

**SINGAPORE TELECOMMUNICATIONS LIMITED RESPONSE TO  
CONSULTATION PAPER:  
THE POLICY FRAMEWORK FOR IP TELEPHONY AND  
ELECTRONIC NUMBERING IN SINGAPORE**

**PART A INTRODUCTION AND STATEMENT OF INTEREST**

- 1.1 Singapore Telecommunications Limited (**SingTel**) welcomes the opportunity to comment on the *Consultation Paper: The Policy Framework for IP Telephony and Electronic Numbering in Singapore*, issued by the Info-communications Development Authority of Singapore (**IDA**) on 21 September 2004 (**Consultation Paper**).
- 1.2 SingTel is licensed to provide telecommunications services in Singapore. It was corporatised on 1 April 1992. SingTel is committed to the provision of state-of-the-art telecommunications technologies and services in Singapore. SingTel has a comprehensive portfolio of services that includes voice and data services over fixed, wireless and Internet platforms. Servicing both corporate and residential customers, SingTel is committed to bring the best of global communications to its customers in the Asia Pacific and beyond.
- 1.3 As a leading provider of telecommunications services including broadband and wireless services, SingTel has a strong interest in the policy framework for IP Telephony and Electronic Numbering in Singapore.
- 1.4 This submission is structured in the following Parts:
- Part B – a summary of SingTel’s major points;
  - Part C – SingTel’s general comments on the Consultation Paper; and
  - Part D – SingTel’s detailed comments on the Consultation Paper.
- 1.5 In relation to the process of consultation, SingTel submits that the IDA should circulate a further consultation paper together with a general response to the issues and comments raised as part of this round of consultation, and provide the opportunity for comments and consideration.

## **PART B. EXECUTIVE SUMMARY**

- The Consultation Paper itself does not contain any substantive discussion by the IDA of the issues involved and is very general and preliminary. It is therefore difficult to provide substantive and detailed comments.
- Following this general and preliminary Consultation Paper, the IDA should circulate a further consultation paper containing more substantive discussion together with a general response to the issues and comments raised as part of this initial round of consultation.
- The precise definition of IP Telephony which is the subject of the Consultation Paper is unclear. The Consultation Paper refers to the type of IP Telephony that *requires* telephone or E.164 numbers whilst in other sections such under interconnection refers to FBOs or SBOs deciding to implement a “closed-user” networks. Based on IDA’s reference to IP Telephony over the public Internet and the requirement for numbers, SingTel’s comments relate only to the provision of VoIP over the public Internet (**VoIP**) where calls can be made and received to and from public networks such as the PSTN and mobile networks.
- SingTel submits that the IDA should closely study the benefits of VoIP within a broad context and not assume that a mere saving on a per-minute rates necessarily results in a benefit to consumers. As is reported by other commentators, there are infrastructure costs associated with VoIP as well as security and other concerns which should be considered.
- The IDA needs to consider the benefits of VoIP services in the Singapore context where domestic telephone tariffs are extremely low, international rates are also very low and there are no domestic long distance services.
- SingTel believes that, should VoIP services be permitted for introduction into Singapore, the regulatory framework must establish a level playing field between licensees providing the same or equivalent services using different technologies. VoIP should not be subject to greater or less regulation than those applied to other technologies used for voice services.

- In relation to licensing, all VoIP providers should be licensed. VoIP licensees providing services utilizing internet connections with consumers supplied by third parties should be licensed as SBO (Class) licensees. Such licensees should not be entitled to numbers.
- VoIP licensees providing services utilizing internet connections provided by them to consumers (as acquired on a wholesale basis) should be licensed as SBO (Individual) licensees. Such licensees should be allocated a new 4-digit national destination code (ie +65 3000 xxxx xxxx).
- VoIP licensees that deploy their own customer access network should be licensed as FBO licensees. FBO VoIP licensees that deploy a nationwide customer access network and offer nationwide domestic telephone service should be entitled to an 8 digit number allocation. Other FBO VoIP licensees should be allocated a 3-digit national destination code (ie +65 05x xxxx xxxx).
- All VoIP operators offering services in Singapore to the public should be licensed, whether offering “closed-user” services or services that enable calls to be made and received from public networks such as PSTN and mobile networks. Further, VoIP licensees should be subject to the obligations and regulations applicable to the relevant services under their respective license category, including, without limitation, the standard license obligations, the relevant provisions of the Telecom Competition Code and the Telecommunications Act. This provides both operators and consumers with clarity as to the framework, applicable requirements as well the service expectations and ensures a level playing field.
- Interconnection and access obligations should be imposed on FBO and SBO VoIP licensees in accordance with the Telecom Competition Code. SingTel strongly submits that termination charges (if any) should be adjusted to take into account the infrastructure used by a VoIP licensee in order to terminate a call, in order to avoid inefficient arbitrage opportunities.
- QoS and emergency services obligations should be imposed on VoIP licensees.
- The IDA has not addressed important issues of national security and co-operation with law enforcement agencies which have been significant issues in the United

States and Europe in relation to VoIP services. These issues must be closely considered by the IDA in any regulatory framework applicable to VoIP.

- The primary concerns associated with ENUM include privacy, administrative and security issues as well as control and strict administrative procedures. These issues need to be carefully addressed.

