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ELECTRONIC ADDRESSING AND NUMBERING INITIAL ISSUES PAPER

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A.   INTRODUCTION

1.   PURPOSE

This paper sets out a range of initial issues relating to numbering and electronic addressing for discussion at the Industry Workshop On Malaysian Electronic Addressing And Numbering ("Industry Workshop") scheduled to be held in Kuala Lumpur on Wednesday, 3 October 2001. Should the need arise, further issues may be added by way of supplemental issues papers.

The purpose of the Industry Workshop is to gain the widest level of industry participation and involvement possible in the project that Zaid Ibrahim & Co. in conjunction with Ovum Pty Ltd are undertaking for the Malaysian Communications and Multimedia Commission ("Commission").

2.   HISTORY OF NUMBERING AND ELECTRONIC ADDRESSING SYSTEMS

Communications systems are about electronic delivery of messages to its intended address. This is the on-going purpose of communications systems and of the numbering and electronic addressing systems that they rely upon.

The range of purposes served by numbering and addressing systems is changing. Originally telecommunications numbering systems were designed to permit the addressing of fixed network (PSTN) telephone calls. The numbering system was relatively simple – it related to a single technology and service, and its main purpose was to define precise network addresses on a geographic basis. Today's requirements are much more complex. Numbering and electronic addressing systems may be numeric or alphanumeric (telecommunications), or alphabetical (Internet addressing). They cover multiple technologies (such as fixed, mobile, telephony and IP packet technologies) and services (such as voice and data including graphics, audio and video).

Comprehensive planning is needed to ensure that such systems facilitate the development of future networking arrangements and of communications services.

Numbering and electronic addressing is not just a matter for telecommunications operators. The quality and design of the numbering and addressing system will either facilitate or retard the development of communications and the convergence between information processing, broadcasting and communications. Numbering and electronic addressing are therefore a matter of interest to communications carriers and service providers, broadcasters, information technology companies, content providers, subscribers and end users, as well as to governments and regulators.

3.   WHY WE NEED A NUMBERING PLAN

Over time, numbering systems have been developed to achieve many ancillary purposes over and above their basic purpose of identifying addresses within communication networks. They can now identify geographic location (country, regional and local), network operator and service provider (such as in the case of mobile numbers in Malaysia), pricing information (*eg.* as in the 600 series numbers in Malaysia), and can have value associated with their length, structure, content or promotion.

Ideally number lengths should not be longer than necessary. In addition, there are international standards limiting the length of numbers. This has the potential to cause the quantity of numbers in certain ranges to be in actual or potential short supply.

We need numbering plans to provide a consistent and predictable framework within which numbers are to be allocated and used for network addressing and for other purposes (such as geographic and functional prefix codes). Such a plan will also address issues associated with the orderly development of the numbering system.

4.   THE FUTURE TRENDS OF NUMBERING AND ELECTRONIC ADDRESSING

 The numbering system has been developed over many years based on the needs of narrowband telecommunications *ie.* telephony. The system has been extended to accommodate new services such as fax, circuit switched data, paging and mobile. By definition, the numbering system is numerically centric. The numbering system at the international level has developed under the auspices of the International Telecommunications Union.

By contrast, the electronic addressing system that applies to the Internet is an alphabetically centric system. It has been developed through the various working groups that have been established through private sector cooperation; and facilitated by the United States of America's Commerce Department to provide an agreed structure and operating rules for the Internet.

The development of ubiquitous digital technologies now enable convergence to occur at the technical, service, and market levels. Convergence is the process by which quite distinct things (whether they be technologies, services or applications) come to share the same functionality. In the communications, broadcasting and information services industries convergence occurs when platforms become independent of the services and applications which they support.

The Internet is the pre-eminent example of convergence in our time. The Internet is an independent platform of interconnecting networks that supports services and applications of many types – including voice, data, graphics, audio and video. Increasingly, technological developments are enabling us to transform information associated with one application or service into information useful for another.

Unified messaging is a good example of such processes – messages received as text may, for example, be accessed as voice.

Convergence requires numbering plans in the future to incorporate rules for electronic addressing. Numbering plans will need to cope with the movement from traditional circuit switched to packet technologies of next generation networks. On the other hand, the universal penetration of the Internet and universal access to Internet-based global information resources requires access devices. The most widely available access devices are those with numerical keypads (*eg.* mobile phones). Therefore, rules for accessing electronic addresses *via* such devices, using numbering systems, need to be devised both internationally and nationally.

We are heading to a world in which convergence enables us to access any communications, information or service from any other – a fully connected world. Such a world needs the support and facilitation of a forward looking numbering plan, suitably integrated with electronic addressing schemes.

5. SCOPE OF WORK

The scope of the work required by the Commission as set out in paragraphs 18 – 22 in the Request for Proposal is reproduced below :

(a) To develop, draft and submit a comprehensive and concise Strategic Plan for Malaysia pertaining to the management and administration of numbers and electronic addresses, by taking into account technological advancement and emerging issues.

