Agenda item: 5
Document for: Action, Discussion, Information

Title: User Identification solutions in converging networks
Source: Mike PLUKE, Castle Consulting Ltd. (representing ETSI TC Human Factors)

Purpose of this document

This document gives a very brief overview of the proposed work for the ETSI Specialist Task Force (STF) HL on "User Identification solutions in converging networks". At the meeting I will give a brief presentation related to this topic and try to answer queries you may have about what the work is, why it is taking place and what might be expected to arise from the work.

A key aspect of the work is that all ETSI Technical Bodies that have a potential interest in the topic should be very aware of what is being done and able to influence the direction of the work (within the scope of its Terms of Reference). To ensure that this happens, a Steering Group has been proposed as a key element of the STF's work. Having introduced the STF to you I hope that your Group(s) will be able to choose someone who can become a member of the STF's Steering Group.

Why an STF?

The ever increasing array of communications systems, each with their own means of identifying users (e.g. email addresses, telephone numbers – fixed and mobile, WEB URLs, ICQ identifiers, etc.), led to the feeling that a fresh look at how we identify users was needed. The existing systems originated in an environment very different to the dynamic one we currently find ourselves in – particularly with the mobile 24/7 lifestyle that challenges the capabilities that the original simple telephone numbering systems were designed to provide. An STF to look at the issue from a fresh, very user-centred, viewpoint was felt to be the best vehicle to try to establish an approach that is robust enough to cope both with today's situation and future as yet unforeseen communications environments. An underlying assumption behind this approach is that, at a fundamental level, human communications needs evolve **very** much more slowly than the systems and services that we create to satisfy those needs (changing from generation to generation rather than from day to day).

The work of STF HL

The following text, extracted from CL1975, gives a top-level view of what the STF is proposing to cover:

"The areas to be covered by the STF are:

- to discover and clarify the issues involved in identifying the person with whom a user wishes to communicate (these are the user requirements);
- to identify the human factors issues involved in requesting and using the identity of the person with whom a user wishes to communicate (these are the usability issues);
- to identify the network and service issues to be observed in realising a system to aid the identification of users in future converging networks and telecom/IT services (these are the implementation issues).

Early exploration of the issues indicates that there are potential solutions to aid user identification that require little or no changes to the way in which current numbering and identification mechanisms within networks and the internet currently work. It would be an aim of the work to ensure that solutions that required significant re-engineering of existing networks or of the Internet were avoided at all costs. It is also expected that enhancements to terminals and to peripheral elements of networks may provide many elements of the answer.

Allowing individuals to have responsibility for building and maintaining their own "User Identification profile" will be explored as a potential solution to avoiding complex inter-organisational sharing of customer data and all the security, confidentiality and charging issues that this would raise. The STF would be expected to define the minimum level of such a "User identification profile", thus allowing enhancements to this minimum specification to be offered by third parties in a competitive environment.

In addition to identifying and clearly expressing the requirements for user identification solutions, a number of potential candidate solutions would be proposed and explored. The approach taken would be to identify a "Roadmap" of partial solutions that could be planned and implemented that would lead to a phased approach to meeting the requirements identified by the STF. This roadmap would take into account different scenarios of the future pace of convergence of networks."

European Telecommunications Standards Institute **HF21(99)019**

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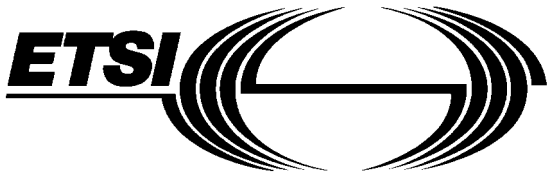

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Foreword

Introduction

The purpose of the work item is stated as:

“To produce guidelines that reflect the user-oriented identification requirements of users of telecommunications systems. They would express implementation free identification capabilities that future systems would need in order to enable users to locate users or services in ways that are natural and meaningful to them. The guidelines would be used by authors of standards to ensure that users’ identification needs are met by systems that follow their standards.”

This document sets out to highlight and discuss some of the issues that are relevant to user-centred identification and provides a basis for further work.

1 Scope

The present document identifies issues on the user-oriented identification requirements of users of telecommunications systems. It expresses implementation free identification capabilities that future systems need in order to enable users to locate other users or services in ways that are natural and meaningful to them. The present document is concerned explicitly with the set-up of communications and not with the content of those communications.

The present document should be used by authors of standards to ensure that users' identification needs are met by systems that follow their standards.

