Commission for
Communications Regulation

Consultation Paper

# Numbering for VoIP services

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All responses to this consultation should be clearly marked:- "Reference: Submission re ComReg 04/72" as indicated above, and sent by post, facsimile, e-mail or on-line at www.comreg.ie (current consultations), to arrive on or before 5 p.m., 30 July 2004, to:

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# 1 Foreword [by the Chairperson]

Voice over Internet Protocol (VoIP) is not a new phenomenon, but is one into which new life has recently been breathed by the increasing availability and uptake of broadband Internet access. It is believed by many that networks using IP will overtake, and eventually even substitute traditional telephone networks (the PSTN). If this transpires, it is appropriate for ComReg to act prudently to ensure that the safeguards and benefits that now accrue to consumers in the world of PSTN are carried forward and enhanced as this substitution takes place. At the same time, this must be balanced with ComReg's key objectives of encouraging innovation and facilitating competition, while avoiding the inhibition of growth and development in this nascent industry. Indeed ComReg is conscious of the need to encourage Irish industry to avail to the maximum of the many opportunities that present themselves with this new technology. There are well publicised advantages that will derive from the implementation of VoIP and associated technologies[i], and it is ComReg's wish that these should be available to as wide a variety of consumers as possible, and as quickly as possible.

Against that background, this consultation paper introduces many of the broader issues surrounding the introduction of VoIP services in the Irish context. Many of these are important issues in their own right (such as access to emergency services, legal intercept, quality of service and others) which have already received a good deal of press coverage worldwide and which ComReg will need to deal with in greater depth in the future as technology standards and EU policy evolve. In the short term however, the most urgent subject to be addressed is that of numbering for VoIP services, since numbering is a key requirement to facilitate the launch of new services and to ensure interoperability with existing networks. On this point, a number of operators have already approached ComReg seeking numbers for their VoIP services (covering both the corporate and domestic markets).

Numbering for VoIP services is a central theme of this consultation, but ComReg is also using this consultation paper as a medium to open the debate on VoIP regulation in Ireland. The approach of this paper is therefore to initiate discussion on the wider aspects of VoIP, which also helps to set the overall VoIP scene, while concentrating in detail on the immediate numbering issues. In respect of the latter, ComReg needs to ask whether a completely new range of numbers should be opened and/or whether existing ranges could/should be used.

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[i] For further background information on Voice over Internet Protocol, see ComReg Briefing Note 03/21 "Voice over Internet Protocol (VoIP)".

ComReg hopes to receive a wide selection of viewpoints representative of all interest groups on this important topic, whether from the traditional telecoms world, the Internet world or the consumer sector.

**John Doherty**
**Chairman**

## 2 Executive Summary

This document is aimed at opening the regulatory debate regarding the operation of VoIP in Ireland as well as addressing the more immediate numbering issues. It is not intended to answer all of the queries that currently arise about VoIP and the resulting implications of the widespread introduction of VoIP services, though the broad issues are opened in this paper. The more immediate requirement is a numbering one to address the pressing needs of certain operators for telephone numbers to be used with their VoIP services. ComReg believes that important numbering issues arise and is therefore now eliciting views from all stakeholders on these.

It is believed by some that the PSTN will be entirely replaced by an IP-based network in the long-term. There will be inevitable consequences to this substitution that must be taken into consideration by ComReg, especially given that current PSTN operators are obliged to comply with specific requirements which may or may not be also relevant to VoIP. These requirements must be carried forward in appropriate (though not necessarily all) cases to new methods of network provision. These include the transmission of calls to emergency services and uninterrupted availability of network, among others. To what extent should these PSTN obligations remain or be extended as network convergence occurs?

A debate about whether or not VoIP services constitute Publicly Available Telephone Services (PATS), as defined in the Universal Service Directive, is ongoing at European level. The core of this debate centres on the question of whether and to what extent VoIP service providers should be required to fulfil the obligations that are inherently associated with PATS. In view of this wider European debate, it would be premature of ComReg to make precipitate decisions on most of these matters at this point, although certain of these issues are of such importance that it must be considered whether to require some or all new operators to offer them pending the outcome of the wider debate.

The above issues are discussed briefly in the context of background information to this debate. This analysis is contained in the annexes found at the end of this document. The different types of VoIP service models are also described in the annexes for the benefit of readers who may not be aware of these distinctions.

The primary focus of this paper, however, is that of numbering. ComReg has set out a range of possibilities in Section 4 regarding the potentially usable types of numbers, including existing geographic, mobile and personal numbering ranges, as well as the potential for the

creation of a new range; the availabilities of these; and the appropriateness and practicalities of their use for VoIP. The associated issues that arise such as number portability, inclusion in CPS and directories, tariffing/tariff transparency and number display in CLI are also discussed. A set of initial terms and conditions that may be associated with the allocation of any numbers intended for use with VoIP services is also proposed in this document, in Annex 5.

Decisions resulting from this consultation will be taken without prejudice to changes that might later become necessary as a consequence of decisions taken by any higher authority or as a result of the ongoing market reviews[ii]. For example, intending operators should be aware that the terms and conditions of number allocation could change in the future for this reason. In addition, responsibilities imposed on operators may also change as a result of ongoing market analysis work being conducted by ComReg.

Linked to numbering, interconnection is another relevant facet of any VoIP service in which interoperability with the PSTN is essential. The National Numbering Conventions[iii] already require that all network operators must open access from their networks to all relevant numbers allocated by ComReg and this would apply whether the numbers are for VoIP purposes or otherwise and whether they are existing or newly-designated number types. Section 4.9 of this document deals with the issue of interconnection.

Finally, formal notification will be required by all entities that intend to offer publicly available electronic communications services and, separately, formal application will be needed by those operators – of whatever category – which need telephone numbers. It should be noted that the allocation of rights of use to telephone numbers implies a corresponding obligation to accept interconnection with any other operators necessary to make those numbers fully accessible to all callers from the PSTN.

[ii] Subject to Market analysis procedures detailed in Regulation 27 of the Framework Regulations

[iii] The National Numbering Conventions are available from http://www.comreg.ie/_fileupload/publications/comreg0435.pdf

# 3 Introduction

There has been much discussion of late, both domestically and in a wider European and global context, (particularly by the FCC in the United States), on how Voice over Internet Protocol (VoIP) services should be regulated, if at all. Arising from these deliberations, it is clear that there are many issues that, while not directly affecting the allocation of numbers for VoIP purposes, nevertheless do affect the services that are enjoyed by end-users. This paper opens preliminary discussion on many of those issues and thereby identifies them as important matters to be addressed, going forward. However, the main concentration of the paper remains on the numbering aspects of VoIP.

This paper is without prejudice to any relevant decisions taken at European Commission level, or by any of the Commission's related offices. A consultation paper on the treatment of VoIP under the new regulatory framework has been recently published by the European Commission. Service providers who are considering offering these types of services should be aware that requirements and procedures may change subject to the outcome of any decisions taken at that level.

Interested parties will be aware that there has been some ongoing debate regarding VoIP services and the need (if indeed such a need exists) to regulate these services. Although this debate is not the primary focus of this paper, it would be remiss of ComReg to ignore these important issues altogether. To this end, the background to the overall VoIP debate is outlined briefly in Annex 2 at the end of this document. Topics of this nature include the issue of substitution, extra-territoriality, matters surrounding the provision of emergency services, location information and legal intercept. These are discussed, along with a brief synopsis of the potential benefits of VoIP to the Irish economy.

A further related discussion has been underway regarding the scope of the definition of a Publicly Available Telephone Service (PATS), as set out in the Universal Service Directive. If an operator wishes to provide a service that can be defined as a "PATS", then there are obligations that that operator must offer to the end user. These are set out in Annex 3.

