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## **REVIEW OF NUMBER PORTABILITY IN SINGAPORE**

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

7 October 2005

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## EXECUTIVE SUMMARY

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- 1.1 StarHub Ltd (“StarHub”) welcomes the opportunity to comment on the proposal by the Info-communications Development Authority of Singapore (“IDA”) in regard to the review of number portability in Singapore.
- 1.2 StarHub Mobile is the third entrant into the Singapore cellular mobile market, and is a net receiver of “porting” customers. StarHub is therefore keen to see number portability work in an effective and efficient manner.
- 1.3 However, while StarHub supports the intent of the number portability review, we do not believe that the centralized database solution proposed in the Consultation Paper is currently appropriate. StarHub’s position is based on three points:
- First, the cost of the proposed centralized database is likely to be high. Studies carried out for Ofcom have calculated that the net cost over 10 years of an All Call Query (“ACQ”) centralized database in the United Kingdom would be over £200 million (S\$600 million). Based on the Ofcom studies, StarHub believes that the cost of implementing an ACQ centralized database in Singapore would be significantly higher than the S\$10 million suggested by IDA (please see Confidential Annex).
  - Second, IDA’s proposal for an ACQ centralized database is targeted at existing circuit-switched networks. However, in the near future it is likely that the major operators will be moving to implement “Next Generation” networks. In such an event, any investment in the ACQ centralized database could well be stranded.
  - Third, moving to an ACQ centralized database solution would raise a number of issues for customers and operators, that have not been raised in the Consultation Paper. These issues include:
    - (i) Establishing an ACQ database could create a single point of failure in the networks (with the potential to disrupt **all** fixed and mobile traffic in Singapore);
    - (ii) Creating a database, that contains the numbering details of all fixed and mobile customers in Singapore, and that is accessible by third parties, would generate significant customer privacy issues; and
    - (iii) Moving away from the existing solutions for number portability could well increase costs for content and application providers.
- 1.4 StarHub favors an outcome that would make effective use of limited capital resources, to provide sustainable benefits to customers. To this end, StarHub would encourage IDA to focus on the perceived limitations of the existing number portability solution, rather than imposing an ACQ centralized database.

- 1.5 If IDA believes that an ACQ centralized database is necessary (for public policy reasons), we believe that Government funding for this solution would be appropriate. IDA has already earmarked \$200 million from the 3G auction held in 2001 for the development of wireless infrastructure and content. If an ACQ centralized database is to be established, StarHub would submit that it should be funded from this source.
- 1.6 Nevertheless, StarHub believes that, prior to introducing an ACQ centralized database solution, it is necessary for IDA to carry out a thorough cost-benefit analysis, similar to that carried out in the United Kingdom in 2004. Such an approach would help to determine whether there is value in moving away from the existing system.
- 1.7 StarHub also submits that the proposal in the Consultation Paper on inter-modal number portability warrants a detailed review of existing regulatory and interconnect frameworks. The spillover effects of the proposed changes (such as dissociation of number levels from service types) could have wide-ranging implications on existing products and services, which would require detailed study.
- 1.8 StarHub is pleased to present its detailed analysis of the various aspects of the Consultation Paper. Part of this analysis has been marked confidential, and appears separately as the Confidential Annex to this response.

## STATEMENT OF INTEREST

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- 2.1 StarHub Ltd 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 StarHub Online Pte Ltd (“StarHub Online”) was incorporated as a company on 11 February 2005. StarHub Online holds a SBO licence and offers broadband services.
- 2.5 This submission represents the views of the StarHub group of companies, namely, StarHub Ltd, StarHub Mobile Pte Ltd, StarHub Internet Pte Ltd, StarHub Cable Vision Ltd and StarHub Online Pte Ltd.

## SPECIFIC COMMENTS

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StarHub makes this submission in response to the public consultation paper issued by IDA on 6 September 2005 in regard to the review of number portability in Singapore (“Consultation Paper”).

StarHub welcomes the opportunity to comment on IDA’s Consultation Paper. StarHub provides a full range of information, communications and entertainment services, and number portability has a direct impact on our operations.

StarHub strongly supports number portability, and believes that it is an essential factor in establishing a competitive environment for telecommunications services. StarHub Mobile is the latest entrant to the mobile market. StarHub Mobile is also a net receiver of “porting” customers (i.e. significantly more customers port their numbers to StarHub than port their numbers from StarHub). StarHub is keen to ensure that number portability is implemented in an efficient and effective manner in Singapore.