2 References

[1] ITU-T Recommendation E.164: "Numbering plan for the ISDN era".

[2] X400

[3] X500

[4] UMTS MMI Requirements, GSM MoU

[5] The Mobile People Architecture: Stanford University, Technical Report: CSL-TR-99-777; January 1999

[6] CEN 304

3 Definitions and abbreviations

3.1 Definitions

Computer Telephony Integration (CTI): The facility to use a computer to control and monitor a number of telephony functions such as dialling, Calling Line Identification display and telephone number storage.

3.2 Abbreviations

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

CTI	Computer Telephony Integration
GSM	Group System Mobile
IETF	Internet Engineering Task Force
IN	Intelligent Network
ISDN	Integrated Services Digital Network
PBX	Private Branch Exchange
PC	Personal Computer
PSTN	Public Switched Telephone Network
SCP	Service Control Point
UPT	Universal Personal Telecommunications
URL	Universal Resource Locator
WWW	World Wide Web

4 Where is identification now?

4.1 Telephony

In the very earliest days of telephony the user had access to one of the most powerful user interfaces that it is possible to envisage - a voice activated intelligent connection system that could often make use of up-to-date knowledge of the location of the intended user. This person, of course, was the Telephone operator. As the number of telephone subscribers increased the operator could no longer have intimate knowledge of the whereabouts of her subscribers and hence she would have been unable to explain why a call is unanswered. Also the caller would be increasingly unlikely to be successful connected to the required person by just quoting the person's name - other identification information would be needed to resolve potential ambiguities.

Current practice in the user interface to telecommunications systems is based upon taking very low-functionality terminals (telephones containing a keypad with 0-9, * and # keys) as the assumed control device. This leads to control procedures that utilise very long strings of numbers and symbols (e.g. E.164 [1] telephone numbers and supplementary service *# codes).

4.2 The internet & X400

Telephone systems have been around for much longer than the internet. It is interesting to look at how the user interface to internet services differs to that of the telephone system. In the field of person-to-person communication the differences in identification are quite revealing. In telephone systems the remote party is identified by a string of digits that contains little information about the person being contacted. In the internet the standard internet email address (and the World Wide Web (WWW) Universal Resource Locator (URL)) can contain very much more meaningful information - typically the name of the person or organisation being reached and either the organisation type or the country of origin. Where email addresses and URLs are not fully known, search tools exist to aid the user.

The WWW points to some other interesting areas of user interface simplicity. The widespread availability of search tools and simple point-and-click navigation in the WWW contrast with the reliance on directory enquiry systems and *# supplementary service control sequences in telephony. The rapid uptake and short learning curve for the WWW also contrasts with the significant under-use of telephony supplementary services, even those directly paid for by users.

Identification in the X400 [2] email system shares many features with internet email addresses. Both systems allow meaningful naming of individuals/organisations and both share the concept of named domains forming part of the address. Where they differ is that the construction of internet addresses is straightforward as they consist of a simple concatenation of all the elements in a standard order "name@organisation.domain" where "organisation" can often contain more than one element. The range of domains has been chosen to have clearly understandable meanings e.g. country types or types of organisation. Once a specific email address is known it can be used in the same way in all circumstances. In contrast X400 defines domains that can have little significance to users. An administrative domain specifies the administration supplying the X400 service and is an identity element that most users would not find useful. Also in X400 many of the fields are optional and may always need to be used in one X400 identifier and not in another, and may have to specified in one mail system and not in another. The specifiers of X400 expected everyone to have access to X500 [3] directory services to locate mail recipients - in practice only large organisations have such directory services as commercial constraints prevented widespread adoption of public X500 services. As a result of these user interface difficulties (and the lack of X500 services), the much simpler internet email system has largely replaced X400 messaging.

4.3 Developments in telecommunications

There has been very accelerated development in many fields in telecommunications terminals and service capabilities. Many of the easiest alternatives to this basic interface appear in the field of Computer Telephony Integration (CTI). Where the power of a PC is used it becomes possible to have large amounts of locally stored information about known contacts and these can be easily searched and controlled with a computer keyboard, mouse or voice interface.

The developments in the field of mobile telephones have led to many advanced user features including speech control and the flexible programmability of features associated with SIM cards. The danger is that although manufacturers will continue to innovatively introduce features in terminals, the lack of supporting standards in the networks and for

communication between different terminals, will mean that end-users will not obtain the maximum potential benefits that these developments could realise.

