
POLICY FRAMEWORK FOR INTERNET PROTOCOL
("IP") TELEPHONY AND ELECTRONIC NUMBERING
("ENUM") IN SINGAPORE

Submission by the StarHub Group to the Info-communications Development
Authority of Singapore

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CONTENTS

A.	Executive Summary	1
B.	Statement of Interest	2
C.	Specific Comments	3
D.	Summary	13

EXECUTIVE SUMMARY

- 1.1 StarHub welcomes the opportunity to comment on the proposed policy framework for IP Telephony. We support a “light-handed” regulatory approach by the Info-communications Development Authority of Singapore (“IDA”) in regard to deployment of IP Telephony services in Singapore. We believe that such an approach would help to create an environment conducive to the innovative use of these new and emerging services.
- 1.2 StarHub believes that the existing licensing regime, based on FBO and SBO licences, is sufficiently robust to allow for the successful introduction and operation of IP Telephony services, without the need for major revision. However, we are concerned by the proposal to allocate number resources to SBO licensees, as this would represent a significant departure from existing numbering policy, and could raise number-scarcity issues. StarHub would instead propose that IDA extends the existing practice on number assignment for fixed telephony services to IP Telephony.
- 1.3 On the issue of number allocation, StarHub supports IDA’s proposal to adopt Option D, which would assign a new 8-digit number level for IP Telephony services. StarHub would also support the proposal that, if FBO licensees providing IP Telephony services are able to comply with the same licensing conditions for local fixed telephony stipulated in the FBO licence, those operators should be allowed the use of 8-digit numbers beginning with “6”.
- 1.4 In addition, to ensure that existing fixed telephony users are not precluded from IP Telephony services, StarHub proposes to allow the use of 8-digit numbers beginning with “6” for IP Telephony services in the event such users prefer to retain their existing numbers when they switch to IP Telephony.

STATEMENT OF INTEREST

- 2.1 StarHub Ltd (“StarHub”) is a Facilities-Based Operator (“FBO”) in Singapore, having been awarded a licence to provide public basic telecommunication services (“PBTS”) by the Telecommunications Authority of Singapore (“TAS”) (the predecessor to IDA) on 5 May 1998.
- 2.2 StarHub Mobile Pte Ltd is a wholly owned subsidiary of StarHub Ltd. StarHub Mobile Pte Ltd was issued a licence to provide public cellular mobile telephone services (“PCMTS”) by TAS on 5 May 1998. StarHub launched its commercial PBTS and PCMTS services on 1 April 2000.
- 2.3 StarHub acquired CyberWay Pte Ltd (now StarHub Internet Pte Ltd) for the provision of Public Internet Access Services in Singapore on 21 January 1999. In July 2002, StarHub completed a merger with Singapore Cable Vision Ltd to form StarHub Cable Vision Ltd (“SCV”). SCV holds a FBO licence and offers broadband and cable TV services.
- 2.4 This submission represents the views of the StarHub group of companies, namely, StarHub Ltd, StarHub Mobile Pte Ltd, StarHub Internet Pte Ltd and StarHub Cable Vision Ltd.

SPECIFIC COMMENTS

StarHub makes this submission in response to the consultation paper issued by IDA on 21 September 2004 in regard to the policy framework for IP Telephony and ENUM in Singapore (“Consultation Paper”).

StarHub welcomes the opportunity to comment on IDA’s proposed policy framework for IP Telephony and ENUM in Singapore. As an info-communications company providing a full range of information, communications and entertainment services over fixed, mobile and Internet platforms, StarHub is actively involved in the deployment of innovative telephony, data and broadband services in Singapore.

StarHub provides herein its specific response to the questions raised by IDA in the Consultation Paper.

3.1 *IDA welcomes views and comments on 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.

StarHub supports the “light-handed” regulatory approach proposed by IDA in the Consultation Paper in regard to deployment of IP Telephony services in Singapore.

Recent technological advancement in packet-switching technologies has enhanced the delivery of streaming applications via IP networks such as the Internet. Such development, coupled with an increasing adoption in broadband Internet access by end-users, have given rise to renewed interests in streaming applications such as Internet-based voice and video communications.

