

## **CSCN ENUM Issues and Questions, 22 March 2004**

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**TITLE:** CIRA's Comments on ENUM

**ISSUES ADDRESSED:** This contribution provides CIRA's comments related to the ENUM work activities

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### **Nature of this Document**

This document responds to the CSCN document whose title is cited above. CIRA considers that some issues raised in the March 22 *ENUM Issues and Questions* document can be responded to now, while others await further developments, including the results of trials, and further thinking by the CSCN and governments. Accordingly, CIRA responds below to some of the questions, and under reserve of changing its positions on the basis of new evidence or further considerations.

CIRA's response follows the format laid out in the document<sup>1</sup> of March 22, 2004, which summarized the discussions that took place at the CSCN ENUM committee's face-to-face meeting of March 11, 2004 and the teleconference of March 22, 2004.

## ***CIRA's General Views on ENUM***

First, ENUM is not the revolution: voice over IP is. ENUM is an address translator and a look-up system. It has already been demonstrated that VOIP can work quite well without ENUM. VOIP is arriving on the scene in force and will not wait for complicated bureaucratic maneuvering around ENUM. Converging communications services will increase the need for a harmonized addressing system. It is quite likely that carriers will want to find an integrated addressing system to keep VOIP working in tandem with the PSTN, and ENUM provides the means to achieve it. But delay or failure to establish suitable official ENUM arrangements in the next year or less will not stop the deployment of VOIP; it will mean that VOIP providers go around the institutional blockage.

Consider that there are about 2 billion telephones in the world<sup>2</sup>. The current domain name system could assign every telephone a domain name and handle the traffic. Moreover the current version of the DNS<sup>3</sup> has the capacity to expand its capabilities by orders of magnitude. Could the E164 numbering system handle the 157 million hosts and 588 million personal computers in the world as well and as easily<sup>4</sup>? And can it handle a world where every processor has an IP address?

Furthermore, the transitional nature of ENUM argues persuasively for the temporary nature of the institutional arrangements to manage it. We acknowledge that, under the current interpretation of rules regarding delegation to Country Code 1, some form of international cooperation is necessary, and that this will require some forum by which to receive ENUM delegation in Country Code 1. Thereafter we do not see the need for creating a new domestic Canadian institution to handle ENUM on an ongoing basis. ENUM could readily be implemented by arrangements among telephone companies or by the current DNS system. It does not, in CIRA's opinion, require a continuing institution dedicated to the purpose.

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<sup>1</sup> Found at <http://www.enumorg.ca> and specifically at <http://www.enumorg.ca/docs/CSCN%20ENUM%20QUESTIONS%20Summary%20for%207%20April%202004%20Meeting%2022March2004.doc>

<sup>2</sup> There were 1 billion land lines in the world in the year 2000 and 946 million cellphone users. (ITU estimate). Rounding up to 2 billion seems reasonable for the purposes of this discussion. See the ITU's statistics at a glance page at [http://www.itu.int/ITU-D/ict/statistics/at\\_glance/main01.pdf](http://www.itu.int/ITU-D/ict/statistics/at_glance/main01.pdf) and at [http://www.itu.int/ITU-D/ict/statistics/at\\_glance/cellular01.pdf](http://www.itu.int/ITU-D/ict/statistics/at_glance/cellular01.pdf).

<sup>3</sup> Domain Name System. The planned future version of the DNS, IPv.6, has orders of magnitude more capacity than the current IPv.4

<sup>4</sup> Hosts and personal computers figures are taken from [http://www.itu.int/ITU-D/ict/statistics/at\\_glance/Internet02.pdf](http://www.itu.int/ITU-D/ict/statistics/at_glance/Internet02.pdf)

Whether ENUM will be a useful consumer product is unknowable at this time. We use the term *user ENUM* here to denote the kind of ENUM service a consumer might wish to subscribe to. *Operator ENUM*, by contrast, denotes the use of ENUM-based protocols to solve addressing problems in the transition to a world where VOIP and the PSTN must intercommunicate seamlessly.

