ENUM in the UK – A Discussion Paper

The DTI has released a consultation document regarding the UK implementation of the 'ENUM' concept. The idea is to allow DNS to support telephone number lookups, returning e-mail addresses and other electronic information.

Discussion Scope

In this paper, I provide an overview of the DTI consultation on implementation of the ENUM concept in the UK, and put forward my own views on the consultation and the ENUM idea itself.

The paper skims the surface of some much larger issues relating to privacy and aggregation of data, but I aim to focus specifically on the topic of ENUM and the consultation, as I will comment more generally on privacy and related issues in other articles.

The discussion below is intended to stimulate thought and discussion around the issues, as well as to raise awareness of this in the community. Although you may not have heard about it before, the consultation is fully public, so please do respond to it if you feel strongly about any of the issues raised here. Indeed, if you are a consumer with a telephone number, I recommend you do.

Please refer to the References section at the end of the paper for further sources of information on ENUM, the consultation and various surrounding issues.

Document Structure

This paper is structured as follows:

- **What is ENUM** – an overview of the concept and a background to the DTI consultation
- **Discussion Points** – the main purpose of the paper, and presents the key issues surrounding ENUM. This section is further divided to discuss the following issues:
  - *Consultation Distribution*
  - *ENUM Justification*
  - *Privacy and Security*
  - *Implementation Issues*
- **UKEG** – a brief overview of the UK ENUM Group, its purpose and its output; this section also refers to the UK ENUM Trial Group (UKETG)
- **Summary** – a final round-up of the primary issues
- **References** – pointers to further information and other documents referred to within the paper

What is ENUM?

There are detailed explanations of the ENUM concept referred to in the References section at the end of this document, as well as in the DTI consultation paper itself, but it is worth presenting a summary before discussing the issues, so that they can be put in context.

The following paragraphs are taken from the consultation document:

2.1 ENUM is a proposed international public database that links telephone numbers to Internet names and other Internet related destinations and identities. Any party can interrogate the database with the telephone number of an ENUM subscriber and the database will return a list of identities and Internet related destinations that are associated with the subscriber; examples are the subscriber's email address, mobile telephone number or web page. These identities can then be used to establish various forms of communications with the ENUM subscriber, eg the party could send an email to an ENUM subscriber having initially known only their telephone number. The ENUM database can be used both by human users and by electronic processes (applications) that are providing other forms of communications services.

2.2 Figure 1 shows how ENUM works. Caller A (the ENUM End user) wishes to communicate with Called B (the ENUM Subscriber). Caller A knows B's telephone number and interrogates ENUM with the telephone number. The ENUM database holds information about B's communications facilities and optionally his current preferences for receiving incoming communications. The ENUM database returns this information to Caller A and then A decides how to communicate with B and initiates a normal form of communication using whichever of the identities and forms of communications seem most appropriate. For example, Caller A could use ENUM to find out B's email address and then send an email.

2.4 Figure 2 shows an example of the information that can be retrieved from a query to ENUM for the number +441794833303. This example is taken from the UK trial.

SMS to +447765402268

POTS to +441794833303

SIP to 3666@voip.srmr.co.uk

EMAIL to mike.hook@roke.co.uk

WWW to www.roke.co.uk

Figure 2: Example of information from ENUM

2.5 The potential significance of ENUM is that it provides a bridge between the disparate systems of telephone numbers and Internet identities. Although there is a wide range of views on the prospects for ENUM, such a bridge could become important as telco networks and the Internet "converge" in the future. This potential significance is one of the main reasons why the DTI has facilitated the development of ENUM.

Even in these few paragraphs, there are some phrases that might be cause for concern (e.g. “international public database”, “Any party can interrogate the database”, etc.), and it is the issues raised by these that I aim to discuss in the next section.

Discussion Points

There are a number of key issues that can be drawn merely from the summary above and a little background research into ENUM, without delving too deeply into the wording and intent of the remainder of the proposal. It is these issues that this document raises to the community in general, and offers up for discussion, thought and general awareness.

