RESPONSE TO TELECOM REGULATORY AUTHORITY OF INDIA CONSULTATION PAPER

Consultation topic:	**Internet Telephony (VoIP)**
Organisation:	**Microsoft Corporation India Private Limited (MCIPL)**
Contact number for any clarifications:	**9811674653**
Email address for any clarifications:	**schandr@microsoft.com**

INDEX

EXECUTIVE SUMMARY

Rapid technological developments are facilitating higher processing power of end devices, reducing memory storage cost and thus enhancing the capability to perform various applications on a common platform. This trend is driving convergence of devices and services, as well as a move to next generation internet protocol (IP)-based networks for the movement of both voice and data traffic (where "voice" is often just another "bit" being moved over data networks). This move to converged platforms and an all-IP network across India and the rest of the world demands a fresh look at the economics and regulatory structure for managing the provision of data and communications services. Microsoft Corporation India Pvt. Ltd. ("Microsoft") applauds the Telecom Regulatory Authority of India ("TRAI") for launching this Consultation to ask important questions regarding the regulatory precincts of one of the more significant services enabled by these IP networks – Voice over Internet Protocol ("VoIP") -- to ensure that Indian businesses and consumers benefit from the innovation created by the internet. TRAI was indeed sagacious and visionary in recommending unfettered internet telephony way back in May 2008, however its recommendations never got translated into reality. Hence we are confident that this time around TRAI's current initiative and renewed efforts will bear fruit.

"VoIP Vs. PSTN" is often wrongly portrayed as a zero sum game. The telecommunication companies play an extremely important role in investing and maintaining infrastructure in India. It's nobody's case that the telecommunication companies should be made to suffer, and there is certainly no reason why infrastructure providers cannot thrive in the internet economy. Enabling VoIP/ internet telephony will be a win-win game for both the telecommunication companies and the application providers. Globally, traditional voice revenues are showing a declining trend while data revenue is dramatically increasing. By providing another reason for consumers and businesses to subscribe to and use broadband data services, VoIP – including VoIP to PSTN calling – will drive data usage in India, and driving data usage will benefit the Indian economy. Protecting older business models in the face of cheaper and better technology does not serve the purpose of public good. For instance, Government of India ("GoI") did not invest in or enact regulations to protect STD/PCO providers after the advent of mobile technology. The better/ cheaper

technology was allowed to prevail in the interest of greater public good. Ensuring that appropriate rules are in place is critical to a future where Indian entrepreneurs, consumers and businesses have ample opportunity to reap the benefits of these new and innovative services, whether through their own entrepreneurial creations or their use of productive and affordable communications tools. Establishing an appropriate, forward-looking regulatory framework will be a key component of India's move into the digital age.

Microsoft believes that GoI can accomplish these objectives through three key rule changes/clarifications with respect to VoIP in India:

Expand & Clarify Internet Telephony definition

- **To clearly encompass the following VoIP capabilities:**
  i)PC to PC VoIP provided over the public internet;
  ii) PC to PC VoIP provided over managed IP networks;
  iii) PC to Public Switched Telephone Network ("PSTN") calling from within India to/from phone numbers outside of India; and
  (iv) PC to PSTN calling from within India to/from phone numbers inside of India.

Authorize UAS/ISP Licensees to allow IP telephony

- **Licensee may be permited unfettered Internet Telephony over their networks:**
  - **whether on their managed IP networks, the public internet or their traditional voice networks (i.e., the PSTN); and**
  - **whether provided by the UAS/ISP licensee themselves or VNO or provided by a third party application providers.**

Clarify No License/Registration/ intimation required for providing/ using PC to PC VoIP

- **Clarify that Provision and/or Usage of PC to PC VoIP applications available via the public internet (or over a managed IP network) does not require a DoT license because such applications are not "telecommunications services" under India law**

The current uncertainty about, and restrictions on, the provision of VoIP in India discourages technological advancements, shifts investment to locales outside of India, and has resulted in grey market activities to nonetheless provide some of these VoIP capabilities to common masses throughout India. Hence, there is an urgent need to remove the current roadblocks and uncertainty so companies and entrepreneurs can extend the benefits of VoIP to India businesses and consumers. In doing so, the TRAI should promote regulations that are consistent with the

realities of a 21st Century global internet and the types of services, technologies and business models that it has generated.

This requires that the GoI take a fresh look at the proper rules of the road rather than simply extending to new technologies and business models the regulatory prescriptions of the past – rules and regulations that were designed for a different marketplace, different types of networks and a different type of technology. Among other things, Microsoft believes that the GoI should look to current VoIP/ internet telephony regulatory frameworks around the world, many of which have been updated to accommodate the dynamic changes taking place in voice communications. While many countries apply *some* regulatory obligations to certain *types* of VoIP, two themes emerge from a review of these other regulatory systems: (i) PC to PC VoIP (whether provided via the public internet or over managed IP networks) is not subject to telecom regulation; and (ii) to the extent some PC to PSTN VoIP capabilities are subject to regulation, governments have not developed VoIP-specific interconnection, intercarrier compensation and/or transit charges for such VoIP services.

On the contrary, PC to PSTN VoIP services are available in markets around the world without the intervention of regulators or application of some VoIP-specific intercarrier payment schemes. The result is not only a growth of voice communications competition, but it also increases the need and demand for data networks to support these services. This "virtuous cycle", as the U.S. Federal Communications Commission ("FCC") calls it, is one in "which innovations at the edges of the network enhance consumer demand, leading to expanded investments in broadband infrastructure that, in turn, spark new innovations at the edge."[1] As a result, if permitted in an unrestricted manner, these VoIP services will drive the need for – and thus investment in – broadband networks, benefitting India's consumers, businesses, network operators and entrepreneurs, large and small. Thus, as described in more detail in response to the Consultation's questions, Microsoft respectfully suggests that there is no need to revisit, refine or apply traditional PSTN interconnection, transit or intercarrier compensation policies to PC to

[1] In the Matter of Protecting and Promoting the Open Internet, *Report and Order on Remand, Declaratory Ruling and Order*, FCC 15-25 (March 12, 2015), at para.7.

PSTN voice services, which to a large extent, take place on networks outside the scope of those traditional concepts. Rather, the government should focus its policy changes on ensuring the existing licensing regime does not prohibit or unnecessarily slow and complicate the availability of VoIP services that are readily available around the globe.

INTRODUCTION

Microsoft respectfully submits these comments on the TRAI's Consultation regarding important updates to India's regulation of VoIP – called "Internet Telephony" in the rules of the Department of Telecommunications (DoT). As a company that participates in nearly every facet of the internet ecosystem – not only providing VoIP apps that are accessed via the internet, but also developing operating systems that run both mobile and non-mobile devices connecting to the internet, building and selling devices (from mobile phones to tablets to gaming devices) that connect users to the internet, and partnering with ISPs to enable those devices to connect to the Internet via unlicensed spectrum– Microsoft has a significant interest in the TRAI's Consultation. Moreover, given Microsoft's commitment to the India market– most recently demonstrated by our investment in three data centers across India[2]– we are pleased to offer our insights on the questions raised by the TRAI in the Consultation.

While Microsoft applauds TRAI's proposals to change the way VoIP services are currently treated under India's telecom rules, it is important to note, at the outset, that Microsoft believes the TRAI's present initiative is based on a flawed premise that it must decide which aspects of conventional telephony regulation should apply to "Internet Telephony" services in India. While some obligations from yesterday's communications regulatory frameworks may be appropriate for 21st Century communications delivered via applications and software downloaded from the internet, it should not be assumed that all such rights, obligations and PSTN payment and interconnection structures are necessary or appropriate, or that they should be considered for all types of VoIP capabilities. Hence, some VoIP capabilities may require the application of some regulations, while others do not.

[2] http://timesofindia.indiatimes.com/tech/it-services/Microsoft-to-set-up-three-data-centers-in-India/articleshow/43887336.cms

It will be important for the TRAI to distinguish among VoIP apps that are little more than a software application reached via the global internet, and those VoIP services that are used as substitutes for traditional telecom services, e.g., enabling calls to and from the PSTN.

Failure to distinguish among the various types of VoIP, and instead clubbing all VoIP into a single category for regulation, would disadvantage the development of new internet apps, content and services in India, by imposing compliance obligations on them that are ill-fitting, unnecessary and would jeopardize the benefits that VoIP can provide consumers and businesses in India. For example, questions about points of interconnection, termination rates, and intercarrier compensation issues, arise squarely out of yesterday's networks, yesterday's ways of doing business and yesterday's way of regulating traditional telephone networks. Such questions are not appropriate for software applications and communications services, untethered from those interconnected PSTN networks, that are delivered globally via the internet. As we describe below, it would not be appropriate to impose VoIP-specific rules with respect to any of these traditional telecom concepts. Telecom Service Providers ("TSPs") will continue to receive interconnect usage charges ("IUC") on calls terminated on their networks. The fact that an inbound call may have originated as VoIP on the public internet or a managed IP network will not change that. And, as discussed below, there is nothing unique about a VoIP-originated call's use of PSTN networks that requires a VoIP-specific intercarrier compensation regime.