CIRA's second point is that there is a limited time frame in which e.164 ENUM, the official, ITU-sponsored kind, will have before it is either ignored or swept away. Unless arrangements are made quickly to put it in place, "official" ITU-approved ENUM will be bypassed by other forms of ENUM, such as dot tel, for which there is already an application before ICANN.<sup>5</sup> The advantage of the telephone number format is the user's familiarity with it. However, that advantage could be a temporary and declining asset, as people learn to use new naming and addressing conventions, or as companies decide to bypass the official ENUM delegation process.

Third, ENUM-based services may turn out to be commercial failures if users find they involve excessive invasion of privacy or prove to be of no advantage. User ENUM may turn out to be dud, and the technology may prove to be advantageous only for the existing managers of telephone numbers.

Fourth, ENUM raises competition concerns at every step of implementation.<sup>6</sup> Control of the user database gives incumbent operators control over any number of authentication processes that may be implemented. The official e164.arpa ENUM confers significant advantages on legacy PSTN operators, and the business case for other types of company to involve themselves in ENUM-based services could be quite weak. Telephone companies have already assigned to telephone consumers their numbers. Accordingly, they would be the trusted party in what would be seen as the natural extension of the previous service.

It may turn out that the most viable form of ENUM is what is called *operator ENUM*. In such a configuration, user data is provisioned and controlled exclusively by the carriers and operators with authority over specific e.164 telephone numbers. Within that secure infrastructure, each operator or carrier may define who can have access to records. Operator ENUM would introduce a standard addressing layer into the system to allow easy interoperability and reduced costs. Since the service is internal to the company, there are no complications with regard to privacy of the data or authentication of the right to use it.

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<sup>5</sup> <http://www.icann.org/announcements/announcement-19mar04.htm>

<sup>6</sup> see "Policy Implications of Convergence in Naming, Numbering and Addressing" by Political Intelligence ([www.political-intelligence.com](http://www.political-intelligence.com)) and authored by Joe McNamee and Tiina Satuli found at <http://www.political-intelligence.com/downloads.html>. We acknowledge their contributions to this paper.

The global root of the ENUM system (.arpa) is a monopoly, the national root of the system is likely to be a monopoly, and the authentication system for the registration of telephone numbers is likely to be a monopoly.

Fifth, user ENUM raises privacy concerns issues that must be satisfactorily addressed, in CIRA's opinion, and on which not enough work has been done and on which a consensus needs to be found, if there is to be a viable form of user ENUM..

Nevertheless, there is a modest window in which we have time to assess ENUM, see what models may work, and devise appropriate policy. Unfortunately, as we will demonstrate, the e164 version of ENUM will suffer from difficulties particular to country code 1, in that obtaining delegation authority from the ITU is made particularly complex because of Canada's belonging to country code 1.

## Category 1 Questions

### Question 1

- 1. Does the CSCN wish to communicate to Industry Canada whether they want to use ENUM?**

Yes. The question is answered in relation to our answer to questions asked in point 2 below.

### Question 2

- 2. Should the CSCN request Industry Canada and/or CRTC to authorize a letter from the Government of Canada approving arrangements for:**
  - a. temporary delegation for a period not to exceed 3 years of 1.e164.arpa to an entity acceptable to the 19 nations of Country Code 1 in order to permit trials of ENUM in Country Code 1 nations that choose to do so, or**
  - b. seeking official delegation of 1.e164.arpa to an entity acceptable to the 19 nations of Country Code 1 in order to implement ENUM commercially in Country Code 1 nations that choose to do so?**

2a) Yes. It is vital that country code 1 obtain delegation of authority to operate e164 ENUM from RIPE-NCC. Once delegation has been achieved, it will be possible to answer several further questions on the basis of experiments and evidence that are better carried out after delegation of authority over e164 ENUM to country code 1, and subsequently to Canada.

2b) No. CIRA does not believe that arrangements are sufficiently advanced to contemplate permanent delegation now.

CIRA considers that the CSCN should communicate to Industry Canada that Canada should participate in ENUM. CIRA also thinks that Canada has a choice in how to participate.

