

**SINGAPORE TELECOMMUNICATIONS LIMITED, SINGAPORE TELECOM
MOBILE PTE LTD AND SINGAPORE TELECOM PAGING PTE LTD**

**RESPONSE TO PUBLIC CONSULTATION – REVIEW OF DIRECT AND
INDIRECT INTERCONNECTION ARRANGEMENTS BETWEEN
TELECOMMUNICATION LICENSEES**

1. INTRODUCTION

1.1 Singapore Telecommunications Limited, Singapore Telecom Mobile Pte Ltd and Singapore Telecom Paging Pte Ltd (collectively referred to as **SingTel**) refer to the Info-communications Development Authority of Singapore (**IDA**) letters dated 3 November 2006 (**IDA Letters**) in relation to the Consultation Paper on the review of direct and indirect interconnection arrangements between telecommunication licensees (**Consultation Paper**).

1.2 SingTel welcomes the opportunity to make this submission on the Consultation Paper and the various issues identified by the IDA.

1.3 SingTel's submission is structured as follows:

Section 1 – Introduction;

Section 2 – Executive Summary;

Section 3 – Detailed Response; and

Section 4 – Conclusion.

1.4 SingTel is happy to clarify any of the issues raised in this document, as appropriate.

2. EXECUTIVE SUMMARY

2.1 The key points made in this submission for the IDA's consideration are as follows:

- (a) The existing interconnection framework permits non-dominant operators to adopt either a direct or indirect form of interconnection with other non-dominant operators, based on the economic and technical considerations of the operators. SingTel considers that this approach has generally been successful and should remain.
- (b) While the current practice of allowing operators to commercially negotiate the form of interconnection is efficient and does not warrant any change, SingTel also considers that the current transit charging arrangement, which provides for the originating operator to pay the applicable call transit charge, should be reviewed.
- (c) In SingTel's view, the current transit charging arrangements skew interconnection decisions in favour of indirect interconnection. The imposition of a transit charge on the originating operator creates an artificial incentive for the terminating operator to pursue indirect interconnection by hubbing behind another operator (which can then collect a transit charge and in some cases, may share revenue from the transit charge with the terminating operator), notwithstanding that such a model may not be the most technically or economically efficient solution. In other words, the current transit charging arrangement results in operators making interconnection decisions based on the prospect of additional revenue generation through the imposition of a transit charge by affiliated and/or non-affiliated operators, rather than focusing on the form of interconnection that is the most efficient from an economic (i.e. cost minimisation) and technical perspective.
- (d) To address this situation, SingTel submits that the transit charges for termination call types should not necessarily be borne by the originating operator. Rather, transit charges should be borne by the operator that is directly interconnected to a transit operator and does not support direct interconnection with other operators (**Hubbed Operator**). SingTel's proposal is set out in diagrammatic form in paragraph 3.18.
- (e) SingTel's proposal will achieve the following:
 - (i) it will ensure that decisions to pursue direct or indirect interconnection are based on the most technically and economically efficient solution, rather than by the prospect of generating additional revenue through the establishment of hubbing (and transit charging) arrangements with affiliated operators;

- (ii) it will remove the incentive for non-affiliated operators to pursue indirect interconnection through the entry into an arrangement with the transit operator for the purpose of sharing the transit revenue generated from the originating operator;
 - (iii) it will benefit a significant cross-section of the industry by reducing the amount of transit charges payable.
- (f) In relation to the impact of direct and/or interconnection arrangements on the type or range of telecommunications services that are offered to customers and the prices charged for these services, SingTel submits that when operators can commercially decide to establish either direct or indirect interconnection arrangements based on their specific economic and technical needs, the form of interconnection adopted would take account of quality of service, user experience, compatibility or signalling issues, risk of service outages, costs and other matters to ensure that they could offer the best possible telecommunications service.
- (g) SingTel believes that the current direct and/or indirect interconnection arrangements are appropriate and remain relevant for emerging players, services and industry trends. Emerging players and existing operators have the option to commercially negotiate and decide the best form of interconnection by having regard to relevant economic and technical considerations.
- (h) Finally, SingTel does not believe that the IDA should intervene and prescribe that all operators, including mobile operators, either share the costs of interconnection links on a 50:50 basis, or fully bear the costs of interconnection links which only convey their own traffic. SingTel considers that the current arrangements have worked well and that there is no overriding reason for change. However, if the IDA decides to intervene, SingTel considers that the IDA should prescribe that all similarly situated operators share the costs of interconnection links on a 50:50 basis.

