



**CONSULTATION PAPER ISSUED BY THE
INFO-COMMUNICATIONS DEVELOPMENT AUTHORITY OF SINGAPORE**

**PROPOSED REGULATORY FRAMEWORK FOR TELEPHONY SERVICES OVER
WIRELESS BROADBAND ACCESS NETWORKS AND INTERCONNECTION
FRAMEWORK FOR TELEPHONY SERVICES**

5 JULY 2007

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PART I : INTRODUCTION

- 1 On 1 July 2005, IDA granted the spectrum rights in the 2.3 GHz and 2.5 GHz spectrum bands to six operators for the provision of Wireless Broadband Access services (WBA) to end users in Singapore. Operators granted spectrum rights in the 2.5 GHz spectrum band are required, as a condition of the spectrum right, to provide publicly available WBA telecommunication services to end users, using the assigned radio frequency spectrum, 18 months from the date of grant, *i.e.*, by 31 December 2006. Operators granted spectrum rights in the 2.3 GHz spectrum band are required to provide the same, 36 months from the date of grant, *i.e.*, by 30 June 2008.

- 2 In addition to providing basic wireless broadband access, WBA operators may wish to offer telephony services as part of their service offerings. To facilitate such service offerings, operators will require regulatory certainty from IDA on the interconnection and number allocation frameworks applicable for the provision of telephony services through WBA networks.

- 3 Separately, IDA had earlier issued an “Extended Interim Framework Governing Interconnection between IP Telephony Operators and Existing Public Switched Telephone Network Operators” (herein referred to as “Extended Interim Framework”) on 29 September 2006 which sets out an interim interconnection framework between fixed-line and mobile operators to all IP telephony operators. IDA stated that it would conduct a public consultation to solicit feedback that would assist IDA in establishing a final interconnection framework for IP telephony services. Given that the provision of telephony services through WBA networks is likely to be IP-

based, the interconnection arrangements for such services should follow the interconnection arrangements for IP telephony services.

- 4 IDA has also published a consultation paper on 3 November 2006, on the review of the existing direct and indirect interconnection arrangements between telecommunication operators. IDA has since completed its review on the matter, including the submissions received from various respondents to the consultation. IDA's view is that the existing direct and indirect arrangements have not kept pace with the telecommunication market's development to remain robust and efficient and thus, a revised framework will need to be put in place to address the matter.

PART II: INDUSTRY TRENDS

- 5 When formulating its proposal on the appropriate number allocation framework for WBA operators providing telephony services, and interconnection framework for both IP telephony operators and WBA operators providing telephony services, IDA took into account some key observations of industry trends.

- 6 Traditional fixed-line and mobile telecommunication services have been provided on distinct platforms. For example, fixed-line telephony services were only provided on the Public Switched Telecommunications Network (PSTN) and mobile voice telephony services were only provided via cellular mobile networks.

- 7 With the introduction of new IP-based platforms and technologies, the distinct silos of traditional circuit switched networks are likely to converge into IP-based Next Generation Networks (NGN) over time, as illustrated in the simplified **Diagram 1** below.

Diagram 1: Blurring Boundaries of Traditional Technology Silos

	Fixed-line Mode	Other Wireless Technologies like WBA	Cellular Mobile Mode
End-user Devices	fixed-line phones cordless phones	GSM/Wi-Fi handsets Laptops	2G, 3G mobile phones
Key Service Functionalities	fixed	fixed to nomadic to vehicular mobility	vehicular mobility
Transport Technology and Platform	circuit-switched Wired	largely IP-based Wireless	circuit-switched Wireless

- 8 This migration to an IP-based NGN is likely to take place in the mid-to-long term. This is evidenced by the announced plans of telecommunication

operators internationally to migrate to NGN, for example British Telecommunications' 21st Century Network in the U.K. In addition to the migration of traditional circuit switch networks, new IP-based networks may also be deployed. As part of the iN2015 Masterplan, Singapore is planning to deploy a Next Generation Network that is capable of delivering ultra high speed connectivity to homes and businesses.

- 9 These new or upgraded networks will enable the convergence of services, with Fixed Mobile Convergence (FMC) as a touted development. FMC may be offered to varying degrees. This may range from a single billing of both fixed and mobile services, to a functional converged offering that provides end users with a single device that may be used on multiple networks, preferably using a single telephone number.

- 10 Single devices with multi-service functionalities that operate across multiple platforms have already emerged. In the UK, for example, British Telecommunications introduced a BT Fusion product in 2005, which switches a subscriber's mobile call to the subscriber's broadband network when at home, thereby lowering outgoing call charges for the consumer. In Singapore, GSM phones with Wi-Fi capabilities, laptops "roaming" with 3G SIM cards and new platforms like WBA with converged capabilities are challenging the way telecommunication services have traditionally been provided. Going forward, the trend towards convergence will be further accelerated by consumers' perennial search for more convenient and cheaper services and devices.