## **PART C      GENERAL COMMENTS**

- 2.1 SingTel is pleased to respond to emerging issues such as those associated with VoIP services. The IDA's paper raises some important questions which need to be closely considered.
- 2.2 However, there is currently a lack of clarity around key concepts, as well as the regulatory reforms necessary prior to the introduction of VoIP services. For example, there is a real lack of clarity around the most basic terms such as IP Telephony.
- 2.3 Furthermore, the IDA introduces some important issues in its paper without exploring all of the relevant options. For example, there are several options concerning interconnection of VoIP operators. None of these models are explored in the current paper issued by the IDA.
- 2.4 Accordingly, SingTel is pleased to provide responses to the IDA's Consultation Paper, although these responses are necessarily preliminary in nature. It is also important to note that many of the issues raised in the IDA's paper remain unresolved.
- 2.5 SingTel would be concerned if the IDA moved from this very "high level" discussion in its paper to a decision about the regulatory approach applicable to VoIP. SingTel believes there needs to be further opportunity provided for comment on proposed regulatory options not explored in the IDA's paper (eg regarding interconnection). Accordingly, SingTel submits that the IDA should consider submissions in response to its current paper and move to a further discussion about regulatory options applicable to VoIP.

2.6 At a minimum, SingTel would hope that the IDA proposes to give commenters another opportunity to comment on the IDA's proposed regulatory approach before the IDA reaches a final view about these matters.

2.7 SingTel's final general comment is that there are a number of issues that the IDA has not addressed in this paper which are of central importance to the regulation of VoIP services. Security and law enforcement issues have not been addressed. VoIP services raise significant national security and law enforcement issues. SingTel also understands that in other jurisdictions (United States, Europe), there have been protracted disputes between law enforcement agencies and VoIP operators about the lawful interception capability of VoIP services. Issues of national security and interception should not be overlooked by the IDA in its regulatory review of VoIP services.

#### **PART D. SPECIFIC COMMENTS**

3.1 The IDA has sought views and comments with respect to the following:

(a) **the potential of and benefits arising from the deployment of IP Telephony; the likely services/applications to be deployed; and the potential demand from businesses and consumers. IDA further seeks comments on how IP Telephony is likely to change the telecommunication competitive landscape in Singapore.**

(i) Summary

In summary, SingTel comments are as follows:

- Given the particular characteristics and competitive landscape of the Singapore market, we do not see significant benefit to consumers;
- The most likely services to be provided are voice services, in particular International Telephony Services (ITS);

- The most likely demand for VoIP will arise from consumers and SMEs. More sophisticated business users are already migrating to a range of IP-based services including IP-VPN, IP Centrex and hosted IP services. By way of example, SingTel began offering its own brand of i-PhoneNet solutions in June 2004 and has been offering a fully managed VoIP service – called ConnectPlus – to corporate customers since 2002. Unlike consumers, IP services to business users are typically provided over managed or private networks to address the requirement for secure, reliable and high quality services;
- There are also significant costs which must be considered when facilitating, through deregulation, the provision of VoIP, including security costs, costs associated with a lack of emergency services support, lack of quality of service measures, impact on interception etc. These costs need to be considered so that a proper cost-benefit view is obtained about VoIP services.

(ii) Consumer Benefit from VoIP

The benefit to consumers must be considered in an overall sense. While per minute rates for VoIP services may be lower in other countries, there are still upfront and monthly access charges that need to be taken into account when assessing the overall costs of a VoIP service.

Any savings to consumers, in SingTel's view, are likely not to be commensurate with the costs that consumers need to bear in acquiring the equipment and paying for broadband connections in order to access VoIP services. These costs must be considered when assessing the overall charges for VoIP services.

In a recent study performed by KPMG in relation to VoIP suitability for large organisations, where some claim that VoIP is most suited, KPMG note the following:

*“Since the commercial availability of VoIP, cost reduction has been the major driver. Using data lines instead of the PSTN enables toll-bypass between an organisation's sites. However, many organisations have been*

able to postpone the implementation of VoIP by negotiating volume discounts on their traditional telephone services.

In addition to toll-bypass, there are many cases of cost savings being demonstrated by factors such as: reduced maintenance; reduction in the number of PSTN access points; standardized infrastructure; and simplified administration. For most large organizations, however, these cost savings alone will not provide a compelling argument for adoption compared to the risks of change and implementation.

For organizations considering the change, potential cost savings need to be balanced against:

- *Associated costs of replacing or updating data network infrastructure including servers, switches, routers and cabling (especially older cabling installations)*
- *Extra bandwidth required (Local Area Network (LAN), Wide Area Network (WAN), internet)*
- *Additional devices to be managed in it data network (such as handsets).” (KPMG, Voice over IP – Decipher and decide. Understanding and managing the technology risks of adoption, October 2004) (our emphasis added)*

Similarly, the IDA should not simply rely on the savings that may be claimed on a per minute basis. The overall costs need to be assessed, as the KPMG advice suggests.

(iii) Costs of VoIP services

As discussed briefly above, the costs associated with VoIP services cannot be ignored when considering the introduction of VoIP. For example, the European Commission has raised issues concerning integrity of networks, quality of service, access to emergency services, privacy and lawful interception, number portability in its review of VoIP services (European Commission, Commission Staff Working Document, The treatment of Voice over Internet Protocol (VoIP) under the EU Regulatory Framework).

