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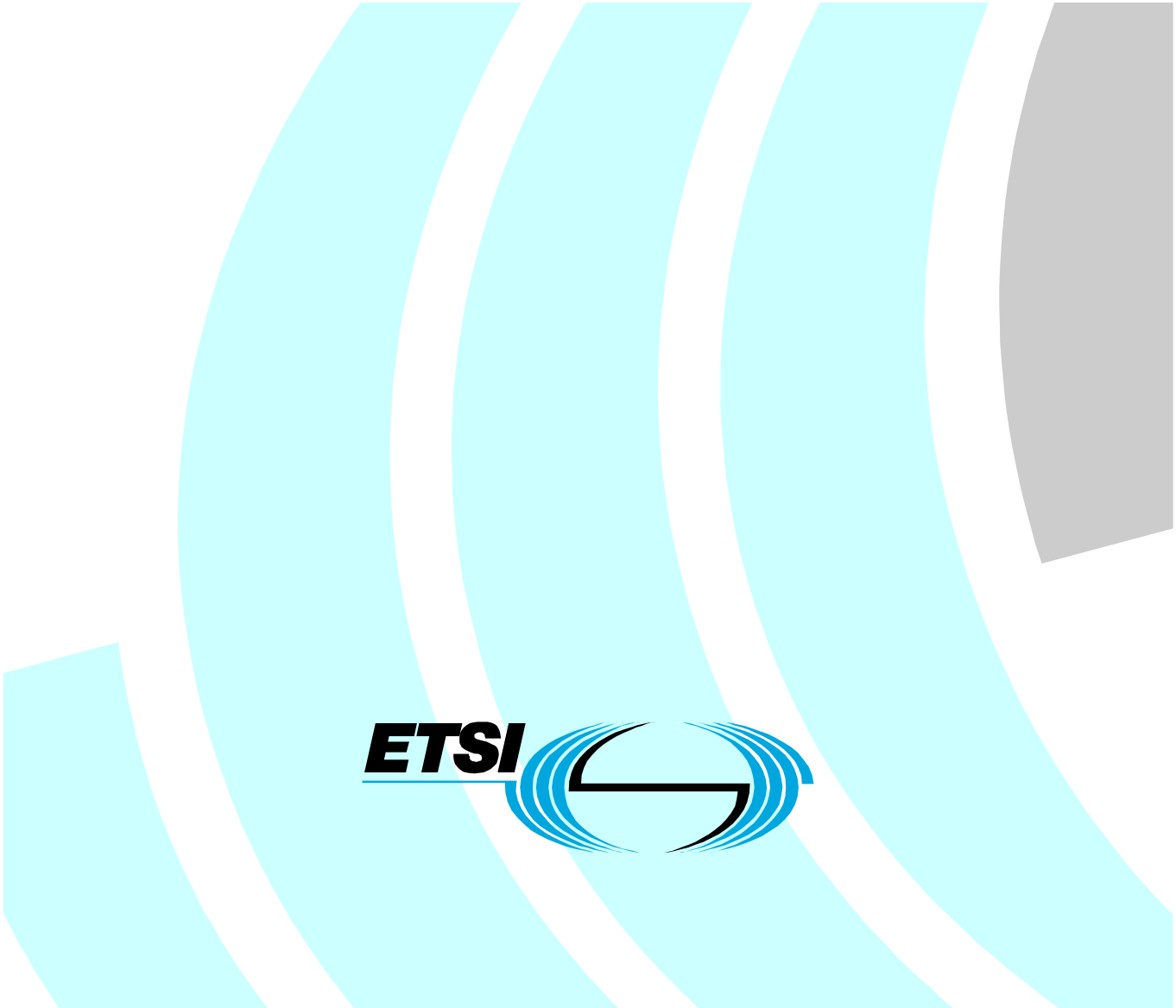
ETSI Guide

Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Design guide; Use of non-numeric names



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Contents

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Foreword

This ETSI Guide (EG) has been produced by ETSI Project Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON).

1 Scope

The present document considers the use of non-numeric names such as "user@domain" for voice and other communications services (These names may include numerals but are different from pure numbers such as are used in E.164). It evaluates:

- The advantages and disadvantages of non numeric names compared to the more traditional use of numbers
- The schemes for non-numeric names that are available for use and the advantages and disadvantages of creating new schemes or of modifying existing schemes
- The implications for network design of using non-numeric names

The present document primarily considers the use of "Internet names" which is a general term for names of the form "user@domain" where "domain" is a "dot-string" resolvable by the Domain Name System. (Email addresses, SIP addresses and Network Address Identifiers are particular instances of Internet names.) The reason for focusing on the use of Internet names is that this is the only global system of names that is both well established and growing. The conclusions of this report are not however limited to Internet names but would apply to any naming scheme because they relate to the generic nature of names and not the particulars of the Internet naming scheme.

The present document takes account of human factors work carried out by ETSI-HF and in particular the specification work on the Universal Communications Identifier (UCI) even though it is not immediately relevant because it uses numbers for its unique identifier. Its contents are not at variance with the work on UCI, as the latter sits at a higher level. UCI seeks to provide a top level scheme with a single identifier for a given individual / persona, and via which a number of different communications services (each potentially with its own naming scheme and unique name for the individual) can be accessed. The present document considers the implications that arise when the naming schemes for those individual services are non numeric.