There is an official, ITU-sanctioned form of ENUM, whose root is called e164arpa. This is the first and preferred path for Canada to take. Nevertheless, it is quite possible to engage in ENUM without relying on an e164arpa. Other roots could be used, such as .tel, .ca, or dot anything, and there are conditions in which Canada should not hesitate to experiment with other roots.

The “official” ENUM is .e164arpa. The protocol that translates telephone numbers into domains can do so using any root for the look-up system. Because telephone numbers constitute an ITU standard, called Recommendation e164, and because telephone companies have traditionally claimed to own this resource, it was thought wise and expedient for the Internet Architecture Board to enter into an agreement with the ITU for how authority over ENUM would be delegated .

However, the question of delegation deals with authority over the form of ENUM that would work with e164 telephone numbers. It is an important question whether ENUM experiments could proceed without solving the issues of delegation and of the vehicle in country code 1 to which authority could be delegated.

Consequently, for the moment, Canada should seek delegation in the company of other members of country code 1. However, the delegation question needs to be somewhat detached, notionally, from experimenting with ENUM. If Canadian industry wants to experiment with ENUM, and organize itself to embrace the possibilities of new technologies, and cannot make headway with “official” e164.arpa ENUM, then we should be prepared to look to other technical possibilities.

E164.arpa ENUM is not necessary; other ENUM roots might be practicable. We have a short period ahead in which, if we make the proper institutional arrangements, Canada can establish ENUM-based services based in a delegation model. ENUM is a look-up system appropriate to VOIP, but VOIP can work for a time by resolving through the addressing system of the PSTN. Ultimately it will be necessary to move to an addressing system based in Internet-compatible technologies. Official e164.arpa ENUM allows the telephone companies a migration path into the VOIP future, and we expect they will see its advantages.

## 2.1 Background information on e164 ENUM delegation

The following section describes what we know about delegating authority to Country Code 1 from the delegating authorities.

The delegation issue derives from the arrangements made between the Internet Architecture Board ([www.iab.org](http://www.iab.org)), which has authority of Internet protocols, and the Telecommunications Standardization Sector of the ITU (<http://www.itu.int/ITU-T/>), which has authority over telephone numbers. ENUM is a protocol devised under the authority of the IAB, while standards telephone numbers, known as e164 numbers, are under the authority of the International Telecommunications Union (ITU). The complications arises from the fact that country code 1 is composed of 19 North American and Caribbean nations, and that the rules apparently call for unanimous assent to the delegation from the country code 1 nations.

The [Internet Architecture Board](http://www.iab.org) is responsible, among other activities, for overseeing the standards process that led to devising the standard called ENUM. The Internet Architecture Board is composed of 13 experts elected or nominated from various places, of whom six are nominated by the IETF (Internet Engineering Task Force).<sup>7</sup> The IAB oversees the editing of RFCs (Requests for Comment), the basic documents setting forth Internet standards.<sup>8</sup> The IAB oversees the process of standards development within the IETF, of which ENUM is an example. Patrik Fällstöm, author of the RFC that defines ENUM<sup>9</sup>, is a member of the IAB.

The process of requesting a delegation of ENUM authority<sup>10</sup> is a matter for two different organizations, one technical, and the other administrative. The technical authority is RIPE-NCC, the administrative if the ITU-T.

The application itself is directed to and goes through an organization called RIPE-NCC (Réseaux IP Européens Network Control Centre), a Dutch- incorporated non-profit company that handles many tasks in relation to domain name management in Europe, and which was selected by the IAB to handle such requests. In addition, requests for delegations are forwarded to the ITU-T Telecommunications Standards Bureau (ITU-T TSB). The TSB acts as the secretariat for the ITU-T.<sup>11</sup> The ITU-T<sup>12</sup> is the standardization sector of the ITU, the International telecommunications Union, a treaty-based organization based in Geneva.