There are a number of attempts at integrating intelligence into the network. This then permits more innovative solutions such as voice dialling to be used to simplify the user's task. Most of these initiatives are limited in that they have to be superimposed on a telephone system that uses a very basic numeric identification system to identify individual telephone terminals.

Another significant innovation that is emerging in telecommunications is the concept of connectionless communication delivered directly to the home. This technology would allow a user to have what appears to be a "permanent connection" to a remote person or service but only pay for the actual information that is sent (e.g. the actual time that active speech is taking place) and pay nothing for idle time. Currently users have a model that calling another party involves not only identifying the party with whom they wish to communicate, but also of starting the clock on what can be a costly period during which the conversation must be tailored to make "the best use of time". Identifying the other party in a connectionless environment can be simply the way of defining the person with whom you wish to communicate and nothing else. The cost of conversations in this environment need only be related to the total amount of the person-to-person dialogue and not the length of the time period during which this dialogue takes place. It is clear that a number of different ways for service providers to present telecommunications services and charge for their usage can be greatly expanded in the connectionless world. It is likely that users will need to develop different models than the one they currently have if they are to understand life in this brave new connectionless world.

5 Being prepared

Historically, issues related to the usability of telecommunications services have only been addressed after the services have been fully specified in standards. This order of setting standards has limited the options for improving the usability of current and future telecommunications services.

Developments in computing and communication capabilities are making it much easier to produce terminals, networks and intelligent peripherals that will support significantly better methods for the user to interact with telecommunications services.

If the capabilities required by users are understood in advance, new technical standards can be drafted in a way that ensures that these capabilities can be realised.

6 Key Factors

6.1 Roles and goals

Two key factors that help to determine which identification scheme will be most appropriate in any particular instance are:

- the role of the person(s) and / or organisations with whom you intend to communicate;
- your goal when attempting to communicate.

Where the above two factors are matched communication is likely to be successful, where there is a significant mismatch, communication may be more difficult or it may fail. So what are these two factors?

6.1.1 Roles

Telecommunications users implicitly and/or explicitly declare communication options related to their various roles. Any one user may have a number of possible roles and these roles may vary significantly between users. Some example roles that a fictitious character, "Mark Homely", might have are:

- Mark Homely - individual;
- Member of the Homely family;

- Marketing Manager for Widget Enterprises;
- Chairman of Anytown Tennis Club.

Examples of implicit changes of communication options are:

- when leaving home you automatically declare yourself unavailable in your “member of the Homely family” role if that role is normally associated with access to your home telephone;
- when switching off your mobile phone you declare yourself unavailable in your “individual” role if the mobile telephone is your personal phone, that you normally carry with you and leave switched on;
- users who are unable to read their email when away from the office implicitly declare themselves unavailable in a text communication mode in their working role.

Universal Personal Telecommunications (UPT) and other personal communication control systems allow users to explicitly specify their availability. Where users use such systems in a specific role (i.e. they use such a system in their work role) they are able to exert explicit control over their communication in that role.

Modern working practices such as homeworking and highly mobile users are tending to increase the rapidity with which people’s roles change. There are also trends for calls to fixed office telephones to be diverted to mobile telephones which can lead to some user identification surprises – such as finding that the called user is non-contactable because they are aboard an aeroplane when they would be expected to be contactable at their desk. Private Branch Exchange (PBX) systems are frequently used as a comprehensive organisational communications system and, to a greater or lesser extent, they may be able to effectively handle the mapping of user identification confusions. Another trend that is becoming apparent is that an increasing number of people ignore emails and stored voice messages either because they are overwhelmed by information overload or because they have adopted this strategy as part of a very deliberate time management approach.

6.1.2 Goals

When a user plans to communicate they usually have a clear goal of the person, or organizational function that they wish to contact, the type of communication that they wish to have and, of course, the purpose of the communication. With a single goal of contacting a specific individual the caller will usually take note of that person’s various roles in planning the strategy to use to effect a successful communication. 3 examples of alternative strategies that could be used to satisfy the single goal of having an immediate voice conversation with a close friend are:

1) If it is during office hours the caller will try the friend’s work telephone number.
2) If the person is expected to be on their way home the caller will try the friend’s mobile phone number.
3) If it is later in the evening the caller is likely to assume that the friend has reached home and hence they will try their friend’s home telephone number.
4) If the above strategies have totally failed (i.e. no conversation and no message left), the user will be forced to reformulate their goal. In this case the caller may decide to send a fax to the friend’s home and/or office.

