. Efficient use of IMSIs is recommended as mobile telecommunications spread and also because of the widening scope of applications. The approved Recommendation E.212 limits the use of IMSIs to mobile networks, but the present draft revision of E.212 has an extended scope covering all networks with mobility services including fixed networks with services such as UPT.

7.2 IMSI standards

IMSI standards are:

- ITU-T Recommendation E.212: The International Identification Plan for Mobile Terminals and Mobile Users.
- ETSI Standard ETS 300 523: European Digital Cellular Telecommunications System (Phase 2): Numbering, Addressing and Identification (GSM 03.03).

E.212 describes the use of IMSIs and their format and also the assignment procedures for IMSIs.
An IMSI is a string of up to 15 digits. It consists of three fields: the Mobile Country Code (MCC), the Mobile Network Code (MNC) and the Mobile Subscriber Identification Number (MSIN):

- The MCC is the first field of the IMSI and is three digits in length. It either identifies a country or a group of international networks that share an MCC. MCCs are assigned by ITU-TSB to countries and to groups of international networks. Applicants who have already been assigned MCCs will be assigned additional MCCs only in situations where exhaustion of assigned resources can be anticipated and after providing evidence of the efficient use of these resources.
- The MNC is the second field of the IMSI and is two or three digits in length. It identifies the home network of the terminal or user concerned in a certain country. MNCs are administered by the designated administrator within each country or by the ITU-TSB in the case of groups of international networks.

- The MSIN is the last field of the IMSI and has a maximum of ten digits. It identifies the mobile terminal or mobile user of a certain home network. MSINs are administered by the operator which has been assigned the MNC concerned. In principle, only one MSIN is assigned to each mobile terminal and mobile user. In case of multiple subscriptions, a mobile terminal or mobile user may be assigned a different MSIN for each subscription.

According to the present proposals, IMSIs will also be used for Universal Personal Telecommunications (UPT). ITU-T Recommendation E.168, Application of E.164 Numbering Plan for UPT, in its revised form will include the IMSI as a base for the Personal User Identity (PUI). The PUI is used to identify UPT subscribers internationally and it has a structure similar to the IMSI format. The PUI will be a specific type of IMSI of which the MSIN is the UPT User Code (UC).

8 NSPCs

This section addresses the uses of NSPCs and the standards for NSPCs.

8.1 Uses of NSPCs

SPCs are used in public telephone networks using Signalling System no. 7 (SS#7). SS#7 is a modern protocol for information interchange between exchanges and other network nodes named signalling points. SPCs are the addresses of the signalling points. There are two types of SPCs: ISPCs and NSPCs. Each of both types constitutes an independent addressing scheme. ISPCs are used in international networks, to address for instance international exchanges. NSPCs are used in national networks.

Proliferation of SS#7 and introduction of competitive networks is leading to an increase in use of NSPCs, but in general no scarcity of NSPCs is to be expected. However, if use of NSPCs is extended, for example outside the national territory, then scarcity of NSPCs may become an issue.

8.2 NSPC standards

The technical aspects of the signalling networks are described in ITU-T Recommendation Q.705. SS#7 provides signalling messages containing 14-bits address fields for SPCs. A two-bit Network Identifier (NI) preceding the SPC field in a signalling message defines whether the SPC is international or national. NI value '00' is followed by an ISPC, NI value '01' by an NSPC. NI value '10' is reserved for national use. The remaining value '01' is spare.
ITU-T Recommendation Q.708 defines the numbering scheme of ISPCs for SS#7. ITU-T Recommendation Q.704 does the same for NSPCs.

The ISPCs are managed by ITU-T which assigns blocks of eight codes, the Signalling Area Network Codes (SANCs), to countries. The conventions for ISPCs are covered in the ETO Final Report on Harmonised National Numbering Conventions. The NSPCs are managed within the countries.

9 Telex numbers.

This section addresses the uses of telex numbers and the standards for telex numbers.

9.1 Uses of telex numbers

Telex numbers are used on dedicated telex networks for identification of network termination points.