ENUM is not considered explicitly in the present document because ENUM is a proposed facility for relating E.164 numbers to non-numeric names and presupposes the existence of the non numeric names that are discussed here.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

[1] ETSI EG 201 940: "Human Factors (HF); User identification solutions in converging networks".

[2] ETSI TR 101 326: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); The procedure for determining IP addresses for routeing packets on interconnected IP networks that support public telephony".

[3] Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive).

3 Abbreviations

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

CLI	Calling Line Identifier
DNS	Domain Name System
ICANN	Internet Corporation for Assigned Names and Numbers
IP	Internet Protocol
ISP	Internet Service Provider
LAN	Local Area Network
NGN	Next Generation Network
PSTN	Public Switched Telephone Network
SIM	Subscriber Identity Module
SIP	Session Initiation Protocol
TLD	Top Level Domain
UCI	Universal Communications Identifier

4 User aspects

An earlier ETSI study, EG 201 940 [1]: User identification solutions in converging networks, examined the user aspects of current naming schemes and its conclusions are summarized in table 1.

Table 1: Current identifiers (from EG 201 940 [1])

User Requirements	Name and Address	Telephone Number	Email Address
Uniqueness	****	**	*****
Memorability	**	*	***
Length	*	****	***
Stability	*	**	***
Terminal Independence	*	*****	*
Searchability	*	*****	*
Robustness	*****	*	*
Meaningfulness	*****	*	***
Additional information	*	**	*
Authenticity	*	*	**
NOTE 1: ***** Meets requirement extremely well. NOTE 2: * Does not meet requirement.			

The telephone number was rated comparatively low on uniqueness as, although each number is always unique, it may not be uniquely associated with a single person and the association with any person is impossible to guess from looking at the number.

This study led to the proposal for a Universal Communications Identifier (UCI) that would consist of the combination of:

- a unique number;
- a user friendly name;
- additional information.

Users might typically have two UCIs, one for private use and one for business use. They would be supported by personal communications agents that would provide valuable additional functionality. The UCI continues to be studied within ETSI with the more recent work focusing on authentication and security.

The differences between the UCI work and the present document are that:

- The UCI work is aimed towards developing a new identification system whereas the present document focuses much more on the use of existing schemes, since the UCI has not yet been implemented and it is not clear whether it will be implemented.

- The present document focuses on the use of non-numeric names, i.e. names that do not rely on numbers for uniqueness, whereas the UCI is essentially a numerical scheme with added non-unique fields.

The key attributes of any naming scheme are that it should be:

- unique (so that each name relates to only a single user or terminal or line or group of lines, although more than one name may relate to the same user or terminal or line);

- user friendly (to encourage their use and minimize misoperation).

The concept of user-friendliness in a name contains at least the following different elements:

- Ease of being remembered by a human.

- Ease of identifying the person or terminal or line from the name.

- Ease of being written (or input to a terminal) without error.

- Ease of being generated from first principles if the name is not known or has been forgotten (this is an advantage only when there are inadequate directory services).

The first three of these elements can easily be substituted by intelligence in terminals, SIMs or the front ends of networks.

The fourth of these elements covers the issue of finding the identifier to use for communications. For geographical E.164 numbers there are widely available directory services that enable the number to be found from the natural name and some part of the street address. Unfortunately these systems have not developed to embrace all the developments in E.164 nor the introduction and growth of Internet names.

Unfortunately the attributes of uniqueness and user friendliness are not fully compatible. For example, the existing ITU-T processes ensure that E.164 numbers possess uniqueness: however they are not inherently user friendly (although use of numbers for approaching 100 years has provided the benefit of familiarity). Conversely, alphanumeric naming schemes have the potential to be more user friendly but require methods to be developed to ensure uniqueness because natural names are not normally unique, and these are likely to reduce user friendliness. Thus Ezekiel.Q.Frogburger@domain has a fair chance of being unique and is user friendly enough, but John Smith might ensure uniqueness by being identified as (say) john.97.smith@domain which is less user friendly.

The problems of uniqueness are fewer if the context reduces the number of names to be handled. In the business context where the name is likely to have the form "user@business" there will be less of an issue of uniqueness if the number of employees is small. There is however an additional problem when companies merge when each company has names with the same value of "user" e.g. each company has a user called "John.Smith".

In the personal context, where users have not registered their own domain name, the Internet name has the form "user@isp" and names of this form are not portable between ISPs, in contrast to E.164 numbers which are portable in many countries.

A further aspect concerns language and alphabet. Whilst names may be user friendly in one language, they are less friendly for non-native speakers of the language concerned. Furthermore because the names would use a specific alphabet they are also less user-friendly if the names exists originally in a different alphabet (e.g. Chinese) and there has to be a translation to the alphabet used for the naming scheme. The use of numbers has gradually overcome this obstacle for the telephone service as all cultures have learned to handle decimal numbers written in the Arabic form.