The Strategic Plan should take into consideration, without limitation, the following :

i. National Policy Objectives of the Communications Multimedia Act 1998 ("CMA") as stipulated in Section 3(2) of the CMA.

ii. Promotion of efficient utilisation of these resources towards meeting the economic and social objectives of the country.

iii. Promotion of efficient use of existing and future resources and infrastructure.

iv. Determination of the economic value of the existing and future resources.

v. Timeframes which are realistic and achievable.

vi. Consideration of the various costs (monetary, non-monetary) involved (eg. to the consumer, industry, country) in the implementation of the proposed plans (ie, the impact on all existing users and applicable international standards), consumer protection and requirements as well as the competitive environment envisaged under the CMA.

vii. Evaluation of the principles pertaining to numbering and electronic addressing without limitation to the following initiatives :

?? E.164 Telephony Numbering Mapping Protocol (ENUM);

?? Signalling System No. 7 (SS7) addressing;

?? Asynchronous Transfer Mode (ATM) addressing;

?? WebNUM;

?? TelNUM;

?? Internet Protocol (IP) addressing;

?? IP addressing version 6 (Ipv6);

?? Domain Name System (DNS) addressing;

?? Country Code Top Level Domain (ccTLD) addressing;

?? Uniform Dispute Resolution Policy (UDRP);

?? Famous Trademark Ownership;

?? Intellectual Property Rights; and

?? Other relevant initiatives pertaining to numbering and electronic addressing.

(b) To develop, draft and submit a sound and transparent Operational Plan, in accordance with section 180(1) of the CMA.

In drafting the Operational Plan as defined above, the consultant should consider, without limitation :

i. Developing the definition and interpretation of the numbering terms, inclusive of the principles and regulation issues with regard to the criteria of applicants being considered for each type of E.164-numbers, and the portability of E.164 numbers;

ii. Reviewing the industry-accepted Numbering Plan draft in view of its applicability with respect to potential development and to propose any changes, if required;

iii. Developing the Electronic Addressing Plan based on the existing saved documents and legacy operational frameworks pertaining to the management and administration of electronic addressing, in particular the Domain Names Registration.

(c) To develop, draft and submit comprehensive and transparent Proposed Regulations, as stipulated in section 180(2) of the CMA, which can

provide clear directions pertaining to the future of the industry and also accommodate the inevitable changes in technology and market preference.

Prior to undertaking the above task the prospective consultant shall be required to conduct a costing study on numbers which may include, without limitation, the following tasks :

i.   Study and analysis of the global trends on number charging per service, per head, the cost recovery process, valuation of numbers (cherished, tender, auction) and other numbering-related issues, as adopted in practice by other administrations;

ii.   Study and analysis of the impact of the various charging structures, charging principles and charging mechanisms for numbers;

iii.   Development of definitions on the charging structure of numbers;

iv.   Identification of benchmarking processes in determining the cost for sets of digits, codes;

v.   Assessment and review of current number practices in Malaysia, which should include medium to long-term projection on the utilisation of numbers in Malaysia;

(d)   A Schedule of Fees shall be developed, and incorporated into the Proposed Regulations with emphasis on the following components, but not limited to :

       ??   Charging structure of numbers;

       ??   Tabulation of the costing structure for numbers; and

       ??   Charging processes for numbers.

(e)   The Proposed Regulations to be developed shall incorporate, without limitation, the following components :

i.   The guiding principles of the operational frameworks on numbering;

ii.   Criteria and procedures for application and assignment of numbers;

iii.   Principles for application and registration of numbers;

iv.   Principles in the suspension or revocation of assignments on numbers;

v.   Portability and transferability of numbers;

vi.   The Schedule of Fees as developed in accordance with Para 20.2 above;

vii.   Initial requirement of section 179(1) of the CMA, pertaining to the management of existing electronic addressing resources such as DNS and others.

(f)   The development of the Proposed Regulations shall recommend adoption, variation to, or revocation of any part(s) of the PBPTN and/or other numbering and electronic addressing operational frameworks.

(g)   The Proposed Regulations shall consider uniform articulation and application leading to the operationalisation of the Operational Plan.

(h)   To conduct a Public Consultation (PC) on the Strategic Plan, the Operational Plan, and the Proposed Regulations, which should include briefing and discussion sessions with the industry, in accordance with the stipulated procedures of the CMA or any other relevant instruments, and to subsequently assess, consolidate industry input to the Commission, and if necessary, make revisions to the Strategic Plan, Operational Plan and the Proposed Regulations.

The Consultant shall make reference to the provisions of the CMA and Regulations and all other relevant instruments in undertaking the proposed Scope of Works.

6.   INITIAL INDUSTRY INVOLVEMENT AND PARTICIPATION

Prior to the formal consultation process envisaged in the CMA, we intend to seek the industry's views on the legal, commercial, consumer and technical issues involved in numbering and electronic addressing through this Industry Workshop.

At the Industry Workshop we shall seek to obtain industry views both in the plenary sessions and in Working Group sessions.

We are interested to understand the industry's views on –

i.   what the issues and concerns are

ii.   their relative priority

iii.   their scope and consequences

iv.   their time horizon

v.   the possible solutions that might be considered for each issue.