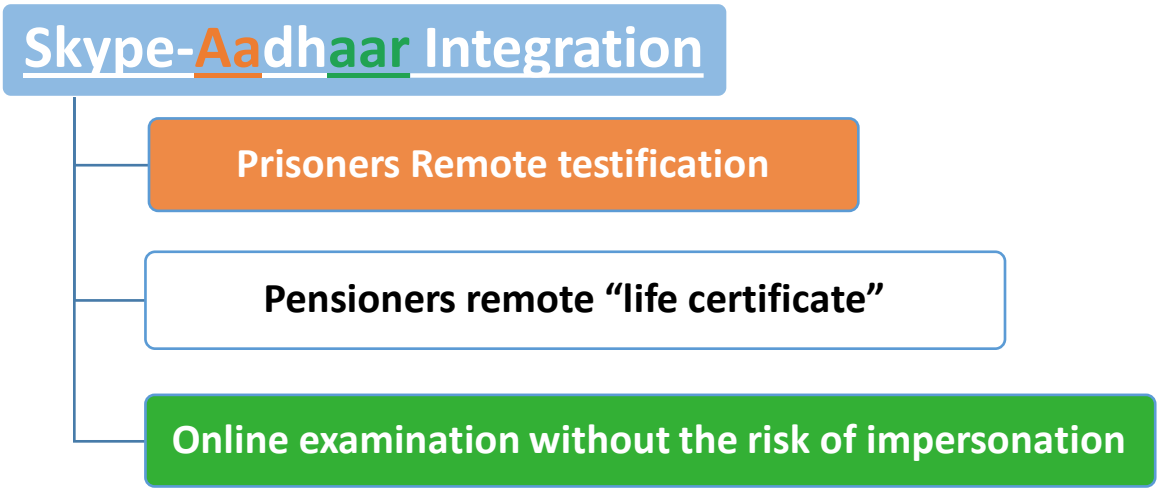
Currently, the global communications industry is witnessing an innovation revolution primarily facilitated due to IP technology. In India, young entrepreneurs and software engineers are at the forefront of this innovation revolution competing globally via the Internet. However, the lack of clarity in communication regulations is driving young Indian entrepreneurs away from India to set up base in countries like Singapore. This is truer of companies operating on the Cloud/ VOIP[3]. It is critical that the GoI enact policies that encourage this development to occur in India – rather than pushing investment to other countries. Such development can result in not only investment in infrastructure in India, but it can also bring innovative new services and capabilities to

[3] http://qz.com/221364/how-india-can-keep-startups-from-moving-to-singapore/

consumers and businesses in India. For example, below are just two examples of how a VOIP app can be used to achieve the Government's vision of Digital India, something that is not possible with PSTN technology.

Skype Translator: Microsoft has developed simultaneous real time translation capability on Skype in some of the world's more widely used languages. For instance, a person who knows only English can converse over Skype with a person who knows only Mandarin (Chinese). The software does a real time translation from one language to the other, in 7 languages. And this software is available free of cost.[4] One can very well imagine the benefits of such a software for a multilingual country like India which has 22 official languages. Benefits would include e-education, e-health, national integration, benefits to Small and Medium enterprises etc. But, for this to happen, the regulatory framework has to encourage Skype and other such companies – large and small - to set up shop in India and invest in this market segment. Without regulatory clarity, major international players will bypass India.

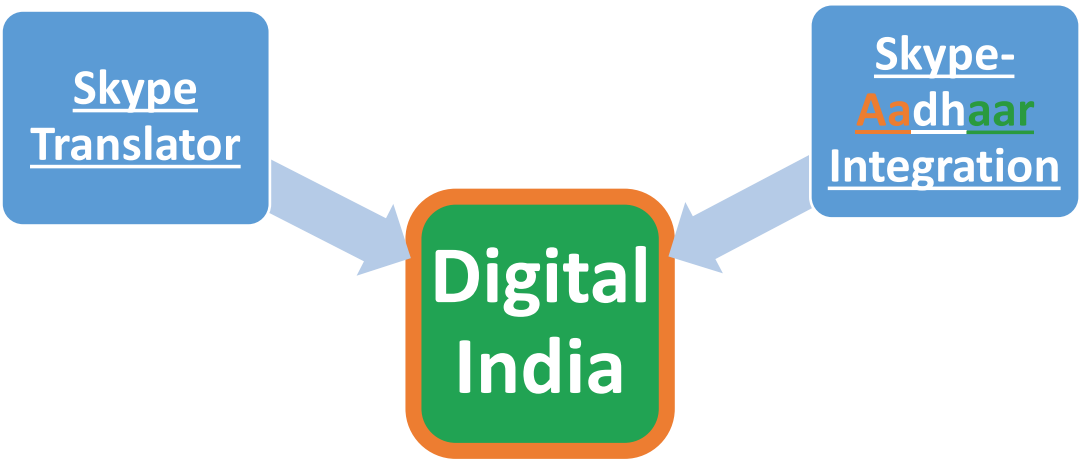
Skype-Aadhaar Integration: Microsoft has already conducted pilot trials integrating Skype Video calling with Aadhaar (India's National Biometric ID system). This allows one to be 100% certain that the person on the other side of the video communication is indeed the person whom he/ she claims to be.



[4] See: https://www.skype.com/en/features/skype-translator/

The potential of this innovation is tremendous in all scenarios where it is mandatory to ascertain the identity of the person on the other end of the video[5].

Together, these two capabilities bring great promise to the realization of a Digital India.



These examples throw up three questions: (i) is such innovation possible where the service or app interacts with the traditional PSTN; (ii) does India want to leverage the benefits of such innovation, and embrace the convergence of traditional technologies and services with those of today and tomorrow, for her national development; and lastly (iii) will major companies invest in India to roll out such innovations if the regulatory framework is restrictive and uncertain, while coupled with an aggressive enforcement environment?

Given this backdrop, TRAI has a tremendous responsibility to ensure that the benefits of modern technology do not bypass India. Microsoft applauds the authority for addressing these important issues.

[5] See: http://indianexpress.com/article/technology/tech-news-technology/microsoft-satya-nadella-ravi-shankar-prasad-aadhaar-digital-id-2826438/

KEY ISSUES FOR CONSULTATION

The TRAI in its present Consultation Paper has highlighted the following six issues for consideration.

1. **Interconnection**
2. **Transit of Calls**
3. **Interconnection Usage Charges**
4. **Numbering**
5. **Access to Emergency Services**
6. **Quality of Service**

However, the Consultation does not address core stage-setting issues that Microsoft believes must be clarified prior to establishing new rules of the road for "Internet Telephony" in India. First, the TRAI should clarify the specific features it intends to include in the "Internet Telephony" definition, and it should carefully and precisely explain which proposed regulations are intended to apply to which types of VoIP. As the TRAI notes in the Consultation, there are varying types of VoIP. In Microsoft's view, not all VoIP is the same (neither from a technological standpoint nor a market/business model point of view) and should, therefore, not be subject to the same set of rules. (The same can be said for the broader set of "voice communications" services (i.e., traditional PSTN "voice" communications and Internet Telephony) – not all "voice" is the same and, thus, should not be subject to an identical set of regulations.) Specifically, Microsoft respectfully requests that TRAI clarify the definition of "Internet Telephony" on the lines suggested below. This would encourage further development of VoIP in India (and also thereby discourage the necessity of today's grey market for VoIP in India).

(i) Expand and clarify that the definition clearly encompasses the following VoIP capabilities: (a) PC to PC VoIP provided over the public internet; (ii) PC to PC VoIP provided over managed IP networks; (iii) PC to PSTN calling from within India to/from phone numbers outside of India; and (iv) PC to PSTN calling from within India to/from phone numbers inside of India.

(ii) Clarify that any Unified Access Service ("UAS") or Internet Service Provider ("ISP") licensee may permit Internet Telephony, as defined above, to be provided over their networks – whether on their managed IP networks, the public internet or their traditional voice networks (i.e., the PSTN); and whether provided by the UAS/ISP licensees themselves or provided by a third party over the top of their networks. Then, as described below, apply appropriate regulatory obligations to those PC to PSTN services that are intended as a substitute for traditional voice services provider over the PSTN, i.e., those that enable calls both to and from any telephone number (whether inside or outside of India).

(iii) Clarify that any entity making PC to PC VoIP applications available via the public internet (or over a managed IP network) does not require a DoT license because such applications are not "telecommunications services" under India law.

We are confident these definitional changes and clarifications would enable further development and deployment of innovative services in India because it would align India's regulatory framework to that of many other countries around the globe – countries where consumers and businesses are enjoying the benefits that VoIP (of all varieties) can provide. First, with respect to opening the intra-India VoIP to PSTN market, consumers and businesses will be permitted to finally use innovative services that reduce their costs, improve their efficiency and productivity, and with respect to businesses in particular, quickly and effectively deploy communications systems throughout India. Today, our customers in India – motivated to deploy services and infrastructure that would enable a highly productive and collaborative unified communications experience – are forced to spend weeks (and, more often, months) getting approvals from the TERM cell of the DoT, working with local legal counsel, and coordinating with the local service providers in order to avail such services to ensure they are deployed in a manner that does not run afoul of the restrictions on Internet Telephony under today's rules. These TERM Cell/DoT approvals are required solely as a result of the artificial constraints created by the VoIP restrictions in place in India. And, once completed – having invested time and money – the service often does not even provide the full set of features and economic benefits otherwise

available to users around the globe, which all goes against the present government's initiative of 'ease of doing business' in India.