In many respects, the advantages of non-numeric names can be realized without the need to build networks that can support them directly through the use of intelligence in terminals, SIMs or network front ends that allows users to assign non-numeric names of their own creation to E.164 numbers. For example the name Fred can be assigned to the number +44 20 7111 2222. This is a local assignment and provided the user assigns the name "Fred" only once for the set of numbers and names stored in the terminal, the problem of uniqueness is overcome. This is the practice commonly used by users of mobile systems such as GSM.

It is likely that use of non numeric names will be adopted earlier in individual corporate networks than in public networks, owing to the fact that:

- Unique alphanumeric identifiers are already being used for accessing LANs (e.g. logging on) and the same identifiers could be used for communications.
- The trade-off of uniqueness vs user friendliness is much more favourable owing to the limited size of corporate networks.

In practice corporate networks would be likely to increase the use of non-numeric names by adopting the existing values of "user" in "user@domain" for new internal services.

Overall the conclusions are that:

- the main attraction of non-numeric names, which is user friendliness, is fundamentally limited by problems of uniqueness, language and alphabet. If the context can be restricted as in many corporate networks, these limitations have less effect. These limitations are easily overlooked by advocates of non-numeric names.
- many of the issues of user friendliness that underlie the attraction of non-numeric names would be solved by improvements in the handling of names by terminals, SIMs or network front ends, and in the scope and accessibility of directory services.

5 Available schemes

5.1 Internet naming

By far the most commonly used non-numeric naming scheme at present is the Internet name of the form user@domain. The other main attempt to establish a non-numeric scheme was X.400 names but these proved to be less user friendly and the X.400 service has become obsolete.

The issue is then whether an alternative scheme to Internet names should be developed or whether the Internet naming scheme needs to be altered or enhanced.

Any naming scheme necessarily involves a combination of individual names, possibly belonging to various different categories, with a syntax for separating the individual names and indicating which category they belong to. Since the aim of a naming scheme is to be user friendly any new naming scheme would have to draw from the same set of natural names such as personal names and company/organization names.

In terms of organization, a naming scheme requires administration which may include a formal system of delegating responsibility for name allocation.

Thus the creation of a new naming scheme would not solve the problems of Internet naming because it would have to work from the same set of natural names but would involve the additional cost of establishing a new parallel system of administration.

The other possibility is the enhancement or improvement of the existing system of Internet names. In principle there appears to be no or very little scope for improvement since the syntactical form of the non-numeric names (the whole "user@domain" string) is already minimally simple and there is an established and reasonably cost effective system of allocation and delegation.

The Internet naming scheme determines how the "domain" part is organized, since the "user" part is organized locally by the owner of "domain" and the resolution of this part is provided by the host that supports the domain. For the domain part, the main scope for enhancement would be the through the creation of new Top Level Domains (TLD). This issue is already under constant consideration in ICANN who evaluate the potential benefits against the costs. There is the possibility of creating a new TLD for a specific service but the practice is to associate user names with TLDs to indicate the type of user (e.g. .com or .org) rather than the nature of the Internet access or service provider. It is also the trend to make the same name capable of use with multiple services and so to create a new TLD for a specific service would be a retrograde step.

In summary, the scheme of Internet names appears to be as good as naming can be and its disadvantages are not a function of the scheme but inherent in the use of names.

5.2 Migration to naming

There is as yet little visible demand from end users for non numeric names in services other than on the Internet, and such demand is not expected to appear in the immediate future.

Demand could take two forms:

- "Changing" the naming scheme for public telephony from E.164 to Internet naming.
- Introducing a new public telecommunications service (e.g. video-telephony) using Internet naming in parallel with continuing the support for public telephony that uses E.164.

If, however, the choice of naming scheme is considered as part of the service description then "Changing the naming scheme for public telephony from E.164 to Internet naming" means introducing a new public telephony service using Internet naming and so the first form is really a subset of the second.

To analyse how the migration can take place we can make two practical assumptions:

- The existing circuit switched networks that support public telephony will not be changed or enhanced further (i.e. the circuit switches themselves will not be changed to handle Internet names). Such a change would be expensive and involve parallel operation with both E.164 and Internet names if the universal public telephony service is to be maintained, since it would be impracticable to coordinate the changeover from E.164 to names worldwide. Furthermore a change without parallel running would involve replacement of all terminals that cannot use Internet names.
- Most users will continue to need access to public telephony that uses E.164 for compatibility with users who have access only to that service.

Figure 1 shows the existing public telephony service based on a circuit switched network.

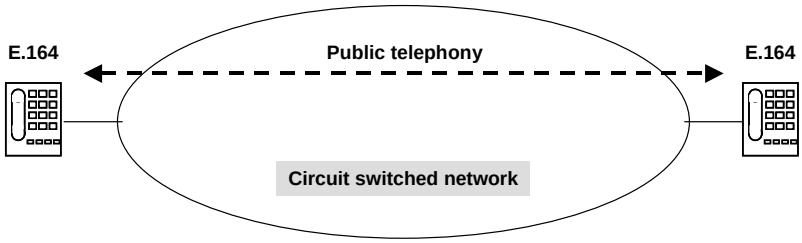

Figure 1: Public telephony on a circuit switched network

Figure 2 shows a parallel packet based network providing a new service based on internet names as well as supporting public telephony based on E.164.