Further, the abovementioned study by KPMG raises considerable issues about VoIP. As stated in that study:

*“There is extensive information available from numerous sources including vendors, researchers and the media, regarding the benefits of VoIP and IP Telephony. However, there is a distinct absence of information detailing the risks and associated risk management practices. As a result, organisations’ preparedness for these new technologies is inadequate.*

*Without adequate risk management, VoIP implementation can result in reputation damage, a negative impact on customer service or affect the bottom line.”*

In accordance with these statements, SingTel submits that the IDA should closely consider the overall costs and benefits of VoIP before reaching a conclusion which may be based on speculation or reputed cost savings without properly considering the overall costs associated with the introduction of the service.

(iv) Application to Singapore environment

The consumer benefit which may accrue in Europe, the United States or Australia, for example, cannot be simply translated into the Singapore telecommunications environment.

In Singapore, the primary benefit of VoIP is small due to the extremely low domestic telephone tariffs, the absence of domestic long-distance given its small geographic size and a vigorously competitive ITS market.

Domestic telephone tariffs in Singapore are extremely low by international standards. SingTel’s domestic telephone tariffs are the lowest when compared with international benchmark countries such as Tokyo, London, Taipei, Seoul, New York, Sydney, Kuala Lumpur and Hong Kong. As such, consumer benefit from the provision of domestic telephone services via VoIP is likely to be small.

Similarly, as acknowledged by the IDA in granting SingTel certain exemptions from regulation in the ITS market, the ITS market in Singapore is vigorously



competitive. It is characterised by a proliferation of operators, competing access techniques, including VoIP. Consumers already have a wide variety of choice. Further, Singapore's international call rates continue to fall as a result of competition between operators.

*“Price competition is fierce, especially in the IDD (International Direct Dial) market. International calling charges have dropped significantly – by an average of 60%. In fact, international direct dial rates in Singapore are now amongst the lowest in the world.”<sup>1</sup>*

In light of the intense competition in the ITS market, consumer benefit from the provision of international calls via VoIP is likely to be small. In any event, consumers already have access to VoIP.

Finally, Singapore is essentially a large city. It is 640 square km, compared to the United Kingdom (244,820 sq km), the United States (9,629,091 sq km) and Australia (7,686,850 sq km). Unlike geographically large countries such as the United States and Australia with dispersed population centres, Singapore is small. This means that Singapore does not have a domestic long distance market. As such, unlike geographically larger countries, consumers will receive no benefit in terms of saving in domestic long distance calls using VoIP.

In summary, whilst there is consumer benefit, it is not likely to be significant in a Singapore context.

(v) Likely Voice Services and Enhanced Applications to be Deployed using VoIP

Further to the IDA's question about the likely services and applications to be deployed using VoIP, the most likely services to be provided to consumers using VoIP in Singapore are voice services, in particular ITS. However, as indicated above, extremely low domestic telephone tariffs and international call rates using traditional services are likely inhibit the attractiveness of services using VoIP.

In addition to voice services, enhanced services such as video telephony services are likely to be deployed and may be more attractive to consumers than basic VoIP. As recently announced, SingTel has launched a month-long fixed line-mobile video call trial as part of its plan to enable video communications across

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<sup>1</sup> IDA Annual Report 2000/01.

different platforms. To use the service, customers simply connect the video phone to a broadband-enabled telephone line at home or in the office to make both voice and video calls.

(vi) Potential demand likely from Consumers and SMEs

The most likely demand for VoIP is likely to arise from consumers and SMEs.

More sophisticated business users are already migrating to a range of IP-based services including IP-VPN, IP Centrex and hosted IP services. By way of example, SingTel began offering its own brand of i-PhoneNet solutions in June 2004 and has been offering a fully managed VoIP service – called Connect Plus - to corporate customers since 2002. IP services to business customers are typically provided over managed or private networks to address the requirement for secure, reliable and high quality services.

**(b) IDA welcomes views and comments on IDA’s proposed regulatory approach to be taken to encourage the development of emerging technologies such as IP Telephony in Singapore.**

(i) SingTel supports a regulatory framework that establishes a level playing field between licensees providing the same or equivalent services using different platforms or technologies. VoIP should not be subject to any greater or lesser level of regulation than those applied to other licensees utilizing other technologies such as PSTN or cable.

(ii) SingTel notes IDA’s view that it considers it premature to consider VoIP and circuit-switched telephony services as being identical services delivered on different technology platforms. Whilst we understand IDA’s rationale, when considering regulatory treatment it is important and relevant to consider the service provided to the consumer, how it is marketed and consumers expectations. By way of example, if a VoIP licensee sells domestic telephone service to consumers as a substitute to the PSTN or cable service, then it must be subject to the same requirements imposed on PSTN or cable providers, such as QoS, access to emergency service, directory services etc. and consumers would have that expectation.