**ComReg invites respondents to share their views on the broader issues that are discussed in the Annex sections following the main body of this document. Viewpoints on aspects of the future regulation of this area (e.g. access to emergency services, legal intercept, management of extra-territorial influences, regulatory intervention (or otherwise) in the PSTN-substitution process, etc.) in Ireland would be especially welcome.**

**Furthermore, the issues contained in Annex 3 should be considered in the context of non-PATS networks as well as PATS. It should be noted that intervention (especially in the former) could have important negative, as well as positive implications and therefore cannot be taken lightly.**

*Note: Responses to the above invitation to comment will be used as background information by ComReg in developing its preliminary positions on VoIP. They are unlikely to result in formal decisions of any kind at this time, as the main focus of this present consultation is on the more immediate numbering issues.*

Comments are invited from all interested parties on all of the questions contained in this consultation paper, and these responses should be submitted in accordance with the directions outlined at the beginning of this document. ComReg will analyse the responses received and publish its response as soon as possible thereafter.

# 4 Numbering for VoIP and related Services

In accordance with the terms of Regulation 22 of the Framework Regulations, ComReg is vested with the responsibility for administering the national telecommunications numbering resource, while under Regulation 14 of the Authorisation Regulations[iv], ComReg has a statutory obligation to define conditions to be attached to rights of use of numbers. As such, ComReg must now decide whether numbers are to be allocated for VoIP services, and if so, must decide which type(s) of number to allocate and under what conditions of use. This paper seeks views on these matters that will guide ComReg in making its numbering decisions.

The case under consideration in this document is that where an E.164[v] number is needed for termination of calls on a non-PSTN network. The user should be resident within Ireland if Irish geographic numbers are to be used and normally be resident if Irish non- geographic numbers are to be used. *If special VoIP non-geographic numbers are designated, then operators and/or Service Providers in receipt of such number blocks from ComReg will be expected to limit their subsequent individual allocation to users who are resident in the State at the time of allocation.*

## 4.1 Using generic number types from the current Numbering Plan

### *4.1.1* ***Geographic numbers***

These, as the name suggests, are numbers related to geographic areas (e.g. '01-234 5678' for a Dublin subscriber or '021- 434 5678' for a Cork subscriber). Calls to geographic numbers are usually routed to a fixed termination point within their original geographic numbering areas (MNAs). It is important for number portability and other reasons that this situation should be maintained. For example, in the former case, if it were deemed acceptable to allow geographic numbers to be used for VoIP purposes, then operator portability in both directions between PSTN and VoIP operators would become a requirement. For this to work, all VoIP operators would need to ensure that geographic numbers allocated to them remain assigned to

[iv] European Communities (Electronic Communications Networks and Services)(Authorisation) Regulations, S.I. 306 of 2003 (The Authorisation Regulations).

[v] Most types of telephone numbers with which readers will be familiar are E.164 numbers.

termination points within their original MNAs[vi]. This obviously places severe restrictions on nomadicity[vii], so potentially limiting the usefulness of geographic numbers for certain VoIP purposes.

The quantities of geographic numbers currently available for use vary according to the STD area concerned. In most STD areas, it could be possible to allocate some geographic blocks for VoIP purposes, though possibly with block size initially restricted to 100 numbers in some cases. In other cases, careful judgements would be needed, as the allocation of a significant number of extra blocks for VoIP purposes could precipitate a number change within the areas concerned.

In summary therefore, it seems reasonable to permit the use of existing geographic number ranges for VoIP purposes where the current specifically geographic characteristics apply and especially if the VoIP services are clearly substituting PSTN services that would themselves be generating the same need for PSTN numbers. Such VoIP services may fall under the PATS classification and in such circumstances would be required to fulfil all of the obligations that this implies [viii]. In view of the potential incompatibility between the nomadic nature of VoIP and the location stability of geographic numbers, only a limited number of such scenarios are likely to exist and these should be strictly controlled in any situation where there is potential for an unusually high demand for numbers (e.g. such as a potentially indeterminate quantity of numbers needed per gateway).

#### *4.1.2 **Impact on geographic numbering resources***

Severe pressure can be expected on numbering plans across Europe if multiple numbers are required per household or even per user. This may be a strong argument for issuing special VoIP numbers, rather than risk overload on existing resources that might occur from an unexpectedly rapid growth of VoIP. For example, if geographic numbers were allocated freely for VoIP purposes without reference to place of residence then it would be possible for users to request several local numbers from

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[vi] See document ComReg 03/147 for a full listing, with maps, of all MNAs.

[vii] Nomadicity implies freedom to roam from a regular home location, to any chosen new location at which a new base may be set up by installing and registering the VoIP phone at that location. This is in contrast to mobility in which the holder of a mobile phone is assumed to be (more or less) constantly on the move without a recognised home location.

[viii] See Annex 3 for a discussion of PATS and the attached obligations.

each area code, which could prematurely result in expensive number changes for those areas. Therefore in Ireland the existing geographic numbering rules should continue to apply (i.e. only one number per line, allocated from the MNA in which the customer is based).

*Note: It is entirely possible that service providers would look for geographic numbers as these are more commonly bundled in tariff plans than other types of numbers.*

#### *4.1.3* ***Mobile numbers***

The 08X access code is used mainly for mobile communications within the Irish Telephony Numbering Scheme, with the exception of the codes '080' (fixed line mailbox services) and '0818' (universal access services).

Mobile numbers are currently reserved for mobile network services and are in sufficiently limited supply that it is not considered appropriate to use these ranges for VoIP purposes, in which the focus is on nomadicity rather than true mobility (VoIP over WiFi for example does not, at present, offer handover as a means of allowing continuous movement on the part of the subscriber). Mobile numbers tend to be associated in users minds with high pricing, which could be seen as a disincentive to VoIP operators. Conversely, if the numbers were actually tariffed at high rates in a VoIP context, this might be considered a misleading use of numbers by consumers. Although it is possible that mobile-like services may be provided in the future over IP networks, ComReg does not currently believe that VoIP numbers should be allocated from existing open mobile ranges or that unopened '08X' ranges should be designated for VoIP purposes.

#### *4.1.4* ***Personal numbers (0700)***

Personal numbering services allow the called person to receive calls at various different locations or terminals, including a mobile telephone, depending on the time the call is made or depending on some other variable pre-defined by the called party (e.g. the location and/or type of telecommunication facilities available to the called party at the time of the call). Personal numbers, the call routing for which may vary according to the caller location at a specific time and which may be dialled from abroad, have certain attractions for use as VoIP numbers, in any case where assignment should be made to a person rather than a termination point.

There are 594 blocks of 1000 personal numbers currently free in the numbering scheme. A further 230 blocks of 1000 personal numbers are reserved for future

expansion. This is sufficient for limited VoIP use but not for use as a mainstream VoIP range.

Personal numbers from the existing 0700 range could therefore potentially be made available for certain VoIP purposes, but only where the applicant can show that the number needs to be assigned to an individual rather than to a termination point. It is important to note however that personal numbers have traditionally been associated with relatively high tariffs and this may be a disincentive to their use by VoIP operators.

#### *4.1.5 Other types of non-geographic numbers*

Other types of non-geographic numbers (i.e. Shared Costs / Premium Rate / FreePhone / Universal Access service numbers) are not considered relevant to VoIP services at this stage and they are therefore not considered further in this document. There may be cases where such numbers could be considered for later use in conjunction with VoIP but these would be special situations that closely parallel the usage of those numbers for PSTN purposes; in all such cases the plans for usage would need to be carefully considered by ComReg to ensure that they match the designated functions of those numbers within the National Numbering Scheme.

### 4.2 Designation of a new VoIP number range

Apart from the specific situations where Geographic and Personal numbers might be suitable, there is likely to be a growing need for more dedicated numbers to meet a whole range of VoIP scenarios, such as those described in section 4.3 below. As such demands might eventually grow to become very significant indeed and as most users will not wish to change their preferred VoIP numbers downstream, ComReg believes that it could now be prudent to designate a completely new range for this purpose. There is justification in this, as VoIP services have the potential to offer far more extensive applications and eventually far more divergent services than the PSTN does. Some services that VoIP could potentially offer include advanced messaging services, presence management and videoconferencing, as well as the nomadicity already mentioned.