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

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### **Question One:**

*IDA welcomes views and comments on whether the existing number portability implementation for fixed and mobile services remain relevant and able to support future industry and market needs.*

1.1 StarHub is encouraged by IDA’s interest in, and proactive approach towards, the evolution of number portability in accommodating technological and market developments.

1.2 StarHub supports a number portability solution that meets the requirements of consumers. However, the privacy and security of customer data, as well as the cost-effectiveness and efficiency of prospective number portability solutions are critical factors to be taken into account. It is also necessary for number portability arrangements to conform with the overall regulatory framework set in place by IDA.

1.3 Unfortunately, the proposed ACQ centralized database does not conform with the existing regulatory regime in several areas. For example, paragraph 10 of the Consultation Paper refers to the need for a number portability solution to support portability for “IP telephony services”. However, in its “Policy Framework for IP Telephony and Electronic Numbering in Singapore”, IDA has stated that:

- *“Mandating number portability at this early stage will place a significant burden on IP Telephony players”; and*
- *“Level “3” numbers issued by IDA, or other E.164 telephone numbers not issued by IDA, will not be required to provide number portability, unless otherwise informed by IDA.”*

1.4 If IDA has decided that number portability is not needed for Level “3” numbers, it is unclear why it is necessary to implement a costly ACQ centralized database to support portability for IP telephony services. StarHub would suggest that any number portability solution should support only those services where number portability has been mandated by IDA.

1.5 Similarly, IDA has raised the issue of portability for “fixed-to-mobile substitution”. However, as IDA will be aware, the regulatory regimes for fixed and mobile services are very different, particularly in regard to interconnection and termination charges. Until IDA has determined the regulatory regime that will apply for fixed-to-mobile substitution, we believe that it would be premature to introduce new (and costly) number portability solutions to support fixed-to-mobile substitution.

1.6 StarHub fully supports the idea that planning for number portability solutions should consider likely technological developments in the industry. It is therefore important to note that in the coming years it is likely that the major operators in Singapore will be migrating their networks to Next Generation “soft-switch” technologies. Operators in other countries, such as BT in the United Kingdom, have already announced their plans in this regard. Ofcom, in its analysis of a potential move to an ACQ centralized database, has noted the move to “Next Generation” networks. Ofcom concluded that: “*investment in current [legacy] network infrastructure now risks assets being stranded and made obsolete in only a few years.*”<sup>1</sup>

1.7 IDA has asked whether there are any industry and market developments that necessitate a move away from the existing number portability solution. As IDA will be aware, it appears that the existing solution for mobile number portability, currently used for 2G services, will also work for existing 3G services (subject to the limitations highlighted in the Consultation Paper). It is therefore not clear to StarHub that the existing number portability solutions have lost their relevance, or that they might be no longer capable of meeting customers’ expectations.

1.8 In StarHub’s view, despite its limitations, the existing number portability solutions continue to serve a useful purpose for the industry. These limitations, and potential ways to address them are set out in the later part of this response.

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**Question Two:**

*IDA notes that there are several shortcomings in the existing MNP solution. While the penetration rate is high within the mobile telecommunication market, IDA believes that these shortcomings need to be addressed so that the barriers to switching (with the MNP solution) will be lowered and end-users will further benefit from enhanced competition.*

*IDA welcomes views and comments on IDA’s assessment of the shortcomings on the existing MNP solution. Are there other shortcomings that need to be addressed?*

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<sup>1</sup> See Ofcom’s: “**An assessment of alternative solutions for UK number portability**”, 25 August 2004 ([http://www.ofcom.org.uk/consult/condocs/uk\\_num\\_port/uk\\_num\\_port\\_cons/](http://www.ofcom.org.uk/consult/condocs/uk_num_port/uk_num_port_cons/))

IDA also welcomes industry and in particular, consumers' feedback on their views and experience with the existing MNP services in Singapore. Specifically, IDA requests feedback on the following:

- (i) *Is the ability to retain your telephone number a critical consideration for switching from your current service provider to another service provider? What other factors would you consider before switching to another service provider?*
- (ii) *Have you considered obtaining MNP service when switching to another service provider but have been reluctant or discouraged from doing so? What are the reasons for not using MNP service?*
- (iii) *Do you think the existing MNP solution is adequate, e.g., pricing, porting timeframes, settlement of outstanding charges and other performance experience? What aspects of the MNP solution could be improved upon?*

2.1 The Consultation Paper identifies three limitations of the existing Mobile Number Portability ("MNP") solution: (i) inefficient use of mobile telephone numbers; (ii) "incorrect" presentation of Caller Line Identification; and (iii) the inability to port Multimedia Messaging Service ("MMS") messages and IP-based services. The Consultation Paper then suggests that, if these limitations were addressed, a more innovative mobile services sector would result. StarHub must respectfully question the Consultation Paper's conclusions.

### ***"Inefficient" Use of Mobile Telephone Numbers***

2.2 StarHub acknowledges that the existing number portability solution involves mobile customers having to take two numbers when they port between operators. However, StarHub would note three points:

- First, following IDA's decision to allocate the 8XXX XXXX number series to mobile services, there is no foreseeable shortage of mobile numbers. The 8XXX XXXX and 9XXX XXXX number ranges would theoretically give Singapore nearly 20 million numbers to use for mobile services. As mobile penetration in Singapore is already high, it would be very difficult to contemplate a number shortage in anything but the very long-term.
- Second, in the (unlikely) event that a shortage of mobile numbers develops, IDA already has the ability to allocate new number ranges to mobile services. IDA has stated that: *"depending on the demand for mobile services, there may be other ranges of 8-digit numbers for mobile services when the existing pool of numbers starting with '9' and '8' runs out."*<sup>2</sup>
- Third, IDA has, from September 2004, adopted a market-based mechanism to auction off mobile telephone numbers. This system was implemented

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<sup>2</sup> See IDA's **"FAQs on New Mobile Phone Numbers with Prefix '8'"** (<http://www.ida.gov.sg>)



precisely to ensure that “number resources are managed in an efficient, objective and transparent manner”<sup>3</sup>.

2.3 Mobile numbers are unlikely to become a scarce resource in the foreseeable future. Therefore, the use of “dual numbers” in the existing number portability regime cannot be considered an inefficient use of numbering resources.

#### **“Incorrect” Calling Line Identification (“CLI”) Display**

2.4 The Consultation Paper is correct in that, under the existing MNP regime, the customer’s “new” number will be passed forward as the customer’s CLI. However, the mobile operators and IDA have had extensive discussions on this issue, and have identified a number of potential solutions to the dual-number issue. These solutions could be implemented without the need for a costly ACQ centralized database.

2.5 In addition, the presentation of a porting customer’s “new” CLI is a useful and cost-effective way for third party content providers to identify whether particular customers should be allowed to access particular content. For example, if a content provider works with StarHub Mobile, and makes content available to StarHub Mobile customers, if a customer ports to the StarHub Mobile network, the customer’s “new” CLI would identify them as a StarHub Mobile customer, thereby allowing the content provider to give the customer access to the content.

#### **Inability to Port MMS and IP-based Services**

2.6 While the existing MNP solution supports portability of SMS and voice services (including video-conferencing), it does not support MMS. Nevertheless:

- MMS traffic volumes are currently significantly lower than SMS volumes.
- There are ongoing discussions taking place amongst the operators on an appropriate methodology to implement MMS portability in the future.
- It would be very difficult to justify the cost and disruption of an ACQ centralized database, simply to rectify this problem, particularly when technological development may render such a database unnecessary.

2.7 StarHub would stress, that in considering the potential limitations of the existing MNP solution, it is necessary to consider: (i) whether the benefits of correcting those limitations outweigh their costs; and (ii) whether there are more effective ways of correcting these limitations without imposing a costly ACQ centralized database.