- (iii) Similarly, if a VoIP licensee sells and markets ITS to consumers as equivalent to a premium service or to those provided by an ISR operator, then it must be subject to the same requirements and obligations imposed on providers of premium ITS and ISR operators, including QoS etc.
- (iv) This issue is being closely considered in Europe at present. Analysys, the European Commission's consultants in relation to the current review of VoIP have considered, but not reached a view about whether VoIP providers should be considered to be providers of Publicly Available Telephony Services ( "PATS" ). Nevertheless, Analysys warns that a narrow definition of VoIP would have "potentially profound implications for public safety if there are many devices that look like telephones but which cannot obtain emergency services". They also say that it is "possible that the regulator could be blamed for setting unrealistically stringent quality standard on access to emergency services" for failure of a VoIP provider to provide access to emergency services. (Analysys Consulting Final Report for the European Commission on IP Voice and Associated Convergent Services, January 2004 at page 98).
- (v) SingTel also notes that the European Commission Staff have also stated that "changing the underlying technology used for a specific service offering, without changing the services offered, does not constitute grounds to alter the obligations or rights associated with provision of PATS [Publicly Available Telephone Services]". SingTel warns that it would be a very unfortunate result if providers of telephone services could switch between different technologies in order to avail themselves of more favourable regulatory treatment. For example, providers should not choose the VoIP technology to provide telephony services because it may be treated more lightly for regulatory purposes.
- (vi) Accordingly, SingTel believes that the objective of the regulatory framework should be to establish a level playing field between licensees providing the same or equivalent services to consumers irrespective of the underlying technology used to provide the service. VoIP should not be subject to any greater or lesser degree of regulation.
- (c) **IDA welcomes views and comments on IDA's proposed licensing approach for providing IP Telephony in Singapore.**
- (i) In principle, SingTel supports the proposed 3-tier licensing approach for VoIP.

- (ii) VoIP operators providing services utilizing internet connections of third parties should be licensed as SBO (Class) licensees. SBO (Class) licensees would not be permitted to provide internet connection services to end users. In other words, SBO (Class) licensees would provide the VoIP application and no more;
- (iii) VoIP operators providing services utilizing internet connections provided by them to end users (as acquired on a wholesale basis) should be licensed as SBO (Individual) licensees;
- (iv) VoIP operators that deploy their own customer access network (wired or wireless) should be licensed as FBO licensees.
- (v) All VoIP operators offering services in Singapore to the public should be licensed, whether offering “closed user” services or services that enable calls to be made and received from public networks such as PSTN and mobile networks. Further, VoIP licensees should be subject to the obligations and regulations applicable to the relevant services under their respective license category, including, without limitation, the standard license obligations, the relevant provisions of the Telecom Competition Code and the Telecommunications Act. This provides both operators and consumers with clarity as to the framework, applicable requirements as well the service expectations and ensures a level playing field.
- (vi) Consumers do not understand distinctions made on regulatory grounds. As stated by INTUG in its submission to the European Commission:

*“The primary distinction drawn by the Commission in its document is not at all apparent to users, nor is it ever likely to be advertised by operators, there being strong disincentives to do so. The difference between the two classes of Electronic Communication Service is extraordinarily obscure – between a PATS and a non-PATS. ...*

*It is a distinction entirely unknown to the general public and so would be wholly unsatisfactory basis for differences in the regulation of consumer services”*

INTUG then went on to warn about educational campaigns as a means of overcoming the problem:

*“If this distinction is to be used at all in the regulation of retail services, then it has to be made explicit and easily understood. The means to do so could including numbering and the very clear labeling of services and devices, for example, with ECS-PATS and ECS-non-PATS logos, with supporting educational campaign runs by NRAs. **However, previous experience suggests that this sort of educational effort is neither easy nor are their goals quickly achieved.**” (emphasis added)*

(d) **IDA welcomes views and comments on the proposed phased approach in assigning new number levels to FBO and SBO (Individual) licensees for IP Telephony services. Please provide supporting reasons for the comments and proposals made. IDA invites views on whether there is a need for IDA to take further measures to ensure that the national numbering resources continue to benefit End Users in Singapore such as requiring IP Telephony service providers to assign level “3” numbers to only users with valid Singapore addresses. IDA also invites views on whether there will be technical issues if IDA were to allocate numbers in blocks of 1,000 instead of the usual blocks of 10,000?**

(i) In summary, SingTel submits that:

- The allocation of numbers is only required where a VoIP licensee wishes to offer a domestic telephone service in Singapore that enables consumers to make and receive calls from public networks such as the PSTN, cable and mobile networks. Telephone numbers are not required for “closed-user” or “peer-to-peer” services;
- The allocation of numbers is not required for VoIP operators offering services which are “closed user” services;
- Numbers are a scarce resource and their allocation should reflect the license category, the level and extent of network deployment and investment, and the level of compliance with obligations and requirements;

- VoIP FBO licensees that deploy a nationwide customer access network, offer nationwide domestic telephone service as a substitute for PSTN and cable service and whom comply with each and all of the obligations and requirements imposed on the existing domestic telephone providers (i.e. SingTel and StarHub) should be entitled to an 8 digit number allocation;
- Other VoIP FBO licensees that do not fully meet all the above requirements should be allocated a new 3-digit national destination code (NDC) (i.e. +65 05x xxxx xxxx);
- VoIP SBO (Individual) licensees should be allocated a new 4-digit national destination code (NDC) (i.e. +65 3000 xxxx xxxx);
- VoIP SBO (Class) licensees should not be entitled to numbers;
- Furthermore, numbers must only be assigned to consumers with valid Singapore addresses to ensure that the national numbering resources are used to benefit consumers in Singapore.
- SingTel does not support the phased approach which we believe to be unnecessary and result in additional costs being incurred by operators and consumers; and
- With the uncertain level of demand for VoIP services, numbers should be allocated in blocks of 1000.