Given this backdrop, StarHub in general agrees with the approach proposed by IDA for IP Telephony services in Singapore, at a time when the underlying technologies and the associated applications are still in their infancy.

Unlike circuit-switched telephony, IP Telephony has the ability to extend beyond voice and video enablement. Delivery of telephony services via IP-based networks allows for integration with data and text-based services that are already “riding” on such networks. Emergence of IP Telephony is therefore part of a growing trend in service integration and convergence for the info-communications industry, which may lead to a full transition to an IP-based environment eventually.

StarHub supports IDA’s proposal to impose regulations only to the extent necessary to address certain economic, social/public and regulatory concerns relating to the provision of IP Telephony. This would help create an environment conducive to the development of emerging technologies such as IP Telephony, and

which encourages service innovation by existing service providers and new market entrants.

- 3.2 *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.*

StarHub believes that the info-communications regulatory regime in Singapore is sufficiently robust so as to facilitate the introduction of IP Telephony services without the need for major revision. Unlike many other regimes, the Singapore regulatory environment does not distinguish between "voice" and "information" services, and so is well placed to support the rapid introduction of services such as IP Telephony.

StarHub therefore supports IDA's proposal to impose regulations only to the extent necessary to address certain economic, social/public and regulatory concerns relating to the provision of IP Telephony. StarHub believes that IDA's key role in regard to IP Telephony is to create a conducive environment in which new technologies and innovations can develop successfully in the market, such that consumers can benefit from a wider range of innovative services.

- 3.3 *IDA welcomes views and comments on IDA's proposed licensing approach for providing IP Telephony in Singapore.*

StarHub has no objection to IDA's proposal to allow the provision of IP Telephony services by FBO and SBO licensees. There is nothing stopping FBO and SBO licensees today from providing IP-based services, under their existing licences. StarHub therefore does not believe that it is necessary to significantly alter the licensing regime in Singapore in order to facilitate the development of IP Telephony services.

However, for practical reasons, as highlighted below, StarHub would recommend that IDA confines the availability of numbers for IP Telephony services to FBO licensees only. Please refer to the comments in paragraphs 3.4 and 3.9 on the issue of number allocation to IP Telephony service providers.

- 3.4 *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.*

On the issue of number allocation, StarHub supports IDA's proposal to adopt Option D, which is to assign a new 8-digit number level for IP Telephony services. Please also refer to the comments in paragraph 3.9 below. StarHub believes that this approach is a sensible compromise that will avoid discriminating against users of IP Telephony services unduly.

But, notwithstanding the above, in the event the migration to the 4-digit national destination code (“NDC”) is considered necessary, StarHub would recommend a detailed study by IDA, prior to the migration exercise and in consultation with the industry, on the potential technical, operational and consumer education issues that could arise. StarHub would note that:

- With the exception of IDD codes, most consumers in Singapore are not familiar with access codes. Introducing NDCs without an effective education campaign could lead to considerable customer confusion.
- There could be a high cost to modify existing switching systems to handle NDCs.
- Depending on the level of demand for IP Telephony services, and the circumstances under which IP Telephony numbers have been exhausted, there could more effective solutions to a shortage of IP telephony numbers. Alternative solutions might include (for example) opening up an additional 8-digit number level for IP Telephony services.

IDA has proposed, in its Consultation Paper, to assign telephone numbers to both FBO and SBO (Individual) licensees authorised to provide IP Telephony services. StarHub respectfully submits that such an approach would not be appropriate due to number resource constraints.

To date, there are approximately 170 SBO (Individual) licensees in Singapore¹. StarHub is concerned that allowing numbering resources to be held by SBO licensees could lead to a “gold-rush”, in which parties establish themselves as SBO licensees in Singapore (with a minimal investment) in order to gain access to a scarce resource. In such an event, the numbers earmarked for IP Telephony may become artificially constrained and consequently, inefficiently utilised due to uncontrolled demand from a large base of service providers. Such a “wasteful” outcome is clearly undesirable.

In StarHub’s view, it is necessary for IDA to ensure that scarce number resources are effectively and efficiently utilised. In the context of number resources for IP Telephony, StarHub therefore believes that IDA should put in place pre-emptive measures to avoid any inefficient depletion of the 8-digit numbers planned for the initial phase of Option D (notwithstanding the “back-up” migration plan to 4-digit NDC numbers).