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#### **Question 3:**

*IDA also welcomes views and comments on the impact of the entry of IP Telephony and WBA players on the existing FNP implementation. Will the FNP solution be able to support these players effectively? What are the areas that IDA needs to consider and address in the FNP implementation?*

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<sup>3</sup> See IDA’s News release dated 8 September 2005 – “**IDA Announces Results for Numbers Auction & Launches ENUM Pilot Trial**” (<http://www.ida.gov.sg/>)

*IDA also welcomes industry and in particular consumers' feedback on their views and experience with the current FNP services in Singapore. Specifically, IDA requests feedback on the following:*

- (i) Is the ability to retain your telephone number a critical consideration for switching from your current service provider to another service provider? What other factors would you consider in switching to another service provider?*
- (ii) Have you considered obtaining FNP service when switching to another service provider but have been reluctant or discouraged from doing so? What are the reasons for not using FNP service?*
- (iii) Do you think the existing FNP solution is adequate, e.g., pricing, porting timeframes, settlement of outstanding charges and other performance experiences? What aspects for FNP solution should be improved upon?*

3.1 IDA has stated in its "Policy Framework for IP Telephony and Electronic Numbering in Singapore" that number portability obligations would not apply to IP telephony operators using Level "3" numbers. It is therefore unclear why the Consultation Paper suggests that IP Telephony should be taken into account in considering number portability solutions.

3.2 The Consultation Paper has raised the issue of the impact of WBA players on number portability. StarHub would suggest that greater clarity is needed as to the form and scope of WBA services to be provided in Singapore, prior to taking WBA into account in the consideration of long-term number portability solutions.

3.3 StarHub is concerned by the suggestion in the Consultation Paper that the monthly recurring retail charges for FNP should be removed. As IDA will be aware, inter-operator and retail charges are inherently linked. StarHub would be concerned if retail charges for FNP were to be removed, while inter-operator charges for FNP were to remain in place. If the ability to recover inter-operator charges from porting customers is stripped from operators, this will be yet another disincentive for operators to win over their competitors' customers, and to use FNP services. In line with the principle of cost-causality, fixed operators should retain the ability to recover FNP charges from FNP customers if inter-operator charges for FNP are to remain.

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#### **Question 4:**

*IDA has identified various areas for review with regard to the existing number portability implementation. These include administrative arrangements, technical solutions and commercial arrangements. IDA notes that a centralized database approach has been adopted in many countries due to benefits it offers. IDA also notes that with respect to the technical routing solutions, the Direct Routing/ACQ method has been adopted as the preferred method, as it provides a long-term, optimized call routing solution.*

IDA welcomes views and comments on the use of a centralized database approach in implementing number portability and the Direct Routing/ACQ for routing calls. Specifically, IDA welcomes views and comments on the following:

***i) The advantages and disadvantages of implementing number portability using a centralized database approach;***

4.1 The main advantages of implementing a centralized database are set out in Paragraph 12 of the Consultation Paper, namely: (i) ability to port MMS; (ii) the forwarding of the original “N1” number; and (iii) the use of a single telephone number for each porting customer.

4.2 However, we are concerned that the Consultation Paper has overlooked a number of the disadvantages of a centralized database. These disadvantages include:

- **Increased Cost for Operators.** The cost of implementing a centralized database (particularly on an ACQ basis) would be high. Studies for Ofcom in the United Kingdom suggest that the **net** cost (i.e. after the benefits and costs have been taken into account) of such a database is more than £200 million over 10 years. Having considered the costs (and limited benefits) of an ACQ centralized database, Ofcom has decided to retain the existing call-forwarding solution for number portability. It is important to note that the cost of an ACQ centralized database would have to be passed on to the ultimate users of the service, and could well divert operators away from investing in services and applications of greater benefit to users.
- **Single Point of Failure.** Under the current number portability arrangements, should the systems supporting number portability fail, other telecommunications traffic can continue to be passed between operators. However, should an ACQ centralized database be implemented, and should that database fail, it could potentially disrupt all telecommunications traffic in Singapore.
- **Investment in Legacy Systems.** Implementing the proposed centralized database would involve heavy investment in existing SS7 and switched voice infrastructure. The likely move by operators to “Next Generation” networks could leave this investment stranded after a relatively short period of time.
- **Increased Cost for Content and Application Providers.** The current number portability regime provides a stable and low-cost basis for Content and Application Providers to operate. However, due to the need to query an additional third-party database, moving to a centralized database could well increase operating costs for Content and Application Providers.
- **Uncertain Benefits.** It is not clear whether introducing the centralized database would have a significant impact on the number of customers choosing to port between operators. If there is no significant increase in the number of porting customers, substantial costs will have been incurred for relatively little benefit.<sup>4</sup>

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<sup>4</sup> As noted in the Mason Report, commissioned by Ofcom in 2004, “In the UK, there is a process for porting GN [Geographic Numbers] and NGNs [Non Geographic Numbers] that

- **Constraints on the Development of New Services:** A centralized database implementation could constrain future service developments, as it creates a pre-condition that requires all new content and service applications to be able to inter-operate with the centralized database.
- **Customer Privacy.** The Consultation Paper envisages a model in which all telephone numbers in Singapore would be stored in one location, and could be accessed by third parties. In the absence of a general privacy law in Singapore, and given that these third parties may not be governed by the “Use of End User Service Information” requirements of the Telecoms Code, it is unclear how customers’ privacy would be protected.