IDA invites views and comments on the long-term market and technology outlook, in particular, the increasing deployment of IP-based networks and the increasing pace of FMC.

IDA also invites views on the impact of these developments on IDA's existing interconnection framework and number allocation framework.

PART III: NUMBER ALLOCATION FOR TELEPHONY SERVICES ON WBA NETWORKS

- 11 With the deployment of IP-based NGNs, services will also become increasingly platform-independent. Services with similar characteristics may be offered on different platforms, *e.g.*, an IP Telephony service may be offered over both wired and wireless broadband access. IDA notes that WBA networks have the potential to provide fixed, nomadic and/or mobile telephony services on a wireless platform.
- 12 However, while industry trends point to increasing convergence of platforms and services, IDA is of the view that the number prefix still plays an important role in differentiating the characteristics of the various types of services at this juncture, and that it would be premature to introduce inter-modal number portability now. Instead, similar number levels may be assigned to services with similar basic characteristics, regardless of the platform the service is riding on or the technologies used.
- 13 This was the same approach used when IDA released its policy framework for IP telephony and Electronic Numbering in Singapore on 14 June 2005. IDA allocated level '3' 8-digit numbers for IP telephony services are not subject to Quality of Service (QoS) standards and requirements to provide number portability, access to emergency services, directory enquiry and printed directory services. However, IDA may also assign level '6' 8-digit numbers to IP telephony operators if they are licensed as Facilities-Based Operators and comply with the same licensing conditions under the FBO licence, including complying with QoS standards and requirements to provide number portability, access to emergency services, directory enquiry services and printed directory.
- 14 In order to provide clarity to operators intending to introduce new services, IDA's articulated framework for the allocation of 8-digit numbers of the different prefixes for telephony services over WBA networks will also apply to telephony services provided over any other new network types or platforms that might be deployed in future.

15 IDA proposes to avail all 8-digit number levels, namely levels '3', '6', '8' and '9' for the provision of telephony services over WBA, depending on the characteristics of the services offered. The proposal for number-level assignment is as follows:

- a. **Level 6.** Currently, Facilities-Based Operator (FBO) licensees offering domestic telephony services (including PSTN Services and Integrated Services Digital Network Services) and IP Telephony services meeting the licensing obligations imposed by IDA are eligible for level '6' 8-digit numbers. Similar to the framework prescribed for IP telephony operators, IDA proposes that WBA operators, who would already hold a valid FBO licence, be eligible for level '6' numbers for the provision of telephony services over their WBA networks if they:
 - i. Comply with the minimum duties of licensees to interconnect specified in Section 5.2 through 5.4 of the Telecommunication Competition Code and provide any-to-any interconnection;
 - ii. Provide number portability in accordance with the same standards and requirements as may be established by IDA from time to time for basic local call services associated with the number level "6";
 - iii. Provide access (at no charge) to emergency services (e.g., "999", "995", and "993") in Singapore;
 - iv. Provide directory enquiry services and printed directory services; and
 - v. Comply with the QoS standards established by IDA, similar to the standards set for basic local call services.

- b. **Level 8 & 9.** 8-digit numbers beginning with the digit '8' and '9' are reserved for radio network services offered by FBO licensees, including Public Cellular Mobile Telephone Services, Public Radio Paging Services and Public Trunk Radio Services. Taking into account the existing requirements imposed on Public Cellular Mobile Telephone operators, IDA proposes that WBA operators, who would already hold a valid FBO licence, be eligible for level '8' and '9' numbers if they:

- i. Comply with the minimum duties of licensees to interconnect specified in Section 5.2 through 5.4 of the Telecommunication Competition Code and provide any-to-any interconnection;
 - ii. Provide number portability;
 - iii. Provide access (at no charge) to emergency services;
 - iv. Provides coverage for the whole of the island of Singapore (including but not limited to underground MRT stations/lines and road tunnels), the offshore islands and the territorial waters up to 15km from the coast line of island of Singapore;
 - v. Comply with any QoS standards imposed on 3G public cellular mobile telephony operators, including in-building coverage requirements.
- c. **Level 3.** Similar to 8-digit level '3' numbers currently allocated for IP telephony¹ services, WBA operators using this level will not be subject to specific regulatory requirements on QoS standards, access to emergency services, provision of number portability, directory enquiry services and printed directories

16 With the above proposal, providers of telephony services over fixed-wireless access platforms (e.g., using Wi-Fi or WBA) that wish to offer telephony services using the number level '8/'9' may do so as long as they comply with similar regulatory conditions imposed on public cellular mobile operators. IDA notes that the proposed criteria for the allocation of level '8/'9' numbers does not include a requirement for 'mobility', which is an intrinsic characteristic of a public cellular mobile telecommunication service. This would allow some flexibility for WBA operators wishing to obtain these number levels, in view of increasing fixed-mobile convergence. However, there may be some confusion to end-users who have grown to expect mobility on these number levels and, in certain areas such as underground MRT lines, it may not be meaningful for operators to provide coverage without mobility.