By way of an example, many countries have recognised that number portability for certain services is pro-competitive and require service providers to work harder to

retain and attract customers. At present some of those customers are encouraged to accept service value and quality that they might not otherwise accept, because of their commitment to their current number. There are many approaches to establishing systems to support number portability. We are not concerned with solutions, but only in exploring the number plan aspects and the consequences and importance that these might have for the industry.

The purpose of the Industry Workshop is not primarily to develop solutions, but to explore the issues and how they are perceived by the industry.

7.   ISSUES SETS FOR THE INDUSTRY WORKSHOP

There are three broad sets of issues, namely –

?? Strategic issues associated with the convergence of numbering and electronic addressing, such as would be covered in a Strategic Plan.

?? Issues specifically associated with E.164 numbers

?? Issues specifically associated with Internet names and addresses.

For the purposes of the Industry Workshop Working Groups we have further divided these categories into six areas, one for each Working Group, as follows :

Working Group	Issue Topic Areas	Remarks
A	Long Term Numbering And Electronic Addressing Plans	Working Group A is considering the top level and future issues.
B	Portability and Consumer Information	Working Group B is considering issues mostly concerned with numbering.
C	Availability, Allocation and Charging	Working Group C is considering issues mostly concerned with numbering.
D	ENUM Issues	Working Group D is considering a specific convergence issue.
E	Current Operational and Implementation Issues	Working Group E is considering specific short term numbering issues.

| F | Personal / Virtual Numbering | Working Group F is considering issues mostly concerned with numbering. |

Each area is discussed in more detail in subsequent sections of this Issues Paper.

B. WORKING GROUP A: LONG TERM NUMBERING AND ELECTRONIC ADDRESSING PLANS

1. INTRODUCTION

The expectation of the industry is that networks will migrate over the next decade from circuit switched to packet technologies and that there will be substantial development in multimedia services giving convergence in technology onto a common packet based infrastructure. This infrastructure will support a convergence between the telecommunications and broadcasting industries with their services becoming less distinguishable and all supported on the same infrastructure.

One of the long term key issues is therefore what changes are needed to be done to numbering and electronic addressing in order to support this process of convergence.

The view that has been established over the last 20 years is that at least two different layers of identification systems are normally needed :

(a) Names that are designed to meet the needs of users, especially human users, *ie.* they are used at the "user" layer.

(b) Addresses that are designed to be used easily by networks, *ie.* they are used at the "network" layer.

In practice since networks have become structured into several layers, there may multiple layers of identifiers in networks with the identifiers at each layer being adapted to the needs of that layer and decoupled from the layer below.

At present there are two major international numbering and naming schemes :

(a) E.164 numbers, which have the advantage of working with different languages, being easily useable from simple keypads and supporting voice recognition with greater accuracy. E.164 numbers have the characteristics of names in that they are increasingly adapted for users and decoupled from networks, for example by number portability.

(b) Internet names (*eg.* user@domain), which are more meaningful and memorable than numbers but do not have the other advantages that numbers have. (NB: There is great confusion because these Internet names are also called "addresses" *eg.* "email address".)

Both schemes co-exist and tend to be used at present by different technologies, but in future IP technology will become capable of supporting both schemes.

For IP technology, there is a worldwide system of addresses and a global system for translating between names and addresses called the Domain Name System (DNS).

This system, however, is in the start of a huge process of change from version 4 to version 6 of the Internet Protocol which will require migration from IPv4 addresses to a much longer IPv6 address. This migration is required in order to move from a standard that provides for a limited number of address possibilities to one that is virtually unlimited, relative to the current projections of need. Although initially IPv4 was considered robust and scalable with the ability to uniquely identify over four billion nodes, the rapid increase in demand coupled with the inflexibility of assigning addresses in strict 'Classes' has led to concerns that the capacity of IPv4 will soon be exhausted. IPv6 on the other hand allows 10 to the 38th power of possible addresses, which is more than enough for at least the next 30 years. When IPv4 addresses in fact becomes exhausted, new allocations will only be possible from IPv6 standard.

This migration raises many issues such as transformation of current addresses into the new standard, and the process for adoption and implementation of new protocols in the IP world.

The support of convergence between telecommunications and broadcasting is primarily a "user" layer issue since the network technology will be capable of supporting any service and therefore the main issue for convergence is naming rather than addressing.

There are three main problems with E.164 numbers :

(a) Many numbers are shared because technology has in the past linked numbers and network access in a one-to-one manner. For example there is only a single number for each exchange line with the result that all members of the same household share the same number and each is faced with a number change when they move and the other household members remain.

(b) Numbers in Malaysia have little or no portability. Therefore if the user or household moves they have to change their number. Numbers are also not portable with respect to service providers and therefore if users change service provider they have to change number. This is especially an issue with mobile communications where there is extensive competition. It is also an issue for fixed services in areas where there is local competition.

(c) The same people frequently have different numbers for different services, even where the charging arrangements for the services are similar.

The resolution of these problems will improve the stability of the numbering arrangements.

