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By Fax (65 6211 2116) and Email

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Attn: Mr. Andrew Haire
Senior Director, (Policy and Competition Development)
Infocomm Development Authority of Singapore
8 Temasek Boulevard
#14-00 Suntec Tower Three
Singapore 038955

Re: AT&T Comments on the Info-communications Development Authority (“IDA”) Consultation Paper “Policy Framework for IP Telephony and Electronic Numbering in Singapore”

Dear Mr. Haire:

On behalf of AT&T Worldwide Telecommunications Services Singapore Private Limited and its parent corporation AT&T Corp. (collectively, “AT&T”), I am pleased to submit these comments on the IDA Consultation Paper “*Policy Framework for IP Telephony and Electronic Numbering in Singapore*” issued on September 21, 2004 (the “*Consultation Paper*”). As a preliminary matter, IDA defines “IP Telephony Service” as a particular form of Voice over Internet Protocol “*that requires telephone or E.164 numbers, that allows a user to make and receive voice, data and video calls with the same telephone number in any domestic or overseas location where Internet access is available*”.¹ Thus, this *Consultation Paper* on IP Telephony Service directly examines the policy consequences and appropriate regulatory framework of a new service that, in addition to providing the look and feel of a voice service with PSTN access and numbering resources, also can converge advanced voice and data applications, can allow end users to obtain the service from an application service provider

¹ *Consultation Paper* at ¶3.

that could be entirely independent from his broadband network access provider, and that end users can use in a location-independent manner where broadband access is available.

AT&T commends the IDA on its timely initiation of the *Consultation Paper* on IP Telephony and Electronic Numbering, with the intent of finalizing and announcing the corresponding policy framework by March 2005. AT&T is supportive of IDA policy goals and agrees with most aspects of the proposed framework to be deployed for IP Telephony, as one that should encourage investment, innovation and development of the nascent technology that will provide businesses and consumers more choices in terms of price, quality and service features. AT&T also agrees that there exist key distinctions in service attributes differentiating IP Telephony and circuit-switched services. Accordingly, IDA is correct in proposing to adopt the approach of imposing regulations on IP Telephony only to the minimal extent necessary to address certain economic, social, and public safety policy concerns. This approach will lay a solid foundation upon which the IP Telephony technology may develop and flourish in Singapore.

AT&T is pleased to provide below its comments on many of the specific issues raised.

(a) IDA welcomes views and comments on the potential of and benefits arising from the development of IP Telephony; the likely services/applications to be deployed; and the potential demand from businesses and consumers. IDA further seeks comments on how IP Telephony is likely to change the telecommunications competitive landscape in Singapore.

AT&T agrees that the IDA has correctly identified the main potential of and benefits arising from the development of IP Telephony, namely: increased competition and stimulated growth in the telecommunications markets for voice communications services; reduced prices and costs in telephone service provision; enhanced service choices for end-users; and further growth and development of broadband access.

IP Telephony Services differ from traditional voice services in at least five primary areas, that is: location independence/nomadic capability, network independence/access agnostic delivery, reliability, advanced features, and lower costs. Some IP Telephony Services can be used over any broadband Internet connection, enabling the service provider to be independent from the underlying access operator. It also means that users can potentially use the service in any location worldwide where Internet connection is accessible, thus bestowing on it a nomadic capability. The network independence and location independence capabilities inherent to many IP Telephony Services provide unprecedented opportunities for competition and customer convenience.

Further, recent improvements such as a standard known as Multi Protocol Label Switching ("MPLS") have enabled carriers to deliver substantially improved quality IP Telephony by prioritizing voice packets to be delivered on time and in the right order, thus, enhancing clarity of conversation. Over the past few years, improvements in MPLS and also

various compression techniques have placed IP-based voice quality on par with, if not better than, traditional circuit-switched voice networks to deliver extremely high reliability.²

The very nature of IP technology is likely to make it much easier for service providers to offer innovative new features as compared to what is technologically feasible with circuit-switched services. The non-proprietary standard and the open architecture of IP technology means entrepreneurial application design firms can develop new hardware and software that can work seamlessly. By contrast, the circuit-switched network typically operates as a closed system, thus making the building and implementation of new applications more difficult, costly and time-consuming.

The circuit-switched legacy networks rely on setting up, negotiating and managing 'point-to-point' connections for each termination route. Carriers therefore have needed to over-provision for peak traffic periods. This has resulted in relatively inflexible systems. By contrast, the application of IP Telephony has given carriers the benefit of 'point-to-multipoint' connections. Internet bandwidth can be dynamically allocated consistent with the real time needs of the market place. Internet, not being dedicated to any two specific end points, is therefore capable of allowing traffic to be routed in the most efficient manner. In addition to the offering of a considerably more flexible traffic handling regime, the ability of IP Telephony to allocate bandwidth in this most-efficient way means that IP Telephony results in a lower per minute cost, while also making possible more advanced features.