Consultation Distribution

This first point is more general in scope than the topic under discussion, but should be raised. I believe there should be an easier way for the consumer to hear about public consultations in this country. I use 'change monitoring' on various HMG Web sites to discover about new consultations, but until this consultation emerged, the DTI wasn't one of them. I'm certain I'm still missing some.

Ideally, the existence of public consultations should be propagated to the intended audience (the public) – unfortunately, there is no obvious mechanism for this short of issuing printed summaries to every household, but it is becoming increasingly important in today's interconnected world, as so many of the topics being discussed will impact on every individual. Consumer representative groups make every effort to ensure consumer issues are covered, but I believe they receive minimal input from the community as a whole.

I only heard about this consultation because Rhye is a Nominet TAG holder, which means I am on an announcement distribution list; Nominet are planning to become the Tier 1 provider for ENUM services in the UK. If I hadn't been a named contact for a Nominet TAG holder, though, I'm not certain I would have heard about this consultation at all.

Quoting from the consultation document, regarding later publication of ENUM policy:

> *Public awareness would be ensured by posting all policy proposals developed by the UK ENUM Policy Board on a publicly accessible web-site and inviting interested parties to register their interest so that they can be advised by e-mail when new documents become available.*

Simply putting something on a public Web site does little to ensure the average consumer sees it. This proposal in particular could impact on every individual in the UK, and I would welcome any ideas I could put to the authorities on more useful communications mechanisms for public consultations. Readers' input on this subject would be appreciated.

To be fair, the DTI have made some effort to distribute the consultation document to a wide audience. The following is a quick summary analysis of the list of recipients (the full list is presented in the document itself):

- A large number of telecommunications providers, ISPs and related service

organisations
- A fair number of Government and Defence departments
- Ofcom, the Information Commissioner, Privacy International and the Consumers' Association

The last item above shows some attempt to reach consumer representatives and advocates of privacy in general, but I will be copying this article to other groups in an effort to widen the audience. I may also contact the organisations that have received it to find out what they think of the proposal. With the permission of the individual responding, I will post any responses to the Privacysense Web site.

ENUM Justification

This is my primary argument against the implementation of ENUM in the UK. Unfortunately, it is not the focus of the consultation – it appears to have been decided that ENUM *will* be implemented, and so the only question is "How?"; this is the general air of the consultation document.

Given my previous point, it may be that I have missed a consultation or EC Directive on the question of whether ENUM should be implemented at all. From the small amount of research I've done, however, I don't think this is the case – the UK ENUM Group (UKEG) was set up to discuss the technology and run a trial, and from there we are looking at how to implement it.

As far as I can tell from the information available, ENUM comes purely from an engineering/academic background. IETF RFCs have been written on it and surrounding technologies, and it has gradually emerged as the most cost-effective means to achieve the end for which it has been designed. My question, though, is more fundamental – is there such consumer demand for this technology to be available that its implementation is deemed inevitable?

In essence, ENUM comes from an academic and engineering exercise into what *could* be done. From there, commercial organisations have realised what they would be able to do with such technology, and only then is it presented to the consumer as something they need. This does not appear to be a particularly customer-focused approach to innovation.

My primary concern is that in this engineering-driven path from concept to reality some of the most essential questions are not asked, including:

- Is this needed?
- Who will use it?
- Are there any privacy issues?
- Fundamentally, does it improve things, all things considered?

Since the whole implementation process is being undertaken before, as far as I can determine, the end users are asked whether they want it at all, we have a situation where investment in the implementation will need to be justified, and so the idea will be sold as beneficial simply for commercial reasons.

Similarly, I feel a worrying assumption is being made by the DTI: that if the

potential Tier 2 providers are willing to invest heavily in implementation of ENUM, there must be some benefit to their customers for them to do so. The fact is that there is technically very little for the Tier 2 provider to do in the initial stages – the infrastructure already exists (DNS), and only some minor enhancements to existing processes would need to be developed. So from a potential Tier 2 registry's point of view, the justification could simply come down to the commercial benefit of obtaining validated marketing information, or even an increase in revenue from increased traffic across their networks.