Initially, with respect to PC to PC VoIP -- whether provided via the public internet or over managed IP networks -- the following are just some of the countries that do not impose telecom regulation on such VoIP capabilities: the U.S., Canada, the European Union, Switzerland and other European Economic Area (EEA) countries, other non-EU European countries, Australia, New Zealand, Brazil, Chile, and numerous other countries throughout Latin America.

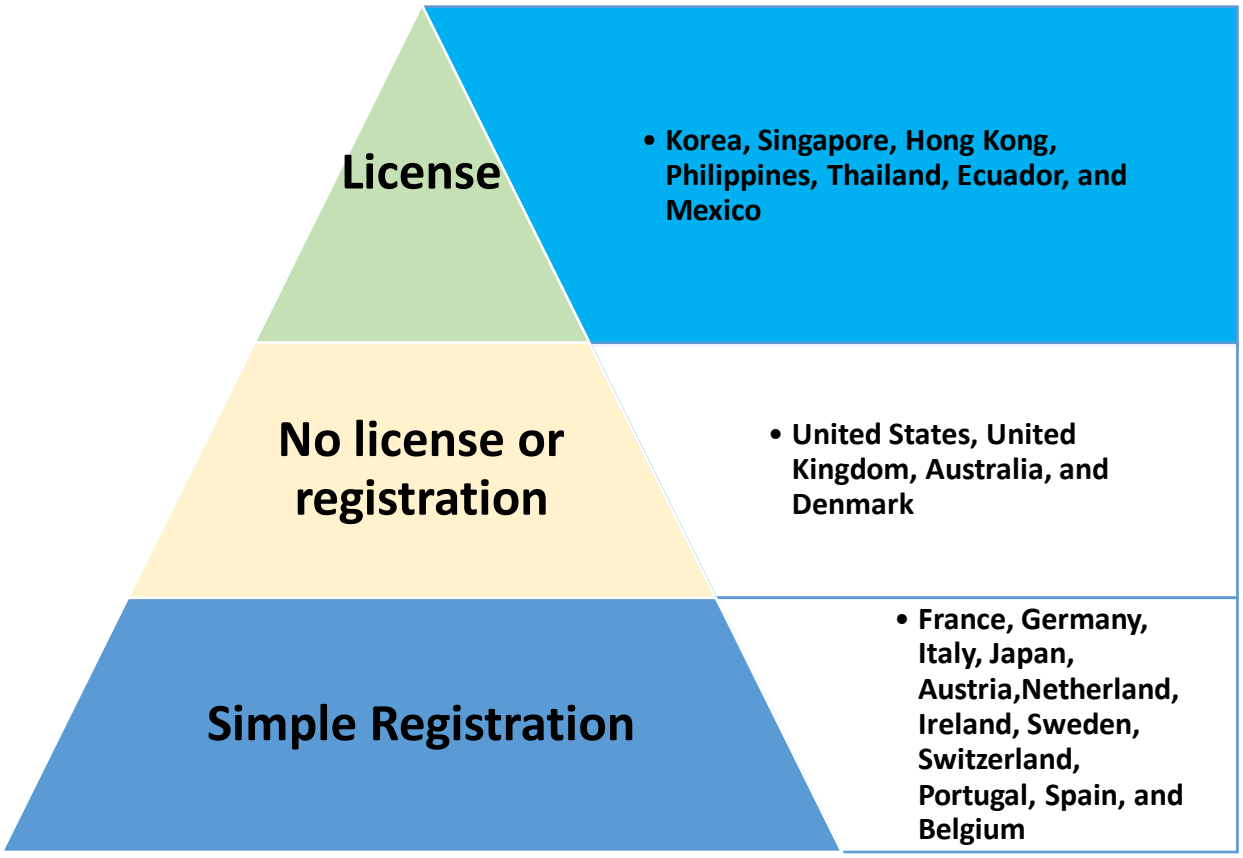
There are two fundamental reasons such VoIP capabilities are not subject to regulation: First, PC to PC VoIP is really nothing more than a software application that is either inbuilt with the hardware or downloaded to an internet-connected device, thus it is not a "service" at all – much less a "telecommunications service" that should be subject to regulation. In the context of India's telecom laws, it is "content" rather than a "carriage service." Therefore, it will fall under the purview of the Information Technology Act 2000 rather than Telecom. regulations.

The next category of VoIP services that must be considered are those that connect VoIP users to users of traditional telephone services (i.e., landline and mobile telecom services). These VoIP services typically arise in one of two ways: (i) VoIP services that enable communications only to *or* from telephone numbers (i.e., one-way VoIP to PSTN services); and (ii) VoIP services that enable communications both to *and* from telephone numbers (i.e., two-way VoIP services). The former is typically a VoIP capability that enables calls out to phone numbers – a complementary communication capability that consumers use to make calls (often, international calls) that otherwise would not be made due to the very high price associated with traditional international calls made over PSTN networks. The latter service is likely intended to compete directly with – and substitute for – traditional PSTN calling provided by regulated carriers. For that reason, this latter service is subject to regulation around the world.

However, in most countries, regulators have recognized the technological differences between a traditional network-tethered PSTN voice service and a nontraditional untethered VoIP to PSTN

calling service, thus subjecting the latter to slightly different regulation. For example, in the United States, no license is required to provide any sort of VoIP to PSTN calling, even two-way VoIP to PSTN services, which is subject to complying with certain regulatory obligations. These obligations include access to emergency services, lawful intercept of calls to and from the PSTN, and number portability, among others. Providers of two-way VoIP to PSTN calling must also report their annual revenues and pay telecoms-related regulatory fees. But, there is no licensing obligation, and there is no specific VoIP-only interconnection and intercarrier compensation regime. In contrast, although Canada has a minimal registration and license obligation for two-way VoIP to PSTN calling, this is primarily used as a means to ensure that the service complies with regulations similar to those in the U.S. – e.g., calls to emergency services and real-time lawful intercept of calls to and from the PSTN. In Canada, these service providers also must pay an annual regulatory fee (on the order of one-half of one percent), but only if their annual revenues exceed a certain threshold (C$10 million). Smaller companies, with revenues below the threshold, are not required to pay the fee, thus helping to stimulate the market.

Hence, in addressing whether a license should be required of VoIP to PSTN providers in India, we can draw broad lines based on the frameworks used in a number of other countries, as illustrated below:



Following the frameworks of many other countries around the world, Microsoft respectfully requests that the TRAI propose a regulatory approach wherein PC to PC VoIP requires no license (and is permitted to be transmitted by ISPs over their networks, public or managed, without restriction), and that only two-way PC to PSTN calling (both inside and outside of India) requires a light-touch registration or minimal licensing obligation, accompanied by appropriate regulations deemed necessary to protect consumers or address a market failure. This would be consistent with other registration regimes in India today in that services – like these VoIP to PSTN calling services – that must rely on an underlying telecom operator for the transmission of the call (either the ISP for transmission of the IP portion of the call or the TSP for the transmission of the PSTN portion of the call), do not require a license. Rather, such services (including OSPs) require only a registration. This approach should stimulate new investment in India as businesses and consumers would be provided more options for their voice communications – options that enable innovative collaboration through voice, video and text – thus also stimulating consumer and business demand for broadband across India.

Key Global data facts on VoIP Regulation Internationally*

Specific VoIP policies or regulations in place, 2015	41%	
VoIP subject to general ICT laws/ regulations, 2015	71%	
Provision of VoIP legal, 2015	84%	
VoIP providers under universal service/access obligation, 2015	52%	
Individual users allowed to use VoIP, 2015	89%	

ITU ICT-Eye: http://www.itu.int/icteye

(* Strictly speaking, India would not fall under any of these categories due to the ambiguity of the existing policies and regulations)

As discussed further below, questions of intercarrier compensation and interconnection are misplaced in the context of VoIP services – particularly PC to PC VoIP, which is wholly outside the traditional PSTN network framework, but also with respect to PC to PSTN calling. Many PC to PSTN calling services are untethered from the underlying broadband network. Thus, the provider has no "network" for which it has a physical "point" to which another network would need to "interconnect" or exchange traffic. Again, when one looks to other countries, VoIP to PSTN calling is not subject to any particular "intercarrier compensation" regime or special interconnection regime. Rather, as addressed in more detail in the Appendix, the services are available (to the significant benefit of users) without any changes to those pre-existing rules and frameworks. Throughout the world, the stance of the regulator has been to create a competitive, healthy, and dynamic environment focused on subscriber protection and enabling economic growth. Microsoft encourages the TRAI to follow their lead and bring the same benefits to India's consumers and businesses.

GENERAL COMMENTS ON TRAI CONSULTATION QUERIES

Q1. What should be the additional entry fee, Performance Bank Guarantee (PBG) and Financial Bank Guarantee (FBG) for Internet Service providers if they are also allowed to provide unrestricted Internet Telephony?

