

NUMBERING AND ELECTRONIC ADDRESSING

CONSULTATION PAPER

26 April 2002

Preface

Under the *Communications and Multimedia Act 1998* (the Act), the Malaysian Communications and Multimedia Commission (the Commission) is vested with the control, planning, administration, management and assignment of the numbering and electronic addressing of network services and applications services under section 179(1) of the Act. The Commission is responsible for the development of a Numbering and Electronic Addressing Plan for the numbering and electronic addressing of such network services and applications services. All licensees, save for content applications service providers, are expressly required to comply with the Numbering and Electronic Addressing Plan issued under the Act as a standard licence condition.

The Commission has appointed Zaid Ibrahim & Co. in collaboration with Ovum Pty Ltd (the Consultants) to assist the Commission to develop a Numbering and Electronic Addressing Plan and other related matters for Malaysia in relation to the management and administration of numbers and electronic addresses by taking into consideration the technological advancement, global trends, local industry views and emerging issues connected with this subject.

The Commission together with the Consultants had conducted an Industry Workshop on Numbering and Electronic Addressing in Kuala Lumpur on 3rd October 2001 to obtain industry participation and involvement on the issues and concerns pertaining to numbers and electronic addresses. The issues which the participants from the industry had to consider and provide their input were set out in the Initial Issues Paper on Numbering and Electronic Addressing dated 27th September 2001 and a Supplemental Note to the Initial Issues Paper dated 2nd October 2001. Following the Industry Workshop, the Consultants had conducted a series of interviews with selected industry players from the local communications and broadcasting industry to obtain their feedback on specific numbering and electronic addressing issues.

Under the terms of the appointment, a public consultation of the Consultants' proposals and recommendations for the new Numbering and Electronic Addressing Plan is to be conducted before the submission of the finalised proposals and recommendations for the Numbering and Electronic Addressing Plan to the Commission.

Two of the key objectives in making public this Consultation Paper are to facilitate open debate on numbering and electronic addressing issues and to provide advance notice of proposed changes in these areas to service providers and end-users.

Interested members of the public are invited to participate in this consultation process by providing feedback, comments and suggestions to this Consultation Paper. The Consultants will take into consideration the feedback received before finalising the proposals and recommendations for the Numbering and Electronic Addressing Plan for submission to the Commission.

All submissions shall be in written form and are to be submitted by **12.00 noon** on **Friday, 24th May 2002**. Written submissions may be made either in electronic version (preferred) or hardcopy printed version addressed to the following:

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The Consultants extend their appreciation to interested parties for their participation and for providing their written submissions to this consultative process.

**Consultation Paper on the
Numbering and Electronic
Addressing Plan**

26 April 2002

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Abbreviations

ADSL	Asynchronous Digital Subscriber Line
AESA	ATM End System Address
APNIC	Asia Pacific Network Information Centre
ASCII	American Standard Code for Information Interchange
ATM	Asynchronous Transfer Mode
ccTLD	Country Code Top Level Domain
GTLD	Generic Top Level Domain
CKSC	Commonly Known Short Code
CPP	Caller Party Pay
DCC	Data Country Code
DTE	Data Terminal Equipment
E.164	ITU-T Recommendation E.164
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile communication
IASC	Internationally Accessible Short Code
ICANN	Internet Corporation for Assigned Names and Numbers
IDN	Internationalised Domain Name
IETF	Internet Engineering Task Force
IND	International Network Designator
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISC	Independent Short Code
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
ISPC	International Signalling Point Codes
ITU	International Telecommunications Union

ITU-T	Telecommunication Standardisation Sector of the International Telecommunications Union
MCMCA	Malaysian Communications and Multimedia Commission Act 1998
MNI	Mobile Network Identifier
MPEG	Moving Picture Experts Group
MP3	MPEG-1 Audio Layer 3
MVNO	Mobile Virtual Network Operator
MYNIC	Malaysian Network Information Centre
NSN	National Significant Number
NTE	Network Terminating Equipment
PC	Personal Computer
PBX	Private Branch Exchange
PCN	Personal Communications Network – also known as DCS 1800 or GSM 1800
PDN	Public Data Network
PSTN	Public Switched Telephone Network
RIR	Regional Internet Registries
SANC	Signalling Area / Network Code
SCN	Short Code Numbers
SDH	Synchronous Digital Hierarchy
SIP	Session Initiation Protocol
SLD	Second Level Domain
SMS	Short Messaging System
SN	Subscriber Number
SNL	Subscriber Number Level code
TDC	Telex Destination Codes
TLD	Top Level Domain
VoIP	Voice over Internet Protocol
VDSL	Very high rate Digital Subscriber Line
WDM	Wavelength Division Multiplexing

Glossary of Terms

Act	The Communications and Multimedia Act, 1998 (Act 588), as amended from time to time.
American Standard Code for Information Interchange or ASCII	A coding method used by computers for converting letters, numbers, punctuation and control codes into digital form.
Applications service provider	The term “applications service provider” shall have the same meaning as provided under the Act.
Area Code	A set of digits beginning with a trunk prefix “0” which forms part of national numbers and which indicates a defined geographical area within Malaysia where the subscriber to public network services and public applications services associated with the number is located.
Assignment	The processes by which individual numbers and electronic addresses are issued to eligible service providers for a particular purpose in relation to the provision of services under the Act.
ATM Switched Virtual Circuits Services	ATM Service utilising temporary circuits managed through signalling.
Break-in	The delivery of calls from the PSTN to other networks.
Break-out	The delivery of calls from other networks to the PSTN.
Caller	The person who initiates the use of a network and/or applications service.
Commission	Malaysian Communication and Multimedia Commission.
Content applications service provider	The term “content applications service provider” shall have the same meaning as provided under the Act.
Customer access service	A network service that enables a customer to access an application service provided over a network.
Data Only Mobile Terminals	A device used for a range of applications of data communications with and between machines.
E.164 numbers	Numbers that conform to ITU-T Recommendation E.164 for public telecommunications network numbering.
ENUM	A planned public database service intended to be

	operated on the Domain Name Server system and interrogated with an existing E.164 number which returns a list of other communication methods for the person identified with the interrogating E.164 number.
H1	The first half of a calendar year, running from 1 st January to 30 th June, inclusive.
H2	The second half of a calendar year, running from 1 st July to 31 st December, inclusive.
Internet Corporation for Assigned Names and Numbers or ICANN	The non-profit corporation which is responsible for Internet Protocol address space allocation, protocol parameter assignment, domain name system management and root server system management functions.
Internet Engineering Task Force	An international community of network designers, operators, vendors and researchers concerned with the evolution of the Internet architecture and the operation of the Internet
Internet Protocol addresses or IP addresses	A 32-bit (version 4) or 128-bit (version 6) number used to identify interfaces in the Internet.
Internet Protocol version 4 or IPv4	Internet Protocol version 4 which uses 32 bit addresses and is the current version of the Internet Protocol.
Internet Protocol version 6 or IPv6	Internet Protocol version 6 which uses 126 bit addresses and is designed to replace and enhance Internet Protocol version 4.
Licensee	A person who either holds an individual licence, or undertakes activities which are subject to a class licence granted under the Act.
Minister	The Minister for the time being charged with the responsibility for communications and multimedia.
Moving Picture Experts Group or MPEG	A group operating under the auspices of the International Organization for Standardization.
Name	A combination of characters that is used to identify "end-users".
Network facilities provider	The term "network facilities provider" shall have the same meaning as provided under the Act.
Network service provider	The term "network service provider" shall have the same meaning as provided under the Act.
Number or Numbering	Number has been defined under section 6 of the Act as "a number, letter or symbol". For the purposes of

	<p>this Consultation Paper, the term “number” or “numbering” when used independently of the term “electronic addresses” shall specifically refer to all unique identifiers for all communication within the purview of the Act other than IP addresses, Autonomous System Numbers and domain names.</p>
Plan or Numbering and Electronic Addressing Plan	<p>The Numbering and Electronic Addressing Plan referred to in Section 180 of the Act which is to be developed based on this Consultation Paper.</p>
Public Cellular Telephony Service	<p>An applications service involving a network of base stations or cells for the delivery of primarily voice communications.</p>
Registrar	<p>A registrar for domain name registration in Malaysia.</p>
Regulations	<p>Regulations or any other subsidiary legislation pursuant to the Act.</p>
Reserved Numbers	<p>Numbers and electronic addresses which are reserved by the Commission that are not subject to either a Normal Assignment Application or Special Assignment Application.</p>
Subscriber Number Level code or SNL	<p>A code being the first digit of subscriber number, and which is, in the case of Geographic Numbers, associated with a geographic location.</p>
Softswitch	<p>A software based switch that provides call control functionality. Typically used to provide telephony functions in a next generation network and for interworking with the PSTN.</p>
Sub-assignment	<p>The process by which Licensees subsequently assign numbers and electronic addresses that have been assigned to them, to their customers.</p>
Telecommunication Standardisation Sector of the International Telecommunications Union or ITU-T	<p>An international telecommunications standards organisation.</p>
WHOIS	<p>A tool which allows anyone to query a database of people and other Internet entities, such as domains, network and hosts. The data includes company or individual name, address, phone number and electronic mail address.</p>

1. The Importance of Numbering and Electronic Addressing

1.1 Introduction

- 1.1.1 National plans and aspirations to develop an advanced information society based on a full range of modern telecommunications, multimedia services and expanding electronic business service applications need to be supported by a range of operational frameworks. One of these frameworks, which operate as an enabler for the information age, relates to numbering and electronic addressing.
- 1.1.2 Numbers and electronic addresses are necessary resources to facilitate the development of new products and services and to provide the means of accessing them. As necessary resources, they must be made available in a fair, transparent and efficient manner within an acceptable time frame to the relevant users. Plans for the designation, reservation and assignment of numbers and electronic addresses need to be forward looking and to reflect not only current requirements but also to anticipate future requirements brought about by next generation services and market demands. Plans that reflect outdated technologies and market structures, and which attempt to solve problems using yesterday's methods and assuming yesterday's compromises, cannot facilitate Malaysia's transition to an information society based on an online economy served by advanced electronic services and applications. At best, outdated plans miss the potential opportunity to contribute to national goals; at worst they inhibit that development.
- 1.1.3 The Consultants take the view that the Numbering and Electronic Addressing Plan (the "Plan") should provide Malaysia with a competitive advantage in the development of communications and multimedia services through clear and forward looking numbering and electronic addressing policies.
- 1.1.4 This Consultation Paper contains proposed policies, strategies and planned changes on the subject of numbering and electronic addressing and have been formulated after considerable industry discussion and consultation and after consideration of the plans and policies adopted in other countries and being considered or planned in international fora, such as the ITU and ICANN.

1.2 Support for Industry Development and Convergence

- 1.2.1 The information and computing technology sector of the economy is undergoing substantial and rapid change and is transforming social and economic transactions in the process.

- 1.2.2 The major industry changes that are occurring on global, regional and national levels are:
- (a) **The liberalisation of the communications market and the development of competition at all levels.** This development has been further supported at the international level by the Basic Telecommunications Services Agreement of the World Trade Organisation which took effect in February 1998, although several countries are allowed to delay implementing the terms of the said agreement until 2000 or later. The range of services and technologies covered by this agreement is vast – from submarine cables to satellite systems, from broadband data to cellular services, from business networks based on the Internet to technologies designed to bring low-cost access for under-served communities.
 - (b) **The transformation of the underlying technologies from circuit switched to packet switched and from electronic to optical operation.** Since the inception of the Internet to its present mass market form and the World Wide Web service in 1995, the balance of telecommunications traffic has shifted from voice to data. As a consequence of a shift in the underlying technology from circuit switched to packet switched technology, the development in communications technology has been driven by the economics of lower cost packet processing, and by the capacity of networks with optical transmission to accommodate the rapidly increasing traffic volumes efficiently.
 - (c) **The introduction and growth of ubiquitous broadband services to address the demand for more complex multimedia services and for faster access to the Internet.** Broadband service capabilities are increasingly needed to accommodate the bandwidth required to support multimedia and in particular video, for both residential entertainment services and business data services.
 - (d) **Convergence of the telecommunications, information technology and broadcasting industries at the technology, supplier, service and market levels.** Convergence at the technical level is based on the ubiquity of digital technologies which enable a wide range of different services to be deployed over the same network platform. This separation of applications and services on the one hand, from platforms, on the other, is at the core of convergence at the service level. The Internet is the quintessential converged platform, since it is capable of supporting all manner of digital services, including multimedia. At the supplier level, convergence has encouraged competition between industries and participants that were once considered distinct – such as the broadcasting and telecommunications industry. Lastly, the ability to reach out to customers on a global scale through online service provision, has redefined markets once considered regional, national or local.
- 1.2.3 All of these developments can be facilitated by the existence of appropriate numbering and electronic addressing policies.

1.3 The Need for a Numbering and Electronic Addressing (NEA) Consultation Paper

- 1.3.1 This Consultation Paper on Numbering and Electronic Addressing has been developed to:
- (a) describe current and future developments that are likely to affect numbering and electronic addressing needs; and
 - (b) highlight proposed developments and planned changes in numbering and electronic addressing that may affect the industry in the future.
- 1.3.2 In both cases the objective is to ensure that proposed policies, intended developments and planned changes to the current numbering and electronic addressing policies and conventions are articulated and made clear. A comprehensive and well considered strategy and policy on numbering and electronic addressing will serve as a guide to ensure that the Plan that is developed will be coherent, consistent and holistic in its structure and approach.
- 1.3.3 The main purposes in publishing this Consultation Paper and to conduct this public consultation exercise are to:
- (a) facilitate open debate and to solicit public feedback on numbering and electronic addressing issues and the proposed recommendations by the Consultants; and
 - (b) to provide advance warning of proposed planned changes which may affect the relevant stakeholders including consumers.

1.4 Time Horizon of the Plan

- 1.4.1 The Plan that is to be developed should be based on assessments of demand for numbers on a 10 year time frame which will be further discussed in this Consultation Paper.
- 1.4.2 The options for ensuring adequacy of number resources, the basis for priorities and preferred options will be set out in this Consultation Paper.
- 1.4.3 The relatively long time frame of 10 years has been selected for the time horizon to ensure a certain measure of stability and planning requirements so as to minimise short term or knee jerk measures that may be disruptive and costly to both the end-users and service providers.

1.6 Plan Review and Revision

- 1.6.1 Notwithstanding the 10 year time frame of the Plan, it is proposed that the Plan be reviewed and amended from time to time, as required by the necessities of the industry and the emerging environment in which it operates.
- 1.6.2 The Consultants are further proposing to the Commission that it should take an active approach in constantly monitoring market environments, consumer needs and technological advancements that may have an impact

on numbering and electronic addressing policies. A major review of the Plan should also be conducted at intervals of no less than 5 years.

1.7 Invitation for Public Comments

Comments are invited on the proposed 10 year time frame for the Plan and the scheduled review of the same at intervals of no less than 5 years.

2. Commercial and Technical Trends

2.1 Introduction

2.1.1 Twenty years ago the communications market was characterised by:

- (a) Most communication traffic being telephony;
- (b) Nearly all revenue being derived from telephony;
- (c) Calls being charged on a per minute basis;
- (d) Prices being strongly dependent on distance; and
- (e) International calls subsidising national and local calls.

2.1.2 The growth of the Internet has changed the communications market by the ever-growing traffic of data funded by subscription-based revenue and in part, by advertising. The Consultants take the view that within the near future the communications market will be characterised by:

- (a) Most communication traffic being data;
- (b) Significant reduction in revenue from telephony as a result of voice communications migrating to the Internet; and
- (c) Prices becoming independent of distance with pressure for fixed network call charges to be replaced by subscription.

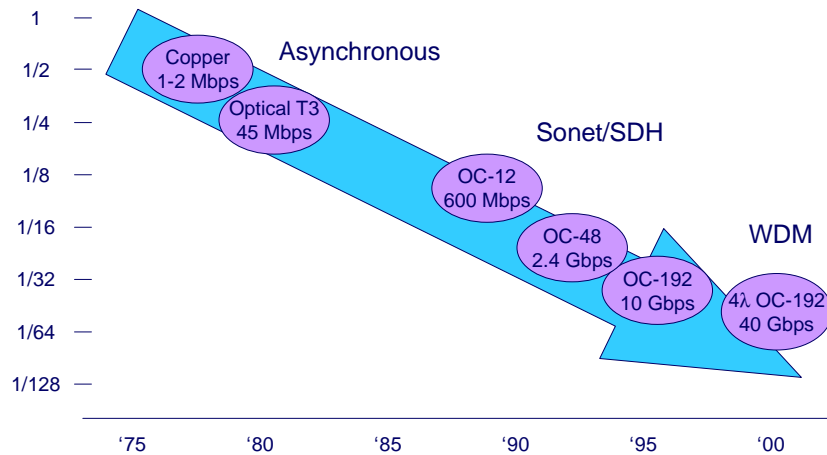
2.1.3 The Plan should be robust and sufficiently flexible to accommodate and support all of the changes above.

2.2 Technology

2.2.1 There are three major trends in technology costs:

- (a) Transmission costs per unit of capacity that have been falling for the last few years are continuing to fall very rapidly, as shown in Figure 2.1;

Figure 2.1: Reduction of Costs per Unit of Bandwidth Capacity over Time



Source: Ovum, 2000

- (b) The switching cost for Internet Protocol technology is reducing steadily and faster than the cost for circuit switches. Internet Protocol technology also enjoys huge economies of scale that are absent in the circuit switched environment;¹ and
- (c) The cost of billing and administration is becoming a growing proportion of the total costs of a service provider, creating a strong incentive for the simplification of these functions by including the use of the Internet as the primary customer interface and the replacement of call and duration-based charging methods with simple subscription-based charging methods.²

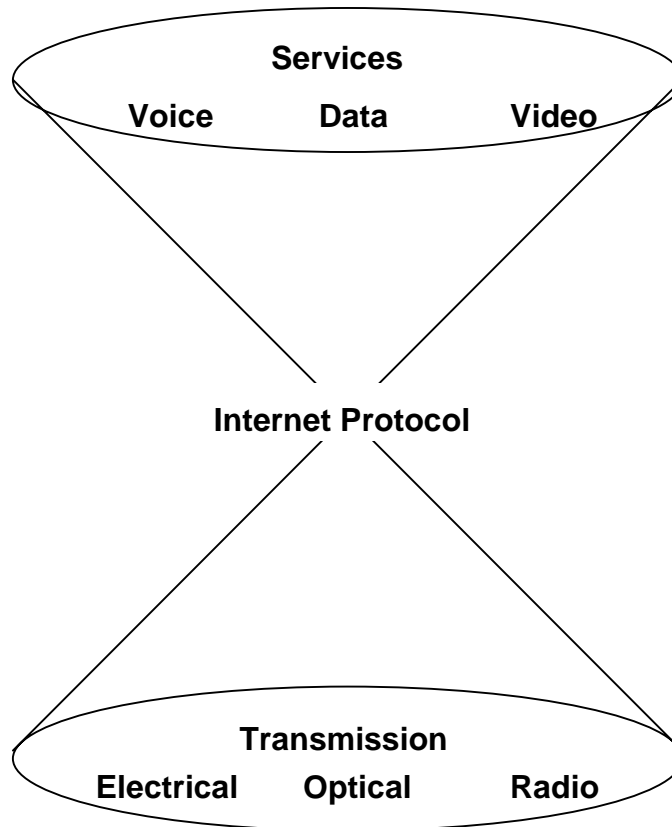
2.2.2 The Internet Protocol and the technology that supports it, is increasingly becoming established as a core technology for communication networks. It is a multi-service technology since it provides a common protocol for communication that can support all services and can be utilised on various

¹ Vendors typically claim unit cost efficiency improvements of up to 70% for next generation Internet Protocol infrastructure. Estimates of the cost of supporting packet based systems go as far as 50% of the costs of supporting comparable circuit switched solutions. Iain Stevenson and Edward Pugh: *Next Generation IP Networks: Service Opportunities from New Platforms*, Ovum, 1999.

² To simplify billing arrangements, some Internet access providers charge a flat monthly fee. "Billing solutions designed principally for circuit-switched networks do not work in the convergent world. It is the lack of a circuit switch that makes billing for transactions over Internet Protocol networks so difficult. The switch, a filter through which all network events are passed, provides a capable point of interaction for business system support software. The switch instantly records raw data, which can then be collected and processed by mediation devices. There are no switches in next-generation networks and no other element to replace their function. Herein, lies a major challenge." K Brody, D James and K Ellis: *Billing for Next Generation Services – Meeting the Challenge*, Ovum, 2000.

different electrical, optical and radio transmission systems as shown in Figure 2.2.

Figure 2.2: The central role of Internet Protocol



Source: Consultants' Study, 2001 .

2.2.3 There are two main driving forces behind the growth of Internet Protocol technology:

- (a) The performance/price ratio of Internet Protocol based switches doubles every 18 months whereas that of circuit switches doubles every 80 months.³ The lower cost of Internet Protocol technology, compared to traditional communications technologies, is caused by the simplicity of the designs, the intensity of competition in the retail orientated computer market and the large economies of scale; and

³ In practice the operational costs of circuit switched operations may well increase as the transfer of telephony operations to next generation operation continues. Network technology vendors will typically reduce the level but increase the cost of support for old technologies, in a bid to improve their capabilities and competitive advantage in new technology markets.

- (b) the potential of Internet Protocol as a multi-service technology, which leads to cost savings both in the provision and operation of networks.⁴

2.2.4 The cost savings provide a compelling argument for the service providers to migrate to Internet Protocol based technology. Even where Internet Protocol is not well suited to particular services, such as conversational voice communications⁵, the cost advantages outweigh the disadvantages.

2.2.5 This has led to a situation where service providers are not willing to invest in additional circuit switches for the expansion of fixed telephony networks because they regard such investment as likely to be short-lived. The reaction of the communications industry to these developments is to develop next generation networks based on Internet Protocol using softswitches as alternatives to circuit switches and gateways for handling the connection between the Internet Protocol domain and the PSTN.