Many of the least successful communications are where a user’s goal is thwarted and they are forced to rapidly adapt to an unintended form of communication. A common cause of thwarted goals is when a caller with the goal of holding a conversation meets an answering machine or voice messaging system. When meeting the unexpected one-way communication system, the caller has to assess whether the purpose of the communication can be furthered by leaving a message for the called party. If the answer is yes, the caller then has to formulate an appropriate message with no opportunity to plan it in advance. Both the inappropriateness of leaving a message and an inability to formulate a suitable message in real-time are probably contributory factors that lead to the high level of slam-downs that are experienced on answering machines and voice messaging systems.

6.2 Identifier specificity versus identity resolution

6.2.1 Precise identification of a location/individual

If it is possible to devise a system that satisfies the ideal of perfectly identifying the required individual or role, many of today's supplementary service and advanced services would be redundant. This ideal would be achieved differently according to the nature of the entity identified.

If the entity being identified were a telephone instrument, the current telephony numbering system would be very accurate - even if not very easy to use. In mobile telephony systems a single terminal is usually associated with a single individual, hence identification systems that identify a terminal are also able to accurately identify an individual. Where the entity being identified is a role that is located at a single telephone instrument (e.g. a simple customer contact number) then the current telephony numbering system would be an accurate means of contacting that entity during its declared hours of operation. In all other cases identification of a terminal may provide a mismatch between the user's goal and the resulting communication.

In a multiple occupation household, there will be a number of individuals who share a single fixed telephone. In this instance there will be a number of potential identities of individuals all directing communication to a single telephone instrument. In a conventional basic telephone network, when someone wishes to call any of the people in that household they will dial the same telephone number. When the call is presented to the telephone the telephone will ring and any one of the people in the household may answer it. Recent advances in telephone services, often based on IN solutions, enable a number of different telephone numbers to be defined for the one fixed telephone location and one of a range of distinctive rings will occur according to which number is called. This solution is a significant attempt to get away from the one identifier to one fixed telephone location but it is far from perfect and practice the independence of the different identities is rarely if ever achieved. For example, various supplementary services such as call diversion applied at the terminal currently associated with any one of the identifiers are likely to affect calls delivered to any of the identifiers.

In their "Mobile People Architecture" [5], Stanford University very properly identify that "People are outsiders in the current communication revolution. Computer hosts, pager terminals, and telephones are identifiable entities throughout the Internet and telephony systems." In their work they Stanford focus on the need to identify and communicate with people. It is hoped that in this document this concept is broadened to cover the need to communicate with individual people, people performing a specific role and people or systems associated with a specific terminal or computer system.

6.2.2 Redirection of calls intended for one identifier to the terminal associated with another identifier

As an alternative to calls going to the terminal directly associated with an identifier, there are an increasing number of instances where the specified identifier is analysed and resolved into another valid identifier which is then contacted. Many current telecommunications developments (including UPT) rely on people informing the telecommunications system of their availability - either by inputting their location via a dedicated user interface or by inserting a personal identification card into an appropriate reader. These systems place a lot of emphasis on people remembering to accurately declare their location. Unless their need to be contacted is very dominant, there is a serious risk that the users of these systems will, from time to time, forget to declare their current location.

In most instances a calling user has a high motivation to locate a called party once they have decided that they need to. It is unlikely that the motivation of the users of UPT-like systems will be as high as that of their callers at any time, whereas it would need to be as high at all times to guarantee that they always remember to keep their location details correct.

Another option to the above personal location services are simple diversion services. These diversions are subject to similar limitations of the user remembering to set and remove the diversions at the appropriate times. In addition, it is only possible to divert calls directed to a specific terminal to another terminal. In the case of shared use of terminals, this may mean that calls intended for other users of the terminal are inappropriately diverted. The impact of supplementary services with identification is dealt with in more detail in clause 7.

6.2.3 Agents

The most general concept that covers the resolution of a specific identifier into the precise communication intended is the concept that software (or even human) agents become involved. These software agents can both act on behalf of the

communication initiator and on behalf of the party with whom the communication is intended. The location of the agents in the network or the terminal is outside the scope of this document. The agents can at one extreme be seen to be the parts of the Public Switched Telephone Network (PSTN) supporting basic supplementary services and at the other extreme potentially co-operating systems of Intelligent Network (IN) Service Control Points (SCP)s, internet routers and distributed applications [5] throughout the internet that might evolve out of the ongoing discussions between the Internet Engineering Task Force (IETF) and the IN Forum and from the planning going on in many other telecommunications and internet bodies.