There are three main, but lesser, problems associated with Internet naming :

(a)   Because names can be associated explicitly with businesses and people, there are significant intellectual property issues.

(b)   Many people have multiple names because it is very easy to subscribe to services on the Internet and many of these subscriptions and names are unused.

(c)   Those users who do not pay to have their own domain name registered have names that include the identity of their service provider and thus are not portable.

Working Group A is therefore being asked to consider the long term strategic issues for naming and electronic addressing with special emphasis on the support of convergence.

The eventual conclusions on these issues will provide valuable industry input to enable the development of the Strategic Plan, whereas details of the changes needed in each identification system would form an Operational Plan.

2.   POLICY GOALS AND OBJECTIVES

The national policy objectives for the communications and multimedia industry set out in sub-section 3(2) of the CMA are :

(a)   to establish Malaysia as a major global centre and hub for communications and multimedia information and content services;

(b)   to promote a civil society where information-based services will provide the basis of continuing enhancements to quality of work and life;

(c)   to grow and nurture local information resources and cultural representation that facilitate the national identity and global diversity;

(d)   to regulate for the long-term benefit of the end user;

(e)   to promote a high level of consumer confidence in service delivery from the industry;

(f)   to ensure an equitable provision of affordable services over ubiquitous national infrastructure;

(g)   to create a robust applications environment for end users;

(h)   to facilitate the efficient allocation of resources such as skilled labour, capital, knowledge and national assets;

(i)   to promote the development of capabilities and skills within Malaysia's convergence industries; and

(j)   to ensure information security and network reliability and integrity.

In view of these policy objectives, the following is a list of potential strategic goals for numbering, naming and addressing :

(a) **Availability** – numbers, names and addresses should be readily available to meet the requirements and growth of Malaysia's communications and multimedia industries and users in future.

(b) **Fairness and efficiency** – numbers, names and addresses should be administered in a way that is fair and non-discriminatory, and is also efficient and cost effective.

(c) **Stability** - numbers, names and addresses should be stable so that users do not have to change their numbers or names to satisfy growth in demand, changes in systems of administration or changes in the arrangements for the provision of services.

(d) **User friendliness** - numbers and names seen by users should be easy to use in terms of human factors, including entry into terminals and memorisation. This includes making those numbers or names that are used by individuals more **personal** and **portable**.

(e) **Information** - Numbers and names seen by users should allow the user to see any important information about the proposed communication that the user expects or that is not available by other means (examples are tariff and location information implicit in numbers).

(f) **Scope** – the same values of numbers and names should be capable of being used in multiple services.

(g) **Value** – the intellectual property value in numbers and names should be protected and realised at least to some extent in the national and individual user interest. Examples are charging for golden numbers and making numbers and names transferable or tradable.

3. ISSUES FOR DISCUSSION IN WORKING GROUP A

A-1: What new requirements for numbering, naming and addressing are likely to arise as a result of convergence (*ie.* convergence at the broadest level including telecommunication and broadcasting) and the development of multimedia (*ie.* all modes of communication including voice, audio, text, graphics and video)?

A-2: Will E.164 numbers and Internet names both continue in parallel as the major naming schemes for the foreseeable future? Will other schemes be added?

A-3: Are there any ways in which the E.164 number and Internet naming schemes need adaptation to support multimedia and convergence?

A-4: What should be the goals of the Strategic Plan? (review list proposed above) What time horizon should it cover?

A-5: What particular changes should be made to the E.164 number and Internet naming schemes to implement the goals in the Strategic Plan?

A-6: How should the regulatory framework look like – should it be self-regulatory, co-regulatory or fully regulated by the Commission?

C.   WORKING GROUP B: PORTABILITY AND CONSUMER INFORMATION

Working Group B is concerned with the goals of :

?? **User friendliness** – that is, how well the numbering system meets the needs of users for simplicity, ease of use, and avoidance of mistakes.

?? **Stability** – that is, to minimise disruptive changes in the numbering arrangements to the greatest possible extent, and to incorporate changes as they become necessary in ways that build on what is there already, rather than radically alter the existing structure.

?? **Information** – that is, to provide in the numbering system and the content of numbering information which users and operators might regard as necessary. This could include information of the service provider, the service type, tariff, geographical location or other detail, *etc.*

?? **Scope** – that is, the range of issues that must be addressed by a numbering plan and system for both current and future purposes.

1.   PORTABILITY

Number portability refers to the ability of customers to retain their numbers when they change service provider, locations or service.   The three types of number portability are :

(a)   **Operator portability**, where a customer changes network provider and keeps the same directory number.   (This may apply to intelligent network services, to local fixed services or to mobile services);

(b)   **Location portability**, where a customer changes location and keeps the same directory number; and

(c)   **Service portability**, where a customer changes service and keeps the same directory number.

(NB: 'Directory number' in the above means the number as it might appear in a directory of numbers – such as a telephone directory.)

Number portability has become increasingly topical over the past 5-10 years, being one of a number of regulatory issues that improves the level of competition and consumer power in telecommunications markets.

Numbers are important to users, and changes are costly and inconvenient. For example,

(a)   There may have been substantial investment in advertising or promoting a number, or in publicising the number as part of the user's business stationery.