2.3 The Future of Circuit Switched Traffic

2.3.1 The developments in technology discussed above are leading to a large measure of uncertainty in the communications industry. In the absence of the widespread presence and appeal of the public Internet, the migration path from circuit switched to softswitch-based networks would have been less disruptive.

2.3.2 A possible outcome that may arise is that the bulk (if not all) of the traffic currently served by telephony service providers (especially PSTN traffic) will migrate onto the Internet. However this outcome is not altogether a foregone certainty.

2.3.3 Figure 2.3 illustrates the differences between the Internet and traditional telecommunications models.

⁴ With multi-service technology and next generation networks, service providers do not need to operate separate voice and data networks and can thereby reduce the overall cost for system design, operation and support from the levels that would otherwise apply with stand alone, separate systems and the gateways needed for their interworking.

⁵ Voice communications are sensitive to latency (time delays) and message elements either not arriving or arriving out of order. Consequently, unless suitable service performance and service quality levels can be assured, Internet Protocol and other packet switched technologies are not particularly suited to voice communications, relative to the standard of dedicated circuit switched connections. However substantial progress is being made with the development of a number of protocols which will address these issues – namely, H.323 by the ITU-T, and SIP by the IETF. It is likely that applications that can work with both protocols will be most successful. As these matters are progressing, the efficiency benefits of Internet Protocol protocol are being obtained by corporate users deploying voice over Internet Protocol, supported by ATM or Frame Relay on their private networks, and by service providers deploying Internet Protocol on their backbone (inter-exchange) networks.

Figure 2.3: Comparison between the Internet and traditional communications models

Dimension	Traditional telecommunications	Internet
Approach	Closed = restricted access and use	Open = unrestricted access and use
Functionality and service creation	Within the network	At network edges by end-users or independent third parties
Charging	Usage based charging	Subscription based charging
Quality of service	Predictable and adequate	Unpredictable but improving
Reliability	Very high	Not high due to the software in terminals, but improving

Source: Consultants' Study, 2001 .

2.3.4 The Consultants are of the opinion that there is a clear and sustained trend of traffic moving away from the traditional "intelligent" high functionality network towards a "dumb" network with all the functionality being at the network edges in the terminals.⁶ This is likely to mean a steady loss of revenue for traditional telephony service providers as traffic that is charged on a per minute basis migrates to the zero marginal price of the Internet. New services are also more likely to be provided via the Internet than via the current telephony networks. It should be further noted that this underlying trend is being enhanced by the incorporation of Internet Protocol based telephony software into commercial desktop operating systems (for example, Windows XP⁷), which allow end-users to make adequate quality voice calls over the Internet. If usage of these types of software takes off rapidly in the business market, it will further facilitate the migration to PC-to-PC traffic. Any regulatory restrictions on the delivery of calls from the PSTN to the Internet (break-in) and from the Internet to the PSTN (break-out) will not be applicable in this scenario.

2.3.5 Voice communications over the Internet will likely grow around the capabilities of certain Internet-based services such as Instant Messenger and Windows Messenger. These services are aimed at frequent communications between informal groups, for example, colleagues working on the same project or social and family groups. They offer multimedia type

⁶ This is the result of convergence, in which services and applications are developed separately and independently of the platform (or network) on which the services operate. For example the Internet, which was developed by American military and academic technologists who have no interest in the development of applications and services today.

⁷ 'Windows XP' is a Microsoft branded product that was launched in 2001. It is SIP enhanced, and therefore will have the capability of supporting voice calls from a PC over the Internet using local carrier access services.

communications including video and file transfer. The significance of incorporating such features into commercial desktop operating systems is that it will further facilitate the migration of traffic onto the Internet. In addition to cost benefits, these Internet based services also offer “presence” – an indication of when a desired party is available for communication. Another feature of such services is easy multi-party communications, enabling remote meetings to take place more readily.

- 2.3.6 Even in a situation where there is a substantial price drop in circuit switched voice telephony services, the demand for such voice telephony services will still be constrained by the maximum limit each human individual requires of voice based communications. It is also unlikely that circuit switched voice telephony services will be able to match the cost advantages enjoyed by Internet Protocol based voice telephony services. If the substitution effect of Public Cellular Telephony Services and migration to other equivalent services are taken into account, it would appear that the long term demand trend of circuit switched PSTN will be one where there is an increase to a peak and then gradually fall when the loss effects due to migration to other forms of services exceed any growth in demand. This effect is however not foreseen for Public Cellular Telephony Services (see later sections) and for calls to Special Service Numbers where traffic is expected to grow until it eventually reaches a plateau.
- 2.3.7 However, reliability and quality of service are important strengths of the circuit switched PSTN. The Internet currently lacks the consistency that the circuit switched networks can provide. This means that although many end-users may use the Internet for their communications most of the time, there is a likelihood that the use of traditional telephony services will be retained. In addition, there is a possibility that even Internet Protocol based telephony service providers will require assignments of E.164 numbers for incoming telephony calls originating from established circuit switched networks.
- 2.3.8 Therefore, the Consultants believe that while traditional telephony services will suffer declining traffic (and consequently a less taxing demand will be placed on numbering and electronic addressing resources), there will still be continuing requirements for E.164 numbers.

2.4 Effect on Fixed Telephony Service Providers

- 2.4.1 In summary, the effects of the developments described in the earlier sections will impact the fixed telephony service market in the following manners:
- (a) fixed telephony service providers will steadily lose telephony traffic to the Internet;
 - (b) fixed telephony service providers will have a high incentive to move the rapidly growing Internet access traffic off the PSTN so that they do not need to invest in additional switching capacity;

- (c) fixed telephony service providers will have little incentive to replace the digital circuit switched networks once they have managed to segregate Internet access traffic because the remaining telephony traffic will not be growing and it will be cheaper to leave these networks unchanged; and
- (d) ISPs and Internet-based telephony service providers will wish to operate gateways for PSTN break-outs and break-ins.

2.4.2 These expected effects should be taken into consideration when developing the Plan.

2.5 Developments in Public Cellular Telephony Services

2.5.1 In spite of the increasing migration of traffic onto the Internet, the demand for Public Cellular Telephony Services is growing. Part of this growth is made at the expense of fixed telephony services as end-users are increasingly making cellular telephony services a substitute to fixed voice telephony services. The growth of Public Cellular Telephony Services is indicated in Figure 2.4.

Figure 2.4: Forecast of mobile connections in Malaysia and Asia Pacific Region

	2002	2003	2004	2005	2006	2007
Total connections (Asia Pacific) ('000)	173,859	209,772	242,684	273,812	302,342	328,582
Malaysia	10,120	13,600	15,500	16,486	16,869	17,135
Total penetration (Asia Pacific) (%)	24.3	29.0	33.2	37.0	40.4	43.5
Malaysia (%)	44.7	59.0	66.1	69.1	69.5	69.6

Source: Consultants' Study, 2001 .

- 2.5.2 The implementation of GPRS is just starting but the service is expected to grow slowly at the initial stages because of terminal shortages and possibly high usage related charges.
- 2.5.3 At this stage, the precise timescale for the development and deployment of third generation mobile (3G) services in Malaysia remains uncertain although the Commission's Framework for Industry Development has targeted the development of spectrum policies for 3G by 2003.
- 2.5.4 Implementation of the new interfaces and attempts at providing higher speed data access will almost certainly proceed but they are likely to be delayed by a combination of:
 - (a) investment shortages;

- (b) terminal shortages; and
- (c) terminal-network compatibility problems.

2.5.5 The dominance of Internet Protocol multimedia services and all-Internet Protocol infrastructure may be challenged by mobile next generation networks. As end-users of Public Cellular Telephony Services do not have the advantages in terms of zero or low marginal price for moving voice onto the public Internet unlike fixed telephony users currently⁸, this may give an incentive for providers of Public Cellular Telephony Services to bundle services and access and to discriminate against services provided on the Internet. Two extreme possibilities in the development of third generation mobile networks are outlined for the purposes of discussion:

- (a) third generation networks becoming a high speed mobile form of Internet access and the perpetuation of current mobile telephony services. However applications services provided on the Internet will thus become accessible to mobile users and therefore the main service development will remain on the Internet; or
- (b) third generation networks become a next generation platform for many new applications services that are not available at equivalent quality and price on the public Internet.

2.5.6 Under either of the possibilities above, third generation mobile networks will potentially impose a large demand on numbers and electronic addressing resources, but more so under scenario (a). The Consultants therefore take the view that the numbering range meant to be used for mobile services should be expanded.

2.5.7 The possible delays in the development and deployment of third generation mobile networks provides an opportunity for an orderly expansion of the Mobile Number range (01Z) to meet this potential demand. Nevertheless, any expansion plans must be implemented quickly to avoid potential numbering and electronic addressing bottlenecks for third generation mobile network deployments.

2.6 Longer Term Issues for E.164 Numbers

2.6.1 E.164 numbers are numbers that conform to ITU-T Recommendation E.164 for public telecommunications network numbering.

2.6.2 E.164 numbers are comparatively highly structured as a result of:

- (a) the inclusion of deliberate information, for example, large scale geographic information;
- (b) the block method of assignment that creates fine scale geographic information and service provider indications;

⁸ Either through the low cost "151X" Internet Dial-up Service or a flat-rate subscription based Internet access service.

- (c) tariff information or tariff warnings; and
 - (d) distinctions between services, although these distinctions are based more on tariff indications than functionality.
- 2.6.3 There is a general trend to make numbers more portable, that is, to eliminate fine scale geographic information, service provider information and distinctions between services.
- 2.6.4 Voice communications over the Internet will continue to increase as shown in Figure 2.5. As it does, so would the role of ISPs as the access points to the Internet become more important and ISPs will eventually need assignments of E.164 numbers for incoming telephony calls. This will be the case irrespective of whether such numbers are portable or not in the hands of end-users. This means that there is an increase in the number of service providers who have to be catered for in the Plan.

Figure 2.5: Worldwide Growth in Voice over Internet*

	2000	2001	2002	2003	2004	2005
Total minutes per year (millions)	3,361	10,920	29,614	69,036	139,63	251,302
National minutes per year (millions)	1,790	6,996	20,924	51,173	105,98	193,116
International minutes per year (millions)	1,571	3,924	8,690	17,863	33,646	58,185
Total revenues (\$US million)	185	512	1,201	2,431	4,190	6,170

* Defined in terms of PC-to-phone traffic

Source: Ovum: Internet Protocol Telephony – Exploiting Market Opportunities, December 2000.

- 2.6.6 Major and sudden changes in the industry are not foreseen and therefore the main issue for the planning of E.164 number resources is to ensure that foreseeable levels of growth can be accommodated with a reasonable safety margin. The Consultants foresee the main demand growth factors coming from the following factors:
- (a) increased penetration levels;
 - (b) new entrants requiring whole number blocks in each charging district;
 - (c) demand for second lines for Internet Access Dial-up Services;
 - (d) new service types that are sufficiently different from existing services to require separate number ranges; and
 - (e) population and economic growth.

2.7 Long Term Implications for Internet Naming and Addressing

- 2.7.1 For clarity of discussion, it is important to set out the distinction between a name and an address in this Consultation Paper:

- (a) **Names** are combination of characters⁹ that are used to identify “end-users”, which may be persons, a persona (for example, a work place, home etc.), pieces of equipment (for example, NTE, telephone, etc.), interface services (for example, Freephone services), applications (for example, Video on Demand), or locations.
- (b) **Addresses** are strings or a combination of digits and symbols that identify the specific termination points of a connection in a network and are used for routing purposes.

2.7.2 Addresses are essential for communication, as the termination points always have to be identified in a manner that can be used for routing purposes. In contrast to addresses, names are used for some services to make it easier for end-users to identify the distant termination point or to provide an identification system that is independent of the structure of the networks or the current location of the entity to be communicated with.

2.7.3 The Consultants take the view that Internet naming is working satisfactorily. It is different from E.164 numbering in that the same name can be used with any protocol and therefore the issue of having different names for different services does not arise. There is also no issue of rate indication or warnings because Internet services are normally paid by way of subscriptions.

2.7.4 The main problem in the Internet name space is the number of names that end-users can collect mostly through registration with different free service providers such as free web based e-mail services. This leads to a problem in identifying and searching for the correct contact particulars without already having a more conventional means of contact. For example, the need to telephone somebody first to find out and use their e-mail address.

2.7.5 Internet addresses will have to accommodate the continuing growth in demand especially as machine-to-machine communications grow. Internet growth and the migration from IPv4 to IPv6 are discussed later in this Consultation Paper.

2.8 Long Term Implications for Number and Name Management

2.8.1 Both numbers and names require efficient directory services to facilitate successful communication. It has been noted that directory services have generally failed to keep pace with the developments in E.164 numbering following the introduction of competition and the growth of mobile services. This often results from the competitive tensions of a multi-operator environment.

2.8.2 Directories in the Internet name space are not well developed but the problem for Internet names is more acute than for E.164 because there is

⁹ Characters may include numbers, letters and symbols.

greater use of international names. E.164 numbers are managed at the national level unlike international names.

2.8.3 The Consultants take the view that the development of directory services should be facilitated whenever possible.

2.8.4 One proposed solution which is generally connected with directories is ENUM, which is designed to provide translations between E.164 names and Internet names using part of the Domain Name System that supports the Internet. This is an attempt to link the existing directory structure for E.164 with domain names. An alternative solution would be the growth of Internet directories themselves and the ability to obtain names for Internet communications from web pages and search engines. The Consultants believe that the latter alternative is more likely to be successful.

2.9 Overall Conclusion

2.9.1 The overall conclusion is that although the communications market will change significantly in the next 5 to 7 years as a result of services and traffic migrating to the Internet, the fundamental issues of numbering, naming and addressing are unlikely to change significantly. Despite “convergence”, the Consultants take the view that E.164 numbering and Internet naming schemes will remain different and distinct for the foreseeable future whether from a technical or market development perspective.

2.9.2 In light of the conclusion reached, the Plan must necessarily approach and address issues relating to E.164 numbering and Internet naming schemes separately. Where possible, the Consultants propose to adopt a framework of convergence in the development of the Plan so that solutions and principles may be applied generically across all numbers and electronic addresses.

2.10 Invitation for Public Comments

Comments are invited on any of the following:

- a) the future of the public switched telephony services and public cellular telephony services market and the impact on numbering and electronic addressing resources;***
- b) the conclusion that Internet naming is working satisfactorily and no intervention from the Commission is required; and***
- c) the approach to treat E.164 numbering and Internet naming schemes separately due to current state of convergence.***

3. Overview of Numbering Scheme

3.1 Introduction

3.1.1 The numbering sections of the Plan encompass the numbering schemes required in Malaysian communications networks. The Consultants propose to classify various numbers under the following categories for ease of reference:

- (a) Geographic Numbers;
- (b) Non-Geographic Numbers such as Short Code Numbers, Special Service Numbers and Mobile Services Numbers; and
- (c) Other Numbers.

3.1.2 The main numbering scheme follows the ITU-T Recommendation E.164 and encompasses the majority of the numbers utilised by the public. The general overview of the current E.164 numbering range is set out in Figure 3.1:

Figure 3.1: Malaysian Numbering Scheme Structure

Prefix	Description
00	International Access Code
01	Access Code for Public Cellular Telephony Services
02	Access Code for Republic of Singapore
03	Access code for Kuala Lumpur, Putrajaya and Selangor
04	Access code for Perlis, Kedah and Pulau Pinang
05	Access code for Perak
06	Access code for Negeri Sembilan and Melaka
07	Access code for Johor
080	Access code for Brunei from Sabah, Sarawak and Labuan
08(2-9)	Access codes for Sabah, Sarawak and Labuan
09	Access codes for Pahang, Terengganu and Kelantan
1(0-9)	Short Code Numbers and Special Service Number
20-98	Subscriber Numbers (except 600- Premium Rate Services)
99	Short Code Numbers for emergency services

3.1.3 Outlined below is an overview of the various number categories and the changes to existing classifications. A more detailed discussion of the issues and of the options for addressing them are set out in later sections of this Consultation Paper.

3.2 Geographic Numbers

- 3.2.1 Geographic Numbers are numbers used for services which correspond to a discrete geographical area where the digits in certain parts of the number string indicates a specific location such as the exchange or state of the person or service being called. The use of Geographic Numbers are presently limited to fixed telephony and data services. These services include the following:
- (a) Integrated Service Digital Network (ISDN);
 - (b) Centralised Exchange (CENTREX);
 - (c) Direct Inwards Dialling (DID) or Direct Dialed In (DDI); and
 - (d) Fixed Wireless.
- 3.2.2 Geographic Numbers are made of the Area Code component and the Subscriber Number component. Subscriber Numbers for Geographic Numbers are currently made of 6, 7 and 8 digits. A phase-by-phase migration to 8 digit Subscriber Numbers is expected to standardise the differences in Subscriber Number digit lengths.

3.3 Non-Geographic Numbers - Short Code Numbers

- 3.3.1 Short Code Numbers are number ranges classified under the Non-Geographic Number category. Non-Geographic Numbers are used for services that do not correspond to discrete geographical areas.
- 3.3.2 Short Code Numbers (SCN) can comprise of 3, 4 or 5 digit numbers. Short Code Numbers are made up of the following types:
- (a) Common Inter-carrier Short Codes (CISC);
 - (b) Internationally Accessible Short Codes (IASC);
 - (c) Independent Short Codes (ISC);
 - (d) Commonly Known Short Codes (CKSC); and
 - (e) Carrier Selection Codes (CSC).
- 3.3.3 It is proposed that certain Short Code Numbers be re-classified to become Special Service Numbers for administrative reasons.

3.4 Non-Geographic Numbers - Special Service Numbers

- 3.4.1 Special Service Numbers which may have classified previously as part of the Short Code Number range have been re-classified as a main sub-category within the Non-Geographic Number category. This decision is made primarily for administrative reasons.
- 3.4.2 Special Service Numbers are generally of the form 1A0Y SP XXXX (where Y = 1 to 9) and are intended for use for the following services:

- (a) Toll Free Service;
- (b) Freephone Service;
- (c) Premium Rate (Audiotelex Hosting) Service¹⁰;
- (d) Caller Party Pay (CPP) Messaging service (Paging Service); and
- (e) Personal Numbering Service¹¹.

3.4.3 In view of the potential confusion with a new number range meant for personal numbering, the Consultants propose to rename the “1700” Personal Numbering Service Numbers to Forwarding Service Numbers.

3.5 Non-Geographic Numbers - Mobile Numbers

3.5.1 Mobile Numbers are another type of Non-Geographic Numbers which are currently being used for Public Cellular Telephony Services. The Consultants propose to expand the current scope of use of this number range beyond that of only Public Cellular Telephony Services.

3.5.2 Mobile Numbers take the form 01A XXXX XXX where the prefix “01A” is commonly referred to as the “Mobile Network Identifier” (MNI) or as “Pengenalan Rangkaian Telefon Bergerak” under the legacy plans.

3.6 Other Numbers

3.6.1 Besides Geographic and Non-Geographic Numbers, there are a few other types of numbers which the proposed Plan should ideally cover such as Data Network Numbers, Telex Numbers, Global Services Numbers, ATM Network Addresses and National and International Signalling Point Codes, all of which are distinct from the E.164 number ranges.

3.6.2 National and International Signalling Point Codes are used to provide for interconnection of signalling systems at the national and international levels. The Consultants take the view that the growth in the number of competitive service providers and the potential for increased points of interworking between their respective networks, require a review of the current Signalling Point Code arrangements under the legacy plans.

3.7 Supply and Demand for Numbers in Malaysia

3.7.1 The two key requirements for the Plan are:

- (a) to ensure a sufficient supply of numbers and electronic addresses for existing services; and

¹⁰ The Premium Rate (Audiotelex Hosting) Service Number structure is 600 8 T SP XX .

¹¹ To be renamed as “Forwarding Services”.

- (b) to facilitate future market development, such as convergence, by opening number ranges or cancelling under-utilised number ranges to make the resources available for new services.

3.7.2 The Plan should be developed with sufficient expansion routes, even if the services cannot be foreseen or sufficiently defined at present.

Supply and Demand Forecast

3.7.3 To ensure sufficient supply of numbers and electronic addresses for existing services, the Consultants undertook a forecast of the requirements for Geographic, Non-Geographic and Other Numbers for a 10 year period commencing from the year 2001.

3.7.4 Figure 3.2 shows the forecast of demand for such numbers for use with existing services in Malaysia for the period between 2001 to 2011. The forecasting results assume a bias towards a higher future demand for such number resources in the interests of avoiding number shortages at any point in future.¹² The notes to Figure 3.2 are given below and outline the assumptions used in the forecasting exercise.

Figure 3.2: Supply and Demand for Numbers in Malaysia

	2001	2001	2006	2011
Number Category	Supply	Demand	Demand	Demand
Geographic	125 m ⁽¹⁾	24 m ⁽²⁾	38 m ⁽³⁾	45 m ⁽⁴⁾
Mobile	64 m ⁽⁵⁾	6.8 m ⁽⁶⁾	25 m ⁽⁷⁾	55 m ⁽⁸⁾
Special Services				
- Toll Free	1 m	2.1 k ⁽⁹⁾	5.2 k ⁽¹⁰⁾	13 k ⁽¹⁰⁾
- Internet dial-up	1 m ⁽¹¹⁾	0	480 ⁽¹¹⁾	1.2 k ⁽¹¹⁾
- CPP messaging	1 m	0	0	0
- Premium rate	10 k	2.4 k ⁽⁹⁾	9 k ⁽¹²⁾	33 k ⁽¹²⁾
- Freephone	1 m	13 k ⁽⁹⁾	33 k ⁽¹²⁾	82 k ⁽¹²⁾
Short Codes	⁽¹³⁾	129 ⁽⁹⁾	200 ⁽¹⁴⁾	250 ⁽¹⁴⁾
Carrier selection codes	8	5 ⁽⁹⁾	<100 ⁽¹⁵⁾	>100 ⁽¹⁵⁾
Network codes				
- international SPCs	40	29 ⁽⁹⁾	40 ⁽¹⁶⁾	55 ⁽¹⁶⁾
- national SPCs	16384	9800 ⁽⁹⁾	4000 ⁽¹⁷⁾	5000 ⁽¹⁷⁾

Source: Consultants' Study, 2001 .