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<sup>7</sup> [www.ietf.org](http://www.ietf.org)

<sup>8</sup> <http://www.iab.org/about/description.html>; <http://www.iab.org/about/overview.html>

<sup>9</sup> <ftp://ftp.rfc-editor.org/in-notes/rfc2916.txt>

<sup>10</sup> <http://www.ripe.net/enum/instructions.html>

<sup>11</sup> <http://www.itu.int/ITU-T/tsb-director/forum/>

<sup>12</sup> <http://www.itu.int/ITU-T/>

The ITU-TSB has authority over delegations of E164 numbers. Its understanding of its role in the delegation process is set forth at <http://www.ietf.org/IESG/LIAISON/ITU-SG2-040-2.htm>. In brief, the ITU-T considers its task to “authenticate” requests for delegations.

The ITU states<sup>13</sup> as follows:

### **ENUM administration ad interim**

#### “1 Background

It appears that there is considerable interest in starting ENUM trials in some Member States so that it would be appropriate to provide interim procedures to enable such trials to take place.

In response to this interest, the Internet Architecture Board (IAB) issued instructions to RIPE-NCC regarding how to proceed with any requests received by RIPE-NCC. Those instructions can be found at <http://www.ripe.net/enum/instructions.html>. Additional information on ENUM can be found at <http://www.ripe.net/enum/>. It should be noted that the cited instructions are fully consistent with the statement:

*Member States will have the right to choose whether to participate in the common designated ENUM domain, or not to participate in it, at their discretion.*

Consistency with the above statement is achieved by RIPE-NCC’s referring any requests for delegations of domain names corresponding to E.164 country codes to the Telecommunications Standardization Bureau (TSB) for approval.

It is important that the TSB process any such requests in a transparent and consistent way, and therefore these procedures have been created. In the long-term, it is envisaged that the TSB processes and procedures will be specified in a future Recommendation(s).”

According to the instructions laid down by RIPE NCC,

- 1.4.2 If ITU-T TSB does not object, and inform the RIPE NCC of the objection during the waiting period, the domain is delegated according to the request.

RIPE-NCC indicates that there have been about 26 delegations approved of authority over ENUM to national administrators.<sup>14</sup>

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<sup>13</sup> <http://www.itu.int/ITU-T/inr/enum/procedures.html>

<sup>14</sup> <http://www.ripe.net/enum/request-archives/>

## 2.2 Problems specific to country code 1

North America and the Caribbean are in Country Code 1. The NANP website<sup>15</sup> describes itself in the following terms:

The North American Numbering Plan (NANP) is an integrated telephone numbering plan serving 19 North American countries that share its resources. These countries include the United States and its territories, Canada, Bermuda, Anguilla, Antigua & Barbuda, the Bahamas, Barbados, the British Virgin Islands, the Cayman Islands, Dominica, the Dominican Republic, Grenada, Jamaica, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, and Turks & Caicos.

[Regulatory authorities](#) in each participating country have plenary authority over numbering resources, but the participating countries share numbering resources cooperatively.

The [International Telecommunications Union](#) (ITU) assigned country code "1" to the NANP area. The NANP conforms with ITU Recommendation E.164, the international standard for telephone numbering plans.

NANP numbers are ten-digit numbers consisting of a three-digit Numbering Plan Area (NPA) code, commonly called an area code, followed by a seven-digit local number. The format is usually represented as

**NXX-NXX-XXXX**

where N is any digit from 2 through 9 and X is any digit from 0 through 9.

The difficulty faced by those who seek delegation of ENUM authority in Country Code 1 lies in the multi-national character of the zone, and the consequent complication of delegation procedures.

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<sup>15</sup> <http://www.nanpa.com/index.html>

## 2.3 The ENUM LLC

The ENUM Forum<sup>16</sup>, a collection of largely US-based telecommunications carriers, has been wrestling with the problems involved with creating a vehicle in country code 1 that could accommodate the delegated authority from RIPE-NCC, as authenticated by the ITU-T. Their work is found in the paper “US ENUM Implementation: Tier 1 Contracting Entity and Contractual Alternatives”<sup>17</sup>.

The ENUM LLC group started well before Canadians began their work in the CISC, and it was not until recently that any Canadian businesses have made their views known about how this ENUM LLC could be structured. Of particular concern has been the way that countries of the NANP might have a voice regarding the fundamental policy questions of national interest, and how domestic ENUM arrangements could be made secure from the interference of the American federal legislature.