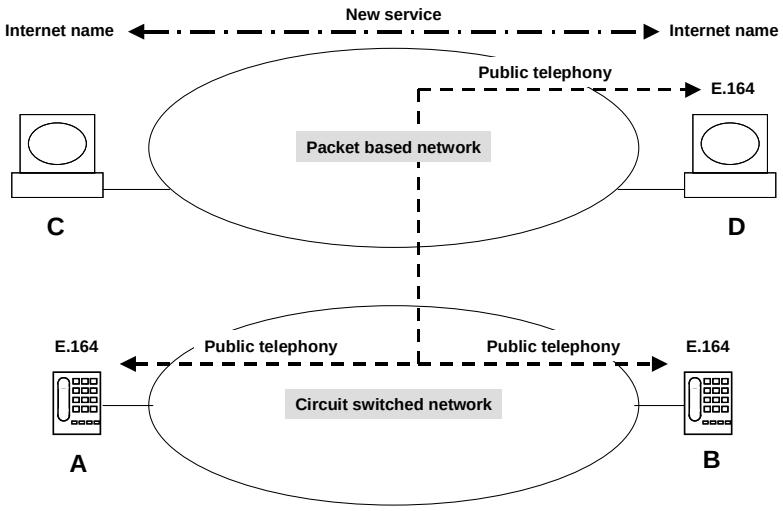

Figure 2: Introduction of a new service with Internet names on a packet based network

A, B and D can all communicate with each other using public telephony with its E.164 numbers. They cannot however communicate with C if C does not have an E.164 number (is not a subscriber to public telephony). C and D can communicate with a new service using Internet names, since D has an Internet name as well as an E.164 number.

Figure 3 shows an alternative way in which people who do not relate the choice of naming scheme to the service description might think of the situation in figure 2 for the case where the new service includes a voice element that is compatible with public telephony.

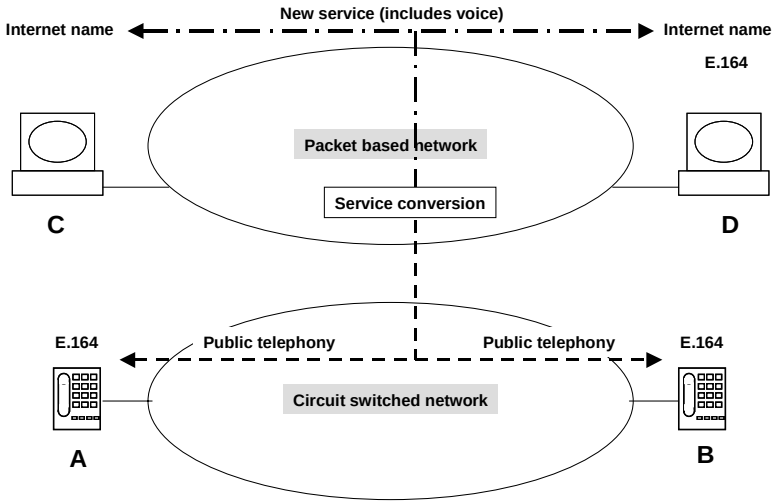

Figure 3: Alternative view of a new service on a packet based network

In figure 3, C can still communicate only with D because C does not have an E.164 number. A, B and D can communicate using E.164 and C and D can communicate using Internet names.

If E.164 numbers are used instead of Internet names for the new service, then naming is no longer an issue in determining which combinations of subscribers can communicate with each other. The situation would be as shown in figure 4 or figure 5.