6.3 Contactability

A key issue in telecommunications, and one that has an impact on identification issues is that of contactability. In general users want to have strict control on their own contactability in terms of defining who can contact them and when they can be contacted. On the other hand, a calling user wants to always be able to contact the person they wish to communicate at any time without fail. Clearly these two requirements are incompatible. In practice many people make use of different identities to help them achieve their objectives. For example:

a) by revealing the identity of their mobile telephone to certain preferred callers, they improve the chance that those callers can contact them when they are away from their normal fixed location;

b) by revealing their home telephone number to certain preferred callers, they allow those callers to call them at any time they are at home even though this would normally be a time that the majority of users would normally expect to be uncontactable by business contacts;

c) by failing to reveal mobile and home numbers, users are effectively restricting the ability of individuals to contact them outside working hours;

d) in order to satisfy their need to contact a difficult to contact business contact when they feel a strong need to, some users may eventually try to contact that person’s mobile or home telephone number even though normal business etiquette would say that such intrusion was unwarranted.

Users can also use supplementary services in conjunction with identification to enhance their ability to control accessibility. For example, in order to increase their chances of receiving calls, users can divert calls to a telephone that is normally only used during working hours to the identifier of a telephone that they are likely to be able to answer. Alternatively a user can restrict their contactability by diverting calls to the identifier of an answering service or voice mailbox.

6.4 Mode of communication

The mode of communication may also have an interaction on the way in which the identity of a communicating party or a service may be expressed. Most of the examples used in this document have, by default, been assumed to be ordinary voice telephony. In this mode, the common expectation is that real-time 2-way communication is the norm and a stored voice service (e.g. a voice mailbox) is the exception. In real-time communication the issue of contactability is of paramount and, at present, the identifier used can have a significant effect on how likely that contact is.

In contrast, in text communication, stored text services are the most common (e.g. email) and real-time communication (e.g. chat systems) the exception. For delivery of messages to a stored service the issue of contactability is likely to be small - as it can normally be assumed that if a correct email address is used the email will be delivered to the recipient’s email system. The issue of whether a recipient reads a stored message may, however, have an identification component. For example, where individuals have multiple email addresses using the one that the recipient reads most often is likely to have significant impact on the likelihood of the recipient becoming aware of the message.

It may be reasonable to assert that the current expectations of type of communication shown in Table 1 predominate.

Table 1: Current expectations of type of communication over communication networks

Communication mode	Predominant type of communication	Secondary type of communication	Further alternative
Speech / audio	Voice telephony	Voicemail	Audio broadcast/multicast stream
Audiovisual	Videotelephony	Video streaming broadcast/multicast	Videogram mail
Text	Email	Web pages	Internet Chat
Communication for deaf people	Text telephony	Signing via enhanced videotelphony	Internet Chat
Information on paper	Fax	Postal service	Scanned Email attachment

If the above assertions are accepted the default communication types shown in Table 2 can be infered.

Table 2: Communication type specification and defaults

Communication mode	Default communication type	Communication types needing specification
Speech / audio	Realtime dialogue	Messaging, Broadcast/Multicast
Audiovisual	Realtime dialogue	Messaging, Broadcast/Multicast
Text	Messaging	Realtime dialogue, Broadcast/Multicast

These defaults, if implemented, could reside in hardware/software in the sending user's communication terminal. The specification of the "non-standard" communication could be done by the user interacting with the terminal or network software. Whether or not the concept and detail of these default communication types for different communication modes is accepted, the above scenarios reveal the potential usefulness of specifying in the communication set-up the intended communication type. The declaration of this intended communication type could be done in two possible ways:

- Declaration as part of the identification information – "Dialogue with AnyPerson@Home";
- Signalling during communication setup – "Call AnyPerson@Home" with the callers terminal signalling to the network the desire for a realtime dialogue.

Both of these scenarios have merits and disadvantages. The declaration in the identification information gives the greatest flexibility for terminals as either the terminal or the user can generate the augmented identifier, but leads to longer identifiers. The declaration in the signalling keeps identifiers simpler but places new requirements on all signalling systems. If the identification option is selected this new identification allows the integration of the request for a specific communication type into a single identification scheme. This is an improvement over the current situation where different communication modes (e.g. voice and text) and different types of communication mode (e.g. realtime dialogue and messaging) require the use of totally independent and radically different identification schemes. Examples of current incompatible identification schemes are:

- Realtime voice communication – multiple E.164 telephone numbers per person;
- Text messaging – internet email addresses;
- Text / Multimedia realtime communication – ICQ identifiers.