(ii) In the Consultation Paper, the IDA identified the following options:

- **Option A** - Continue to assign the 8-digit local fixed-line numbers starting with “6” (i.e. +65 6xxx xxxx);
- **Option B** - Assign a new 8-digit number level (i.e. +65 3xxx xxxx) from the 5 number levels left (i.e. 2, 3, 4, 5 and 7);
- **Option C** - Assign a new 4-digit national destination code (NDC) (i.e. +65 3000 xxxx xxxx);
- **Option D** - Adopt Option B but if demand warrants, migrate to Option C.

(iii) Options A & B

8 digit numbers are a scarce national resource and should only be allocated to FBOs that deploy a nationwide customer access network, offer nationwide domestic telephone service and comply with each and all of the obligations and requirements.

SingTel has deployed a nationwide PSTN network and provides nationwide domestic telephone services. StarHub has deployed a nationwide cable HFC network and provides a fixed-line voice service offered through the same broadband network that delivers StarHub CableTV and MaxOnline broadband services to residential consumers. Both are PTLs, utilize 8 digit numbers and comply with each and all of the obligations and requirements for the provision of domestic telephone services to the public.

Similarly, 8 digit numbers should only be allocated to a VoIP FBO that deploys a nationwide customer access network, offers nationwide domestic telephone services which is a substitute for the domestic telephone service offer via PSTN and cable and complies with each and all of the obligations and requirements imposed on the existing domestic telephone providers (i.e. SingTel and StarHub). To do otherwise would be inequitable and unfair and likely confuse and mislead consumers about the extent, nature and quality of the VoIP service vis-à-vis the domestic telephone services offered using PSTN and cable.

Finally, where VoIP operators are treated differently from a regulatory perspective to PSTN or cable providers, the allocation of 8-digit numbers would be very confusing. INTUG, in its submission to the European Commission, stated that:

*“The confusion would be greatly accentuated if non-PATS operators were to be assigned traditional geographical telephone numbers and to compete directly with PATS service providers.”* (INTUG Response to a consultation on the treatment of Voice over Internet Protocol (VoIP) telephony under the EU regulatory framework, August 2004)

(iv) Option D

We do not agree with Option D as it first requires the allocation of a new 8 digit and then second, when demand warrants, migration to a new 4 digit national destination code (ie +65 3000 xxxx xxxx). In relation to the use of 8 digit numbers after the NDA, we refer to our comments in regard to the assignation of an 8 digit number above. In terms of migrating to using an NDC then followed by an 8 digit number, this requirement will mean more costs to be borne by the industry, both by providers and consumers. Providers have to condition their network systems to allow for the new access number/ code in their own networks (including interconnect, billing systems). Consumers will also be affected; apart from confusion from dialing parity and businesses would incur costs with pre-programmed devices such as fax machines, PABXs.

- (v) Aside from the consumer interest issues identified above, both Options A, B and D can lead to unnecessary hogging of resources. This is because once a number is assigned to an end user, the number is logged to an end-user terminal which clearly can be used overseas. There is no means to control the location at which the consumer uses the number, and similarly, no means to recover the 8 digit number or initiate an effective number change. This also leads to a drain on number resources particularly where 8 digit numbers are concerned.

(vi) Option C

SingTel proposes an additional option under which a VoIP FBO licensee that does not fully meet all the requirements for an 8 digit number is allocated a new 3-digit national destination code (NDC) (i.e. +65 05x xxxxxxxx). VoIP SBO (Individual) would use Option C and be allocated a new 4-digit national destination code (NDC) which is prefixed to another number (eg. +65 3000 xxxx xxxx). We believe that this represents a fair and reasonable balance and avoids any consumer confusion.

However, we recommend that the IDA exercise caution with this approach. Again, we note that there is a possibility of VoIP licensee affixing the NDA to an existing PSTN or mobile number, or even an 8 digit number from one of the currently available 8 digit series.

We submit that this approach be used, as long as an VoIP licensee does not add the NDC to any 8 digit number, be it an existing PSTN or mobile number or a number from any of the available 8 digit series. This approach would reflect the



level of investment and does not mislead consumers with regard to the nature of and quality of the service, does not confuse end-users and also addresses the limitations and constraints that the other options would place on numbering resources. The use of a 3 and 4 digit access code will also remove any concerns regarding the allocation of numbers associated with services rendered in Singapore to “nomadic” services like VoIP.

- (vii) We note that this is the approach adopted in various countries:

#### Japan

In Japan, the Ministry of Internal Affairs and Communications (“MIC”) has allocated the prefix “050” for IP telephony services that meet certain defined quality parameters. Only IP Telephony services with quality and functionalities (e.g. ability to make emergency calls, provision of information on callers’ location etc) equivalent to existing telephone services are allocated numbers same as existing telephone services.