¹IP Telephony refers to "a form of VoIP that requires telephone or E.164 numbers that allows a user to make and receive voice, data and video calls in any domestic or overseas location where broadband Internet access is available".

- 17 Further, IDA notes that operators might wish to leverage on WBA platforms to provide multi-platform services to consumers, e.g., FMC services with wired broadband/WBA or mobile cellular/WBA combinations. With the above number-level assignment framework, operators will be allowed to offer a particular number level to the consumer as long as the service as a whole fulfils the stated criteria above (operators are nonetheless not precluded from offering multiple numbers for a converged service). To illustrate,
- a. Operator A would like to introduce a wired broadband/WBA converged IP Telephony service to a consumer. Operator A has the option of offering the consumer a level '3' number, or a level '6' number if both the wired broadband and WBA platforms are able to satisfy the criteria for level '6' assignment;
 - b. Operator B would like to introduce a mobile cellular/WBA converged telephony service to a consumer. Operator B has the option of offering the consumer a single level '8' or '9' number, provided the service as a whole is able to satisfy the criteria for such assignment. For example, if the consumer wishes to access an emergency service, he will be able to do so (using either the mobile cellular or WBA networks), and the consumer will experience at least 95% nationwide street-level wireless coverage (either through the mobile cellular or WBA networks or both).
- 18 IDA believes that the proposed framework will aid end user convenience by allowing mobile or fixed customers to enter into dual use service plans while retaining a single number. Availing multiple number levels to these operators would also facilitate the transition to inter-modal number portability if IDA so decides in the future.

IDA invites views and comments on IDA's proposed conditions for the allocation of each number level in the light of industry trends. In particular, for convergent services offered over multiple platforms, do you agree that the numbers allocation conditions can be met as long as the service, as a whole, fulfils the number allocation criteria?

IDA invites views and comments on IDA's proposal to allocate number levels '3', '6', '8' and '9' to WBA operators for the provision of telephony services. In particular, do you agree that there is no need to include a requirement for "mobility" as a criteria for the allocation of level '8' and '9' numbers? If you propose to include the requirement for "mobility", please assist by defining "mobility", and determining when the requirement is met or unmet.

PART IV: INTERCONNECTION SETTLEMENT REGIME

Long term interconnection settlement regime for telephony services

- 19 The interconnection arrangement for telephony services in Singapore today is generally configured around the traditional PSTN and cellular network silos, with cost settlements based on traffic minutes conveyed between networks. Interconnection settlement between fixed-line operators is based on the “Calling Party Pays” (CPP) regime, while the settlement involving mobile operators are governed by the “Mobile Party Pays” (MPP) regime.
- 20 However, with the migration of both legacy and new network deployments to IP-based NGNs that may be both fixed and wireless, interconnection arrangements involving IP telephony operators will be an important component of the overall interconnection framework. In addition, voice traffic may be increasingly capacity or packet based rather than minutes-based.
- 21 The interconnection settlement regime that will apply to IP-based NGNs, amongst themselves and with traditional networks like the PSTN or the cellular mobile networks has yet to be finalised in many jurisdictions. IDA notes that even in jurisdictions where incumbent operators have announced large scale plans to migrate their networks to IP-based NGNs, like in the UK, regulators and industry bodies have yet to adopt any particular interconnection settlement regime for IP-based NGNs.
- 22 Nevertheless, IDA observes that the ‘Bill-And-Keep’ (BAK) regime, where there are no termination charges and each operator is required to recover the costs of termination and origination from its own customers, has often been cited as a plausible interconnection settlement regime for IP-based NGNs, especially if telephony traffic becomes largely capacity based. This follows from the current interconnection arrangements of Internet Access Service Providers, which exchange traffic either through peering (where service providers reciprocally provide access to each other’s customers

without compensation arrangements) or transit (where one service provider sells access to the destinations in its routing table to another service provider).

- 23 The BAK model will be able to work regardless of whether voice traffic is capacity-based or minutes-based. As each operator bears its own costs, the BAK arrangement also helps to steer operators to more efficient technologies to keep their costs low. It also avoids the problem of terminating network monopolies and relieves the industry of the transaction costs associated with interconnection billing and settlements. Hence, IDA is of the view that the BAK regime may be an appropriate long term solution that could apply to all interconnection settlements, whether between fixed or mobile, PSTN, cellular or IP, and regardless of the devices used and the number levels assigned.
- 24 However, IDA recognises that a BAK regime is considered fair and reasonable typically only in situations where traffic between operators is relatively balanced, which may not always be the case. Moreover, IP telephony traffic is still relatively low and the appropriate interconnection settlement model for IP-based NGNs is still unclear. In this respect, IDA is of the view that it may be premature to prescribe the application of a BAK arrangement at this point. Instead, IDA will continue to closely monitor the industry environment, network cost structures, other economic and technical factors, and international best practices before determining the overall long term interconnection regime.

