



Commission for
Communications Regulation

Response to Consultation

ENUM: Ireland's Next Steps

| | |
|---------------------|------------------------|
| Document No: | 03/96 |
| Date: | 07, August 2003 |

Contents

| | | |
|--------|-------------------------------------------------------------------------|----|
| 1 | Foreword [by the Chairperson] | 3 |
| 2 | Executive Summary | 5 |
| 3 | Introduction | 7 |
| 4 | Discussion Issues | 9 |
| 4.0 | OVERALL OBSERVATIONS | 9 |
| 4.1 | QUESTIONS ON GENERAL ISSUES SURROUNDING ENUM | 9 |
| 4.1.1 | <i>Data Confidentiality & hijacking</i> | 9 |
| 4.1.2 | <i>Views of Respondents</i> | 9 |
| 4.1.3 | <i>Commission's Position</i> | 10 |
| 4.1.4 | <i>Demand for E.164 Telephone Numbers</i> | 10 |
| 4.1.5 | <i>Views of Respondents</i> | 10 |
| 4.1.6 | <i>Commissions's Position</i> | 10 |
| 4.1.7 | <i>Parallel ENUMs and Usage of E.164 Numbers</i> | 11 |
| 4.1.8 | <i>Views of Respondents</i> | 12 |
| 4.1.9 | <i>Commissions's Position</i> | 12 |
| 4.1.10 | <i>E.164 Number Types Permitted to Register</i> | 12 |
| 4.1.11 | <i>Views of Respondents</i> | 12 |
| 4.1.12 | <i>Commissions's Position</i> | 13 |
| 4.1.13 | <i>To Participate Now, or Not?</i> | 13 |
| 4.1.14 | <i>Views of Respondents</i> | 14 |
| 4.1.15 | <i>Commissions's Position</i> | 14 |
| 4.2 | QUESTIONS SPECIFIC TO A TRIAL | 15 |
| 4.2.1 | <i>Monopolies and the Players within an Irish ENUM System</i> | 15 |
| 4.2.2 | <i>Views of Respondents on monopolies & players</i> | 16 |
| 4.2.3 | <i>Commissions's Position</i> | 16 |
| 4.2.4 | <i>Views of Respondents on Delegation of Tier 1 Technical Operation</i> | 16 |
| 4.2.5 | <i>Commissions's Position</i> | 17 |
| 4.2.6 | <i>Views of Respondents on Operation of Tier 2 by Tier 1 Operator</i> | 17 |
| 4.2.7 | <i>Commissions's Position</i> | 17 |
| 4.2.8 | <i>Architecture of an Irish ENUM Trial</i> | 18 |
| 4.2.9 | <i>Views of Respondents</i> | 18 |
| 4.2.10 | <i>Commissions's Position</i> | 18 |
| 4.2.11 | <i>Irish ENUM Entities for Trial Purposes</i> | 19 |
| 4.2.12 | <i>Views of Respondents about Selection of Tier 2 Operators</i> | 19 |
| 4.2.13 | <i>Commissions's Position</i> | 19 |
| 4.2.14 | <i>Views of Respondents on Selection of Tier 2 Registrars</i> | 19 |
| 4.2.15 | <i>Commissions's Position</i> | 20 |
| 4.2.16 | <i>Measuring Interest in an ENUM Trial</i> | 20 |
| 4.2.17 | <i>Views of Respondents on Importance of ENUM</i> | 20 |
| 4.2.18 | <i>Commissions's Position</i> | 21 |
| 4.2.19 | <i>Views of Respondents on Integration into wider European Trials</i> | 21 |
| 4.2.20 | <i>Commissions's Position</i> | 21 |
| 4.2.21 | <i>Views of Respondents on using Spare Capacity in Other Countries</i> | 22 |
| 4.2.22 | <i>Commissions's Position</i> | 22 |
| 4.2.23 | <i>Views of Respondents on their Own Participation in a Trial</i> | 22 |
| 4.2.24 | <i>Commissions's Position</i> | 23 |
| 4.2.25 | <i>Respondents Ability to Provide Trial Users & Applications</i> | 23 |
| 4.2.26 | <i>Commissions's Position</i> | 23 |
| 4.2.27 | <i>Views of Respondents on Trial Parameters and Issues</i> | 24 |
| 4.2.28 | <i>Commissions's Position</i> | 24 |
| 4.2.29 | <i>Views of Respondents on Participation in a Forum</i> | 24 |
| 4.2.30 | <i>Commissions's Position</i> | 25 |

ENUM: The Next Steps, in Ireland

| | | |
|---|----------------------------------------|----|
| 5 | Next Steps | 26 |
| | Appendix A – Description of ENUM | 27 |
| | Appendix B – List of Key Actions..... | 31 |

1 Foreword [by the Chairperson]

Even though the ENUM protocol is based upon a relatively simple algorithm which most people would readily understand, its practical implementation as an advanced telecommunications service involves a great deal of technical complexity. Furthermore, behind the technical concepts lie a host of other even deeper issues that touch on national sovereignty, commercial viability, data integrity, data confidentiality etc. Many countries have therefore already established or are preparing to undertake ENUM trials to both clarify some of these uncertainties and to identify what the potential opportunities may be. Given the significance of the ICT sector in Ireland it is important that we remain in the vanguard of these developments. Furthermore, it is important that Irish consumers should receive whatever benefits ENUM may bring, as early as possible.

All interested parties were invited to express their views on ENUM and I am happy to see that the respondents cover the complete industry spectrum from the telephony and data worlds to the Internet and IT realms. While no specific consumer viewpoints were received, this is probably a reflection of the complexity of the issues covered in the consultation. However given the potential impact of ENUM, it will be a critical part of the Forums task going forward to ensure that the consumer viewpoint is expressed and integrated into the process.

ComReg has undertaken this ENUM initiative in order to encourage efficient investment in advanced telecommunications infrastructure by Irish industry and as part of its role of promoting innovative solutions that contribute to that end. It is my view that the widespread take-up of ENUM services could very significantly enhance the general inter-operability of trans-national services and improve end-to-end connectivity¹. That represents an important contribution to promotion of the European Internal market. However, while we will continue to provide practical ongoing support and encouragement, I nevertheless believe that the main driving force and motivation for moving rapidly forward on ENUM must now stem from industry itself.

There is little doubt about the potential of ENUM, but many uncertainties still exist. Nevertheless, being at the forefront of this development should be highly advantageous, particularly for the innovative sectors of industry. ENUM can also be expected to encourage competition and thereby bring important benefits to consumers. In recognition of these factors, the Department of Communications, Marine & Natural Resources has lent its support to an initiative to be taken by ComReg in the form of an industry ENUM trial, by obtaining delegation from the ITU-T of the Tier 1 function, which it is prepared to sub-delegate for the duration of the trial. The consultation response leaves no room for doubt about industry's wish to proceed with a trial and in view of the potential consumer benefits, ComReg is pleased to lend its full support to this. The way is therefore now clear to move ahead

¹ Encouraging efficient and innovative investment and encouraging interoperability of transnational services and end-to-end connectivity fall within the objectives set down for ComReg in the Communications Regulation Act, 2002.

ENUM: The Next Steps, in Ireland

and to use the trial as a vehicle to establish precisely what ENUM can offer and how best to go about maximising whatever commercial opportunities may exist while also minimising any of the challenges.

Finally, I want to thank all those who lent their considerable expertise to providing us with informed opinions in their consultation responses. The viewpoints expressed were not only clearly in favour of an ENUM trial, but also sought the setting up of an industry forum to give proper guidance on its design and implementation. The consultation respondents already encompass the main types of expertise needed to ensure success in the trial but we shall seek to ensure other interested entities are also given the opportunity to participate; I have little doubt that we will indeed be successful and make a useful contribution to the sum of ENUM knowledge while also preparing industry for this emerging convergence world. In that respect, and returning to my remark about consumers above, it is vital to now meaningfully involve consumer representatives and the Data Protection Commissioner in all future work in this area. ENUM, based as it is on handling of personal customer data, raises many important questions that demand strong consumer input. We need to be certain, going forward, that the potentially significant benefits of ENUM are not gained at the cost of weakening consumer protections.

Thank you once again for your submissions.