Where multimedia terminals with varied capabilities exists, awareness of the capabilities of the intended recipient can be very important. Building some information about the terminal capabilities into the identification information could have some merit in these circumstances. This might prove particularly effective if communicating with unknown recipients. An example of where terminal capabilities are associated with identities is in Microsoft NetMeeting where, in a chat system context, users can scan a list of recipients to see those that have similar terminal capabilities to their own terminal (users may consider it pointless chatting with a person that has only a text communication capability if they have audio, video and shared whiteboarding capabilities available).

In shared environment virtual reality environments, an identifier may need to convey information about complex characteristics of the environment. As a somewhat bizarre example, pacifists would need to know the characteristics of a shared environment to avoid entering a virtual war zone.

Increasingly technological solutions to some of the issues of incompatible communication modes are being over come by the use of mode conversion software agents in the network or terminal. Thus it is now perfectly possible to dictate an email message over a telephone and have it delivered as text or a speech file to a terminal according to the capabilities of the receiving terminal. Similarly, it is now common that systems that text email messages to be retrieved in a spoken form from an ordinary telephone. For this reason the media incompatibilities between the receiving and sending terminals should not be a factor that is necessarily embedded in the identifier. It is not necessary to have a separate identifier for a persons voice mailbox and their text mailbox and their fax. What these media conversions cannot address is incompatibilities between the sender's intention and the realtime or stored messaging capabilities of the receiver's terminal. If the user's intention is to have a realtime dialogue with the receiver, the delivery of a message to the receiver's mailbox, whether in spoken or written form has not achieved that intention. Similarly if the intention of the sender is to send a message to the receiver they may not wish to be connected directly to the receiver in realtime if the receiver has no message storage facility.

Another development that aids users manage a number of separate communications systems is the provision of a common mailbox. This mailbox can hold all of the text, voice, and image/fax communications originating from a range of separate and potential incompatible systems.

6.5 Terminal types

The terminal type of the originating and receiving terminals can have a profound effect on the impact that identification may have on the user. Taking the scenario quoted in sub-clause 6.1.2, it is possible to conceive of a terminal that had the rules relating to the likelihood of contacting a person at a specific location built into it (either manually programmed in or "learned" from an analysis of previous calling patterns. With such a terminal, it would only be necessary to select the recipient's name and the terminal would determine the correct identifier to use and then dial it. In the much more common instance of telephones that allow the local storage of telephone numbers, the complexity of the actual recipient identifier becomes irrelevant as the user is able to use a potentially very simple mechanism to access and use that identifier.

Almost all mobile telephones have some form of telephone number storage and retrieval and hence they minimise the number of times that a user has to manually remember and enter a long telephone number.

Where the recipient's telephone has more sophisticated facilities, the task of choosing and using the correct identifier to contact that person reduces considerably. For example, if the recipient's telephone has a message recording and forwarding capability built into it and switched on, an attempt to contact that single telephone number should be much more likely to result in a favourable outcome than if using the identifier resulted in the call being routed to a simple, potentially unattended, telephone.

6.6 Switched connection vs. Permanent connection

Many of the identification examples used in the document relate to switched telephony identification. With systems like the internet, the interchange of information between two parties does not need to be accompanied by a lengthy call-setup and call release procedure. Such systems would, potentially, more easily handle continued communication with an entity that had a rapidly varying identifier (were that to have some useful application at some time). What is also clear is that in situations like the internet, the linkage between the content and structuring of a telephone number and the routing used to contact it does not exist in the case of, for instance, an internet URL.

6.8 Purpose of communication

The purpose of the communication will tend to favour certain types of identifier. Each of the following examples might favour one form of identification over other alternatives:

- Person to person (specific individual): Identifier - Mike Pluke
- Person to role (technical support, etc.): Identifier - Chairman of Ipswich Tennis Club, tech_support@Castle_Consulting
- Person to company (anyone in the company): Identifier - Castle_Consulting
- Person to group location (home, office, etc.): Identifier - 76 Cowper Street

- Person to group of people: Identifier - (TC-HF or Fred + Bill + Sue + …)

One example of a specialised and well proven identification scheme that favours the accurate and simple location of specific buildings is the postal address. It is frequently true that a property can be easily located with the use of a slightly incomplete and/or slightly incorrect address. A slightly incorrect or incomplete telephone number will never lead to a satisfactory call set-up.