The current regulatory framework for fixed telephony services limits the availability of number resource to FBO licensees, who have invested significantly in info-communications network infrastructure in Singapore. Having made

¹ Refer to the following hyperlink in IDA’s website – “List of IDA Licensees”:

<http://www2.ida.gov.sg/license/licensees.nsf/licenseview?openview>

significant investments locally, it is logical to reason that FBO licensees are more committed to, and aligned, with IDA's objective to further advance Singapore's prominence as an info-communications and business hub for the region. FBO licensees have a keen interest to further optimise and invest in their existing operations.

For the reasons cited above, StarHub is of the view that IDA should extend the existing practice on number assignment for fixed telephony services to IP Telephony. Given that use of IP Telephony numbers will not be confined domestically within Singapore, StarHub believes that it is necessary for a prudent regulatory approach to be followed for the management of scarce number resource by assigning IP Telephony numbers to FBO licensees only².

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.

StarHub strongly recommends the measures cited in the preceding paragraphs to ensure that end-users in Singapore will continue to benefit from IDA's long-standing policy on effective and efficient utilisation of numbering resources.

In regard to whether or not IDA should limit the availability of IP Telephony numbers to end-users with valid Singapore addresses, StarHub would caution against such an approach.

As IDA has acknowledged in the Consultation Paper, the crucial difference between IP Telephony and circuit-switching fixed telephony is that the latter is not confined domestically within Singapore. While this is unconventional in the context of traditional fixed telephony services, it should not be viewed negatively. In the same way that GSM mobile services can be used outside of their "home" country, so too can IP Telephony services, and it would be artificial to restrict this.

In addition, it is unclear how requiring a valid Singapore address would work in practice. As is the case with GSM mobile customers today, it is possible for an IP

² This is consistent with the regulatory approaches adopted in Canada and Finland. In its preliminary view issued on 7 April 2004, the Canadian Radio-television and Telecommunications Commission ("CRTC") considered voice communications services using IP that provide universal access to and/or from PSTN as functionally similar to circuit-switched voice communications services. Accordingly, CRTC's preliminary view was to apply the existing regulatory framework to VoIP services.

In a decision issued on 29 October 2003, the Finnish Communications Regulatory Authority ("FICORA") considered a publicly available VoIP service offered by TeliaSonera as a "substitute" to PSTN connection and imposed upon TeliaSonera the same set of obligations for PSTN.

Telephony customer to pay their telephone bill via direct debit through a Singapore bank, but to use their telephone outside of Singapore for extended periods of time. It is unclear: (i) whether such usage would be considered in breach of a “valid address” rule; and (ii) how such a rule would be enforced in such a case.

To address any concern IDA may have in regard to use of Singapore numbers by end-users residing overseas, while at the same time allow room for innovation and service differentiation by IP Telephony service providers, StarHub proposes the following regulatory measure:

- FBO licensees authorised to provide IP Telephony services shall be required to submit to IDA their requests for IP Telephony numbers intended for allocation to end-users residing overseas;
- IDA shall assess such requests on a case-by-case basis. FBO licensees shall be accountable and responsible for IP Telephony numbers that have been allocated to overseas end-users; and
- Numbers intended for allocation to end-users residing overseas shall follow the same “number utilisation” requirements as numbers intended for allocation to end-users in Singapore. That is, new number ranges would not be allocated to an operator unless a pre-defined percentage of numbers already allocated to that operator were in use.

On a related point, StarHub would support the use of 8-digit numbers beginning with “6” for the provision of fixed telephony services. A critical component of the Singapore regulatory regime is its technological neutrality, and it must be noted that IP Telephony is simply a technology that can be implemented in a number of different services. In line with IDA’s stated policy of technological neutrality, StarHub believes that, if an FBO licensee is able to comply with IDA’s quality of service requirements (and associated obligations) for local fixed telephony services, such a licensee should be allowed the use of 8-digit numbers beginning with “6” for such services.

StarHub believes that the above proposals, together with other recommendations put forth in this response, would contribute to the development of a conducive environment for IP Telephony services.