Performance and financial bank guarantees are levers used by regulatory authorities to influence market development. As such, they have to be viewed in the context of regulatory objectives: how quickly a market should be opened to innovative and competitive services that will benefit consumers and business, carefully balanced against any need to protect traditional telecom operators who have invested in legacy infrastructure. Certainly, it is important that PBGs and FBGs do not act as a barrier to entry, particular when innovative tools are ready to be made available to enhance India's productivity and economic growth.

FBGs are sometimes considered in order to ensure the reliability and stability of service providers. The FBG provides the government more confidence in the financial health of new market entrants. The existing ISP license is well formulated to allow VoIP/ internet telephony without requiring any additional FBG. It may be noted that even for IPTV services, the licensee is required to have a networth for Rs. 100 crores (Rs. 1 billion); without any requirement of any additional FBG. Accordingly, any additional FBG for internet telephony may not be advisable. With respect to VoIP, however, FBGs are largely unnecessary, particularly in the context of PC-to-PC VoIP, thus further justifying why such capabilities should be wholly outside the scope of telecom regulation.

As noted above, PC-to-PC VoIP is merely a software application that consumers have bundled with their machines or downloaded onto their interconnected-devices. The customer's investment is essentially nothing, and they are not in any way precluded or discouraged from downloading any other software application that may facilitate VoIP communications/ internet telephony. The simplicity of the app, the ability to easily and quickly move from one app to another on one's device, and the low cost of the app (free, except for the cost of the data – paid to the ISP – necessary to download it) make a FBG meaningless. If the app provider goes out of the business, the consumer can simply switch to any number of other apps that enable VoIP communications. For these reasons, PC to PC VoIP communications should remain unregulated,

including with respect to FBGs.

With respect to PC-to-PSTN calling, particularly a service that encourages traditional TSP service users to switch providers, most countries do impose some telecom regulation. In India, there may be reason to consider an appropriate requirement – particularly if a customer is encouraged to terminate their existing telephone service (e.g., port their phone number) in order to adopt the new VoIP to PSTN calling service. However, as described in more detail in the Appendix, more developed and innovative markets around the world do not impose any such FBG.

Q2: Point of Interconnection for Circuit switched Network for various types of calls is well defined. Should same be continued for Internet Telephony calls or is there a need to change Point of Interconnection for Internet Telephony calls?

Assessing "points of interconnection" of networks in the context of VoIP communications is a prime example of why it is not appropriate to evaluate today's technologies in the context of yesterday's regulations. With respect to applications and services delivered via the internet that enable only PC to PC communications, the provider typically has no network to or from which they must or need to interconnect and never interacts with the PSTN (from which the concept of a "POI" arises). Rather, the underlying ISP – from which the VoIP service provider may be untethered – operates the network that is interconnected to other data networks, thus creating the "network of networks" that is the internet. Thus, a discussion of "points of interconnection" is not a relevant discussion for PC to PC VoIP – again emphasizing why such functionality should be wholly outside the scope of any telecom regulation.

With respect to those non-network based VoIP providers that allow their users to make and/or receive calls to/from phone numbers in other countries, such VoIP providers have successfully depended upon commercial negotiations with PSTN operators to carry their traffic to and from PSTN end points. Such agreements between a network-agnostic VoIP to PSTN provider and the licensed PSTN operator are not "interconnection" agreements, but instead commercial agreements whereby a PSTN network operator (already interconnected – in the traditional sense of "interconnection" – to the PSTN and, thus, to other PSTN networks) has simply agreed to take PSTN-bound traffic from the internet (typically via a SIP trunk) and deliver it to an endpoint on the PSTN (and/or vice versa). These VoIP services that are not tethered to a particular network

resemble the offerings of PC to PC VoIP providers in that they do not necessarily require a physical transmission network for interconnection and, thus, no necessity for interconnection to a particular PSTN POI. In order to realize the benefits that VoIP can bring India's consumers and businesses, it is imperative that the regulatory framework not be restricted by legacy network language or concepts that are ill-fitting and likely to unnecessarily increase cost and reduce innovation.

With respect to network-tethered VoIP to PSTN services – i.e., "managed VoIP," or those that are provided by an operator that also operates the underlying physical "last mile" network that must be interconnected to other networks, Microsoft takes no position as to the appropriate manner in which any such issues should be raised or addressed. It is imperative, though, that all network operators generally have the ability to interconnect with other network operators for the exchange and termination of voice traffic, whether such traffic is in the form of TDM or IP voice traffic.

Q3: Whether accessing of telecom services of the TSP by the subscriber through public Internet (internet access of any other TSP) can be construed as extension of fixed line or mobile services of the TSP? Please provide full justification in support of your answer.

Accessing the telecom services of the TSP by a subscriber through the public internet cannot be construed as extension of fixed line or mobile services of the TSP. Moreover, the classification of Internet Telephony as a fixed or mobile service, if accessed through the public internet or a managed IP network, is not justified, whether or not the provider is also a TSP. Hence in our view TSP-provided VoIP should be treated the same as non-TSP provided VoIP. A TSP shouldn't be subject to different rules just because it happens to also provide traditional PSTN services.

Q4: Whether present ceiling of transit charge needs to be reviewed or it can be continued at the same level? In case it is to be reviewed, please provide cost details and method to calculate transit charge.

By "transit" we assume the TRAI is referring to voice traffic that flows from one PSTN network operator to another indirectly rather than directly, *i.e.*, from one end office to another through a tandem switch and tandem transport. There is no need to review or change the current transit

charge regime in India – at least not with respect to VoIP communications. First, with respect to PC to PC VoIP communications, the concept of transit charges has no relevance whatsoever, since transit charges apply only to PSTN traffic, and PC to PC communications do not traverse the PSTN. Nor are transit charges relevant to PC to PSTN VoIP communications. Once a PC to PSTN communication enters the PSTN, that call is the same as any other PSTN call being transmitted and/or terminated on PSTN infrastructure. The fact that a PC to PSTN communication originates on an IP network before it enters the PSTN has no impact on PSTN transit traffic or transit charges. Such traffic will or will not transit intermediary networks and thus will or will not be subject to transit charges the same as any other call that traverses the PSTN from any other origination point. VoIP to PSTN calling creates no distinctions that require a review or a change to the regime.

Q5: What should be the termination charge when call is terminating into Internet telephony network?

Intercarrier compensation regimes worldwide are moving more and more toward a system whereby no intercarrier payments are made for the termination of PSTN voice traffic. We understand that wireless domestic calls terminating to a traditional wireless PSTN user in India involve termination charges and that TRAI is considering whether and how to reform that mechanism in a separate proceeding. In the instant proceeding, however, TRAI is considering opening the market to unrestricted Internet Telephony, including VoIP to PSTN calling within India. Typically, providers of Internet Telephony partner with licensed telephone companies to facilitate origination of calls to and termination of calls from the PSTN. And, these partners are likely to be wireline telephone companies who, under the current system, do not receive payments for terminating calls on PSTN networks. We see little rational economic basis for introducing unique charges for terminating calls to the users of their Internet Telephony partners. Not only are such VoIP-specific intercarrier charges economically unjustified, they would introduce significant complexity to an IUC system that already can readily accommodate PSTN-originated calls that are bound for an Internet Telephony subscriber.

Q6: What should be the termination charge for the calls originated from Internet Telephony Network and terminated into the wireline and wireless Network?

See answer above to question 5. For the same reasons explained above, a call from an Internet Telephony user will likely originate on the PSTN as a wireline call via the VoIP provider's underlying partner on whom it relies to connect its VoIP users to the PSTN. Therefore, in India, the terminating access applied to that call would be zero if the call is terminated to another wireline PSTN network. If terminated to a wireless PSTN network, the wireless provider would apply the same terminating access it would charge to anything other inbound call from the wireline PSTN, which under today's IUC framework is zero.

Q7: How to ensure that users of International Internet Telephony calls pay applicable International termination charges?

Given the way VoIP works, there is no such thing as an "International Internet Telephony" call – at least not in the context of international termination charges, which apply to traffic carried over PSTN networks. VoIP calls tend to use the internet rather than PSTN networks for traversing international borders, and as the TRAI noted in its August 5th IUC Consultation, the access and terminating charges traditionally applied to this traffic is zero, or "bill and keep." Once VoIP calls are delivered from the internet to the PSTN, then traditional PSTN termination charges apply. Because VoIP calls do not become PSTN calls until they actually reach the PSTN – which often occurs within a country's borders – it would be inappropriate to apply international PSTN termination charges to a call that has traversed only domestic PSTN infrastructure. Should a VoIP call use the PSTN to cross international borders, then it would be appropriate to apply international toll charges to the termination of the call—just as with any other PSTN call that crosses that same international border. But, so long as the use of the PSTN network is limited to domestic usage, domestic PSTN charges (if any) should apply – just as they would apply (or would not apply) to any other call that originates and terminates on the PSTN within India. This is one of the great societal benefits of the internet and VoIP technology, vastly reducing the costs of communicating with friends, family and business colleagues across the globe, and thereby opening up new opportunities for communication that otherwise were previously foreclosed. The long-term economic and societal impacts of these communications capabilities and opportunities cannot be overstated.

Q8: Should an Internet telephony subscriber be able to initiate or receive calls from outside the SDCA, or service area, or the country through the public Internet thus providing limited or full mobility to such subscriber?