There is no scarcity of telex numbers. Telex is a fading market in Europe and not attractive for competition. It is mainly used for communication with developing countries.

9.2 Telex number standards

ITU-T Recommendation F.69 Plan for Telex Destination Codes defines the hierarchical structure of the international telex numbers. They consist of a telex destination code followed by a national telex number. There are no restrictions on the length of the national telex number.

Annex H Overview of responses

The overview of responses to the questionnaire shows the questions posed in the questionnaire. To limit the time required to respond, the number of questions were limited to the most essential ones where differences between naming and addressing resources could be expected. In addition, the same questions were used for the different naming and addressing schemes. Only two questions related to a specific type of address: one on NSAP addresses and one on AESAs.

The choice of the questions was based on the general framework created for the ETO study on Harmonised National Numbering Conventions. The questions were limited to those aspects that were expected to yield a valuable and informative extension of the general framework.

ETO sent out the Questionnaire on Naming and Addressing Conventions to all ECTRA and ECTRA/PTN representatives on 6 May 1998. The representatives were requested to involve other relevant bodies for the different naming and addressing schemes where needed to complete the questionnaire. The need to involve other bodies complicated the completion and caused some delayed or incomplete responses. Completed questionnaires were requested by 9 June 1998. Responses that were received later have been included here as far as possible. Responses have been completed by interviews with relevant bodies.

Responses were received from 19 countries: 11 EU countries and 8 non-EU countries. The most-frequently addressed resource types were NSPCs (18 countries), E.212 IMSIs (18 countries) and X.400 names (16 countries). These resources are also within the field of responsibility of NRAs in most of the countries. The remaining resource types were addressed by 9 to 12 of the countries. These resources are within the field of responsibility of NRAs in a minority of countries only.

1 List of responding countries

The following 19 countries responded to the questionnaire:

- the EU countries Belgium (be), Denmark (dk), Finland (fi), France (fr), Germany (de), Italy (it), Luxembourg (lu), The Netherlands (nl), Portugal (pt), Spain (es) and Sweden (se)

- the non-EU countries Czech Republic (cz), Iceland (is), Norway (no), Poland (pl), Slovak Republic (sk), Slovenia (si), Switzerland (ch) and Ukraine (ua).

The abbreviations between brackets are the two-letter combinations indicating the countries according to the standard ISO 3166. These abbreviations are used in the scheme below.

2 Questions generally applicable to conventions for numbering, naming and addressing

The type of resource (number, name or address) to which the responses to the questions apply.

Internet names	be,ch,de,es,fi,it,lu,nl,pt,se	10 countries
IP addresses	ch,de,es,fi,it,lu,nl,pt,se	9 countries
NSAP addresses	ch,de,es,fi,fr,it,lu,nl,no,pt,se,si	12 countries
AESAs	be,ch,es,fi,fr,it,lu,nl,no,pt,si	11 countries
X.400 names	be,ch,cz,de,dk,es,fi,fr,is,lu,nl,no,pl,pt,se,si	16 countries
X.500 names	be,ch,de,es,fi,lu,nl,pt,si	9 countries
E.212 IMSIs	be,ch,cz,de,dk,es,fi,fr,is,lu,nl,no,pl,pt,se,si,sk,ua	18 countries
NSPCs	be,ch,cz,de,es,fi,fr,is,it,lu,nl,no,pl,pt,se,si,sk,ua	18 countries
Telex numbers	ch,de,es,fi,lu,nl,pl,pt,si	9 countries

Table 1 Overview of types of resources and their coverage by the responses of countries

2.1 NRA responsibilities for administration or management

2.1.1 Do NRAs in your country have responsibilities (apart from those towards ITU and ISO) concerning the administration or management of the resources (on 1.5.98)?

The answers are provided in table 2 below.