#### Korea

The Ministry of Information and Communication (“MIC”) of Korea has announced that it will issue numbers beginning with a prefix “070” to VoIP or IP Telephony providers. In order to be assigned of such telephone numbers, VoIP service providers will be required to follow and maintain a specific service quality standard adopted by the MIC. In the case of Korea, IP Telephony service providers cannot add the prefix to fixed-line subscribers' existing numbers.

We therefore recommend that the IDA follows the approach in Korea and Japan where short access codes, equivalent to the NDC, are used. Further, we note that in Korea, the VoIP service providers cannot add the short access code to the fixed line subscribers’ existing numbers.

- (viii) Furthermore, all numbers, including 3 or 4 digit codes, must only be assigned to consumers with valid Singapore addresses to ensure that the national numbering resources are used to benefit consumers in Singapore.

- (e) **IDA welcomes views and comments on IDA’s proposed approach to apply the same interconnection framework under the Telecom Competition Code to IP Telephony service providers. IDA also welcomes views and comments on whether the current interconnection framework is sufficient to address the interconnection arrangements with IP Telephony networks. Specifically, IDA invites views on issues such as interconnection configurations or models that are likely to arise, technical, financial and implementation considerations for interconnection. Please provide supporting reasons for each comment and proposal made.**
- (i) A VoIP FBO or SBO (Individual) licensee should comply each and all of the obligations and requirements under the Telecom Competition Code, including with respect to interconnection and access.
- (ii) However, we are puzzled by the statement that a VoIP licensee may establish “closed-user” network. As we have indicated above, numbers from the national numbering plan are only required to enable consumers to make and *receive* calls from public networks such as the PSTN or mobile networks. We do not support the allocation of numbers VoIP licensees providing “closed user” services.
- (iii) In order to *receive* calls from public networks such as the PSTN and mobile networks, there must be some form of interconnection. With respect to physical interconnection, VoIP licensees can interconnect in the same manner that FBOs and SBOs interconnect today. Signalling arrangements, for example using SS7 interconnect signaling, should be the same for all FBOs and SBOs.
- (iv) VoIP FBOs and SBOs should also bear the costs associated with their own operations necessary to interconnect with the PSTN. So, for example, the translation of the service between IP and PSTN networks and the costs associated with such translation should be borne by the VoIP FBO and SBO. Furthermore, VoIP FBOs or SBOs should bear the cost of provisioning the code into other FBOs’ networks.
- (v) Furthermore, SingTel submits that there are strong grounds for no or differentiated termination rates applicable to different VoIP FBOs and SBOs depending on the infrastructure provided. For example, some VoIP SBOs will have no substantive network infrastructure.

(vi) SingTel strongly believes that artificial arbitrage opportunities, such as those that have arisen in relation to dial-up internet traffic, should not arise in relation to new technologies and that the IDA should closely consider the need for no or differentiated termination rates. In cases where no substantive network infrastructure has been built by a VoIP SBO, SingTel would argue that there should be no termination charge paid.

**(f) IDA welcomes views and comments on whether there is a need for QOS to be established for IP Telephony. If so, what are the types of QOS needed and the minimum standards to be set?**

(i) All VoIP licensees should comply with minimum QoS requirements. Further, where a VoIP licensee offers a service as a substitute for a service provided via PSTN, cable or other technologies, they should comply with the relevant QoS applicable to that service.

(ii) To the extent that VoIP introduces a form of competition for voice and other services, competition should deliver lower prices but higher quality and improved functionality. As INTUG has stated, this is what consumers are interested in.

*“The demand is not for technologies.”* INTUG Response to a consultation on the treatment of Voice over Internet Protocol (VoIP) telephony under the EU regulatory framework, August 2004

(iii) We do not agree that consumers will continue to accept a lower level of quality for a cheaper price. Competition is meant to deliver both lower prices and higher quality of service – not simply lower prices at the expense of all other factors. We cite, as an example, the fact that the IDA imposes QoS on SBOs providing ITS via Internet. Similarly, broadband prices have been competitive over the last few years but the IDA has similarly chosen to impose a QoS framework on the provision of broadband services.

(iv) We note that Japan and Korea have imposed QoS requirements on VoIP services and will issue existing telephone numbers to VoIP services that address the necessary consumer interests.

(v) We do not agree therefore, that VoIP licensees should simply be required to inform consumers that the quality of their service does not comply with the

minimum QoS set by the IDA for local fixed – line and mobile services. This proposal does not serve the community interests. Inevitably such “information” would be left for the small print in advertisements and contracts. Again, as INTUG has stated:

*“It cannot be acceptable for operators to present significant cost savings in the headline and to leave for the small print of the contract, the absence of quality guarantees, the failure to provide access to the emergency services, the impossibility of obtaining a directory entry or of porting a number to another operator.”* INTUG Response to a consultation on the treatment of Voice over Internet Protocol (VoIP) telephony under the EU regulatory framework, August 2004