In an effort to present a balanced view, I have attempted to quantify the benefits to the end user of ENUM being implemented. This has turned out to be a difficult task – whilst I have personally experienced moments where I'd wished I could look up details of whom a missed call was from, or find an e-mail address for someone when they're not answering the telephone, these are not regular occurrences, and do not generally present a major problem. It certainly doesn't happen frequently enough for me to encourage international implementation of new technologies and the summary collection of vast quantities of identifying information.

Of course, we do already have processes in place that will allow us to obtain information about someone given only their telephone number. It may be old-fashioned, but if I want to send someone an e-mail, and I only have their telephone number, the first thing I would try is calling them and *asking* for their e-mail address! If I can't do that because they might not want to give it to me, then they are unlikely to have given it to an ENUM registry anyway…

Even the small section on 'Benefits of ENUM' in Appendix C of the consultation document demonstrates the inherent difficulty in finding a good reason to implement it:

C23 ENUM enables enterprises including small and medium businesses to offer new Internet-based communication services such as reading emails to telephone users. ENUM offers a standard that provides something for manufacturers and other stakeholders to work around. It enables everyone to work in a defined way internationally and the standard is sufficiently detailed to ensure interoperability between systems developed independently but in compliance with the standard in other countries. It is too early in the international development of ENUM to provide examples of its use although a limited service is now in operation in Austria.

C24 While the trial was carried out on only a limited number of applications, it was encouraging that more ENUM-based applications emerged towards the end of the trial and their numbers are growing. These could attract very large numbers of future registrations.

In all, I see little advantage over existing processes and technologies to the end user, the consumer, of ENUM being implemented in the UK. Given the potential impact covered in the next section, I would argue that ENUM implementation could be a false economy to this country's communications industry. Is the demand for 'convergence of telephony and networking' really coming from the consumer or industry, or from commercial organisations

seizing financial opportunities?

Unfortunately, it looks at this stage like ENUM *will* be implemented, however many people read this paper – industry trends such as this tend to have considerable impetus. Given this, there must be certain controls put in place to minimise abuse of the system, but I am concerned that the current proposal does not address this adequately.

On a lighter note, the consultation contains suggestions on the process to be followed in selecting the Tier 1 registry, and an intriguing thought occurred to me: what would happen if an organisation applied to become the Tier 1 registry with the express intention of doing nothing whatsoever (i.e. not actually performing any registry services) on ethical grounds? It is unclear whether the application would be rejected, since applications of this kind do not appear to be explicitly excluded in the DTI proposal!

Privacy and Security

How would ENUM be used if it existed in the UK now? Undoubtedly, some consumers would use it to obtain alternative contact details, but I don't believe such end users would represent the main audience. Communications providers *might* be able to transport communications between different media in a more transparent fashion (I'm not yet convinced of this argument), but other extant technologies already allow this with fewer inherent issues. My main concern is that the largest group of users would be abusers.

To make the system useful, all information held by the Tier 2 registries (and even at Tier 1) would need to be validated, or the very purpose of the technology would not be realised. The registrars would, therefore, hold large databases of accurate and validated e-mail addresses, and the inherent value of such a database to both legitimate and illegitimate marketing groups is obvious. Even if each registry was committed to keeping its database secure from abuse, the information is *intended* to be public, and so there must by definition be some mechanism to query it. Similarly, the Domain Name System (DNS) was designed from the outset to provide public information, and it would be difficult to 'retro-fit' security to it.

Additionally, there are 'reverse lookups' to deal with. Readers should consider whether there are any issues with obtaining a telephone number from an e-mail address. Personally, this potential would concern me if my details were stored at an ENUM registry.

One area extensively discussed in the consultation document is that of authentication. As mentioned earlier, for the system to be useful, the data held in ENUM must be kept accurate. The methods of authenticating input to the system may be appropriate and robust, but I would suggest there ought to be some thought given to authenticating those *querying* the system. For example, how will automated data collection processes be prevented from downloading the entire database? It would not be difficult to write a script that will cycle through all possible numbers and submit an ENUM query for each one.