Country	Internet	IP	NSAP	AESA	X.400	X.500	IMSI	NSPC	Telex
EU:									
Belgium			x		x	x	x	x	
Denmark					x		x		
Finland	x		x	x			x	x	x
France					x		x	x	
Germany			x		x	x	x	x	x
Italy								x	
Luxembourg	x		x	x	x	x	x	x	x
Netherlands							x	x	x
Portugal				x	x		x	x	x
Spain			x	x	x	x	x	x	x
Sweden							x	x	
Non-EU:									
Czech Rep.					x		x	x	
Iceland					x		x	x	
Norway			x	x	x		x	x	
Poland			x	x	x	x	x	x	x
Slovak Rep.							x	x	
Slovenia			x	x	x	x	x	x	x
Switzerland			x	x	x	x	x	x	x
Ukraine							x	x	
Total nr of countries	2	0	9	8	13	7	18	18	9

Table 2 Overview by country of NRA responsibilities for each type of number, name or address

Key to symbols

x = NRA responsibilities

(x) = firm plans for NRA responsibilities

(blank) = no NRA responsibilities (no response interpreted as no NRA responsibility).

2.2 Administration: setting up of conventions

2.2.1 What is the name of the body that sets up the national conventions for the resources?

2.2.2 Is that body formally recognised by the state as a body independent of telecommunications organisations?

The answers are provided in table 3 below.

Country	Internet	IP	NSAP	AESA	X.400	X.500	IMSI	NSPC	Telex
EU:									
Belgium	o		a		a	a	a	a	
Denmark					m+a		m+a		
Finland	a		a	a	--	--	a	a	c
France					a		a	a	
Germany	o		o		a	a	a	a	c
Italy	o	o	o					m	
Luxembourg	a		a	a		a	a	a	a
Netherlands	o		o	o		o	a	m	m
Portugal	o			a	a	--	a	a	a
Spain	o	o	m	m	m	m	m	m	m
Sweden	o		o		o		a	c	
Non-EU:									
Czech Rep.					a		a	a	
Iceland					a		a	a	
Norway			a	a	o		a	a	
Poland	o		m	m	m	--	m	m	c
Slovak Rep.							m	m	
Slovenia			m	m	m	m	m	m	m
Switzerland	o		a	a	a	a	a	a	c
Ukraine							a	a	

Table 3 Overview by country of the type of body that sets up the national conventions for each type of number, name or address

Key to symbols

a = agency being an NRA on a distance from the ministries
c = incumbent operator
m = ministry
o = others
-- = no body
(blank) = no information

2.2.3 Is the body obliged to consult interested market parties or their representatives, for example, by means of a consultative body, on the national conventions?

The answers are provided in table 4 below.

Country	Internet	IP	NSAP	AESA	X.400	X.500	IMSI	NSPC	Telex
EU:									
Belgium			no		no	no	no	no	
Denmark					(yes)		(yes)		
Finland	yes		(yes)	(yes)	--	--	no	no	no
France					(yes)		(yes)	(yes)	
Germany					yes	yes	yes	yes	no
Italy	no	no	no					yes	
Luxembourg	no		no	no	no	no	no	no	no
Netherlands								yes	yes
Portugal				(yes)	(yes)	--	(yes)	(yes)	(yes)
Spain	no	no			n.d.	n.d.	n.d.	yes	n.d.
Sweden	yes		yes		yes		(yes)	no	
Non-EU:									
Czech Rep.					no		no	no	
Iceland					no		no	no	
Norway			(yes)	(yes)			(yes)	(yes)	
Poland					no	--	no	no	no
Slovak Rep.							no	yes	
Slovenia									
Switzerland	no	(yes)	yes	yes	no	no	no	no	yes
Ukraine							yes	yes	

Table 4 Overview by country of the obligation for consultation for each type of number, name or address

Key to symbols

yes = obligation for consultation
(yes) = obligation for consultation on specific issues only
-- = no body
n.d. = not defined
(blank) = no information

2.3 Management: primary assignment of resources

2.3.1 What is the name of the National Plan Manager (NPM) for the primary assignment?

2.3.2 Is the NPM formally recognised by the state as a body independent of telecommunications organisations?

The answers are provided in table 5 below.