(b)   A number may have initial or subsequent significance or mnemonic value.

(c)   A number may be known and stored by many correspondents.

Operator portability may facilitate greater competition by enabling those customers who cannot afford to change their number to change service provider. In addition location and service portability may make the numbering plan more efficient and may greatly contribute to the stability of numbering.

Number portability is complementary to personal numbering but is not identical to it.

Most portability issues concern numbers rather than Internet names because Internet names inherently have operator and location portability and support multiple services and so do not need service portability. However, the operator portability applies only where the customer has registered their own domain name. Many individual non-business customers are locked-in to service providers with user names that include the identity of the service provider, *eg.* the email address "zaidibrahim@hotmail.com". There is therefore an issue of how private users could obtain portable names without having to register their own domain name.

The initial concern about number portability was its economic justification. As a result several countries conducted cost benefit analyses to determine whether it was justified and what systems should be used to implement numbering portability.

These studies, and subsequent experience have showed that the overall net benefit of service provider portability is normally greatest for non-geographic numbers such as freephone and least for mobile. However practical experience has demonstrated the critical importance of achieving simple and fast porting procedures especially for mobile number portability in order to realise the potential net benefits.

Operator number portability for one or more of the local, mobile or intelligent network numbers is now required in many countries including the United States, European Union, Australia, New Zealand, Singapore and Hong Kong.

The issues for Working Group B includes :

(a)   Should operator number portability be introduced for each of the following :- non-geographic, geographic and mobile services?

(b)   To what extent should location number portability be introduced or expanded for geographic services?

(c)   To what extent should service portability be introduced? (NB: This is an aspect of making numbers more "multi-service").

2.   CONSUMER INFORMATION ISSUES

Traditionally numbers have been more than network addresses. They have included substantial information within their structure - information that was thought to be of particular importance to users and to network operators, such as tariff and location. Information is incompatible with portability because, for example, you cannot determine by inspection the location of a number if that number is portable between different locations.

The types of information included in numbers includes :

(a)   **Type of service** – for example, fixed telephony numbers have different number ranges from mobile numbers and callers may have different expectations of calls to different services.

(b)   **Pricing** – callers use the early digits in a number to indicate the price range for the call. Prices are related to the type of service (*eg.* higher prices for calls to mobile) and the distance of the call, although the effect of distance on prices is reducing rapidly. Callers need warning of calls to particularly high priced numbers such as premium rate numbers and this can be achieved by the choice of number range.

(c)   **Service provider** – some numbers include digits to identify the service provider to whom the number range has been allocated and this information is incompatible with operator portability.

(d)   **Location** – traditionally detailed area codes enabled callers to identify the location of the fixed service being called with some precision. Whilst this may no longer be so useful in indicating the price of the call, it may remain useful for other purposes *eg.* when a caller only wants to contact a local and not a distant business.

(e)   **Special services** – short codes are used for special services such as emergency services (for *eg.* police, ambulance and fire brigades) because such numbers are more easily remembered and easily dialed, even in an emergency.

The main question is how should the balance be drawn between portability and information, and how should the information that needs to be retained be structured? Can other ways of meeting the information needs of users, consumers and service providers be found?

3.   ISSUES FOR DISCUSSION IN WORKING GROUP B

B-1: What information is essential to be retained in numbers?

B-2: Should Malaysia introduce number portability as soon as possible or undertake studies of cost-benefit first before making firm decisions?

B-3 Which services should number portability apply to (non-geographic (*eg.* freephone and premium rate), geographic or mobile)?

B-4: What special provisions should be made for private users of Internet names to prevent them from being locked in to their service providers?

B-5: How are billing disputes between a user and the operator currently resolved? Is there any value to have a tribunal to take care of such disputes, if it cannot be resolved between the parties?

B-6: How can consumers be protected from premium rate phone calls *ie.* 600 number calls?

B-7: What sort of terms and conditions should exist between the operator and the user when the user wishes to port an old number (especially in a case where the user wishes to subscribe to a new service provider) ?

D.   WORKING GROUP C: AVAILABILITY, ALLOCATION AND CHARGING

Working Group C is concerned with the goals of :

?? **Availability** – that is, the availability of numbers to satisfy demand as and when it arises.

?? **Fairness and Efficiency** – that is, fairness and efficiency in the allocation, issue, cancellation and withdrawal of numbers.

?? **Stability** – that is, certainty and predictability in the management of numbers, and the minimisation of disruption when changes to numbering plans and arrangements are implemented.

?? **Value** – that is, the management of the value that is inherent in numbers within the framework of the numbering plan. The sources of such value are many, and can include length, memorability, cultural factors (*eg.* lucky numbers), promotion and advertising investment, and the value of continuity (that is, of avoided inconvenience and avoided cost of change).

1.   AVAILABILITY

The numbering plan must be designed to ensure adequate availability in the face of growing demand. Demand for numbers results from :

(a)   Growth in services requiring numbers.

(b)   Requirements for location, provider, network, service type, tariff and other information in numbers.