Potential candidates for a VoIP range (which could also be used for other new technology or convergent services as discussed elsewhere herein) include ‘060’, ‘072’, ‘073’, and ‘075’ through ‘079’. These are available for use as non-geographic numbers for VoIP or other purposes. Apart from these ranges, the entire ‘03’ range

remains available for use. However, as '03' is the sole remaining unopened top-level range, which has traditionally been kept secure in case it is needed for a major number change (or to handle any other large-scale but currently unforeseen numbering situation) it is not currently intended to use it for VoIP purposes.

Within the above ranges, '07X' offers the most scope for future growth and is therefore preferred. Within '07X', the ranges '072' and '073' lie between the operational geographic ranges '071' and '074' and should therefore only be considered as fall-backs, leaving the choice between the ranges '075', '076', '077', '078' and '079'. All of these except '076' are currently still in a 12-month quarantine period (following number changes completed in 2003), but the quarantine period could easily be shortened to 6 months (i.e. effectively already expired) if early re-use is desirable. As the only reason for doing so would be to allow the lowest range (i.e. '075') to be opened first, this is deemed to be insufficient justification for deviating from normal rules and ComReg proposes that the range '076' should be designated for IP-access purposes. If additional resources are required later, then the '075' range and then – progressively – '077', '078' and '079' ranges can be also opened, as needed.

A further point that must be considered is that of subscriber number length. This refers to the last part of the telephone number, i.e. the digits following the '07X' access code. As part of its ongoing management of the national numbering plan, ComReg is gradually migrating geographic subscriber number lengths to 7 digits long, associated with 3-digit access codes (i.e. including the trunk access '0' digit). Existing non-geographic numbers have similar overall length of 10 digits. Having this kind of standardised subscriber number length reduces post-dial delay as it reduces the need for number analysis. It also facilitates recognition by consumers and by network operators in other jurisdictions. ComReg would therefore propose that the number length for any new range opened for VoIP services would also be of the magnitude of 3+7 digits (e.g. 076-123 4567).

## 4.3 Numbering scenarios arising from the use of VoIP services

Where termination of a call occurs on the Irish PSTN, normal numbering allocation procedures will apply.

Where termination occurs on a VoIP phone or service, and origination from the PSTN (Irish or international) is to be supported, then an Irish E.164 number will usually[ix] be necessary for the called party, as call origination only occurs via dialled digits. There are several instances which must be evaluated in respect of the need for such (Irish) telephone numbers, as follows:

*Note: Points 4.3.1, 4.3.2 and 4.3.3 below do not require any additions/changes to the numbering scheme, but Points 4.3.4 and 4.3.5 do require consideration as to what type of numbers should be offered.*

#### *4.3.1 **Termination abroad of call leaving Ireland as IP-based call***

If the call remains IP-based right through to termination (i.e. having originated as an IP call or first entered Ireland as one), then there are no numbering implications either for ComReg or for other National Regulatory Authorities (NRAs). However, if the call first enters a PSTN/IP gateway within Ireland, then a number may have been necessary to reach the gateway, which for PSTN purposes is assumed to be the termination point.

#### *4.3.2 **Termination abroad of call leaving Ireland as PSTN-based call***

This situation also need not be considered further in this paper in respect of numbering, as the applicable termination numbers will be administered by the NRA of the State where the call terminates, not by ComReg.

#### *4.3.3 **Visitor uses foreign E.164 number to receive IP telephony calls***

The PSTN would not route the call to an Irish PSTN destination (i.e. because the country code forming part of the number was not '353') but an up to date ENUM[x] profile could be used by callers to reach an IP terminal at which the foreign visitor was located in Ireland.

#### *4.3.4 **PSTN-to-IP Call, with numbers assigned to PSTN-IP Gateway***

This case concerns the situation where PSTN-originated calls (whether originated abroad or in Ireland) virtually terminate in Ireland on a PSTN-IP gateway to which a block of numbers is assigned (i.e. analogous to the manner in which DDI numbers are

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[ix] Use of the ENUM protocol with a subscriber's existing fixed or mobile telephone number would alternatively allow access to a terminal identified by a URI or any kind, that is associated with that user.

[x] For more information on ENUM, see ComReg 03/36 "ENUM: Accessing Multiple Customer Services through Telephone Numbers" and ComReg 03/96 "ENUM: Ireland's Next Steps".

allocated to a PBX). In this situation the virtual destination nodes (i.e. the IP network end-points) will have IP-numbers whose relationships to the telephone numbers are determined by the gateway. The term 'virtual' node is used to describe the real termination point of the call which becomes invisible to the PSTN, once the call enters the gateway.

#### 4.3.5 *PSTN-to-IP Call, with numbers assigned to IP Gateway or IP terminal*

This situation occurs where the call termination point is clearly known to be a specific IP-based termination (e.g. a native IP telephony terminal or IP PBX). In this case the termination is not masked from the PSTN via an intermediate gateway address and the telephone number (or block of numbers in the case of an IP PBX) is/are assigned directly to the termination point. This case allows for nomadicity of the terminal telephone number. How the telephone number and IP address of the end point are handled in the VoIP network (e.g. by extraction of the telephone number to the gateway during terminal registration process, or otherwise) is a network specific matter and need not be considered further here.

*Note: Other types of numbering scenarios than those listed above may be identified from time to time, and ComReg will deal with these situations as appropriate.*

**Q. 1. Do you agree with ComReg that geographic numbers could be allocated for VoIP purposes in specific cases (see also Q21)?**

**Q. 2. Do you agree that if geographic numbers are made available for VoIP use (See Q1), they should follow the same rules as for PSTN (i.e. only one number per 'line' or termination point, allocated from the MNA in which the customer is based)?**

**Q. 3. If geographic numbers are made available for VoIP use, would you consider that this should be limited to VoIP services that qualify under the current definition of PATS (i.e. have the rights and corresponding obligations - as far as those can be applied - of PATS)?**

**Q. 4. Do you agree with ComReg that Personal numbers could be allocated for VoIP purposes in very specific cases (e.g. where justification can be provided for allocating a number to a natural person using an IP connection)?**

**Q. 5. Do you agree with ComReg that other non-geographic numbers and mobile numbers should not be allocated for VoIP purposes – at least at this point in time?**

**Q. 6. Do you agree that a new number range should be opened for VoIP services?**

**Q. 7. If so, do you agree that this new range should be the 076 range? If not the 076 range, which range do you think would be more appropriate?**

**Q. 8. Do you agree that the number length should be 3+7 digits long? If not, please suggest your alternative.**

**Please explain your answers giving practical examples of how you see the numbers being used where appropriate (e.g. assigned to terminals, persons, gateways …).**

## 4.4 ENUM

ENUM is an addressing protocol that enables a range of communications mechanisms to be identified for a participating customer by mapping that customer's telephone number into the Internet domain name system, using a simple algorithm defined by the IETF. Put simply, ENUM allows end-users to have one address string (i.e. a fixed line or mobile telephone number) that will then connect to any termination method of their choice (e.g. VoIP).

It has been suggested[xi] that special ENUM numbers should be provided, which would act as a mechanism for finding contact information for individuals (including their secondary phone numbers). If Ireland were to follow this suggestion it might be that a sub-division of the VoIP range would be appropriate; VoIP connection is expected to be an important user of ENUM. Such ENUM numbers would be unique in that they would 'belong' to individuals (as normal) but would be associated with no physical PSTN termination point of their own (i.e. a connection is never made to that number). Calls would instead be routed to an ENUM-enabled gateway which would carry out an ENUM look-up in order to decide to which real address to onward-route the call. As ENUM could be used for obtaining any user addressing information, automatic connection to virtually any service becomes possible and 'calls' might be communications of *any* type, not necessarily telephony. This means that while VoIP is seen as the 'killer' application for ENUM, in fact the scope of ENUM is much wider than just VoIP.