Country	Internet	IP	NSAP	AESA	X.400	X.500	IMSI	NSPC	Telex
EU:									
Belgium	o		a		a	a	a	a	
Denmark					a		a		
Finland	a				--	--	a	a	o
France					a		a	a	
Germany	o		a		a	a	a	a	c
Italy								a	
Luxembourg	a					a	a	a	
Netherlands	o		o	o			a	a	a
Portugal	o		a	a	a		a	a	a
Spain	o	o					a	a	
Sweden	o				o		a	c	
Non-EU:									
Czech Rep.					a		a	a	
Iceland					a		a	a	
Norway			a	a	a		a	a	
Poland					m	--	m	m	c
Slovak Rep.			m	m			m	m	
Slovenia			m	m	m	m	m	m	m
Switzerland	o		a	a	a	a	a	a	c
Ukraine							a	a	

Table 5 Overview by country of the type of NPM for each type of number, name or address

Key to symbols

a = agency being an NRA on a distance from the ministries
c = incumbent operator
m = ministry
o = others
-- = no body
(blank) = no information

2.3.3 For what reasons can the NPM refuse assignments? Distinguish between reservation and allocation as required.

The answers are provided in table 6 below.

Country	Internet	IP	NSAP	AESA	X.400	X.500	IMSI	NSPC	Telex
EU:									
Belgium			e,p,r		e,p,r	e,p,r	e,p,r	e,p,r	
Denmark					e,p,s	n.d.	e,p,s		
Finland	p,f,9)				--	--	n.d.		
France									
Germany					o,p,1)	n.d.	n.d.	a6,n	
Italy								e,l	
Luxembourg	r,f,l,p				n.d.	2)	a6,f,l,o, r,t 3)	a6,f,l,o, r,t 3)	n.d.
Netherlands								e	e,f,l,s, t 8)
Portugal					n.d.	--	n.d.	n.d.	n.d.
Spain	p,f,l,r				n.d.	n.d.	n.d.	n.d.	n.d.
Sweden					4)			n.d.	
Non-EU:									
Czech Rep.					a6-12, o,l,p,t		a6-12, o,l,p,t	a6-12, o,l,p,t	
Iceland					e		e	e	
Norway			n.d.	n.d.	r		e,l,s 5)	e,l,s 5)	
Poland					i,l,p,6)	n.d.	a	a	
Slovak Rep.							n.d.	n.d.	
Slovenia					n.d.	n.d.	n.d.	n.d.	n.d.
Switzerland	r,f,l,p,o 9)		f,i,l,n	f,i,l,n	f,i,n,p, 7)	f,i,n,p, 7)	f,i,n,p, 7)	f,i,n,p, 7)	f,i,n, p,7)
Ukraine							r		

Table 6 Overview by country of the different reasons for which the NPM can refuse assignments for each of the type of number, name or address

Key to symbols

a = activation not within certain timescale (number of months, if known, added behind 'a')
e = effective use lacking
f = fee payment not in time
i = international standards not complied with
l = applicant not eligible, not licensed or not registered
o = information obligation not complied with
n = use not on national territory or for national services
p = purpose of use not correct
q = quality of service lacking
r = requested resource not available
s = service not public
t = transfer and trade prohibition not complied with
n.d. = not defined
-- = no NPM
(blank) = no information

Notes
1) Additional reasons concern obligations to interconnect with other ADMDs and to transfer messages to other ADMDs, data protection, telecommunications secrecy, name right protection.
2) Quality of directory service should be sufficient, in particular data completeness and accuracy, data availability and directory addressing scheme.
3) These reasons are provisional; definition of eligibility of applicants not known to ETO.
4) Both ADMD names and PRMD names shall be unique in the country and shall be chosen from the same national naming space. They should be short, but at least three characters, upper and lower case shall be interpreted as equal, the name shall only use A-Z, 0-9, <hyphen> and <space>, and some restriction on the use of acronyms and daily used words shall apply.
5) Applicant is not registered as a public telecom service provider or applicant has not demonstrated a need for the resource.
6) Additional reasons concern intellectual property rights (IPRs) and obligations to interconnect with as many other MDs as possible and to offer public services MT, IPM and EDI.
7) Technical reasons such as exhaustion of the resources.
8) Applicant is residing abroad or keeping accounting records abroad or there are financial shortcomings or technical shortcomings.
9) Technical violation.