- (vi) However, should the IDA proceed to allow VoIP licensees to offer services without any QoS requirements, then we would request that the IDA impose minimum requirements on the educational activities and effort that VoIP licensees must put in place to inform their consumers of the non-availability of QoS, eg introducing a different dial tone, advertisements to also inform end-users of the lower quality possible etc. These matters should be dealt with as very strong obligations and not left to the small print in contracts or advertisements.
- (g) **IDA welcomes views and comments on whether there are issues relating to the provision of emergency services in the context of IP Telephony. IDA further invites comments on the availability of operational solutions to address the issue of emergency calls.**
- (i) Where VoIP licensees offer a domestic telephony service, the applicable obligations with regard to emergency services should be no different from that imposed on the current PSTN or cable providers of domestic telephony services.
- (ii) We thus find it untenable that VoIP licensees providing domestic telephone services to consumers should be allowed to decide whether they need to provide emergency services, ie access to “993”, “995” and “999” due to the “nomadic” nature of their services where the service can be accessed whether in Singapore or overseas. We note that the provision of emergency service is a universal regulatory requirement for telephony service. The fulfillment of this obligation is critical for any party who wishes to offer a telephony service. Consumers naturally expect to gain access to the emergency services when they use any

telephony service and the removal of this obligation for VoIP licensees, whilst encouraging the growth of VoIP would amount to harming community interests.

(iii) The European Commission Staff Paper states that:

*“Access to Emergency services is extremely important for citizens, irrespective of how a telephone service may be classified for legal and regulatory purposes. ... From a public policy point of view it is desirable that access to emergency services is available from as wide a range of electronic communications services as possible. This calls for an evolutionary approach in cooperation with the emergency authorities.”*

(iv) This approach, we submit, ensures minimal consumer confusion, protects consumer interests and ensures a level playing field.

(v) Where the IDA feels that it is impractical, however, to VoIP licensees to provide emergency service, then we would request that the IDA impose minimum requirements on the educational activities and effort that VoIP licensees must put in place to inform their consumers of the non-availability of emergency service, eg introducing a different dial tone, advertisements to also inform end-users of the lower quality possible etc.

**(h) IDA welcomes views and comments on whether there are issues that may pose problems to achieving number portability in future.**

(i) We refer to our comments above regarding number allocation. Under SingTel’s proposal where 8 digit numbers would only be allocated to VoIP FBO licensees that deploy a nationwide customer access network, offer nationwide domestic telephone service and comply with each and all of the obligations and requirements, the issue of Number Portability would not arise.

**(i) IDA welcomes views and comments on the differentiation approach between providers who can comply with the FBO licensing approach and those who**

**cannot. Please provide supporting reasons for each comment and proposal made.**

- (i) We refer to our comments above regarding number allocation.
- (j) **IDA welcomes views and comments on the potential of and benefits arising from the deployment of ENUM; the likely services/applications; and the potential demand from businesses and consumers. IDA welcomes views and comments on whether there are other key international developments that IDA should take into consideration when developing the policy framework to implement ENUM in Singapore.**
- (i) ENUM protocol aims at translating numbers stemming from the International Telecommunications Union (ITU-T) E.164 Recommendation into Internet Domain Names.
- (ii) ENUM involves the translation of its existing telephone (fixed or mobile) number into a fully qualified e164 number by adding city (or area) code and country code and by reversing the order and then adding the e164.arpa domain.
- (iii) The discussions on ENUM have focused mainly on the protocol involved in translating a telephone number into a fully qualified domain address using a DNS-based architecture.
- (iv) To subscribers, however, ENUM will allow a “single contact service” as it enables the linking of telephone numbers with other communications media such as email, fax and mobile numbers. For example, ENUM could enable one number to be used for home, work, mobile and email contact, allowing users to organise when and how they wish to be contacted. We note however, that even without ENUM, some of the applications possible with ENUM are already available today, eg unified messaging is currently available from service providers.
- (v) The primary concerns associated with ENUM, which are also highlighted in various fora, are:
  - privacy issues:
    - privacy of ENUM subscribers’ information;

- possibility of ENUM subscribers receiving spam messages/calls, marketing literature they have not asked for, tracking of subscribers.
- the implications on the offer of ex-directory services and calling number non-display services;
- whether subscribers should register for ENUM service;
- administrative and security issues, including:
  - proper mechanisms involved for registering, authenticating and maintaining the subscriber information;
  - preventing abuse and/or unauthorized (fraudulent) usage of the stored data;
  - preventing malicious redirection due to wrong entry(s) in databases;
  - protection against hackers;
  - guidelines for enforcing accuracy and timeliness in of information
- administrative and registration issues, including:
  - careful control and strict administrative procedures from national numbering planning authorities;
  - identifying the roles and responsibilities of registries and registrars for ENUM;

We provide our comments on these issues below.

- (k) **IDA welcomes views and comments on the allocation of ENUM to only telecommunication service subscribers allocated with telephone numbers. IDA also invites views on what would be a suitable authentication mechanism and the frequency of re-authentication to ensure that the assignee is still using the assigned telephone number.**
- (i) As we have indicated, ENUM requires the translation of a telephone number into a fully qualified domain address using a DNS-based architecture. Hence, it is only logical that only telephone service subscribers (fixed or mobile) who have been assigned with the corresponding telephone number can use it for ENUM. This is also the recommendation made by the ENUM Working Group. Practically