**Etais Doyle,
Commissioner.**

2 Executive Summary

In March 2003, ComReg opened a public consultation² aimed at determining what would be an appropriate response to the emerging new technology known as ENUM³, and drawing attention to initiatives being taken – mainly in the form of trials – in other countries⁴. The consultation document provided some tutorial information on the ENUM protocol itself as well as information on how it is implemented in practice. However, this background material was necessarily limited as the document's main focus was on a series of 20 questions designed to elicit viewpoints on how ComReg should react to ENUM.

Responses were received from telecommunications operators, both mobile and fixed-line, from an Internet registry operator and from Internet/IT service provider organisations and while the total number was small, this degree of coverage should be considered very satisfactory. It is indeed representative of all the main areas except for consumers and data protection bodies. However, because the ENUM protocol is oriented towards provision of personal user data (i.e. contact addresses of various kinds) it is clear that special efforts must be made to ensure the latter are fully represented in all future steps.

Readers were asked whether an Irish ENUM trial is needed and various optional approaches to such a trial were offered for their consideration. These covered scenarios involving other countries trials as well as trial models defined by ETSI⁵. Their answers were generally quite unambiguous and made it clear that they strongly support a trial, principally as a means for clarifying ENUM and its potential and in some cases the possible threats it may pose for their organisations. Their responses also indicated that a full trial should be developed here rather than simply 'piggy-backing' on another country's trial although clearly we should endeavour to glean whatever data is to hand from their experiences. The trial should follow the single golden tree approach and the ETSI Example 3 was the preferred model. ComReg has decided to support an Irish ENUM trial and it is understood that the Department of Communications, Marine & Natural Resources is also lending its support by offering delegation of the Irish Tier 1 Registry for the duration of the trial.

Responses also showed there is a degree of uncertainty about how best to respond to ENUM and about the issues it opens up (e.g. data confidentiality, opportunities, threats, types of services etc.) and therefore there was strong support for the setting up of an industry forum. This body would take responsibility for design and implementation of the trial including its timeline, ensure it meets the needs of industry and consumers, monitor its consumption of resources to ensure efficient and

² Reference ComReg document 03/36.

³ ENUM is said to stand for Electronic Numbering, though other suggestions that have been made include tElephone NUmber Mapping, e164 Number Mapping, tElephone Number – URI Mapping, Enhancement of NUmbering and naMing.

⁴ It should be noted that since document 03/36 was published, information has emerged that in addition to the countries listed in its Section 5, Italy has also now undertaken a trial.

⁵ The European Telecommunications Standards Institute

ENUM: The Next Steps, in Ireland

economical performance, and at the end it would deliver a report describing what was achieved and learnt. ComReg has decided to support the setting up of this forum, to be known as the ENUM Forum, and will provide it with secretariat and meeting facilities. ComReg will hold discussions with the Department of Communications, Marine & Natural Resources before selecting a chairperson from either ComReg itself or the Department, or from some independent third party.

The trial will inevitably consume additional resources and some respondents made strong representations that these should be carefully controlled and distributed fairly. ComReg believes, on the basis of this consultation, that individual industry participants may make key relevant facilities available without cost, as part of their individual contributions to the Irish trial but this would involve acceptance of their roles by the other trial participants. In any case, ComReg proposes that each trial participant should fully fund its own involvement or obtain corresponding external sponsorship to pay for its costs. Such matters can best be discussed within the ENUM Forum itself, once it has been formed, though it is important for speedy decisions to then be made on such fundamental issues.

ComReg is aiming for a start-up meeting of the ENUM Forum during the second week of September, with a follow-on meeting to take place within a further two weeks. All potential participants are therefore asked to make their preparations – including clarification of their corporate positions regarding resources to be committed to the trial – during the intervening period, so that the initial meetings can deal decisively with the fundamental issues, leaving later meetings free to address implementation.

No deadline for completion of the Irish trial is being set down by ComReg as this involves a lot of uncertainty related to the precise scope and content of Irish trial, which are to be decided by the ENUM Forum. However, in line with the more limited trials being carried out elsewhere, ComReg would expect that around six months will be necessary.

3 Introduction

ENUM is a protocol that maps a customer's telephone number into the Internet domain name system, using a simple algorithm defined by the IETF⁶, and then uses that number as a single gateway to the customer using any one of a whole range of communications mechanisms. If widely adopted, ENUM potentially offers a mechanism to contact anybody, anywhere, on the communications terminal and using the communications service that is most efficient or convenient for both parties. ENUM is being studied in many countries at present and industry trials are being carried out in some of these, with the aim of understanding what is involved in bringing ENUM-based services into operation and what are the opportunities and practical challenges it presents.

ENUM is fundamentally based on the use of the E.164 numbering system (widely recognised for its use as the basis of telephony numbering), which is regulated in Ireland by ComReg. A key function of that regulation is ensuring adequate numbers of all types remain constantly available for new users and services and consequently the need for number changes – which tend to be very costly – is minimised. The emergence of ENUM offers an opportunity to leverage the national numbering plan to enhance customer convenience, gain economic advantage and improve interoperability of services, though it also presents a potential threat if unplanned demand surges occur in respect of numbers⁷.

To ensure that industry can be at the forefront of any general uptake of ENUM, ComReg opened a public consultation on the subject on 26 March⁸ and invited responses from all interested parties. This was intended to provide guidance on whether sufficient interest in ENUM exists in Ireland to take further steps towards its implementation, at least up to the stage of carrying out a trial of the technology. If sufficient support existed for a trial then the consultation should provide further guidance on the actual trial structure to support the taking of appropriate steps in that direction.

Seven organisations responded to the consultation, as listed below. Six of these were fully detailed responses, while the seventh (O₂) took the form of a more general expression of support for ComReg's initiative in researching the need for action on ENUM; it also confirmed that O₂ wishes to see an industry forum set up and would participate in it. The consultation response was unambiguously in favour of an Irish ENUM trial being carried out, an industry forum being set up to oversee this and appropriate safeguards being incorporated in respect of data integrity. The identities of respondents are shown in the table below.

⁶ Internet Engineering Task Force, the technical body that develops Internet standards.

⁷ ComReg's statutory objectives include *inter alia* the efficient and effective management of the numbering resource and also encouragement of the interoperability of trans-national services and end-to-end connectivity [Communications Regulation Act' 2002].

⁸ See ComReg document 03/36 "ENUM: Accessing Multiple Customer Services Through Telephone Numbers".

ENUM: The Next Steps, in Ireland

List of Respondents:

| | |
|------------------------|--------------------------------------|
| Afilias Limited | Provider of global registry services |
| Data Electronics (DEG) | Communications services management |
| <i>eircom</i> | Fixed network operator |
| Esat BT | Fixed network operator |
| mQuery | Mobile applications provider |
| O ₂ | Mobile network operator |
| Vodafone | Mobile network operator |

4 Discussion Issues

4.0 Overall Observations

Two key outcomes of this consultation process are that:

- a) a trial of ENUM should be carried out (see 4.1.15 below); and
- b) an ENUM forum should be set up to guide the processes of setting up and implementing the trial (also in 4.1.15 below).

These decisions and the reasons leading up to them are discussed in detail at individual sub-sections in this chapter but it is necessary to approach the earlier consultation questions below with this overall outcome of the consultation already in mind.

4.1 Questions on General Issues Surrounding ENUM

4.1.1 Data Confidentiality & hijacking

ComReg 03/36 discusses data confidentiality and certain abuses that can occur in respect of ENUM, even when the opt-in principle is followed. It is difficult to totally prevent such abuses but if they aren't tackled then the growth of ENUM will be inhibited.

Section 2.3.2 addresses hijacking, which is a more serious type of ENUM abuse, though it is easier to see ways of tackling this with careful controls by the Registrar (who authenticates ENUM applicants) as well as by appropriate network regulation of service providers/operators. Nevertheless comments and suggestions for preventing or tackling these abuses were welcomed.

Q. 1. Have you suggestions for avoiding or minimising the above abuses in Irish ENUM implementations, while placing the least barriers in the way of the emergence of ENUM?

4.1.2 Views of Respondents

It was noticeable throughout all responses how much emphasis was placed on data security and prevention of abuse and this could be considered a main focus of respondents concerns. Learning from the results of trials carried out elsewhere was one recommendation and in that respect one respondent noted that nine of the twelve recommendations in the first report from the Dutch ENUM group concerned Data Protection. The respondent felt these recommendations should be built-into any Irish trial.

