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November 4, 2004

VIA ELECTRONIC MAIL AND FAX

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Re: Public Consultation on the Policy Framework for IP Telephony and Electronic Numbering in Singapore

Dear Sirs, dear Madams,

On behalf of Vonage Holdings Corp. ("Vonage"), we are pleased to submit comments to the Info-Communications Development Authority ("IDA")of Singapore in the above-mentioned proceeding.

Vonage is the leading broadband US-based Voice over Internet Protocol ("VoIP") — provider with more than 300,000 "line equivalents." Although Vonage offers its service to residents in the United States and Canada, the service is mobile and can be used in any country with broadband access. Vonage recently began its r offering its services in Canada and plans to enter new markets, including Singapore For more information about Vonage's products and services, please visit www.vonage.com. Vonage is pleased that the IDA has opened this proceeding to clarify regulatory framework applicable to VoIP. Because VoIP services are mobile, and because they can be offered to subscribers in countries where the provider has no physical nexus – it is critical that the IDA adopt a reasonable and uniform regulatory framework that does not discourage the deployment or adoption of these innovative communications offerings.

BROADBAND ADOPTION AND VOIP SERVICES

It is critical that VoIP services continue to grow and attract users in order to spur the deployment of broadband facilities and networks within Singapore. On a global level, broadband deployment is still in its infancy but is growing at an impressive pace. At the start of 2003, there were 63 million broadband subscribers worldwide which represents a 73 percent increase from 2002; however, these numbers still pale in comparison to the 1.13 billion fixed-line users and the 1.16 billion mobile phone users.[1] Further analysis of the broadband penetration rates show that the Singapore is lagging behind the rest of world. Korea, Hong Kong and Canada top the list with 21.28, 14.90 and 11.19 subscribers per 100 people, respectively.[2] Singapore ranks 14th with 5.53 broadband subscribers per 100 people.[3] VoIP is a catalyst for broadband adoption because broadband Internet is a precondition to using VoIP. For the price of using a dial-up Internet connection and traditional telephony a customer can upgrade to a broadband Internet connection and upgrade to the advanced features and functionality of VoIP. [4]

Recent market analysis prepared by investment bankers suggests that light regulation of IP-enabled services is already increasing broadband penetration rates in the United States. For example, in 2003, broadband penetration rates in the United States increased 5.7%.[5] According to one investment firm "VoIP will add fuel to the broadband fire, helping to drive [broadband] penetration over time."[6] The report expresses concern, however, that overly burdensome regulation could impede broadband penetration.[7] By adopting an appropriate regulatory framework, the IDA could have a dramatic and favorable impact on broadband adoption and deployment within Singapore.

DESCRIPTION OF VONAGE'S VoIP SERVICE

Vonage provides a form of VoIP service, enabling customers with broadband Internet connections and specialized Customer Premises Equipment ("CPE") to communicate without using a telephone line. This distinguishes Vonage's services from many VoIP services that are already available in Asia. Vonage's service permits intercommunication between the incompatible protocols used on the Internet and on the Public Switched Telephone Network ("PSTN"). Vonage's service is an Internet offering that, like e-mail, instant messaging, Internet conferencing, and other as yet undreamed of services, permits customers to communicate over the Internet. Although it resembles traditional telephone service in some respects, it has crucial technical and functional differences.

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1 *Birth of Broadband*, ITU Internet Reports 2 (Sept. 2003) ("ITU Report"). The term "broadband" is defined in the ITU Report as "transmission capacity with sufficient bandwidth to permit combined provision of voice, data and video with no lower limit. Effectively, broadband is implemented mainly through ADSL, cable modem or Wireless LAN . . . services." *See id* Glossary.

2 *See id*., Table A-12.

3 *Id*.