This question suggests an attempt to apply yesterday's ways of doing things to new technologies, networks and business models. In the traditional PSTN network environment, networks were constructed to deliver and receive traffic at specific and well-defined points for purposes of load-balancing circuit-switched calls. The physical limitations of yesteryear's telecom networks that led to this traditional PSTN structure, however, don't exist with the global internet or with the transition of traditional PSTN networks to next generation IP-based networks. In view of the fact that the internet is an open interconnected set of networks with a comparatively low cost structure, traditional PSTN issues related to pricing and taxation on different types of calls (e.g. local vs. long distance vs. international) become fundamentally different from PSTN circuit-switched networks. In fact, such price differentiation becomes irrelevant, which means that decades-old service area restrictions are misplaced in a world of IP-based network infrastructure. Therefore, there is no technological or economic reason to apply traditional definitions of SDCA, NDCA and even IDCA to VoIP calling. Moreover, with today's technology and customer expectations, local or regional calling areas and distance-based pricing in the domestic market are anachronistic.

Thus, the specific answer to the question above is an emphatic "yes" – particularly with respect to non-tethered VoIP apps and services. By definition, this type of VoIP is a technology that enables communications from anywhere with internet access. Users can place telephone calls to E.164 numbers or communicate with anyone else using the same VoIP app so long as they have internet access – regardless of the provider of the underlying internet access. This flexibility and ubiquity provides additional value and a lower cost option over traditional switched voice services. Consequently, the regulatory authority should adapt its framework to allow modern services such as VoIP to PSTN calling service, as well as modern networks built with more efficient IP-based technology, to flourish for the ultimate benefit of the public. Applying yesterday's rules, such as geographic restrictions, which were developed for a different, older technology and based on a different set of facts, will not benefit India.

Q9: Should the last mile for an Internet telephony subscriber be the public Internet irrespective of where the subscriber is currently located as long as the PSTN leg abides by all the interconnection rules and regulations concerning NLDO and ILDO?

Traditionally, the concept of the "last mile" has been premised upon the *network*, not the *user*. The last mile traditionally has been the final leg before call termination or the first leg from call origination on the PSTN network. In the context of Internet-based VoIP services that connect to the PSTN, more than one network is involved in a call and those networks operate differently. We have explained above that only the PSTN component of a call should be considered with respect to PSTN rules. The portion of a VoIP to PSTN call that does not utilize the PSTN but, instead, uses the global internet should not be the focus of, or subject to, PSTN rules. This approach would align with the network focus (rather than user focus) of the "last mile" concept. Accordingly, if the concept of a "last mile" is going to be retained for purposes of an IUC regime, the last mile of an Internet Telephony VoIP to PSTN call thus should be the point where a call begins to use the PSTN or where a call finishes using the PSTN, irrespective of the physical location of the end user. Traditional concepts of geography are no longer required or justified with respect to Internet Telephony.

Q10: What should be the framework for allocation of numbering resource for Internet Telephony services?

Before addressing the issue of numbering resources with respect to "Internet Telephony" services, is it important to first clarify the particular type of VoIP application or service to which these number allocation rules would apply or impact. As noted above, PC to PC VoIP services (whether accessed via the public internet or a managed IP network) are significantly different from PC to PSTN VoIP services because the PC to PC VoIP capabilities do not use a telephone number for routing and terminating a call to a called party. Such services use software applications and IP addresses for routing and connecting users. Therefore, the numbering framework is irrelevant to such apps.

For PC to PSTN Calling services, telephone numbers must be available to all providers – either directly by allowing the VoIP provider to apply for and obtain numbers (even if they are merely a Virtual Network Operator ("VNO") licensee, without an underlying PSTN network in the country)

or indirectly by allowing the provider to use phone numbers that have been allocated to their TSP partner. For example, if a VNO licensee's wholesale partner is an ISP with Internet Telephony authority and that ISP has an inventory of phone numbers, the VNO VoIP provider must be allowed to use the phone numbers of its underlying partner. This concept of sub-allocation of numbering resources is quite common throughout the world and should be used in India to enable a vibrant and innovative communications marketplace.

Moreover, the phone numbers made available to PC to PSTN VoIP providers should be the same phone numbers available to other non-VoIP PSTN providers. There is no need for a separate set of phone numbers for VoIP to PSTN calling, and doing so would only put new entrants at a competitive disadvantage. Limiting PC to PSTN VoIP providers to numbers that are not already in use by customers would discourage entry of competitive alternatives into India, particularly in the business voice market where businesses will not be willing to try a new service provider if it cannot keep its existing phone number. Companies in India, large and small, invest significant resources in promoting their telephone numbers (e.g., on letterhead, business cards, electronic signatures, marketing and advertising) and are reluctant to switch providers if they can't port their existing numbers to a new provider. This is particularly true of longstanding businesses whose numbers are well established in the marketplace. Thus, to port their phone number to a new entrant (which is discussed in more detail below), the new entrant must be permitted to provide services based on the customer's preexisting phone number.

Microsoft believes there is little justification for continuing to attribute geographic significance to telephone numbers. Although customers and businesses may attribute some significance to the geographic locale of a particular phone number, that attribution is not a regulatory or legal distinction; it is merely a marketplace/customer satisfaction distinction that should be left to the customer's preferences. From a regulatory perspective, assigning separate number ranges to VoIP providers has no impact on number availability or administration; on the contrary, it unnecessarily uses more numbering resources than is necessary because VoIP providers are not allowed to port in new customer's existing phone numbers. Call routing, rating, and destination information is handled through signaling and is no longer dependent on telephone numbers. Moreover, the continued existence of any price differentiation between calling geographic and

non-geographic numbers is artificial and, as a matter of economic efficiency, ought to be eliminated (as discussed in more detail above in our answers to questions 5, 6 and 7). In fact, in most countries where a non-geographic number range has been introduced, it has been largely unpopular, unused and, thus, not enforced upon nomadic VoIP providers (e.g., France, Germany, UK, Italy, Belgium, Sweden, Denmark). The genesis of geographic numbers resides largely in the vestiges of yesterday's PSTN networks, their physical limitations, and their attendant intercarrier compensation regimes; as such, there is no justification for bringing these outdated concepts into the VoIP to PSTN calling environment by limiting nomadic VoIP providers to the use of non-geographic numbers.

Q11: Whether Number portability should be allowed for Internet Telephony numbers? If yes, what should be the framework?

Number Portability is critical to ensuring a competitive communications market for consumers and businesses in India, particularly where the VoIP to PSTN service is a two-way calling offering intended as a substitute for traditional PSTN voice calling. Without it, new entrant VoIP to PSTN providers are at a disadvantage because consumers and businesses may not want to release their current phone number and replace it with a new one. Business cards, billboards, marketing materials would have to be thrown away and replaced so they reflect the new phone number. This is not a reasonable outcome in 2016. The introduction of Number Portability in countries around the world was intended to protect new entrants from the competitive advantages of incumbent providers, and has become a standard practice in India for mobile, and will be necessary for wireline as well, if the GoI wants to bring the benefits of voice competition to consumers and businesses in India.

Q12: Is it possible to provide location information to the police station when the subscriber is making Internet Telephony call to Emergency number? If yes, how?

Before answering the specific question posed here, it is important to clarify what specific type of VoIP capability is being referenced when the TRAI says "Internet Telephony." Because the definition currently includes both PC to PC VoIP and PC to PSTN VoIP, each must be addressed separately because the answer is very different for each functionality.

First, with respect to PC to PC VoIP, whether or not location information can be provided to the police station is largely irrelevant today, because PC to PC VoIP cannot connect to the police station all. The police station's emergency services contact number is an E.164 number that requires connectivity to the PSTN. PC to PC VoIP does not connect to the PSTN; therefore, it does not connect to any E.164 phone number, including emergency phone number(s) in any country around the world. Until such time that emergency call centers (including the police station or other appropriate public safety agencies that answer emergency calls) are upgraded to "next generation" calling systems that are connected to the internet, PC to PC VoIP applications and services have no way of connecting to those centers. Therefore, it is premature to ask whether or not location information can be provided with such a communication since it is not possible for the communication itself to be completed pursuant to today's emergency calling architecture. This technological limitation again highlights why PC to PC VoIP should remain outside the scope of telecom regulatory obligations – as it is in other countries around the world.

Second, with respect to VoIP to PSTN calling services, it remains important to first clarify what type of calling capabilities are offered. Is this a one-way VoIP to PSTN service, allowing only calls from the VoIP device to PSTN number? Or, conversely, allowing only calls from the PSTN to the VoIP device? If the VoIP to PSTN calling service is one-way only, it may not be appropriate to impose emergency calling requirements. Certainly, if the feature is only a one-way inbound calling feature, the user can make no calls out to E.164 numbers – including the emergency call center numbers – so it would be inappropriate to impose the obligation on these services. With respect to a VoIP to PSTN outbound-only calling capability, a call to the police station would arrive with no call-back phone number. Thus, if the user contacted emergency services on their VoIP to PSTN outbound-only service and the call disconnects, the emergency call operator has no way of calling back the person in distress because the caller has no phone number to which a call can be made. Thus, rather than imposing an emergency calling obligation on these one-way outbound services, Microsoft believes the public interest is better served by requiring emergency calling of only two-way VoIP to PSTN services: services that are intended as a substitute for traditional PSTN calling services and from which consumers expect to reach emergency services.