***(ii) Should the centralized database be run by the operators (e.g. a consortium of the operators) or by an independent and neutral party (e.g. a third party vendor)? What are the pros and cons of each option identified or proposed?***

**A Consortium of Operators:**

4.3 Establishing a consortium of operators to oversee the operation of a centralized database would help to ensure that operating costs are contained, and that the database is operated in an efficient manner, in the interests of operators and their customers.

4.4 However, given the competitive nature of some segments of the Singapore telecommunications market, we are concerned that a consortium of operators would not necessarily be an effective operating mechanism. This could particularly be the case for a consortium of the mobile operators. As IDA will be aware from the discussions in the MNPWG, the mobile operators have already indicated that they do not believe that the consortium approach would be a practical solution.

**An Independent Third Party:**

4.5 Establishing the centralized database under an independent third party would create a more stable basis on which portability services could be provided. However, introducing such a third party into the process would create immediate questions of data security and customer privacy.

4.6 Furthermore, the introduction of an independent third party into the process could increase the operating costs of the project, for two reasons:

- First, the independent third party will need to generate a commercial return from the service it provides; and
- In StarHub’s experience, a third party vendor may not always operate in the interests of the operators and their customers. In particular, a third party vendor may not have the necessary incentives to ensure that the costs involved in managing the centralized database are properly contained. As IDA will be aware, the mobile operators already have experience with this issue, in regard to common service platforms.

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*works. There is currently little, if any, documented evidence that users are unhappy with the current solution.”*

***(iii) The likely cost components and cost estimates in implementing a centralized database in Singapore? What are the commercial or charging arrangements that can be considered when implementing a centralized database, e.g., should the charges be apportioned or recovered from operators based on equal sharing, usage, market share etc? What are the pros and cons of each of these options identified?***

#### **Cost of Implementation:**

4.7 The proposal set out in the Consultation Paper for the establishment of a centralized database would involve significant capital expenditure. In addition to the investment required for the centralized database, it is likely that operators and major content service providers would have to maintain their own distributed/localized database (to ensure some level of network resilience and redundancy).

4.8 In the United Kingdom, the Mason Report has identified that the capital expenditure needed for an IN platform for a centralized database is expected to cost between S\$6,000 to S\$60,000 per Call Attempts Per Second (“CAPS:”), with an average value of S\$15,000 per CAPS. Based on the volume of StarHub’s CAPS, and its share of the telecommunications market, we believe that the capital expenditure involved in establishing a centralized database in Singapore would be considerably higher than the S\$10 million suggested by IDA (StarHub’s estimates are set out in the Confidential Annex). It is important to note that the Singapore market is significantly smaller than the market in the United Kingdom, and will therefore have considerably weaker economies of scale for such a project.

4.9 The Mason Report also contains a detailed cost-benefit analysis of moving from a calling forwarding solution to an ACQ centralized database. We believe that establishing such a database in Singapore would incur the same cost elements and types of benefits. The Mason Report found that *“the potential savings due to increased routing efficiencies are outweighed by the capital investment required”*. The Mason Report concluded that implementing an ACQ centralized database in the United Kingdom would have a Net Present Value after 10 years of between -£200.6 million and -£39.9 million (i.e. a net cost to the nation of S\$600 million to S\$119 million).

4.10 As IDA will be aware, Japan is also looking to implement MNP. Analysts have suggested that the cost of this move would range between ¥50 billion (S\$740 million) and ¥80 billion yen (S\$1.184 billion).<sup>5</sup>

4.11 As noted previously, this capital expenditure could be left stranded should the operators migrate to Next Generation networks.