4 Matt Richtel, *In a Fast-Moving Web World, Some Prefer the Dial-Up Lane*, N.Y. TIMES, April 19, 2004, at A1.

5 Merrill Lynch, *Everything Over IP: VoIP—and Beyond*, at 1 (March 12, 2004).

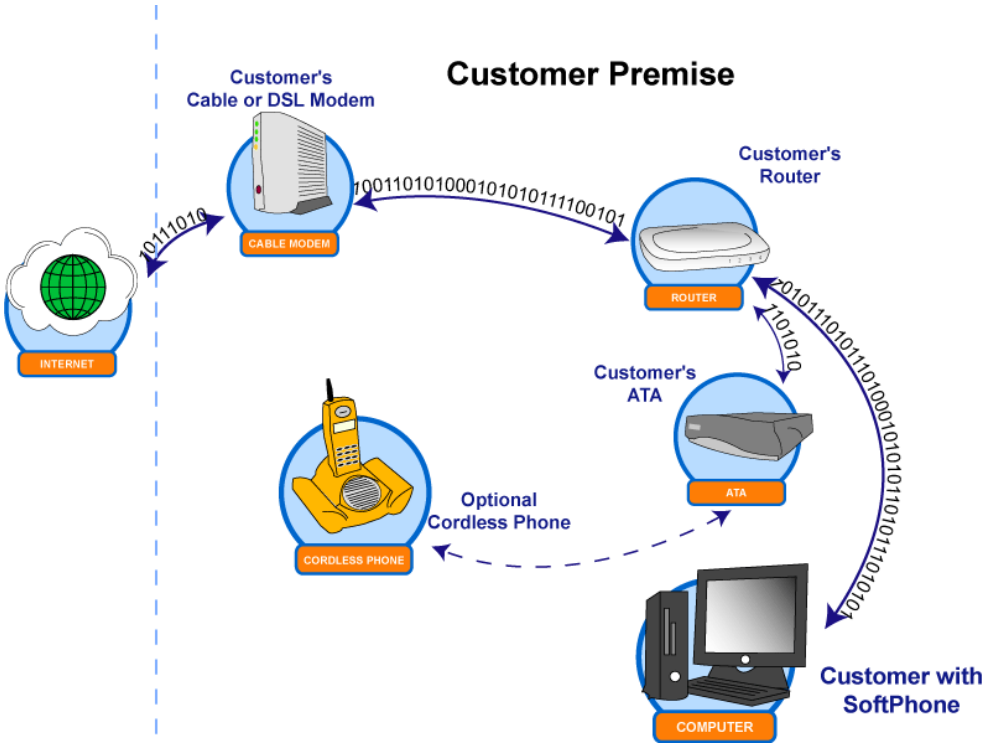
6 *Id.*

7 *Id.* at 2.

First, unlike some other services that rely on Internet Protocol transmission, Vonage customers cannot access Vonage's service by "dialing in" over the PSTN. Vonage customers can only access the service over a high-speed Internet connection provided by a third party telecommunications carrier, satellite or cable company. Because Vonage's service is accessed over the Internet, it can be used anywhere a broadband Internet connection is available. Thus Vonage's customers may use their service anywhere in the world so long as they have access to a broadband Internet connection. Further, the physical location of users on the Internet cannot be accurately determined, as a technical matter, so it is impossible for Vonage for identify the point of origin or termination of traffic on its network.

Second, Vonage's service requires customers to purchase special equipment, namely a computer device. Vonage customers must subscribe to a broadband Internet access service, and then install compatible computer equipment that encodes audio signals as digital packets (or vice versa) and transmits and receives those packets over an Ethernet connection. Most Vonage customers use a specialized computer called a Multimedia Terminal Adapter ("MTA"), which contains a digital signal processing unit that performs digital-to-audio and audio-to-digital conversions, and has a standard telephone jack connection. Although a customer can connect conventional analog telephone sets to the MTA computer for use with Vonage's service, a conventional telephone will not work with Vonage's service unless it is connected to computer hardware or software that generates digital packets. Other Vonage customers do not use any traditional telephone equipment. Some use "native IP phones," which include both a telephone handset and a digital signal processing unit in an integrated device—such a device can only be used with an Internet connection, as it is not compatible with the PSTN. Still other users may not use any telephone handsets at all, but configure their personal computer equipment so that the microphone and speakers attached to the computer are used as the audio input and output, using a software application on the computer to perform the digital-to-analog conversion. Vonage is also testing the compatibility of its service with Personal Digital Assistant ("PDA") devices and WiFi-enabled phones. In short, Vonage's network processes IP packets, regardless of what devices are used to encode or decode the audio content contained in those packets.