Notes to Figure 3.2

- (1) This is based on the 7 digit to 8 digit migration being completed in the 03 Area Code.
- (2) Initial Geographic Number demand has been based on the number of blocks assigned and used, where a block is considered used if at least one service from that block has been issued.

¹² Note that the higher figure here as compared to the result in Figure 2.4 is intentional.

- (3) The 2006 Geographic Number demand figure is based on population growth and a factor of 1.4 representing the increased number of services per head of population.
- (4) The 2011 Geographic Number demand figure is based on population growth and a factor of 1.5 representing the increased number of services per head of population compared to 2001.
- (5) This is based on the availability of 8 MNIs with 8 million numbers each.
- (6) This figure is the same as the demand forecast tabled in Parliament on 16 October 2001.
- (7) Based on a 20% per annum growth in voice services from 2001 to 2006, including the mobile data-only services demand.
- (8) Based on a 15% per annum growth in voice services from 2006 to 2011, including the mobile data-only services demand.
- (9) Based on assignment and usage figures held by the Commission.
- (10) Based on 20% per annum growth in services.
- (11) The supply is based on the "1508" Internet Access Dial-up Service code being designated by the Commission in 2001.
The demands are based on 60 service providers in 2006 and 150 service providers in 2011, each requiring 8 Internet Access Dial-up Service numbers.
- (12) Based on 30% per annum growth in services. This growth rate is higher than the Toll Free Service Number and Freephone Service Number growth rates based on the recommended removal of the rate restrictions on Premium Rate (Audiotelex Hosting) Service Numbers.
- (13) The actual supply of Short Code Numbers is not static but depends on what is assigned. For example, where 3, 4 or 5 digit codes can be assigned, assigning a shorter code precludes the assignment of the longer codes.
- (14) This forecast is based on the assumption of an increase in the number of competitors.
- (15) This is based on the Commission opening up the use of Carrier Selection Codes.
- (16) Based on reduction in reserved ISPCs and the increase in the number of competitors and services requiring international interconnection.
- (17) Based on reclaiming a substantial number of point codes used for network internal purposes and the growth in requirement for National Signalling Point Codes due to the increase in the number of competitors and services requiring national interconnection.

Findings

- 3.7.5 The forecast results highlighted potential shortages in the following number types namely Mobile Numbers, Premium Rate (Audiotelex Hosting) Service

Numbers, Carrier Selection Codes, National and International Signalling Point Codes.

- 3.7.6 The Consultants take the view that Telex services have been declining for years (although still in use in specific sectors of the international economy), and there is not likely to be any new demand for Telex Numbers¹³ that can not be met with the current supply. Consequently the Consultants do not see the need to revise the Telex Numbering scheme.
- 3.7.7 It is also the view of the Consultants that the Data Network Numbering scheme is being supplanted over time by integrated voice and Internet Protocol networks and therefore has a limited future and does not require revision at this juncture.
- 3.7.8 Based on the findings, the Consultants have proposed a series of planned changes which are expected to resolve the forecasted shortages. The planned changes will be detailed in later sections of this Consultation Paper.
- 3.7.9 Figure 3.3 shows the revised forecast demand and supply for numbers forecast to be in shortage in Malaysia for the period 2001 to 2011 after the implementation of the proposed planned changes.

Figure 3.3: Supply and Demand for Selected Numbers in Malaysia (Revised)

Number Category	2001		2006		2011	
	Supply	Demand	Supply ⁽¹⁾	Demand	Supply ⁽¹⁾	Demand
Mobile	64 m ⁽²⁾	6.8 m ⁽³⁾	240 m ⁽⁴⁾	25 m ⁽⁵⁾	240 m	55 m ⁽⁶⁾
Special services						
- Premium rate	10 k	2.4 k ⁽⁷⁾	1 m ⁽⁸⁾	9 k ⁽⁹⁾	1 m	33 k ⁽⁹⁾
Short codes	⁽¹⁰⁾	129 ⁽⁷⁾		200 ⁽¹¹⁾		250 ⁽¹¹⁾
Carrier selection codes	8	5 ⁽⁷⁾	800 ⁽¹²⁾	<100	800	>100
Network codes						
- international	40	29 ⁽⁷⁾	56 ⁽¹³⁾	40 ⁽¹⁴⁾	72 ⁽¹³⁾	55 ⁽¹⁴⁾
SPCs						
- national SPCs	16384	9800 ⁽⁷⁾	16384	4000 ⁽¹⁵⁾	16384	5000 ⁽¹⁵⁾

Source: Consultants' Study, 2001 .

Notes to Figure 3.3

- (1) Supply figures are based on the assumption that the recommended expansion plans are implemented.
- (2) This is based on the availability of 8 MNIs with 8 million numbers each.

¹³ The decline has continued since the peak years of telex operation in the 1970s. In 1990 Malaysia had 8,372 telex subscribers compared to 3196 in 1999. ITU Yearbook of Statistics: Telecommunications Services 1990 - 1999 (February 2001).

- (3) This figure is the same as the demand forecast tabled in Parliament on 16 October 2001.
- (4) Based on the completion of the proposed the Mobile Number range expansion.
- (5) Based on a 20% per annum growth in voice services from 2001 to 2006, including the mobile data-only services demand.
- (6) Based on a 15% per annum growth in voice services from 2006 to 2011, including the mobile data-only services demand.
- (7) Based on assignment and usage figures held by the Commission.
- (8) Based on the migration to the 1600 range and opening of the entire range.
- (9) Based on 30% per annum growth in services. This growth rate is higher than the Toll Free Service Number and Freephone Service Number growth rates based on the recommended removal of the tariff restrictions on the Premium Rate (Audiotext Hosting) Service Numbers.
- (10) The actual supply of short codes is not static but depends on what is assigned. For example, where 3, 4 or 5 digit codes can be assigned, assigning a shorter code precludes the assignment of the longer codes.
- (11) This forecast is based on the assumption of an increase in the number of competitors.
- (12) Based on the expansion of the Carrier Selection Codes to 5 digits.
- (13) Based on an additional assignment of 2 SANCs from ITU-T.
- (14) Based on reduction in reserved ISPCs and the increase in the number of competitors and services requiring international interconnection.
- (15) Based on reclaiming a substantial number of signalling point codes used for network internal purposes and the growth in requirement for National Signalling Point Codes due to the increase in number of competitors and services requiring national interconnection.

3.8 Invitation for Public Comments

Comments are invited on any of the following:

- a) the proposed classification on the categories of numbers; and***
- b) the forecast supply and demand of numbers in Figure 3.2 and the resulting findings by the Consultants (paragraphs 3.75 to 3.79).***

4. Expansion of Number Supply

4.1 Approaches for Expanding Number Supply

4.1.1 There are essentially two basic approaches in expanding number ranges, namely by the addition of a number and by merging existing number ranges.

Addition of a Leading Digit

4.1.2 The first approach is the addition of a leading digit that increases the total range of numbers available for assignment. This approach has the following advantages:

- (a) The process is adaptable and can be timed to meet specific circumstances such as limited needs for sterilisation and urgency factors;
- (b) The transition process to the new number allows a period of adaptation by end-users, through a period of parallel operation of old and new number ranges;
- (c) The process is readily understood, since the principle for converting an existing number into a 'new' one, can be readily explained and applied. End-users with records in the 'old' number format, can easily update them to the amended form; and
- (d) Subscriber Numbers are not substantially altered in the process.

4.1.3 The number addition approach has the following disadvantages:

- (a) The process adds an additional digit which increases the incidence of number recording, transcription and dialling errors; and
- (b) The process will typically require approximately 18 months before 'sterilised' old number ranges are available for further assignment (in the new expanded format). In some circumstances this lead time may not be available.

Merging Two Existing Number Ranges

4.1.4 The second approach of merging number ranges seeks to release under-utilised ranges to enable a more efficient utilisation of the existing number ranges. This approach has the following disadvantages:

- (a) Some Subscriber Numbers may need to be changed and this would be much more disruptive for end-users than the addition of digits or changes to the initial part of the number; and
- (b) Geographic information or service provider identification may be lost in the process.

- 4.1.5 Due to the more disruptive nature of the second approach, the number merging approach to number expansion should only be undertaken under the following circumstances:
- (a) Where there is only a small number of end-users who will be required to change their Subscriber Numbers;
 - (b) Where the economic impact of the requirement to change the Subscriber Numbers for affected end-users is estimated to be reasonably small; and
 - (c) Where it is undesirable or not possible to adopt the number addition approach.

4.2 Overview of Cost Implications of Number Changes

- 4.2.1 The expansion of number ranges and the migration process due to the number change will have a significant cost impact on both end-users and service providers.
- 4.2.2 In the event the number range is expanded, end-users would have to notify callers from their own numbering district, from other numbering areas in Malaysia and callers from other countries regarding change in numbers. Users of that affected end-user's number in the same numbering area, in other numbering areas of Malaysia and outside Malaysia would have to update to that new number. These costs may be classified into 3 types:
- (a) Costs for business end-users;
 - (b) Costs for residential end-users; and
 - (c) Costs for service providers.
- 4.2.3 This overview is not intended to set out the quantum of costs which will be incurred in each of the categories of end-users, but instead, it will identify what are the items which will require cost expenditure due to number expansion. Any migration plans will have to take into account the costs highlighted above.

Costs for Business Users

- 4.2.4 This category of end-users usually experience the cost impact of number changes most acutely because the changes would require them to make corresponding changes to the following equipment or items:
- (a) Changes in auto-dialling equipment;
 - (b) Switchboard equipment;
 - (c) Call barring and routing equipment;
 - (d) Help line numbers;
 - (e) Facsimile machine number identity numbers;
 - (f) Programmed numbers stored in the memory of any telephone or facsimile machines;
 - (g) Emergency instructions and documentation;
 - (h) Stationery, letterheads, invoices, business cards;
 - (i) Advertisements, company brochures, product brochures, internal directories, packaging, vehicle delivery signs, company signboards; and
 - (j) Overseas contacts and personnel records.
- 4.2.5 While the above list is not exhaustive, all of the above items would result in direct costs to business end-users. The severity of the cost impact caused by number expansion on business end-users would depend on, amongst other things, the size of its operations and the number of its customers and personnel. The migration period from the "old numbers" to the new numbers would inevitably generate some missed calls or facsimiles by the business's existing and prospective customers and the unnecessary expenditure in time and money for calls which are made by parties who are unaware of the change in that number.
- 4.2.6 Nevertheless, such costs may be minimised if the number expansion is publicised well ahead of the time it is to take effect and if business users have the time to optimise the inevitable costs by timing the purchase of new material to coincide with the number change. The costs of notifying customers and business partners in publicising the new numbers are reduced with the growing ubiquity in the usage of e-mail as a mode of communications by businesses.

Costs for Residential Users

- 4.2.7 In comparison with business users, the cost of number changes is substantially lower for residential users. In most cases, the cost of number changes to residential users would involve:
- (a) Updating his personal address books and pre-programmed numbers himself;
 - (b) Obtaining the equipment supplier to do update pre-programmed number if the residential user is unable to do it; and
 - (c) Notifying his contacts of the change in numbers.

Costs for Service Providers

- 4.2.8 Service providers of the affected end-users have to modify their networks at a local level and in their internal support systems. Service providers will also experience cost expenditure for the items set out below:
- (a) Changes in software;
 - (b) Customer information, billing databases and directories; and
 - (c) Publicity and advertisement of the new numbers caused by the number expansion.

4.3 Migration Process for Number Expansion

- 4.3.1 In the interest of consumer confidence, a smooth transition to a planned number expansion and to minimise the cost impact highlighted earlier, the Consultants propose to require all migration plans for number expansion to adopt the following process unless there are good reasons to depart from the standard:
- (a) **First Stage – Notice:** This stage involves the publicity of the impending change of the end-user's existing Subscriber Number by way of mail notification and through advertisements in national dailies of all major languages at least 3 months prior to the Parallel Operation. The Commission may issue further guidelines requiring specific publicity efforts from the relevant service providers.
 - (b) **Second Stage – Parallel Operation:** This stage involves implementing the planned number expansion change by means of the addition of a leading digit or by merger of existing number ranges. Depending on the situation, this stage may not be possible for certain migration plans which adopt the number merger approach. Subject to any specific circumstances that would suggest otherwise, this stage should continue for 6 months.
 - (c) **Third Stage – Recorded Voice Announcements:** This stage involves terminating the service on the old numbers and applying recorded announcements when the old numbers are dialled. The recorded announcements should announce the change that has

taken place (change announcements) or where this is not possible, the standard number-not-in-service announcement. Subject to any specific circumstances, change announcements should continue for a period of 6 months.

- (d) **Forth Stage – Sterilisation:** This stage involves a period in which the change announcements (if any) are removed and replaced with the number-not-in-service announcement. The old number range will be reserved and not be assigned even if the old number range has undergone a change in its number structure. The duration of this stage will be ascertained by many factors, including the scarcity of appropriate numbers, the need to re-assign the range in question, the extent of the number restructuring and the extent of prior use of the old number range.

- 4.3.2 A variation can be achieved by modifying the above preferred process by deleting or contracting one or more stages. Typically, the contraction will affect the first stage (parallel operation) or the third stage (sterilisation). As noted, contracting the sterilisation stage may not have adverse consequences, particularly if the old number range was little used or the extent of change in the new number structure is minimal. Deleting or contracting the parallel operation stage may be necessary if spare digits are not available for the purpose.

4.4 Invitation for Public Comments

Comments are invited on the proposed approaches for expanding number supply and the Consultants' preferred approach of adding a leading digit. Comments are also invited on the proposed required migration process for number expansion.

5. Geographic Numbers

5.1 Current Situation

5.1.1 Geographic Numbers are presently limited to fixed telephony and data services. Geographic Numbers take in the following form:

Geographic Number = Area Code + Subscriber Number

5.1.2 The first digit of the Subscriber Number (referred to as the Subscriber Number Level or SNL) further refines the geographical information given by the Area Code. There are a few exceptions to the general SNL under the legacy plan.

5.1.3 For end-users to call numbers in another Area Code, the full Geographic Number must be dialled. For end-users to call numbers within the same Area Code, the Area Code can be left out and only the Subscriber Number need be dialled.

5.1.4 Most Area Codes have 2 digits but there are a few with 3 digits. The length of the Subscriber Number component can be 6, 7 or 8 digits. Within Area Code 03 (Kuala Lumpur, Putrajaya and Selangor), Subscriber Numbers are currently being migrated from 7 to 8 digits. Sabah, Sarawak and Labuan currently use a 3 digit Area Code and a 6 digit Subscriber Number. With the planned migration to an 8 digit Subscriber Number, Sabah, Sarawak and Labuan will become uniform with the rest of Malaysia with an 8 digit Subscriber Number and a shared designated Area Code "08".

5.1.5 Figure 5.1 shows the geographical allocation of Area Codes.

Figure 5.1: Designation of Area Codes in Malaysia

Area	Geographical	SN Length
03	Kuala Lumpur, Putrajaya and Selangor	7 / 8
04	Perlis, Kedah and Pulau Pinang	7
05	Perak	7
06	Negeri Sembilan and Melaka	7
07	Johor	7
08{2-6}	Sarawak	6
08{7-9}	Sabah and Labuan	6
09	Pahang, Terengganu and Kelantan	7

SN: Subscriber Number

5.1.6 In addition, the "02" prefix has been designated as an access code for the Republic of Singapore and "080" has been designated as an access code for Brunei from Sabah and Sarawak.

- 5.1.7 Geographic Numbers are assigned in blocks of 10,000 (or 1,000 in Sabah and Sarawak) and each fixed telephony service provider uses a different number block for each charging district in which it wishes to serve its customers, even if the number of expected customers in that area is low. This leads to numbers being assigned at a faster rate than they are being used for actual services, and reduces the number of spare blocks still available for assignment.

5.2 Future Requirements

- 5.2.1 The growth in demand for assignments of Geographical Numbers is likely to be driven by several factors such as:
- (a) population and economic growth;
 - (b) new entrants requiring whole number blocks in each charging district;
 - (c) increased penetration levels;
 - (d) demand for second lines for Internet dial-up; and
 - (f) new service types that generate additional number requirements (for example, additional numbers for multiple virtual services from a single physical broadband connection).
- 5.2.2 With competition, multiple service providers offer competing services in the same charging district. Each service provider needs its own number block in each charging district. This reduces the utilisation level for numbers, as more numbers are assigned than are actually used. However the benefits of a competitive environment outweigh any disadvantage of low utilisation levels.
- 5.2.3 Increasing usage of the Internet by residential users will see some end-users choosing to install a second line for the purpose of Internet access via dial-ups. This will marginally increase the demand for numbers per head of population.
- 5.2.4 Any growth in demand may be partially offset by a substitution effect brought about by Public Cellular Telephony Services as such services become more affordable.
- 5.2.5 Figure 5.2 shows the estimated potential demand for Geographic Numbers assignments by service providers.

Figure 5.2: Estimated potential demand for Geographic Numbers

Area Code	States	Population ('000)			Number Demand ('000)		
		2001	2006	2011	2001	2006	2011
03	KL / Putrajaya	1,412	1,623	1,866			
	Selangor	4,354	5,248	6,325			
	Total	5,766	6,871	8,191	8,220	13,713	17,516
04	Perlis	206	215	224			
	Kedah	1,680	1,819	1,969			
	Penang	1,337	1,481	1,640			
	Total	3,222	3,514	3,834	3,620	5,527	6,460
05	Perak	2,214	2,196	2,271	2,700	3,908	4,329
06	Negeri Sembilan	869	918	970			
	Melaka	643	690	741			
	Total	1,512	1,608	1,710	2,270	3,380	3,851
07	Johor	2,782	3,080	3,410	2,840	4,402	5,222
08 {2-6}	Sarawak	2,118	2,346	2,598	710	1,101	1,307
08 {7-9}	Sabah	2,747	3,203	3,735	653	1,066	1,454
09	Pahang	1,305	1,380	1,459			
	Terengganu	922	1,036	1,164			
	Kelantan	1,322	1,355	1,388			
	Total	3,548	3,770	4,012	3,090	4,597	5,240

Source: Consultants' Study, 2001 .

5.2.6 Once the migration from 7 digit to 8 digit numbers is completed there will be no shortage in the availability of Geographic Numbers to meet forecast demand over the ten year period till 2011.

5.3 Other Options for Number Expansion

5.3.1 With the exception of the 03 Area Code area, there appears to be no immediate shortage of numbers, nor any shortage during the time horizon of the Plan. However the proposed migration to 8 digit Subscriber Numbers will address any such shortages.

5.3.2 If a number shortage should arise due to the combination of having charging districts with low populations and an increase in the number of service provider offering service in those districts, then there are three measures available to address such a shortage:

- (a) Where the shortage is prior to the migration to 8 digit Subscriber Numbers, priority should be given to the 8 digit migration in the affected state or territory. This would substantially increase the availability of numbers, but involve number changes for everyone in the region.
- (b) Assigning numbers in 1,000 blocks rather than 10,000 number blocks. If adopted, this option will be introduced well before number shortages are experienced and service providers who have assignments of 10,000 number blocks will be required to assign

numbers from one end of the block rather than randomly throughout the block so that the block could be split later into separate 1,000 blocks. This option may incur significant costs for service providers in terms of changes to support systems, which assume 10,000 numbers per block and to routing tables and number analysis in the switches. It will however, minimise the disturbance to end-users.

- (c) Changing the boundaries of the charging districts so that they become fewer and larger. This will reduce the granularity of the assignments and so as to enable the utilisation of the 10,000 number blocks to increase. End-users will not have existing numbers changed but the relationship between numbering and charging would change and local dialling would be affected. Since the long term cost trend is towards distance independence, such changes may be accommodated relatively easily.

5.3.3 On a macro level, there are two other options in the unlikely event of an greater than anticipated demand for Geographic Numbers in Malaysia:

- (a) Cancelling the designation of the "02" prefix from use as an Area Code for Singapore and its reuse for national numbering. This change would generate approximately 80 million additional numbers, but may have socio-political consequences and therefore requires careful consideration and consultation before being implemented; and
- (b) Merger of adjacent ranges such as "04" and "05" or "06" and "07". This option is highly complex to implement and should be undertaken in conjunction with the 8 digit migration process. This means that there is only a limited time window in which to implement this option. The change would also take a long time and it is estimated that it would take at least 2 years.

5.4 Invitation for Public Comments

Comments are invited on the conclusion that there will not be any shortage in Geographic Numbers within the time frame of the proposed Plan upon the completion of the migration from 7 digit to 8 digit numbers. Comments are also sought on the proposed contingency arrangements outlined in section 5.3.

6. Non-Geographic Numbers - Short Code Numbers

6.1 Current Situation

- 6.1.1 Non-Geographic Numbers are used for a range of services that are not assigned to a specific geographical location. These number ranges are mostly located in the 1 series, although emergency services are in the 99x range and Premium Rate Services (Audiotext Hosting Services) are currently in the 600 range.
- 6.1.2 For administrative reasons, the Consultants are proposing to categorically classify the "1300", "150X", "151X", "1700" and "1800" ranges as Special Service Numbers to distinguish it from being a type of Short Code Number.¹⁴
- 6.1.3 All Short Code Numbers with the number structure of 1A0X where A = 1 to 9 and X = 0 to 9 will also be redesignated as reserved Special Service Numbers.
- 6.1.4 Short Code Numbers can comprise of 3, 4 or 5 digits in length and fall into one of the following categories:
- (a) **Common Inter-carrier Short Code (CISC)** – consisting of 4 or 5 digits, allows a service offered by one service provider to be accessible by end-users on other networks.
 - (b) **Internationally Accessible Short Code (IASC)** – consisting of 5 digits, these codes are for services that are accessible from outside Malaysia.
 - (c) **Independent Short Code (ISC)** – consisting of 3, 4 or 5 digits and are assigned for services that are only available to end-users on the same network or for internal use. Different networks may use the same ISC for different purposes.
 - (d) **Commonly Known Short Code (CKSC)** – consisting of 3 digits, these codes are used mainly for public benefit services such as emergency services and service provider inquiries and are provided in the same manner across all networks.
 - (e) **Carrier Selection Code (CSC)** – consisting of 3 digits, these codes are used by end-users select their preferred network for carrying long distance calls.
- 6.1.5 The general structure of Short Code Numbers and Special Services Numbers within the 1 series after the re-classification are shown in Figure 6.1.