One respondent suggested that the customer/number authentication process could be delegated to trusted third parties (TTP) authorised to obtain the necessary information (e.g. from Telecoms Operators) while another felt it was essential that ComReg should oversee development and implementation of this process to minimise abuse. Two emphasised that participation or input of the Office of the Data Protection Commissioner (ODPC) was desirable to prevent or minimise abuse while one of these also felt that Data controllers and registrars should be obliged to disclose how customer information will be used.

4.1.3 Commission's Position

ComReg agrees that protection of customer data and effective authentication of applicants opting into the system must be at the core of ENUM. Adherence to DP legislation and careful selection of authentication bodies will therefore be important and these matters must be carefully considered in the planned trial implementations. ComReg agrees that the Recommendations of the Dutch ENUM Group can form a good starting point for further considerations in Ireland, while other key studies⁹ can supplement this to ensure that Irish approaches follow the best possible routes to a secure and trustworthy ENUM implementation. The input of the Data Protection Commissioner and consumer groups will also be sought at all relevant stages going forward.

4.1.4 Demand for E.164 Telephone Numbers

ComReg 03/36 suggested that ENUM, of itself, should bring no additional need for numbers but indirect consequences of ENUM and/or other IP services could conspire to “spring” a sudden unexpected demand. In addition, suggestions have been made in some fora for setting aside dedicated “ENUM ranges” (to improve look-up efficiency etc). ComReg is unaware of any imminent danger from this scenario but if a real risk arises then our shortage of completely empty number ranges, coupled with the long provisioning timescale for number recovery, could present difficulties. In the past, consideration was given to setting aside a special range of numbers for IP-related applications and ComReg proposed that it could be appropriate to activate such a plan at this stage - for IP and ENUM - if signs of demand for such services start to appear.

Q. 2. Do you agree that there is no imminent threat of undue demand for numbers arising from ENUM (or other IP services)? If you disagree, please explain and – if possible – try to indicate the scale of the demand.

4.1.5 Views of Respondents

Respondents were unclear about whether ENUM might impact on demand for numbers, with one noting that this issue is outside the scope of ENUM *per se*.

4.1.6 Commissions's Position

ComReg agrees this is not a specific ENUM concern, though it is one of concern to ComReg, as guardian of the numbering resource. Some sources¹⁰ see a clear need for numbers to be set aside purely for ENUM purposes and in terms that suggest a possibly very significant demand arising. In most cases, the need could probably be met by a non-geographic number which should not present difficulties but many complicated scenarios could arise:

⁹ See for example the excellent analysis from the Center for Democracy & Technology on the ITU-T web site <http://www.itu.int/osg/spu/enum/index.html>: “Enum: Mapping Telephone Numbers Onto The Internet: Potential Benefits with Public Policy Risks”

¹⁰ See for example P23 of “ENUM: Mapping Telephone Numbers onto the Internet” from the Center for Democracy & Technology of April 2003.

ENUM: The Next Steps, in Ireland

- New need to retain numbers for ENUM purposes when lines are cancelled;
- ENUM-only numbers for potential users who have no fixed/mobile line of their own;
- ENUM-only numbers for additional family members (e.g. with email or SIP/VoIP addresses but no separate phone);
- Additional ENUM-only (non-dialable) number where an ex-directory user is prepared to be contactable by other means, such as email.

Many of the potential scenarios could be controversial (e.g. the non-dialable aspect) but the fact they are already being discussed (e.g. see document mentioned in footnote 10) means that at least some of them may have to be considered in due course. ComReg will therefore draft a default numbering strategy to respond to requests for IP and ENUM numbers and will discuss this with the Numbering Advisory Panel (NAP). *Note: Such a strategy can only be considered as a default plan as it is still too early to have a clear view about which scenarios and requests will really arise.*

4.1.7 Parallel ENUMs and Usage of E.164 Numbers

It is proposed in ComReg 03/36 that public ENUM in Ireland should be based on the architectural structure of a single ENUM tree, in line with the preferred external trend towards a single international ‘golden tree’ (i.e. whether or not parallel trees do appear in certain jurisdictions). Furthermore, it is proposed that each Irish E.164 telephone number should only be permitted to be populated into a single public “3.5.3” Tier 2 Register database to avoid ambiguous situations. If they are populated into private ENUM databases – whether in Ireland or abroad then those databases should not be accessible by any public DNS query.

Note: A “3.5.3” public ENUM service could not be provided elsewhere without Irish approval, though it might be possible for “3.5.3-like” services to be offered from anywhere (e.g. “<Tel No>.353.e164.arp”); consequently any ENUM rules should also seek to restrict number-holders from simultaneous participation in these and in the authentic “3.5.3” ENUM tree.

Q. 3. Do you agree that Ireland’s participation in public ENUM should avoid undue complexity by following the single tree approach at national level (i.e. only one “3.5.3” Tier 1 Registry branching to one or more Tier 2 Nameservers)¹¹? If you disagree, please explain your concerns and/or suggest alternatives.

¹¹ Note: This would mean that each Irish E.164 number could only be populated into a single Tier 1 Registry and a single Tier 2 Nameserver that are publicly accessible though there is no reason why it couldn’t also be populated into a totally private ENUM database. In consequence, no ENUM query of the number should be able to return more than one set of NAPTR records.

4.1.8 Views of Respondents

There was complete agreement on the single tree approach, with one respondent noting that this also brings an obligation to ensure the Tier 1 operator must operate transparently so it cannot inhibit the benefits of ENUM to Ireland. Another respondent pointed out the advantages the single tree approach brings, of maintaining numbering plan integrity and minimising the volume of data in routing tables. Two respondents added remarks signifying their belief in the need for competition at lower layers.

4.1.9 Commissions's Position

ComReg agrees that the single golden tree is the right approach and the Irish trial will be based on this.

4.1.10 E.164 Number Types Permitted to Register

ENUM can be used with E.164 telephone numbers of all kinds but the use of non-geographic numbers and short codes¹² for this purpose needs special consideration. It was proposed that, until experience suggests otherwise, Personal Numbers and Universal Access numbers should be deemed suitable for registration, while Freephone, Shared-Cost numbers, and Premium Rate numbers¹³ are deemed unsuitable due to potential clashes with Dublin geographic number ranges. It should also be assumed that short codes providing access to certain public services compatible with email contact (e.g. 118XX DQ services) may also be suitable for ENUM, while others (e.g. Network Use codes) are not; short codes must therefore be decided on a case-by-case basis.

Q. 4. Do you agree that geographic and mobile E.164 numbers, as well as Personal and universal Access numbers should be considered suitable for registration in ENUM from the outset, subject to ongoing experience and monitoring by ComReg? Furthermore, do you agree that other types of non-geographic numbers should be considered unsuitable (at least initially), while short codes should be considered suitable only after individual consideration (per code type) by ComReg?

4.1.11 Views of Respondents

Respondents all agreed on the use of geographic and mobile numbers and there was some support for the use of personal numbers. Support for inclusion of other types of non-geographic numbers was much more cautious, with the basic view being that their use should only be accepted after a very careful study.

¹² This implies that ordinary geographic telephone numbers and ordinary mobile numbers are considered to be automatically suitable for registration.

¹³ There may be additional reasons for excluding Premium Rate Numbers.

4.1.12 Commissions's Position

ComReg agrees with the views of respondents and accordingly the Irish ENUM trial will be restricted to the use of geographic, mobile and personal numbers, assuming there is a demand for each of these within the trial. Although there has been very little demand for personal numbers in Ireland to date, it may be found that they have advantages for some types of ENUM application that could be hosted on the trial. It is noted for instance that the Austrian trial supports UPT personal numbering as one element of its ENUM service.

The use of other types of numbers will be assessed in conjunction with the NAP, only if special justification is put forward.

4.1.13 To Participate Now, or Not?

ComReg 03/36 discusses possible Irish participation in ENUM as well as noting the expressions of support and/or industry pressure for the undertaking of a national initiative, including a national ENUM trial. It also mentions the possibility of integration of such a trial into a wider European trial. It notes that practical moves would be dependent on the Department's decision to either carry out the Tier 1 function itself or to agree to its delegation to ComReg (or some other entity).