3. DETAILED RESPONSE

Views on Current Direct and Indirect Interconnection Arrangements and Their Impact on Technological and Economic Efficiencies

What are your views on the current direct and indirect interconnection arrangements? Do direct or indirect interconnection arrangements have any impact on technological and economic efficiencies? Please explain your views.

Views on Current Direct and Indirect Interconnection Arrangements

- 3.1 The IDA has requested comments on the current direct and indirect interconnection arrangements. SingTel submits that the current direct and indirect interconnection arrangements, which are established commercially and by having regard to the specific economic and technical considerations of the interconnected operators, have generally served the industry well. SingTel considers that operators should remain free to determine whether to adopt direct or indirect forms of interconnection, having regard to the relevant technical and economic considerations of the operators.
- 3.2 As the IDA is aware, interconnection is a complex process. Operators are in the best position to determine their own circumstances and to decide whether direct or indirect interconnection arrangements are most appropriate. The ability of operators to choose appropriate interconnection arrangements based on relevant technical and economic considerations has been acknowledged by the IDA in paragraph 2 of the Consultation Paper and is also supported in the current interconnection framework.
- 3.3 As the IDA is aware, sub-section 5.2 of the Code of Practice for Competition in the Provision of Telecommunication Services 2005 (**Code**) permits operators to establish either direct or indirect forms of interconnection:

“Duty to Interconnect With Other Licensees

Licensees have a duty to interconnect with other Licensees. Interconnection may be either direct or indirect. IDA generally will not involve itself in interconnection negotiations between Non-dominant Licensees. Every Interconnection Agreement must be in writing” (our emphasis).

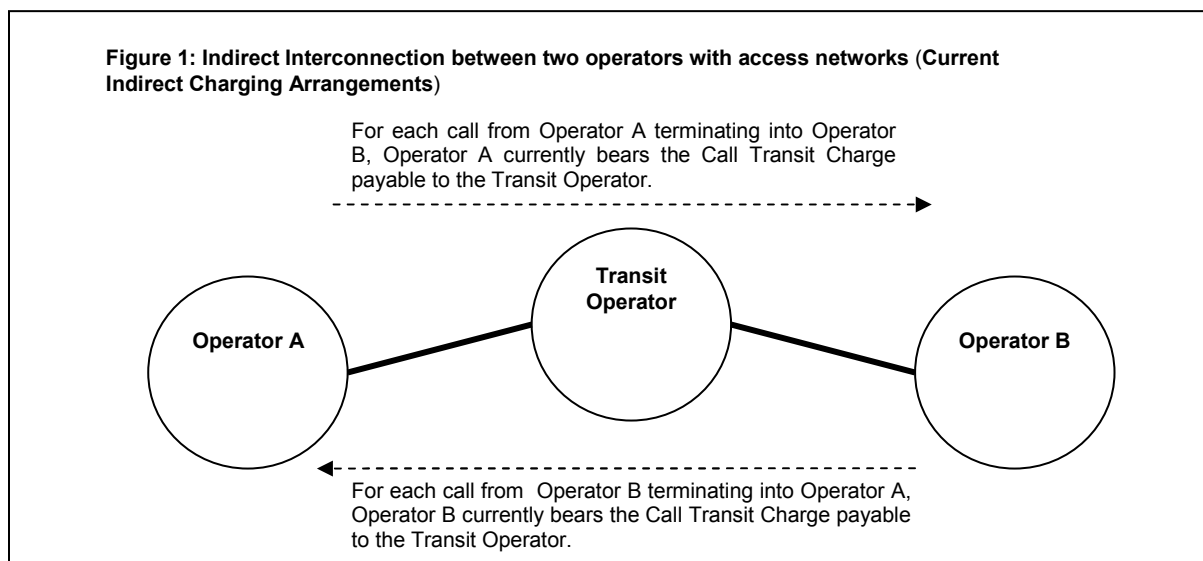
- 3.4 The option for operators to enter into direct or indirect interconnection arrangements has also been recognised by the IDA in the following regulatory documents:
- (a) the Code of Practice for Competition in the Provision of Telecommunication Services (RIO Requirements) Notification 2005 (**IRS/MWS Schedule**); and
 - (b) the IDA's Information Paper entitled, "*Charging Regime for Origination, Termination and Transit Services in a multi-operator environment*" (**Information Paper**).¹
- 3.5 SingTel submits that the existing framework, which permits interconnecting operators to establish direct or indirect forms of interconnection by having regard to the specific economic and technical considerations of both operators, should be maintained. There is no overriding reason for change.
- 3.6 While interconnection with SingTel's PSTN is subject to a separate process under section 6 of the Code, SingTel believes that it is appropriate for all other interconnection arrangements in the industry to remain voluntary and subject to commercial negotiations. This allows interconnecting operators to adopt the form of interconnection which best reflects their economic and technical considerations.
- 3.7 The current framework has generally served the industry well and the IDA does not need to specify the form of interconnection for operators.