Interconnection Settlement Regime for IP Telephony

- 25 Nevertheless, to facilitate the entry of IP telephony operators, including WBA network operators that offer telephony services, there is a need to establish a framework for the interconnection settlement arrangements involving such operators before a long term interconnection settlement regime for IP-based NGNs is decided.

Same interconnection settlement regime for similar services

- 26 In view of the proposed number allocation framework (as discussed in Part III above) where existing '3', '6', '8' and '9' number levels may be assigned to services with associated basic characteristics regardless of the underlying platform or technology used, IDA is of the view that the same interconnection settlement regimes should apply for the provision of similar services, regardless of the underlying technology or platform used. **Hence IP telephony operators, including WBA network operators offering telephony services, would be viewed as fixed-line or mobile operators if they adopt the Level 6 or Level 8/9 numbers respectively, and come under the respective interconnection regimes accordingly.**

Interconnection settlement regime for services using Level 3 numbers

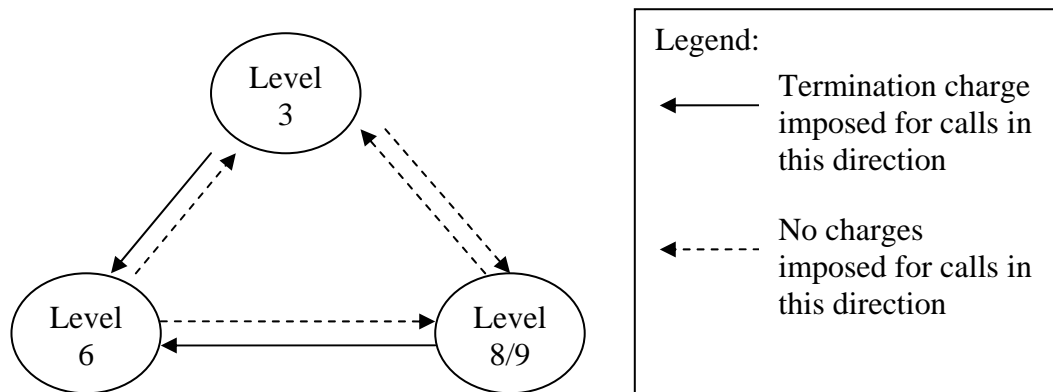
- 27 However, for interconnection involving IP telephony operators including WBA network operators that offer telephony services using Level 3 numbers ("Level 3 Operators"), IDA proposes to allow such operators to commercially negotiate their own interconnection arrangements. Nevertheless, IDA notes that these operators may have disputes on their commercial resolution of interconnection settlement arrangements. That being the case, there might be occasions where IDA will be requested to intervene to resolve such interconnection-related disputes between such operators. The following paragraphs outline a framework that IDA will adopt when resolving such interconnection-related disputes concerning Level 3 Operators. During the dispute resolution period, IDA proposes to apply the BAK regime as an interim arrangement, in order to facilitate interconnection during these periods.
- 28 As a starting point, IDA considered whether to apply the BAK regime for interconnection settlement between Level 3 Operators and fixed-line or mobile operators. This will help to facilitate future transition, if the BAK regime is indeed adopted as the long term interconnection settlement framework for all networks. IDA notes that under the Extended Interim

Framework, mobile operators and Level 3 Operators are already adopting a BAK arrangement for interconnection with each other.

- 29 However, IDA recognises the practical constraints and legacy issues in relation to interconnection with the fixed-line PSTN operators that have traditionally been on the CPP regime. This is reflected in the retail pricing for fixed-line telephony services, where consumers and business end users are generally charged on a usage or time-based model for outgoing calls, and do not pay for incoming calls. A switch to the BAK regime for interconnection between Level 3 Operators and fixed-line operators now may have a significant impact on the manner in which retail fixed-line telephony services are charged to end users, given that the PSTN is still the predominant telephony service network which end users are subscribed to.
- 30 Before the CPP regime for fixed-line operators is revised, IDA is of the view that the interconnection settlement arrangements prescribed under the Extended Interim Framework should be maintained. In other words, Level 3 Operators should pay corresponding origination, transit and termination charges for calls originating, transiting through or terminating on the fixed-line networks (where applicable), to compensate the fixed-line operators for the network costs incurred. For calls from fixed-line operators terminating on the networks of Level 3 Operators, IDA understands that the cost of origination or termination on an IP network is likely to be insignificant. Hence, IDA proposes that there is no need to establish origination or termination charges for calls originating/terminating on Level 3 operators' networks. The Level 3 Operators may recover the costs through their service offerings to their subscribers. This would be similar to the case for mobile operators in their interconnection with fixed-line operators and other operators.
- 31 In summary, IDA's proposed interconnection settlement regime for IP telephony operators and WBA operators providing telephony services is as follows:

	Fixed-line (Level 6)	Others (Levels 3, 8 & 9)
Interconnection settlement regime	<p>'CPP' (with network origination/transit/termination rates payable)</p> <p>* Includes any local, international and ISDN calls requiring PSTN for completing transmission</p>	No origination, transit or termination charges payable to operators providing telephony services on other networks.