The most minimal degree of participation would be to not carry out a trial but simply encourage another country's ENUM registries and market players to also provide similar services for Irish E.164 number-holders. In contrast, "full" participation in ENUM (as in the next question) is assumed to mean that all elements of the trial would be undertaken here. A compromise position would be to formally contract with another country to host Irish ENUM services whilst still retaining control.

Q. 5. Do you consider that Ireland should participate fully in ENUM, in principle and/or do you believe that Ireland should undertake its own ENUM trial to build experience in ENUM and to better understand the technologies, opportunities and challenges?

Q. 6. If you do not consider that Ireland needs to participate fully or carry out a trial at this stage, do you believe that arrangements should be made – at an appropriate stage - with another ENUM country to offer ENUM services to Ireland either:

(a) under full Irish management and control; or

(b) with formal Irish involvement limited to agreeing that Irish E.164 numbers can be inserted into and served from that country's ENUM system? Please comment.

4.1.14 Views of Respondents

Respondents were unanimous that a trial should be held, with all but two agreeing it should be a fully Irish one. One of the latter respondents would not object to an Irish operation ‘piggy-backed’ upon some other country’s trial while the other only expressed an interest in exploring that option further (noting that issues about Data Protection and Authentication would arise).

Some key points made in response to the above two questions were:

- Businesses and individuals would benefit as early adopters and the trial will help them understand the technologies and challenges, seize the opportunities and develop new ENUM services;
- It will help companies and individuals to evaluate the costs and benefits of participation in ENUM;
- ENUM will result in significant technological developments (e.g. in directory services) and our software/communications industries should be given the chance to establish themselves as early leaders in the field;
- The setting up of an industry forum is strongly urged, to prepare the groundwork and then oversee the trial;
- Past experience is that a small number of entities carry the burden of such trials; executive and technical costs should be minimised and either be shared by all or else come from ComReg’s levy;
- A local trial is needed to address local issues and find suitable processes and policies to address them; Among others, these include numbering, Data protection, authentication methods, consumer protection, approaches to regulatory oversight, roles within a trial and industry interest in these;
- Due to the serious issues involved, ComReg should have initial responsibility for administering the national country code under ENUM and ComReg and the Department¹⁴ should oversee that ENUM development is transparent and controlled;
- ENUM needs a critical mass to succeed but the number of countries interested in it suggests eventual widespread adoption;
- Before starting a trial we should learn as much as possible from trials elsewhere, exploit their findings and tailor our trial for areas requiring specific inquiry;
- One respondent offered its experience of the UK trial as a design aid for the Irish trial.

4.1.15 Commissions’s Position

In view of the strongly positive support for a trial, ComReg is encouraged to move forward with this initiative, noting the various remarks about its importance for positioning Irish industry and individuals. In the period since the consultation was opened the Minister has also signalled his support for such moves in favour of industry by provisionally obtaining the “353” Tier 1 delegation and indicating it could be sub-delegated to ComReg for the purposes of a national trial. As the

¹⁴ The Department of Communications, Marine & Natural Resources.

overwhelming opinion was that the trial should be a fully Irish one, rather than piggy-backed onto another country's initiative, that will be the approach followed here. ComReg notes that two respondents are involved in the UK trial and there is very good potential to implement a trial here on a quite strong technical baseline. Nevertheless, it will be important, as respondents noted, to learn as much as possible from trials carried out elsewhere.

ComReg agrees with the suggestion, as discussed further below, that an industry ENUM Forum should be set up to progress design of the trial and then oversee its progress.

The issue of costs and burden were not specifically targeted in the consultation but the remarks by one respondent are well taken – it will be important to keep good control over the trial, its duration, its costs and the spreading of any burden in some appropriate manner. There is an indication in some responses that certain significant infrastructural parts of the ENUM platform and/or certain SP applications might be contributed by potential trial participants and, while that needs to be carefully explored, it could help to very significantly minimise overall costs. ComReg will discuss this issue within the context of the ENUM Forum and will also seek the views/support of the Department, as the scope of this trial and its potential benefits reach out to such a wide audience.

At the conclusion of the trial, a formal report should be drawn up and published – on ComReg's web site or some other public location agreed by the ENUM Forum. This should present the lessons learnt from the trial and, if relevant, point the way forward on ENUM. At that point, commercial operation will or will not proceed, though as this would occur outside the trial context, ComReg's role and involvement will have been completed.

4.2 Questions Specific to a Trial

4.2.1 *Monopolies and the Players within an Irish ENUM System*

As explained in ComReg 03/36, the Tier 1 Registry function is a natural monopoly, overseen (along with the whole national operation of ENUM) by the Tier 1 Management function; well thought-out management rules are therefore important. ComReg proposed that it should itself undertake this Manager role, thereby allowing it to set down appropriate rules for the Tier 1 Registry, as well as for the Tier 2 Nameservers and Registrars; this is in line with expectations at ITU and ETSI level.

ComReg noted there is a strong argument for keeping Ireland's implementation of ENUM as simple as possible, by permitting the Tier 1 Registry operator to also offer Tier 2 Nameserver services. However this could increase the monopoly risk inherent in the nature of the Tier 1 Registry, even after appropriate safeguards are specified.

Finally, unless sufficient competition exists for the separate functions, there are arguments for a small country permitting Tier 2 Nameserver Providers (apart from one also offering Tier 1 Registry services) to also offer Registrar functions (i.e. directly register ENUM customers on their own Tier 2 Nameserver databases).

Q. 7. Do you agree with the proposal that ComReg, as the manager of the E.164 National Numbering Scheme and National Regulatory Authority, should seek delegation to itself of the “353” Tier 1 Registry Manager function for trial purposes, subject to any decisions on ENUM made by the Department¹⁵? If you disagree, do you wish to propose a suitable other entity or that a special body be set up (please discuss)?

4.2.2 Views of Respondents on monopolies & players

Of the four respondents to this question, three were in favour of ComReg being designated as the Tier 1 Manager, while the fourth would be content for delegation to be done by the Department to *any* suitable third party. The importance of industry/user input was especially mentioned by three of the respondents (e.g. in respect of ongoing decisions by the selected body).

4.2.3 Commissions’s Position

ComReg notes the respondents’ support for its designation as Tier 1 Manager and will pursue this with the Department of Communications, Marine & Natural Resources in the context of an ENUM trial. ComReg agrees that the involvement of all relevant parties in the proposed forum is essential to ensure effective representation of industry and users.

Q. 8. Do you agree that the Tier 1 Manager should then in turn delegate technical operation of the Tier 1 Registry to some suitable entity, based on expressions of interest and/or tender, as appropriate, while maintaining the Tier 1 Manager role? The Manager would set down the rules of operation for the Registry to obviate concerns about potential monopoly abuse. If not, please describe your alternative proposal.

4.2.4 Views of Respondents on Delegation of Tier 1 Technical Operation

All respondents were agreed that the Tier 1 technical operation should be outsourced by the Tier 1 Manager to a suitable and competent organisation, selected by a fair and appropriate mechanism. Some key points suggested about this body were:

- It must be a (not-for-profit) entity with an appropriate track record;
- It should provide an efficient technical service with operating costs scrutinised by the industry forum under ComReg guidelines designed to ensure transparent, non-discriminatory and fair operation;

¹⁵ This question and others in this document would not apply or would apply in altered format should the Department itself decide to lead any Irish trial.

- It should be contracted to operate/host the Nameserver using an arrangement underpinned by contractual prices and SLAs;
- Selection of the entity should follow a previously agreed procedure (e.g. a competitive tender) which would follow industry discussions;
- The contract should take account of consumer protection issues.

4.2.5 *Commissions's Position*

ComReg appreciates the guidance given on this important issue and will take it fully into account in dealing with the Tier 1 operator for the Irish trial. Guidance from the industry forum (see 4.1.15 above) will provide an important input to any decisions made, while fair and transparent procedures, commensurate with reasonable speed of implementation, will be an objective from the outset.

Q. 9. Do you agree with the concept of permitting the Tier 1 Registry Provider to also carry out the Tier 2 Nameserver Provider function (in competition with others and operating under appropriate rules)

(a) regardless of other considerations?

