M1'S RESPONSE TO IDA'S CONSULTATION PAPER ON THE REVIEW OF DIRECT AND INDIRECT INTERCONNECTION ARRANGEMENTS BETWEEN TELECOMMUNICATION LICENSEES

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1. M1 welcomes the opportunity to submit our views and comments to IDA for its consideration in its review of direct and indirect interconnection arrangements between telecommunication licensees.

2. M1 has been providing cellular mobile services to the Singapore market since 1 April 1997 and in August 2000, we launched our international telephone services. We obtained the FBO License for the Provision of 3G Mobile Communication System and Services and the 3G Spectrum Right in April 2001. In February 2005, M1 took the lead in introducing 3G technology and launching our 3G services. In July 2005, M1 acquired our Wireless Broadband Access ("WBA") Spectrum Rights for the deployment of WBA services. We launched the M1 Broadband service in December 2006, reaffirming M1's commitment to offer customers high quality services that complements mobility with high speed and wide area coverage for data intensive applications in the home, office and mobile broadband market.

3. With the rapid adoption of mobile in Singapore, and the telecommunications industry burgeoning with technological advances and convergence, IDA's review is timely to ensure that market growth is not impeded by interconnect arrangements established more than a decade ago. M1 strongly supports IDA's review to ensure continued relevance of interconnection arrangements in light of market developments, to promote a level playing field in the telecommunications industry, and to cater for future growth, developments and opportunities.

Views on Direct and Indirect Interconnection Arrangements

4. The existing indirect interconnection arrangement was established more than a decade ago before market liberalisation. Until Apr 97, Singapore Telecom (SingTel) had a comprehensive monopoly on the provision of telecommunication networks and services. SingTel had achieved an extremely high penetration in the network (>95.5%), but mobile penetration was low at 13.6% in Jan 97. This was the scenario in 1997 when M1 and the new paging operators entered the market. Besides the incumbent, SingTel, no operator had sufficient traffic volumes with other operators to justify direct interconnection with each other's networks. Furthermore, direct interconnection would not be economically viable for the new market entrants as the leasing cost of interconnect links was high and operators would incur additional costs for multiple interconnect links which might not be fully utilised. With these considerations and in view of the high fixed line penetration, it made sense economically and technically for the operators to

interconnect with each other indirectly via SingTel's Interconnect Gateway Switch ("IGS"). From the overall industry and the regulator's point of view, the Interconnect Tandem switch set-up was an optimal arrangement as it caters for interconnection among the operators and achieving economies of scale.

5. However, with the strong competition following market liberalization, Singapore's mobile adoption rate increased tremendously, exceeding 100% since Aug 06. This is more than double the figure reported for fixed-line, indicating a trend of fixed-mobile substitution. Indeed, in recent years, there has been substantial call substitution facilitated by the low cost of mobile calls. Mobile traffic volume has increased significantly over the years and the existing indirect interconnection arrangement is no longer technically efficient nor cost effective. Details on the limitations of the existing indirect interconnection arrangement shall be elaborated in the following sections. A comparison of Direct and Indirect Interconnection arrangements is also attached in Annex A of this paper.

Technological and Economical aspects which would impact Consumers/Industry

6. With indirect interconnection arrangement, calls originating from one mobile network and terminating on another mobile network will have to transit via the legacy fixed-line IGS. **The IGS does not add value in the call process,** but causes transmission delay during call set-up and introduces additional potential points of failure in connecting inter-operator calls. From the traffic engineering point of view, transiting traffic is undesirable especially in situations when the subscriber numbers are high and likely to grow.

7. This inefficient routing of calls not only subject consumers to longer call set-up time but also add costs to the whole industry. For a call between customers belonging to two different mobile networks, two additional leased circuits will be used - one leased circuit to connect the call from the sender network to the fixed-line IGS incoming port and another leased circuit to connect the call from the fixed-line IGS port to the recipient network. With direct interconnection, a call between mobile operators will be supported by a direct leased circuit between the two networks. Moreover, transiting of traffic between operators entails **avoidable transit charges** payable to the respective fixed-line affiliates of SingTel Mobile and StarHub Mobile. These factors unnecessarily inflate the costs of interconnection for the mobile operators.