If special ENUM numbers were to be allocated, then automatic opt-in to ENUM would be a condition of allocation, so on the one hand this gets over the problem of encouraging users to opt-in while on the other hand the automatic registration of a user into ENUM gets over the troublesome problem of validation[xii] that occurs with other number types. A corresponding condition of allocation is that opting out of ENUM would mean loss of the number. However, opting out of a telephone line subscription would have no significance for the right to hold an ENUM number, given that ENUM numbers can legitimately point to other addressing mechanisms.

[xi] Stastny, Richard: Proposal to be included in ETSI Version 2 of TS 102 172 Services and Protocols for Advanced Networks (SPAN); Minimum requirements for interoperability of European ENUM trials

[xii] Entry into the ENUM registries is dependent on validating a user's rights of use to the telephone number concerned.

**Q. 9. Do you consider that ComReg should support ENUM using a distinctive number range (which could be a sub-set of a range designated for VoIP, or a separate range with its own access code)?**

**Q. 10. Do you prefer designation of the first digit(s) of the VoIP subscriber number to achieve this (i.e. the digits immediately following the VoIP access code), or the allocation of a separate access code (e.g. 079)?**
***Note: your answer to this may be a reflection of how large you anticipate the (medium term) growth of demand to be for ENUM numbers.***

**Q. 11. Do you support the broad principle that end-users who wish to avail of this ENUM number range should be obliged to "opt-in" to the ENUM protocol, and would lose the number if subsequently opting out?**

**Please explain your responses with practical examples where feasible.**

## 4.5 Different VoIP number ranges for different categories of VoIP

Should differentiation of VoIP service type, as described in Annex 4 (for example self-provided consumer, independent of ISP etc.) be identifiable from looking at the number? This could be achieved by designating the first and/or second digit of the subscriber number to different services. In the extreme this differentiation could be identified by the last STD digit, though ComReg is reluctant to open two or more separate STD codes for VoIP at this stage without strong justification. An example of the latter could be to open '075' for VoIP in which quality levels are (at least partially) guaranteed and/or where certain defined PATS service levels are offered, with '076' being opened for VoIP in which only basic service is offered. The value of such a differentiation is that it would assist customers to recognise the levels of service they could expect when dialling a '07X' number, while rewarding those service providers (SPs) prepared to offer better services, relative to others, by distinguishing the access number. The disadvantage is that it places ComReg in the position of having to validate claims for services while also placing numbering barriers in the way of SPs who start out with relatively more basic services and then upgrade as time goes by.

**Q. 12. Do you consider that ComReg should allow or support the differentiation of different VoIP service types using distinctive number ranges?**

**Please explain your response with practical examples where feasible.**

## 4.6 Quality

Annex 2 discusses voice quality in respect of VoIP. A possibility that might aid customer transparency could be to allocate one VoIP number range for services where quality is guaranteed to be at some specific level, perhaps related to PSTN quality, and an alternative range for VoIP services where quality is not so specified. Should more than one range be opened for VoIP services (in order to allow differentiation based on quality of service), then service providers who initially offer services based on the lower level of quality may be disadvantaged as their offerings improve. This approach would also require monitoring to ensure that the required level of quality was being offered, and this may be difficult to achieve. ComReg is not of the opinion that this is a suitable approach but invites viewpoints on the matter.

**Q. 13. Do you agree with the opinion that the selection of a number range to facilitate the provision of VoIP services should not be predicated on the quality of those services? If you disagree, please give your opinion as to why it should be based on voice quality.**

**Q. 14. If not by number range, how can consumers be best informed about the expected quality of service?**

## 4.7 Number portability as mandated in the Universal Service Regulations[xiii]

Number portability has been mandated in the Universal Service Regulations[xiv]. This requirement is further elaborated in the Numbering Conventions, which state that "All fixed network operators with geographic or non-geographic number allocations and all mobile network operators, including MVNOs, are obliged to offer full Operator Number Portability to their customers. In the case of geographic numbers, Location

[xiii] European Communities (Electronic Communications Networks and Services)(Universal Service and Users rights) Regulations, 2003, S.I. 308 of 2003, (the Universal Service Regulations).

[xiv] At Regulation 26.

Portability may also be offered by an operator, but only within the MNA for which the number was originally allocated."[xv] If geographic numbers are ported between PSTN operators and VoIP operators (or vice versa) – bearing in mind the geographic restrictions that apply to such numbers - then nothing shall be done that would prevent any subsequent porting back, should the customer choose to do so.

It is expected that operators who avail of any new numbers for VoIP services will comply with regulations already in place for porting of non-geographic numbers, to the extent that is practicable and appropriate to the designated function of the number. This will initially apply only for customers porting between different IP networks, i.e. not for customers wishing to port those numbers onto traditional PSTN networks.

*Note: This situation may change at some stage in the future.*

The question of portability between (primarily or totally) PSTN-based service and (primarily or totally) VoIP-based service (as discussed above) is a difficult one to address definitively and ComReg is inviting inputs on this, which might be used to guide possible future VoIP consultations. Such viewpoints should discuss the specific criteria that might be used to differentiate between cases where portability should or should not be mandated, bearing in mind the long term likelihood of network convergence.

ComReg considers that in principle the requirement for Number Portability should be extended to include new number types such as any new VoIP range, but it does not anticipate enforcing such a requirement at the outset. However, as technologies mature and assuming more and more consumers adopt VoIP (or similar) services, the importance of number portability will in time over-ride the need to minimise barriers in the path of early developers.

[xv] National Numbering Conventions, ComReg 04/35, Section 11.6.1. For further information on number portability, please refer to Section 11.6 of the Numbering Conventions.

**Q. 15. ComReg invites comments on the Number Portability (NP) issues.**

**a) Do you agree that NP should be required between PSTN and VoIP operators for geographic numbers? Please comment on your answer.**

**b) Do you agree that NP should not be required between PSTN and VoIP operators for personal numbers (if these are permitted to be used for VoIP purposes), in view of the existing complexity of personal numbers even without taking inter-technology issues into account?**

**c) If existing number ranges (e.g. geographic or personal numbers) are allowed for use with VoIP services, do you agree that NP should be required between different (but compatible) VoIP operators?**

**d) If (a) new number range(s) are designated specifically for VoIP and/or other new technologies, do you consider that NP should be required for these between different (but compatible) operators of such services, either from the outset or at a later more mature stage of the market?**

**Please explain your views on these NP issues as succinctly as possible.**

## 4.8 Tarriffing

Important tarriffing questions arise in respect of VoIP numbering. In principle, if existing numbers are to be permitted for use with VoIP services then it seems that the existing rules for retail tariffs, settlements and retention should apply and ComReg would expect interconnection for new operators of these technologies to be negotiated in the traditional manner.

ComReg does not regulate individual tariffs, although tariff ceilings may be imposed in order to facilitate consumer recognition and understanding. ComReg believes that the tariff ceiling charged for a call from an Irish PSTN source to a VoIP gateway[xvi], where both are located in Ireland, should not cost more than the standard national rate for the network concerned, although it is reasonable to expect that many instances will exist where the tariff charged for a call from a VoIP service could be much lower than this.

ComReg further believes that the requirements for tariff publication that arise from operating as a PATS (discussed in Annex 3) should be equally applied to new number

[xvi] The term 'gateway' is used here in its widest sense of an interconnection point between two different technologies and is not necessarily restricted to a node that is formally defined as some specific type of gateway.

ranges (i.e. easily available; all elements understandable by consumers; information on website, or advertisement or other location should be up to date and accurate; any tariff options should be informative and not misleading or confusing).