In actual fact, the specific information that is currently proposed to be held in ENUM records is not a great issue – most of it is already public, and even a large database would not add greatly to the plethora of private information that can be easily obtained. Indeed, most people already happily publish all of the information proposed. ENUM would, however, make it easier to gather private information for unethical purposes. Future development also needs to be considered – it is possible the data will increase in detail as industry drives to make the interface more useful, or as Tier 2 registries compete with each other to 'add benefit' to the service.

On a more general note, there are potential privacy issues, some of them quite considerate, with the entire concept of technology convergence, and I will continue to discuss these with relevant organisations as technology evolves. The potential aggregation effect given future convergence of other data sources does concern me, and this aggregation, combined with the general lack of security awareness in the community and industry, commerce-led implementation and a drive to recoup implementation costs, leaves me worried about what may be overlooked in the process.

The biggest privacy-related issue I have seen in ENUM discussions in other countries is the question of whether ENUM would be an 'Opt In' or 'Opt Out' system. Fortunately, the UK ENUM Group strongly recommend that the system is 'Opt In' (i.e. no details are held unless explicitly approved by individual or organisation concerned). This is the best way to proceed, but leads to the problem (for suppliers) that any implementation may fail due to lack of input. The 'Opt Out' approach (i.e. all details can be held unless an individual or organisation requests their removal) conflicts with ethical and legislative controls, and is not a realistic option.

Even with an 'Opt In' system, I am concerned that the general consumer will be heavily encouraged by their telephone company, Internet Service Provider or another organisation to register (or authorise the registration of) their details in ENUM. It needs to be considered whether such organisations would ensure the consumer receives a balanced view of the advantages and disadvantages of registration, rather than focus solely on the benefits (whatever they are perceived to be). If not, we could see widespread exploitation of lack of awareness in consumers who may not know precisely what they are agreeing to. It is not difficult to envisage contracts and application forms being updated to include a small-print checkbox labelled:

> "Tick here if you **do not** want to be listed in ENUM".

There is one final issue worth mentioning on the security/privacy front, but it is related again to the concept of 'convergence' and 'cross-connectivity' in communications technology – the issue of boundaries. Currently, if I am calling my bank from a landline to a landline number, I am reasonably assured that the infrastructure supporting that call is secure. With the spread of Voice over IP (VoIP) and Voice over Broadband (VoB), however, it is becoming difficult to be sure how your call is routed. Is the recipient already on VoB? Or are they using a wireless handset? Or are they actually talking to you using a microphone on an Internet-connected PC?

In summary, I don't believe it is so difficult for the 21st Century citizen to deal with more than one input/output device for communications. I use my telephone for audio calls, my computer and modem/broadband to connect to the Internet and e-mail, and a fax machine to send and receive faxes. As technology and legislation currently stand, I believe any potential cost saving in converging technologies is outweighed by potential impact on security and privacy.

Implementation Issues

When it comes to the proposal for implementation of ENUM in the UK, I have a number of concerns. These can certainly be resolved through process, but note my earlier points regarding justification for ENUM.

The primary area of concern is the apparent lack of control that will be enforced over potential Tier 2 registries. To quote from the consultation document:

> *Any organisation except the ENUM Tier 1 registry may become an ENUM registrar at Tier 2. There will be no a priori accreditation of ENUM registrars but they will be required to abide by a Code of Practice to be developed by the UK ENUM Supervisory Board. The UK ENUM Supervisory Board will investigate complaints against ENUM registrars who fail to comply with the Code of Practice and in the event of recurring non-compliance will disqualify the ENUM registrar.*

There is no proposal to regulate or review performance and compliance of Tier 2 registries, which strikes me as dangerous, since it is the Tier 2 organisations that will be responsible for managing the data itself. Only in the event of a complaint will any review and/or action be taken. The phrase "any organisation" is also mildly concerning – will organisations' backgrounds be investigated? Will any industry sectors be excluded (e.g. direct marketing), or does "any" really mean "any"?