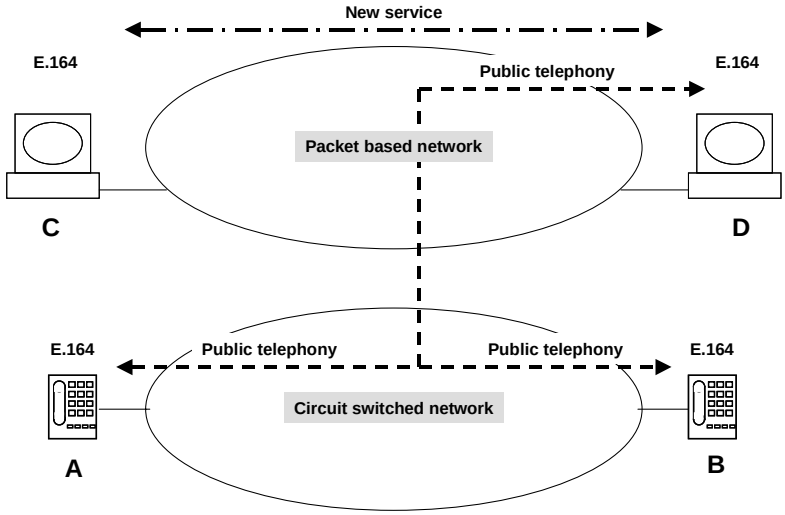

Figure 4: Introduction of a new service with E.164 on a packet based network

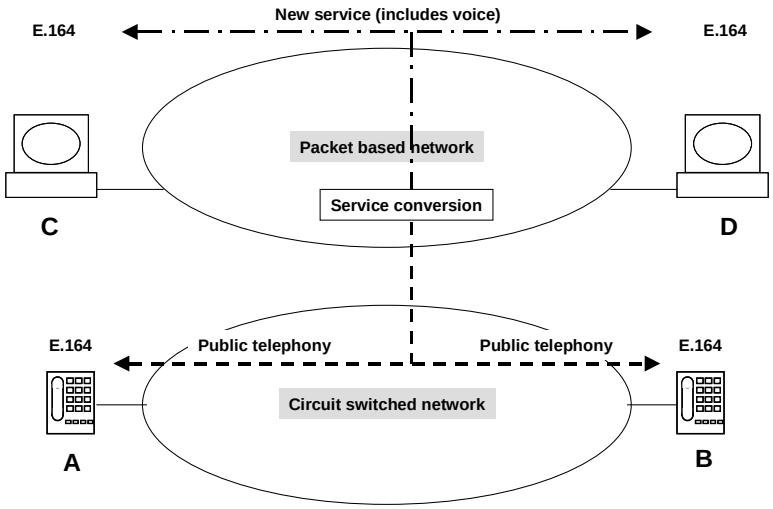

Figure 5: Alternative view of a new service with E.164 on a packet based network

A further possibility in a potential migration is that one user on the circuit switched network wants to use Internet names rather than E.164 numbers to call people because they prefer to use names. They either:

- buy a "box" to convert E.164 numbers to names;
- use a network front end service to convert E.164 numbers to names.

The results are shown in figure 6.

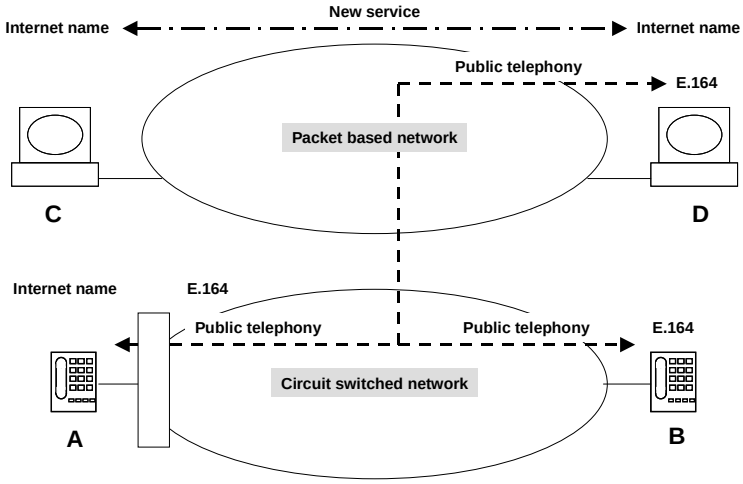

Figure 6: Name-number conversion at the network edge

Although A uses Internet names, he also has an E.164 alias that is used by the circuit switched network, because the network cannot use names. A still cannot communicate with C even though A has started to use Internet names. This could be seriously confusing because user A might think that because they can communicate with D (who has an E.164 number as well as an Internet name) they can also communicate with C, since both have Internet names. Furthermore, unless A also uses E.164 numbers directly, the introduction of the conversion box has stopped A from communicating with B because A can no longer initiate a call with an E.164 number.

From these examples, we see that:

- Internet names are likely to be introduced only in conjunction with the introduction of a new service that offers more than public telephony.
- Where Internet names are introduced, parallel running with E.164 needs to be maintained for public telephony or connectivity will be reduced.

Thus where new public services are introduced by telcos on an NGN infrastructure there is scope for introducing a new naming scheme, but currently there are no known plans for new public services that are significantly different from the current generation of PSTN based services such as public telephony and facsimile.

Where new services are introduced over the Internet they are unlikely to use any form of name other than the existing system of Internet names.

5.3 Universal Communications Identifier (UCI)

The UCI proposed by ETSI consists of:

- A unique numerical identifier + A natural name (e.g. John Smith) + Additional information.

The unique numerical identifier is the main part of the proposed UCI and is the part that would be used by networks to identify the calling and called parties. The natural name is added to provide more meaning for the human user, for example when they see a Calling Line Identifier (CLI) they could also see the name of the caller. The additional information would be designed to help directories or user agents and could include information about the preferences of the person identified. The exact nature of the unique numerical identifier has not yet been determined but it is highly likely to be a new range of E.164 numbers. Different values of the unique numerical identifier could be used for personal and business life. This would make UCI an extension of E.164.

From the perspective of the present document, the UCI is essentially a numeric identification system albeit with increased user friendliness. It is therefore outside the main scope of the present document.