(b) if suitable persons are not otherwise found to carry out these functions independently.

If you disagree, please comment.

4.2.6 *Views of Respondents on Operation of Tier 2 by Tier 1 Operator*

A mix of concerns was expressed in response to this question, with some respondents accepting a need for combined Tier 1 and Tier 2 operation (during the trial, but not in subsequent commercial operation), while others rejected this outright. If the Tier 1 operator is also permitted to offer Tier 2 services (for economic reasons) then the view was that clear separation is needed in the processes. All respondents to this question were convinced that strong competition at Tier 2 level is highly desirable or even essential.

4.2.7 *Commissions's Position*

It is clear that respondent's feel strongly that competition must exist at Tier 2 level, even during the trial if that is feasible. ComReg agrees and will initiate its next steps on the assumption that competing offers will be made for Tier 2 participation in the trial. In principle, any rules set down for the trial, in conjunction with the ENUM Forum, will be based on the assumption that all candidates for Tier 2 services (i.e. Registration and NameServer services on the one hand and Registrar services on the other hand) will be accepted, subject to meeting whatever qualifying requirements are defined beforehand.

4.2.8 Architecture of an Irish ENUM Trial

A key decision for ENUM operation concerns the model adopted from the very wide range of available possibilities, just four of which are summarised in ComReg 03/36. It may not be technically difficult to change to a different model after the trial if the chosen model is found to have limitations but legal difficulties and market resistance to such a change would probably arise. ComReg 03/36 discusses this matter, and proposes that Ireland initially selects either Example 1 or Example 3 from ETSI document TS 102 051 as its foundation. It further suggests that, if Ireland is to set up its own ENUM infrastructure, then the model of Example 3 is adequate and would be most efficient, whereas if we allow “353” ENUM services to be provided by some larger country (i.e. whether run under Irish national control or under the control of that country, with Irish permission) then it is most likely that the Example 1 model would be followed.

Q. 10. If you believe that Ireland should set up its own independent “353” ENUM system do you agree that at least for trial purposes the simplest model, broadly as described in ETSI Example 3 should in principle¹⁶ be the basis? *Note: A trial might well include other compromises if these were justified on cost, speed or practicability grounds (e.g. merged trial with some other country).*

4.2.9 Views of Respondents

Of the four respondents to this question, three supported use of the ETSI Example 3 model, while the fourth did not dismiss this but noted that it is “important to achieve realistic implementation and many issues remain outstanding with respect to the trial”.

4.2.10 Commissions’s Position

ComReg believes that the ETSI Example 3 may be the best solution for a small country but accepts that a definitive decision on this matter would commit the trial along a certain path that might be expensive and/or difficult to change afterwards. The model selected also has important implications for the relationships between Tier 1 and Tier 2 (technical) operators. Accordingly, while it is important not to delay the trial unduly, ComReg accepts that a decision between the two most practical examples from ETSI for the trial, should only be made after further discussion within the ENUM Forum. This should therefore be a matter for discussion and early agreement at the first meeting(s) of the Forum.

¹⁶ Subject to change, of course, if emerging ENUM developments make this advantageous.

4.2.11 Irish ENUM Entities for Trial Purposes

It is proposed in ComReg 03/36 that the Tier 1 Registry operator and Tier 2 Nameserver operators (whether combined or not) should be selected by competitive tender.

It is also proposed in ComReg 03/36 that the Registrar function should be open to all interested parties¹⁷.

Q. 11. Do you agree that for trial purposes, the Tier 2 Nameserver operators function (whether combined with Tier 1 or not) should be selected by competitive tender, if there is more than one expression of interest in this?

4.2.12 Views of Respondents about Selection of Tier 2 Operators

Respondents were in favour of as much competition as possible at Tier 2, though one respondent doubted that there would be a high level of interest in Tier 2 at this stage of ENUM's development. Another respondent would prefer to discuss the matter in the ENUM Forum before making a decision, in order to minimise resource usage and maximise trial output.

4.2.13 Commissions's Position

Taking all responses into account, ComReg has decided to invite expressions of interest for provision of Tier 2 NameServer services and to accept those that meet reasonable minimal criteria, which it will define beforehand. If an unexpectedly large number of qualifying applications is received¹⁸, ComReg will discuss these within the ENUM Forum context and agree a process to quickly but equitably reduce the number of trial participants to a more acceptable figure, if the ENUM Forum deems this to be necessary. While two Tier 2 providers is adequate for trial purposes and to meet competitive objectives it is also desirable to allow as many players as possible to gain direct experience of ENUM.

Q. 12. Do you agree that for Trial purposes, the Registrar function should be open to all interested parties (subject to certain restrictions based on background and capabilities)?

4.2.14 Views of Respondents on Selection of Tier 2 Registrars

Of the four respondents to this question, two were in favour of allowing all suitable applicants to provide Registrar functions, even for the trial. A third felt the number should be restricted for practical purposes but didn't expect an excessive number of

¹⁷ In fact, certain qualifications on background and capabilities would be needed to avoid risk of abuse of confidential information.

¹⁸ For example, the ENUM Forum might consider four (or possibly even three) Tier 2 NameServer Providers to be excessive for a trial.

applicants, while the fourth was keen for discussions to be held on this so that resource usage could be controlled.

4.2.15 Commissions's Position

ComReg considers that, as for Tier 2 NameServer Providers, the number of competing Tier 2 Registrars should ideally be unrestricted but trial efficiency and cost implications may impose limits. The same approach will therefore be adopted as that described in 4.2.13 above.

4.2.16 Measuring Interest in an ENUM Trial

ComReg 03/36 discusses the issue of an Irish trial of ENUM at some length. It notes that trials are being carried out elsewhere and that it is possible to learn a great deal from these, though inevitably only real experience can fully prepare the various ENUM players for their role and identify clearly for them what the real difficulties and opportunities are. Interest has been expressed in the holding of such a trial and ComReg has determined to pursue this and assist if possible, although ComReg also considers any such trial should primarily be industry-driven. The following questions are intended to elicit how serious is the interest in performance of an actual Irish trial and how – in broad terms – it should be carried out.

Q. 13. How important does your organisation consider ENUM to be and to what degree do you consider it to be a business opportunity (for you or for Ireland in general)?

4.2.17 Views of Respondents on Importance of ENUM

Four respondents were agreed that ENUM is a significant development that can bring important opportunities and two of these foresaw real business opportunities for their organisations. The other two were uncertain about the opportunities and, both being network operators, could clearly see the potential threats to their business, but were agreed these needed to be explored and evaluated. The fifth respondent to this question considered ENUM to be an unproven and concept-driven opportunity, the proof of which has yet to be established (e.g. from perspectives of market demand/supply, technical, DP and commercial interest) but this respondent was also agreed on the need for Irish players to participate in order to understand what is involved.

The Internet/IT respondents were the most enthusiastic, noting that ENUM is a valuable additional Internet service on which Ireland is in a good position to capitalise. It could inject some energy into the voice services market, and aid number portability. They also noted that specific ENUM opportunities will arise, given the increase in IP-based communications that are not adequately catered for by existing directory services. One stated that the universal adoption of mobile phones has created an environment where people expect to be contactable at all times; as mostly people's contact lists contain a single contact method for any person (mobile, PSTN or email) and it would be a significant advantage if one standard contact address could cover all available communication media. Voice and messaging applications could exploit ENUM (routing voice to an IP address or making mobile contact where

mobile numbers are unknown to the caller). These extended capabilities would make existing messaging applications much more useful/attractive to customers.

Two respondents emphasised that the design of ENUM should preclude its use as a mechanism for developing a universal spam directory.

4.2.18 Commissions's Position

ComReg notes the need felt by the telecoms operators to evaluate the threats and opportunities that ENUM will present to their businesses, as well as the obvious opportunities detected by potential players from the IT/Internet side. The success or otherwise of ENUM cannot be predicted at this early stage but if it succeeds the impact on operators and others could easily be very significant (e.g. diversion of traffic, openings for new roles and new applications etc.). ComReg therefore commends the pragmatic approach adopted by both the telecoms operators and other respondents.

Q. 14. Do you consider that an Irish ENUM trial should be carried out and if so do you agree that it should, as far as can be arranged, be integrated into any overall European ENUM trial infrastructure¹⁹? Please comment.