#### **Charging Arrangements:**

4.12 The cost of establishing and operating an ACQ centralized database is likely to be high, given the sophistication of the model proposed in the Consultation Paper. The levels of utilization of that database are uncertain, and may not be large.

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<sup>5</sup> Please see UBS Investment Research; Q-Series: Number Portability, Page 6.

4.13 StarHub would put forward two principles to apply in setting charges for utilizing such a database:

- First, based on the principle of cost-causality, operators should be able to directly recover any inter-operator number portability charges from the retail customers generating those charges; and
- Second, all parties accessing the database (including Content and Application Providers) should be required to contribute to the cost of establishing and operating the database.

4.14 The Consultation Paper has highlighted the fact that Taiwan and the United States have both implemented centralized databases for number portability. However, the Consultation Paper has failed to note that:

- The establishment of the centralized number portability database in Taiwan received considerable Government funding; and
- In the United States, operators have been allowed to recover the costs of number portability through a "number portability tax", levied on the purchases of all telecommunications services. This tax is implemented by way of a monthly charge per line, and ranges from US\$0.23 (Verizon) to US\$0.48 (Sprint).

4.15 IDA has already stated that \$200 million from the proceeds of the 3G auction held in 2001 is to be used to "*spur the development of wireless products and services by infrastructure developers, access service providers and content creators for both consumers and industry.*"<sup>6</sup> This statement was echoed by the Minister for Communications & Information, Mr Yeo Cheow Tong, on 27 October 2000.<sup>7</sup> If IDA's review concludes that an ACQ centralized database would generate significant public benefits and a new applications platform for content providers, StarHub would submit that the database should be funded through the proceeds of the 3G auction.

4.16 Funding the database through the proceeds of the 3G auction would have a number of benefits, including:

- It would speed the introduction of the database;
- It would be an appropriate use of the 3G auction's proceeds; and
- It would ensure that if the project has public benefits, it is funded from public sources.

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<sup>6</sup> See IDA's news release dated 24 October 2000: "**New Wireless Initiatives to Position Singapore as the Nucleus for Wireless Activities**" (<http://www.ida.gov.sg/>).

<sup>7</sup> See the Speech by Mr Yeo Cheow Tong, Minister for Communications & Information, on 27 October 2000: "**Wired with Wireless**" (<http://www.ida.gov.sg/>).

***(iv) What are the pros and cons of Direct Routing/ACQ versus Indirect Routing? What issues and factors need to be considered in deciding which method to adopt? What are the likely cost components and estimates in implementing a Direct Routing/ACQ in an operator's network?***

4.17 StarHub submits that a Direct Routing/ACQ solution would be more appropriate in an environment in which a high proportion of customers are porting their numbers between operators. However, we believe that the efficiencies of Direct Routing/ACQ envisaged by the Consultation Paper, in routing calls directly from the Originating Network to the Recipient Network, could be outweighed by the additional costs incurred in querying the centralized database for all calls (porting and non-porting).

4.18 In the Singapore context, Indirect Routing could be more cost-effective if the base of porting customers is small. In such an environment, adopting Indirect Routing would minimize the number of queries to handle, and therefore the overall cost of the solution.

4.19 StarHub would also emphasize the issue of network reliability and robustness. In an Indirect Routing model, should the number portability solution fail, only calls involving number portability would be disrupted. However, under a Direct Routing/ACQ centralized database model, the failure of the number portability solution could result in all calls being disrupted.

***(v) What impact would the use of a centralized database and change in technical routing solutions have on other industry players, such as the mobile content and application providers? IDA notes that currently some mobile content and application providers rely on the phone numbers N1 (the ported customer's original phone number in the Donor Network) and N2 (the new phone number assigned to the ported customer in the Recipient Network) of a ported customer for proper authentication and billing purposes. Will mobile content and application providers benefit from a centralized database approach?***

4.20 As the Consultation Paper correctly notes, existing mobile content and application providers operate on the basis of the mobile customers' new numbers ("N2"). This arrangement is low cost, flexible, and simple to administer.

4.21 Moving to an ACQ centralized database could generate additional business costs for content and application providers, due to:

- The need for content and application providers to establish connections to the centralized database;
- The need for content and application providers to modify their systems to interface with the centralized database; and
- The need for content and application providers to contribute to the costs of establishing and operating the database.