2.3.4 Has an applicant the right to choose which specific resources, if available, are assigned to him?

The answers are provided in table 7 below.

Country	Internet	IP	NSAP	AESA	X.400	X.500	IMSI	NSPC	Telex
EU:									
Belgium			yes		yes	yes	yes	yes	
Denmark					yes		yes		
Finland	no				n.a.	n.a.	yes	no	yes
France					yes		yes	yes	
Germany					yes	yes	no	no	
Italy								no	
Luxembourg	yes				n.d.	yes	yes	yes	n.d.
Netherlands									
Portugal					n.d.	n.a.	n.d.	n.d.	n.d.
Spain	yes				n.d.	n.d.	n.d.	n.d.	n.d.
Sweden	yes				yes		yes	n.d.	
Non-EU:									
Czech Rep.									
Iceland					no		no	no	
Norway			no	no	yes		no	no	
Poland					yes	n.d.	no	no	no
Slovak Rep.							no	no	
Slovenia					n.d.	n.d.	n.d.	n.d.	n.d.
Switzerland	yes		yes	yes	yes	yes	no	no	no
Ukraine							yes	yes	

Table 7 Overview by country of the right of the applicant to choose specific resources for each type of number, name or address

Key to symbols

n.d. = not defined

-- = no NPM

(blank) = no information

2.3.5 What usage conditions can the NPM impose for an assignment? Examples of usage conditions are: fees, prescribed use, deadline for activation, limited assignment period, prohibition of number transfer and trade, information obligation, conditions regarding secondary and tertiary assignment. Distinguish between reservation and allocation as required.

The answers are provided in table 8 below.

Country	Internet	IP	NSAP	AESA	X.400	X.500	IMSI	NSPC	Telex
EU:									
Belgium			a12,e,f,o,p		a12,e,f,o,p	a12,e,f,o,p	a12,e,f,o,p	a12,e,f,o,p	
Denmark					a12,e,f,n,o,p		a12,e,f,n,o,p		
Finland	f,p,9)				--	--	n.d.	f	
France									
Germany					n,o,p,1)	n.d.	n.d.	a6,e,f,o,p,t,8)	
Italy								a,f,t	
Luxembourg	f				n.d.	3)	a6,f,o,t	a6,f,o,t	
Netherlands								I,n,p,2)	o,f,t,7)
Portugal					n.d.	--	n.d.	n.d.	n.d.
Spain	f				n.d.	n.d.	n.d.	n.d.	n.d.
Sweden					n.d.		l	n.d.	
Non-EU:									
Czech Rep.					a6-12, l,o,p,t		a6-12, l,o,p,t	a6-12, l,o,p,t	
Iceland					a,o,p,t		a,o,p,t	a,o,p,t	
Norway			f	f	f		a,f,l,o,t	a,f,l,o,t	
Poland					p,t	n.d.	o,p,t	o,p,t	
Slovak Rep.							p,t	p,t	
Slovenia					n.d.	n.d.	n.d.	n.d.	n.d.
Switzerland	f,p		f,o	f,o	f,i,n,o,p,4)	f,i,n,o,p,5)	f,i,n,o,p	f,i,n,o,p,6)	o
Ukraine							n.d	n.d.	