4.2.19 Views of Respondents on Integration into wider European Trials

Respondents were not only unanimously in favour of an Irish trial but were also supportive of the integration of the Irish trial platform into whatever wider European ENUM initiatives might take place. One respondent felt that even if the context widened to a European-level trial, our focus should remain on the impact of ENUM on the specific situation of the Irish marketplace. Another noted that a European-level trial would provide better opportunities to demonstrate cost-saving advantages by routing calls more effectively (e.g. over IP).

4.2.20 Commissions's Position

The realism shown by all respondents in their answers to the last question, coupled to their certainty about the need for a trial, has persuaded ComReg that an ENUM trial would be genuinely beneficial to industry and would help to position it on firmer ground at a time when major changes are occurring in convergent communications. ComReg will therefore commence working towards this target of a trial. However, in making this decision of principle to initiate a trial, ComReg is anxious that it should be clearly seen as an industry-driven platform (as defined by the ENUM Forum) rather than ComReg-driven.

ComReg will also take the related initiative to draft start-up conditions for the ENUM Forum and define certain parameters (e.g. guidance on scope and direction to

¹⁹ This means integration on a peer-to-peer basis with Irish ENUM being an independent subset, as distinct from Irish ENUM being subsumed into another country's ENUM trial.

ensure realistic ambitions and timescales) and it is prepared to provide start-up support such as an independent chair²⁰ and secretariat for the Forum

ComReg agrees that if the concept of a European-level trial or some trial integration framework is set up then Ireland should integrate its own trial into this, as the benefits of ENUM are so heavily influenced by its scale and by the numbers of participants.

Q. 15. If you believe that an Irish ENUM trial should be carried out would you accept that the possibility of using spare infrastructure – if any – available in other trialist countries, rather than acquiring/developing new Irish infrastructure, should be explored? Please comment.

4.2.21 Views of Respondents on using Spare Capacity in Other Countries

Respondents were clearly very dubious about the idea of building a trial on the basis of ‘spare’ infrastructure in other countries. Views were mostly against that approach though some would accept it if necessary and/or provided it remained firmly customised to Irish needs.

4.2.22 Commissions’s Position

The responses make it clear that an independent trial is what is preferred and as it has also been established during the consultation that suitable infrastructure may be made available by participants for the trial then the fall-back position of piggy-backing on another country’s trial seems unnecessary. Preparations should therefore proceed on the assumption that an independent trial will be implemented.

Q. 16. To what extent might your organisation be interested in participating in a trial, and in which role(s)?

4.2.23 Views of Respondents on their Own Participation in a Trial

While the three IT/Internet-based respondents all confirmed their interest in participation only one of the telecoms operators gave an unqualified ‘yes’, though the others have signalled elsewhere in their responses that they would also be likely to participate. All of these telecoms operators, as well as O₂, which only submitted a general expression of support, would participate in the industry discussions (the ENUM Forum).

Provisional expressions of interest have been signalled for participation as:

- Tier 1 technical provider;

²⁰ The issue of provision of chairperson is subject to prior discussion with the Department.

- Application service provider;
- Managed hosting environment and managed services (and/or consultancy).

4.2.24 Commissions's Position

ComReg notes that despite the caution of several of the major telecoms operators in committing themselves, their overall responses show a clear intention to participate in the trial, subject to detailed discussions in the ENUM Forum. As there is still some confusion about the ENUM concept, how it is implemented and what it means at a practical level, this caution is unsurprising. The first step of the ENUM Forum should therefore be one of providing tutorial materials and of attempting to clarify the concept and – especially – the practical implications and technical approaches to ENUM. The other respondents are unambiguous about their intention to participate and, as the ENUM consultation may not have received sufficiently widespread attention outside the telecommunications arena, it can probably be anticipated that various additional IT/Internet participants can readily be found.

The participation areas of interest (see bullets in 4.2.23 above) signifies that a strong starting base can be established for the trial, especially when the very significant additional capabilities of the fixed and mobile operators are also taken into account, though of course all roles and all applications must still be discussed and agreed in practice.

Q. 17. Are you able to provide real end-users and/or real applications/services²¹ to test the operation of ENUM in the trial and provide useful feedback? Please comment.

4.2.25 Respondents Ability to Provide Trial Users & Applications

Capabilities and/or interest have been expressed by respondents in respect of Tier 1, Tier 2 and Registrar roles, Authentication agency and application service provider – the latter potentially in the areas of SMS/MMS and WIFI/Bluetooth sessions with VoIP. The respondents are also well placed to provide the necessary end-users who will give meaning to the trial. In addition, some respondents bring with them first hand experience from the UK trial, which can be leveraged to advantage in the Irish trial.

4.2.26 Commissions's Position

Based on these responses, ComReg is encouraged to believe a very meaningful trial can be undertaken. It agrees with respondents that the details should first be discussed in the ENUM Forum and furthermore it considers that details of the trial should now be made known to a wider audience.

²¹ For example SIP, H.323, Other VoIP, email, fax, SMS, Web, IM, Global services

Q. 18. Do you wish to suggest any parameters for the trial and/or to list issues that it should address and how?

4.2.27 Views of Respondents on Trial Parameters and Issues

Respondents felt that the trial should be used to evaluate:

- The fundamental technical feasibility and commercial viability of ENUM;
- The technical issues already outlined in the consultation document ComReg 03/36;
- The registration processes, including authentication. These should be based on a clear authorisation and privacy policy;
- ENUM-based services, offered by Application SPs, thereby giving them an opportunity to assess the opportunities;
- Given ENUM's links to the take up of IP communications, there is a case for including broadband users in the trial, as these have most to gain from ENUM. Furthermore, the benefits of ENUM will only accrue from its widespread take-up and broadband users are good proxies for the important early-adopters.

Three respondents again took the opportunity of emphasising the importance of discussing these matters in the ENUM Forum before proceeding into the trial.

4.2.28 Commissions's Position

ComReg accepts the wide-ranging and rather fundamental suggestions made and agrees that the details of these need to be clarified and elaborated in the ENUM Forum before proceeding with planning and implementation.

Q. 19. Are you prepared to participate in or initiate a working group or forum to guide development of an Irish ENUM trial and perhaps later introduction of commercial ENUM? Have you any comments/suggestions for such a WG or forum?

Q. 20. Are you prepared to lead an industry initiative to carry out an ENUM trial and/or to move towards full commercial ENUM implementation in Ireland?

4.2.29 Views of Respondents on Participation in a Forum

All seven respondents indicated their willingness to participate in the ENUM Forum and two indicated their willingness to lead this, if asked. Another respondent was emphatic that it would be "inappropriate for any other body [than ComReg] to

ENUM: The Next Steps, in Ireland

convene and run such a group, as ENUM is a new protocol that must be set up in a fully transparent and independent manner”. A further respondent also considered that “the WG chair should be independent and someone likely to play a minimal role in actual ENUM operation in Ireland”; it proposed the Department of Communications, Marine & Natural Resources for this task.

Other good suggestions by respondents about the ENUM Forum included:

- There should be broad representation from representatives of the worlds of Internet, telephony, Government and consumers;
- Its terms of Reference (to be agreed by all) should define the remit of all of its groups. These should address their membership, responsibilities, objectives, the trial design, the trial organisation, its schedule, its resource requirements;
- There should be alignment with trials elsewhere (where relevant) in anticipation of future cross-border trials;
- There should be agreement up-front on governance and funding of the trial to avoid unfair or disproportionate burdens on any one participant;
- One Working Group should address the scope of the trial and another plan and undertake it.
- A useful model for the Irish trial and/or its working groups is that adopted by the ccTLD umbrella group called CENTR (<http://www.centri.org>). The key principles followed by CENTR are:
 - consultative, consensus-driven forum with equal input from all members;
 - banded fees, allowing different-sized organisations to contribute appropriately;
 - engagement with international standards efforts.

4.2.30 Commissions's Position

The responses are unanimous in respect of the need for an ENUM forum and ComReg agrees that this is an essential next step in moving forward with a trial. There are many high-level and more detailed issues to be resolved by the ENUM Forum and the responses to this consultation show where the priorities should lie.