- speaking, the entire purpose of ENUM is to translate an existing telephone number into something meaningful and which can be used as by users to access services and applications on the internet using just one number. It is not feasible for ENUM to work in any other way.
- (ii) In terms of registration for ENUM and authentication of the request, we foresee proper mechanisms must be in place in order to ensure the proper functioning of ENUM. For a start, when a potential subscriber applies for ENUM, the telephone number has to be first verified as valid; and the telephone end-user has to correspondingly be verified as the “ENUM subscriber” (also known as “assignee” or “Registrant”). This is critical for the purposes of ensuring calls to the ENUM subscriber are properly routed. We emphasise that it is important to ensure that the ENUM subscriber must also be the telephone service end-user and thus, would have the right to ask that calls to the telephone number are then correspondingly routed to the ENUM subscriber’s domain name. Put simply, if proper procedures and mechanisms are not in place, it can lead to fraudulent requests for ENUM, leading to abuse and even hacking issues. We provide more information on some of the issues related to registration and authentication below.
  - (iii) First, the domain name system databases must be populated with valid data; and that the ENUM applicants must be verified and registered.
  - (iv) There is a need for adequate mechanisms to ensure that the request to enter an E.164 number in the ENUM DNS is originated from a rightful assignee of that E.164 number. One possible administrative method is to allow only telephone service providers (fixed or mobile) to populate E.164 numbers and NAPTR records in ENUM DNS. The authentication process will have to be carried out either by the telephone service provider that has assigned the telephone number in the first place.
  - (v) Finally, the frequency, accuracy and timeliness in updating information is important. Changes in telephone numbers, terminations of telephone services (fixed or mobile) will correspondingly lead to a change or termination of the ENUM service. Under such circumstances, the ENUM service provider will need to correspondingly update its own database for efficient and accurate routing purposes.



**(l) IDA welcomes views and comments on the proposed Registry-Registrar-Registrant approach for registering for ENUM.**

(i) The IDA proposes to appoint the SGNIC and use the current Registry-Registrar-Registrant model where the SGNIC will become the Registry for ENUM.

(ii) Whilst we note that the SGNIC currently issues the internet domain names used by ISPs and corporate customers, we submit that the requirements of ENUM and the need to ensure proper mapping between an existing telephone number (fixed or mobile) to the ENUM domain name goes beyond the current processes that are needed for the issuance of domain names.

(iii) As we have pointed out above, ENUM requires the translation of a telephone number into a fully qualified domain address using a DNS-based architecture. The role of the SGNIC today does not extend to the management of the national numbering plan. We submit that it is more appropriate and relevant for the national numbering plan agency, ie the IDA, to assume this role.

(iv) In terms of the Registrar role, the work involved covers the authentication and verification of the ENUM subscriber's request to use the telephone service number and tally the ENUM subscriber (the assignee or Registrant) with the telephone service end-user. As we have mentioned, the authentication process is critical to the proper functioning of ENUM service. It is natural and logical for the role to be carried out either by the telephone service provider that has assigned the telephone number in the first place.

**(m) IDA welcomes views and comments on the approach to allow End Users to decide whether they want to register for ENUM and the information they want to make publicly available.**

(i) ENUM service brings with it concerns related to privacy and security.

Privacy and security

(ii) The ENUM initiative has to be considered in the context of the collection and storage of data that reveals people's communications and movements, and the easy accessibility to that data. Once ENUM is enabled, it allows a subscriber to "announce over the Internet" the availability of the ENUM to accept service

sessions and how to manage those sessions as a result of having subscribed to an ENUM-enabled service. In the case of ENUM, the telephone number, and all associated information, will be used to announce the presence of the ENUM subscriber on the internet.

- (iii) This differs from the current environment, where all data associated with an end-user arising from the telephone number issued to the telephone service (fixed or mobile) end-user is not used to “announce” the presence of the end-user over the internet. As we have pointed out above, there is a possibility of abuse and/or unauthorized (fraudulent) requests for ENUM, leading to abuse and malicious redirection of calls etc.

#### Ex-directory service

- (iv) Currently, large and still-increasing numbers of people attempt to limit exposure of their service information by subscribing to 'ex-directory' or “calling number non-display” service. The “ex-directory” service for fixed telephone line end-users, for example, allows the end-user to ensure that the telephone number and address of the end-user is not listed in the integrated telephone directories. This is usually subscribed by end-users who wish to protect their own privacy and to avoid nuisance calls. The ENUM initiative will mean that any end-user who takes up the “ex-directory” or “calling number non-display” service will never be able to protect its privacy.

#### Spam

- (v) We also believe that end-users should have legitimate reasons to be concerned about the open availability of personal data associated with their service, not least because of the way in which it would be abused by direct marketers. ENUM will inevitably present attractive options for spammers who will clearly have an additional base of users to send their spam messages.

#### Recommendation

- (vi) We submit that it is necessary that any regulatory approach on ENUM takes note of its potentially highly privacy-invasive form and addresses the concerns related to privacy and security, ex-directory services, spam etc. We see no way that service providers can prevent this and any responsibility for regulating this should not lie with the telephone service providers or ENUM providers.
- (vii) Rather, end-users should be conscious of the nature of the ENUM. In this context, we advise that
- ENUM should only be made available when a subscriber applies / signs up (ie registers) for it;
  - an ENUM subscriber must also explicitly acknowledge the implications that ENUM can have on privacy, security and the negation of any ex-directory or calling number non-display service that the subscriber may have had (or wished to obtain) with its telephone number.
  - In terms of the types of information that an ENUM subscriber may want to make public, the ENUM subscriber should be allowed to determine the types of information they want to make publicly available.