¹⁴ It is not immediately clear whether some of these number ranges are considered to be Short Code Numbers under the existing conventions and plans.

Figure 6.1: National Short Code Numbering Structure of 1ABX

1 A/B	0	1	2	3	4	5	6	7	8	9	
10	100	101	102	103	104	105X	106X	107X	108	109X	
11			112								
12											
13	130X					134XX	135XX	136XX	137XX	138XX	139XX
14											
15	150X	151X	152X	153X	154XX	155X	156X	157X	158X	159X	
16											
17	170X										
18	180X	181	182	183	184	185	186	187	188	189	
19											

<table border="0"> <tr> <td style="background-color: blue; width: 20px; height: 15px; display: inline-block;"></td> <td>Commonly Known Short Code (CKSC)</td> </tr> <tr> <td style="background-color: magenta; width: 20px; height: 15px; display: inline-block;"></td> <td>Common Intercarrier Short Code (CISC)</td> </tr> <tr> <td style="background-color: yellow; width: 20px; height: 15px; display: inline-block;"></td> <td>Independent Short Code (ISC)</td> </tr> <tr> <td style="background-color: white; width: 20px; height: 15px; display: inline-block; border: 1px solid black;"></td> <td>Special Service Number (SSN) *</td> </tr> </table>		Commonly Known Short Code (CKSC)		Common Intercarrier Short Code (CISC)		Independent Short Code (ISC)		Special Service Number (SSN) *	<table border="0"> <tr> <td style="background-color: white; width: 20px; height: 15px; display: inline-block; border: 1px solid black;"></td> <td>International Accessible Short Code (IASC)</td> </tr> <tr> <td style="background-color: green; width: 20px; height: 15px; display: inline-block;"></td> <td>Carrier Selection Code (CSC)</td> </tr> <tr> <td style="background-color: gray; width: 20px; height: 15px; display: inline-block;"></td> <td>Reserved</td> </tr> </table>		International Accessible Short Code (IASC)		Carrier Selection Code (CSC)		Reserved
	Commonly Known Short Code (CKSC)														
	Common Intercarrier Short Code (CISC)														
	Independent Short Code (ISC)														
	Special Service Number (SSN) *														
	International Accessible Short Code (IASC)														
	Carrier Selection Code (CSC)														
	Reserved														

*** Note: It is proposed that all Special Service Numbers no longer be considered as a type of Short Code Numbers under the proposed Plan.**

6.2 Future Requirements

Commonly Known Short Code

- 6.2.1 Commonly Known Short Code (CKSC) is a form of Independent Short Code which is assigned only for specific public services and is intended to be utilised for access to similar services across all telephony networks.
- 6.2.2 All Commonly Known Short Codes consist of 3 digit numbers. Figure 6.2 shows the current designated services and short codes for Commonly Known Short Codes.
- 6.2.3 No applications for an assignment of the designated Commonly Known Short Codes in Figure 6.2 to provide the relevant services are necessary for service providers licensed under the Act to provide fixed or public cellular telephony services.
- 6.2.4 The Consultants have noted the following proposals during its industry interviews and consultation:
- (a) to cancel the use of the “102” Commonly Known Short Code for General Inquiries. If this proposal becomes part of the finalised Number and Electronic Addressing Plan, all service providers will have to cease the use of the “102” Commonly Known Short Code for such services; and
 - (b) to cancel the use of “994”, “991” and “995” Commonly Known Short Codes and to promote the “999” short code as a universal short code for all emergency services.

Figure 6.2: Commonly Known Short Codes

CODE	SERVICE OFFERED
999	General Emergency Services
994	Fire Department
991	Civil Defence Services
995	Gas Pipeline Emergency Service
100	Telephone and Facsimile Fault Report
101	Operator Assistance – Domestic Calls
102	General Inquiries
103	Directory Services
104	Telegram Services
108	Operator Assistance – International Calls
112	GSM and PCN Emergency Services

Carrier Selection Codes

- 6.2.5 Carrier Selection Codes (CSC) are intended to enable a calling party to access a preferred service provider for carrying his or her long distance communication on a call by call basis.
- 6.2.6 Carrier Selection Codes are currently assigned to service providers who provide long distance call services (domestic trunk and/or international) and who are also holders of an individual network facilities provider licence.
- 6.2.7 Carrier Selection Codes have been introduced to enable end-users to select alternative carriers on a call by call basis – known as call by call equal access in Malaysia. The current range of Carrier Selection Codes of “181” to “189” limits the number of competitors to a maximum of nine.
- 6.2.8 Based on the experience in Europe, Australia and the United States consumers in Malaysia are expected to have reasonable expectations of being able to access attractive call prices available from time to time from service providers other than the one that they have selected. These consumers will wish to take advantage of seasonal or transient special rates, without the need to formally change their selected service provider.
- 6.2.9 The Consultants propose that Carrier Selection Codes be assigned to service providers outside of the original intention under the Equal Access

arrangement such as to providers of Internet Protocol-based telephony services.

- 6.2.10 The Consultants recognise that this may place applications service providers licensed to provide Internet Protocol-based telephony services at an advantage in many respects at the expense of local access providers who will not have reciprocal equal access benefits. However it should be noted that providers of Internet Protocol-based telephony services are currently also using intelligent PBXs at customer premises to achieve the same result (call-by-call selection) and that any undue advantage achieved by the non-reciprocal local access may be compensated by appropriate payments for the use of the local access network facilities. The Consultants therefore concluded that, on the balance, it would appear that the benefits of a more competitive environment engendered by a level playing field favours an expanded scope in the use of the Carrier Selection Codes.
- 6.2.11 Even if the Commission decides to reserve its decision on whether Carrier Selection Codes should be assigned to service providers outside of the original intention under the Equal Access arrangement for the time being, the Consultants take the view that:
- (a) the expansion should occur at this point in time as the present easing in the Equal Access arrangement provides an opportune time for a migration to be implemented with least disruption; and
 - (b) an expanded Carrier Selection Code range will offer the Commission the option to level the playing field for other competitors providing telephony services in the domestic trunk and long distance communication market in the future.
- 6.2.12 The Consultants therefore propose for the Commission to expand the Carrier Selection Codes range to become a 5 digit code from "18Y" to "18YXX" code format where Y = 1 to 9 and X = 0 to 9. In the short term expansion to 99 possible codes may be effected through the addition of the digit '8' between the current first and second digits, to provide codes in the form "188XX". In the medium term, the number of codes may be expanded to 999 through the use of other values for the second digit.

Independent Short Codes

- 6.2.13 Independent Short Codes (ISCs) are intended to be used for providing services to end-users within a service provider's own telephony network or for its internal use.
- 6.2.14 A large part of the 1x range is reserved for Common Inter-carrier Short Code and Independent Short Code usage. The Independent Short Codes in particular are spread throughout the "1x" range and are of less public value than other short codes as they are only available in a single network.
- 6.2.15 While there may be possible branding (by association to the Mobile Network Identifier code) and other reasons for existing service providers to require Independent Short Codes to be characterised by a particular x digit

in the “1x” range format, this is leading to an inefficient use of the available numbers.

- 6.2.16 The Consultants further propose to migrate all existing Independent Short Codes ranges to the “13” Independent Short Code range commencing with the “17x” and “19x” ranges.
- 6.2.17 The basis for the migration are as follows:
- (a) The release of the ranges in the “1x” series will allow room for expansion for future services and applications;
 - (b) This is in line with the Mobile Number expansion plan which will dissociate any prefix as the MNI in the longer term.
- 6.2.18 The Consultants noted a proposal to streamline and make consistent all Independent Short Codes so that the same code is applicable for similar services made available by each network. This proposal has merit in view of portability and domestic roaming being made available in the country. If accepted and implemented, an end-user may, for example, dial for a particular service using the same code regardless of which network he has been ported to or is roaming with within Malaysia.

6.3 Invitation for Public Comments

Comments are invited on any of the following:

- a) the proposed categorisation of certain Short Code Numbers as Special Service Numbers;***
- b) the proposed cancellation of the “102” Commonly Known Short Code;***
- c) the proposed cancellation of the “994”, “991” and “995” Commonly Known Short Codes and to promote the “999” short code as a universal short code for all emergency services;***
- d) the proposed expansion of the Carrier Selection Code ranges to become 5 digit and the possibility of assignment to service providers outside of the original intention under the Equal Access arrangement such as to providers of Internet Protocol-based telephony services.***
- e) comments are invited on any proposed criteria of new entrants eligible for the expanded CSC, the period and time frame for the proposed CSC number range expansion to take place and the cost implication for such an exercise to be taken;***

- f) the proposal to migrate all existing Independent Short Codes ranges to the "13" Independent Short Code range commencing with the 17x and 19x ranges; and*
- g) the proposal to streamline and make consistent all Independent Short Codes so that the same code is applicable for similar services made available by each network.*

7. Non-Geographic Numbers - Special Service Numbers

7.1 Current Situation

7.1.1 Special Service Numbers are a type of Non-Geographic Number intended for use of the following services:

- (a) Toll Free Services;
- (b) Freephone Services;
- (c) Premium Rate (Audiotelex Hosting) Services;
- (d) Caller Party Pay (CPP) Messaging Service (Paging Service); and
- (e) Personal Numbering Services.

7.1.2 The above services are accessed by numbers that do not indicate the geographic location of the persons or services being called or accessed. These services shall be treated as a national and unified service to ensure that any caller is able to access the services by dialling the same digits regardless of the network of location he or she is calling from.

7.1.3 The general format for Special Service Numbers is:

1A0X SP YYYY

and A = 1 to 9 and X = 0 to 9. The digits A and X indicate the service and SP identifies the service provider. This provides for 100 assignments of 10,000 numbers each. The special services available in the number scheme and the corresponding value for A and X are:

Freephone Services (A=8 and X=0: 1800);

Toll Free Services (A=3 and X=0: 1300);

Premium Rate (or Audiotelex Hosting) Services (see below);

Caller Party Pays (CPP) Messaging Service (A=5 and X=0: 1500);

Internet Access Dial-up Services (A=5 and X=8: 1508); and

Personal Numbering Services (A=7 and X=0: 1700).

7.1.4 The exceptions to the general structure are the "151X" Internet Access Dial-Up Service Numbers and the "600" Premium Rate (Audiotelex Hosting) Service Number.

7.1.5 The "151X" number range was previously designated for nationwide Internet Access Dial-up Services and the rates are regulated.

7.1.6 The Premium Rate (Audiotelex Hosting) Service Number follows the following structure:

600 8 T SP XX

where T indicates a fixed tariff level (from 1 to 6) and SP indicates the service provider. This provides for 100 assignments of 1,000 numbers, but the tariff indication given by the T digit effectively limits the assignment size to 100 numbers as providers tend to reserve the same number across the other possible tariffs to minimise customer confusion and provide scope for tariff changes without changing the whole number.

7.2 Future Requirements

7.2.1 Figure 7.1 shows the forecast growth in demand for Special Service Numbers.

Figure 7.1: Demand for Special Service Numbers

Special Service	Demand		
	2001	2006	2011
Toll Free	2,100	5,200	13,000
Internet Dial-up	0	480	1,200
CPP Messaging	0	0	0
Premium Rate	2,400	9,000	33,000
Freephone	13,000	33,000	82,000

Source: Consultants' Study, 2001 .

Notes to Figure 7.1:

- (1) The supply for each category of Special Service Numbers for each year is 1 million numbers, except for Premium Rate (Audiotext Hosting) Services Number in 2001, where the supply is 10,000 numbers.
- (2) Current demand based on the Commission's assignment and usage figures.
- (3) Toll Free Services Numbers and Freephone Services Numbers are based on 20% per annum growth in demand.
- (4) Premium Rate (Audiotext Hosting) Service Numbers rate based on 30% per annum growth in demand, which is a higher rate reflecting the removal of the current rate restrictions on such services.
- (5) Internet dial-up based on 60 service providers in 2006 and 150 service providers in 2011 with each requiring 8 Internet Access Dial-up Service numbers.

Freephone and Toll Free Services Numbers

7.2.2 Based on the Consultants' industry interviews, it would appear that it may be fairly difficult for a new entrant to acquire existing Freephone Service and Toll Free Service users as a customer even where distinct cost and service-quality advantages can be demonstrated.

- 7.2.3 Some are of the view that any decision to change to a new service provider is complicated by the requirement for such users to change their existing Freephone Service and Toll Free Service Numbers. This could mean that all the goodwill generated from advertising the existing numbers would be lost in the event of a switch to a new service provider.
- 7.2.4 The Consultants therefore propose that number portability for Special Service Numbers should be made a priority in order to remove a barrier to a more competitive environment that will benefit consumers as a whole. This is discussed in more detail in section 12 of this Consultation Paper.

Premium Rate (AudioteXt Hosting) Service Numbers

- 7.2.5 It is implicit in the demand forecast that a liberalisation of sorts to the present rate structure for the Premium Rate (AudioteXt Hosting) Services is assumed. The Consultants are of the opinion that rate regulation coupled with the need to embed the rate band information unnecessarily restricts the numbering structure of the Premium Rate (AudioteXt Hosting) Services Numbers.
- 7.2.6 It is proposed that the existing "600" number structure be migrated to the "1600" number structure for the following reasons:- firstly to increase the available number range for Premium Rate (AudioteXt Hosting) Services and secondly, to streamline the numbering structure to the 1A0X format where A=6 and X=0.

7.2.7 Existing numbers will be mapped across to almost identical numbers as follows:

600 8 T SP XX maps to **1600 8 T SP XX.**

7.2.8 With the change to the “1600” range, the limitation of the (current) fourth digit to ‘8’ will be removed and so future services may have any value of the fourth digit in the 0-9 range.

7.2.9 The Consultants propose to remove the restriction in the sixth digit, referred to as ‘T’ above after the migration. The “T” denotes the rate that applies to the service and serves to provide embedded information to service providers and consumers. The Commission has been advised that in terms of consumer protection, it may be better served through the following requirements on service providers:

- (a) to file proposed rates and charges with the Commission for approval prior to use;
- (b) to include adequate information regarding rates and charges in any advertising; and
- (c) to include an initial rates and charges announcement at the commencement of each call.

Personal Numbering Service (Forwarding Service) Numbers

7.2.10 The “1700” range is currently reserved for personal numbering with a 1 million number capacity. No use has been made of this range to date, although there may be demand for such numbers in future.

7.2.11 Various forms of personal numbering services need to be distinguished. One type of personal numbering service may take the form of a forwarding service that acts as a service for diverting calls to other fixed and mobile services that the end-user may have. Such services operate on a follow-on basis and need to be supported by network software or intelligence. They are typically associated with a number which is sub-assigned by the service provider to the end-user, and do not require number portability for their operational or commercial viability.

7.2.12 The other form of personal numbering service relates to services that are highly associated with individuals and which may be associated for the term of an individual’s life. For these conditions to be met, it is desirable for such numbers to be assigned on an individual basis and necessary for number portability arrangements to be in place, so that the number may be ported from service provider to service provider. These kinds of numbers are of a type that will be associated with ENUM and similar proposals if they are to proceed.

7.2.13 The Consultants propose to distinguish the two types of ‘personal’ number referred to above. The first kind (currently associated with the reserved

number range “1700”) will be called ‘Forwarding Service Numbers’, and the second kind, ‘Personal Numbering Service Numbers’.

- 7.2.14 The existing designation for “1700” range for Forwarding Service Numbers will be retained. A new Personal Numbering Service Number range, with the “017” prefix, should be designated in the expanded Mobile Number range for ENUM-type personal numbering service.

Internet Access Dial-up Service Numbers

- 7.2.15 Internet Access Dial-up Service Numbers are intended to be numbers which are used for Internet connection and access services.
- 7.2.16 The intention of a special number range for Internet Access Dial-up Services is to allow calls intended for Internet Access Dial-up Services to be easily distinguished from voice calls within the network, and therefore may be routed for optimal network efficiency, reducing the potential for network congestion.
- 7.2.17 The present Internet Access Dial-up Services numbering structure is “151X” and at present “1511”, “1512”, “1515”, “1516”, “1517” and “1519” have been assigned to Internet Service Providers. However these Internet Access Dial-Up numbers are not accessible across all networks.
- 7.2.18 The Consultants propose that the rest of the unassigned “151X” range be reserved and that no further assignments should be made from the “151X” range.
- 7.2.19 A notification entitled “*Guideline On Provision of Dial-Up Internet Access Service Using New Special Service Number Range 1508 A XXXXX*” was issued by the Commission on 5 April 2002. The Commission has decided to designate “1508 A XXXXX” as a new range of numbers for Internet Access Dial-up Services with the following numbering structure:

1508 A XXXXX

Where,

1508	-	Internet dial-up service prefix
A	-	Network provider code
XXXXX	-	Internet Access Service Provider code.

- 7.2.20 The Commission intends for the relevant parties to negotiate the relevant charges applicable for the use of this number.
- 7.2.21 If the new “1508” Internet Access Dial-up Service Number proves to be successful, the Consultants propose to cancel the 151X range for Internet Access Dial-up Services at the appropriate time.

Multimedia Services Numbers

- 7.2.22 The Consultants propose to designate the “1900” range to be used for Multimedia Services which will be a new type of Special Service Number.

7.2.23 Multimedia Service Numbers are numbers which are intended to be used for services that involve more than one form of medium such as voice and video or voice and text. The type of services envisaged is further discussed in section 10 on broadcasting and multimedia services.

7.2.24 The Multimedia Service Number structure is as follows:

1900 - SP - XXXX

Where,

1900	-	Multimedia service prefix
SP	-	Service provider code
XXXX	-	Subscriber Number

7.2.25 Any assignment of numbers from this range should only be made upon the Commission being satisfied that the intended services of the applicant can not be better classified under the other existing Special Services.

7.3 Invitation for Public Comments

Comments are invited on any of the following:

- a) the proposal to migrate the existing "600" number structure for Premium Rate (Audiotelephony) Services to the "1600" number structure;***
- b) the proposal to remove the rate (tariff) indicator, referred to as 'T' after the migration of the "600" number structure for Premium Rate (Audiotelephony) Services to the "1600" number structure;***
- c) any comments on how the migration of the "600" number structure to the "1600" number structure will affect competition, costs and the service provisioning of Premium Rate (Audiotelephony) Services;***
- d) the proposal to rename the Special Services Numbers from "1700" range as 'Forwarding Service Numbers';***
- e) the proposal not to further assign any numbers from the "151X" range for Internet Access Dial-up Services and to consider cancelling the assigned "151X" numbers in future. In particular, comments are invited on the issue whether there would be more demand for further assignments from the "151X" range which will justify the Commission in continuing to assign such numbers;***

- f) whether the provision of Dial Up Internet Access Service Numbers promote the rate of Internet take up in Malaysia and lower the costs of business in the long run;*
- g) whether the proposal for the parties to negotiate the relevant charges for the new "1508" Dial Up Internet Access Service Numbers is feasible;*
- h) how could the proposed Special Service Number "1508" be improved in the long run in the expectation of various broadband services; and*
- i) the proposal to designate the "1900" range to be used for Multimedia Services which will be a new type of Special Service Number.*

8. Non-Geographic Numbers - Mobile Numbers

8.1 Current Situation

8.1.1 Mobile Numbers are another type of Non-Geographic Numbers which are currently being used for Public Cellular Telephony Services. The Consultants propose to expand the current scope of use of this number range beyond that of only Public Cellular Telephony Services.

8.1.2 The Consultants propose that the scope of the use of numbers under the "01Z" range be expanded to encompass not only Public Cellular Telephony Services but for any service which incorporates features such as the mobility of the terminating device and the concept of personal association with the assigned number. Besides Public Cellular Telephony Services, other services with similar characteristics include:

- (a) Digital public mobile radio services;
- (b) Public Cellular Telephony Services operated by Mobile Virtual Network Operators ("MVNOs"); and
- (c) ENUM-type Personal Numbering Services with national number access.

8.1.3 Mobile Numbers occupy the "01" number range and are of the form:

$$\text{Mobile Number} = \text{MNI} + \text{Subscriber Number},$$

where the mobile prefix is of the form 01Z and the Subscriber Number is currently 7 digits in length.

8.1.4 Most users of Public Cellular Telephony Services can currently dial other users on the same network by using just the Subscriber Number and leaving out the Mobile Network Identifier code. Eight of the "01Z" prefixes have been assigned and is set out in Figure 8.1.

Figure 8.1 : Availability of 01Z prefixes

Mobile	Status
010	Assigned
011	Assigned
012	Assigned
013	Assigned
014	Reserved
015	Reserved
016	Assigned
017	Assigned

018	Assigned
019	Assigned

8.1.5 The providers of Public Cellular Telephony Services have been assigned the entire block of 10 million numbers each by way of a designation of the MNI. Each MNI has approximately 8 million usable numbers.

8.1.6 While the total mobile customer base is currently approximately 7.5 million¹⁵, some service providers have already indicated to the Commission that they are experiencing a shortage of Subscriber Numbers for sub-assignment. This shortage is due to an unduly restrictive Subscriber Number level numbering structure which was self imposed by the service providers. This numbering structure has led to a shortage of numbers in high demand areas and an excess of numbers in low demand areas.