Finally, to address the TRAI's specific question about location information, it is important to distinguish between a static piece of location information that may be associated with a user and the "real time" location of the user at the moment he is making the emergency call. The former location information – a static address – can generally be provided if the provider of the service has collected that information and has a way to convey it to the public safety call center. In the U.S., the static location information is referred to as the user's "registered location" and is used for routing calls to the appropriate emergency call center and for dispatching emergency services. The obligation to collect the registered location information and route calls to emergency call centers is imposed only on two-way VoIP to PSTN calling services; it is not imposed on one-way VoIP to PSTN calling or PC to PC calling.

Obtaining the real-time location of a network-untethered VoIP to PSTN user is much more challenging today, in circumstances where the user is not calling from his or her registered location. And, even if a real-time location can be ascertained, it is not necessarily possible to convey that information to a public safety call center in a manner that is governed by consistent industry standards. However, at this time, there is no reliable industry-wide practice or standard that enables the real-time location of a VoIP user so that it can be used to route the emergency call and dispatch emergency assistance. Rather, VoIP providers typically rely solely on a static user location – provided when the customer signed up for the service – for routing the call and dispatching emergency services. This approach is usually accompanied by warnings and disclaimers that the emergency calling service has these limitations. By using the static location information and a disclaimer, innovative new technologies are able to enter the marketplace – despite these technological challenges of fitting new internet-based services into a PSTN-bound emergency calling network -- while these location challenges are addressed in industry and standards bodies around the world.

Q13: In case it is not possible to provide Emergency services through Internet Telephony, whether informing limitation of Internet Telephony calls in advance to the consumers will be sufficient?

In markets where VoIP to PSTN calling providers are required to implement calling to emergency services, they typically are required to disclose the above-described limitations to their

customers. These disclaimers ensure that customers are aware of the limitations while also allowing new, innovative and economical communications services to enter the marketplace. This approach provides an appropriate balance of interests – enabling innovation and competition in the market, while also protecting consumers' safety, during this time that the industry transitions to a future when the challenges of location are resolved and more robust emergency calling capabilities are available for VoIP to PSTN calling services.

Q14: Is there a need to prescribe QoS parameters for Internet telephony at present? If yes, what parameter has to be prescribed? Please give your suggestions with justifications.

The imposition of QoS parameters is another relic of the traditional PSTN telephone network that should not be extended to the 21st century communications. Imposing QoS on services that were tethered to a particular network, owned and operated by the same provider offering the services, meant that the provider had significant control over the elements of the service and, therefore, the ability to manage the quality of the service. With respect to VoIP to PSTN services that are provided by entities untethered from any particular network, the service provider has no control over the end-user's underlying broadband network, making it difficult to guarantee any particular QoS. The same is true for PC to PC VoIP services that run "over the top" of broadband networks with which the VoIP provider has no relationship.

Q15: Any other issue related to the matter of Consultation.

Yes, see our discussion in the Executive Summary, Introduction and at the beginning of the section entitled Key Issues for Consultation.

APPENDIX A

GLOBAL BEST PRACTICES

As noted at the outset of this document, we noted that it is important to consider the regulatory frameworks in use around the world. Below we provide responses to each question in the Consultation by explaining how the U.S., U.K., Australia and the European Union address the issues raised in the Consultation.

Q1. What should be the additional entry fee, Performance Bank Guarantee (PBG) and Financial Bank Guarantee (FBG) for Internet Service providers if they are also allowed to provide unrestricted Internet Telephony?

Nowhere, among the numerous countries we analysed, does a VoIP provider (neither a PC to PC VoIP provider nor a PC to PSTN VoIP provider) have to make a PBG or FBG payment. This concept is one that arose out of decades' old telecom regulations and structures, and they are not applicable in today's 21st century global internet based technologies.

United States. In the U.S., where regulation of VoIP services is limited to those that enable calls both to *and* from the PSTN, there is no license required of the provider, and there is no upfront PBG or FBG payment. In the U.S., there are regulations (such as emergency calling) that are applicable to two-way VoIP to PSTN services, but those obligations do not include a license, registration or fee payment.

Australia. In Australia, there is no PBG or FBG payment by VoIP providers of any kind. An entity that enables VoIP to PSTN calling is designated as a 'carriage service provider' by operation of statute. No formal license is required for the supply of such services, but various statutory terms and conditions apply as a consequence of the statutory designation.

Australia only requires telecoms licenses to be held in relation to entities that own or operate certain types of telecommunications *infrastructure*, known as 'carriers'. However, even carriage service providers in Australia are not required to pay an entry fee, PBG or FBG to supply carriage services (whether or not Internet Telephony).

If those entities supply a 'standard telephone service' they are subject to a higher level of regulation (but are still not required to pay an entry fee, PBG or FBG).

European Union. Under the EU regulatory framework, Member States may subject the provision of an Electronic Communications Service ("ECS") – including VoIP if it is deemed to qualify as such – only to a general authorization regime (with defined maximum obligations) and not to an individual license. In most Member States (e.g., the Netherlands, Belgium, Italy, Germany) require only a notification or registration duty without the obligation to pay a licensing fee. Thus, there is no concept of a PBG or FBG payment for VoIP services in Europe.

United Kingdom. The UK Communications Act 2003 (implementing the EU electronic communications regulatory framework) introduced a general authorization regime permitting an entity to provide electronic communications networks or services in the UK, without any license, notification or registration. And, there is no PBG or FBG payment required. In the UK there are regulations (such as emergency calling) where VOIP to PSTN (VOIP out services) or 2 way VOIP (VOIP in and out services) are provided but those obligations do not include a license, fee or registration payment.

Q2: Point of Interconnection for Circuit switched Network for various types of calls is well defined. Should same be continued for Internet Telephony calls or is there a need to change Point of Interconnection for Internet Telephony calls?

United States. The U.S. has no VoIP-specific interconnection rules. VoIP services are often untethered from any particular underlying network and, therefore, generally have no "network" to/from which other networks need to interconnect. Rather, the connection of a VoIP provider's cloud to a PSTN provider that is interconnected to the PSTN is managed through commercial negotiations. The point at which the parties connect their clouds and exchange traffic is not regulated. Notably, there has been no need for such regulation as the VoIP-to-PSTN marketplace in the U.S. is relatively vibrant, including network-based VoIP providers (e.g., cable companies that have added VoIP to their line-up of services) and non-network based providers (e.g., network untethered providers such as Vonage).

Australia. Australia does not expressly regulate points of interconnection, rather these are determined as a matter of commercial negotiation between telecommunications operators.

European Union. Under the EU regulatory framework, interconnection obligations are imposed by the national law of the EU Member States (transposing the Access and Interconnection Directive 2002/19/EC as amended by 2009/140/EC (in particular Articles 3, 4, 5 thereof)). This results in the following obligation which is directly applicable to all operators of public communications networks: to offer access and interconnection upon request of operators of electronic communications networks and services: (i) for the purposes of providing public electronic communications services, and (ii) in order to ensure interoperability of services.

In addition, the national law of the EU Member States (transposing the same Directive) empowers National Regulatory Authorities to impose obligations:

> (a) to the extent that is necessary to ensure end-to-end connectivity, on undertakings that control access to end-users, including in justified cases the obligation to interconnect their networks where this is not already the case;
>
> (ab) in justified cases and to the extent that is necessary, on undertakings that control access to end users to make their services interoperable;
>
> (c) (omitted here, concerns broadcasting).

Furthermore, in application of the Significant Market Power (SMP) regime, National Regulatory Authorities may impose specific regulatory obligations to ensure access to, and use of, specific facilities (based on Articles 8 and 12 of the Access and Interconnection Directive) of operators that have been found to hold SMP on specific markets.

Because VoIP providers (of all kinds, PC to PC VoIP and PC to PSTN VoIP) do not fit these descriptions, and presumably because VoIP providers typically have no network to/from which they must provide interconnection, no EU Member State imposes any VoIP-specific interconnection obligation.

United Kingdom. Although the U.K. has general interconnection rules and policies in place, there are no VoIP-specific interconnection rules because there is no need or justification for such rules when most VoIP providers are untethered from the networks over which they are accessed by consumers and businesses. In addition, the U.K. has transposed the EU regulatory framework in its national legislation/regulation.

Q3: Whether accessing of telecom services of the TSP by the subscriber through public Internet (internet access of any other TSP) can be construed as extension of fixed line or mobile services of the TSP? Please provide full justification in support of your answer.

United States. All that matters in the U.S. is whether a provider is offering an "interconnected VoIP" service, i.e., a service that enables users to make calls to and receive calls from phone numbers. Whether or not this is provided as an extension of the telecom provider's traditional PSTN offering is irrelevant. The service either is "interconnected VoIP" that is subject to FCC regulation or it is not.

Australia. In Australia, it does not matter if the VoIP service is provided by Australia's equivalent of a TSP or not. What matters is whether the service fits the definition of a regulated VoIP service. Thus, whether or not it is an "extension of a fixed line or mobile service" of a TSP is not a relevant analysis in Australia.