6.9 Multicast and broadcast

The identification issues related to multicast and broadcast communication will also be likely to have some unique requirements. At present these requirements have not been studied in detail. In particular, as broadcast communication is being sent to potentially unknown destinations, is there any user requirements for identification in this context.

6.10 Aliases

Aliases can be used as an important method of enhancing the effectiveness of identification systems. If there are a number of aliases for a user identifier, then the likelihood that a user will be familiar with one of these aliases increases and hence the probability that they will be able to successfully communicate with the intended user also increases.

7 Interaction between method of identification, supplementary services and telecommunications technology

7.1 The present position

At present there is a matching between the type of identifier and the technology - telephony, internet, etc. From a Human Factors perspective there appears to be no logic to this. As the previous sections of the document suggest, a matching between the type of identifier and the purpose of the communication appears to be a much better model. If it is intended to communicate with a fixed location, then each fixed location normally has a postal address, and hence this would be a good candidate for this task - whereas it would be most inappropriate to identify a mobile phone. Similarly, an email address is well suited to identifying an individual, but it would form a poor way of identifying a package intended for a domestic house.

7.2 Convergence

It should be considered that existing telecommunications technologies have inherent benefits in supporting different user communication needs. Some very obvious examples are:

- Fixed network systems provide a natural mechanism for satisfying the request “I want to communicate with this particular location and I don’t care who I speak to”;
- Mobile systems provide a natural mechanism for satisfying the request “I want to speak to this particular person, no matter where they are currently located”;
- Neither of the above systems has the inherent ability to directly satisfy the request that the other one easily satisfies.

There is an increasing trend for the convergence of differing technologies. The convergence of fixed and mobile communications systems has the potential to combine the strengths of both of these technologies as outlined above. The convergence of telephony and the internet also has the potential to combine the benefits of both of these technologies. However, in all cases where technologies are combined, the issues of resolving the potentially large differences between the user identification systems need to be addressed. Creating new user identification systems for the converged communication systems presents an opportunity to enhance the capability beyond that of the pre-existing communication systems.

7.3 Supplementary Services

In order to satisfy the maximum number of user communication needs, supplementary services are introduced to the networks to allow users to modify the natural behaviour provided by that network. To enable someone in a fixed network to ensure that people are able to satisfy the "I want to speak to this particular person, no matter where they are currently located" request the user has to activate the call forwarding (call diversion) service to their new location or to a mobile telephone.

The application of the call forwarding supplementary service can, unfortunately, have the side effect that calls that were intended for other people at the fixed location will also have their calls forwarded to the new location or telephone. This would mean that a caller trying to reach someone other than the person who activated the call forwarding supplementary service would reach a person other than the one they wished to contact. Also someone trying to reach **anyone** located at the original location would also not have their request satisfied.

The above scenarios illustrate the fact that the application of supplementary services to basic networks is a crude mechanism to use to help user satisfy their specific communication needs.

Table 3 gives an overview of some potential interactions between the intended type of communication and supplementary services for different types of technology.

Table 3: Interaction of intended type of communication and the use of supplementary services

Item	Service	Originator Technology	Destination Technology	Destination Supplementary Service that may be needed	Destination Supplementary Service that will undermine the purpose of the call	Consequences of unsuccessful connection
1	Person to person	Unimportant	PSTN, ISDN	Diversion	Diversion	Wrong person receives call
		Unimportant	GSM	None	Diversion	Wrong person receives call
		Unimportant	Email	Mail redirect	None	Mail does not get read
		Unimportant	Pager	None	None	Message not delivered
2	Person to fixed location	Unimportant	PSTN, ISDN	None	Diversion	A person at the wrong location is contacted
		Unimportant	GSM	Diversion	Any	A person at the wrong location is contacted
		Unimportant	Email	None	Mail redirect	A person at the wrong location is contacted
3	Service to person (e.g. email receipt notification)	Unimportant	PSTN, ISDN	Diversion	Diversion	Wrong person is notified
		Unimportant	GSM	None	Diversion	Wrong person is notified
		Unimportant	Email	None	Mail redirect	Target user does not receive the email
4	Person to service (e.g. voice banking service, email)	Unimportant	Unimportant	None	None	None
5	Person to specified role (e.g. Computer Help Desk)	Unimportant	Person serving the role will use a specific terminal technology	Depends on the technology used (See Items 1-3)	Depends on the technology used (See Items 1-3)	Depends on the technology used (See items 1-3)

The desired result of the use of any new identification scheme is that actions taken by the application of supplementary services at a called terminal would have the very precise and predictable results that the person applying the supplementary service intended. The issue of how, if at all, any requested call set-up might override the supplementary service that the called party had set is a matter for further study.