**Q. 16. Do you anticipate any undue difficulties in respect of commercial negotiations between operators (whether existing or new market entries) in respect of the development of tariffs for new VoIP services, whether based on existing or new number ranges? If so, please explain and if possible suggest your solutions to these.**

**Q. 17. If yes, what broad criteria should be applied to these tariffs?**

**Q. 18. Specifically, would you agree with ComReg's proposal that the maximum retail tariff for calls from PSTN to VoIP destinations in Ireland (i.e. where the PSTN/VoIP gateway or the final destination is in Ireland) should not exceed national rate for the originating PSTN network? Please comment on this and on the corresponding situation where any VoIP network that may be subject to regulation originates such a call, where the termination may be on a) PSTN or b) IP. If you feel national rate is excessive for VoIP, would you alternatively consider that local rate is a practical alternative maximum amount to set down?**

**Q. 19. Alternatively, is there merit in allowing totally free market competition to set the retail tariff without any number-related indication for customer transparency of the maximum permitted retail prices? If 'yes', is it also your view that commercial negotiations can generally be concluded sufficiently quickly without such a retail 'starting point'?**

## 4.9 Interconnection

New interconnection arrangements may need to be negotiated for any special numbers introduced for VoIP or ENUM or other services. Nevertheless, even in these cases, ComReg considers that the broad principles of such new arrangements should already be clear from analogies with existing arrangements for other non-geographic number types (not including Premium Rate Numbers), especially those where local or national rates apply. ComReg does not foresee commercial objections or negotiation delays arising from the transition of calls between PSTN and IP networks or technologies per

se, nor from the numbering perspective, where it may be appropriate to assign numbers at the gateway (implying the onwards path is treated for negotiation purposes as a private network) or at the actual termination point.

ComReg considers that the various interconnection matters (e.g. retention and settlement rates) should in the first instance be negotiated between the operators involved, in the normal way, notwithstanding that certain of these operators seeking interconnection arrangements will be at least partially based outside the PSTN arena and with little if any experience of such negotiations.

#### *4.9.1* ***Requirement to open up number ranges***

There is a requirement in the current version of the National Numbering Conventions that all network operators, including CPS operators, must open access from their networks to all relevant numbers allocated by ComReg, subject only to commercial negotiations between operators[xvii]. Regulations 4 and 5 of the Access Regulations 2003[xviii] provides for this in the Regulatory Framework which came into operation in July 2003. It is also a condition of the General Authorisation with which all operators must comply[xix]. This would also apply in respect of any new VoIP numbering range that is designated for use. The degree and manner in which this would apply to pure VoIP operators remains unclear at this stage but in principle ComReg would expect inter-connection requests from and to them to be handled broadly in the same way as for voice-based operators. It should be noted that one condition of number allocation, that would also apply to VoIP operators, is that number block recipients agree not only to support access on their networks to all number types allocated to them but also to all other number types.

#### *4.9.2* ***Call Termination charges***

Call termination rates charged by operators who are deemed to have SMP, are currently regulated according to the principles of cost orientation. ComReg expects that other operators, especially new entrants using IP technology, may have a smaller cost base and therefore might be expected to operate with greater efficiencies. Thus call termination rates charged by other operators are likely to be no higher than those regulated charges.

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[xvii] Section 3.2.2-6 of the National Numbering Conventions, ComReg 04/35

[xviii] European Communities (Electronic Communications Networks and Services)(Access) Regulations, 2003, S.I. 305 of 2003. The Access Regulations.

[xix] Conditions of General Authorisation, ComReg 03/81, condition 14.

The forthcoming market analysis of interconnection markets will determine future arrangements.

### *4.9.3* ***Call origination charges***

Call origination rates charged by operators who are deemed to have SMP, are also currently regulated according to the principles of cost orientation. The rate charged for call origination to Irish VoIP numbers (i.e. where the call will effectively terminate within Ireland for PSTN purposes[xx]) should be no different from any other type of call in this tariff range and, therefore, it seems reasonable that individual networks should charge no more than their own national rates. The retail price for delivering a call from the PSTN to an IP operator's interconnect gateway should in principle be no different to that for delivering a call from the same PSTN point to any other operator's network. ComReg may consult on this further in its forthcoming market review of the interconnection markets, and any future arrangements will be dependent the outcome of this review.

[xx] Where a user unplugs his/her terminal to which an Irish VoIP number is allocated and re-plugs it abroad (i.e. nomadic usage), it is assumed that the call-forwarding operation across borders will occur over an IP network and not through the PSTN

**Q. 20. Do you agree that the wholesale settlement and retention arrangements that would apply to any usage of existing number ranges for VoIP purposes should follow existing PSTN arrangements, or do you consider that VoIP represents a special case which would necessitate changes? Please explain your views in the latter case.**

**Q. 21. Do you agree that retail, settlement and retention principles that would apply to any new VoIP non-geographic number range could be quickly determined based on existing arrangements for other non-geographic services (and not taking account of the special case of Premium Rate services)? Please explain your views, with suggestions if appropriate.**

**Q. 22. Respondents are invited to comment on the above section 4.9, dealing with interconnection:**
**Do you agree with ComReg's position on the VoIP interconnection issues of opening of number ranges, call termination and call origination? If not, please comment.**

## 4.10 Display of Calling Line Identification (CLI)

While the display and transmission of CLI may be technically possible from, over and to IP networks, it is possible that this could be open to manipulation by third parties, especially if it transits over the public Internet. ComReg's initial view is that unless the unaltered status of the CLI can be guaranteed with a very high degree of certainty, it should either come with a 'health warning' to this effect, or else not be displayed. In such circumstances, it would be appropriate when interconnecting with the PSTN to use the "Unavailable" indication.

**Q. 23. Do you agree with ComReg's view that unless the unaltered status of CLI on VOIP services can be guaranteed with a very high degree of certainty, it should either come with a 'health warning' to this effect, or else not be displayed – and in any case should be 'Unavailable' for PSTN purposes? Please comment on this topic, which has potential importance for billing, data security and privacy, emergency services, fraud prevention and customer service levels.**

## 4.11 Inclusion in Carrier Pre-Select (CPS)

ComReg does not believe that calls originated from VoIP services can easily (if at all) be made amenable to CPS, due to the nature of CPS as an origination service. However, CPS providers would have an interest in originating PSTN calls to any special VoIP number range. ComReg believes the general principles affecting CPS in respect of other non-geographic numbers would equally apply in this case.

**Q. 24. Do you agree with ComReg's view that in principle VoIP origination is incompatible with CPS, while PSTN origination to VoIP numbers can follow principles already established for other non-geographic numbers?**

## 4.12 Directory Enquiries (DQ)

Currently, service providers who operate in the PSTN space are required to ensure that subscribers have the right, without charge, to have an entry related to their telephone number, in a printed or electronic directory[xxi]. All service providers which assign telephone numbers to their subscribers are obliged to make relevant information available in a fair, cost oriented and non-discriminatory manner for the purposes of facilitating the provision of this. ComReg believes that in principle this right should also be afforded to those users who choose to subscribe to a public VoIP service. This requirement may not be implemented in the short to intermediate term if practical reasons impede it or market development policies over-ride it, but it should remain an underlying obligation, with enforcement, if necessary, to be triggered at a later stage.

[xxi] Regulation 4 of the Universal Service Regulations.

**Q. 25. ComReg invites responses from interested parties on the topic of Directory Enquiry entries for VoIP users availing of public telephone numbers.**
**a) Should a listing in a publicly available directory be available to all subscribers to these VoIP services?**
**b) Should this directory be linked to the National Directory Database (NDD), if separate?**

## 4.13 Who should receive allocations of VoIP numbers?

ComReg believes that existing number types that may be designated also for VoIP purposes should continue to be allocated to the same operators as before. Furthermore, if those operators intend to offer VoIP services and comply with any conditions of use that are set down, then they should be accepted as recipients of primary allocations of any new VoIP number range that may be designated.

It might also be that new VoIP operators should be allocated blocks of certain number types for sub-allocation to their customers. ComReg will assess applications from these operators on a case-by-case basis but in all such cases they will be expected to follow the same application procedures as other operators and will be assessed in the same way for primary allocations, based on their merits. The Numbering Conventions would also apply in such cases to new VoIP operators receiving numbering allocations. A set of proposed terms and conditions that would be attached to any allocation of numbers for VoIP services is included in Annex 5.