Once the Vonage customer has installed and configured their computer equipment and the requisite software, the customer can place and receive "calls" to anyone with a telephone number (including other Vonage customers) by establishing a connection over the Internet to a Vonage server. A typical Vonage user's equipment configuration is represented in the figure below:



Third, Vonage is an information service and performs a net protocol conversion from IP to TDM on Vonage to PSTN communications and from TDM to IP on PSTN to Vonage communications. This conversion permits users of broadband Internet connections to communicate with users of the PSTN. Vonage users can initiate and receive communications to and from PSTN users. Vonage's service uses computerized media gateways that provide an interface between the Internet and the PSTN, including protocol conversion between the incompatible digital formats used by these two networks; and computer servers that process set-up signaling and route packetized data between the media gateways and other points on the Internet. Vonage does not provide either Internet access or telecommunications services. Rather, the distinguishing characteristic of the Vonage service is the conversion of data to permit communication between users of the Internet and users of the PSTN.

Packets sent by the customer's MTA or other computer are routed over the public Internet to Vonage's servers. There, if the communication is destined to a station on the PSTN, Vonage converts the information received in the IP packets to a TDM digital signal, and obtains a connection to the PSTN station using the services of an unaffiliated common carrier. If, however, the transmission is to be connected to another Vonage user, then it is not converted to a TDM signal, and instead the Vonage server routes a new set of IP packets to the second user. Vonage-to-Vonage "calls" never travel over the PSTN, and thus constitute purely "computer-to-computer" communications.

Fourth, in offering its services to residents of the United States and Canada, Vonage associates each of its customers with one or more telephone numbers. The telephone number

associated with the Vonage customer is not tied to the customer's physical location. Rather, the telephone number is mapped to the digital signal processor contained in the customer's computer, enabling Vonage to identify and serve that customer over any broadband Internet connection in any country.

LICENSING FRAMEWORK / INTERCONNECTION AND ACCESS

Vonage generally agrees with IDA's position to incorporate VoIP providers within the existing regulatory framework in Singapore, as Facilities-Based Operation ("FBO") or as Service-Based Operation ("SBO") providers, depending on the services and facilities that providers deploy in Singapore.[8] In particular, Vonage supports that providers that carry voice/data over the public Internet need only require to register as an SBO (Class) provider in order to offer their services.

As noted in detail above, Vonage's service is an Internet offering that simply permits customers to communicate over the Internet. As such, if IDA's proposed framework is to be adopted, Vonage would only be required to register as an SBO (Class) operator to provide its VoIP offering in Singapore. Vonage believes that an SBO (Class) registration is sufficient to allow Vonage and other similarly situated providers to offer VoIP services to consumers in Singapore. However, Vonage notes that none of the services described in IDA's Guidelines for Submission of SBO licenses[9] appropriately fit Vonage's or other similarly situated carriers VoIP service offerings, Vonage suggests that the IDA create a new category of SBO (Class) offering for VoIP providers. This subclass would be given the same rights as SBO providers and would ensure that only appropriate and technically feasible obligations are imposed on VoIP providers. This is critical since VoIP providers offer their services in a fundamentally different manner than circuit switched providers and, as such, may not be capable of complying with the same technical requirements and obligations.

Of particular concern for Vonage is the ability of SBO (Class) licensees to deploy servers and computer equipment for the net protocol conversions associated with their service offering. This hardware shall not be deemed "facilities" or "switching" equipment as defined in the Telecommunications Act. Accordingly, Vonage urges the IDA to ensure that the new licensing framework for VoIP providers transmitting their services over the public Internet, allows SBO (Class) licensees to deploy all computer equipment necessary for their offering.

As to the interconnection obligations imposed on VoIP providers, Vonage supports that VoIP providers have full access to interconnection with other carriers as proposed by the IDA. [10] Other than the specific technical issues identified below, Vonage is willing to provide access to other carriers and expects other carriers to provide access to Vonage in terms similar to those contained in the Code of Practice for Competition in the Provision of Telecommunications Services (the "Code"). However, under the current definitions in the Code, only SBO licensees

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8 *See IDA Consultation*, at ¶ 10.