32 The following diagram illustrates the proposed interconnection settlement framework between the various number levels:



33 For interconnection with Dominant Operator, operators will be able to enter into interconnection agreements pursuant to any regulated Reference Interconnection Offer (“RIO”) of the Dominant Operator.

IDA invites views and comments on the proposed interconnection settlement regime for telephony services, in particular, whether:

a) the “Bill and Keep” interconnection regime is a viable long term interconnection regime for all forms of telephony services, and if so, at what stage should we move over to such a regime?

b) the interconnection settlement regime in the medium term should be based on the number level that reflects the service characteristics, regardless of platform or technology used;

c) the settlement arrangements under the Extended Interim Framework should be maintained for interconnection arrangements involving Level 3

Cost of opening of number levels

- 34 There may be a need for operators to open up new number levels to cater to telephony traffic to and from IP telephony operators and WBA operators that provide telephony services. Such any-to-any connectivity will benefit subscribers of IP and WBA telephony operators as well as other interconnecting operators. IDA recognises that because of the differences in subscriber numbers and customer usage patterns, different operators would have varying degrees of interest and incentives to open up new number levels. Nevertheless, IDA notes that the existing fixed-line and mobile network operators absorb their own cost of opening up new number levels among themselves, *i.e.*, similar to a BAK approach. In addition, IDA is also cognisant of the need to ensure that IP Telephony operators and WBA operators do not incur undue cost as new entrants to the market by having to bear the cost of opening up new number levels in every other network. Therefore, IDA proposes to extend the BAK model for the cost of opening up new number levels to all telephony operators, including IP Telephony and WBA operators, *i.e.*, each network operator is to bear its own cost of opening up a new number level, as subscribers of new and existing operators would stand to benefit from interconnection.

The only exception is in the case of opening of access codes, such as 00X, 15XX and 1800 numbers, where the cost of such openings should be borne by the access code service providers. This is because calls to access codes are uni-directional, *i.e.*, calls are only made from end users to those numbers, and not *vice versa*. The benefit of opening of number levels would thus accrue primarily to the access code service provider. It would thus be more equitable for the access code service provider to bear the cost of opening new number levels.

Commercial wholesale services

- 35 There may be cases where a Level 3 Operator commercially negotiates a 'wholesale' arrangement with another operator (hub operator), whether fixed or mobile, to hub behind the latter operator for all calls to and from the former². Under such arrangements, the hub operator offers to obtain interconnection, and receive or terminate traffic from or onto other interconnected operators' networks, at commercial rates. In these instances, IDA is of the view that the hub operator is in effect a transit operator, and that the responsibility for the cost of transit should follow the framework proposed in Part V for such indirect interconnections. The origination and termination charges between the Level 3 operator and the operator at the other end of the call would follow the interconnection settlement regime proposed earlier in paragraphs 27-33.

Cost of interconnection links

- 36 IDA notes that in addition to the interconnection charges payable for each call, there are costs associated with establishing and maintaining the interconnection links between the IP telephony and WBA operators that provide telephony services, and the fixed and mobile operators. The responsibility of these costs between the operators is proposed in Part V of this consultation document.

² IDA notes that SingTel currently offers a commercial wholesale service to Level 3 Operators for interconnection with other operators.

IDA invites comments on whether

a) the cost of opening up new number levels should be borne according to a 'BAK' arrangement, i.e., each operator bears its own cost of opening up a new number level, except in the case of opening of access codes e.g. 00x, 15xx, 1800; and

b) the hub operators in wholesale agreements with Level 3 operators should be considered as transit providers, and whether Level 3 operators in such agreements would still need to enter into separate interconnection agreements with the operators at the other end of the call.