**Q. 26. ComReg calls for comments regarding these terms and conditions. Do you feel that these are appropriate to the proposed use of numbers for VoIP services? Are there any conditions of use that are unnecessary or (conversely) omitted from this set? Respondents are invited to respond these issues, with suggested alterations if so desired.**

## 4.14 Authorisation

Any person intending to provide an electronic communications network or service must notify ComReg of their intention to do so prior to providing the network or service.[xxii] Upon receipt of a valid notification the person concerned is deemed to be authorised and is subject to the conditions of the General Authorisation. Whether or not offering VoIP

[xxii] Regulation 4 of the Authorisation Regulations.

type services falls into the category of PATS (as previously discussed) is not a matter for this paper, or indeed ComReg in isolation. Current categories that currently need authorisation include fixed, mobile and satellite telephony networks, other fixed or wireless networks that offer publicly available or other telephone services, data or internet access services or other electronic communications services.

## 5 Submitting Comments

All comments are welcome; however it would make the task of analysing responses easier if comments were referenced to the relevant question numbers from this document.

The consultation period will run from 18 June 2004 to 30 July 2004 during which the Commission welcomes written comments on any of the issues raised in this paper.

Having analysed and considered the comments received, ComReg will review the issue of Numbering for VoIP Services and publish a report in September on the consultation which will, inter alia summarise the responses to the consultation.

In order to promote further openness and transparency ComReg will publish the names of all respondents and make available for inspection responses to the consultation at its Offices.

ComReg appreciates that many of the issues raised in this paper may require respondents to provide confidential information if their comments are to be meaningful. Respondents are requested to clearly identify confidential material and if possible to include it in a separate annex to the response. Such information will be treated as strictly confidential.

# Annex 1 – Definitions

### New Regulatory Framework (NRF)

A new EU regulatory framework for the electronic communications sector was adopted by the European Commission in April 2002 and was transposed into secondary legislation in Ireland on 25 July 2003. The new Framework which is based on five principal Directives radically changed the way the communications sector is regulated across the EU and entailed administrative changes in procedures in the regulating authorities in each Member State: in Ireland this authority is ComReg. Further information on the NRF is available from our website at http://www.comreg.ie.

### Universal Service Regulations

Means the European Communities (Electronic Communications Networks and Services) (Universal Service and Users' Rights) Regulations, 2003 (S. I. No. 308 of 2003). These Regulations transpose the Universal Service Directive into Irish law.

### Electronic Communication Service (ECS)

The ECS is a key concept within the new framework. It is defined in the Framework Regulations 2003[xxiii] as: *A service normally provided for remuneration which consists wholly or mainly in the conveyance of signals on electronic communications networks, including telecommunications services and transmission services in networks used for broadcasting, but excludes -*

*(a) A service providing, or exercising editorial control over, content transmitted using electronic communications networks and services; and*

(b) *an information society service, as defined in Article 1 of Directive 98/34/EC, which does not consist wholly or mainly in the conveyance of signals on electronic communications networks.*

### Publicly Available Telephone Service (PATS)

The PATS is another important concept within the new framework. It is defined in the Universal Service Directive 2003[xxiv] as: *A service available to the public for originating*

[xxiii] European Communities (Electronic Communications Networks and Services) (Framework) Regulations, 2003 (S.I. No. 307 of 2003).

[xxiv] European Communities (Electronic Communications Networks and Services) (Universal Service and Users Rights) Regulations, 2003 (S.I. No. 308 of 2003).

*and receiving national and international calls and access to emergency services through a number or numbers in a national or international telephone numbering plan, and in addition, may, where relevant, include one or more of the following services: the provision of operator assistance, directory enquiry services, directories, provision of public pay phones, provision of service under special terms, provision of special facilities for customers with disabilities or with special social needs and/or the provision of non-geographic services.*

### Public Switched Telephone Network (PSTN)

In the context of this paper, the PSTN is used as a synonym for the traditional circuit-switched telephone network offered by public telecommunications operators (PTOs), including the integrated services digital network (ISDN), and the public land mobile network (PLMN).

### Internet Protocol (IP)

The communications standard used by the Internet (strictly only the Internet networking protocol, but commonly used to include a whole related set of protocols).

### Voice over Internet Protocol (VoIP)

VoIP is used in this document as a generic term for the conveyance of voice, fax and related services, partially or wholly over packet-switched, IP-based networks. The main focus of this paper is VoIP, but outcomes or conclusions arrived at may also be appropriate to other packet-switched voice services, such as VoATM, VoDSL etc.

# Annex 2 – Background Issues

### Substitution

It is entirely conceivable, and indeed expected by many, that at some stage the existing PSTN will be entirely replaced by an IP-based network. This will impact both supply chain industries and end users who are expected to enjoy a greater number of services and lower costs. This substitution cycle, which has already commenced at core network and trunk levels is not likely to complete, however, in the short to medium term due to, among other factors, existing equipment replacement cycles. The issue of substitution is important because currently there are very specific requirements that PSTN operators must comply with, that have wider implications than the narrow provision of telephony services. These requirements, such as the transmission of calls to the emergency services, uninterrupted availability of network etc. will need to be carried forward, where appropriate, to new methods of network provision. ComReg has no wish to burden innovative operators by imposing onerous requirements on new network approaches, but direct substitution of existing services implies support for the ancillary services that go with PSTN. A more complicated regulatory situation exists where 'PSTN-like' IP networks and/or network services are proposed and this is an area with many dimensions that is under detailed examination by the European Commission, the FCC and other US bodies and by various other NRAs. ComReg will follow European initiatives in those cases and, if it is necessary to deal more urgently with any specific national situations, will develop its own positions on them.

### Extra-territoriality and Harmonisation of Approach

If IP network facilities are provided to Irish customers from outside the European Union, the New Regulatory Framework (NRF) is still legally applicable. This implies that if a problem arises that requires regulatory intervention, ComReg would have the power to act according to the terms of this new legislation. In practice, for both technical and economic reasons, it is realistic to expect that PSTN gateways for Irish customers will normally be placed within the national territory.

One of the driving factors behind the NRF surrounding telecommunications is the desire to promote a harmonised approach throughout the EU. A degree of harmonisation is desirable to reduce the possibility of service providers seeking to take advantage of differences in regulatory stance. Such differences might be deemed by operators to be

negative if (for example) they impose public service obligations or positive if they strongly support inter-working or offer numbering or other valuable resources. Another reason for harmonisation would be to ensure that the benefits and lower costs that VoIP offers are made available to more citizens in a shorter time span. Since the effect of Metcalfe's Law[xxv] is to ensure that as the numbers of VoIP users (and hence personal VoIP contacts) increase, so too do the benefits that accrue to each user, then it is in the interests of both operators and consumers that an aligned approach be taken Europe-wide.

### Emergency Services / Location Information

At present, because the emergency services call centre can identify the location of a caller from the geographic number used, the implication is that a caller need only dial the 112/999 number to ensure a targeted response to their call. Given that there is an inherent nomadic element to VoIP, service providers cannot ensure that a location that is nominally associated with the calling number (if any) is correct. The bills may go to an address in Ireland, but the calling party may be using their VoIP phone from another visited location. This lack of certainty about caller location has obvious drawbacks, including the possibility of wasted emergency resources if they are sent to the wrong location, as well as potential disaster for the caller through failure of the emergency services to arrive.

Location information (which is vital in the current method of responding to emergency calls) is not currently available on all numbers, but there may nevertheless be other practical solutions. At present in the US, the VoIP service provider Vonage[xxvi] urges subscribers to manually select the Public Safety Answering Point (PSAP) that is closest to them, and also warns subscribers that it may not be possible to dial 911 from a VoIP phone during a power outage. The prior selection involved in this solution may not be optimum, but it does indicate that workable solutions are available, and are likely to develop.

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[xxv] **Metcalfe's Law:** The usefulness, or utility, of a network equals the square of the number of users.

[xxvi] http://www.vonage.com (Vonage provides the user with a gateway that allows interconnection to the PSTN from the users Internet connection.)

Access to emergency services is an obligation on those who wish to provide PATS services, as discussed in Annex 3.