In line with the responses, ComReg will immediately commence preparation of the groundwork for the forum and will also discuss the issue of chairperson with the Department of Communications, Marine & Natural Resources. The various suggestions and ideas submitted by respondents will inform ComReg's preparations for the start of work.

5 Next Steps

For ENUM to progress efficiently in Ireland, and bearing in mind that trials have already been under way for some time elsewhere – or are even already complete in some cases, it is important for time to not now be lost in setting up the Irish ENUM trial. Nevertheless, ComReg realises that the desire for rapid and efficient progress with quick results must be balanced by the need of potential participants to first develop a clear understanding of what is entailed. Confusion undoubtedly still exists and needs to be dispelled about :

- The nature and principles of ENUM;
- The opportunities, challenges and risks for each type of organisation;
- Who can “play” in this convergent technology – and how;
- What applications (the so-called Tier 3 of ENUM) can be used with ENUM, and how;
- Which organisations are well-placed or at least able to fulfil which roles in ENUM.

Accordingly, ComReg will aim to hold the first ENUM Forum meeting during the second week of September and to set aside some time during this for a workshop to shed some light on the above matters. The intervening period will be used by ComReg to prepare the ground work for the Forum, draft terms of reference for it and for its members, hold discussions with the Department and ensure that as many potential participants as possible are made aware of this unique opportunity. As this meeting is likely to be busy with procedural and preparatory matters a second meeting will be scheduled for approximately two weeks later, with the focus directed much more on definition and preparation of the trial itself.

While ComReg will provide basic facilities for the ENUM Forum (meeting area, secretariat etc), it is expected that trial participants will meet their own costs and expenses, unless sponsorship of some kind is offered to individual companies or to the trial as a whole (e.g. by Government departments or one of the State development agencies).

Before the first ENUM Forum meeting, ComReg will establish the status of any moves towards integration of national trials, in order to provide guidance on the level of consideration to be given to this within the proposed trial.

Appendix A – Description of ENUM

(Some extracts from document ComReg 03/36)

A1. What is ENUM?

Much has been spoken and written about telecommunications “convergence”, in the context of the growing support by the Internet for traditional telecoms services as well as the steady growth of support by the PSTN/ISDN for IP capabilities - typically in the form of transport and access mechanisms (See REFs 2 & 3 of ComReg 03/36 for discussions on this). ENUM is a key emerging Internet and DNS-based protocol, supported by its own architecture of databases, that converges user-addressing across these two distinctive worlds. Put simply, ENUM allows one to type a standard telephone number²² into a Web browser (or similar tool) and receive back the number-holder’s email address, Web URL, messaging address or other data that can be used to contact the number-holder. This data can also show that person’s preferred means of contact, facilitating connection using the cheapest or most effective or most efficient means available – for example IP telephony if it is available, or fax in the case of simple page-image transfer.

Using ENUM, a single user telephone number can be the gateway for routing callers to any selected one of a variety of addresses belonging to the called party, including those used for phone (standard/mobile/VoIP), fax (standard or IP), e-mail or multimedia (e.g. SIP²³) and others. The list of contact addresses can be amended, added to, or updated without changing the telephone number used for access. Figure 1 below shows schematically what happens when an ENUM-based IP telephony call is made, including querying of the ENUM databases, identification of the called party’s preferred means of access (for IP calls) and her address, and then automatic completion of the call. As Figure 1 shows, the first essential step in the ENUM process is to reverse the entire internationally formatted telephone number, inserting a period after each digit, and then to add “e164.arpa” at the end. This effectively converts the telephone number into an internet DNS domain, under the .arpa root. The well-established process of DNS querying then follows, but using special ENUM registries rather than the regular DNS name servers. The result is also different, as it is not an IP address that is returned but rather a special record known as a NAPTR²⁴ resource record, containing all (electronic) contact addresses that the relevant number-holder wishes to make known (Note: Figure 1 only shows the part of the response needed for an IP telephony communication, but any other types of addresses stored by the customer would also be returned).

²² Known as E.164 numbers, after the ITU-T Recommendation E.164

²³ SIP = Session Initiation Protocol. SIP is an emerging signalling protocol for Internet conferencing, telephony, presence, events notification and instant messaging. The protocol initiates call setup, controls routing, authentication and other signalling for IP communications.

²⁴ These are known as Naming Authority Pointer (or NAPTR) Resource Records.

ENUM: The Next Steps, in Ireland

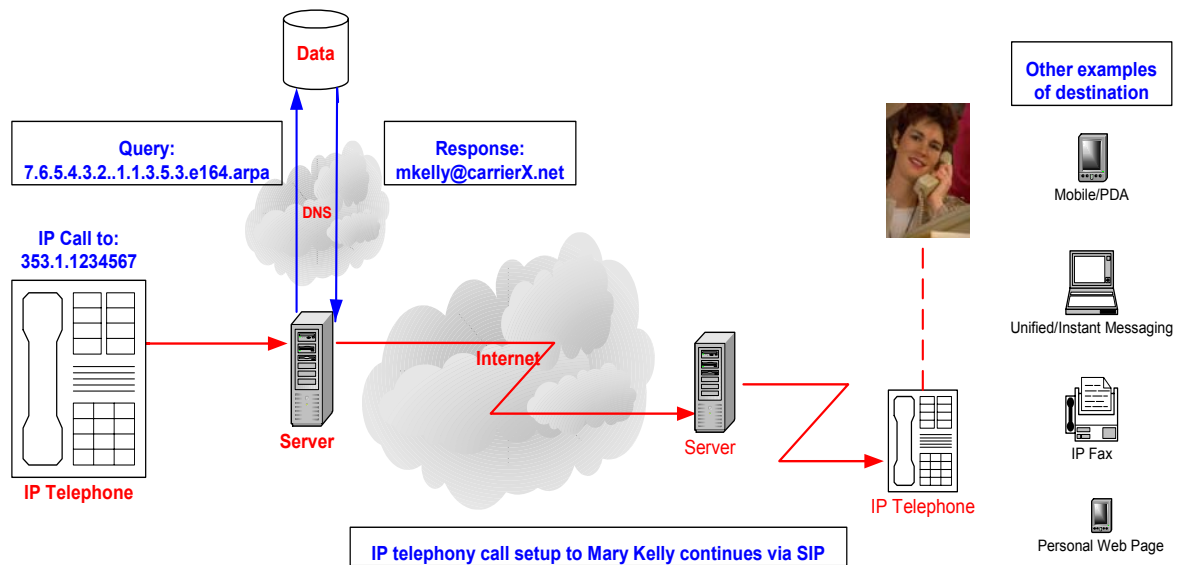


Figure 1: Example of an IP-telephony call using ENUM

ENUM, which is some 2½ years old²⁵, has been developed by the Internet body IETF²⁶, with the Internet Architecture Board (IAB) and the ITU-T subsequently becoming heavily involved in its management, administration and architecture side. Today, the standards for ENUM are virtually complete and significant progress has been made towards bringing the system into being as a public service but progress appears to have temporarily slowed for reasons outside of the protocol itself or its capabilities. These brakes on progress spring from uncertainties related to how national and international bodies will implement the protocol at a practical level. No such constraints exist at the totally private level and some “private ENUMs” have already been set up, with trial or real customers already in place in these. These parallel efforts – which for the moment only exist in the USA - are striving to grow fast before a full integrated public service gets underway, which could make their own offerings less attractive. They may affect growth levels of public ENUM, at least in their own countries, if they achieve a sufficiently large base of users at an early stage. Private ENUM systems are also of use to very large organisations, especially those with diverse subsidiaries operating separate IT systems in one or multiple countries and this may be where the fastest growth occurs in the early stages.

ENUM has two end-users, the calling party (as described above) and the called party who is the telephone number-holder and who pays whatever ENUM subscriptions may be levied. Figure 2 below shows typical²⁷ ENUM relationships, which are structured under the Internet “Arpa” domain, while Figure 3 shows where Arpa and ENUM themselves fit into the wider picture.

²⁵ It entered the Standards track in the IETF in September 2000.

²⁶ IETF = Internet Engineering Task Force

²⁷ There are many other possible sets of inter-relationships.