(c)   Provision and Demand for short numbers.

(d)   Inefficiency in number allocation, issue and use.

But there is a balance between achieving availability by designing in spare capacity, which makes the plan less efficient, and achieving it by designing in extendibility, which makes numbering less stable.

Availability is strongly related to allocation because the method of allocation affects the efficiency with which the numbering space may be used and hence the ability to accommodate growth. For example allocation in single large blocks for purposes where the real demand varies greatly leads to large parts of the blocks remaining unused, making numbers unnecessarily long. However unused numbers are not available for the areas that require it most.

The following issues may need to be explored by Working Group C :

(a)   Where should the balance be struck, *ie* between spare capacity and inefficiency on the one hand and extendibility and instability on the other?

(b)   Which services are likely to grow most and lead to number shortages within the next 5 and 10 years, if the current numbering plan remains in place?

(c)   What are the preferred ways of creating more numbers :

    i.   Opening up digits reserved for location, service, operator or tariff codes?

    ii.   Extending number length?

    iii.   Opening up new major ranges, possibly at the expense of defunct or obsolescent services?

    iv.   Migrating to a completely new structure immediately (*ie.* within 18 – 24 months)

2.   ALLOCATION

Allocation covers many important issues, such as :

(a)   To whom should numbers be allocated? Should there be scope for allocating numbers to individual end users or only *via* operators? Who should undertake any individual allocation, the Commission or an agency on its behalf or the operators?

(b)   What size blocks of numbers should be allocated to operators for use with different services?

(c)   Should users or operators be given any choice in the allocation of numbers or number blocks? Should they be allocated numbers or blocks through administrative processes, or by other means, such as an auction process?

(d)   How should golden numbers be handled? Should they be transferable in the way that vehicle numbers are transferred in some countries?

(e)   Should charges be made for numbers and number blocks and if so should they be set to reflect market value or just to cover administrative costs? How should market value be determined (*eg.* by auctions)?

(f)   Under what circumstances should it be possible to change allocations and what period of notice should be given?

(g)   What are the legal issues concerning number use and rights of ownership? How do they relate to the customer's sense of ownership and entitlement, and how do they affect allocation?

(h)   Should applicants for the allocation or issue of numbers have rights to redress if refused, and, if so, under what circumstances?

(i)   How can number allocation information be linked to the provision of directory services?

3.   CHARGING

Charging for the allocation and/or issue of certain types of numbers is a means of :

(a)   Recovering the cost of numbering administration.

(b)   Realising the value of cherished numbers (for *eg.* short numbers, memorable numbers, lucky numbers, *etc.*).

(c)   Encouraging efficiency in the use of numbers.

There are a range of issues associated with charging regimes, including when and how a charging mechanism should be applied. A further consideration is whether private trading in numbers should be permitted, and, if so, under what conditions.

4.   DISPUTES OVER NUMBERS AND ELECTRONIC ADDRESSES

Disputes over who has better rights over numbers and electronic addresses will increasingly become an issue in Malaysia.

Consider the following hypothetical scenarios :

(a)   Zaid Ibrahim & Co., a law firm, found recently to its horror that a China based web hosting company has registered the *zaidibrahim.com.my* domain name. It approached the web hosting company and was told that they were only willing to give up the domain name for a substantial amount of money.

(b)   A pizza delivery company had spent substantial amount of money promoting its order and delivery service phone number in the Kuala Lumpur area. After two years, the pizza delivery company decides to expand nation wide and migrate to a free-phone (1800) based number. However it appears that someone else has registered the 1800 number similar to its original Kuala Lumpur phone number.

In both the examples above, the users have attached certain value to a particular Internet name and telephone number. The current registrants may have registered the domain name and the 1800 free-phone number in bad faith with the intention of

making some quick money from the electronic address or telephone number. How should such conflicts be resolved? Should there be an alternative dispute resolution process other than proceeding to court (for *eg* having a policy similar to the UDRP as adopted by ICANN)?

5.   ISSUES FOR DISCUSSION IN WORKING GROUP C

C-1: What are likely to be the main sources of growth in demand for numbers in the future?

C-2: How should growth in demand for numbers be handled, what changes would be most acceptable within the current number length to increase availability?

C-3: What should be the main objectives for improvements in number allocation?

C-4: To what extent should users' wishes influence number allocation, and what rights should they be granted from allocations?

C-5: Should the Commission regulate the dispute resolution process for numbers and electronic addresses?

C-6: What charging arrangements should be associated with number allocation?

C-7: Should private trading in numbers be permitted, and, if so, under what conditions? Should users be allowed to "own" numbers and electronic addresses?

C-8: How long can a number or electronic address be retained by a user assuming it is not effectively used?

E. WORKING GROUP D: ENUM ISSUES

Working Group D is concerned with a specific issue relating to the support of convergence.