8.2 Future Requirements

8.2.1 Figure 8.2 shows the growth in mobile services in Malaysia.

Figure 8.2: Growth in Mobile Services in Operation – Malaysia

	1997	1998	1999	2000	2001
Mobile penetration (%)	7.3	9.6	10.6	13.6	24.5

Note: figures refer to the start of each year

Source: ITU, National Statistics Office (NSO) Kuala Lumpur.

8.2.2 The Consultants' study has estimated the current mobile penetration to be in excess of 30 per 100 head of population¹⁶. The main growth drivers for demand for Mobile Numbers will most likely be:

- (a) increased penetration in response to falling prices and economic development;
- (b) substitution of mobile services for fixed services;
- (c) multiple mobile services per customer;
- (d) population growth; and
- (e) data only mobile terminals.

8.2.3 Falling prices for handsets and tariffs combined with continued economic development will result in increased penetration of mobile services for business and private use.

¹⁵ The Commission's statistics as at December 2001.

¹⁶ Consultants' estimate.

- 8.2.4 The Consultants are of the opinion that the greatest demand for Mobile Number expansion will not come from the growth in Public Cellular Telephony Services but from other types of services such as combination GPS and mobile services for in-car navigation. Demand will also be driven by the expected high take-up rate of Data Only Terminals and the requirements of 3G and MVNOs as set out below.

Data Only Mobile Terminals

- 8.2.5 Data Only Mobile Terminals are likely to be used for a range of applications of data communications with and between machines. The GSM standards currently require that these terminals be assigned with E.164 numbers, even if they are only used for Internet Protocol-based data services. The Consultants recommend the use of the "014" range after the expansion of the Mobile Number range for data only terminals. In the meantime, numbers in existing ranges may be used for data-only terminals.

Third Generation Mobile

- 8.2.6 The Consultants take the view that the introduction of 3G networks and services will tend towards an evolutionary extension of 2G networks. Service providers will wish to upgrade customers from the current 2G networks to the new 3G networks and many of the customers will wish to retain their existing numbers.
- 8.2.7 In view of the general approach of removing the MNI and the trend towards Mobile Number portability, the Consultants are therefore proposing not to make any distinctions between 2G and 3G numbering for services that can be offered on both networks such as basic mobile telephony for voice services.
- 8.2.8 Where 3G networks are used for the provision of new services, the Commission should consider the assignment of a new sub-range within the Mobile Number range as appropriate.

Mobile Virtual Network Operators

- 8.2.9 In line with the Framework for Industry Development (2001-2005) to provide a wider choice of service providers and applications services, the Consultants believe that the Commission intends to open up the mobile telephony market to new service providers utilising new business models.
- 8.2.10 A major example of such new entrants based on different business models, are Mobile Virtual Network Operators (MVNOs). MVNOs own and operate their own home location registers and billing systems but use the radio network capacity of other mobile network service providers through roaming agreements. They assign end-users with their own Subscriber Identity Module (SIM) cards (for GSM) and require the ability to sub-assign numbers to their customers.
- 8.2.11 It is proposed that eligible MVNOs be assigned blocks of 10,000 numbers in the expanded "0154 XXX XXXX" range. This range can be made

available very quickly because the “014 XXX XXXX” range is currently unused.

Number Portability

- 8.2.12 By the very nature of the services for which Mobile Numbers are used, sub-assigned numbers become more personal in nature than other categories of numbers. Human end-users therefore attach value to their existing numbers. If they are unable to retain their number when they change service providers this would become a barrier to competition. Even though the mobile voice telephony market is already more competitive than the fixed telephony market, there may still be more competitive benefits to be gained from successfully introducing Mobile Number portability in Malaysia. A further dimension to this proposition is that it is likely that Mobile Number portability will increase the success of the introduction of 3G services in Malaysia, by allowing existing 2G service subscribers to be upgraded to any 3G network of their choice while retaining their existing numbers. Mobile Number portability is discussed in more detail in section 12 of this Consultation Paper.

8.3 Expansion of Mobile Numbers

Short Term Requirements

- 8.3.1 The larger providers of Public Cellular Telephony Services are already concerned about possible Subscriber Number shortages. There is no real need to expand the Mobile Number range in response to this perceived exhaustion of mobile Subscriber Numbers in certain geographical locations.
- 8.3.2 In the short term, the service providers are expected to operate within their current assignment of numbers, which are sufficient to meet current and medium term demand if utilised effectively. This may mean that these service providers may have to re-organise and improve their use of numbers.
- 8.3.3 The following possibilities are proposed as solutions to resolve this perceived shortage:
- (a) Re-using numbers from closed pre-paid accounts; or
 - (b) Ceasing to assign numbers on a regional basis within their own networks. By ceasing regional Subscriber Number issuance completely or by altering the regional Subscriber Number distribution, service providers should be able to relieve pressure on the region or regions that are experiencing shortage of numbers first. From a rate perspective, the long term trend is that the distance dependent element in rates will reduce and such changes would be in line with this trend.

Longer Term Measures

- 8.3.4 The Consultants' number supply and demand forecast indicates that the existing Mobile Number range will face a shortage in the near future on the assumption of the introduction and high take-up of new services such as Data Only Mobile Terminals.
- 8.3.5 It is therefore proposed that the Mobile Number range capacity be increased by an order of magnitude by adding an additional digit to the prefix codes. This means that existing "01Z" Mobile Numbers will be converted to "015Z" Mobile Numbers within the new Mobile Number range as part of the expansion process.
- 8.3.6 This option has been chosen because it can be implemented in a manner that causes the least disruption to service providers, end-users and customers. It will provide a simple and readily understood rule that for each code, "01Z" becomes "015Z". Furthermore, this option does not involve any withdrawal of existing assignments to service providers, and the additional capacity created will be available to the Commission to assign in the most appropriate way as future demand and competition develop. After the exhaustion of numbers in the "015Z" range, the Commission should assign number blocks of up to one million numbers from other ranges, starting with the "016X" range, as required to meet reasonably anticipated service demand.
- 8.3.7 This option will most likely result in the current MNI from being dissociated with the service provider and may reduce the degree of branding goodwill that existing service providers currently enjoy. Nevertheless, the Consultants take the view that this is a necessary and unavoidable consequence in light of the intention to introduce Mobile Number portability in Malaysia. Therefore after careful deliberation of various other options, it would appear that this proposal is the most desirable one for the purposes of expanding the Mobile Number range. The other options are further elaborated below.
- 8.3.8 If the recommendation above is accepted by the Commission, the Consultants recommend that existing assignment holders of number blocks under the Mobile Number category avoid the practice of closely associating their branding and marketing activities with their current MNIs.

Requirements Prior to Expansion

- 8.3.9 Prior to the finalisation of the migration plans, eligible MVNOs and other service providers who are entitled to number assignments (apart from existing service providers) may be assigned 10,000 blocks in the 014 YXX XXXX range where Y = 2 to 9 and X = 0 to 9.
- 8.3.10 Existing service providers who require new numbers will not be provided with any assignments prior to the Mobile Number expansion.

Other Options

8.3.12 The Consultants have considered and rejected the following options for expanding the Mobile Number range capacity in favour of the "015Z" option described above:

- (a) **Use small number blocks (of up to 10,000) in the under-utilised "011", "011" and "018" number ranges.**

This option has merit in that these ranges make up about 30 million numbers and serve less than 0.5 million end-users. However, this option has been rejected because these number ranges have been assigned to existing service providers and because it will be insufficient to satisfy the longer term demands.

- (b) **Recover and re-assign number ranges with the prefix code "010", "011" and "018".**

This option has the disadvantage of requiring a significant number of end-users to potentially change their Subscriber Numbers if moved within a number range or to a new one. It will also involve the cancellation of number ranges previously assigned for the long term, and will not fully satisfy the longer term demands.

- (c) **Use number blocks in the currently unassigned ranges, "014" and "015".**

This option would not meet future demand and would prevent the implementation of a subsequent number expansion for all existing mobile services.

- (d) **Increase the existing Mobile Number ranges by including an extra digit after the first three digits of the prefix code (for example, in the form of adding Y to "01X" to form "01XY") and assigning existing providers of Public Cellular Telephony Services one or more of the 10 million number ranges that result.**

This option would take a long time to implement and would not permit parallel operation. Further, it does not remove but in fact may serve to perpetuate the close association of the service provider identity with the MNI.

8.4 Invitation for Public Comments

Comments are invited on any of the following:

- a) the proposal to rename the "01Z" number range as "Mobile Numbers";***
b) the proposal to expand the scope of use of the "01Z" number range to any service which incorporates features such as the mobility of the terminating device and the concept of personal

- association with the assigned number such as Public Cellular Telephony Services operated by Mobile Virtual Network Operators, Digital Public Mobile Radio Services and ENUM-type Personal Numbering Services;*
- c) the short term solutions to resolve the perceived shortage of numbers currently experienced by some providers of Public Cellular Telephony Services;*
 - d) the proposal to assign Mobile Virtual Network Operators (prior to the Mobile Number range expansion to the "015Z" prefix) in 10,000 blocks from the "014 YXX XXXX" range where Y = 2 to 9 and X = 0 to 9;*
 - e) the proposal to increase the Mobile Number range capacity by adding an additional digit to the prefix codes and converting existing "01Z" Mobile Numbers to "015Z" and, subject to demand, to assign blocks of up to one million numbers from other ranges, commencing with the "016X" range, as required;*
 - f) the proposal to assign eligible service providers in 10,000 blocks from the "014 YXXXXXX" range where Y=2 to 9 and X=0 to 9, prior to the Mobile Number range expansion to the "015Z" prefix;*
 - g) the proposal to assign eligible Mobile Virtual Network Operators (after the Mobile Number range expansion to the "015Z" prefix) in blocks of 10,000 numbers in the expanded "0154 XXX XXXX" range;*
 - h) the proposal to retain the 2G numbering for voice services in 3G networks to allow end-users to maintain their existing number;*
 - i) the proposal for service providers to cease from closely associating their branding and marketing activities with their current MNI;*
 - j) the future of Personal Numbering Service and its impact on the numbering resource;*
 - k) comments are invited to propose an alternative Mobile Number prefix to the Consultants' proposed "017" range; and*
 - l) comments for the demand for Forwarding Service Numbers ("1700") and Personal Numbering Service ("017").*

9. Other Numbers

9.1 Data Network Numbers

9.1.1 Data Network Numbers are used in public data networks according to ITU-T Recommendation X.121 International Numbering Plan for Public Data Networks. The Data Country Code (DCC) 502 has been assigned by ITU-T for Malaysia data networks.

Future Requirements

9.1.2 With the increasing shift to Internet Protocol based networks, it is not expected that additional Data Network Numbering capacity will be required.

9.1.3 In the event that additional Data Network Numbering capacity is required, the Commission should apply to ITU-T for the new DCC 503.

9.2 Telex Numbers

9.2.1 Telex Numbering is defined according to ITU-T Recommendation F.69.

Future Requirements

9.2.2 The Consultants take the view that Telex services is a declining service and does not require additional number capacity.¹⁷ When telex services are no longer operational in Malaysia, the Telex Number designation should be removed at its next review of the Plan.

9.3 Global Services and International Network Numbers

9.3.1 Global Services and International Network Numbers are assigned by ITU-T and the Consultants recommend that no action is required to be taken by the Commission.

9.4 ATM Network Addresses

9.4.1 ATM network addresses are required for public ATM switched virtual circuit services. The preferred option is to use ATM End System Addresses with an International Network Designator (IND) as defined in ITU-T Recommendation E.191. Malaysian service providers using other ATM addressing options are expected to migrate to the IND option.

¹⁷ Supra no.12.

- 9.4.2 The assignment of the IND is handled by ITU-T, and ATM service providers providing public ATM services within Malaysia should inform the Commission of IND assignments.
- 9.4.3 The Consultants further propose that the ITU-T IND AESA format is to be utilised and where ATM addressing other than ITU-T IND AESA is in use, the end-users will be required to migrate to ITU-T IND AESA format.

9.5 Signalling Point Codes

- 9.5.1 Signalling Point Codes are used for addressing within SS7 networks. The three types of Signalling Point Codes are:
- (a) International Signalling Point Codes (ISPC) – used for signalling points with international connections;
 - (b) National Signalling Point Codes – used for signalling points with national connections and often also used for network internal signalling points; and
 - (c) Network Internal Signalling Point Codes – used for signalling points that have no connections to other networks.
- 9.5.2 ITU-T has assigned 5 Signalling Area/Network Codes (SANCs) to Malaysia, with each SANC allowing 8 ISPCs. The International Signalling Point Codes are currently 90% assigned or reserved.
- 9.5.3 National Signalling Point Codes are currently about 60% assigned and are used for both national interconnection points and network internal signalling points.

Future Requirements

- 9.5.4 Increased competition in the communications sector in Malaysia will result in an increase in demand for International Signaling Point Codes and National Signaling Point Codes. New competitors entering the Malaysian communications market as well as existing service providers expanding their scope and scale of services will require additional signaling point codes. Without change, both the International and National Signaling Point Codes are likely to be exhausted in approximately the year 2006.

9.6 International Signaling Point Codes

- 9.6.1 The Consultants propose for the Commission to review the existing use of International Signaling Point Codes with service providers and reclaim codes where possible.
- 9.6.2 New SANCs should also be applied from the ITU-T in advance of any requirement.

9.7 National Signalling Point Codes

- 9.7.1 The usage of National Signalling Point Codes can be reduced dramatically by service providers using network Internal Signalling Point Codes for signalling points that are not national interconnection points requiring National Signalling Point Codes.
- 9.7.2 Existing service providers should review their own usage of National Signalling Point Codes and come up with a plan on how they will reduce their usage of such codes. This approach will ensure that service providers are able to propose plans that best meet their own service and technical requirements.

9.8 Invitation for Public Comments

Comments are invited on any of the following:

- a) Whether additional Data Network Numbering capacity is required;*
- b) the view that Telex services is a declining service and does not require additional number capacity;*
- c) the proposal that the ITU-T IND AESA format be utilised in Malaysia, and end-users with a different format be required to migrate to the ITU-T IND AESA format;*
- d) the proposal to review the existing use of International Signaling Point Codes with current assignment holders and reclaim codes where possible;*
- e) the need to apply to the ITU-T for new SANCs in advance of requirement; and*
- f) the proposal to require existing service providers to review their usage of National Signalling Point Codes and report to the Commission with a plan on how their usage of such codes may be reduced.*

10. Broadcasting and Multimedia

10.1 Introduction

- 10.1.1 The convergence of communications and broadcasting and the development of multimedia services is expected to be the main development for the next decade and has been anticipated with the enactment of the Act.
- 10.1.2 The following paragraphs outline the possible numbering and electronic addressing requirements of content applications services in a convergence environment resulting from the Consultants' study.
- 10.1.3 The underlying driver for the convergence communications and broadcasting is the development of digital network technologies that can support the whole spectrum of services from the simple one-to-one telephony calls through to broadcasting and multicasting of multimedia services with varying and sometimes high bandwidth requirements and varying degrees of interaction between the receiver and the sender. The main elements are:
- (a) High and varying bit rates;
 - (b) Different bit rates in each direction;
 - (c) Varying degrees of interactivity; and
 - (d) Multicasting (one to many where each receiver is known and specified) and broadcasting (one to many where the receivers are unspecified).
- 10.1.4 The main enabling technology at the network level is the Internet Protocol with its capability of supporting varying data rates and multicasting. However, the essential key enabling technologies are:
- (a) Digital TV standards and compression standards (for example, MPEG and its derivative MP3);
 - (b) Digital radio standards; and
 - (c) Higher rate access technologies such as ADSL and VDSL.
- 10.1.5 The ability of networks to support the different types of traffic of the communications and broadcasting industry will lead to organisations that were hitherto in separate markets increasingly overlapping, giving broadcasters opportunities to support services more commonly associated with telecommunications and telecommunications service providers opportunities to provide services more commonly associated with broadcasting.
- 10.1.6 "Multimedia" means simply the combination of two or more media in a service. This could be, for example, the combination of speech and video. Although there has been some work in ITU-T and other bodies on multimedia services there are few "standard" services and everyone is

waiting to see whether the market demands fairly complex or more simple services and whether most service are of a client to host type or whether many host to host services such as video telephony will develop.

10.2 Market Development

- 10.2.1 At present, there is a general lack of an orderly technological development in the convergence market. At the low end, software such as NetMeeting provide video-telephony and video conferencing with comparatively low quality, but these solutions are expected to advance now that Microsoft has introduced its new Windows Messenger as part of Windows XP based on the SIP. Many web sites are already providing small video clips that may be downloaded and played with software such as Windows Media Player and RealPlayer.
- 10.2.2 At the upper end of the market, there are various standards initiatives that are supported by the broadcasters such as:
- (a) TV-Anytime Forum, which is developing specifications for audio-visual services based on mass digital storage (sophisticated video on demand);
 - (b) The MPEG groups of ISO/IEC which has developed:
 - (i) MPEG-1 (1992): Coding systems for moving images and audio at rates of up to 1.5 Mbit/s used by PCs, video CDs, some broadcasting and digital cameras, including MP3 for web audio;
 - (ii) MPEG-2 (1994): More advanced coding for higher rates used for digital satellite and terrestrial TV and DVDs;
 - (iii) MPEG-4 (1998): Coding of audio visual objects mainly for the mobile environment;
 - (iv) MPEG-7: Content description describing a single object; and
 - (v) MPEG21: A framework for digital compilations of multiple objects.
 - (c) The Joint Rapporteurs Group (JRG) formed between the broadcasters of ITU-R SG6 and ITU-T SG9 to develop scenarios and standards for interactive digital broadcasting involving the communities of content creation, advertising and broadcasting over the next 5 years.

10.3 Service Classification

- 10.3.1 A wide range of service scenarios is under consideration in the JRG of the ITU, relating to broadcast services. This includes:
- (a) Simple broadcasting;
 - (b) Interactive broadcasting;

- (c) Broadcasting where the end-user can exercise control as they would of a video;
- (d) Suppression and interaction with advertising; and
- (e) Game programmes.

10.3.2 In the longer term, the broadcasting industry anticipates that many services will also be provided over the Internet and that this will lead to even greater functionality and diversity.

10.4 Numbering Requirement

10.4.1 Identifiers are used for referencing content and there are several such schemes as summarised in Figure 10.1:

Figure 10.1: Content identification schemes

Identifier	Administered by	Other information
Content Identification System	Confederation Internationale des Societies d'Auteurs et Compositeurs	Overall system for the digital age
Content ID	Content ID Forum	Code to embed in content to protect copyright
Digital Object Identifier	International DOI Foundation	Describes intellectual property
EAN/UPC System		Identifies products
International Standard Audiovisual Number)	ISO	Identifies audiovisual work
International Standard Book Number	ISO	Identifies books
International Standard Recording Code	ISO	Identifies sound recordings
International Standard Textual Work Code	ISO	Identifies textual works in their abstract form
International Standard Work Code	ISO	Identifies musical works
Universal Programme Identifier	Society of Motion Picture and Television Engineers	TV programmes

Source: Consultants' Study, 2001 .

10.4.2 In practice these identifiers do not need to be included into any communications numbering or naming scheme because the communications link will be established first to the service provider and then the end-user will indicate the content required by sending one of these identifiers transparently over the communications link.

10.4.3 Communications service providers may be required to collect payment for access to communications content as they already do for premium rate numbers. Therefore there may be a need for regulatory intervention in

respect of a fair and transparent framework for setting rates between the various stakeholders.

10.5 Implications for the Plan

- 10.5.1 After further deliberations and interviews with major content applications service providers in Malaysia, the Consultants have concluded that no special needs for numbering and electronic addressing can be foreseen at this stage other than the possible introduction of a number range for Multimedia Services.
- 10.5.2 The Consultants take the view that the growth and development of multimedia and convergent broadband services require the following actions:
- (a) Create a number range for multimedia service providers to be available within 2 years. The services involved are likely to be offered on a national, or non-geographic basis, and should be included in the range within the Special Service Number category.
 - (b) To consider regulating the framework for rates for the access to such services especially in relation to the content applications service provider and the provider of the connectivity services.
- 10.5.3 The Consultants propose for the 1900 XX XXXX range be designated for Multimedia Services which are services that involve more than one form of medium such as voice and video or voice and text. The Consultants are aware that such definition of the services may be insufficiently clear to potential applicants. This number range designation is recommended in preparation of future services which have yet taken shape and as such it is not be possible to have a clear definition of such services at this stage.
- 10.5.4 The Consultants have taken note of the possible difficulty in determining what would constitute Multimedia Services and are therefore proposing that numbers from this range be assigned by the Commission upon being satisfied that the intended services of the applicant could not be better classified under other existing Special Services.

10.6 Invitation for Public Comments

- a) *Comments are invited on the proposal to designate the 1900 XX XXXX range for Multimedia Services which are services defined to mean services that involve more than one form of medium such as voice and video or voice and text. Comments are also sought on the proposal to only assign numbers from this range upon being satisfied that the intended services of the applicant could not be better classified under the other existing Special Services; and***

b) Comments are also sought on the likely demand for Multimedia Services and its impact on the numbering resource.

11. Assignment of Numbers

11.1 Overview

- 11.1.1 The Consultants take the view that the assignment of numbers and electronic addresses should be made in a fair, transparent and efficient manner while ensuring that the value of such numbers and electronic addresses be realised and protected. A set of clear and stable procedures for application and principles of assignment of numbers and electronic addresses should be developed to achieve the said objective.
- 11.1.2 Whilst it is desirable to have a set of generic and common procedures and principles for all numbers and electronic addresses, these procedures and principles must also take into account international agreements, conventions, recommendations, standards and practices and as such, it is not always possible to adopt uniform procedures and principles. The procedures and principles in this section are intended to apply only to the assignment of numbers.
- 11.1.3 The procedures and principles for assignment should be made in the form of Regulations pursuant to section 16 of the Act. This will ensure the stability and transparency of the procedures and assignment principles. The Consultants propose that the Regulations on number assignment incorporate the principles and procedures outlined in this section.
- 11.1.4 Prior to the coming into operation of any such Regulations, the current procedures as provided under REG-T 006 as supplemented, amended or modified by the Commission should continue to be used.