8. Another disadvantage of indirect interconnection is that there is absolutely no visibility on the integrity and availability of the network behind the indirect interconnection, resulting in difficulties in defining and ensuring good end-to-end quality of service.

9. However, most importantly, as advances in mobile technology have overtaken the capabilities of legacy fixed-line IGS, transiting mobile calls via fixed-line based IGS will hinder the delivery of new, innovative services to mobile end users. To illustrate our point, in 1999 when the mobile operators were working on a technical solution for inter-operator Short Message Service, we were informed that the legacy fixed-line IGS was designed to support only voice services. With this IGS limitation, implementation of a C7 Signalling Solution (the international standard solution for SMS Inter-working), was not feasible. Consequently, the mobile operators had to implement a non-standard, IT-based solution to handle inter-operator SMS traffic in Singapore. But for the rest of the world, global SMS traffic between mobile operators is sent via international Gateway Switches between countries using the international standard C7 Signalling Solution.

10. As the **legacy fixed-line IGS could not support full mobile functionality**, over time, issues with the non-standard, IT-based SMS Inter-working solution adopted in Singapore had surfaced with the substantial increase in SMS traffic volumes. SMS traffic to inbound roamers on other operators' networks also had to be delivered via third party service provider rather than the mobile networks' C7 signalling capability. When MMS service was subsequently introduced, operators were faced with the same issue of enabling inter-operability. The mobile operators had to similarly bypass the legacy fixed-line IGS and adopt a GRX solution operated by a third party to provide MMS inter-operability.

11. With direct interconnection between mobile networks, mobile operators will be able to implement standardised inter-working protocol to deliver new, innovative mobile services instead of spending unproductive time and effort to work round the limitations posed by the legacy fixed-line IGS.

Unfair Mobile Subsidization of Fixed Networks

12. The existing indirect interconnection arrangement unfairly burdens mobile operators with considerably higher costs for interconnection and call conveyance. Apart from the initial capital and one-time costs to establish interconnection, there are recurring access charges, interconnect link charges and ancillary charges for the associated facilities required for the interconnection and access arrangement. This inflated cost base of mobile operators distorts the competitive environment between fixed and mobile operators. The **inefficient subsidy from the mobile to the fixed operators**, if left unchanged, would lead to anomalies/uncertainties that in turn reduce mobile investment incentives.

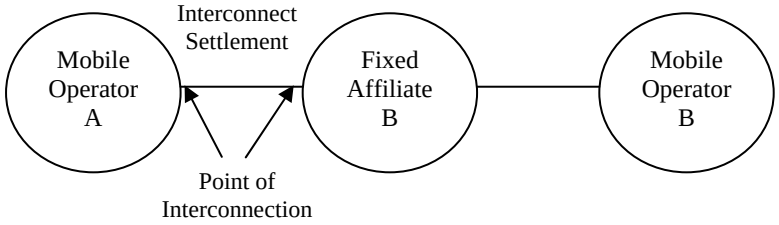
13. Singapore's situation is unique as two out of the three mobile operators have fixed-line affiliates who would benefit from the collection of Call Transit charges under the existing indirect interconnection arrangement. As such, there is no apparent incentive for these mobile operators to review or change the existing

arrangement of transiting all calls via their fixed-line IGS. Since the respective fixed-line affiliates effectively have a monopoly over the termination of calls to the respective mobile networks, there is also no commercial incentive to keep the Call Transit charges low. While IDA regulates the interconnect charges imposed by SingTel under the Reference Interconnection Offers (RIOs) due to its Dominant status, StarHub who is a non-dominant licensee, does not require regulatory approval for its interconnect charges. Consequently, there are disparities in interconnect charges imposed by the two operators. We are faced with a situation where **market failure** exists and there is insignificant or no countervailing influences for any commercial negotiations with respect to interconnection strategies to achieve technical and economic efficiency.