1. INTRODUCTION

ENUM is a mechanism for handling some aspects of convergence by providing translations between E.164 numbers and Internet names.
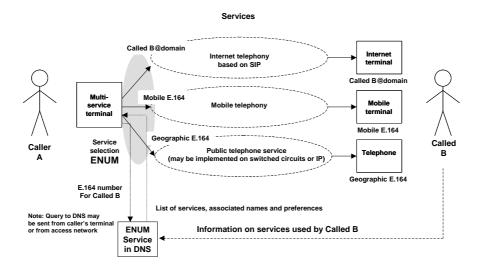
ENUM is a planned public database service for use by callers and network operators. It will be implemented on the Domain Name Server (DNS) system and interrogated with an existing E.164 number and return a list of communications methods by which the person identified by the E.164 number can be reached. The caller (or network) can then select one of these methods and establish communications using that method in the normal way. The database may also store the called parties preferences, *ie.* that they prefer to be contacted by email.

NB: The name ENUM is also used for the protocol defined by the IETF in RFC 2916, and for the name of the IETF Working group that developed the protocol.

ENUM is intended :

(a) to facilitate handing traffic to the Internet if the ENUM interrogation indicates that the called party can be reached by Internet telephony.

(b) to provide service conversion between public telephony, which uses E.164 and Internet telephony which uses Internet names.

(c) to provide additional functionality and value for users though indicating the options and preferences of the called party.

The following figure shows a caller using ENUM :

ENUM can also be used by network operators and Internet Service Providers (ISPs).

ENUM will be interrogated with the digits of the called party E.164 number reversed and stored under .e164.arpa. For example DNS would be interrogated with :

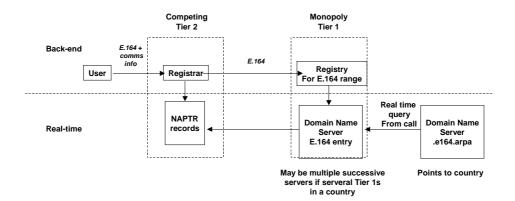9.9.9.9.7.5.2.3.0.6.e164.arpa for the Malaysian number +60 3 257 9999.

ENUM has been the subject of discussion between IETF and ITU-T for some two years. This discussion centres on the following issues :

(a) What involvement does ITU-T have in the use of E.164 numbers which are allocated under ITU-T authority, in the DNS part of the Internet?

(b) Which part of the domain name structure should be used for ENUM? IETF has decided to use .e164.arpa but ITU-T has concerns about this decision.

(c) Who should run the registry for .e164.arpa? IETF has appointed RIPE (the European Regional Internet Registry) but ITU-T has not been involved in this appointment.

(d) Should ENUM data be kept together in a special part of the domain name (*eg.* under .164.arpa) or can it be scattered in different parts, or can both arrangements be allowed?

(e) How can entries into the E.164 part of DNS be validated to ensure that only legitimate users of a particular number have their information entered into ENUM (to prevent the theft of incoming communications), and that only valid E.164 numbers are used within ENUM (to prevent pseudo allocations of E.164 numbers that will lead to conflicts later)?

Whilst discussions continue between IETF and ITU-T, some US based companies such as Telcordia are starting their own specialised ENUM services such as WebNUM which translates a number onto a web address for facilitating access to web pages for mobile phones where numbers are easier to enter than alphabetical characters.

Several countries such as the UK, France and Netherlands are starting consultation about ENUM.

The following figure shows the US plans for how information will be handled in DNS. This includes a monopoly registry function, called Tier-1, and competing registrars, called Tier-2. The situation is shown in the following figure :

Potential called parties will contact competing Tier-2 providers to submit their information (E.164 number and list of the services that they use and the corresponding names). Although the payment arrangements are not yet defined, they will probably have to pay a small sum for uploading their details. The Tier-2 registrars will store the details on their customers in a real time database, and will notify a monopoly registry for the range of E.164 numbers that contains the customer's number that they hold the details.

When a caller queries ENUM, the query is passed down from the root servers to the real-time database of the registry and then referred to the database of the registrar.

2. DISCUSSION

What is new about ENUM is the use of an already allocated E.164 number that is used for the provision of an incoming service on one network (public telephony on circuit switched networks) for the delivery of calls with another service (Internet telephony) by another service provider (an ISP).

There are several serious commercial issues that will affect the viability of ENUM :

(a) Will there be sufficient incentive for users to put their communications identifiers into ENUM?

(b) How will ENUM provision be funded?

(c) Will callers and networks use it when the proportion of called numbers stored in the ENUM system is low? (the critical mass problem)

(d) Will users bother to upload their details and pay to do so, or can some other means of populating the ENUM database be found?

(e) How will the situation be handled where several users share an E.164 number?

These issues mean that there is no certainty that ENUM will be viable commercially.

At a national level the issues are :

    (a)   Which organisation(s) should be appointed as the registry for Malaysia?

    (b)   Should there be any price control on the registry, which is a monopoly?

    (c)   Should there be any obligations on service providers that sub-allocate E.164 numbers to verify the use of E.164 numbers by their customers to assist accurate entry into ENUM?

    (d)   How can one ensure that ceased E.164 numbers (that is, E.164 numbers not in current use) are removed from ENUM and is this necessary?

    (e)   Should a special area of E.164 numbers be assigned for personal use with special allocation arrangements and verification of entries in ENUM?