With further progress of work on ENUM in Canada, Canadian businesses will be able to participate more effectively in devising a means by which an entity might receive the delegation of e164.arpa ENUM authority for country code 1. The ENUM Forum’s LLC chairman has gone out of her way to welcome Canadian participation and input. Nevertheless, owing to the absence of a concerted Canadian position on any of these subjects, the ENUM Forum members could only do their work from a strictly US-national perspective. As work progresses on ENUM-related issues on Canada, Canadian businesses and the Canadian government should be able to intervene effectively.

### Question 3

3. Should the CSCN agree to recommend to Industry Canada or CRTC for Canada to participate in the above ENUM trials or official delegation?

Primarily, someone in Canada should recommend to Industry Canada and the CRTC that Canada needs to make arrangements to solve the delegation problem. Should it be the CSCN? Does it matter? It would assist government in taking a stand to know that Canadian companies are interested in this issue and believe that, unless appropriate arrangements are made soon, the ENUM issue will flow into other channels and be solved outside of Canadian influence. Consequently, the CSCN is a natural forum for developing this consensus.

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<sup>16</sup> [www.enumf.org](http://www.enumf.org)

<sup>17</sup> [http://www.enumf.org/documents/6001\\_1\\_0.pdf](http://www.enumf.org/documents/6001_1_0.pdf)

## **Question 4**

4. What Canadian parties are interested in potentially undertaking ENUM trials in Canada in the next 12 to 18 months?

CIRA has already offered its services, under certain conditions, as a temporary repository of the NANP area codes, until a permanent arrangement for delegation can take place. CIRA is interested in conducting ENUM trials with interested parties.

## **Questions 5-8**

5. Should ENUM have to deal with 9-1-1, MRS and any of the mandated services?
6. If ENUM Registrar, Tier 2 Registries, and/or ENUM Application Service Providers are assigned CO Codes (NXX), then do these entities automatically become Telecommunications Service Providers and subject to regulation in Canada?
7. What are the Canadian telecommunications regulatory requirements to become an ENUM Registrar, Tier 2 Registry, and/or an ENUM Application Service Provider?
8. Will the services provided by ENUM Registrars, Tier 2 Registries, and/or ENUM Application Service Providers be viewed as services provided over the public telephone network and therefore subject to the Telecommunication Act and associated regulation in Canada?

CIRA thinks it is premature for it to venture an opinion or position on these topics.

## **Category 2 - Canadian ENUM Industry Structure & Administration**

1. CRTC Regulatory requirements and oversight
2. Canadian ENUM industry structure (obligations of entities; roles and responsibilities)
3. Canadian Tier 2 ENUM industry structure (e.g., Tier 2 Registrars, Application Service Providers, Users/Registrants)
4. Management & administration of Canadian ENUM
5. Architecture and infrastructure (operational requirements)

### **Questions:**

1. - How should ENUM be implemented in Country Code 1?
2. - If yes, how should ENUM be implemented in Canada?

3. - Should Country Code 1 NPAs be included in the Tier 0 RIPE Registry, or should Country Code 1 NPAs be included in a separate Tier 1 Registry?
4. - If the solution that is selected is to have a separate Tier 1 Registry, then what is the suitable Tier 1 architecture and management structure?
5. - If the skinny Tier 1 architecture is selected what should be the architecture and management structure for ENUM in Canada?

## ***Preliminary remarks on Category 2 issues and questions***

CIRA considers that some of these questions cannot reasonably be answered until we have sorted out the delegation problem.

Assuming that Canada wishes to pursue the ITU-authorized version of ENUM, we should seek delegation of authority, and to do so we have to create and agree upon a vehicle to receive the delegation of ENUM authority.

The problem, which has been discussed elsewhere, is that country code 1 embraces 19 American and Caribbean nations. According to current interpretations of the rules set out between the IAB and the ITU, delegation can only be made by and with the authority of the 19 members of country code 1. (Whether there is occasion for changing those rules, or interpretations, should be explored, particularly if it appears that North America is being disadvantaged relative to its other trading partners in the deployment of up-to-date communications systems.)