5.4 Conclusions

The conclusions are that:

- it is not possible to create a new naming scheme that is inherently significantly better than the existing scheme of Internet names;
- there is little value in attempting to enhance or improve the system of Internet names;
- where there is a wish to introduce new services that use non-numeric names, it would be better to use names from the current Internet naming scheme giving users the possibility to use, for example, their existing email address also for the new service;
- the costs of changing from E.164 numbering to non-numeric names for public telephony would be extremely large;
- internet names could be introduced in as the identification system for new services but the need to maintain the connectivity of the public telephony service would be likely to make parallel running with E.164 essential;
- overall the attractions of using Internet names for new public services appear to be quite limited especially in a global context;
- in the short term corporate networks have the greatest scope for the development of new services that use non-numeric names.

6 Network aspects

6.1 Network and routeing types

Networks need to obtain routing information from the identifier used for the called party. There are two fundamentally different network models, the telco model and the Internet model. Figure 7 shows the differences between these models.

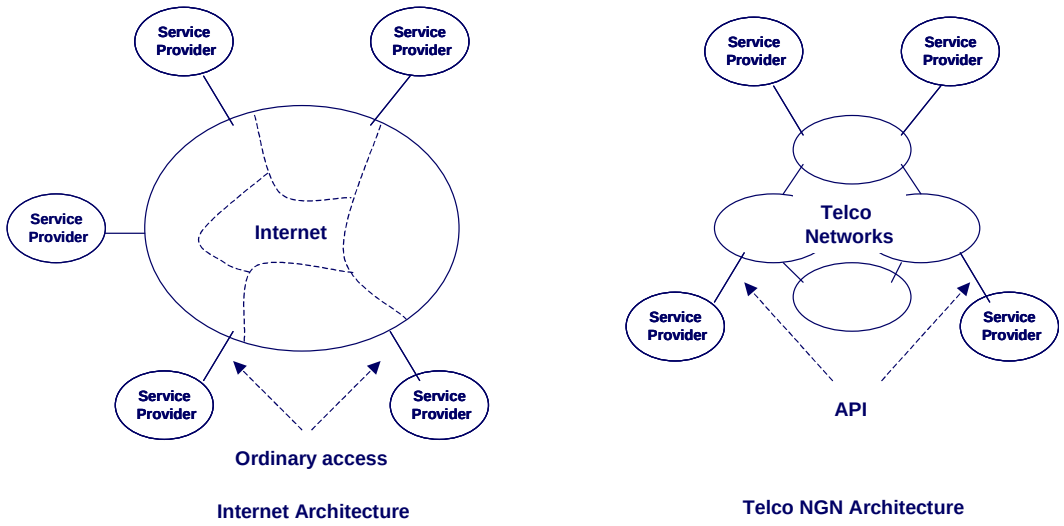

Figure 7: Comparison of Internet and telco NGN architectures

Names relate to users, terminals or lines. There are two fundamentally different models in use for obtaining routing information.

- Telco Word: In the Telco world, it is in many cases necessary to traverse multiple interconnected networks to achieve an end to end connection. Routeing within each network is handled separately, and routing information is obtained from number analysis (often of only part of the number) using routeing tables or databases.

  TR 101 326 [2] distinguishes between:

  - service resolutions such as interrogating a database for number portability or for resolving a non-geographical number into a geographical one. Service resolutions normally either add a routeing prefix to the E.164 number or replace it with another E.164 number.

  - routeing resolutions that analyse the E.164 number. Except for the final resolution to the called party, partial analysis is normally possible because, in the case of geographic numbers, the structure of the number is related to the network topology, and for this reason it is generally only necessary to analyse the most significant digits of the number to obtain the required routeing information. This simplified routing process results in reduced volume of information to be stored in data tables and also reduced processing load.

NOTE 1: Here, the term "E.164" number means a number from the E.164 scheme or compatible with to or from an associated dialling plan. This includes part of an E.164 number and an E.64 number with a prefix added to it.

Each network always performs a routing resolution, but some networks perform a service resolution followed by a routing resolution.

- Internet word: The following example shows in principle how a call to an Internet name could be routed on the public Internet, but there is as yet no single established procedure for calls over the Internet:

  - The mapping of names to public IP addresses which are analysed for routing is carried out by the Domain Name System (DNS). Because the public Internet is single and monolithic, a single name / address lookup is possible, and this occurs at the origin of the communication.

- The public IP address received is then used to route the communication throughout the public Internet to the destination sub-network that is identified by the "domain" part of "user@domain". The routing based on the public IP address received from the DNS also uses partial analysis and the size of routing tables is reduced by aggregation within the public IP address allocations.

- A server in the destination sub-network then resolves the "user" part of the name to an IP address (this could be public or private) that identifies the interface to the called user's terminal.

- This address is then used to for the final stage of the routing.

NOTE 2: The routing of calls using Instant Messenging services is handled differently. There is a single resolution from the called name to a public IP address and port number that represents the called party. The public IP address and port number are normally assigned dynamically. The resolution is performed by the provider of the Instant Messenging service who runs a server that is updated with the latest public IP address and port number information when the called party activates their terminal and is allocated and IP address.

Figure 8 compares the routeing models.