3.   ISSUES FOR DISCUSSION IN WORKING GROUP D

D-1: Should Malaysia seek positively to facilitate the development of ENUM, or just wait and see?

D-2: Should a special range of numbers be assigned for ENUM?

D-3: What are the main points to be taken into account concerning arrangements for a registry, registrars and validation of numbers?

D-4: Should only Governmental agencies be allowed to operate the registries?

D-5: Is it essential that all E.164 numbers continue to be reachable from the Public Switched Telephone Network (PSTN)?

D-6: Should there be any ownership or database rights over any registry or directories?

D-7: What areas of the registry administrator rights should be regulated?

F. WORKING GROUP E: CURRENT OPERATIONAL AND IMPLEMENTATION ISSUES

1. BACKGROUND

The current numbering plan has been drafted on minimalist lines and appears in the following documents :

(a) Operational Frameworks on Numbering – including PBPTN and REG-T 002, 004, 005, 006, 010, 011 and 012;

(b) Operational Frameworks for Internet Services – REG-T 008; and

(c) Operational Documents on Domain Name Registration.

All numbering plans raise issues such as –

(a) Allocation

(b) Issue

(c) Certainty

(d) Withdrawal and cancellation

(e) Dispute resolution

(f) Notice of changes

(g) Plan development

(h) Transition arrangements.

2. ISSUES FOR DISCUSSION IN WORKING GROUP E

E.1: What is the industry perception of the current numbering plan and its strengths and weaknesses?

E.2: What are the operational issues that the Commission should address for the current numbering plan?

E.3: What are the priority issues and problems to be addressed under the current numbering plan?

E.4: What are the consequences for the industry if current problems, identified above, are not addressed?

G. WORKING GROUP F: PERSONAL / VIRTUAL NUMBERING

Working Group F is concerned with the goals of :

?? **User friendliness** – that is, how well the numbering system meets the needs of users for simplicity, ease of use, and the avoidance of mistakes.

?? **Stability** - that is, to minimise disruptive changes in the numbering arrangements to the greatest possible extent, and to incorporate changes as they become necessary in ways that build on what is there already, rather than radically alter it.

1. INTRODUCTION

Personal numbering is the allocation of numbers to individual users rather than lines, which can result in numbers being shared between several different individuals. There are many different situations where numbers are personal in this sense :

(a) Mobile services.

(b) Distinctive ringing tones, where the different members of a household have different numbers and incoming calls are delivered on the same line with different ringing tones.

(c) Advanced services that support the ability to register at any location and have incoming calls delivered to that location and outgoing calls billed to the user's account. The main example of this type of service is Universal Personal Telecommunications (UPT), which is standardised by ITU-T but which has yet to become a commercial success.

Personal numbering is not the same as number portability but are complementary to each other. Personal numbers may be allocated through an operator, or may be allocated direct by the regulator to end users who then procure a service on the number from an operator. This type of direct allocation requires all operators to be able to support any number. The approach that is favoured depends on whether the regulator wishes to establish a central system for number allocation or use the resources of the industry.

2.   ISSUES FOR DISCUSSION IN WORKING GROUP F

F-1: How can geographic numbers, which are frequently shared be made more personal? Should a service such as distinctive ringing be introduced?

F-2: Should a number range be created for more advanced personal number services?

F-3: Should some form of direct allocation of numbers to individuals be introduced and what services should it apply to? (*NB: Without limiting Working Group F, it might want to consider Intelligent Network Services (such as Freephone and Information Services), mobile services, and fixed network services)*)

F-4: Should there be a right either by the Commission or the operator to change the users' numbers ? If so under what circumstances?

F-5: Should the user of a personal number be prevented from porting the number to a different service provider, and if so under what circumstances?

GLOSSARY OF TERMS AND ABBREVIATIONS

ATM	Asynchronous Transfer Mode
CcTLD	Country Code Top Level Domain
CMA	Communications Multimedia Act
Commission	Malaysian Communications and Multimedia Commission
DNS	Domain Name Server System
ENUM	E.164 Telephony Numbering Mapping Protocol
IETF	Internet Engineering Task Force
Industry Workshop	Industry Workshop On Malaysian Electronic Addressing And Numbering
ICANN	Internet Corporation for Assigned Names and Numbers
IP	Internet Protocol
Ipv4	IP version 4
Ipv6	IP version 6
ISPs	Internet Service Providers
ITU-T	International Telecommunications Union – Telecommunications
PC	Public Consultation
PSTN	Public Switched Telephone Network
RFC 2916	Request For Comments 2916
RFP	Request for Proposal
RIPE	European Regional Internet Registry
SS7	Signalling System No. 7
TelNUM	The name of a US based commercial enterprise for the conversion of strings of digits into URLs (internet addresses)
UDRP	Uniform Domain-Name Dispute Resolution Policy
UK	United Kingdom
UPT	Universal Personal Telecommunications
URL	Uniform Resource Locators

| US | United States of America |
| WebNUM | The name of a US based commercial enterprise for the conversion of strings of digits into URLs (internet addresses) |