European Union. Within this context, BEREC notes that in the context of market power designations in the markets relevant to voice telephony (such as retail markets for fixed telephony, access at fixed location market, wholesale markets for fixed calls origination and fixed and mobile call termination), only one NRA (Norway) found VoIP services with the capability to make calls to the PATS to constitute a substitute for traditional voice services, while only two NRAs (Spain and Portugal) considered that nomadic voice services are also part of the voice market. Most NRAs are of the opinion that there is no clear evidence at the moment that the use of VoIP services may impact the provision of traditional voice, and identify as some of the reasons

for the lack of substitutability that end users perceive VoIP services as having lower quality and security, and the lack of interoperability among OTT voice services.[6]

By contrast, Voice over Broadband – generally comprising non-nomadic services, combining the offering of a broadband access line (e.g. via DSL technology or cable modem) with the provision of voice services by a single company – has been interpreted as a substitute for PSTN-based fixed line telephony by various NRAs in the course of their market analyses under the EU framework.

United Kingdom. In the UK, VOIP is treated as any other packet switched data, and VOIP is not currently seen as a 'relevant market' in the UK that requires a review to ensure that it is functioning correctly. Thus, it does not matter if the VoIP app is provided as an extension to a regulated entity's preexisting PSTN voice service or by a company providing only the VoIP capability all that matters is whether it is a 'VOIP out' or a 'VOIP in and out' service. Moreover, it should be noted that Ofcom has stated*: Traditional voice calls are carried over the PSTN network, a circuit switched network that allocates a dedicated circuit to each call. Internet Protocol (IP) data networks, such as the internet, operate in a different way, splitting data into packets which are then sent individually across the network.*

Voice over internet protocol (VoIP) technology allows voice and video calls to be delivered over IP networks, rather than the PSTN network. As VoIP calls are routed over the open internet, VoIP providers are isolated from costs relating to running the IP network over which calls are transmitted (these are incurred by the network operator and passed to the end users as part of their access charges i.e. call origination or call termination charges as appropriate).[7]

Q4: Whether present ceiling of transit charge needs to be reviewed or it can be continued at the same level? In case it is to be reviewed, please provide cost details and method to calculate transit charge.

[6] BEREC, Report on OTT services, BoR (16) 35, Jan. 2016, p. 18.

[7] See: http://stakeholders.ofcom.org.uk/binaries/research/cmr/cmr15/CMR_UK_2015.pdf - Page 261

(Also see Ofcom Communications Market Report (6 August 2015) as provided at link above in relation to VoIP market generally substitutability).

As discussed above, the concept of transit is not uniquely relevant to VoIP. Thus, VoIP has no bearing on the question of whether or not transit rates in India should be reviewed.

United States. In the U.S., "transit" is generally defined as a service provided to two PSTN network operators that allows them to interconnect and exchange traffic indirectly rather than directly. It consists of the rate elements of tandem switching and tandem transport. Even as it determined to bring most other rate elements associated with intercarrier compensation to zero (including tandem switching and transport where it is provided for traffic other than transit traffic, e.g., long distance access traffic), the FCC chose not to regulate rates for the provision of transit services. There are competitive providers of transit services in the U.S., e.g., Intelliquent, which subject transit rates to marketplace discipline.

Australia. The supply of transit services is not regulated in Australia. Thus, no methodology applies for the calculation of levels of transit charges.

European Union. The supply of transit services is substantially deregulated in the EU (only 5 Member States retain some legacy regulation, which is often focused to address those situations where it is difficult to reach locations). The 2014 edition of the European Commission's Recommendation on Relevant Markets Susceptible to Ex-Ante Regulation does not include the fixed transit market. The 2007 edition of the European Commission's Recommendation removed fixed transit from the list of markets that was deemed susceptible to ex-ante regulation in the 2003 edition (ex-Market 10). The relevance of the transit market is declining as the number of PoIs for the PSTN decreases substantially with migration to all-IP NGN architectures. VoIP was never a consideration relating to the transit market in the EU.

United Kingdom. Currently the transit charge does not have a ceiling in the UK - it is a strictly commercial arrangement between two companies. We are aware that sometimes there is no cost as each party bears its own costs. Moreover, there has been no review of transit charges with respect to VoIP services because no such review was necessary.

Q5: What should be the termination charge when call is terminating into Internet telephony network?

United States. In the United States, there is no unique intercarrier charging regime for VoIP services. Moreover, the FCC has adopted a transition of moving all originating and terminating intercarrier compensation to zero (whether for terminating or originating local or long distance calls) – or, as it is commonly called, "bill and keep." Under this approach, carriers recover the costs of the network (specifically, those used for terminating and originating calls) from their subscribers, not from other carriers. In doing so, the FCC explicitly rejected the notion that *only* the calling party benefits from a call and therefore should bear the burden of paying for originating, transporting, and terminating a call. This method of intercarrier compensation has been in place in the U.S. wireless industry for more than 20 years, and it has worked remarkably well, removing uneconomic distortions and encouraging adoption of the most efficient network technologies. More specifically, wireless carriers were required to develop cost-saving network technologies and offer higher quality services to attract customers rather than being able to demand payments from other carriers for access to old networks. The policy has contributed to the deployment of the most technologically advanced mobile wireless networks in the world.

Australia. In Australia, the termination charge for terminating a call to a VoIP user is a matter for commercial negotiation.

European Union. In the EU, VoIP services that terminate calls from the PSTN are subject to the same termination rates that are applicable to any other fixed or mobile PSTN endpoint. Thus, if a VoIP to PSTN provider has obtained its own telephone numbers directly from the regulator/government, that VoIP provider may impose terminating access charges on calls delivered to it from the PSTN. For a VoIP to PSTN provider that uses the phone numbers of an underlying network operator/carrier, it is the underlying network operator/carrier that charges terminating access for calls to it from the PSTN. Notably, however, the EU has not created any VoIP-specific termination charges; rather, calls to/from VoIP providers to/from traditional PSTN endpoints are subject to the very same terminating access framework as any other PSTN call.

United Kingdom. The answer is the same as the European Union, described immediately above.

Q6: What should be the termination charge for the calls originated from Internet Telephony Network and terminated into the wireline and wireless Network?

United States. See answer to question #5.

Australia. In order for a call to be terminated onto a mobile network as a mobile call, or a fixed network as a PSTN call, the call will need to be delivered to the relevant carrier at its POI in the requisite form. This means that the call will need to be converted from an internet call to a standard call (with CCS#7 signaling, etc.) before it is routed to the POI of the mobile or fixed carrier, unless separate arrangements are negotiated with the mobile or fixed carrier.

Assuming that the call is delivered at the POI with the requisite characteristics, it would be accepted by the mobile or fixed carrier for termination and the standard mobile terminating access (MTAS) charge or fixed terminating access (FTAS) charge would be applied. The MTAS and FTAS charges in Australia are commercially negotiated, but default charges are applied. If a call is not delivered to a carrier at the POI in the requisite format at the POI, but is rather delivered to the carrier as an internet call, then the call termination arrangements will fall outside the scope of the regulated services. In such circumstances, the charges will be determined as a matter of commercial negotiation.

European Union. Please see answer to question #5.

United Kingdom. Please see answer to question #5.

Q7: How to ensure that users of International Internet Telephony calls pay applicable International termination charges?

United States. There are no distinctions in charges for "domestic termination" and "international termination" in the United States (recognizing, perhaps, the reality that there is no empirical economic difference between the two types of termination). Further, as noted above, in the United States there are no carrier-to-carrier termination charges for mobile, and those for wireline telephony, including VoIP, have nearly completed the transition to zero.

Australia. Australia does not differentiate between termination of inbound international calls and inbound domestic calls. A carrier in India, for example, could route a call over the Internet into Australia as an internet call to carrier X, arrange for carrier X to convert the call to a PSTN call, then have the call delivered to the POI of the relevant carrier in Australia for termination in Australia. In this manner, there is a mechanism to avoid international termination charges – something that benefits users of these services by ensuring calling rates are low.

Telstra, the incumbent operator in Australia, has historically sought to eliminate the ability for calls to enter Australia over the internet before being delivered to the PSTN, by seeking for domestic carriers to agree not to supply transit services for inbound international calls. However, such matters are commercially negotiated and would be unlikely to be upheld if subject to regulatory challenge.

European Union. Please see previous comments.

United Kingdom. Please see previous comments.

Q8: Should an Internet telephony subscriber be able to initiate or receive calls from outside the SDCA, or service area, or the country through the public Internet thus providing limited or full mobility to such subscriber?

United States. The U.S. does not impose any geographic restrictions on the provision or use of VoIP services.

Australia. Australia does not impose any geographic restrictions on the provision of VoIP services. Once a call has been routed into the internet, it becomes an internet call so could be terminated literally anywhere that the internet IP address is located at the time.

European Union. Please see previous comments.

United Kingdom. There is no restriction in the UK on whether a VoIP service is nomadic or non-nomadic. The potential portability of VoIP is recognized as a benefit of VoIP over a fixed line PSTN line.

Q9: Should the last mile for an Internet telephony subscriber be the public Internet irrespective of where the subscriber is currently located as long as the PSTN leg abides by all the interconnection rules and regulations concerning NLDO and ILDO?