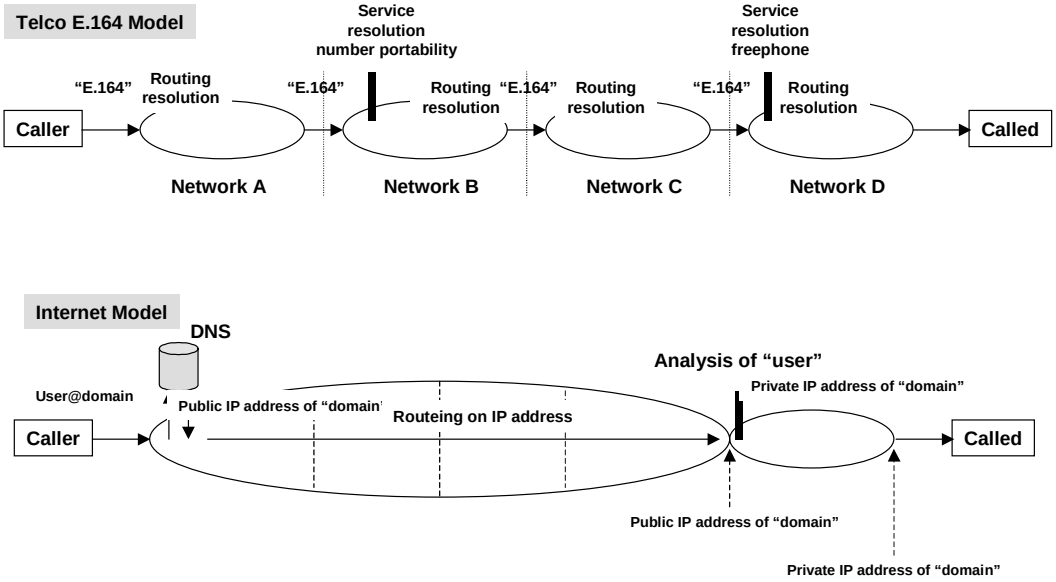

Figure 8: Comparison of telco and Internet routeing models

6.2 Use of Internet names in telco networks

If Internet names are used to support new services provided on a telco NGN infrastructure, then two stages of resolution are needed for call routeing.

- Firstly the identity of the network that serves the called customer (the home network) must be determined from the domain part of the called Internet name. In most cases the Internet name will have been chosen to contain information about the user and their activities and not about their network arrangements and so a database translation rather than a character by character or string by string analysis is needed (see note 1). This translation gives the information on where the called party is, so that the process of routeing may start. The form of the home network identity could be a URL or a number. The resolution from Internet name to home network is "objective" because it would return the same answer to the same question to all enquiries from whatever origin. An IP address cannot be used instead of the home network name because under the telco model each network is separate and the IP address arrangements are not organized to a common plan as they are in the public Internet. Because the resolution is objective it could be performed by a centralized service such as DNS and could be integrated into DNS by using new record types but DNS may not be able to deliver the availability or speed of response necessary to keep call set-up times to the levels currently experienced with circuit switched networks (see note 2).

- The resolution of the Internet name to the identity of the serving network could be carried out either by the originating network or by a transit network on behalf of the originating network. A global reference database (like DNS) is needed to make available the information on the translation from the called domain name to the home network identity, but operators may run their own copy of this database for handling operational queries with fast response times and update the information in this copy regularly from the reference database. This practice is already followed in some countries for number portability.

- Secondly each successive network that handles the call has to obtain routeing information from the home network identity. This is a "subjective" routing resolution because the routing information depends on the network itself. This resolution therefore has to be organized internally by each network. Again unless the home network names were organized to reflect network structure, routing databases rather than tables would be needed.

These processes will route the call to the home network. The home network will then resolve the "user" part of the Internet name into a private IP address.

The use of DNS would add to the call set-up time if the information is not adequately cached. Telcos might wish to take additional measures to improve the speed of this resolution process but it is difficult to see what measures could be taken other than extra caching since the names used for users of the services in question could be distributed all over the domain name space.

Routeing would be simplified if the telco networks used a coherent system of IP addresses across all telco networks. This would then be similar to the public Internet and allow resolution of the home network name into an IP address at the origin of the call so that the call could be routed by partial analysis of the IP address as in the Internet. This is, however, not consistent with the TIPHON approach of allowing each network to be organized independently.

NOTE 1: In a domain name such as <string1>.<string2>.<string3>, character by character analysis refers to the characters within each string whereas string by string analysis refers to analysis of the whole name in terms of the values of each string.

NOTE 2: The performance of DNS is variable and measures, such as caching, can be taken to produce fast responses.

6.3 Support systems

Many of the support systems and the processes relating to telco services are based on the use of E.164 numbers. Major changes would be required to these systems for the support of Internet naming for new services, and these alterations would require extensive investment.

6.4 Conclusions

The conclusions are that:

- the use of non-numeric names over telco NGNs would require the establishment of a new approach to routing potentially involving both DNS (if internet names are used) and network-internal routing databases;

- DNS would need to carry additional information (home network identity) for those names used for new telco services;

- many support systems would need altering as they are based on E.164 numbers, and these alterations would require extensive investment.