IP-enabled voice services are expected to deliver tremendous value to businesses and consumers alike. Their true value lies with their efficiency, the numerous advanced features, and the control the end user has to customize his communications needs. For example, AT&T Corp. in the US and several other service providers have already begun offering new IP-enabled voice services that provide both voice telephone functionality and enhanced functions far more advanced than the capabilities of traditional circuit-switched voice services. These features offer far more than high quality voice calls at very affordable rates. They also offer unprecedented options for customer convenience and control of their communications options.

In addition to traditional "vertical features" such as voice mail, caller ID, call waiting and call forwarding, unique service attributes not possible with the PSTN are also readily available. Among these features that can be controlled and customized by the end user at a personal computer, are the ability to check voice mail from any phone or computer; the option of storing and forwarding "talking" emails containing voice mail messages; "do not disturb" functions that allow the user to set times to restrict incoming calls while also permitting an override for urgent incoming calls; personal conferencing; advanced call forwarding features that allow sequential or simultaneous forwarding to multiple alternative numbers; and other advanced call management features such as personalized call logs, phone books, and click to dial functions.

² AT&T agrees that for some services the reliability will be impacted by the performance of the user's broadband connection. However, AT&T's experience and that of our customers is that IP Telephony call quality can already match or beat the best PSTN sound quality, particularly where IP Telephony services use a lower compression technique than that used for TDM PSTN.

These features and functions only scratch the surface of IP's potential. IP-enabled voice services are quickly becoming full-blown "computer" applications, limited only by the talents of applications developers. They offer the potential for the full integration of voice, data and advanced computer applications.

Businesses are attracted to IP-based services for the simplified access to both voice and data. This in turn means more flexible and cost effective administration of the communications function. For example, in an IP Telephony environment, the cost for handset MACDs (moves, adds, changes, deletes) is a fraction of the cost and time required in a circuit switched environment. Also, new electronic servicing tools and network intelligence enable businesses to evolve and integrate new technologies more easily and at their own pace. Developing applications and supporting network capabilities for business customers is likely to be an important driver in the future development of IP-based services as a whole. Examples of such enterprise-generated applications include "one number" (or "follow me") services, instant messaging to any device at any location, interactive call centers, readily available multipoint videoconferencing and virtual meeting capabilities, real-time language translation and desktop multimedia services.

Although the possibilities with IP-enabled services may seem almost unlimited, it is unlikely that traditional circuit-switched networks would be replaced overnight. Both businesses and carriers have huge investments in circuit-switched equipment. Economics do not justify the value of an outright write-off of these assets. Similarly, it could be decades before consumers completely replace their existing phones with IP-enabled equipment. We believe as IP Telephony continues to extend its footprint in Singapore and indeed in other regional countries, it is reasonable to anticipate a gradual shift of network traffic to IP infrastructure from the traditional PSTN network. The impact of IP technologies on the conventional telephony segment will be to substantially broaden the range of applications and increase the volume of global network traffic overtime. Nonetheless, given the sheer size of traditional telephony infrastructures in Singapore and the region, both basic telephony services and integrated IP-based voice applications will coexist for a long time and possibly merge at some point.

(b) IDA welcomes views and comments on IDA's proposed regulatory approach to be taken to encourage the development of emerging technologies such as IP Telephony in Singapore.

AT&T believes the very essence of any regulatory approach in encouraging the development of IP Telephony must be that of striking the right balance between encouraging providers of IP Telephony to enter the market with low entry barriers, and ensuring that consumers are properly informed and protected, primarily by market forces. IDA has the correct view that "*it is premature to consider IP Telephony and circuit-switched telephony services as being identical services delivered on different technology platforms.*"³ Accordingly, IDA correctly asserts that these fundamentally different services merit a different regulatory approach, even if to achieve the similar policy goals.

³ Consultation Paper at ¶ 8.

AT&T applauds IDA for having resisted the temptation of a reflexive application of the traditional telephony services regulations to IP Telephony. Such a reactive approach would not acknowledge the advanced service attributes as well as the service limitations associated with use of IP Technology. Instead, IDA proposes to adopt the flexible approach of *“imposing regulations only to the extent necessary to address certain economic, social/public and regulatory concerns relating to the provision of IP Telephony... thus allowing emerging new technologies such as IP Telephony to fully develop at the introductory phase.”*⁴ IDA is correct in basing its regulatory approach to IP Telephony on a confidence that competitive market forces will deliver unprecedented benefits in a way that also protects the interests of Singapore consumers.