9 *See Guidelines for Submission of Application for Services-Based Operator Licenses*, Version 5, September 8, 2004, Annex 2.

10 *See IDA Consultation*, at ¶ 21.

that use "switching and routing" equipment are afforded interconnection rights in Singapore. As noted in detail above, Vonage simply uses computer hardware to effect net protocol conversions and this equipment may not be considered "switching or routing" equipment as associated with traditional telecommunications networks.

Vonage proposes that the IDA amend the Code in order to provide the right and obligations of interconnection to VoIP carriers such as Vonage. The terms of the interconnection obligations should be similar to those contained in Sections 4 and 5 of the Code (*i.e.*, interconnection should be through commercially negotiated agreements); however, the new VoIP interconnection framework needs to take into account the specific characteristics of VoIP services, as opposed to traditional wireline networks. For instance, Vonage proposes that interconnection with a VoIP provider's "network" may be done directly or indirectly and at a point mutually agreed by both parties to the interconnection arrangement. Moreover, Vonage notes that the duties imposed by Section 4.6 of the Code, including duties to comply with mandatory technical standards and duty to disclose interfaces are not specifically suited for VoIP providers.

In reviewing the interconnection framework applicable to VoIP providers, Vonage urges the IDA to take a "light touch" approach to VoIP networks. In particular, Vonage notes that some of the interconnection obligations imposed on traditional telecommunications providers are not best suited for next-generation VoIP communications. Vonage reaffirms its commitment to provide access to other carriers, but requests the IDA to create an interconnection framework that allows the parties to freely negotiate the terms of the interconnection agreement and minimizes regulatory intervention.

VONAGE RECOMMENDS THAT THE IDA ADOPT OPTION "A" IN ALLOCATING NUMBERS TO VoIP PROVIDERS

In the Consultation, the IDA proposes to adopt Option D in allocation numbers to VoIP providers. Briefly, Option D calls for the assignment of a new 8-digit number level that would differentiate VoIP users from local fixed-line call services telephone numbers.[11] This option also allows for the assignment of a 4-digit national destination code should demand warrant such an allocation.

Vonage appreciates the IDA's concerns regarding the use of numbers by VoIP providers. In particular, the IDA expresses concern that if the same numbers are used for VoIP services as those that are used by providers of domestic local fixed-line call services, numbers allocated from this block of telephone numbers may exhaust. The IDA is also concerned that use of the same telephone numbers for VoIP and local fixed-line call telephone services may also lead to customer confusion as customers may think the services provided by VoIP providers is equivalent to what they receive in the local fixed-line call services marketplace; however, Vonage recommends that the IDA adopt Option A and assign telephone numbers using the same numbering scheme that now applies to users of local fixed-line call telephone services.

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[11] *IDA Consultation*, ¶¶ 12-17.

In order to provide effective competition in the marketplace for communications services, providers of VoIP services cannot be viewed by consumers as problematic. If customers are required to change their telephone numbers in order to use VoIP services, customers will be much less likely to use the service. VoIP services can only be used by approximately 6 out of every 100 subscribers in Singapore.[12] To further restrict VoIP services to only those customers that are willing to change their telephone numbers is to place inordinate burdens on a fledgling industry.

Concerns regarding number exhaust do not withstand scrutiny. At the base of the IDA's concern about number exhaust, is the assumption that VoIP providers' use of telephone numbers will expand the need for telephone numbers, which could advance the exhaust telephone numbers used to provide local fixed-line call telephone numbers. This assumption could be based on three different misconceptions: (i) that customers who choose VoIP services will use it as a complement to existing telecommunications services, rather than as a replacement; and/or (ii) that since VoIP services like Vonage's separate telephone numbers from geography, global demand for Singaporean telephone numbers will lead to exhaust; and/or (iii) VoIP will increase the demand for numbers and without any corresponding conservation benefits.