On a more general note, the proposal is based on a "self-regulating industry". This can work, but in the past, such arrangements have often required later intervention by the authorities. There are proposals for the creation of a Committee (the UKEC) that will have some responsibility for ensuring ENUM works in the best interests of all concerned, but I feel its remit will need to be carefully defined, its power potentially increased and its membership reviewed to ensure all affected parties are represented. From the consultation document:

3.2 *The proposal is to form an organisation to be called the UK ENUM Committee (UKEC) that consists of two boards:*

a. *An executive UK ENUM Policy Board composed of stakeholders to formulate the rules and policies underpinning ENUM implementation within the UK. The membership would be:*

ENUM Tier 1 Registry - 1 seat

Tier 2 nameserver providers - 2 seats

ENUM Registrars - 2 seats

Authentication Agencies - 2 seats

Users - 2 seats

Application Providers - 2 seats

b. A UK ENUM Supervisory Board whose role is to review and comment on the documents prepared by the UK ENUM Policy Board. The intention is that the UK ENUM Supervisory Board will provide the checks and balances necessary to ensure transparency, fairness and equality. The membership would be:

Independent organisations - 3 seats

Ofcom - 1 seat (observer status)

DTI - 1 seat (observer status)

The composition of the Supervisory Board will be critical to ensuring all concerns are addressed, but I am concerned about the composition of the Policy Board. Hopefully decisions will be made by consensus or unanimity, rather than majority vote, as consumer representation is minimal. It also needs to be clarified who the 'Users' might be. I would suggest representatives of consumer-focused organisations might be appropriate.

UKEG

It is worth looking at the UK ENUM Group (UKEG) that was set up to examine ENUM and organise a trial of potential systems, as their report contains some sensible recommendations. Membership of the UKEG was as follows:

- BT Exact technologies
- Nominum
- Internet Computer Bureau plc.
- Inmarsat
- DTI
- Neustar
- Nominet
- Thus
- Oftel
- Cable & Wireless
- Vodafone
- INTUG
- Steptoe & Johnson
- InterConnect Communications
- NTL
- Comorotel

Consumer representation was minimal, and the majority of organisations involved would have been very implementation-focused.

The UKEG's preliminary report can be obtained from the DTI Web site at http://www.dti.gov.uk/industry_files/other/enumgroup.doc, and fortunately they produced some coherent and intelligent recommendations. It concerns me, however, that these recommendations may not be sufficiently considered by the potential Tier 2 registries, as the UKEG report does not have a great deal of visibility in the consultation process. The report is dated April 2002, and it appears little has been done between then and now, other than to run a trial that appears to have been less than successful.

The recommendations from the UKEG were as follows, and I have inserted one comment:

> *RECOMMENDATION 1: The UK will adopt a policy of 'opt-in' for the UK implementation of ENUM.*
>
> *RECOMMENDATION 2: No database will be populated with that are not assigned to end users numbers.*
>
> *RECOMMENDATION 3: The UK implementation will adopt all recommendations on consumer protection and data privacy.*
>
> *RECOMMENDATION 4: ENUM applications must ensure that the existing requirements for number portability are retained.*
>
> *RECOMMENDATION 5: In principle any UK number range can be*

included in ENUM

Policy will need to be produced to address excluded ranges. Consider, for example, the prefix 020 7231 – the first digits of numbers at New Scotland Yard. Should there be built-in checks to prevent an unaware administrative assistant at NSY entering sensitive details into ENUM? There are a lot of other restricted number ranges, and I am curious about how these would be dealt with, if at all. There will clearly be questions around ex-directory numbers as well.

RECOMMENDATION 6: The UK will implement a single Tier 1 Registry architecture serving all UK E.164 numbers.

RECOMMENDATION 7: NAPTR records will be stored in the ENUM DNS Provider's database.

RECOMMENDATION 8: The UK will implement an architecture at Tier 2 that will allow business entities to provide both Registrar and DNS Provider services or alternatively just one of them.