Although AT&T is pleased that IDA is inclined not to reflexively impose identical regulations to IP Telephony, AT&T believes this light-handed approach has not been transposed in the proposed scheme of number allocation. IDA proposes to assign a new 8-digit number level “3” for IP Telephony Services, and proposes that the existing number level “6” for local fixed line services only will be made available to IP Telephony Service providers on the condition that they could comply with *all* of the same traditional licensing conditions under the Facilities-Based Operation (“FBO”) license. AT&T submits that the existing number level for local fixed-line services should also be made available for IP Telephony Services, but without full mandate of all existing regulatory requirements as a pre-condition. AT&T will provide its detailed comments on this concern below, in response to IDA question (d).

Additionally, AT&T emphasizes that IDA also will need to consider regulatory safeguards necessary to ensure fair competition in the provision of IP Telephony Services. In this regard, AT&T advocates a layered regulatory framework that recognizes the fundamental differences in how service providers can deliver IP Telephony to consumers. This approach would distinguish the regulatory considerations of IP Telephony at the “applications layer” from the regulatory considerations of the underlying access and transport at the “network layer” that is provided by FBOs. In this model, if regulation adequately protects against abuse of market power at the FBO network layer – that is, the broadband network facilities through which consumers access IP Telephony applications – then the preconditions for market power at the IP Telephony applications layer typically will be absent, due to the ability for many IP Telephony Service providers to directly serve consumers.

Only modest regulation at the network layer should be necessary to protect IP Telephony competition. One rule should be to forbid any network provider, or entity providing Internet access to subscribers, from impeding or degrading access to the Internet content of another applications or service provider, except where such access would threaten the integrity of the network, or where required by law. Second, IDA should broadly prohibit any broadband transport provider from requiring subscribers to purchase any IP-enabled service as a condition of obtaining broadband Internet access service. This form of tying would restrict competition at the applications layer. Nor should the broadband transport provider be allowed to improperly seek to double-charge for broadband access (i.e., collect once from end user for broadband subscription, and then also seek an “interconnection

⁴ *Consultation Paper* at ¶ 9.

payment” from IP Telephony Service providers when the end user accesses the IP Telephony Service over the same broadband connection).

(c) IDA welcomes views and comments on IDA’s proposed licensing approach for providing IP Telephony in Singapore.

AT&T submits that the policy framework that will best realize IDA’s objectives is to treat IP applications as a value added service so that not only can FBO licensees provide these services, but Service-Based Operation (“SBO”) licensees can also compete to deliver service in demand by consumers. AT&T supports the IDA’s proposed licensing approach, allowing SBO licensees to participate and compete in the provision of IP Telephony Services, along with FBO licensees. This will benefit users and the broader economy through active competition.

(d) IDA welcomes views and comments on the proposed phased approach in assigning new number levels to FBO and SBO (individual) licensees for IP Telephony services. Please provide supporting reasons for the comments and proposals made. IDA invites views on whether there is a need for IDA to take a further measures to ensure that the national numbering resources continue to benefit End Users in Singapore such as requiring IP Telephony service providers to assign level “3” numbers to only users with valid Singapore addresses. IDA also invites views on whether there will be technical issues if IDA were to allocate numbers in blocks of 1,000 instead of the usual blocks of 10,000?

In most respects, IDA’s proposed policy for assignment of number resources is sound. The proposal to create a new level “3” number range specifically for IP Telephony Services would provide a “safe harbor” for innovation and particularly light-touch regulation, and would lower all significant barriers to obtaining a license and numbering resources. This is a welcome step to foster IP Telephony innovation, and will suit the needs of many service providers and many end users. However, in addition to the proposed approach for the level “3” number range, AT&T does recommend that IDA should also take a more flexible approach to the assignment of traditional level “6” numbers to certain IP Telephony Service providers.

There are several reasons why it will remain important to make available the traditional level “6” numbering resource for IP Telephony Service providers, without requiring as a condition precedent that all traditional voice regulations be satisfied. First, over time as IP Telephony Service grows in acceptance and use, and at some future point surpassing use of circuits switched voice services, it may be a very inefficient use of the Singapore numbering resource to exclude these services from the level “6” number range. Second, because many customers will be more comfortable switching to IP Telephony Service only if they use a familiar numbering resource (i.e., familiar both to them, and familiar to the people who will call them and who will want to be aware of any relevant call charges associated with that number range), reasonable access to these familiar numbers will promote IP Telephony adoption by consumers beyond the early adopters. Third, because a high percentage of customers may wish to switch to IP Telephony only if they can port-in their existing level “6” number, unnecessary barriers to use of these numbers will impede IP Telephony competition by limiting portability. Traditional voice service providers will have a

strong defensive market position by virtue of the numbering resources if most IP Telephony Service providers cannot offer use of the same familiar numbering resource. Finally, as discussed below, IDA has proposed too high a set of requirements for use of the traditional level “6” numbering resource, whereas it could justifiably narrow the tailoring of these requirements, and benefit Singapore consumers by doing so.