ENUM: The Next Steps, in Ireland

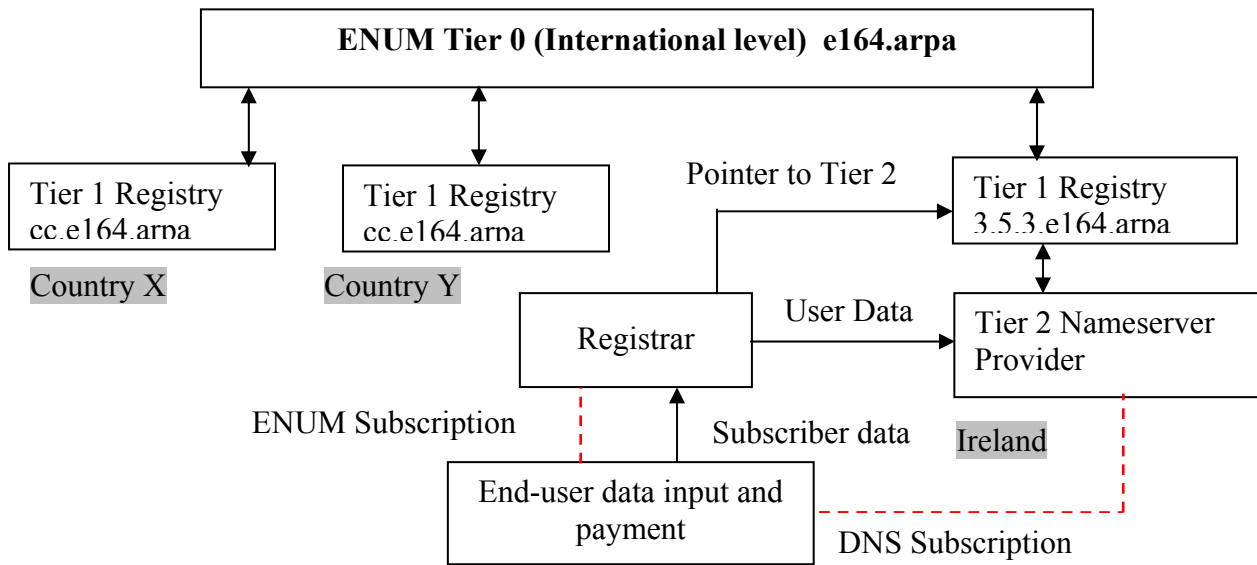


Figure 2: Typical ENUM relationships from the subscriber perspective

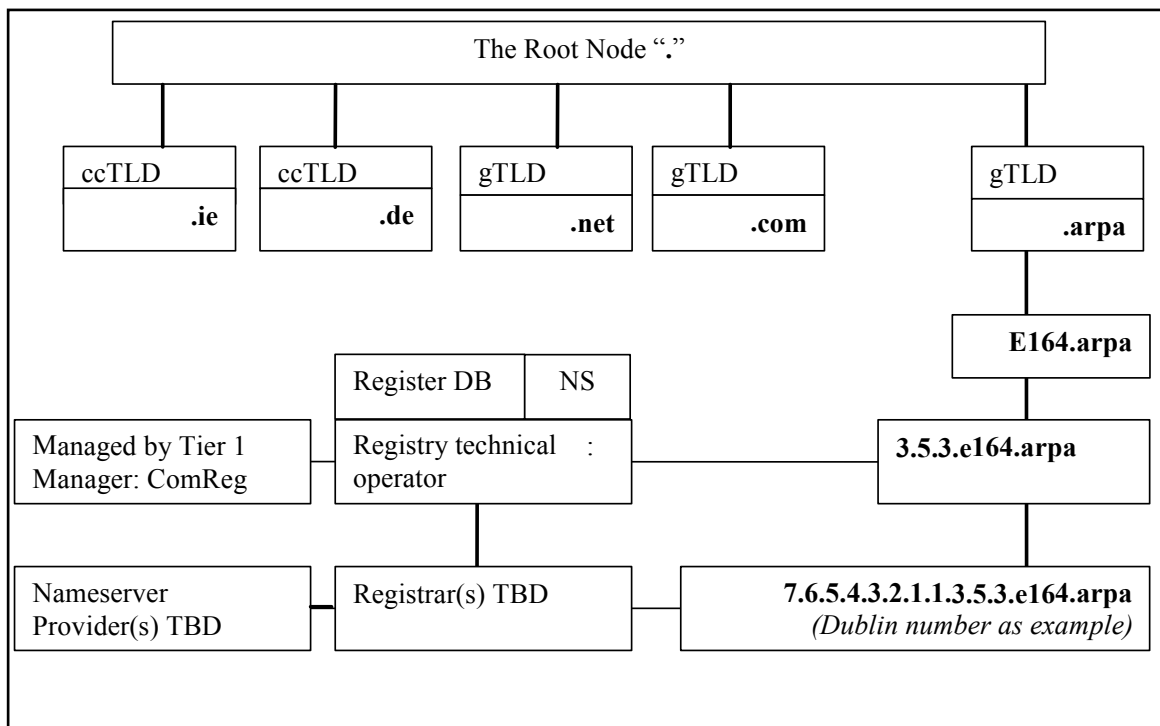


Figure 3: ENUM is Part of the Whole Domain Name System (DNS)

A2. The advantages of ENUM

Armed only with somebody's telephone number, anyone can quickly and quite transparently – using a suitable ENUM application - perform an ENUM look-up that returns a range of alternative mechanisms to contact the person in question. Because the data returned by the system includes alphabetical characters, the lookup would normally be initiated from a suitable terminal²⁸ that can display (and input) such data as email or SIP address or web URL. With this information, the caller can decide how best to contact the number-holder; for example, if the caller is using an IP phone and the returned NAPTR records show the number-holder also has IP telephony, then a direct IP call can be initiated at little or no cost.

It is therefore feasible for the standard telephone number to become the sole contact mechanism shown on business cards, headed notepaper etc.

It also becomes possible on the one hand for someone to indicate his/her preferences among the methods of communication that will work and, on the other hand for a caller to select the means of contact from these choices according to his/her own possibilities.

The combination of ENUM and IP telephony is especially powerful and standardisation of the SIP²³ protocol in parallel with ENUM is opening the door to rapid progress in respect of both of these protocols. A SIP-enabled terminal could initiate a call to someone's phone number and if SIP (or other IP telephony mode) is possible, automatically set up such a cheap (or free) call and if not – rapidly and quite transparently to the caller – proceed to initiate a normal phone call that only moves onto the PSTN at the nearest SIP gateway to the called person.

It is important to understand that while ENUM opens the door to automating and supporting a whole range of communications mechanisms, the ENUM protocol itself is restricted to providing addresses and related data for communicating with any registered number holder anywhere in the world, when that person's E.164 telephone number is entered.

²⁸ This could include PCs, mobile/cordless phones, IP phones and various data terminals. See ComReg document 03/21 for information on IP telephony (VoIP) and SIP.

Appendix B – List of Key Actions

For ease of reference, the following sets out a list of the more significant actions arrived at in this document.

(Note: Apart from the significant actions listed below, various other outcomes of the consultation will be dealt with in the normal course of work and/or in discussions within the Numbering Advisory Panel.)

1. ComReg will initiate planning for an Irish National ENUM Trial, whose parameters will be defined within a new Irish ENUM Forum - see Decision 2. The forum will take responsibility for oversight of the trial's progress.
2. ComReg will set up a new Irish National ENUM Forum, setting out its draft terms of reference which will be put forward for agreement at the outset. The ENUM Forum will be open to interested representatives of Government departments and Agencies, ComReg, the Office of the Data Protection Commissioner, Telecommunications and Internet industry bodies, potential ENUM service and application providers, and consumers.
3. ComReg will pursue discussions with the Department of Communications, Marine & Natural Resources aimed at securing designation of itself as the Irish ENUM Tier 1 Manager for the purposes (only) of carrying out administrative management of the Irish trial.
4. If designated as the Irish ENUM Tier 1 Manager, ComReg will define appropriate procedures and terms of reference for Tier 1 and Tier 2 technical operators (Registries, NameServer Providers and Registrars), and agree these procedures in discussions within the ENUM Forum.
5. ComReg will, as soon as possible, agree a neutral ENUM Forum chairperson in discussion with the Department of Communications, Marine & Natural Resources (i.e. from the Department, from some third party or from ComReg itself).