### Legal intercept

This is an issue that has generated much interest both in the United States and Europe. The basis of these concerns focuses on the fact that points of legal intercept that exist on the PSTN do not necessarily have counterparts on IP networks. If a VoIP call travels on the public Internet then there may currently be no realistic way of tracing it. Even if the call is traced, it may not be practical to decrypt it, given that many VoIP providers and many end-users use high levels of encryption. It is possible that, as more research and development is carried out by interested parties, viable solutions to these issues will be found.

These issues are not unique to the Irish context, and are being actively discussed at various European forums, including ETSI. ComReg will keep abreast of any and all developments, and ensure that any necessary requirements are implemented.

### Quality

Although voice quality on VoIP may not be as consistent as that on PSTN at present, it can be higher (as well as lower) that that experienced on circuit switched networks. Congestion (among other factors) can, and does, affect voice quality but can occur on PSTN networks as well as on IP networks. It is arguable that the selection of a number range for the provision of any specific VoIP services should not be predicated on its level of quality. Quality issues may sometimes be better judged by users than regulators; users may prefer to have a call of poor quality in some circumstances that they may not in others especially if the possibility of low-cost or free telephony is available.

### Benefits to the Irish economy

Setting out a comprehensive list of the benefits and disadvantages of VoIP for the Irish economy is not within the scope of this paper, though some national macro-level benefits that have been suggested include increased competition; improved communications infrastructure; positive influence on inward investment etc.

At the enterprise level, Irish organisations will be facilitated to integrate their voice and data services and to have reduced costs and/or additional service capabilities.

At the operator level, new competing organisations are likely to enter the marketplace, possibly from the IT/Internet world, with the aim of undercutting existing telecommunications services with IP (including Internet-based) services. At the same time, existing operators can be expected to migrate their systems towards an IP orientation to safeguard their competitiveness and avoid the risk of losing customers.
This topic is expanded on in the ComReg Briefing Note "Voice over Internet Protocol (VoIP)" ComReg 03/21.

## Annex 3 – Provision of Publicly Available Telephony Service

Whether Service Providers wishing to offer VoIP type services will require authorisation as PATS operators does not come within the scope of this document. The issue is one that is under discussion at European level and any decisions taken at that level are likely to affect the manner and/or type of authorisation in Ireland, including any specific obligations placed on operators offering VoIP services.

Likewise, whether or not VoIP services themselves will come under the definition of PATS is, in principle, not a question for this paper, though some of the obligations associated with PATS are mentioned below because they have implications for end users.

Certain obligations associated with offering a PATS service, are of such importance that ComReg must consider whether to require most or all new operators – whether PATS or not - to offer them. Indeed some SPs may believe that the provision of some of these services may be beneficial to the roll-out of services in certain markets. An example of this could be the requirement to offer routing to the emergency services. ComReg would expect that any service provider operating a voice service would in principle wish to offer routing to emergency services, notwithstanding any practical limitations that might exist for such a service, such as the guarantee of correct location information.

**Some obligations that are attached to PATS:**

Article numbers in the following section relate to the relevant articles in the Universal Service Regulations (S. I. No. 308 of 2003) of the New Regulatory Framework.

*5.1.1 Directory enquiry services and directories (Regulation 4)*

PSTN end users have the right to be included in a comprehensive, regularly updated publicly available telephone directory. It is clearly desirable for similar requirements to extend to publicly offered parts of VoIP networks where payment is demanded from subscribers, but exceptions may be justifiable in certain cases; the guidelines for deciding on such cases need to be established.

*5.1.2 Measures for end-users with disabilities (Regulation 6)*

Disabled end-users have the right to accessible and affordable publicly available telephone services, equivalent to those enjoyed by other end-users. Given the opportunities offered by VoIP and the Internet, it is conceivable that services offered to

end-users with specific requirements will be more varied, and perhaps more cheaply available than at present.

#### *5.1.3 Billing issues (Regulations 8 and 9)*

Disconnection for non-payment of bills should only take place after due warning is given to the subscriber and any service interruption should be confined to the service concerned.

A basic level of itemised bills which are to be provided by designated undertakings may be laid down. This is so that end-users might verify and control charges that they incur in using the PATS and thereby exercise a reasonable level of control over their bills.

#### *5.1.4 Transparency and publication of pricing (Regulation 18)*

Transparent and up-to-date information on applicable prices and tariffs and on standard terms and conditions, in respect of access to and use of PATS should be available to end-users. It is reasonable to expect service providers to offer this information publicly, in an easy to understand and readily accessible format.

#### *5.1.5 Integrity of the network (Regulation 19)*

The integrity and availability of the public telephone network should be maintained at all times, and all reasonable steps should be taken to ensure uninterrupted access to emergency services.

#### *5.1.6 Emergency services (Article 22)*

It is essential that all end-users of PATS be able to call the emergency services free of charge, either through the single European emergency call number '112' or any national emergency call number, e.g. '999' in the Irish context.

This issue is discussed in the context of background issues in the previous annex, including its possible application to non-PATS operators.

#### *5.1.7 Access to non-geographic numbers (Regulation 24)*

End-users from other Member States should be able to access non-geographic numbers within their territory, except where a called subscriber has chosen for commercial reasons to limit access by calling parties located in specific geographical areas. This is in line with the current numbering conventions and EU legislation. ComReg will take account of these issues, as necessary.

*5.1.8 Number portability (Regulation 26)*

Subscribers of PATS who request number portability must be able to retain their number(s) when moving between operators offering similar service types. This issue is discussed elsewhere in this document in the context of numbering for VoIP services.

*5.1.9 Code of practice/Dispute resolution (Regulation 28)*

Transparent, simple and inexpensive out-of-court procedures are currently in use for dealing with unresolved disputes involving consumers in respect of CPS, Number Portability and many other aspects of the PSTN. These work reasonably effectively and minimise regulatory intervention and it is therefore very desirable to have similar arrangements governing the publicly offered parts of VoIP networks. Such a code or codes should relate, but not necessarily be limited to, issues covered by the Universal Services Directive.

## Annex 4 – Typical types of VoIP services

### Self-provided consumer

This is a peer to peer model, without specific operational support by any service provider. Examples of this type of service would be similar to that currently offered by Skype[xxvii]. Such a user has an IP connection and VoIP-enabled device, allowing him/her to place calls to other similarly-equipped users over or via the public Internet. If the user has a flat-rate Internet access plan, then the marginal cost of these calls can be as low as zero.

### Self-provided consumer with PSTN access

This type of consumer uses a broadly similar type of service to that described in the basic 'Self-provided consumer' model above, but with the added advantage of having access to a gateway (or gateways) to the PSTN provided by some Service Provider (SP). A subscription is likely to be needed to the SP, who may be located anywhere in the world, typically with payment made on-line. The number of countries in which gateways are provided by the SP will greatly affect the usefulness of such a service, as well as its cost. Access to emergency services and legal intercept will be unavailable or difficult to implement, especially where no local presence exists for the SP.

### Independent of ISP

The user in this scenario subscribes to a local SP that is independent of the Internet Service Provider (ISP). The SP (as opposed to the ISP) provides a gateway to the PSTN, at least at national level, as well as direct IP-based access to other customers who are also using VoIP. This ensures that the user can call both VoIP and PSTN users. The marginal cost that the user incurs in this situation would be lower than in normal PSTN circumstances, but generally higher than in the self-provided consumer example, especially if (as is likely) overseas calls cannot be gatewayed onto the PSTN by the SP (or its affiliates) in the destination country. Although the service provided is superficially like a traditional PSTN service, there are elements that are distinctly different, for example the inability to make a call during a power outage or extra value-

[xxvii] http://www.skype.com (Skype [Sky-pee] is peer-to-peer software that allows Skype users to connect to each other via the public Internet.)

added services that only VoIP type services can offer. An example of an SP providing this type of service is the previously mentioned Vonage.

The main difference between this and the previous type of VoIP service is provision of access to on-net users (i.e. access to other users who also subscribe to the same VoIP service or to services affiliated to it).