Comments on the current charging arrangement for indirect interconnection

- 3.8 The current direct and indirect interconnection arrangements, which are established commercially and by having regard to the specific economic and technical considerations of both operators, have generally served the industry well. Notwithstanding this, however, SingTel submits that the transit charging arrangements which are currently applicable for indirect interconnection situations for termination call types (**Current Indirect Charging Arrangements**) should be amended to provide the right signals and incentives to operators.

¹ IDA, *Information Paper: Charging Regime for Origination, Termination and Transit Services in a multi-operator environment*, December 2001. See, http://www.ida.gov.sg/idaweb/doc/download/I245/Charge_Regime_for_OTT_in_multi-op_envnment.pdf

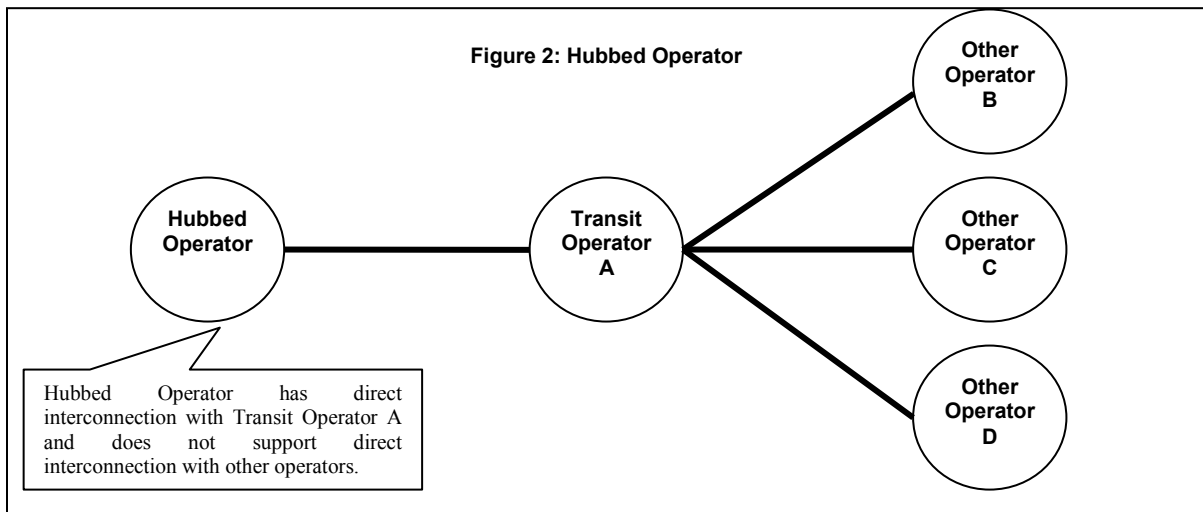
- 3.9 In SingTel's view, the Current Indirect Charging Arrangements whereby the originating operator bears the transit charges associated with conveying a call to the terminating operator, suppresses market signals and does not create the correct economic incentives for the operators in deciding the form of interconnection.
- 3.10 For example, consider the current indirect interconnection arrangements between two operators with access networks (Operator A and Operator B) via a Transit Operator:



- 3.11 Consistent with the IDA's Information Paper, when a customer of Operator A calls a customer of Operator B, Operator A currently bears the transit charges payable to the Transit Operator. Similarly, when a customer of the Operator B calls a customer of Operator A, Operator B currently bears the transit charges payable to the Transit Operator.
- 3.12 While the current practice of allowing operators to commercially negotiate the form of interconnection is effective and does not warrant any change, the transit charging arrangements for certain call transit scenarios create artificial incentives that may skew interconnection decisions in favor of indirect interconnection. SingTel submits that the IDA should review the current requirement for the originating operator to bear the transit charges associated with conveying a call to the terminating operator.
- 3.13 In SingTel's view, the imposition of a transit charge on the originating operator creates an artificial incentive for the terminating operator to establish indirect

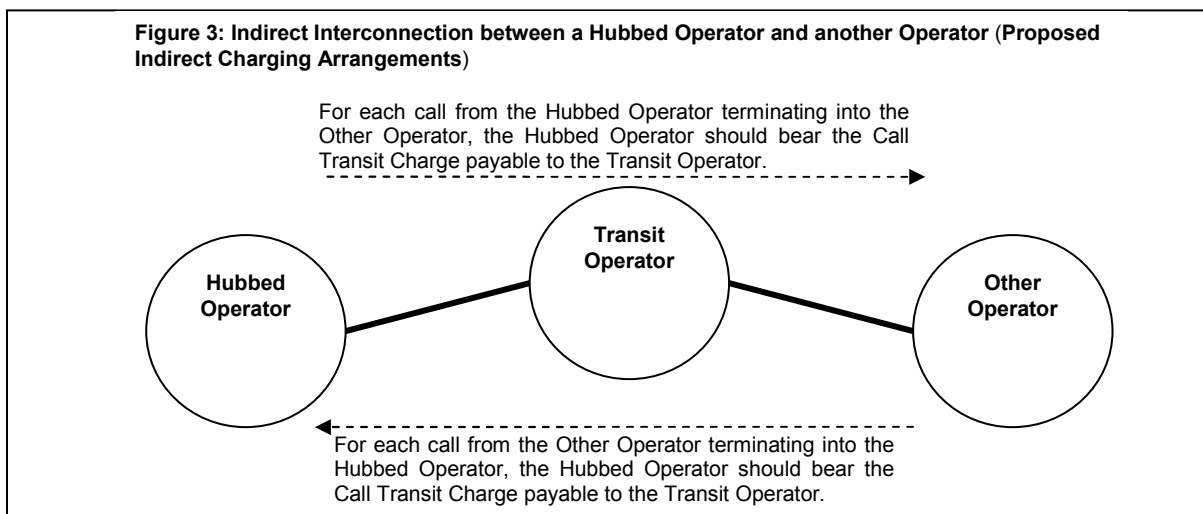
interconnection by hubbing behind an affiliated operator (which can then collect the transit charge from the originating operator).

- 3.14 The Current Indirect Charging Arrangements may have resulted in some operators making interconnection decisions based on the prospect of revenue generation ahead of economic (i.e. cost minimization) or technical considerations. This issue does not only affect affiliated operators. Transit charges can sometimes be shared between unaffiliated operators (i.e. between the transit and terminating operators) and the decision of unaffiliated operators to indirectly interconnect may also be driven from the prospect of generating revenue, and not necessarily by the most efficient form of interconnection.
- 3.15 SingTel considers that the Current Indirect Charging Arrangements for call transit scenarios involving termination call types should be changed so that transit charges are borne by the operator that is directly interconnected to (i.e. hubs behind) a Transit Operator and does not support direct interconnection with other operators (Hubbed Operator) (see Figure 2). When the Hubbed Operator is the terminating operator, it will pay the transit charge to the Transit Operator. When the Hubbed Operator is the originating operator for termination call types, it will also pay the transit charge to the Transit Operator. This change in the charging arrangements would be beneficial to a significant cross-section of the industry and would create the correct economic incentives for operators in respect of the interconnection arrangements.
- 3.16 SingTel's proposal would result in operators adopting the most efficient form of interconnection, balancing the various costs and benefits associated with each form of interconnection.