7.4 Specialised identification schemes

If it is accepted that a calling user would like to be able to unambiguously specify what communication they desire, then the identification scheme(s) would seem to be the place where support for making specific requests resides. It would be desirable that a user could use the identification scheme to make requests such as those used as examples in sub-clause 7.1 (i.e. “I want to communicate with this particular location and I don’t care who I speak to” and “I want to speak to this particular person, no matter where they are currently located”).

If the identification scheme supports requests such as those quoted above, then the problem presented to the designers of future network systems is how to practically interpret the identifier to accurately meet the users request. A difficult case would be where an “I want to communicate with this particular location and I don’t care who I speak to” request is made to a traditional fixed network where the terminal at that requested location has a call forwarding supplementary service activated. To achieve the desired result it would be necessary to override the call forwarding and deliver the call to the requested terminal. At present this capability may well be unavailable. If this is so, then there is a need to provide feedback to the user that their request cannot be met and to offer them alternatives (e.g. allow the call to be forwarded or terminate the call attempt).

The above example illustrates the close interaction with the nature of an identification system and the capabilities of the underlying network. This interaction is inevitable but should not be used as an excuse for not identifying the need for identification systems that currently present significant implementation challenges. The specification of the identification system should be seen as a statement of a user requirement and the technical task will then be to identify practical mechanisms that enable a the system to deliver something that gets as close as possible to meeting that user requirement.

7.5 Ownership of call control

In sub-clause 7.2 it was shown how supplementary services can be used by users to modify the behaviour of the telecommunications system to meet specific user needs. In sub-clause 7.3 it was shown how specialised identification schemes can be used by users to modify the behaviour of the telecommunications system to meet other specific user needs.

These two approaches differ in one very specific aspect - supplementary services most frequently allow called users to determine how calls to them should be handled whereas identification systems have the potential to place the control of call delivery very clearly in the hands of the calling party. A very important issue that needs to be considered in the specification of improved identification schemes is the impact that the scheme will have on the ownership of call control and whether the changes that are implied are desirable or undesirable. It will be necessary to look at the relative priority of the needs of the called user and the calling user in determining how new identification schemes and supplementary services should interact.

There are even cases where the call-setup is controlled by a third party. This third party might be a service provider, or it might be a secretary who is operating a “boss-secretary” telephone arrangement. In these cases, the negotiation between any potentially conflicting requirements of the calling and called party is at the discretion of the third party.

8 Areas of potential concern

There are a number areas of concern that need to be addressed in proposing a new method of user identification. Some known concerns are listed below:

1 If the specificity of the identifier is increased then there is a strong danger that the length of the identifier will have to be increased in order to incorporate the additional detail required. If the identifier is composed of meaningful words then the load on the users memory will be significantly less than if the identifier was composed of a similar length string of digits.

2 If the length of the identifier is increased then the risk of an error being made in keying this identifier into a communication system increases. To avoid an increase in the number of call set-up failures, a means of handling errors made in entering the identifier will be needed. Such error handling systems should minimise the load put on the user during the process of correcting the error.

3 Any text based alphanumeric identification system should be able to cope with all European alphabets and preferably a wider range of languages [6]. Communication systems should attempt to resolve alternative presentations of these addresses where, for example, a user has entered an identifier with no accented characters where the original identifier contained them.

9 Conclusion

ETSI needs to identify bodies throughout the world that are explicitly or implicitly specifying future identification schemes and bring to their attention all the user oriented aspects of identification schemes that may be required. This document begins to raise issues and potential requirements but a detailed analysis of the user's requirements of a universal identification scheme needs to take place urgently within ETSI so that it can take an authoritative position in dialogues with the relevant bodies in highlighting the important issues involved.

History

Document history		
0.1	25.03.98	Scope, table of contents and initial material for discussion
0.2	15.09.98	Title changed, additional material on the interaction between technologies and supplementary services, minor additions and amendments.
1.0	16.03.99	Stable draft for approval
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