4.22 StarHub is concerned by the suggestion in the Consultation Paper that the needs of content and application providers should be an important factor in a review of number portability. StarHub submits that a review of number portability options should focus on the costs and benefits to operators and their customers.

***(vi) What is the impact on downstream markets, e.g. telecom equipment dealers and existing ported customers? If so, who are the affected parties and what are these impact?***

4.23 The impact on existing ported customers of the proposed ACQ centralized database is unclear. However, if the existing number portability regime is abandoned (as the Consultation Paper appears to propose) it may be necessary for all existing ported customers to re-register under the new regime. This would, of course, generate disruption for customers, as well as additional work for operators. Alternatively, both regimes could run concurrently, but this could generate additional costs in the system.

4.24 The impact of the solution on telecommunications equipment vendors is also unclear. However, StarHub would note that if operators are required to divert significant resources into the ACQ centralized database (and the Mason Report suggests that the resources required would be significant), this will divert capital expenditure away from other, more effective, use of funds. The implementation of the database could therefore result in less operator investment in new services, higher bandwidth applications, and improved mobile coverage.

***(vii) Are there other implementation issues IDA should consider in its number portability review?***

4.25 StarHub believes that it is important to highlight the operational impact of moving to an ACQ centralized database. Should an ACQ centralized database be established it would be necessary to put in place detailed synchronization procedures, to ensure that all operators and content providers are operating with the same information base at the same point in time. The need for this synchronization could delay the point at which customers would be able to port their numbers between operators. StarHub would also note that establishing an ACQ centralized database could potentially raise security issues (see Confidential Annex).

4.26 StarHub submits that the impact of the proposed ACQ centralized database on the growth in use of number portability services is not clear, particularly as a number portability solution is already in place. StarHub believes that, before reaching a conclusion on the introduction of an ACQ centralized database, it would be appropriate for IDA to carry out a thorough cost-benefit analysis, similar to that carried out in the United Kingdom.

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**Question 5:**

*IDA notes that in Singapore, the number levels have been associated with the particular type of service. However, the association of number levels with a particular service may no longer be sustainable due to technological and market developments. Therefore, it may not be critical or useful for end-users to identify a particular number with the type of service. IDA welcomes views and comments on possible implications of allowing inter-modal number portability (i.e., porting numbers between different services) and the delinking of a particular number level with a type of service.*



5.1 As IDA will be aware, under the current regulatory framework, the interconnection charging regimes for the fixed and mobile services are very different. Fixed services are subject to the interconnect charging regime under the Telecoms Code, which is in turn based upon the cost-causality approach. A different approach is currently used for mobile operators due to the Mobile-Party-Pays (“MPP”) regime.

5.2 Therefore, implementing a regime in which customers can port between fixed and mobile services would raise a number of challenges:

- It may be necessary to align interconnect regimes, to ensure that operators terminating calls are not under-paid or over-paid for the work they do.
- It may be necessary to signal to customers that their calls will not be terminated in the network indicated by the telephone number (for example, a call to a cellular mobile number could terminate on a IP telephony network).
- Some services might not be capable of supporting inter-modal number portability. For example, if a mobile customer ports their “9” Level number to a “3” Level IP telephony service, it is unlikely that SMS messages to the 9” Level number could be completed.
- It may be necessary for operators to significantly upgrade their switching capabilities with the additional intelligence necessary to analyze the full length of dialed telephone numbers, to determine switching and charging arrangements.

5.3 StarHub believes that it is necessary to carry out a detailed review of the regulatory regimes of the different services, to ensure they are properly aligned, before any inter-modal number portability is introduced. For example, the licence obligations of IP Telephony service providers (in terms of quality of service, eligibility of customers to take service, etc) depend critically on the number ranges used by the service providers. If inter-modal number portability is introduced, and Level “6” customers can port to IP Telephony service providers operating with Level “3” numbers, it is unclear what licence obligations would apply to those providers.

5.4 For the above reasons, StarHub believes that the implementation of inter-modal number portability requires greater consideration. StarHub would note that relatively few countries in the world have implemented full inter-modal number portability of fixed-mobile, prepaid-postpaid services.