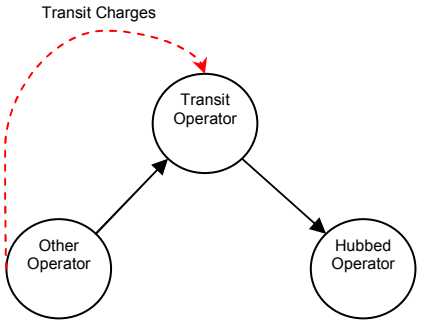
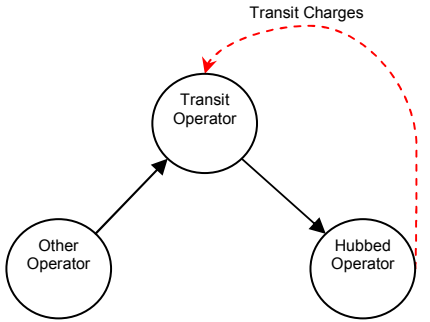
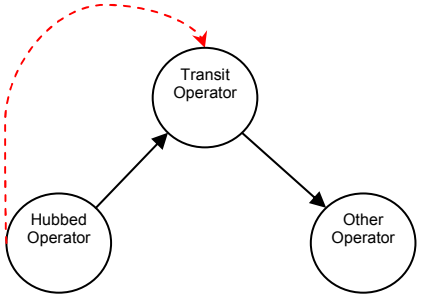
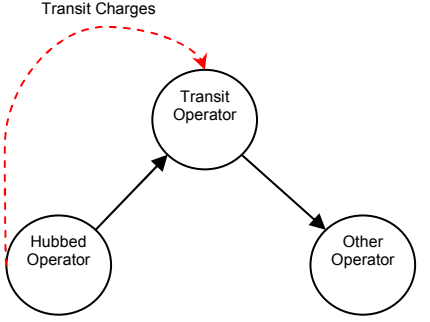
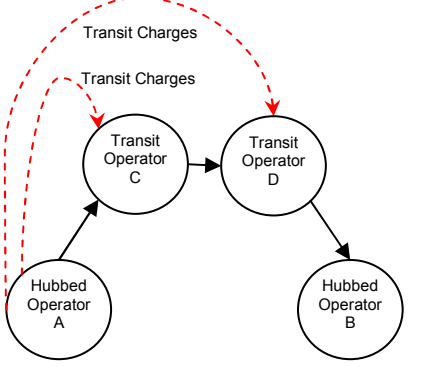
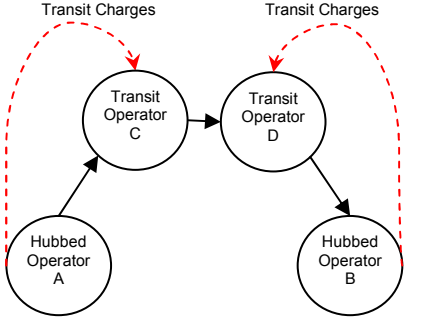


3.17 Specifically, with reference to the scenario in Figure 3 where a Hubbed Operator is indirectly interconnected with another operator (**Other Operator**), SingTel’s proposal is that when a customer of the Other Operator calls a customer of the Hubbed Operator, the Hubbed Operator should bear the transit charges payable to the Transit Operator (instead of the Other Operator bearing the transit charges, even though it is the originating operator in this case).

3.18 Similarly, when a customer of the Hubbed Operator calls a customer of the Other Operator, the Hubbed Operator should bear the transit charges payable to the Transit Operator (see Figure 3). For the avoidance of doubt, the Hubbed Operator would still pay call termination charges (if applicable) to the Other Operator for these calls.



3.19 To illustrate SingTel’s proposal further, the following diagrams set out both the Current Indirect Charging Arrangements and the corresponding amended charging arrangements under SingTel’s proposal. For the avoidance of doubt, it is only the below call transit scenarios associated with termination call types that should be amended.

Call Originating Party	Call Terminating Party	Current Indirect Charging Arrangements	Proposed Indirect Charging Arrangements
Other Operator	Hubbed Operator		
Hubbed Operator	Other Operator		
Hubbed Operator A	Hubbed Operator B		

Conclusion on transit arrangements

- 3.20 In conclusion, SingTel submits that the Current Indirect Charging Arrangements should be amended such that the Hubbed Operator should be responsible for any transit charges incurred in the manner illustrated above.
- 3.21 SingTel's proposal would remove the current artificial incentive for the terminating operator to establish indirect interconnection by hubbing behind an affiliated operator or unaffiliated operator (which can then collect the transit charge from the originating operator). It would establish the correct incentives and would result in operators making decisions regarding direct or indirect interconnection by having appropriate regard to the economic (i.e. cost minimisation) and technical matters, rather than revenue generation possibilities.