14. M1 respects that as commercial entities, operators should be able to decide for themselves their preferred method of interconnection with other licensees. However, we would emphasize that **the method of interconnection should not result in either of the interconnecting licensees having to incur unnecessary, additional costs, especially on an on-going basis, for the conveyance of calls between the networks**.

15. In light of the above, M1 submits that IDA addresses the existing market failure and level the playing field in terms of the interconnection framework. Similar to other countries[1], IDA could mandate direct interconnection for all cases where at least one of the two parties desire direct interconnection. Only in cases where there is insufficient traffic and direct interconnection might not have techno-economic justification, then operators could mutually agree on traffic routing through transit operators.

16. Alternatively, if an operator (Party B) decides to hub behind a fixed-line affiliate B, whether for technical, commercial or other reasons, the interconnection charges should apply only between the points of interconnection for the respective networks. Therefore, while Party B may negotiate its own arrangement with the transit operator for conveyance of its traffic, Party A should not have to incur transit charges to convey calls to Party B via the fixed-line affiliate B. In other words, **the interconnection settlement should be at the interconnecting operators' respective points of interconnection** as reflected in the diagram below.



[1] 2003 rediff.com, Trai orders direct connectivity in 3 months, 1 Aug 2003.

17. In the case where IDA determines that the fixed-line affiliates should be allowed to continue to charge for transiting calls to operators that hub behind them, arguably, M1's Transit Switches could also be designated as Tandem Switches and transit charges should similarly apply for conveyance of calls to M1's network via our Transit Switches. **The fact is that M1's existing system configuration is no different from the Tandem Switches currently operated by the two fixed-line affiliates**.

Provision and Costs of Interconnection Links

18. In Singapore, under the current interconnect arrangements with fixed-line operators, mobile operators are required to pay for the interconnect links between their networks and fixed-line operators, although these links are utilised to carry traffic both ways. Such an arrangement is inequitable. The fixed-line operators today do not pay any terminating charges to terminate their calls onto mobile networks. But there is no logical reason why they need not share the cost of the interconnect links which are also being used to carry fixed-line originating traffic terminating on mobile networks.

19. Currently, only Hong Kong shares the same regulatory asymmetry as Singapore in that the mobile operators bear 100% of the ongoing cost of interconnection links between the fixed and mobile networks. The Office of the Telecommunications Authority, Hong Kong ("OFTA") had already commissioned consultants to review their regulatory framework. The consultants, based on international best practices and cost causation principles, have recommended that each originating network pay for the link capacity required to deliver traffic to the terminating network.[2] M1 supports the recommendation that **the costs of interconnection links should rightly be borne equally by both the interconnecting operators**. This should apply not just for new interconnection links but for existing interconnection links as well.

Conclusion

20. M1 submits that the existing legacy indirect interconnection arrangement via IGS is no longer economically, technically and administratively efficient. It does not add any value to call routing efficiency but instead, affects the overall functionality and performance of the mobile networks. It also unfairly burdens mobile operators with considerably higher costs for interconnection and call conveyance.

[2] Ovum Limited Consultancy Report - Review of the Regulatory Framework for Fixed-Mobile Convergence in Hong Kong, 28 April 06, OFTA, http://www.ofta.gov.hk/en/report-paper-guide/report/rp20060714.pdf

21. Mobile operators should have the option of alternative interconnect configurations without being burdened with the legacy IGS. Adopting direct interconnection arrangement between mobile networks is technically more efficient, minimizes points of failure, and improves call connection time for mobile users.

22. As Singapore's situation is unique with two out of the three mobile operators having fixed-line affiliates who would benefit from the collection of Call Transit charges under the existing indirect interconnection arrangement, a market failure exist which prevents any commercial negotiations with respect to direct interconnection and reduction of Call Transit charges.