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**Question 6:**

*IDA notes that in addition to having a centralized database infrastructure for number portability, such infrastructure can be expanded to support other common platform services. IDA welcomes views and comments on how the centralized database infrastructure can support and develop other aspects of the info-communications market, in particular content development. Are there other services and applications that can leverage on such infrastructure?*

6.1 IDA has proposed to extend the capability of the centralized database infrastructure to support other value-added services. This proposal would raise a number of concerns for StarHub:

- First, we believe that the proposal to establish an ACQ centralized database should stand or fall solely on the merits of the case. We do not believe that the analysis of the database should take into account exogenous factors, such as whether a database might be able to provide undefined services to unidentified customers.
- Second, introducing third party service providers into the centralized database would heighten StarHub's concerns in regard to customer privacy. We note that the Consultation Paper is silent as to the safeguards that would have to be put in place to protect customer information.
- Third, it is not clear how such services would be delivered in practice. StarHub's understanding is that the proposed database would only contain numbering information, and would not contain customers' billing details. In such an arrangement, it would not be possible for third party suppliers to offer services directly to customers.
- Fourth, it must be remembered that previous attempts at establishing common services platforms in Singapore have not proven successful.
- Fifth, there is no evidence that there is an existing market failure which establishing a centralized database to provide "other common platform services" would correct. Operators already have every incentive to supply the services their customers want.
- Sixth, service differentiation is an important element in competition between the operators. Establishing a common service platform could, inadvertently, reduce service differentiation.

6.2 StarHub therefore believes that any consideration of an ACQ centralized database should focus solely on the costs and benefits of number portability.

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**Question 7:**

*IDA welcomes views and comments on IDA's proposed approach set out above to implement number portability in Singapore. Specifically, IDA welcomes views and comments on the following:*

- (i) The feasibility of using a centralized database approach for fixed and mobile number portability services in Singapore, in light of technology and market developments;**
- (ii) IDA's proposed number portability requirements to achieve the desired outcomes of number portability as set out in Annex 3; and**

7.1 It is important for number portability arrangements to be reviewed from time-to-time to ensure that they are still relevant and appropriate. However, as set out above,

StarHub does not agree with the assessment in the Consultation Paper that it is timely to depart from the existing solutions for number portability.

7.2 The costs of implementing the proposed ACQ centralized database would be high (and we believe that they would be significantly higher than the \$10 million indicated by IDA). These costs would have to be born by all parties, including content and application providers, and ultimately by customers. The benefits in moving to an ACQ centralized database also seem to be limited, particularly when there is already a number portability solution in place today. The extent to which the proposed database would increase the number of porting customers is not clear.

7.3 Furthermore, given the likely transition by operators to Next Generation networks, we are concerned about having to make significant investments in legacy circuit-switching technologies which may only be in operation for a relatively short time. StarHub believes that any consideration of longer-term number portability solutions should take into account the developments in operators' networks that are likely to take place in the longer term.

7.4 StarHub is also concerned with the risks inherent in the centralized database solution. These risks include the creation of a single point of failure with the ability to significantly disrupt telecommunications services in Singapore; and the impact on customer privacy. These issues have not been addressed in the Consultation Paper.

7.5 We would also note that the database proposed in the Consultation Paper would require significant customization of existing solutions that are in the market today, to accommodate the number portability requirements as prescribed by IDA. This would in turn lead to deviations from standard solutions that are readily available. Maintenance and upgrades would also become costly and time-consuming due to the proprietary nature of the customized solutions.

(iii) ***IDA believes that 9 months is a reasonable and adequate timeframe for implementation of a new number portability solution. If respondents feel otherwise, please justify in detail why the timeframe is insufficient.***

7.6 StarHub does not agree the 9-month period proposed in the Consultation Paper is reasonable or adequate. Before the proposed ACQ centralized database could be implemented it would be necessary to:

- Clearly quantify the costs and benefits of the proposed solution (and we would note that the Mason report in the United Kingdom took over 5 months to prepare);
- Review and amend the regulatory and interconnect regimes to reflect the proposed solution;
- Determine exactly how the proposed solution would be implemented (this step is particularly important, given that the proposed ACQ centralized database would create a single point of failure for fixed and mobile traffic in Singapore);
- Issue the necessary RFI/RFP, and negotiate with the potential solution providers;
- Determine the appropriate solution provider(s); and

- Reconfigure existing the existing networks.

7.7 Based on StarHub's experience with large-scale IN-based projects, we do not believe that a 9-month timeframe is appropriate.