Impact on Technological and Economic Efficiencies

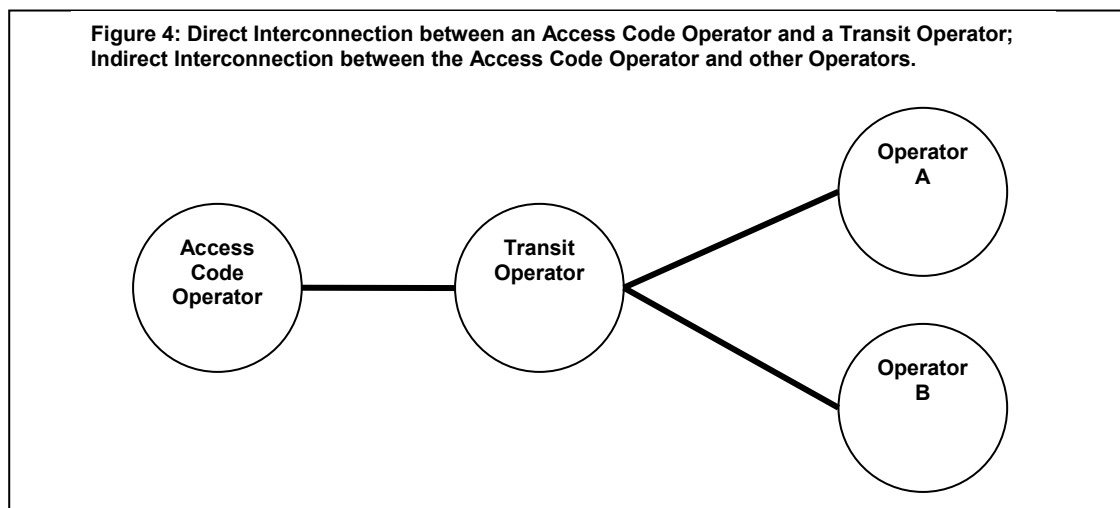
- 3.22 The IDA has requested comments on whether the current direct and indirect interconnection arrangements have any impact on technological and economic efficiencies.
- 3.23 SingTel provides more details on how economic and technological considerations influence its choice in establishing either direct or indirect interconnection arrangements with other operators in paragraphs 3.32 to 3.41 below.

Competitive Impact of the Current Direct or Indirect Interconnection Arrangements

What is the competitive impact of the current direct or indirect interconnection arrangements? Would the adoption of direct and/or indirect arrangements have an impact on the type of services you would offer to your customers now and in the future, and the prices charged for these services? For instance, whether direct and/or indirect interconnection arrangements would affect the quality of service, user experience, compatibility or signalling issues, risk of service outages, etc. In addition, would the impact be similar for all licensees and services?

- 3.24 The IDA has requested comments on whether the adoption of direct and/or indirect interconnection arrangements would have an impact on the type of services offered to the customers now and in the future, and the prices charged for these services.

- 3.25 SingTel submits that the issue is not about whether the adoption of direct and/or indirect interconnection arrangements would have any negative impact on the type or range of telecommunications services offered to customers and the prices charged for these services. Instead, it is about whether operators have the ability to choose to adopt the most economical and technically efficient form of interconnection.
- 3.26 As SingTel has submitted above, currently operators can commercially decide to establish either direct or indirect interconnection arrangements depending on their specific economic and technical considerations. In other words, the form of interconnection adopted by operators today would take account of quality of service, user experience, compatibility or signalling issues, risk of service outages, costs and other matters to ensure that they could offer the best possible telecommunications service.
- 3.27 For example, some operators (e.g. access code operators) may choose to establish direct interconnection arrangement with an operator and indirect interconnection arrangements with all other operators (see Figure 4). This would enable new operators to establish interconnection quickly and efficiently, and would ease market entry and increase competition in the relevant market.