IDA has proposed to make available the level “6” number resource to IP Telephony Service providers only if they satisfy the full set of traditional telephony requirements, including: (1) be an FBO licensee; (2) comply with IDA interconnection framework; (3) provide number portability; (4) provide connection to emergency agencies; (5) provide directory enquiry services; and (6) comply with the QoS for local fixed-line call services.

This approach of tying IP Telephony use of the most familiar and valued numbering resource to regulations designed around traditional circuit switched service requirements and capabilities is flawed, because it applies circuit switched rules that do not apply to the facts of IP Telephony. For example, the QoS requirement fails to acknowledge the fact that QoS for many IP Telephony Services depends not only on the service provider’s equipment, but also on the underlying broadband connection potentially from an independent service provider. Thus, the only way to confidently satisfy this QoS requirement would be to be a party that controls both the access layer and the application layer on a proprietary end to end bases (i.e. creating a monopoly or duopoly environment at best). Second, although emergency service capabilities with IP Telephony Services will steadily improve over time, at the outset service providers may not be able to offer the same level of emergency service access as exists from traditional voice services. This rigid transfer of all traditional voice rules serves as the barrier to obtain level “6” numbers will stifle IP Telephony competition, will give traditional voice providers an unjustified defensive advantage, and will unnecessarily limit the choices of consumers who want IP Telephony service over a level “6” number.

AT&T recommends that IDA take a more flexible approach to assignment of level “6” numbers, allowing greater service provider differentiation in key areas such as QoS and emergency service access solutions. By more narrowly tailoring the requirements to use level “6” numbers, and by creating an innovative safe harbor to use level “3” numbers, IDA will have a sufficiently sophisticated and flexible number use policy that creates a robust environment for service providers to bring globally cutting-edge IP Telephony Services to Singapore consumers.

Finally, IDA has inquired about use of 1,000 number blocks rather than the traditional 10,000 number blocks. In this context, AT&T can share our experience in implementing a change in number block allocation from 10,000 to 1,000. In the United States, allocation of numbers in blocks of 1,000 has already been generally implemented. Thousand Block Number Pooling (“TBNP”), as it is known, has been a priority prong of the US FCC strategy to defer exhaust of the North American Numbering Plan in the face of proliferation of service providers, each needing numbering resources in multiple geographic areas. TBNP has significantly extended the life of the number plan, and is working very effectively, as

evidenced by a recent FCC report stating that TBNP has already saved *over 61 million telephone numbers*.⁵

(e) IDA welcomes views and comments on IDA's proposed approach to apply the same interconnection framework under the Telecom Competition Code to IP Telephony service providers. IDA also welcomes views and comments on whether the current interconnection framework is sufficient to address the interconnection arrangements with IP Telephony networks. Specifically, IDA invites views on issues such as interconnection configurations or models that are likely to arise, technical, financial and implementation considerations for interconnection. Please provide supporting reasons for each comment and proposal made.

AT&T agrees that if IP Telephony Service providers choose to interconnect with existing telecommunications networks, then they should observe the interconnection requirements stipulated under the Telecom Competition Code and allow interconnection requests from existing FBO and SBO licensees. In this regard, AT&T would expect that interconnection arrangements with IP Telephony Service providers would be subject to non-discrimination requirement, and that interconnection charges should be cost-oriented. The IDA should ensure, for example, that traditional voice service providers do not charge a non-cost-justified higher interconnection rate when exchanging traffic with an IP Telephony Service provider.

(f) IDA welcomes views and comments on whether there is a need for QoS to be established for IP Telephony. If so, what are the types of QoS needed and the minimum standards to be set?

AT&T supports IDA's proposal to refrain from imposing QoS on IP Telephony but instead to allow market forces to dictate the price points and the corresponding QoS levels. This is consistent with the principle that the regulatory approach that IDA will adopt should recognize the ability of IP Telephony to best achieve consumer welfare through a light-touch approach that maximizes reliance on market forces. A combination of robust competition, service provider differentiation and customer notification will ensure that the appropriate balance of consumer requirements are met in the market.