Table 8 Overview by country of usage conditions that can be imposed for each type of number, name or address

Key to symbols

a = activation within certain timescale (number of months, if known, added behind 'a')
e = effective use
f = fee payment
i = in line with international standards
l = limited period of assignment
n = for national services or on national territory only
o = information obligation
p = purpose as prescribed
t = transfer and trade prohibition
n.d. = not defined
n.a. = not applicable
(blank) = no information

Notes

1) Additional conditions: interconnect with other ADMDs, transfer messages to other ADMDs, data protection, telecommunications secrecy, name right protection.
2) Additional conditions: valid ITU-T Recommendations, use for node in so-called transit domain of national telephony traffic.
3) Quality of directory service should be sufficient, in particular data completeness and accurateness, data availability and directory addressing scheme.
4) Additional conditions for use of ADMD names: the assignee should only interconnection with PRMDs assigned by the NPM and the assignee should submit a list of PRMDs connected to the ADMD to the NPM before the end of each year.
5) Additional conditions for use of X:500 names: assigned names should be part of the national Directory Information Tree, the assignee should define the structure of the branch of the national DIT subordinated to him, if he intends to exploit a first level DSA, he should fulfil a number of conditions regarding the quality of the service concerned.
6) The assignee should manage the signalling point codes for his own network (NI=10) in conformity with ITU-T Recommendation Q.705.
7) Applicant is residing in the country and keeping accounting records in the country. There should be no financial shortcomings or technical shortcomings.
8) Structure and length of the assigned resources as prescribed.
9) In line with technical specification.

2.3.6 What are the amounts of one-off and periodical fees that the NPM imposes for an assignment. Please specify if different fees for different categories of resources are distinguished. Distinguish between reservation and allocation as required.

The answers are provided in table 9 below

Country	Internet	IP	NSAP	AESA	X.400	X.500	IMSI	NSPC	Telex
EU:									
Belgium			f 8)		f 8)	f 8)	f 8)	f 8)	
Denmark					a 3)		a 3)		
Finland	f+a 14)				--	--	a 6)	a 6)	
France									
Germany					n.d.	n.d.	n.d.	n.d.	
Italy								13)	
Luxembourg	f+a 10)				n.d.	0	n.d.	n.d.	n.d.
Netherlands								f+a 1)	f+a 2)
Portugal					n.d.	--	n.d.	n.d.	n.d.
Spain	f+a 15)				n.d.	n.d.	n.d.	n.d.	n.d.
Sweden	f+a 11)						0	n.d.	
Non-EU:									
Czech Rep.					0		0	0	
Iceland					n.d.		n.d.	n.d.	
Norway			f 9)	f 9)	f 4)		a 5)	a 5)	
Poland					0	n.d.	0	0	
Slovak Rep.							0	0	
Slovenia					n.d.	n.d.	n.d.	n.d.	n.d.
Switzerland	f+a 12)		f+a 7)	f+a 7)	f+a 7)	f+a 7)	f+a 7)	f+a 7)	n.a.
Ukraine							n.d.	n.d.	

Table 9 Overview by country of fees for each type of number, name or address

Key to symbols

f = one-off fee (amount, if known and not zero, in note)
a = annual fee (amount, if known and not zero, in note)
n.d. = not defined
-- = no NPM
(blank) = no information

Notes

1) Netherlands, NSPC:
One-off fees: 2,000 DFL per 8 NSCPs for reservation or allocation, 1,000 DFL per 8 NSPCs for changing from reservation into allocation. Annual fees: 500 DFL per 8 reserved NSPCs, 1,000 DFL per 8 allocated NSPCs.
2) Netherlands, telex:
One-off fees: .05 DFL per telex number for reservation or allocation (minimum 500 DFL and maximum 250,000 DFL), .02 DFL per telex number for changing from reservation into allocation (minimum 200 DFL and maximum 100,000 DFL). Annual fees: .02 DFL per reserved telex number (minimum 200 DFL), .05 DFL per allocated telex number (minimum 500 DFL).
3) Danmark, X:400+IMSI:

The annual fees are 1,000 units per ADMD name and 10,000 units per MNC. The unit is the annual fee to be paid per ordinary telephone number. Fees for other types of resources are expressed in this unit. The unit is calculated for each year to balance receipts and expenditures of that year. The provisional amount for the unit in 1998 is 1.71 DKR.

4) Norway, X.400:
The one-off fees are 2,000 NOK per ADMD name and 1,000 NOK per PRMD name.

5) Norway, IMSI+NSPC:
The proposed annual fees are 10,000 NOK per MNC and 10,000 NOK per NSPC.