RECOMMENDATION 9: The UK should create a Policy Oversight Committee for UK ENUM

RECOMMENDATION 10: The selection of the Tier 1 registry for the UK should take place using an open, public and transparent process and selection based on the criteria proposed, together with cost and experience.

UKETG

It is difficult to obtain information relating to the progress and results of the UKETG (UK ENUM Trial Group). A Web site was created for the project (http://www.ukenumgroup.org/), but this doesn't appear to have been updated since April 2003. It doesn't list the participants, and the only published output appears to be a Terms of Reference document, which contains very little detail.

However, a Google search located a presentation produced by the UKETG's Chairman in February 2004, which suggests that the trial was far from successful. It appears there were a large number of serious procedural, operational and technical issues identified and, fundamentally, the Chairman points out that it is difficult to justify a business case for ENUM at all.

Given the attitude of this presentation, it comes as something of a surprise that the DTI is presenting ENUM in a positive light in this consultation, and I would be extremely interested to see any further information on the UKETG's work that the reader may uncover.

Summary

I am assuming at this stage that ENUM implementation will happen in the UK, whether it is sensible or not – there appear to be commercial drivers at work that may override common sense.

There are clearly a number of issues with the proposals as they stand, and limited ways in which the concerned individual or organisation can input, beyond responding to the consultation. Given the apparent impetus of ENUM, it seems likely to me that the system will be implemented, and so I believe the best way to proceed is to take part in the process in an effort to ensure it is set up with consumer protection of paramount importance.

The key issue I see is that discussed under 'Justification' above. Do we really need a system such as this in the UK, and even if we do, do we need it badly enough to justify the amount of effort that will go into controlling and managing it, making it useful and preventing its abuse?

I recommend that concerned individuals and organisations respond to the DTI consultation to ensure the Department receives a properly representative set of views.

Should you decide to respond to the consultation document, please also consider copying your response to enum-consult@privacysense.com. Depending on the volume of response, it may be some time before the DTI publish the results of the consultation, but your input would allow me to publish an abridged summary of views in advance of this.

References

Privacysense Web Site – one of a suite of sites from World of Sense, which is the main mechanism by which I publish articles, papers and discussion on privacy and related issues affecting the general consumer. It is here that the latest version of this document can be found:

http://www.privacysense.com/

DTI Consultation – the relevant page on the DTI Web site. Further information is due to be published later, including details of a public workshop to take place in September. The Consultation Document (URN 04/1314) can also be downloaded from here, or ordered in hard copy:

http://www.dti.gov.uk/consultations/files/publication-1286.pdf

Electronic Privacy Information Centre (EPIC) – an analysis of ENUM in general, but with may useful references to international proposals and implementations. Of particular note is the link to Roger Clarke's paper regarding Australian proposals:

http://www.epic.org/privacy/enum/default.html

Political Intelligence – a very detailed analysis of ENUM presented to the European Union for consideration in policy-making. There have been comments that some of this analysis is based on misunderstanding of the principles and technology, but personally I cannot see any misunderstanding:

http://europa.eu.int/information_society/topics/telecoms/regulatory/publiconsult/ngn_numbering/documents/nna_final_15sept.pdf

RIPE Discussion Group – during the recent trials, a discussion group was created on the RIPE Web site – there appear to have been only a few comments from one person concerned about privacy, but some of the threads make interesting reading in any case, and certainly provide an indication of how ENUM could work in the real world:

http://www.ripe.net/ripencc/mail-archives/enum-trials/2003/index-subj.html

The Register – an article from the online technical magazine on the topic:

http://www.theregister.co.uk/2003/10/07/the_future_of_enum_voip/

UKETG – a presentation, produced by the Chairman, on the UK ENUM Trial Group's activities, not referenced in the consultation or from the Web site of the UKETG:

http://docbox.etsi.org/tispan/open/ENUM-Workshop-20040224-Sophia/02.%20Jim%20Reid%20UKETG-ETSI.pdf