(g) IDA welcomes views and comments on whether there are issues relating to the provision of emergency services in the context of IP Telephony. IDA further invites comments on the availability of operational solutions to address the issue of emergency calls.

AT&T submits that in most respects, IP Telephony Services will offer consumers capabilities that far exceed those of traditional telephone services. Of course, there are certain current limitations to be addressed and improved. With regard to emergency services, there is wide recognition of the fact that new technologies and operational arrangements will need to be developed and perfected, because location-independent/nomadic IP-enabled services often

⁵ *FCC Releases Telephone Numbering Resource Utilization Report, Over 61 Million Numbers Saved Through Thousand-Block Pooling*, FCC News, (rel. Dec. 11, 2003) (http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/utilizationjun2003.pdf).

cannot comply strictly with legacy requirements that were designed over time to suit traditional circuit-switched telephone service capabilities. Mechanical application of traditional requirements to IP-based applications thus risks stunting development of new and important services, features and functionalities that could actually improve consumer interests.

There is however a need to recognize the difference in the level of demand for emergency calls access among different market segments. For example, AT&T does expect that for IP Telephony Services targeting residential users, most service providers will have strong incentives to continually improve emergency service capabilities, as such capabilities will be demanded by most residential consumers and high quality satisfaction of this demand will be a valued market differentiator. On the other hand, AT&T believes that there are IP Telephony applications (e.g. those positioned as secondary rather than primary lines for business teleworkers) and users where provision of access to emergency services may not be appropriate or, indeed, a particular customer requirement or business priority.

Further, AT&T views the current challenges with IP Telephony as an opportunity, given that IP environment applications could develop far superior public safety solutions for the coming Century. This potential for emergency service improvement through IP technology, and the very potential for IP Telephony market entry itself, could be compromised if unrealistic obligations are imposed at the outset. Rather, industry should be encouraged to develop workable, operational solutions with regard to routing emergency calls, the effective transmission of caller ID and provision of location information. In this regard, many IP Telephony service providers are working hard on solutions to give consumers emergency call access in the foreseeable future.

AT&T therefore endorses IDA's proposal of leaving the decision to the service providers if they would like to provide access to emergency services on the condition that precise information is given to customers as to the capabilities and limitations of the service to reach the emergency agencies.

(h) IDA welcomes views and comments on whether there are issues that may pose problems to achieving number portability in future.

AT&T endorses IDA's view that it would not be appropriate to mandate number portability at this nascent stage to all IP Telephony Service provider, in order that IP Telephony Service providers are not unduly burdened if that provider does not seek number portability rights. For some service providers, number portability rights will not be important due to the demands of their target customer base, so accordingly such rights and obligations should not be mandatory.

However, for other service providers, number portability rights (and associated obligations) will be critical to meet the demands of their target customers. To allow a level playing field for competition by IP Telephony Service providers, it is essential that IDA allow such service providers to opt in to number portability rights, if they will also accept number portability obligations. To emphasize the need, many consumers may be inclined to switch from a traditional telephone service to an IP Telephony Service only if the consumers can port-in an existing familiar number. Indeed, AT&T's experience in the U.S. with residential

consumers is that a majority of new customers of our IP Telephony Service do seek to port-in their existing number.

If IDA does not ensure that IP Telephony Service providers have enforceable number portability rights, then adoption of service could be stifled, and the market share of the fixed line incumbent protected from a potential substitute. Although the technical mechanics of number portability between IP Telephony Service providers and traditional fixed-line service providers (or, between different IP Telephony Service providers) will require work overtime between industry and government, the IDA should begin with a policy premise that such rights are available when desired and when accompanied by an obligation.

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

Please refer to AT&T responses to IDA question (d).

* * *

In summary, AT&T supports IDA's forward-thinking view that IP Telephony Services provide an unprecedented opportunity for competition and innovation, and that at this nascent stage of service development, a light-touch regulatory approach is appropriate. For the short term, IDA should allow service providers a wide latitude to provide differentiated services that users demand (i.e., as opposed to mandating a "one size fits all" approach), and in turn, to expect that service providers should make their users clearly aware of essential capabilities and limitations of their particular IP Telephony service. This powerful combination of competition, service differentiation and customer information will promote innovation and improve the customer experience. Over the long term as the service starts to mature, if IDA does find that these market forces are not adequately addressing specific policy concerns, then on the basis of experience IDA can better identify general compliance obligations for the industry.

AT&T would be pleased to respond to any questions concerning these comments and to provide any further information that would be helpful to the IDA with respect to the *Consultation Paper*. Please do not hesitate to contact me in that regard.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Vincent Ma", written in a cursive style.

Vincent Ma