6) Finland, IMSI+NSPC:
The annual fee is 2,000 FIM per MNC and 200 FIM per 10 NSPCs.

7) Switzerland, NSAP+AESA+X.400+X.500+IMSI+NSPC:
The one-off fees are 500 SFR and the annual fees are 100 SFR per NSAP address, AESA, PRMD name, X.500 name, MNC (provisionally) and NSPC.
The one-off fee is 1,500 SFR and the annual fee is 500 SFR per ADMD name.

8) Belgium, NSAP+X.400+X.500+IMSI+NSPC:
The one-off fees are 15,000 BFR per NSAP address, ADMD name, X.500 name, MNC and NSPC. These fees have to be paid for reservation, which always has to precede allocation. No additional fees for allocation are required.

9) Norway, NSAP+AESA:
The one-off fees are 5,000 NOK per NSAP address and AESA.

10) Luxembourg, Internet:
The one-off fee is 2,000 FLUX and the annual fee is 3,000 FLUX per Internet name.

11) Sweden, Internet:
The one-off fee is 250 SEK and the annual fee is 250 SEK per Internet name.

12) Switzerland, Internet:
The one-off fee is 80 SFR and the annual fee is 48 SFR per Internet name.

13) Italy, NSPC:
The reservation fee is 50% of the allocation fee.

14) Finland, Internet:
The one-off fee is 320 FIM and the annual fee is 60 FIM per Internet name.

15) Spain, Internet:
The one-off fee is 12,000 PTS and the annual fee is 8,000 PTS per Internet name.

2.4 Concluding questions

2.4.1 Please describe briefly other items that you consider important regarding the national conventions of your country.

The answers are provided in the box below.

Belgium:
For the development of national conventions for Internet names a sector-specific working group is going to be created.

Finland:
Part of the IMSI resources has been reserved for three-digit MNCs, allowing 450 MNCs of both two digits and three digits under MCC 244.

Norway:
Schemes for X.400, AESA and NSAP are voluntary with rules developed by the industry.

Sweden:
The Swedish government is investigating the regulatory strategy for Domain Name in Sweden

Switzerland:
DCC and ICD NSAP addresses are regarded as the most important ones.
The NPM does not check whether the applicant has the right to use the requested X.400 or X.500 name.
The length of ADMD and PRMD names is limited to 16 characters to ensure conformity with ITU-T Recommendation F.401. Two consecutive spaces in an X.400 name are interpreted as a single space. An X.400 name cannot consist of a single space or a single zero only. Capitals and small characters are not distinguished in an X.400 name.
The length of X.500 names is limited to 64 characters to ensure conformity with ITU-T Recommendation F.500. Only capitals A-Z, small letters a-z and spaces are used to compose an X.500 name. Two consecutive spaces in an X.500 name are interpreted as a single space. An X.500 name cannot consist of a single space only.
In principle not more than one MNC per organisation is assigned.
Telex numbers are used by the incumbent only. The responsible NRA has delegated the assignment of telex numbers to the incumbent on the following conditions: the incumbent submits a list of assigned telex numbers to the NRA annually, monitors their use annually and makes proposals regarding the national telex numbering plan.

2.4.2 Please indicate briefly what firm plans exist to change the national conventions of your country.

The answers are provided in the box below.