- 3.28 In fact, it is more likely that prescribing that operators adopt a specific form of interconnection (direct or indirect) will have an adverse impact on the type of services offered to their customers and the prices charged for their services. Such operators, when compelled to adopt a specific form of interconnection, would lose the ability to adopt any other forms of interconnection which may be more economically or

technically appropriate. This is likely to result in inefficient interconnection arrangements and higher costs for the operator and may act as a barrier-to-entry, particularly in respect of lower capitalised new entrants and those with limited traffic on their networks or systems. As such, SingTel considers that it is imperative for the form of interconnection to be determined on voluntary basis.

Emerging Players, Services and Industry Trends

Would the current direct and/or indirect interconnection arrangements be appropriate for emerging players, services and industry trends, such as IP telephony, new mobile data offerings, etc? Please explain your views.

- 3.29 The IDA has requested comments on whether the current direct and/or indirect interconnection arrangements would be appropriate for emerging players, services and industry trends, such as IP telephony, new mobile data offerings, etc.
- 3.30 In SingTel's view, the current direct and/or indirect interconnection arrangements are appropriate and remain relevant for emerging players, services and industry trends. Under the current framework, emerging players and existing operators have the option to commercially negotiate and decide whether to establish direct and/or indirect interconnection arrangements. In addition, emerging players also have alternative forms of interconnection with existing operators. For example, the IDA would appreciate that IP telephony operators are able to directly interconnect, indirectly interconnect or acquire wholesale services from existing operators to establish interconnection.
- 3.31 In SingTel's experience, the current direct and/or indirect interconnection arrangements have generally been effective as it enables emerging players and existing operators to adopt the best form of interconnection by having regard to relevant economic and technical considerations.

Criteria to Consider in Deciding Whether to Establish Direct or Indirect Interconnection Arrangement with Another Operator

What are the specific criteria that you will consider in deciding whether to establish direct or indirect interconnection arrangement with another licensee? Please explain each identified criterion in detail, and how the satisfaction/dissatisfaction of that criterion would affect the final decision to opt for direct or indirect interconnection arrangement.

- 3.32 The IDA has requested comments on the specific criteria which are being considered in deciding whether to establish direct or indirect interconnection arrangement with another operator.

SingTel PSTN

- 3.33 As a Dominant Licensee, SingTel PSTN is required to offer direct interconnection, in the form of physical interconnection under its RIO, to all requesting operators. Unlike other operators, SingTel does not have a choice and is required to directly interconnect with other operators upon request pursuant to the Code and the RIO. It is other operators that determine the form of interconnection with SingTel PSTN.

SingTel Mobile

- 3.34 SingTel Mobile has established direct interconnection with SingTel PSTN and indirect interconnection arrangements with 22 other operators. SingTel Mobile's form of interconnection has been driven by several economic and technical considerations.
- 3.35 Network resiliency requirements and costs are a significant consideration in SingTel Mobile's decision to establish direct or indirect interconnection arrangements with various operators.
- 3.36 In respect of network resiliency requirements, SingTel Mobile would have to deploy dedicated Interconnect Gateway Switches before it could establish direct interconnection arrangements with all other operators. This requirement is likely to be applicable to other operators too. This would prove highly costly and would significantly raise the costs associated with interconnection.

3.37 Additional operational measures would also need to be undertaken to conduct interconnection testing with all operators so as to manage compatibility and signaling issues if SingTel Mobile opted to directly interconnect to all other operators. SingTel Mobile would have to utilise additional resources to implement call routing rules for every interconnected operator. These requirements would have to be met on an “on-going” basis. All these additional network requirements translate into additional costs for SingTel Mobile in establishing interconnection with other operators.

3.38 Based on considerations such as the above, SingTel Mobile established indirect interconnection arrangements with all other operators, with SingTel PSTN acting as the transit operator.

SingTel Paging

3.39 As above, SingTel Paging’s form of interconnection has been driven by several economic and technical considerations.

3.40 The economic considerations are similar to those applicable to SingTel Mobile.

3.41 In terms of technical considerations, it is not technically feasible for the SingTel Paging network to directly interconnect with more than one network – the SingTel Paging network is unable to support more than two signaling link sets.

Difficulties Encountered in Reaching Agreement for Direct or Indirect Interconnection Arrangements

In your negotiation with other licensees for direct or indirect interconnection arrangements, were there difficulties encountered in reaching an agreement? If yes, please explain in detail what these difficulties were and how they were resolved. Would regulatory intervention have been necessary? If so, what should be the regulatory approach or solutions?