11.2 Assignment and Sub-Assignment Principles

Principles for Assignment of Numbers

- 11.2.1 In evaluating any application for an assignment of numbers or deciding to suspend or cancel any assignments of numbers, the following principles should be taken into consideration:
- (a) Numbers and electronic addresses are unique national resources.
 - (b) An adequate supply of numbers and electronic addresses is needed for the development and expansion of networks, applications and services.
 - (c) Numbers and electronic addresses should be organised and managed so as to accommodate future growth and not be allowed to restrict any activity in the provision of services.
 - (d) The Commission should have the power to suspend or cancel the assignment of any numbers and electronic addresses in accordance with the Regulations and with the Plan, after adequate notice.

- (e) Assignments should take into account the likely effects on all industry stakeholders such as network facilities providers, network service providers, applications service providers, content applications service providers and consumers.
- (f) Unless otherwise stated in the Plan, all assignments shall be on a 'first come first served' basis.
- (g) No party should be allowed to collect or hoard assignments that they do not use within a reasonable time.
- (h) All administrative costs of processing requests and assigning numbers and electronic addresses by the Commission should be recovered through appropriate charges.
- (i) Assignments should be in compliance with Malaysia's obligations, if any, to international agreements, conventions, recommendations and standards.
- (j) Assignments should take into account any recommendations and standards by any international body relating to the communications.
- (k) Assignments of numbers and electronic addresses should take into account any other matter deemed relevant by the Commission at the time of the assignment.

Principles for Sub-Assignment of Numbers

- 11.2.2 Where an assignment holder is permitted to sub-assign numbers to an end-user, the sub-assignment should be in accordance with the following principles:
- (a) Fair, equitable and non-discriminatory treatment of end-users, and applicants for numbers and electronic addresses.
 - (b) Sub-assignment on a "first come first served" basis and end-users shall not be subject to any direct charge whether administrative or otherwise for the said issuance, other than in accordance with guidelines that may be published by the Commission from time to time.
 - (c) Following sub-assignment, numbers shall not be withdrawn or cancelled by assignment holders except:
 - (i) where the end-user has not complied with the conditions of service to which the numbers and electronic addresses relates, such as timely payment of charges associated with the service;
 - (ii) where the end-user has failed to comply with the conditions of use associated with the assignment of the numbers and electronic addresses;
 - (iii) in compliance with instructions from the Commission; or

- (iv) where the end-user cancels the service for which the number was sub-assigned.

11.3 Conditions of Use of Assigned Numbers

11.3.1 In respect of numbers assigned, the Consultants propose that the following conditions of use should apply:

- (a) Assignment holders should only use the assigned numbers for the stated service/purpose in the assignment and shall not utilise numbers assigned for any other purpose. Prior written approval from the Commission shall be required if the numbers are to be used for a purpose other than that for which it was originally assigned.
- (b) The assigned numbers should be used in accordance with any conditions imposed by the Regulations or by the Commission. Such conditions may include the requirement that certain numbers or range of numbers assigned be assigned only to a specific class of end-users, such as government authorities.
- (c) Successful applicants and end-users shall not charge, sell, auction, trade or otherwise transfer the numbers assigned to them other than in accordance with the procedures and authorisations set out by the Commission from time to time. Currently no such acts are allowed by the Commission.
- (d) Current assignment holders providing Public Cellular Telephony Services shall maintain a plan for the sub-assignment and reassignment of numbers and electronic addresses referred to under Section 180(2)(f) of the Act and must forward such plan to the Commission before the expiry of three calendar months from the date of the issuance of the finalised Plan.

11.3.2 In respect of numbers assigned, the entire assignment or parts of an assignment may be suspended or cancelled if any of the following occurs:

- (a) The assignment holder is in breach of any conditions attached to the assignment.
- (b) The assignment holder utilises the assigned numbers for a service or purpose other than that for which it was originally assigned unless the Commission had given prior written approval of the change in the service or purpose.
- (c) The assignment holder does not fully utilise the assigned numbers within the period specified in the conditions for assignment.
- (d) The assignment holder's use of the assigned numbers is inconsistent with the assignment principles or the national policy objectives stated in the Act.
- (e) The assignment holder is found to be engaged in the selling, charging, auctioning or trading of any numbers assigned to them other than in accordance with the procedures and authorisations set out in the formal guidelines of the Commission applicable at the time.

- (f) The assignment holder fails to pay any fees in relation to the assignment.
 - (g) Another person is declared to have a stronger right to use the assigned number pursuant to any dispute resolution proceedings.
- 11.3.3 Suspension or cancellation of in-service numbers should be made after consultation with the assignment holder and any other interested party, taking into account consumer interests.
- 11.3.4 Notice of suspension or cancellation of in-service numbers should thereafter be given by the relevant assignment holder to all affected end-users at least 6 months prior to the actual suspension or cancellation.
- 11.3.5 Where an assignment holder is authorised to sub-assign numbers to its customers, the assignment holder should be required to maintain a record of the numbers that have been assigned and a record of such numbers which have been abandoned or terminated by the end-users. The record shall include details of the percentages of numbers abandoned or terminated in each category.
- 11.3.6 For audit purposes, the Consultants recommend that all assignment holders of numbers with a right of sub-assignment submit to the Commission, an *“Annual Usage Report”*, which sets out the current use, percentage assigned and unused numbers.
- 11.3.7 End-users who have been sub-assigned numbers should not acquire any direct proprietary right or title over the numbers assigned to them, and the ownership of the numbers shall, at all times, remain with the Government of Malaysia, but the end-user shall be entitled to the continued and undisturbed enjoyment of the numbers assigned, subject only to actions taken by the Commission in accordance with the proposed Plan and the applicable Regulations.
- 11.3.8 The assignment holder who sub-assigns numbers shall ensure that the end-users of such sub-assignments may only use the assigned numbers for the service which they applied for.
- 11.3.9 The assignment holder who sub-assigns numbers shall ensure that the end-users are appropriately informed that they shall not charge, sell, auction, trade or otherwise transfer numbers that have been assigned to them, unless otherwise decided by the Commission.
- 11.3.10 End-users may, at any time, surrender the numbers to the Commission.

11.4 Designation of Reserved Numbers by the Commission

- 11.4.1 In addition to designating certain numbers to be Reserved Numbers for planning purposes, certain numbers should also be designated as Reserved Numbers for the purpose of protecting the value in such numbers.

- 11.4.2 Numbers that should be reserved to protect and realise its value should include cherished numbers which have inherent and widespread appeal to Malaysians but do not include popular or some cherished numbers peculiar to small segments of the population.
- 11.4.3 Reserved Numbers may be designated prior to any assignment of numbers or after such numbers have been assigned. Where the designation of Reserved Numbers is done after the number has been previously assigned, the Commission should cancel the same from the use of the assignment holder.
- 11.4.4 Numbers or ranges of numbers designated as Reserved Numbers indicate that the Commission is not yet prepared to assign the same and therefore Reserved Numbers should not be subject to an application for assignment.
- 11.4.5 Reserved Numbers should not be available for any application by interested parties unless:
- (a) the Reserved Number designation is removed; or
 - (b) where the Commission decides to assign the numbers directly to the end-users.
- 11.4.6 However, at this stage, the Consultants are of the view that a direct assignment of reserved cherished numbers to end-users is premature as the two pre-conditions for such assignments to realise the value of such numbers (that is, Plan stability and number portability) have yet to be fulfilled.

Principles of Reservation of Cherished Numbers

- 11.4.7 The following principles may be adopted when deciding to reserve cherished numbers from the Special Service Numbers and Mobile Service Numbers ranges for the purposes of protecting and realising its value:
- (a) Repeated digits - numbers containing the same digit repeated 4 or more times consecutively. For example 1800 X7 777X.
 - (b) Increasing or decreasing sequences - numbers containing an increasing or decreasing sequence of 4 or more consecutive digits. For example 1800 XX 5678.
 - (c) Alternating sequences - numbers containing consecutive alternating digits with a length of 6 or more. For example 015X 131 313X.
 - (d) Repeated pairs - numbers containing consecutive pairs of repeated digits of a total length of 6 or more. For example 015X X11 7733.
- 11.4.8 Reservation of such cherished numbers are on the basis that they possess an inherent and therefore widespread appeal which makes such Reserved Numbers more valuable than other numbers.
- 11.4.9 The decision of the Commission in identifying cherished numbers and designating them as Reserved Numbers to protect its value should be final.

11.5 Numbering Administration

- 11.5.1 In a multi-service provider environment, with a range of service providers being entitled to apply for number assignments, it is necessary to provide information about pre-existing assignments.
- 11.5.2 As a first step, an online database containing current information on the assignment and availability of all number ranges in the Plan for E.164 numbers should be developed and provided.
- 11.5.3 The prospects for introducing online applications for number assignment should be monitored. If and when introduced, there has been a proposal for the cost of the provision for such services to be recovered by way of subscription fees.

11.6 Invitation for Public Comments

Comments are invited on any of the following:

- c) the proposed assignment principles and conditions of use for number assignments;*
- d) the proposal for the number assignment procedures and principles to be made in the form of Regulations;*
- e) the condition of not allowing assigned numbers to be charged, sold, auctioned, traded or transferred unless approved by the Commission;*
- f) the proposal to reserve cherished numbers in order to protect and realise its value;*
- g) the proposed principles for reservation of cherished numbers; and*
- h) the proposal to provide online numbering application and whether such service should be charged on a subscription basis.*

12. Number Portability

12.1 Forms of Number Portability

- 12.1.1 The form of number portability being considered in this Consultation Paper is **service provider portability** – that is, where a customer changes service provider and retains the same service number.
- 12.1.2 Other forms of number portability are:
- (a) **location portability** – where a number is retained even though the service is moved to a different location; and
 - (b) **service portability** – where a number is retained even though a different service is provided.
- 12.1.3 The structure of the proposed Plan as contemplated by the Consultation Paper is such that full location portability and service portability will not be possible until a major review of the Plan is made by removing, *inter alia*, the SNL designation for Geographic Numbers and the current approach of requiring intended services to be matched with specified number structures (for example Special Service Numbers).
- 12.1.4 There are two alternative types of requirement that the Commission may impose on service providers for number portability:
- (a) **customer initiated portability**. The customer may request portability and the service provider must be in a position to provide it. Customer initiated portability gives end-users the right to portability and all service providers must make their networks capable of dealing with both the export and import of numbers.
 - (b) **service provider initiated portability**. This means that number portability is introduced only when requested by a service provider (normally a new entrant), so end-users have no right to number portability and portability will not be implemented if it is not requested. The requirement is normally that:
 - (i) the incumbent service provider must introduce the capability of exporting numbers to another service provider if that service provider requests it;
 - (ii) the requesting new entrant service provider must offer to export numbers to the incumbent in return (reciprocity); and
 - (iii) a new entrant service provider can refuse portability to another new entrant if it has not requested portability from the incumbent.

12.2 Benefits and Costs of Number Portability

- 12.2.1 Number portability brings many benefits to service providers and end-users, but it has associated costs.

- 12.2.2 The key benefits of number portability are:
- (a) Customers who change service providers save costs in informing others of a change of number and in changing letterheads, business cards and signage;
 - (b) Barriers to changing network are removed and hence service providers must improve their performance to attract and retain customers; and
 - (c) All callers save costs in updating their records when correspondents change numbers.
- 12.2.3 The costs of number portability include:
- (a) the initial set-up costs, including the costs associated with updating customer support systems and introducing new porting procedures;
 - (b) the costs associated with each individual porting; and
 - (c) the costs of changing the routing of calls (called "additional conveyance").
- 12.2.4 The Consultants recommend that more in depth studies be conducted on the potential costs and benefits of portability for each type of number before any decision is taken. The studies should take into account the particular technical solution to be used and will be undertaken with full opportunities for service provider and consumer consultation. The studies should lead to informed recommendations for:
- (a) the charging and routing principles to be used between service providers;
 - (b) controls on prices applied to customers who port their numbers;
 - (c) quality of service reporting and targets for the portability process; and
 - (d) restrictions on the use of data exchanged between service providers in the course of supporting portability, for example, attempts to dissuade customers from porting.
- 12.2.5 The success of number portability depends on adequate interconnection arrangements. The interconnection arrangements and charges should be reviewed to ensure that they are compatible with the successful operation of number portability.

12.3 Special Service Numbers

- 12.3.1 The Consultants take the view that the potential benefits of Special Service Number portability are very high because a substantial amount of money is invested in advertising some numbers and so end-users may be completely locked into the initial service providers in the absence of portability.
- 12.3.2 As such, the Consultants recommend a study to be conducted into the costs and benefits of Special Service Number portability in Malaysia in the near future, preferably before the end of 2002. Based on the results of the study, the Commission will be able to make an informed decision as to when and how to introduce Special Service Number portability in Malaysia and which services should be encompassed.
- 12.3.3 This form of portability will most likely be end-user initiated.

12.4 Mobile Numbers

- 12.4.1 From the countries surveyed by the Consultants, it appears that Mobile Number service portability have provided only modest net benefits. Only Hong Kong S.A.R. has achieved a solution where the volume of porting is sufficient to realise the net benefits. In other countries such as the United Kingdom and the Netherlands, the volumes of porting are still low despite several years of implementation. The Consultants have attributed lengthy and unreliable porting procedures as the primary reasons for the low volumes experienced.
- 12.4.2 The Consultants do not favour the introduction of Mobile Number service portability any time soon. It is proposed that the Commission monitor the effectiveness and the results of Mobile Number portability schemes adopted in other countries in order to understand how to avoid or minimise difficulties that they have experienced.
- 12.4.3 However the desirability of Mobile Number service portability has been taken into account in the Consultants' proposed Mobile Number expansion plans. The removal of service provider association with the MNI has been consciously incorporated as an initial step in Mobile Number portability. In addition, limited service provider portability for 2G and 3G has also been factored into the proposed Mobile Number expansion plan.
- 12.4.4 At an appropriate stage, the Consultants recommend a more in depth study into the costs and benefits study of Mobile Number service portability in Malaysia later in 2002. Based on the results of that study the Commission will ascertain whether, when and how to introduce Mobile Number service portability in Malaysia.

12.5 Geographic Numbers

- 12.5.1 The portability of Geographic Numbers is also known as fixed number portability or local number portability. It can apply only in areas in which

there are providers of alternative local access services. There are few areas in which non-incumbent local access service providers are currently operating in Malaysia, and therefore there are limited opportunities for Geographic Number portability.

- 12.5.2 The Consultants are of the opinion that the net benefits of Geographic Number portability can be significant but portability may not be of great importance to new entrants initially because many larger businesses will take separate lines from new entrants for outgoing traffic while retaining lines from the incumbent for incoming traffic.
- 12.5.3 The Commission should continue to monitor the development of the competition in the fixed telephony service market and undertake a study of service provider initiated portability when there is a choice of networks for the consumer. Geographic Number portability implementation may be limited to particular geographical areas, such as the Klang Valley region.
- 12.5.4 The following considerations in respect of a service provider initiated number portability request are proposed:
- (a) The Commission will accept or reject the request having regard to:
 - (i) whether the area specified is feasible;
 - (ii) the existence of alternative network infrastructure or of clear plans for such; and
 - (iii) any other matter considered relevant by the Commission.
 - (b) If the Commission accepts the request, the requesting service provider may approach the incumbent to ascertain whether the incumbent service provider's network is capable of supporting number portability in the relevant area. The incumbent service provider shall provide an answer within 14 days of being provided with a copy of the request.
 - (c) If the incumbent service provider's network is capable of supporting Geographic Number portability in the specified area, then, after consultation with the parties the Commission will ascertain the basis, including the time, on which number portability will proceed.
 - (d) If the incumbent service provider's network is incapable of supporting Geographic Number portability in the specified area, the Commission may, but is not obliged to, ascertain the basis, including the time, on which number portability will proceed.

12.6 Principles for the Introduction and Operation of Number Portability in Malaysia

- 12.6.1 The following principles have been outlined as pre-conditions for introducing number portability in Malaysia:

Competitive Neutrality

- 12.6.2 Number portability will be introduced and implemented on the basis of competitive neutrality. The technical implementation and other procedures shall not in themselves alter the balance of competitiveness between service providers, nor provide any form of competitive advantage.

Non-Discrimination

- 12.6.3 Number portability shall be administered on a basis that does not discriminate between end-user or categories of end-user. In particular, an end-user customer shall not be subject to discrimination in the provision of any service as a result of his decision to port a number associated with a particular service.

Reciprocity

- 12.6.4 Service providers shall be obliged to offer reciprocal services in relation to the porting of numbers. No service provider shall be required to port numbers to another, unless the other service provider is prepared and capable of porting numbers in return at the request of an end-user.

Performance Standards

- 12.6.5 Specific performance standards will be dependent on future decisions concerning porting technologies then in use and number portability policy goals. Performance standards will need to be established in relation to:
- (a) the porting process; and
 - (b) the operation of services that are associated with ported numbers.
- 12.6.6 These performance standards may apply generally or to specific types of number portability. Without limitation, the performance standards may include:
- (a) the maximum permitted elapsed time for successful ports; and
 - (b) equivalent service standards.
- 12.6.7 Equivalent service standards relate to the perceived performance of the ported service. A service in relation to a ported number is an equivalent service only if any differences in quality, reliability or service features, between it and a non-porting service provided by the same service provider:
- (a) will not be apparent to an end-user; or
 - (b) if they are apparent to an end-user, it will not affect the end-user's choice of service provider.

Procedural Compliance

- 12.6.8 Procedures should be established from time to time which apply to number portability. These procedures may relate to number portability generally or to specific types of number portability.

- 12.6.9 Without limitation, the procedures may include procedures relating to:
- (a) the respective responsibilities of end-user, service providers and others in relation to the application and other processes associated with number portability;
 - (b) charges that may be levied to recover porting costs; and
 - (c) the process by which end-user authorisation is to be given for a number port.

Privacy

- 12.6.10 Customer information made available in the course of effecting a number port shall not be used for any other purpose.

Least Cost

- 12.6.11 The systems and procedures mandated for specific types of number portability shall reflect the approach that has the least net cost for the industry, including end-users, in the long term.

Cost Allocation

- 12.6.12 Service providers shall bear their own costs, as between themselves, in relation to the establishment and operations of systems for number portability, excluding the costs associated with the provision of leased circuits or other communications services.
- 12.6.13 Subject to the Commission's approval, the costs associated with effecting a port on behalf of a customer to a service may be recovered in the form of a number portability application charge.

12.7 Invitation for Public Comments

Comments are invited on any of the following:

- a) the priorities accorded to portability implementation for Special Service Numbers, Mobile Numbers and Geographic Numbers and the proposal for further detailed cost and benefit studies before making any final decision to introduce service provider portability in Malaysia; and*
- b) the proposed porting principles as pre-conditions for introducing service provider portability in Malaysia (Section 12.6).*

13. Internet Naming and Addressing

13.1 Current Situation - Internet Naming

- 13.1.1 ICANN has global responsibility for domain names and assigns all top level domain names (TLDs). Internet naming under “.my” (the ccTLD for Malaysia) is currently managed by the MYNIC, which is a business unit within MIMOS Berhad. MIMOS Berhad was a Government technology department active in software, microelectronics and the Internet, that became a Government-owned corporation in 1996. Within MIMOS Berhad, a separate business unit known as JARING operates the largest ISP in Malaysia.
- 13.1.2 In place of the Commission, MYNIC currently manages the domain name assignments under .my as a separate unit within MIMOS Berhad.
- 13.1.3 Presently, there are six second level domains (SLDs) under the .my ccTLD:
- (a) .com.my
 - (b) .net.my
 - (c) .org.my
 - (d) .gov.my
 - (e) .edu.my
 - (f) .mil.my
- 13.1.4 There are normally two functions in the management of domain names:
- (a) **A registry** maintains a central database of assignments and operates, or arranges to operate, at least two on-line servers within the Domain Name System (DNS) hierarchy that needs to be queried by host machines that resolve names.
 - (b) **A registrar** oversees the assignment of names to end-users. It takes the end-user’s request, checks with the registry that the name is unassigned and then registers the end-user with the registry. ISPs commonly act as registrars and in some countries there are independent registrars who are not ISPs.
- 13.1.5 MYNIC currently acts as a registry and registrar for all these combinations and has appointed several parties as “resellers” of the following SLDs: .com.my; .net.my and .org.my.
- 13.1.6 Some industry concerns about the ownership by MIMOS Berhad of MYNIC have been expressed during the course of interviews associated with the present study. An important consideration is that the continued performance of both the registry and registrar function by one entity should not in any way prejudice access of any other registrars to the registry.
- 13.1.7 Further, there is no clear and consistent distinction between the roles of a registrar and a reseller, as resellers duplicate parts of the role of registrars

to varying extents. To ensure adequate competition and diversity, the focus should be on the creation of an open market for registrars, whilst leaving the registrars to decide whether or not they wish to work with resellers. The registrar would then be responsible for ensuring that they and their resellers comply with any relevant Regulations.