Czech Republic, X.400+IMSI+NSPC:
Conventions are being drafted. There will be fees defined in the new Act.
Finland, Internet:
Regulations are under reformation
Finland, X.500:
Administration of X.500 names is under consideration. Consultative body is 'Finlands Directory Forum' which is planning to make a proposal in 1999. At the same time, service providers are changing from X.500 to LDAP (Lightweight Directory Access Protocol) as LDAP is easier to use than X.500.
Finland, NSPC:
More detailed conventions will be drafted based on the new Q.708.
Germany, X.500+IMSI:
Assignment procedures will be detailed.
Germany, X.400+X.500+IMSI+NSPC:
An ordinance for fees is being detailed, very likely with on-off fees.
Germany, IMSI:
Assignment of three-digit MNCs instead of two-digit MNCs is under consideration.
Germany, NSPC:
Assignment rules will be revised, for example use will explicitly be restricted to the national territory.
Iceland, X.400+IMSI+NSPC:
Fees are under consideration.
Ireland, Internet+IP:
May consider regulations but no firm plans yet.
Luxembourg, IMSI+NSPC:
Conventions are being drafted.
The Netherlands, IMSI:
Development of numbering plan and conventions planned in 1999.
Portugal, X.400, IMSI, NSPC, Telex:
Conventions are in preparation, starting from E.164 number conventions, already taking full liberalisation from 01.01.2000 into account.
Slovak Republic, IMSI+NSPC:
New conventions are being prepared.
Slovenia, NSAP+AESA+X.400+X.500+IMSI+NSPC+telex:
New conventions foreseen for adoption in 1999.
Sweden, Internet:
Regulatory strategy for Domain Name is under study.
Sweden, NSPC:
Assignment task will be transferred from incumbent to NRA and conventions will be produced on that occasion.
Switzerland, NSAP+AESA:
Interest in the use of NSAP as ATM addresses. As soon as decisions are taken the allocation of these resources will be regulated.
Switzerland, IMSI:
Required to be alert to new developments to prevent exhaustion of MNCs.
Ukraine, IMSI+NSPC:
Conventions are being developed.

2.4.3 Please indicate briefly what changes to the national conventions of your country may be required in the long term because of developments in technology, markets and regulations.

The answers are provided in the box below.

Sweden, IMSI: Assignment of three-digit MNCs instead of two-digit MNCs because of the broadening of the scope of E.212. Ukraine: Improvements regarding IMSIs.

Add comments here:

Belgium: The interest of market parties in X.400, X.500, NSAP and IMSI resources is very low.

3 Questions applicable to conventions for a specific type of number, name or address

3.1 Questions regarding NSAP addresses

3.1.1 Please specify what kind of NSAP addresses are assigned by the NPM.

Finland, France, Germany, Sweden, Norway, assign DCC NSAP addresses.

3.2 Questions regarding AESAs

3.2.1 Please explain whether only DCC AESAs are assigned by the NPM or also E.164 AESAs.

Norway and Finland assign DCC AESAs.

Annex I Comments of ENF members

Comments from ENF members on the second interim report have been annexed as far as they have not been fully taken into account. These are comments from ETNO and ETSI.

ETNO Reflection Document regarding the ETO second interim report on “Harmonised National Conventions for Naming and Addressing.”

General comments

Some important issues remain open in the second version of the report which, in ETNO’s view, do not fully take account of the evolving context of the Internet governance. Although this framework is not stabilised yet, the new statutes of the Internet Corporation for Assigned Names and Numbers (ICANN) exclude all national and governmental representation in the Corporation, in favour of operational, developmental and user representation. Against this background, ETNO would again call the ETO’s attention to the following issues:

1. IP naming and addressing is under the control of ICANN. For this reason, the extension of EU regulation to Internet naming and addressing, name portability and related areas cannot be decided at European level, but lies solely with ICANN, which should be the focal point for all these issues.

2. Any proposal - eg, for the portability of names between ISPs - can only be determined by contribution to the nominated ICANN Supporting Organisations, once these Organisations have been created by the ICANN Interim Board. It will then be their responsibility to recommend to the ICANN Board appropriate Domain Naming and Addressing policies.

3. In addition, ETNO notes the ETO recommendations in point 3.1.4, but does not recognise that NRAs have any authority on these issues.

European Telecommunication Standards Institute
ETSI WG NA2

Liaison from NA2 to ETO

2nd interim report on 'Harmonised Naming and Addressing Conventions'

ETSI NA2 reviewed this report during their March 1999 meeting and wish to offer the following comments:

> No support can be offered for the proposal to create a TLD for Europe (.eu) in advance of substantial market demands for such a resource. It is the view of ETSI NA2 that currently no such demand has been identified.