PART V: DIRECT VS INDIRECT INTERCONNECTION

- 37 IDA has in the 3 November 2006 Consultation, sought views on the current direct and indirect interconnection arrangements between operators, such as whether these arrangements would have an impact on technological and economic efficiencies, on competition, on future telecommunications trends, etc. Having reviewed the responses received, IDA views that the existing arrangement for operators to enter into direct or indirect interconnection with each other, for the fulfilment of their interconnection obligation under the Code, should generally be retained.
- 38 First, while IDA recognises that direct interconnection arrangements will clearly require less switching and transmission elements for the conveyance of traffic between two interconnecting operators, indirect interconnection need not necessarily be inefficient for operators. For instance, as highlighted by a number of respondents, in situations where the volume of traffic conveyed between two operators is low, there is less economic justification for direct interconnection with each other as the set-up and recurrent costs for direct interconnection, such as interconnect gateway switches, installation and maintenance of multiple interconnection links, etc, may be significant. In this respect, IDA believes that operators should continue to have the flexibility to commercially negotiate and agree on whether to enter into direct or indirect interconnection arrangements with one another.
- 39 Nevertheless, IDA believes that there may be circumstances where operators are unable to reach a commercial agreement as to whether they should interconnect directly or indirectly with each other. In such situations, IDA understands the existing default arrangement will be indirect interconnection between the parties. However, as described above, whether direct or indirect interconnections are more efficient would largely depend on appropriate considerations of the costs of direct interconnections vis-a-vis the costs of transit via a 3rd operator. Therefore, IDA notes that the existing default indirect interconnection arrangement

could possibly override the economic considerations and lead to inefficient interconnection arrangements.

- 40 In particular, the party initiating a request for interconnection with another operator will be placed in a competitively disadvantaged position right from the start, as the current default interconnection arrangement tilts the balance of negotiation in favour of the party receiving the interconnection request. In other words, by its refusal for direct interconnection for whatever reasons, the receiving party could require the requesting party to incur additional transit costs to convey traffic via a 3rd operator, even though the high volume of traffic exchanged between the parties could mean that transit costs involved would exceed the savings from the costs of direct interconnection avoided.
- 41 Therefore, to ensure that interconnecting operators will negotiate interconnection arrangements on a fair basis, with the appropriate motivations to adopt efficient arrangements, IDA intends to adopt an interconnection framework largely based on the points of interconnection (“**POI**”) to be determined by the parties for each applicable interconnection service that they provide to each other (herein referred to as “**POI Interconnection Arrangement**”), should the parties fail to reach a commercial agreement in their negotiations. For the avoidance of doubt, the POI Interconnection Arrangement will be applicable to all operators, fixed-line, mobile, IP, WBA, etc.
- 42 In proposing the POI Interconnection Arrangement, IDA is mindful of the fact that a number of respondents have raised the concern that the costs of direct interconnection if mandated, could be significant as operators would not only need to deploy dedicated interconnect gateway switches and ensure that such switches are equipped with sufficient ports and capacity, operators would also need to maintain and manage multiple interconnection links. Therefore on balance, IDA notes that the said framework would not only send the appropriate signals to operators in their negotiation for direct or indirect interconnection arrangements, but would also allow operators to retain their existing network configurations without

being unduly burdened with significant implementation costs and efforts. The POI Interconnection Arrangement is described in greater detail below.

General Description

- 43 Under the POI Interconnection Arrangement, each operator **designates a POI** for any and all the origination and termination services that it provides, and **is responsible for the costs of transit and interconnection links (if any) on its own side of that point of interconnection.** For the avoidance of doubt, responsibility for call origination and termination charges will not be addressed by the POI Interconnection Arrangement since the responsibility for such charges are unlikely to affect operators' decision to enter into direct or indirect interconnection arrangements.

Application to Call Termination Services

- 44 Under the POI Interconnection Arrangement, the operator providing the call termination service would designate the POI where it would like to receive traffic meant for termination on its network. Two possible POIs that can be designated are: at its own switch, or at the switch of a transit operator. The originating operator must then either deliver the traffic to the designated POI directly, or can choose to deliver it indirectly through its own transit provider. In other words, either party may elect to use a transit operator to convey traffic between their networks, **but the operator making the choice of indirect interconnection will be responsible for the transit charges payable to its elected transit operator.** The operations of the POI Interconnection Arrangement for call termination services are illustrated as follows:

Illustration 1:

- 45 The terminating operator prefers direct interconnection, and so chooses the POI at its own switch, and the originating operator also prefers direct interconnection, and delivers the traffic directly to the designated POI. In this case, there is no transit charge involved, and the originating operator bears the costs of the interconnection links used to convey the traffic from

its network and pays for the links to the terminating operator's switch. This is shown in Exhibit 1 below, where the vertical line represents the POI.



Exhibit .1: Direct interconnection

Illustration 2:

46 The terminating operator prefers direct interconnection, and chooses the POI at its own switch, but the originating operator chooses to deliver the traffic indirectly. In this case, the originating operators bears the transit charge payable to the transit operator, and the costs of the interconnection links to convey traffic from the originating operator to the transit operator, and also from the transit operator to the terminating operator. This is shown in Exhibit 2 below.