It is Vonage's experience that many users of its service port telephone numbers from existing providers of telecommunications services to Vonage. In fact, more than half of Vonage's customers in the United States have ported their telephone numbers from an existing telecommunications carrier to Vonage's service. This is true for two reasons. First, Vonage's service appeals to both residential and small business customers. These customers typically, want to retain their telephone number(s) for convenience or business-related reasons. Residential customers do not want to have to inform family and friends of a changed telephone number and small business users do not want to incur the expenses associated with informing their clients, changing their letterhead, marketing materials, business cards, etc. Second, these customers are attracted to Vonage's service due to it competitive price, superior customer service and innovative features. Rather than paying for Vonage's feature-laden, low-cost service and an expensive local fixed-line call service, Vonage customers drop their existing provider of legacy telecommunications services in favor of Vonage's service.

Vonage appreciates the IDA's concern about potential global demand for Singaporean telephone numbers; however, Vonage believes that this concern is misplaced. While it is true that VoIP services like Vonage's can be used from any location that provides broadband Internet access, the utility using a telephone number from one country in another is significantly reduced for economic reasons. International settlement rates discourage the use of telephone numbers that are associated with a foreign country. For example, if a Vonage customer physically located in the United States were to use a Singapore telephone number, every call made by or to that Vonage customer would be assessed as if it were an international call, unless the call originated in Singapore. It has not been Vonage's experience that allowing access to numbers from other countries has increased demand for those numbers in an appreciable manner.

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[12] *See Birth of Broadband*, Table A-12.

In considering issues of exhaust, it is also important to note that VoIP services actually promote number conservation goals. Specifically, because the service is portable, Vonage customers enjoy the convenience of choosing to have a *single* telephone number follow them wherever they may go. This avoids the complexity and annoyance of subscribing to multiple fixed telephone lines. For example, a Vonage customer with a vacation home and primary residence will choose to give friends and family the single number associated with their portable Vonage services rather than distribute multiple telephone numbers, check messages at various locations and pay for several fixed telephone lines.

Lastly, in responding to the IDA's concern that customer's could be confused if VoIP services are assigned the same numbers as traditional telephone services – Vonage believes that the overwhelming majority of users are aware of the differences between the service they receive from a VoIP provider and that available from legacy providers of telephone service. As detailed above, in order to make use of Vonage's service, customers must have a third-party provided broadband Internet connection and a specialized device (or software). When signing up for the service, the customer is repeatedly informed of the unique aspects associated with Vonage's service. Finally, customers using the MTA computing device received a printed notice also advising them of certain key differences between Vonage's service and local fixed-line call service. In short, Vonage believes that the risk of customer confusion is unlikely.

VONAGE SUPPORTS DIRECT ASSIGNMENT OF NUMBERS TO VoIP PROVIDERS

Vonage agrees with IDA's recommendation that VoIP providers, whether FBO or SBO authorizations, be given direct access to obtaining telephone numbers.[13] In order for VoIP providers to compete effectively with other providers of communications services, VoIP providers must have the same ability to obtain telephone numbers as existing providers. Accordingly, Vonage agrees with the IDA that VoIP licensees should be granted the ability to obtain telephone numbers directly.

VONAGE SUPPORTS THE IDA'S PROPOSAL TO NOT SUBJECT VoIP PROVIDERS TO QUALITY OF SERVICE GUARANTEES

Vonage agrees with the IDA that providers of VoIP services should not be subject to quality of service ("QoS") guarantees for real time voice.[14] Unlike the market place for local fixed-line call services, the VoIP market is extremely competitive. If customers are not satisfied with the QoS of a particular VoIP provider they can switch to a new service provider with incredible ease. Further, Vonage's service is wholly reliant on the third-party provided broadband Internet connection of the user. VoIP providers like Vonage do not offer broadband Internet access services; rather, Vonage offers an application available over the Internet. When Vonage customers place or receive calls, the communications are routed over the third-party provided Internet connection subscribed to independently by the Vonage subscriber. Vonage does not have any control over any quality of service issues associated with that connection. As

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[13] *See IDA Consultation*, at ¶ 19.