IDA also invites view 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?

StarHub does not support the allocation of IP Telephony numbers in blocks of 1,000. Such a practice is likely to be costly and resource-intensive in terms of network operation and provisioning, and would generate network inefficiencies. StarHub submits that the allocation of separate 1,000-number blocks should be

avoided, and that the existing practice of allocating 10,000-number blocks should be maintained for IP Telephony services.

3.5 *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.

StarHub supports IDA's proposed approach on application of the interconnection framework under the Telecom Competition Code to IP Telephony service providers.

With regard to the relevance of the existing interconnection framework to the interconnection arrangements for IP Telephony networks, StarHub believes that the existing framework is sufficient.

Today, licensees are encouraged to enter into interconnection agreements through commercial negotiations. In addition, licensees have the options to enter into, (i) an approved Reference Interconnection Offer extended by the dominant licensee; (ii) any existing interconnection agreement between the dominant licensee and any similarly situated licensee; or (iii) an individualised agreement between the dominant and requesting licensees.

The Telecom Competition Code also stipulates the relevant technical and operational requirements for compliance by licensees interested in interconnecting with existing telecommunication networks. These include (but are not limited to):

- duty to provide non-discriminatory interconnection quality;
- duty to provide billing information necessary to allow for accurate and timely billing services;
- duty to disclose physical and logical network interfaces; and
- duty to comply with mandatory technical standards.

Given the fact that the underlying technologies for IP Telephony are still evolving, interconnection requirements by IP Telephony service providers may differ from one another due to unique system set-up and/or service configuration. IP Telephony service providers could therefore engage existing telecommunication network operators on their interconnection requirements on a case-by-case basis,

pursuant to the existing interconnection framework under the Telecom Competition Code.

Coupled with the technical and operational requirements of the Telecom Competition Code, StarHub believes that the existing interconnection framework, while flexible in allowing commercial discussion between interested parties to effect network interconnection, would also ensure adherence to the necessary technical and network requirements on interface and inter-operability with circuit-switched networks.

- 3.6 *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?*

StarHub agrees with the assessment by IDA that imposition of QoS standards for IP Telephony services would not be practical given the current state of IP technologies. Any premature introduction of performance standards on a nascent technology such as IP Telephony would artificially constrain the development of such services, thereby stifling innovation.

Accordingly, in order to ensure that end-users are advised on the difference in QoS between IP Telephony and fixed telephony services, StarHub agrees that it is necessary to require IP Telephony service providers to advise end-users that their services do not comply with the minimum QoS standards set by IDA for local fixed and mobile telephony services.

- 3.7 *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.*

As IDA rightly noted in the Consultation Paper, there are practical constraints in effecting access to emergency, directory enquiry and print directory services in the context of IP Telephony. StarHub therefore agrees with IDA's proposal to grant to IP Telephony service providers the flexibility to decide if they would like to enable access to such services, provided that IP Telephony service providers must fully disclose to end-users the status of such services (i.e. they must provide a clear communication to end-users on whether access to emergency, directory enquiry and print directory services are part of the service's features).

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

Today, to a large extent, the interconnection between IP Telephony networks and Public Switched Telephone Networks ("PSTN") resembles that of a Private

Automatic Branch Exchange (“PABX”) system. Number management employed by the former follows the same technique that was adopted for Direct-Dialling-Inward/Direct-Inward-Dialling (“DDI/DID”) numbers utilised by PABX systems.

As a result, number portability for IP Telephony services is presently constrained by a lack of support for porting of individual numbers³. Notwithstanding this, StarHub notes that there are ongoing developmental efforts to support the porting of individual numbers in future. StarHub believes that number portability is an important consideration for end-users. Therefore, number portability for IP Telephony services should be introduced once it can be supported.

3.9 *IDA welcomes views and comments on the above differentiation approach. Please provide supporting reasons for each comment and proposal made.*

IDA has correctly identified the increasing difficulty in differentiating IP Telephony services from other digital voice services. In addition, given IDA’s stated policy of technological neutrality⁴, StarHub believes that operators should be able to craft their services out of whatever technology they believe is appropriate, subject to practical constraints.