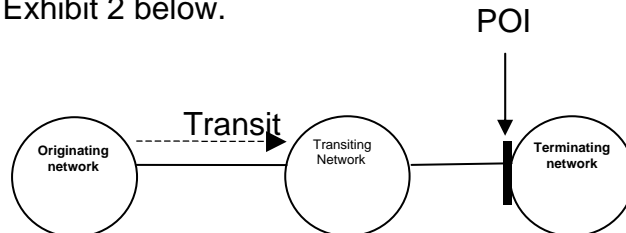


Exhibit .2: Indirect Interconnection - Originating network chooses indirect interconnection to deliver traffic

Illustration 3:

47 The terminating operator prefers indirect interconnection, and designates the POI at the switch of a transit operator, and the originating operator delivers the traffic directly to the transit operator. In this case, the originating operator will only bear the costs of interconnection links to convey traffic from its network to the transit operator, while the terminating operator bears the transit charge payable to the transit operator and the costs of the interconnection links for the conveyance of traffic from the transit operator to its own network. This is shown in Exhibit 3 below.

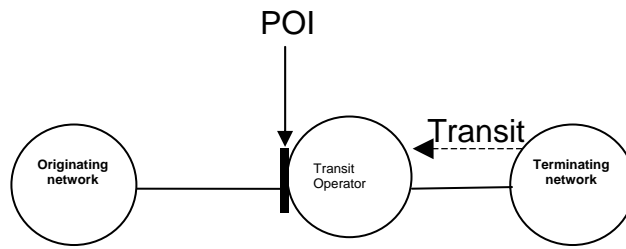


Exhibit 3: *Indirect Interconnection - Terminating network chooses indirect interconnection to receive traffic*

Illustration 4:

- 48 The terminating operator chooses the POI at the switch of a transit operator (i.e., Transit Operator B), and the originating operator chooses to deliver the traffic indirectly to that POI via a different transit provider (i.e., Transit Operator A). In this case, both the originating and terminating operators bear the transit charges payable to their own respective transit operators, and also the costs of the interconnection links for the conveyance of traffic to/from their respective transit operators. In addition, the originating operator will be responsible for the costs of interconnection links for the conveyance of traffic from Transit Operator A to Transit Operator B. This is illustrated in Exhibit 4 below.

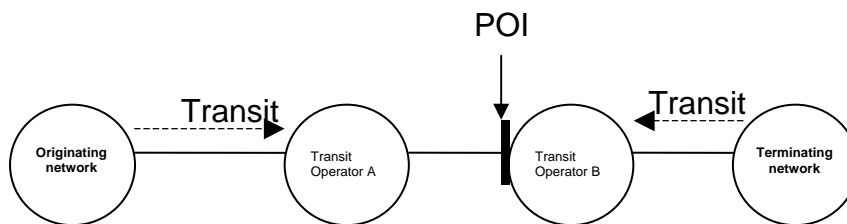


Exhibit .4: *Both networks choose indirect interconnection*

Application to Call Origination Services

- 49 Under the POI Interconnection Arrangement, the operator offering origination services would designate the POI where the terminating operator, such as a 00x, 15xx or 1800 service provider, could collect the traffic. Similar to the call termination services, the originating operator can

choose to designate the POI to be at its own switch or at the switch of a transit operator if it cannot or does not want to support direct interconnection. In either case, the terminating operator could also connect to the designated POI directly or indirectly. Once again, both the originating and terminating operator have the flexibility to choose indirect interconnection to the POI if doing so is more efficient, but then also has the obligation to pay for necessary transit charges. The operation of the POI Interconnection Arrangement for call termination services are illustrated as follows:

Illustration 5:

- 50 The originating operator designates its own switch as the POI, and the 15xx operator picks up the traffic directly from that switch. In this case there is no transit charge, and the 15xx operator pays for the costs of the interconnection link to convey traffic from the originating operator. This is shown in Exhibit 5 below.



Exhibit .5: Direct Interconnection

Illustration 6:

- 51 The originating operator designates the switch of a transit operator as the POI, and the 15xx operator picks up the traffic from that transit operator. In this case, the originating operator bears the transit charge, and also the costs of the interconnection link for the conveyance of traffic to the transit operator, while the 15xx operator bears for the costs of the interconnection link to the POI at the transit operator's switch. This is shown in Exhibit 6 below.

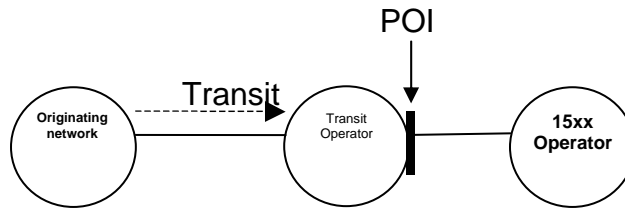


Exhibit .6: *Indirect Interconnection - Originating operator chooses to use indirect interconnection.*

Illustration 7:

52 The originating operator designates its own switch as the POI, and the 15xx operator chooses to pick up the traffic via a transit operator. In this case, the 15xx operator bears the transit charge, and also the costs of the interconnection links to convey traffic from the originating operator to the transit operator, and from the transit operator to its own switch. This is shown in Exhibit 7 below.