[14] *See IDA Consultation*, at ¶ 22.

such, Vonage does not have control over the key element, *i.e.*, the facility, that is most likely responsible for the vast majority of QoS-related issues. Accordingly, the imposition of QoS requirements on Vonage is inapposite.

VONAGE SUPPORTS THE IDA PROPOSAL TO ALLOW VoIP PROVIDERS TO DETERMINE WHETHER TO PROVIDE ACCESS TO EMERGENCY SERVICES

As the IDA, recognizes, there are many technological difficulties associated with the provision of emergency services by VoIP providers.[15] Vonage's emergency service solution implemented in the United States is very different from that offered by a traditional provider of telephone services due to the differences its technology and network architecture between its service and that offered by legacy providers of circuit-switched telephone service. Further, the fact that Vonage's service is a "nomadic" VoIP service means that it does not currently allow for the automatic delivery of location information when Vonage customers dial for emergency services. Vonage agrees with the proposal in the Consultation that VoIP providers be allowed to chose whether to provide access to emergency services and to provide precise information to customers on how the VoIP provider handles access to emergency services. Vonage already provides its customers in the United States and Canada with such information.[16]

VONAGE BELIEVES THAT NUMBER PORTABILITY SHOULD BE REQUIRED

Vonage appreciates the IDA's concern about over-regulating VoIP services; however, a key component to establishing competition in the marketplace is to allow customers to port their telephone numbers to their service provider of choice. Residential customers are extremely reluctant to switch to a service provider that would require them to change their telephone number because of the inconvenience it causes friends and family. Similarly, businesses resist changing telephone numbers because of the expense associated with printing new business cards, updating letterhead, revising marketing materials, etc. In fact, some businesses view their telephone numbers as an important company asset. For these reasons, Vonage strongly believes that number portability between all providers of communications services is critical to VoIP service providers. New entrants to the communications marketplace are already placed at a significant disadvantage as compared to incumbent providers of traditional telephone services who serve a captive base of ratepayers. Additionally, the broadband penetration rates in Singapore, detailed above, limit the number of customers that even have the option of choosing VoIP services. If potential customers of VoIP services cannot seamlessly transition to VoIP services by keeping their present telephone numbers, VoIP providers will be placed at a disadvantage.

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[15] *See IDA Consultation*, at ¶¶ 24-25.

[16] Please visit http://www.vonage.com/features_terms_service.php and http://www.vonage.com/features.php?feature=911 to view a detailed description of Vonage's provision of access to emergency services.

VoIP PROVIDERS SHOULD BE ALLOCATED 8-DIGIT NUMBERS BEGINNING WITH "6" REGARDLESS OF WHETHER THEY ARE A FBO OR A SBO LICENSEE

Vonage recommends that the IDA re-examine its proposal to require VoIP providers to comply with the same licensing conditions as an FBO licensee in order to obtain 8-digit numbers that begin with a "6."[17] As detailed herein, Vonage supports Option A in terms of in allocating numbers to VoIP providers. Access to the same telephone numbers as local fixed-line call services is essential to enable VoIP providers to compete with traditional voice operators. Vonage cannot overemphasize the importance of both adopting Option A and mandating number portability. To do otherwise is to place VoIP providers at a significant competitive disadvantage and to impede the development of competition in the communications marketplace. Without access to the same telephone numbers as traditional providers of communications services, users are much less likely to adopt VoIP services. This, in turn, will reduce demand for broadband services and frustrate the development of broadband networks. Accordingly, the IDA should not require VoIP providers to comply with the conditions of an FBO licensee in order to obtain a certain range of telephone numbers.

[17] *See IDA Consultation*, at ¶29.

CONCLUSION

The regulatory policy concerning VoIP and its technical development are in a state of flux on a global scale. This is a great opportunity for Singapore to become a leader in promoting a uniform, rational regulatory framework. A uniform rational framework will encourage deployment and adoption of innovative service offerings and broadband networks. Vonage stands ready to support Singapore in its efforts to promote a rational, unduly burdensome regulatory approach to VoIP and would be pleased to resume a dialogue with Singapore.

Please feel free to contact the undersigned if you have any questions.

Sincerely yours,

/s/

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