3.42 The IDA has requested comments on whether there have been difficulties encountered in reaching an agreement with other licensees for direct or indirect interconnection arrangements.

SingTel PSTN

- 3.43 SingTel has not experienced any difficulties in reaching an agreement with other operators for direct interconnection. As the IDA is aware, SingTel is required to offer direct interconnection to its fixed network in accordance with section 6 of the Code.
- 3.44 The Code provides for interconnection pursuant to the SingTel RIO, an existing interconnection agreement or an individualised interconnection agreement. SingTel considers that the process established by the Code for interconnection with SingTel is straightforward, transparent and robust, and has generally proven effective in facilitating interconnection between SingTel and other operators.

SingTel Mobile

- 3.45 SingTel Mobile has not encountered any difficulties. To date, SingTel Mobile has successfully established direct interconnection with SingTel and indirect interconnection with 22 other operators.

SingTel Paging

- 3.46 SingTel Paging has not encountered any difficulties.

Responsibility for Provision and Costs of Interconnection Links

Should IDA harmonise the requirement for all licensees to be responsible for the provision and costs of interconnection links on their side of the point of interconnection? Should IDA prescribe that all licensees, including mobile operators, either share the costs of interconnection links on a 50:50 basis, or fully bear the costs of interconnection links which only convey their own traffic? Please explain your views.

- 3.47 The IDA has requested comments on whether it should harmonise the requirement for all operators to be responsible for the provision and costs of interconnection links on their side of the point of interconnection and whether it should prescribe that all operators, including mobile operators, either share the costs of interconnection links on a 50:50 basis, or fully bear the costs of interconnection links which only convey their own traffic.

- 3.48 Currently, all operators may enter into any mutually acceptable compensation arrangement for the Origination, Transit and Termination of telecommunication traffic pursuant to sub-section 5.4.1 of the Code. SingTel does not believe that the IDA should intervene and prescribe that all operators, including mobile operators, either share the costs of interconnection links on a 50:50 basis, or fully bear the costs of interconnection links which only convey their own traffic. SingTel considers that the existing arrangements have worked well and that there is no overriding or compelling reason for change.
- 3.49 However, in the event that the IDA considers that the existing arrangements are not appropriate, SingTel submits that the IDA should prescribe that all similarly situated operators share the costs of interconnection links on a 50:50 basis. This is consistent with the current arrangements between the Fixed-Line Operators with access networks, where the costs of the interconnection links are shared on a 50:50 basis.
- 3.50 With respect to interconnection with access code providers, SingTel submits that the cost of interconnection links should be borne by the access code providers. This is consistent with the existing interconnection arrangements. As the IDA is aware, the nature of calls to access code providers are uni-directional. Furthermore, the access code providers are providing the retail call services and earning revenue from such calls. Therefore, the access code providers should rightly bear the cost of interconnection links.
- 3.51 For the avoidance of doubt, SingTel clarifies that when two operators adopt an indirect interconnection arrangement with each other, each of them must bear the cost of their own interconnection links to the Transit Operator's network which would be transiting calls between these two indirectly interconnected operators. The Transit Operator simply performs a transit switching function. The two indirectly-interconnected operators are responsible for the cost of the interconnection links which are used to deliver the transit traffic to the Transit Operator.

CONCLUSION

- 3.52 In conclusion, SingTel considers that operators should remain free to decide on whether to pursue direct or indirect interconnection with other operators, based on the relevant economic and technical considerations of the operators.
- 3.53 However, SingTel is concerned that the current transit charging arrangements skew interconnection decisions in favour of indirect interconnection for revenue generation

reasons. SingTel considers that the current transit charging arrangements should be replaced with a new model which requires transit charges for termination call types to be borne by the Hubbed Operator.

- 3.54 SingTel's proposal will be beneficial to a large cross-section of the industry.
- 3.55 Finally, SingTel considers that the current arrangement for the charging of interconnection links should remain. However, if the IDA is minded to make a change, SingTel considers that all similarly situated operators should share the cost of the interconnection links on a 50:50 basis.
- 3.56 SingTel is happy to clarify any of the issues raised in this document, as appropriate.