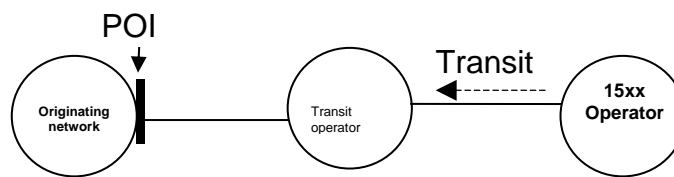


Exhibit .7: *Indirect Interconnection - 15xx operator chooses to use indirect interconnection*

Illustration 8:

53 The originating operator designates the switch of a transit operator (i.e. transit operator A) as the POI, and the 15xx operator chooses to use a different transit provider (i.e. transit operator B) to collect the traffic. In this case, the originating operator and the 15XX operator bear the transit charge payable to their own respective transit operators, and also the costs of the interconnection links to convey traffic to/from their respective transit operators. In addition, the 15XX operator will be responsible for the costs of interconnection links for the conveyance of traffic from Transit Operator A to Transit Operator B. This is shown in Exhibit 8 below.

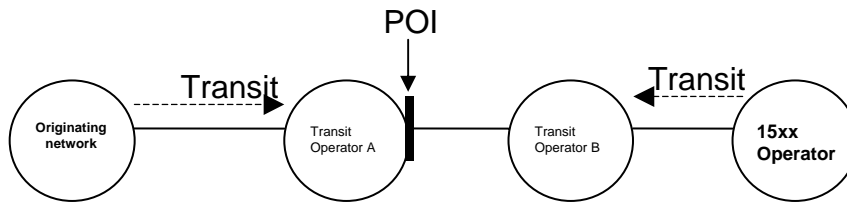


Exhibit .8: *Both operators choose indirect interconnection*

Responsibility for Costs of Interconnection Links

- 54 With respect to the sharing of the costs of the interconnection links, as discussed in paragraph 43, under the POI Interconnection Arrangement, operators are responsible for ensuring sure that their traffic is delivered to or received at the other operator’s POI. In other words, this means that operators will be responsible for building or leasing capacity to have dedicated links for traffic under direct interconnection, or enough capacity for total traffic sent via the transit operator under indirect interconnection, on their side of the POI. For the avoidance of doubt, this will also apply to interconnection with mobile operators, where we note that mobile operators currently bears the cost of the entire interconnection links to fixed-line operators, even though such links may be bi-directional and carrying traffic from the fixed-line operators’ networks to the mobile operators’ networks.
- 55 That said, IDA notes the comments from two of the respondents that interconnecting operators may have commercially agreed on the sharing of the costs of interconnection links, and IDA should continue to allow operators to do so. In this respect, IDA clarifies that interconnecting operators are still free to negotiate alternative interconnection link sharing arrangements between themselves should they both agree to do so, be it on a 50:50 basis or in any other proportion. Nevertheless, should the operators fail to reach a commercial arrangement, the prescribed responsibility for costs of interconnection links under the POI Interconnection Arrangement will apply.

Responsibility for other Costs

- 56 The proposal that each operator pays the costs on its side of the POI extends to implementation costs, including any one-time charges relating to connecting to the POI.
- 57 IDA recognises that as networks evolve, operators may wish to choose to alter their network configurations, either by moving between direct and indirect interconnection, or by moving the location of any or all switches being used for the POI. As a general principle, IDA proposes that each operator is responsible for the costs resulting from choices that it makes. Specifically, if a operator chooses to subsequently move its own designated POI(s) either by relocating its own switches, or designating the POI at other switches of its own, or by switching transit providers, or by designating the POI at a different switch of the same transit provider, IDA views that the one-time costs for the other interconnected operator to move its interconnection links to the new designated POI(s) should be borne by the first operator. The first operator would also bear any network testing costs incurred by both operators.

IDA invites views and comments on the proposed POI Interconnection Arrangement, i.e., that each licensee designates a POI for the origination and termination services it provides, and licensees are responsible for all costs on their side of that point of interconnection, including the costs of interconnection links.

What would be the impact of implementing this proposal on technological and economic efficiencies, both for existing operators (fixed and mobile) as well as IP telephony operators and WBA operators that offer telephony services?

What are the challenges to moving from the current arrangements to this proposed POI Interconnection Arrangement?

What are the long-term implications of this proposed POI Interconnection Arrangement as networks evolve over time?

PART VI: INVITATION TO COMMENT

58 IDA would like to seek the views and comments from the industry and members of the public on the above issues. All views and comments should be submitted in writing and in both hard and soft copies (Microsoft Word Format), and should reach IDA by **12 noon, 3 August 2007**. Respondents are required to include their personal or company particulars, correspondence address, contact number and email address in their submissions. IDA will make all or parts of any submissions made in response to this consultation paper public and disclose the identity of the source. Any part of the submission which is considered commercially sensitive must be clearly marked and placed as an annex to the comments raised. IDA will take this into account in its review. All comments should be addressed to:

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AND

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