Charges for Domain Name Registration

13.1.9 MYNIC currently charges RM 100 per annum for registrations. These charges are high when compared with other countries taking into account the relative cost of living. For example:

- (a) Verisign is the registry for the gTLDs .com, .net and .org. Verisign used to be the only registrar but was forced to open the market to competing registrars by the United States Government. The registrar accreditation programme is based on the ICANN guidelines. Verisign's prices as a registry are fixed under an agreement with ICANN at \$US 6 per annum (RM 20). Typical end-user prices are from \$US 20 per annum to \$US 30 per annum depending on the length of the contract, although subsidised renewals are as low as \$US 5 per annum. Any person or organisation can register under .com and .org.
- (b) Nominet, the domain name registry for the .uk names, charges ISPs who are its members £2.50 (RM 12.50) per year for each domain name. Membership costs comprise of a £400 (RM 2,000) joining fee plus a £100 (RM 500) per year membership fee and most members are ISPs who function as resellers/registrars (the distinction is not clear) and can set their own fees in a competitive market. A typical unbundled end-user price is £12 (RM 60) per year for a .uk registration. Qualifications for becoming a member are almost non-existent and any person or organisation can register under .co.uk and .org.uk.
- (c) AUNIC has responsibility for .com.au in Australia but the day to day management is delegated to Melbourne IT, which works with competing resellers. End-user prices are typically \$US 35 per annum (RM 130). Only registered companies can have names under .com.au and the names must match or be abbreviations of their registered company name.
- (d) In the Netherlands, domain name registration for .nl is managed by Foundation Internet Domain Registration the Netherlands (SIDN). Registration can only be carried out by a participant (member) of SIDN who must be a company or institution based in the EU and pay an annual subscription of about £400 and provide an indemnity. There are no other qualifications and there are some 900 participants. Registrations may be made for corporate entities and for persons resident in the Netherlands. SIDN charges \$US 5 (RM 15) for initial registration and then \$US 7 per annum (RM 20). The charges of participants to end-users are not regulated and can be high.

- 13.1.10 Domain names to be registered under .com.my are subject to various pre-requisites such as requiring an applicant to be a company registered in Malaysia. One view supporting such a stringent requirement is that such domain names may be trusted and therefore adds value to .my domain names. In contrast, many other countries allow the registration of names with minimal requirements.

Multi-lingual Domain Names (also known as Internationalised Domain Names – IDN)

- 13.1.11 Multi-lingual domain names are names that use a different character set to the Roman alphabet¹⁸ used at present for domain names. The label is a misnomer since the issue has more to do with character sets than the issue of languages. The possibility of supporting different character sets is of special interest in Asia Pacific as a high proportion of the population use different character sets. Views have been expressed that there could be an opportunity for Malaysia to play a central role in their introduction and thereby take advantage of the multi-cultural dimension of Malaysian life.
- 13.1.12 This issue is being studied by the International Domain Names Working Group of IETF. Several Internet drafts have been produced but no Requests For Comment have been agreed to date.
- 13.1.13 Technically there are two possibilities:
- (a) Introduce a new parallel DNS for each different character set; or
 - (b) Introduce unicode standards or ASCII compatible equivalents for names in other character sets and use additional software in hosts to convert from the other character sets to these ASCII equivalents.
- 13.1.14 The latter solution seems to be much favoured within ICANN because it avoids the creation of a separate Internet for each character set. Verisign, the United States' registry for .com, .net, and .org, has started a trial using ASCII compatible equivalents for non-ASCII characters. The trial is using domain space below .com, .net, and .org and is planned to run until formal standards for such operation are agreed within IETF.
- 13.1.15 The potential opportunity is for Malaysia to implement a trial solution under .my ccTLD similar to the one used by Verisign. However based on interviews and other consultations conducted with the industry, there appears to be little support for such a move at this stage. However this situation might have changed since the interviews and consultations were conducted.
- 13.1.16 The Consultants recommend that the Commission continue to monitor ICANN discussions on this subject matter and to sponsor or facilitate a trial when there appears to be clearer prospects of valuable potential opportunities for Malaysia.

¹⁸ Subset of 7 bit ACSII as specified in ISO/IEC 646.

- 13.1.17 Interested parties are invited to learn more about this subject from the following resources from the Internet:
- (a) Internationalised Domain Names (IDN) Committee page at <http://www.icann.org/committees/idn/>
 - (b) IETF IDN working group website at <http://www.i-d-n.net/>

13.2 Issues and Proposals

Structure for the Registry

- 13.2.1 In accordance with the Act, the function of control, administration, management and assignment of electronic address are vested in the Commission, but the Commission may delegate any or all of its functions under section 179 of the Act.
- 13.2.2 The Commission is therefore primarily responsible for the domain name registry, which key functions are:
- (a) To provide the authoritative nameserver for the DNS so that an Internet end-user's computer can translate a domain name to a physical address for on-line access; and
 - (b) To provide public information services (commonly known as WHOIS) services.
- 13.2.3 While competition commonly brings community benefit, the Consultants are of the view that it is more beneficial to have one registry as opposed to multiple registries for each SLD because:
- (a) This will allow significant economies of scale in the operation of the registry to be made possible; and
 - (b) A high level of expertise is required for this function since it involves real-time servers within the DNS on which Malaysia's communications will depend.
- 13.2.4 The benefits of having a single operator outweighs the benefits of innovation and competition at the registry level. Instead, competition can be fostered closer to the retail level by having multiple registrars. The effects of a monopoly on the registry function can be mitigated by the separation and vesting of the policy function with the Commission.
- 13.2.5 Based on the following reasons, the relevant personnel in MYNIC would appear to be in a position to operate the registry during the transition to a single registry-multiple registrar model:
- (a) MYNIC's good overall performance to date;
 - (b) Requirements for continuity of service; and
 - (c) Best use of existing skills and resources.

Structure for Registrars

- 13.2.6 In addition to the functions described in paragraph 13.1.4(b), domain name registrars provide customer sales and technical support services, including billing and renewal services, updating of the registry database, and managing modifications to the register. These functions are not an inherently monopoly function.
- 13.2.7 The issue is therefore whether there should be competition in the customer facing registrar/reseller process for registering domain names under the SLDs. There are two benefits from introducing competition:
- (a) Using competition to ascertain prices instead of price control and letting market forces determine prices consistent with section 197; of the Act and
 - (b) Enabling ISPs to offer a one-stop-shop service for web sites including name registration and hosting, and other value added services.
- 13.2.8 These benefits are likely to exceed the additional costs of involving multiple organisations. Although different countries have differing arrangements, most countries, including the United Kingdom, the United States, and Australia, allow or require competitive customer facing registration services.
- 13.2.9 The Consultants propose that the registry administrator be required to open its registry to competing registrars to the .com.my, .net.my and .org.my SLDs.
- 13.2.10 All registrars must be accredited by the Commission in accordance with Regulations. ISPs will be allowed to qualify as registrars. ISPs fulfil this function for their customers in many countries and competition should help to improve service and keep costs low.
- 13.2.11 An organisation will be permitted to fulfil multiple functions (such as registrar and registry operator) provided that there is a clear separation of functions. In particular there must be safeguards to ensure that a registry does not discriminate in favour of its own registrar or prevent fair and equal access to the Register and that there is no cross-subsidy. If the Commission is agreeable for the entity operating the registry to also take on the role of a Registrar, the Consultants recommend that this dual function be conducted on an arms length basis and that any cross subsidises between these two functions be avoided.

The Role of Resale Agents or Resellers for Registrars

- 13.2.12 Registrars may either provide wholesale technical services to resellers, or provide retail services direct to end-users or both. At the wholesale level, registrars provide a range of interfaces which can be customised for each reseller, thus allowing for innovation and competition.
- 13.2.13 The use of resale agents as part of the registrar's organisation should be permitted, but the registrar concerned must remain responsible for

compliance with all conditions of its own appointment, including compliance by resale agents employed.

Control of Registry Prices

- 13.2.14 The introduction of competitive registrar services will create the market conditions for prices to find the level suggested by the cost of modern and efficient practices and procedures. The effects of competition on price levels may not be immediate, and there is a risk that prices might increase in the short term. To prevent this, a price ceiling should be established for standard registration services at the current levels, and to review the need for such a ceiling at regular intervals as the number of registrars increases. There is a need for a careful and balanced consideration to be applied here, because the continuation of price ceilings, notwithstanding their short term effect of protecting consumer interests, may distort competitive price levels in the longer term.
- 13.2.15 The prices for registration should be reviewed by comparing them to other registries elsewhere and the prices should be regulated to a comparable level. The current prices reflect price levels some years ago and prices generally have dropped significantly in the last few years.

New Second Level Domain Names

- 13.2.16 Given the current level of domain name registrations in Malaysia, it does not appear to the Consultants that there is any immediate need to introduce new second level domain names. However, this perceived lack of demand may be due to a combination of a high cost of registering and maintaining Malaysian domain names and the stringent registration pre-requisites. In any event the Commission should be the party that ascertains the time and manner of implementation in Malaysia of additional second level domain names as required to meet demand or other market requirements.

13.3 Options and Evaluation for Assignment of Domain Names under .my ccTLD

The Registry and the Separation of Policy and Operational Functions

- 13.3.1 A division of the Commission, to be known as the registry, should maintain a database that contains all the domain names registered using the .my ccTLD (ie the register).
- 13.3.2 This registry should have the following functions :
- (a) **Non-delegable policy functions** – to provide rules in relation to all domains including all second level domains created under the .my ccTLD, including:
 - (i) Categorisation of second level domains as open second level domains (those that have minimal eligibility criteria, for

- example .com.my, .org.my) and closed second level domains (those that have strict criteria, for example, .gov.my, .mil.my);
- (ii) Criteria for domain name eligibility and supporting documents required to be submitted with any application;
 - (iii) Any specific purposes for which specified second level domains shall be used;
 - (iv) The minimum and maximum length of domain name; eligible character sets; excluded characters, codes, abbreviations and words; and
 - (v) New second level domains which may be used.
- (b) **Delegable operational functions** described below:
- (i) Maintain the register;
 - (ii) Provide an authoritative nameserver so that an Internet end-user's access device can translate a domain name to a physical Internet Protocol address for online access;
 - (iii) Provide registrars with an on-line interface to the register; and
 - (iv) Provide a WHOIS service to enable end-users to access the registration data of the assignment holder corresponding to a particular domain name.
- (c) **Delegation of operational functions.** The Commission may appoint a person, as the administrator of the registry on the following basis:
- (i) Prospectively from the date of appointment for a maximum period of five years; and
 - (ii) Subject to the obligations and conditions specified in the Regulations, which include allowing non-discriminatory access to the register for all registrars.

Accreditation of Registrars

- 13.3.3 The Consultants propose that all registrars must be accredited by the Commission in accordance with the Regulations. Accreditation is subject to compliance with guidelines that may be issued by the Commission from time to time.
- 13.3.4 As a pre-requisite, registrars:-
- (a) must be a company incorporated under the Companies Act 1965 [*Act 125*]; and
 - (b) have a specified minimum paid up capital.
- 13.3.5 A non-refundable administrative fee should also be payable by any applicant before the Commission proceeds to process any application.

Matters for Consideration for Accreditation

- 13.3.6 In deciding whether to approve an application for accreditation, the Commission should consider the following:
- (a) Organisational and managerial capability and financial capacity;
 - (b) Ability of the persons involved in the registration process to discharge their obligations in accordance with the Regulations;
 - (c) Ability to interpret domain name policy and correctly apply policy compliance checks;
 - (d) Ability to interface with the registry using specified protocols;
 - (e) Adequacy of billing system and customer support services, including an internal complaints-handling mechanism;
 - (f) Need for law enforcement background checks; and
 - (g) Management of reseller arrangements.

Term and Conditions of Accreditation

- 13.3.7 Any accreditation of a registrar shall be for a term not exceeding 5 years and subject to the following conditions:
- (a) Compliance with the technical standards issued by the Commission from time to time and Chapter II of Part VI of the Act; and
 - (b) Nomination of a suitable person who will be responsible for the registration activities of the registrar and to ensure compliance with the Regulations, and any direction or guideline issued by the Commission.

- 13.3.8 A registrar may apply for the renewal of its accreditation upon payment of the prescribed fee.

Withdrawal of Accreditation

- 13.3.9 The Commission should be able to withdraw an accreditation at any time in any of the following situations:
- (a) There is a material inaccuracy or misleading statement in the registrar's application for accreditation;
 - (b) The registrar becomes ineligible in accordance with the eligibility criteria and the withdrawal of the accreditation would be in the best interest of the public;
 - (c) The Commission decides that the registrar had acted in a manner that endangers the stability and operational integrity of the register; or
 - (d) The registrar ceases to conduct business as a registrar or becomes insolvent or is wound up.

Duties of Registrars

- 13.3.10 Registrars shall have the following duties:
- (a) Provide applicants for domain names with a copy of the procedures that the registrar will adopt in processing applications for registration, together with a schedule of relevant fees and charges;
 - (b) Process all applications for the registration of domain names in an expeditious, fair and non-discriminatory manner in the order of receipt of applications within defined categories of applications;
 - (c) Verify the accuracy of information provided by actual and potential assignment holders and that the primary domain name server and the secondary domain name servers are active prior to registration;
 - (d) Provide by on-line means to the registry, the registration data and the exact time and date of registration and the expiry date of the registration;
 - (e) Ensure the security of registration data and any documents submitted by applications for third level domains;
 - (f) Issue bills to their customers for the fees levied for domain name registrations and renewals;
 - (g) Maintain a reliable data backup system;
 - (h) Implement the decision of the Commission following a resolution of a domain name dispute; and
 - (i) Operate the registrar function in accordance with the guidelines and determinations made by the Commission from time to time.
- 13.3.11 Since there will be multiple registrars, the Commission may develop a code of conduct to regulate the manner in which registrars provide services.
- 13.3.12 All accredited registrars shall only have the rights to assign all domain names under .com.my, .net.my and .org.my, unless the terms of accreditation specify otherwise.

Assignment Process for Domain Names

- 13.3.13 The application process of any domain name assignment by the registrars must be in accordance with the rules imposed by the Commission pursuant to its non-delegable policy function. All applicants for domain names shall provide the information in accordance with the Regulations, such as particulars of the applicant, Internet Protocol addresses of the primary nameserver and secondary nameserver, contacts particulars of the technical, administrative and billing contacts ("Registration Data") and file supporting documents in line with the said rules. Registration Data shall be accessible to the public and shall appear in the WHOIS directory.
- 13.3.14 Domain name assignment (or commonly known as domain name registration) should be made by any registrar on a "first come first serve"

basis. Successful applicants for domain names shall be bound by the Regulations.

- 13.3.15 The Regulations may specify names which are prohibited for registration or names which are reserved.

Conditions of Assignment of Domain Names

- 13.3.16 Any end-user of a domain name should not acquire any direct proprietary right or title over the domain name, but should be entitled to the continued use of the domain name subject only to the Regulations and the proposed Plan.
- 13.3.17 Domain names assigned should only be used for the purpose specified in the applicable rules for the second level domain under which the assignment is issued.

Cancellation or Suspension of Assignment

- 13.3.18 The Commission should have the power to cancel or suspend any assigned domain name:
- (a) Upon a breach of any condition contained in the assignment;
 - (b) Upon a failure to pay any fee or renewal fee in relation to the assignment;
 - (c) If the primary and secondary domain nameserver is inactive for a continuous period of twelve months;
 - (d) Upon contravention of any provision of the Act or any subsidiary legislation made under the Act in relation to the assignment or any relevant written laws; or
 - (e) If the suspension or cancellation is in the public interest.
- 13.3.19 Cancellation or suspension of a domain name assignment should only be made after consultation with the assignment holder and any other interested party, taking into account broader consumer interests. The Commission should give written notice of any proposed cancellation.
- 13.3.20 A domain name assignment holder should be able to appeal against any decision to cancel a domain name by the Commission.

Renewal of Domain Name Assignment

- 13.3.21 An assignment holder may, upon payment of a non-refundable renewal fee, renew a domain name assignment with any registrar, but if the registrar is not the original registrar which registered the assignment or the registrar which handled the renewal immediately preceding the present renewal ("earlier registrar"), the earlier registrar may charge a transfer fee for the transfer of the supporting documents to the registrar who is making the present renewal. This means that a transfer from one registrar to another may only take place at the time of renewal of an assignment.

Transfer of Domain Names

- 13.3.22 Domain names may be transferred from one assignment holder to another upon request of the assignment holder, a decision of the Commission or the court in accordance with the procedures and requirements in the Regulations.

Fees

- 13.3.23 Fees for accreditation of registrars will be prescribed in the Regulations. However in respect of fees for assignment of domain names, renewals and transfers, only the upper limit is prescribed. This is to allow competition between registrars and resellers. The proposed fees are further discussed in section 15.

Transition

- 13.3.24 Consideration should be given to the following transitional provisions if the Consultants' proposals are accepted and incorporated in the form of Regulations:
- (a) All domain names registered prior to the commencement of the Regulations should be deemed to be done in accordance with the Regulations.
 - (b) Assignment holders of second level domains which are to be cancelled, should be given prior notice before the actual cancellation.

13.4 Internet Addressing (IPv4) and Autonomous System Numbers

Current Situation

- 13.4.1 Internet Protocol addresses are assigned globally by ICANN. These assignments are made to Regional Internet Registries (RIRs) who assign ranges of addresses to ISPs and backbone networks and backbone networks assign ranges to ISPs, who in turn assign values to end-users.
- 13.4.2 Autonomous System Numbers are assigned by RIRs. The RIR for Asia-Pacific is APNIC, which is based in Brisbane, Australia. This Section evaluates whether a Malaysian agency should be established for assigning Internet Protocol addresses to ISPs in Malaysia.

Issues and Proposals

- 13.4.3 Discussion with service providers showed that the assignment system for Internet Protocol addresses and Autonomous System Numbers via the RIRs is working satisfactorily. At a technical level, the assignments of Internet Protocol addresses are made to reflect the topology of the interconnections between ISPs and backbone networks. This approach is called aggregation and its purpose is to keep the size of the routing tables in the routers in the Internet as small as possible. The Consultants take the view that the introduction of a national assignment system may create a tension where it is not possible to achieve aggregation from national assignments.

- 13.4.4 It does not appear that there are any immediate need for the current system of assignments through APNIC to be changed.
- 13.4.5 The arrangements for Internet Protocol addresses and Autonomous System Numbers also do not seem to fit well with the concept of the Commission being given responsibility for addressing in Malaysia.

Planned changes

- 13.4.6 The Consultants propose that the Commission may consider establishing a National Internet Registry to handle requests within Malaysia, in accordance with its powers under the Act and in accordance with APNIC rules.
- 13.4.7 If established, this National Internet Registry will be operated by the Commission, or an organisation nominated by it for that purpose, and will be operated according to guidelines developed by the Commission, in consultation with APNIC, for that purpose.

13.5 Internet Addressing – Migration from IPv4 to IPv6

Current Situation

- 13.5.1 Version 4 of the Internet Protocol (IPv4) uses 32 bit addresses and there is worldwide concern that the supply of unassigned public addresses will be exhausted within the next few years. However there is no established view of when the exhaustion will occur because of the following uncertainties:
- (a) future demand for addresses;
 - (b) continued use of Network Address Translators that enable a few public address values to be shared by many private addresses on LANs; and
 - (c) possible reclamation of many assignments of very large blocks of addresses to organisations that do not need these assignments. This situation arose in the early years of the Internet when its growth was not anticipated.
- 13.5.2 Version 6 of the Internet Protocol (IPv6) is standardised and expected to replace IPv4. IPv6 uses 128 bit addresses and although the assignment mechanism planned will limit the number of addresses to below the theoretical maximum, it should provide more than enough addresses for all foreseeable equipment for the foreseeable future. IPv6 will also introduce some valuable new features.
- 13.5.3 It has not been generally accepted that IPv6 is mature enough for the migration from IPv4 to IPv6 to commence. IPv6 is being promoted strongly by certain quarters and by the IPv6 Forum. The two addressing systems are fundamentally incompatible and during the migration period there will be a need to operate both IPv4 and IPv6 systems (called 'dual stack') to maintain global connectivity. The risk of moving too early may be wasted investment and disruption to operations whereas the risk of being too late

is that not all parties will introduce dual stack before the supply of IPv4 addresses is exhausted. At that point, new Internet hosts will only be able to obtain IPv6 addresses and will lose connectivity with those hosts that still use only IPv4.

Issues and Proposals

- 13.5.4 Many governments are monitoring the situation on IPv4 addresses but none have attempted to intervene yet, preferring to leave the timing of migration to commercial entities. The only possible exception is the European Union, which is trying to promote IPv6 strongly.
- 13.5.5 There has been a number of initiatives for research into IPv6 in Malaysia and the Consultants take the view that developments in this area should be closely monitored.

13.6 Invitation for Public Comments

Comments are invited on any of the following:

- a) the proposal to adopt a wait-and-see approach for Internationalised Domain Names and to continue to monitor ICANN discussions and to sponsor or facilitate a trial when there appears to be clearer prospects of valuable potential opportunities for Malaysia;***
- b) should Malaysia instead take a more proactive approach in initiating developments towards the adoption of Internationalised Domain Names in Malaysia;***
- c) should Malaysia introduce specific programmes to ensure that Malaysia becomes an early adopter of Internationalised Domain Name. If so, what should these programmes be;***
- d) the proposed model, structure and policies of a single registry – multiple registrars in Malaysia. In particular comments are invited on how would the interests of the Internet community be protected where the roles and functions of the registry are undertaken by a third party other than the Commission;***
- e) should the current arrangement in terms of roles and functions of the registry be reviewed;***
- f) what other roles and functions should the registry take on that would encourage further growth in Internet usage in Malaysia;***
- g) the proposed assignment principles and procedures of domain names. In particular comments are invited as to whether the pre-***

- requisites for domain name registration in Malaysia are too restrictive and whether it should be liberalised;*
- h) should Malaysia take on additional gTLD into the .my SLD names other than .com.my, .net.my, .edu.my, .gov.my and .mil.my in line with international developments;*
 - i) whether the current system of assignments of IP Addresses and Autonomous System Numbers should be changed;*
 - j) whether a National Internet Registry to handle requests within Malaysia should be set up; and*
 - k) whether IPv6 is still too immature to press for migration.*

13.6 ENUM

Current Situation

- 13.6.1 ENUM is a mechanism for handling some aspects of convergence by providing translations between E.164 numbers and Internet names. The following sections contains a discussion on the application of ENUM and the possibility of implementation in Malaysia.
- 13.6.2 ENUM is a planned public “database” service for use by callers and service providers. 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, for example, that they prefer to be contacted by email.