7 Use in services

A service in telco terminology, whether public or private, or an application in Internet terminology needs to specify the naming scheme that it uses since this determines who can be reached by the service. The old concept of being a subscriber to a service implies that you can communicate with any other subscriber of the same service, yet this communication requires the use of the same naming scheme (the caller has to be able to use the naming scheme and the called party has to have an identity within the naming scheme). In other words, the specification of the naming scheme is an integral part of the technical specification for the service. A given naming scheme may however be used for more than one service and the use of the same name values for multiple services makes it easier for users to remember names (as users have fewer different names) although it reduces other users' awareness of the services by which a given user may be contacted.

Whilst there is some underlying interest in the use of non-numeric names, no new services which specifically require non numeric names have yet been identified or specified for telco NGNs. This situation limits the scope for elaboration, but there are two general considerations:

- If new services are introduced and can be accessed from the same terminals that are used for existing services such as public telephony, then users may wish to use their existing E.164 numbers for the new services rather than handle multiple names (numeric and non-numeric).
- Some multimedia services may include a voice element and that element may be made compatible with public telephony so the service can be used without the extra media elements where one party has only a simple telephone. Such a feature would require the use of E.164 alias working (as described above) as part of the definition of the new service.

Protocols may be capable of supporting more than one type of name, whether explicitly or implicitly, just as they may also be capable of supporting several different services. They can support different names explicitly if they include a type of name indicator. They can support different names implicitly if one type of name can be coded as another. An example would be where a protocol such as SIP is used for a service that uses E.164 numbers. The SIP name form of "user@domain" could be used where "user" has the value of the string of the E.164 number and "domain" has the value of the home network name, e.g. <E.164 number>@<home network>.

The conclusions are that:

- The technical specification for a service should identify the naming schemes to be used.
- The same naming scheme may be used by more than one service and such use will help migration to new services.
- The forms of names used in protocols should not be confused with the naming system used by the users of a service.

8 Regulatory issues

Most public telecommunications services are subject to some regulation or official authorization. Public telephony is subject to the greatest degree of regulation because it is regarded as a universal service needed for the public good although the extent of the regulation has reduced over the past decade. For example the Universal Service Directive (2002/22/EC) [3] focuses on the provision of public telephony and access to the PSTN. Regulatory requirements vary from country to country, but aspects of public telephony that are commonly regulated or carefully controlled include:

- access to emergency services;
- emergency preference service;
- lawful interception;
- number portability;
- calling line identification.

All these requirements currently involve the use of E.164 as a naming scheme. If a change to non-numeric names were made, the formulation of some of these of regulatory requirements would need to be modified but more importantly the support and other systems used in their implementation would need to be changed and this change would incur high costs.

Number portability applies currently only to E.164 numbers (and in many countries only to certain ranges of these numbers). No equivalent portability requirement applies to Internet names (although the names are normally portable provided that the "domain" does not include the identity of the Internet Service Provider (ISP)). Where the identity of the Internet Service Provider is included, the name is inherently not portable, e.g. John_Smith@<ISP>.com: and if such names were to be adopted for telco networks, the concept of portability would become essentially meaningless.

Furthermore, where new public services are introduced that use non-numeric names it is not clear to what extent the regulations that apply to public telephony would also be applied to these new services, and the regulators have not reached any conclusions on these issues. If regulators take the view that the public concerns are adequately satisfied by the universal public telephony, then less regulation may be applied to new services.

The conclusions are that:

- Any change to base public telephony on non-numeric names would involve changes to some regulatory requirements and extensive changes at high cost to the various support systems that implement these requirements.
- It is not clear what regulation would be applied to any public services that use non-numeric names since these services are likely to run in parallel with the continued availability of public telephony and so the extent of regulation may be lower than for public telephony.

9 Overall Conclusions

The use of non-numeric names has several advantages over numeric schemes in terms of user friendliness and memorability, but these advantages occur only in restricted contexts where the language and alphabet are the same and where the number of users is sufficiently small that the degree of duplication of natural names is low. For global public systems, it is unclear that overall non-numeric names are better than E.164 numbers.

Nearly all the advantages of non-numeric names can be realized by combinations of solutions such as:

- Naming customized to the individual user supported in terminals, SIMs or network front ends.
- Improvements in directory services.

The Internet naming scheme appears to have no disadvantages other than ones inherent in the use of natural names and so there is no point in trying to invent a new scheme for non-numeric names.

Networks benefit substantially from using an identification system for routing that reflects at least some aspects of network structure and so permits routing decisions to be based on partial analysis. E.164 is still sufficiently related to network structure to allow some partial analysis but the scope for this is reducing as global services grow and as individual networks traverse more countries. IP addresses are strongly and deliberately related to network structure. Therefore a system of non-numeric names would be best realized using translations at the edge of networks to addresses that reflect network structure, i.e. they would be best organized in the same way as the public Internet, but this is not the approach taken in TIPHON which assumes the internal independence of each network.

There appears to be little customer demand for migrating telco networks to use non-numeric naming instead of E.164 numbers.

The support of Internet names would require many support systems and related processes to be altered because they are currently based on E.164 numbers. This would require considerable investment.

Non-numeric naming may grow for new services in corporate networks where the context is limited, and it will continue to be used for the Internet, but so far its attractiveness for new public services remains unproven.

History

Document history		
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