### Bundled with broadband product

In this example the user signs a commercial agreement with a non-PSTN-based SP that provides broadband Internet access as well as a gateway to the PSTN. Because the entire path from the user to the PSTN is controlled by the SP, service quality can be guaranteed. Again, the marginal cost to the user is not zero, but is usually lower than a comparable voice minute bill from a PSTN SP. One example of this type of provider would be Japan's 'Yahoo! BB'. Providers in Europe are as yet rare.

### Corporate internal use on a business LAN/WAN

In general, in this Virtual Private Network (VPN) situation, there is not considered to be a SP per se, although the management of the system may be outsourced to one. Coverage of multiple sites in the form of an Intranet may be included and support may also be provided for out-workers (e.g. tele-working). Quality of service may be totally or partly assured according to whether private lines are used for external interconnections and/or whether the necessary quality management protocols like MPLS, RSVP or DiffServ are implemented. Except insofar as it reaches out beyond the corporate Intranet (e.g. to reach PSTN or public VoIP customers), this is effectively a private network.

This category of VoIP service is likely to be the main driver of VoIP growth for the immediate future, with the other more consumer-oriented versions gathering pace as interconnection of VoIP 'islands' takes place. Such interconnections increase the population of potential contacts available to interested newcomers, thus overcoming Metcalfe's Law.

## Annex 5 – Proposed Conditions of Use for new range of numbers for VoIP services

1. Numbers allocated for use for VoIP services (specifically numbers that fall under the ITU-T Recommendation E.164) are part of the National Numbering Scheme that is administered by the Commission for Communications Regulation (ComReg). These numbers are subject to the National Numbering Conventions and they are allocated strictly on that understanding.
2. Numbering resources designated for VoIP purposes shall be assigned to specific termination points or to specific personnel, as appropriate. Both of these categories are deemed to be 'number-holders' for the purposes of these Conditions of Use.
3. The number-holder must normally be resident in Ireland or otherwise establish genuine and specific reasons why a number or numbers from the Irish numbering plan should be allocated.
4. In accordance with the National Numbering Conventions, it is a condition of allocation that serious and/or repeated contravention of the Conventions is considered to be grounds for immediate withdrawal of Rights of Use to the numbers concerned.
5. VoIP numbers are issued for use within Ireland but occasional nomadic use outside Ireland (e.g. for travel by the number-holder) is permitted. Where continuous use occurs outside Ireland (e.g. for any continuous period of more than 6 months) and/or for longer-term nomadic use where more time is spent outside Ireland than inside, then a number or numbers from the visited country (countries) should be obtained.
6. Where cases are reported of contravention of paragraph 5 above, ComReg's decision on whether or not to withdraw the number shall be accepted as final, provided that ComReg has first given the number-holder an opportunity to explain its usage and justify the amount of time during which the number is in use or potentially in use abroad. This is a proportionate and necessary level of control of the numbering plan resources to ensure they are protected, in view of the difficulty of controlling nomadic usage and the potential growth of demand for this kind of numbering resource.
7. Allocations of VoIP numbers are currently made without charge. Assignees should be aware that this situation could change in the future.
8. No proprietary rights in respect of these numbers shall be acquired by the Assignee.
9. Primary level Assignees shall immediately advise ComReg of any changes in their status as Service Provider/operator. Further, the Assignee shall advise ComReg of any

change in circumstances that may be capable of preventing the Assignee from complying with the conditions of allocation herein and/or any further conditions imposed and/or directions issued from time to time. End user Assignees (i.e. secondary level Assignees) shall correspondingly advise their providers of any changes that might affect their individual number allocations.

## Appendix A – Legislation

**Authorisation Regulations** means the European Communities (Electronic Communications Networks and Services) (Authorisation) Regulation, 2003 (S.I. No. 306 of 2003). Under Regulation 14 of the Authorisation Regulations, ComReg is obliged to define conditions to be attached to rights of use of numbers.

**Framework Regulations** means the European Communities (Electronic Communications Networks and Services) (Framework) Regulations, 2003 (S.I. No. 307 of 2003). In accordance with the terms of Regulation 22 of the Framework Regulations, ComReg is vested with sole responsibility for administering the national telecommunications numbering resource.

**Universal Service Regulations** means the European Communities (Electronic Communications Networks and Services) (Universal Service and Users' Rights) Regulation, 2003 (S.I. No. 308 of 2003). Number portability, access requirements to the emergency call numbers '112' and '999', and various other matters that may – completely or in part – apply to VoIP services, have been mandated (at least for PATS) in the Universal Service Regulations.

# Appendix B – Consultation Questions

## List of Questions

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## Appendix C - Acronyms

**CLI** (Calling Line Identifier) is a facility that enables identification of the number from which a call is being made.

**CPS** (Carrier Pre-Selection) is the facility offered to customers which allows them to opt for certain defined classes of call to be carried by an operator selected in advance (and having a contract with the customer), without having to dial a routing prefix or follow any other different procedure to invoke such routing. The CPS operator need not be the access provider.

**DDI** (Direct Dial In) is a switchboard's capability to route an incoming call to the extension dialled without the intervention of an operator.

**DSL** (Digital Subscriber Loop) is a family of technologies generically referred to as DSL, or xDSL, capable of transforming ordinary phone lines (also known as "twisted copper pairs") into high-speed digital lines, capable of supporting advanced services such as fast Internet access and video-on-demand. ADSL (Asymmetric Digital Subscriber Line) and HDSL (High Data Rate Subscriber Line) are just two examples of xDSL.

**E.164** Standard is an ITU-T standard that defines the international public telecommunication numbering plan.

**ENUM** (Electronic Numbering) is a protocol for converting an ordinary telephone number into a format that facilitates Internet-based look-up of any kind of addressing information.

**ETSI** (European Telecommunications Standards Institute) is an independent, non-profit organization, whose function is to produce telecommunications standards.

**FCC** (Federal Commission for Communications) is a US based body that is charged with regulating interstate and international communications by radio, television, wire, satellite and cable.

**IETF** (Internet Engineering Task Force) The Internet standardisation body.

**ISP** (Internet service provider) is a service provider who provides access to Internet services.

**MNA** (Minimum Numbering Area) is a defined geographic area that is equal to or one of a few subdivisions of an STD area. Location portability (of geographic numbers) may not extend beyond an MNA's boundaries, for practical (PSTN-oriented) reasons.

**MVNO** (Mobile Virtual Network Operator) is a company that buys network capacity from a network operator to offer its own branded mobile subscriptions and value-added services.

**NDD** (National Directory Database) is a record of all subscribers in the state, including those with fixed, mobile and personal numbers, who have not refused to be included in that record.

**NP** (Number portability) between operators enables a customer to transfer from one operator to a second operator, while retaining the same number provided the customer remains at the same address or at least within the same MNA.

**NRA** (National Regulatory Authority) is the relevant regulatory authority in each country. In Ireland, the NRA is ComReg.

**PBX (**Private Branch Exchange) is a subscriber-owned telecommunications exchange that usually includes access to the public switched network**.**

**SMP** (Significant Market Power) The Significant Market Power test is set out in various European Directives, including the Interconnection Directive, the Amending Leased Lines Directive and the Revised Voice Telephony Directive. It is used by the National Regulatory Authorities (NRA) to identify those operators who must meet additional obligations under the relevant directive. It is not an economic test; rather it requires a consideration of the factors set out in the test within a specified market.

**STD** (Subscriber Trunk Dialling) is another term for NDC (National Destination Code).

**Virtual number** is a secondary number that allows a call to be redirected from a home mobile number (i.e. so that the caller and calling party pays a local rate)

**VPN** (Virtual Private Network) consists of a private network that may be based around one or more inter-linked 'islands' connected together through secure connections. In addition, the network may include individual outworkers who are also connected through secure connections.

**WiFi** (Wireless Fidelity) (otherwise known as Wireless Networking) commonly uses the 802.11 series of protocols to transmit and receive data over distances of a few hundred feet.