StarHub therefore support IDA’s proposal that licensees providing IP Telephony services should have access to 8-digit numbers starting with “6”, provided that those licensees can comply with regulatory conditions equivalent to those under FBO licenses in respect of local fixed telephony.

In addition, StarHub proposes that IDA allows the use of 8-digit numbers beginning with “6” for IP Telephony services in the event:

- fixed telephony users were to request to retain their existing numbers when they switch to IP Telephony, provided that, where relevant, the service providers shall advise end-users that their services do not comply with the same performance standards and requirements stipulated by IDA for local fixed telephony; and
- porting of individual numbers for IP Telephony is technically feasible (refer to comments in paragraph 3.8 above).

StarHub believes that such an approach would encourage adoption of IP Telephony in Singapore and avoid a situation whereby existing fixed telephony users would be deterred from switching to IP Telephony services if they would

³ As with the case for DDI/DID numbers, IP Telephony numbers can only be ported in blocks today.

⁴ See, for example, Section 1.5.4 of IDA’s Code of Practice for Competition in the Provision of Telecommunication Services.

have to surrender their existing numbers in exchange for 8-digit numbers beginning with “3”, for example.

- 3.10 *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.

StarHub agrees with IDA that ENUM, using protocol defined by the Internet Engineering Task Force (“IETF”) in RFC 3761, would be a key enabler in bridging the gap between IP and PSTN networks. StarHub believes that ENUM would play a crucial role in enabling and advancing further integration and convergence of info-communications services towards an IP-based environment.

- 3.11 *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.

StarHub supports IDA’s proposal to allocate ENUM addresses only to telecommunication service subscribers assigned with telephone numbers.

In addition, the allocation process could be “automatic” to the effect that, upon issuance of a telephone number to a subscriber, a ENUM address would be created automatically for the individual. Such an approach would enable service providers to offer value-added and other unified services to the subscriber in a seamless manner.

As ENUM would be implemented on a Domain Name System (“DNS”), security of any DNS query on ENUM-related services would need to be enhanced. To this end, StarHub understands the industry is considering to adopt ““Domain Name System Security Extensions”, RFC 2535” for authentication of zonal information.

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

StarHub agrees with the Registry-Registrar-Registrant approach proposed by IDA for registration of “5.6.e164.arpa” addresses.

- 3.13 *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.*

Given the early stage of development for ENUM and its related services, StarHub believes it would be premature to discuss specific implementation issues such as end-user ENUM registration. The extent of “public disclosure” required of end-users for ENUM-related services could differ for services of different nature. StarHub therefore proposes a detailed study by IDA on the implementation issues at a later stage, when there is more visibility as to ENUM-related services.

SUMMARY

- 4.1 StarHub supports the “light-handed” regulatory approach proposed by IDA in regard to deployment of IP Telephony services in Singapore. StarHub agrees with IDA’s view that, in order to allow emerging technologies such as IP Telephony to fully develop at the introductory phase, regulation should be applied only to the extent necessary to address certain economic, social/public and regulatory concerns relating to the provision of IP Telephony.
- 4.2 StarHub believes that the existing licensing regime for provision of info-communications service in Singapore is sufficiently robust to allow for the successful introduction and operation of IP Telephony services, without the need for major revision. In particular, due to concerns on number resource constraints, StarHub would propose that IDA extends the existing practice on number assignment for fixed telephony services to IP Telephony.
- 4.3 StarHub supports IDA’s proposal to adopt Option D in regard to number allocation for IP Telephony services, and the proposed differentiation between 8-digit numbers beginning with “6” and IP Telephony numbers, with the exception that, use of 8-digit numbers beginning with “6” for IP Telephony services shall be permitted in the event fixed telephony users prefer to retain their existing numbers when they switch to IP Telephony.
- 4.4 StarHub also concurs with IDA’s preliminary view that the existing interconnection framework under the Telecom Competition Code should apply to IP Telephony service providers.
- 4.5 StarHub supports the various initiatives by IDA in regard to adoption of the ENUM protocol in Singapore. However, given the early stage of development for ENUM and its related services, StarHub believes it would be premature to discuss specific implementation issues such as end-user ENUM registration.