23. Hence, in aligning with IDA's policy objectives in addressing market failures and promoting a level playing field, M1 submits that IDA mandates:

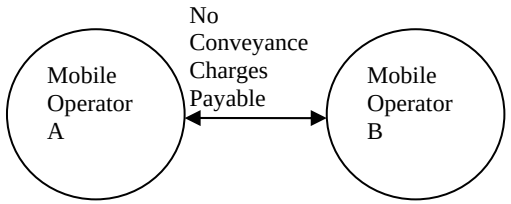
    - Direct interconnection for all cases where at least one of the two parties desire direct interconnection; or

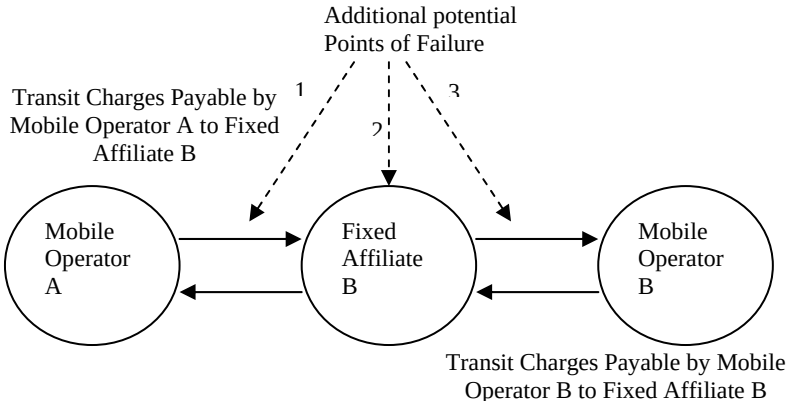
    - Interconnection settlement at the Point of Interconnection (POI) between operators (i.e. no Call Transit Charges applicable), even if one party decides to hub behind an interconnection network gateway; and

    - Interconnecting operators must equally share the implementation and recurring costs for interconnection.

24. If IDA decides, for whatever reason, to maintain the current interconnection arrangement, M1 would request to designate M1's Transit Switches as our Interconnect Tandem Switches and Call Transit Charges will apply accordingly.

Annex A: Comparison of Direct and Indirect Interconnection Arrangements





Type	Description	Direct	Indirect
Technical & Consumer impact	Routing of Calls	Efficient routing of calls to mobile numbers	Inefficient routing of calls to mobile numbers
	Call set-up time	No transmission delay during call set-up	Transmission delay during call set-up
	Additional points of Failure	No additional point of Failure	Minimum 3 additional points of Failure: 1) Failure due to interconnection link between Mobile Operator A and Fixed Line Affiliate B 2) Failure at IGS of Fixed Line Affiliate B 3) Failure due to interconnection link between Fixed Line Affiliate B and Mobile Operator B
	Impact on Services	No impact on the functionalities of the calls as the fixed network is not involved unnecessarily eg. call to a mobile number	The fixed network is involved in the call to a mobile number. Advances in mobile telecommunications have already overtaken fixed line based interconnect switches. Legacy fixed network hinders the delivery of new, innovative services to mobile users.
Economic Impact	Additional costs	No additional cost	Transit charges payable by mobile operators to Fixed Line Affiliate B
			Two additional leased circuits required. One to connect call from the sender network to the interconnect tandem incoming port and another to connect call from the interconnect tandem port to the recipient network
	Unnecessary time, effort, investments, and costs due to legacy fixed-line IGS	Nil as mobile operators are directly interconnected	Unnecessary time, effort, investments, and costs due to legacy fixed-line IGS. For example, MMS service was introduced, issues of enabling inter-operability due to legacy fixed-line IGS resulted in mobile operators having to spend unnecessary time, effort, investment, cost on workaround solutions.
Competitive Impact	Cross Subsidisation of Fixed Line Affiliates	Nil	Payment of unnecessary transit charges by mobile operators to Fixed Line affiliates.
Align with International best practice		Yes	No