Therefore the vehicle that is to receive delegation becomes an international matter, engaging concerns of sovereignty, if states choose to be concerned, however remotely, with the management of addressing and numbering systems.

Delegation of the actual software is technically trivial. It involves a few hundred lines of code, which serve each of the number planning areas (NPAs), known better as area codes, of North America and the Caribbean. An inquiry regarding a telephone number in area code 613 is directed to a computer having information about that number. The computer could reside in a suburb of Washington DC, Houston, Denver or Toronto. A distributed architecture can coexist with an authoritative root, as the DNS has shown.

The question for Canada is how best to create an entity with authority over names and addressing systems that could receive the delegation. How much should the entity be subject to any particular legislature? How can Canada's national interests, assuming it has some in this area, be satisfied?

The precedent from telephone numbering administration suggests that a way can be found for the receiving entity to be sufficiently subject to national policy as regards the numbering resources belonging to, or administered under the authority, of the nation.

These requirements conflict with one another: an international agreement to receive delegation, a vehicle to receive delegation that must be under some country's legislative authority, and the need to manage numbering resources in a manner that is compatible with the national interest.

The considerations argue strongly for the form of delegation referred to in the literature as "Skinny Tier 1". This option has the following characteristics:

- The entity holding the code for the North American Numbering Plan Area has the smallest possible functions;
- Authority is delegated to a national level to manage DNS resources, and states can make arrangements for the operation of their numbering and addressing functions consistent with national desires and laws.

### **Question 1**

1. How should ENUM be implemented in Country Code 1?

CIRA has indicated its preference for delegation of the official e164.arpa ENUM as a starting point, without being committed to that form of ENUM for all time.

### **Question 2**

2. If yes, how should ENUM be implemented in Canada?

See the general discussion above. The precedent form telephone numbering administration suggests that national policy considerations can be taken into account effectively in the administration of telephone numbering. Canada needs to satisfy itself that the rules and structure of the vehicle receiving ENUM delegation will respond to national policy concerns. So far, the only game in town is the ENUM LLC, in relation to which Canadian concerns are only beginning to be felt.

It is obvious that the only structure that will allow national sovereignty to be preserved on issues of national concern is the "skinny tier 1".

### **Question 3**

3. Should Country Code 1 NPAs be included in the Tier 0 RIPE Registry, or should Country Code 1 NPAs be included in a separate Tier 1 Registry?

CIRA is acting on the assumption we have heard that RIPE-NCC is not anxious to take on the Country Code 1 look up function, or at least do so without compensation. This possibility remains to be explored and should be investigated before we plunge irrevocably down the track of developing an ENUM delegation and administrative structure for Country Code 1.

Assuming for the sake of discussion that the United States objects to the notion that Country Code 1 NPAs be housed in a European-based Tier 0 RIPE registry and that their objections will not be overcome in a politically relevant time frame, then CIRA supports any sensible outcome that sees delegation occur quickly so that we can get on with the necessary trials in Canada. Accordingly CIRA favours the concept of the Skinny Tier 1 Registry, with the functions and services pertaining to the stored URI's housed in some body subject to national policy control.

## **Questions 4 & 5**

4. If the solution that is selected is to have a separate Tier 1 Registry, then what is the suitable Tier 1 architecture and management structure?
5. If the skinny Tier 1 architecture is selected what should be the architecture and management structure for ENUM in Canada?

CIRA is prepared at this time to state its preferences for the organization of the ENUM service in Canada at the registry level. As to what is the registrar level of the domain name system, CIRA can state general preferences for how ENUM might be offered to the consumer, but these are somewhat beyond its immediate interests.

Notionally, ENUM has been envisaged as having three levels below Tier 0, the root that is housed in the Netherlands in the servers of RIPE-NCC. There is a Tier 1, which is the national level in countries outside of country code 1. There are also two lower layers, Tier 2 registry and a registrar layer.