Potential Benefits of ENUM

- 13.6.3 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; and
 - (c) To provide additional functionality and value for end-users though indicating the options and preferences of the called party.
- 13.6.4 Many claims have been made in relation to the benefits of ENUM, both in itself and in relation to the environment it is intended to help create. The benefits that have been claimed include:
- (a) More widespread and lower cost access to the Internet through addresses that are expressed in numerals, permitting access via devices with telephone keypads, rather than through devices (such as those with computer keyboards) with alpha-numeric keypads. Telephones are more ubiquitous and cheaper than computers.
 - (b) Standardisation of processes and content in the update of a comprehensive look-up system¹⁹ of addresses associated with individuals. Reasonably comprehensive directory services exist in all countries for telephone services (subject to silent number and other personal choice options, and to the currency of available directory information). These services do not extend to mobile services or to other electronic addresses. ENUM is seen as a means of

¹⁹ Technically ENUM is considered to be a look-up system and not a directory, although it provides some of the functions that a simple directory would provide

standardising processes that will enable comprehensive information across all services to be collected and accessed.

- (c) Improved connectivity at a personal level. The ENUM database is intended not only to record details of the personal numbers relating to services through which an individual may be contacted, but also to record the preferences for contact, and the conditions under which the preferences might be exercised. For example, a preferred mode of contact during office hours may be via an Internet Protocol address, and at other times via a mobile telephone service.
- (d) Facilitation of convergence at service level. ENUM is not a telecommunications service as such. Nevertheless it should facilitate convergence by making information about resources on the Internet more readily available.

13.6.5 Many aspects of these claimed benefits have yet to be studied and assessed. In particular the following matters need to be studied further:

- (a) The extent of the benefits relative to the costs of creating them;
- (b) The value placed on ENUM benefits by customers at large, and particular groups of customer segments;
- (c) The best way to populate the ENUM system with end-user information including the privacy aspects of the data; and
- (d) The complexity and cost of maintaining ENUM systems, and therefore the benefits they deliver.

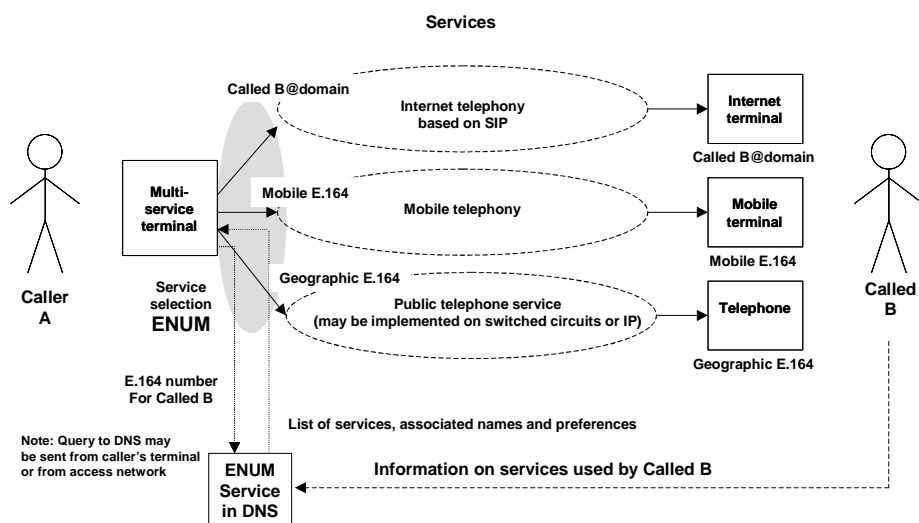
13.6.6 Nevertheless, and notwithstanding the various problems and challenges that confront ENUM, the potential ENUM benefits are sufficiently attractive to warrant on-going monitoring and involvement by the Commission as outlined below.

How ENUM Works

13.6.7 ENUM numbers are converted by ENUM devices into domain names, and then used to query the domain name system. If an ENUM record exists, then the database produces the contact information. The ENUM device is on the Internet, the query is made over the Internet, and the ENUM database is on the Internet.

13.6.8 Figure 13.1 illustrates a caller using ENUM:

Figure 13.1: ENUM usage



Source : Consultants' Study, 2001 .

13.6.9 ENUM can also be used by service providers. 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.

13.6.10 ENUM has been the subject of discussion between IETF and ITU-T since about two years ago. Many issues remain unresolved at this stage.

13.6.11 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 from mobile phones where numbers are easier to enter than alphabetical characters.

13.6.12 Several countries such as United Kingdom, France and the Netherlands are starting consultation about ENUM. Sweden and the United Kingdom are planning trials.

Issues and Proposals

13.6.13 What is new about ENUM is the use of an issued 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). This creates a confusion between the authority structures for E.164 numbers and Internet names.

13.6.14 Despite the enthusiasm with which ENUM is being pursued by some parties especially in the United States and the potential for ENUM or something akin to it to facilitate convergence between the traditional

telephony service and the Internet, there are some doubts about the future of the ENUM service under consideration, for the following reasons:

- (a) Given the discussions over the last 18 months, there is no basis for confidence that ITU-T SG2 will reach agreement with IETF about the way in which E.164 numbers are stored within DNS. Failure to gain "approval" from ITU-T will dissuade some key potential parties, even though it is arguable that such approval is not a legal requirement;
- (b) End-users will likely not take the necessary initiative to enter their communications details since the main benefits accrue to callers rather than called parties; and
- (c) Callers and networks are unlikely to use ENUM when the proportion of called numbers stored in the ENUM system is low.

13.6.15 This situation makes it difficult to assess how best to approach ENUM at the present time. Nevertheless there are potential benefits to be an early adopter of a technology especially in building up a pool of skilled workers, potential foreign direct investment into Malaysia and the development of applications services in Malaysia.

13.6.16 It is too early to ascertain exactly how ENUM would be used but it is likely that the potential application services are those which would accelerate the transfer of voice traffic from the PSTN to the Internet. This aspect of ENUM should be kept under careful review. In particular the existing policies on universal service and the local calls rate regulation may need to be reviewed at the appropriate time.

13.6.17 Consequently the Commission will be advised to ensure its active interest in the development of ENUM in international discussions and report these initiatives to the communications industry. There does not appear to be any need for the Commission to initiate any trials or undertake public consultation on ENUM within Malaysia at present. However industry initiatives in this area should be welcomed.

13.6.18 The Commission's involvement may include:

- (a) Supporting an early conclusion of the discussions between ITU-T and IETF including supporting the use of .e164.arpa as the location of ENUM within DNS as proposed by the IETF. This is the quickest and most effective route towards enabling implementation.
- (b) Participating actively in international discussions where the results of trials in other countries are presented to enable Malaysia to gain practical knowledge from these trials.
- (c) Participating actively in international discussions on any regulatory aspects of ENUM including issues concerning the validation of the information stored and the structure of the registry/registrar relationships for ENUM.

13.6.19 These actions will ensure that Malaysia will be in a better position to implement ENUM quickly and effectively as soon as the proposals and arrangements become more stable. Implementation will include the

appointment of a registry and registrars and decisions in this area will take into account experience gained from the introduction of more competition into the whole domain name area.

- 13.6.20 However the groundwork for ENUM should be catered for by designating and reserving a number range for personal numbers of a type that could be used to facilitate ENUM or ENUM-like services (017 under the expanded Mobile Number category).

13.7 Invitation for Public Comments

Comments are invited for the proposal to ensure an active involvement by the Commission in the development of ENUM short of conducting any trials, or undertake further public consultation on ENUM in the near future.

14. Dispute Resolution

14.1 Introduction

- 14.1.1 Chapter 7 of Part V (sections 82 to 89) of the Act empowers the Commission to resolve disputes regarding any matter between any party if the Act or its subsidiary legislation expressly provides for it.
- 14.1.2 Pursuant to section 85 of the Act, the Commission may publish guidelines stipulating the principles and procedures which the Commission may consider in resolving the disputes. The Commission's decision must be binding on the parties in dispute.
- 14.1.3 The introduction of a framework for the adjudication of disputes relating to the right to use numbers and electronic addresses will be a timely step forward. With the emergence of a multiple domain name registrar scenario as set out in Section 13 and the growing use of domain names for communication, information and commercial transactions, the incidence of disputes in relation to rights over domain names, for example "cybersquatting", is likely to significantly increase in future.
- 14.1.4 This section provides an overview of the proposed process for resolution of disputes and the guidelines which are proposed to be applied in respect of domain name and number disputes.
- 14.1.5 There is a proposal to reflect the principles and procedures for dispute resolution in the form of guidelines pursuant to section 85 of the Act.

14.2 Governing Principles for Domain Name and Number Disputes

- 14.2.1 The Commission may publish guidelines for adjudicating domain name and number disputes which should take into account international best practices on domain name dispute resolutions policies.
- 14.2.2 The types of disputes which should come within the ambit of the Commission's purview include those pertaining to disputes involving competing rights to use domain names with the ".my" country code top level domain (ccTLD) and numbers which have been assigned pursuant to the Act and related subsidiary legislation.
- 14.2.3 The guidelines should specify that a complainant must prove that:
- (a) The domain name or number assignee's (for the ease of reference domain name or number assignee shall hereinafter be referred to as the 'assignment holder' for this Section) is identical or confusingly similar to the complainant's name, trade mark or service mark in which the complainant has rights;
 - (b) The complainant has stronger legitimate rights or interests in respect of the domain name or number; and

- (c) The domain name or number has been registered or is being used in bad faith.

Examples of Legitimate Rights or Interests in Domain Names or Numbers

14.2.4 The guidelines should set out the following non-exhaustive list of circumstances which can demonstrate a party's legitimate rights or interests to a domain name or number:

- (a) prior to notice of the dispute -
 - (i) the domain name or number; or
 - (ii) a name or number corresponding to the domain name or number in connection with a bona fide offering of goods or services

has been used in good faith, or demonstrable preparations to use the domain name or number has been made;
- (b) the party asserting such rights or interests has been commonly known by or known to be closely related to the domain name or number, even if that party has not acquired any trade mark or service mark rights; or
- (c) the party asserting such rights or interests is making a legitimate non-commercial or fair use of the domain name or number, without intent for commercial gain to misleading consumers or to tarnish the name, trade mark or service mark in contention.

Examples of Bad Faith

14.2.5 The following is a non-exhaustive list of circumstances which can demonstrate that the assignment holder has registered or used a domain name or number in bad faith:

- (a) circumstances indicating that the assignment holder has registered or has acquired the right to use the domain name primarily for the purpose of selling, renting, or otherwise transferring the domain name registration to another person for valuable consideration in excess of the assignment holder's documented out-of-pocket costs directly related to the domain name in dispute;
- (b) the assignment holder has registered the domain name to prevent the owner of a name, trade mark or service mark from reflecting that name or mark in a corresponding domain name;
- (c) the assignment holder has registered the domain name primarily for the purpose of disrupting the business or activities of another person; or
- (d) in respect of domain names, the assignment holder has intentionally attempted to attract, for commercial gain, Internet users to a web site or other on-line location, by creating a likelihood of confusion with the

aggrieved party's name or mark as to the source, sponsorship, affiliation, or endorsement of that web site or location or of a product or service on that web site or location.

14.3 Remedies Available for Domain Name and Number Disputes

14.3.1 The remedies available to an aggrieved person where the dispute pertains to domain names or numbers should be limited to either:

- (a) the cancellation of the assignment holder's domain name or number assignment. In respect of numbers, the sub-assignment of number may be cancelled coupled with a direction to the relevant service provider to reassign the number to the aggrieved party; or
- (b) the transfer of the assignment holder's domain name or number assignment to the aggrieved party.

14.4 Invitation for Public Comments

Comments are invited on the proposed principles for resolving number and domain name disputes in Malaysia. In particular, comments are invited for the proposal for the principles and the procedures to be solely in the form of guidelines.

15. Number and Naming Charging

15.1 Background

- 15.1.1 Numbers are a finite national public resource. Number range is finite since the maximum length of numbers is limited by international standards, the current technical implementation of networks and by customer convenience.
- 15.1.2 The Commission currently assigns blocks of number to network operators free of charge. There is little incentive for operators to efficiently utilise their assigned numbers and, as such, number hoarding may occur. This leads to number shortages even in number ranges where there is an excess of numbers above customer demand. Number resource management is currently managed administratively by the Commission.
- 15.1.3 In comparison, Internet names (domain names) are not limited. MYNIC currently charges an administrative fee for assignment and for annual renewal of domain names. This covers the provision of both registry and registrar services.

15.2 Number and Naming Charging

- 15.2.1 Some numbering administrations in other countries impose application charges for the processing of applications for the assignment of numbers and number blocks. These charges are typically imposed on a cost recovery basis.
- 15.2.2 Relatively few administrations seek to impose charges for the on-going use of number resource. Of those that do, most seek to recover general costs associated with number administration.
- 15.2.3 There are a number of specific options relating to charges for different aspects of numbering, as follows:

(a) Application costs incurred by the Commission

The issues involved in charging for assignment applications are:

- (i) recovery of estimated future costs; and
- (ii) the extent of averaging costs across application categories.

It follows from the cost recovery principle that charges for processing the applications will reflect matters relating to costs, such as the complexity of the issues raised by the application. Charges will not vary, therefore, in relation to the size of the number range for which an application is made, in the absence of greater complexity resulting in increased application processing costs being incurred. For this reason, for example, the Consultants recommend the following charges:

- (i) the same application charge for 10,000 number blocks and 1,000 number blocks for Geographic Numbers; and

- (ii) the same application charge for 10,000 number blocks and 100,000 number blocks for Special Service Numbers.

It is proposed that all applications for numbers or names will incur charges, and that these charges will be based on estimates of future marked up costs borne by the Commission. The charges will be decided for each category of application based on:

- (i) the estimated number of applications;
- (ii) the revenue requirement; and
- (iii) the variation in resources required between categories of application.

(b) Non-application costs incurred by Commission

General numbering administrative costs not directly associated with applications are recovered from general licensing and other revenues, including the National Budget.

(c) Sharing the value of number resources

There has been a proposal to charge for the assigned numbers on an annual basis. If such a charge is to be implemented, the Consultants recommend the following policies to be adopted for when determining the annual rentals for assigned numbers:

- (i) to reflect the value of numbers as a resource in a recurring charge;
- (ii) that the charging structure will broadly reflect the extent of the resource assigned, and the value of services typically associated with specific number categories; and
- (iii) that large blocks of pre-assigned numbers (such as Geographic Numbers and Mobile Numbers) will attract nominal charges.

(d) Sharing the value of cherished numbers.

The Consultants propose for certain numbers that may have potential value because of their inherent and widespread appeal to Malaysians to be reserved, such as repeated digits, numbers with auspicious homonyms, mnemonic sequences and the like. The means of directly assigning these numbers to end-users at the suitable time with appropriate charges on a per number basis should be established, which may be decided by one of the following methods:

- (i) Auction (with or without reserves);
- (ii) At administratively fixed prices;
- (iii) Sale by tender; or
- (iv) Any combination of these means.

Current Number Charging Arrangements

- 15.2.4 There is currently no provision for levying charges for number administration or for the value of the resource represented by numbers

assigned. Realisation of the value of numbers is managed administratively by the Commission and by assignment holders where large blocks have been assigned (as in the case of Mobile Number ranges).

Current Naming Charging Arrangements

- 15.2.5 The costs associated with the administration, application processing, registry and registrar functions associated with domain names are recovered by the registry administrator through initial and on-going registration charges.

15.3 Number and Naming Charging Principles

Number Charging Principles

- 15.3.1 Fair and non-discriminatory access to numbers is a key element of competition. While a number of countries set the level of charges for numbers based on a cost recovery basis, an important consideration in the structure of the charges is that it promotes the efficient use of numbers by service providers in a fair and equitable manner.
- 15.3.2 As there is no cost imposed for holding on to assigned numbers (hoarding), there is no economic incentive for operators to be more efficient in the use of their assigned numbers. Numbering charges provide an economic cost to service providers for their use of the finite national resource.
- 15.3.3 The long-term benefit of encouraging efficient use of numbers is to minimise numbering scheme changes which result in disruption and additional cost and inconvenience to customers and industry.
- 15.3.4 As a finite national resource, numbers hold a value to industry above the level of administrative costs. A reasonable portion of this national value should be collected on behalf of the Government. This has the economic effect on industry of setting an appropriate cost level for the numbering resource in business decisions, such as the evaluation of new products and services.
- 15.3.5 The following principles has been proposed to apply to number charging:
- (a) **Fairness and equity:** Numbering charges should be fair and equitable for incumbents and new entrants. The introduction of numbering charges should be fair and equitable with regards to the circumstances of both the incumbent and the new entrants. For example, the incumbent will hold a large amount of Geographic Numbers, while the new entrants will need to apply for new number blocks. The balance and structure of the numbering charges should not unfairly burden any segment of the industry.
 - (b) **Transparency:** The charges should be known in advance to industry.

- (c) **Process efficiency:** The process of calculating the total charge and collecting it should be efficient and not require substantial administration by the Commission or the industry.
- (d) **Value:** A reasonable portion of the value of the finite numbering resource should be collected by the Commission.
- (e) **Cost recovery:** The costs of numbering administration should be recovered. The total estimated numbering charges should be sufficient to cover, but not limited by, the estimated number administration costs.

Naming Charging Principles

- 15.3.6 Internet domain names are not finitely limited, and there is not the same requirement as in numbering to ensure their efficient use. However, the application process and application and renewal charges will reduce the opportunity for cybersquatting and speculative gains from domain names.
- 15.3.7 There are essentially two services associated with domain name registrations:
 - (a) **Registry service:** provision of the central database and the DNS root servers for .my. By its nature this service needs to be supplied by a single organisation.
 - (b) **Registrar service:** provision of the registration application and renewal processing service. This service can be provided by multiple competitors.
- 15.3.8 The following principles have been proposed to apply to naming charging:
 - (a) **Fairness and equity:** Naming charging should be fair and equitable to industry and customers. With no requirement to encourage economic efficiency, naming charges will either be set by competitive market forces, or regulated by the Commission on a cost recovery basis.
 - (b) **Transparency:** The charges should be known in advance to industry.
 - (c) **Process efficiency:** The process of collecting naming charges should be simple and efficient.
 - (d) **Cost reflective charging:** Registry services to be provided on a cost basis. The appointed registry provider will provide registry services on behalf of the Commission on an approximate cost recovery basis.
 - (e) **Market reflective charging:** Registrar services to be provided on a competitive basis. Registrars to be appointed and regulated by the Commission.

15.4 Charges for Number and Naming Assignments

Number Charging

15.4.1 For number charging the following charges are proposed:

- (a) Number assignment application charges will be set to recover the costs of processing applications. Applications will be differentiated on the basis of the type of number and whether or not the application is for a standard or non-standard block size through the use of Normal Assignment Application and Special Assignment Application forms.
- (b) Other costs associated with numbering administration (that is, not associated with application processing) are not specifically recovered on a cost basis. In effect, these costs are recovered through general licensing and other revenue, or through value based annual numbering charges.
- (c) Annual charges, if adopted, should be set administratively on a value-based approach. Charges will be allocated according to the numbers assigned, that is, on a number block basis. This will continue even following number portability, until the level of ported numbers becomes significant (as decided by the Commission) to justify the administrative costs of switching to a numbers held calculation.
- (d) Following the introduction of number portability, particular cherished numbers from the Special Service Numbers and Mobile Numbers number ranges may be designated as Reserved Numbers. Annual charges for these Reserved Numbers will be set through a market-based approach such as an auction or tender, with a reserve price set by the Commission.
- (e) No annual charge is made for Commonly Known Short Codes, as the use of such codes in one network does not preclude their use in other networks.
- (f) These charges will be reviewed on an annual basis by the Commission.

15.4.2 Figure 15.1 shows the proposed number application charges for 2002, and Figure 15.2 shows the proposed annual number charges for 2002.

Figure 15.1: Number Application charges from H2 2002

Application Type	Fee (RM) Normal Assignment Application	Fee (RM) Special Assignment Application
Geographic Numbers		
10,000 blocks	150	200
1,000 blocks	150	200
Special Service Numbers		
10,000 blocks	250	350
100 blocks	250	350
Less than 100 blocks	250	350
Mobile Numbers		
10,000 blocks	250	Not applicable
100,000 blocks	250	Not applicable
1 million blocks	250	Not applicable
Short Code Numbers	1,000	Not applicable

Note: A Normal Assignment Application relates to standard block size. A Special Assignment Application may relate to a non-standard block size.

Figure 15.2: Number Annual Rentals from H2 2002

Number Type	Annual Rental (RM)
Geographical Numbers	
10,000 blocks	100
1,000 blocks	50
Special Service Numbers	
10,000 blocks	10,000
100 blocks	1,000
Less than 100 blocks	500
Mobile Numbers	
10 million blocks	500,000
1 million blocks	100,000
100,000 blocks	50,000
10,000 blocks	10,000
Shorts Code Numbers	
3	
4	25,000
5	10,000
Commonly Known Short Code Numbers	5,000
	Not Applicable

Naming Charging

- 15.4.3 The Consultants propose the following in line with the single registry – multiple registrar model:
- (a) the Commission will set the charges levied by the appointed registry provider on the basis of cost recovery;
 - (b) a registration service charge based on a ceiling value per domain name registration will apply for registrars in 2002. The Consultants propose a RM100 ceiling so as to ensure that existing domain name registrants and potential registrants for .my domains will not be any worse off under this proposal;
 - (c) the registry charge per domain name registration will be no more than RM30 in 2002, if the RM100 ceiling is adopted;
 - (d) the ongoing registry charge per domain name will be RM15 per year in 2002, if the RM100 ceiling is adopted;
- 15.4.4 These charges should be reviewed by the Commission on an annual basis.

15.5 Invitation for Public Comments

Comments are invited on any of the following:

- a) the proposed number and naming charging principles;***
- b) the proposed charges for number application and assignment. In particular, comments are invited as to whether annual rentals should be applicable for numbers assigned;***
- c) the proposed charges for naming assignments. In particular comments are invited as to how much should domain name registration cost; and***
- d) in what proportion should the registrar and registry share the domain name registration charge which is levied on the consumer.***