## **Registry level**

CIRA thinks that experience in the domain name registry business has shown the following:

1. That a single national registry can most efficiently deliver service to the clients, and that, under suitable arrangements, a monopoly can both drop prices significantly and deliver a high level of service.
2. Competition at the registry level can occur but is not the most efficient arrangement.
3. If competition is to occur at the registry level, arrangements must be made for the updating of vast amounts of file information so that no registry is disadvantaged and no person inquiring of a registry fails to find the resources he is looking for in a commercially acceptable time-frame, which may as short as milliseconds. Incentives may work in such a way that competing registries fail to maintain adequate, near instantaneous, updates of information.
4. The existing telephone number look-up system is managed collectively by telephone companies working through a monopoly service supplier.

These considerations argue strongly for a monopoly supplier of ENUM-registry service domestically, in the same fashion as currently works in the domain name and the telephone numbering worlds.

Is there any business requirement for a Tier-2 registry level? By Tier 2 registry we mean a level of registry below a national Tier-1 registry. CIRA is not aware of any. CIRA envisages a registry-registrar pattern, similar to the current domain name look-up system.

## **Registrars level**

CIRA is not in a position to state who registrars can or should be. We note that the domain name registration business works with low barriers to entry. It is fully competitive, both as to the different nomenclatures people can use, such as dot com and dot ca, and different price and service levels consumers can obtain from a large selection of registrars.

The question for government is whether there will be a registrar business for other than telephone companies. Will there be *operator ENUM* only, or will it become a consumer product (*user ENUM*)?

CIRA cannot tell without further trials whether there is a right answer to this question.

Telephone companies may have such an advantage in terms of customer relationships that competitive entry will prove impossible. Nevertheless, CIRA's general direction would be to argue for a competitive registrar market, and to take all such steps as to allow fair competition at the registrar level.

ENUM raises large questions about number portability, insofar as a domain name is not itself a set of routing instructions, but allows the consumer to associate a set of routing

instructions to a number. Thus consumers might choose to associate themselves with area code 416 but never live there. The ENUM look-up function will have to accommodate the dissociation of telephone numbers from older ideas of locality. It may turn out that the most efficient market organization is the one we have in the domain name world, with plenty of competition at the retail level. Contrarily, it may be that the telephone companies cannot relinquish control over numbering resources to this extent.

In the abstract, CIRA cannot predict how or whether a consumer ENUM market will develop. It may be that the only form ENUM that makes commercial sense is what is called *operator* ENUM, in other words, merely an improved technical arrangement for the management of “telephone numbers” as they transmute into domain names. We need trials and people with vision to come forward with commercial ideas before we can know whether user ENUM has a market.

## **Category 3 - Operational Considerations & Technical Issues**

Issues:

1. Internetworking and Interoperability
2. Applications and Standards
3. Provisioning process and requirements (e.g., resource records, flows & processes, authentication, Registrant number validation, etc.)

Questions:

1. - Are there particular architectures that would facilitate or hamper lawful access?
2. - Will the architectures support 9-1-1, MRS and any of the mandated services?
3. - Will ENUM Registrar, Tier 2 Registries and/or ENUM Application Service Providers require the assignment of Central Office Codes (NXXs) in order to provide them with e.164 Country Code 1 NANP Telephone numbers for their customers?

CIRA sees no reason to venture an opinion on these subjects at this time.

## **Category 4 - End-User Considerations**

Issues:

1. Canadian User security and privacy

Questions:

1. - What privacy protection needs to be done? In particular should we adopt a called party control model for ENUM implementation?

CIRA is convinced that there are many serious concerns for privacy in any publicly accessible look-up system. The experience from ICANN is that the Whois look-up system has generated strong conflicting claims between users and registrars, on the one hand, who want minimal data in the public, and intellectual property lawyers and police, on the other, who want a system that provides rapid access to accurate data.

An extensive discussion of the privacy issues in ENUM is available at [http://www.tmdenton.com/pub/privacy\\_ENUM.pdf](http://www.tmdenton.com/pub/privacy_ENUM.pdf)

CIRA considers that if user ENUM is to become a viable product, significant privacy protection must be assured in its deployment.