United States. The United States has no licensing obligation for VoIP, and the location of the user is not a relevant regulatory consideration for carrier-to-carrier payments or end user charges. The concept of the "last mile," accordingly, is meaningless for such purposes.

Australia. Because Australia has no licensing obligation for VoIP, and the location of a user is irrelevant for regulatory purposes (other than, perhaps, emergency calling), there is no need to consider the "last mile" of an Internet Telephony call. Rather, VoIP calls – once on the PSTN -- are subject to the same interconnection and routing obligations that are applicable to any other call on the PSTN. The Australian approach is as follows:

- Australia has various industry codes addressing matters such as interconnection. Interconnection agreements in Australia also have commercially negotiated terms specifying technical requirements.
- Where a call is routed over the PSTN to a POI as a standard call, it will need to comply with industry codes and the commercial interconnection agreements. Accordingly, it will need to be delivered to the POI in the requisite format for termination – eg with CCS#7 signalling. An internet call will therefore be converted to a standard call before delivery to the POI under this approach.
- If the call is delivered to a carrier as an internet call for delivery on a PSTN or mobile number of the carrier, then separate arrangements will need to be negotiated with the carrier that involve the conversion of the call by the carrier.
- If the call is delivered to a carrier as an internet call for delivery on an IP address, the call will pass through internet peering and transit links as IP packets and the carrier will have no knowledge that the IP packets constitute a 'call'. *A pure internet call is therefore essentially no different from any other internet service.*

European Union. Please see previous comments.

United Kingdom. This question does not transfer into the UK scenario as licenses are not required for the provision of VoIP services. Moreover, as noted above, VoIP calls are treated just like any other bit when on the internet, and they are treated just like any other PSTN call when they are on the PSTN. There are no restrictions on the mobility of their use, and the location of the user is irrelevant to the application of intercarrier payments that may be applicable.

Q10: What should be the framework for allocation of numbering resource for Internet Telephony services?

United States. Telephone numbers in the U.S. are allocated to VoIP services in one of two ways: (i) they are sub-allocated through a commercial relationship between the VoIP provider and a telephone service provider (typically a "Competitive Local Exchange Carrier" or CLEC) which has obtained its telephone numbers directly from the U.S. number administrator; or (ii) the VoIP provider obtains the numbers directly from the numbering administrator because the VoIP provider has, itself, obtained a CLEC certificate or has otherwise been granted FCC authority to directly obtain the numbers. In no case are VoIP providers precluded from obtaining and using any particular type of number – i.e., there are no geographic vs. non-geographic number restrictions in the U.S. And, there are no restrictions on a VoIP provider's assignment of phone numbers to its users. This flexibility in the numbering allocation and assignment rules has enabled VoIP services to flourish and compete in the U.S., bringing significant benefits to consumers and businesses alike.

Australia. Although Australia has historically had a fairly rigid numbering system – strictly dividing geographic numbers from non-geographic numbers – the regulator (ACMA) has recently launched a consultation to consider modernizing the number allocation rules. Specifically, ACMA is looking to put in place a more flexible numbering system in the future. In the future, it is possible that arrangements will be implemented to enable use of standard geographic numbers for nomadic VoIP services, providing greater geographic mobility of phone numbers.

European Union. The EU regulatory framework generally mandates that numbers shall be available for all publicly available electronic communications services, but does not expressly deal

with VoIP in that context or specify on what basis geographic versus non-geographic numbers should be assigned.

The European Regulators Group (ERG) takes the position that: [8]

(a) all providers of fixed telephony services should be authorized to permit nomadic use by their subscribers, and geographic numbers should be available for this purpose. The ERG points out that geographical numbers appear to be preferred by many end users for making and receiving phone calls, for various reasons, like end users being used to geographical numbers, having more confidence in calls where the caller's location can be identified, having a preference for calling companies or commercial offers from the same area or fearing unknown rates when calling non-geographical numbers. The ERG considers these reasons to all be valid consumer concerns to be taken into account when allocating numbers to VoIP providers.

(b) Numbering plans should be technologically neutral, based on the service descriptions and the same number ranges should be available within those service descriptions. This means that, geographical numbers for traditional telephony services and geographical numbers for VoIP services should share the same number range, that is, come from a common "number pool".

(c) Nomadism is an essential feature of VoIP services which should not be restricted. Nomadism does not preclude Member States from maintaining the geographical meaning of geographical numbers if desirable; this can be achieved by allocating such a number only to subscribers with a main location (address) in the corresponding geographical zone, as defined in the national numbering plan.

From a study mandated by the European Commission, it appeared that many EU Member States maintain non-geographic number ranges dedicated to VoIP, which are allocated to nomadic operators of VoIP, while geographic numbers are available to non-nomadic providers of VoIP.[9]

[8] ERG Common Position on VoIP, ERG (07) 56rev2, Dec. 2007, p. 15-16.

[9] WIK Consult, The Regulation of Voice over IP (VOIP) in Europe, 2008, p. 35.

Geographic numbers are sometimes offered under conditions to nomadic VoIP operators as well, pursuant to which, for example, the use of the geographic numbers is restricted to the same geographical area (France, Italy, Spain), or requiring the VoIP service provider to confirm that the subscriber has his/her home address in the same area (Germany, the Netherlands)). Moreover, there is a growing trend to liberalize and further enable VoIP providers to use geographic numbers in EU countries. Austria, for example, has a draft decision wherein it proposes to expressly allow use of geographic numbers by VoIP providers.[10] And, Portugal just launched a Consultation in which it proposes to liberalize its geographic numbering rules.[11]

United Kingdom. A non-geographic numbering range (056), which is part of the UK National Telephony Numbering Plan (NTNP), was made available by Ofcom for nomadic VOIP services and geographic numbers are available for all PATS including VOIP.

Q11: Whether Number portability should be allowed for Internet Telephony numbers? If yes, what should be the framework?

United States. Not only is number portability "allowed" in the U.S., number portability is a regulatory mandate for VoIP providers that are subject to the FCC's rules – that is, "interconnected VoIP" providers that enable calls both to and from the PSTN. Portability is critical to ensuring a robustly competitive market; therefore, wireless carriers, wireline carriers and providers of interconnected VoIP services must all be prepared to port telephone numbers both to and from other PSTN voice providers.

Australia. Number portability exists in Australia. For example:

- A fixed line geographic number is subject to Local Number Portability arrangements. Hence if a customer was terminating VoIP calls onto a geographic number, they could keep their geographic number if they ported to another provider.

[10] See https://www.rtr.at/de/inf/Konsult6NovKEMV2009/6_Novelle_KEMV2009_kurz_Konsultationsdokument.pdf

[11] See http://www.anacom.pt/render.jsp?contentId=1391085#.V5e7cI-cGVB

- A mobile number is subject to Mobile Number Portability arrangements. Hence if a customer was terminating VoIP calls onto a mobile number, they could keep their mobile number if they ported to another provider.
- Special services numbers used for Internet Telephony are not currently the subject of number portability arrangements in Australia, but this is likely to change in the future as Australia updates and modernizes its numbering plan.

European Union. Recognizing that number portability is one of the main enablers of competition, the European regulatory framework mandates that subscribers of publicly available telephone services can retain their numbers independently of the undertaking providing the service (i.e., service provider portability for PATS). The number portability mechanisms (onward routing, all call query, etc.) are regulated independently in each Member State, as portability between countries is not defined.

The ERG has indicated that number portability is viewed as a basic right by consumers in the Member States and that it would be difficult to justify, from a user's point of view, why VoIP would be excluded from portability. The further development of VoIP would also be severely impeded if a user of the traditional public telephone service on the PSTN could not migrate to a VoIP service maintaining the number, even though the VoIP provider is entitled to be allocated numbers in the same number range. The ERG therefore deems it appropriate to impose number portability obligations on VoIP providers, and also allow number portability between traditional telephone services and VoIP services, within the same location. The ERG additionally notes that the imposition of a number portability obligation will only be effective as a facilitator of competition via VoIP if any provider has the ability to request the combination of ceasing of PSTN service and porting of the number to that provider, e.g. to offer a naked DSL service.

United Kingdom. In the UK, number portability is a right of any subscriber to a public electronic communications service with a number from the NTNP. Number portability is seen as a key facilitator of consumer choice and effective competition throughout the EU as without it, the

inconvenience of having to switch phone numbers would have the potential for discouraging subscribers and competition.

Q12: Is it possible to provide location information to the police station when the subscriber is making Internet Telephony call to Emergency number? If yes, how?

United States. In the U.S., VoIP providers do not have an obligation to – nor is there currently a technical methodology to enable it – provide the real-time location of a nomadic VoIP user who has dialled the emergency services number, 911. Rather, the FCC has required that the interconnected VoIP providers, i.e., only those that provide a service that enables calls both to and from the PSTN, to collect a "registered location" from each customer. That registered location is then used for purposes of routing the call to the appropriate emergency call center. It is well recognized in the U.S., that the user may not be at that location when he/she calls 911. Therefore, the FCC has also required that interconnected VoIP providers provide their customers a disclaimer that informs them of the limitations of its VoIP 911 calling capabilities.

Australia. In Australia, there is a requirement to provide emergency calling services that applies to the supply of "standard telephone services." The supply of emergency calling services is regulated under an industry code in Australia, known as ACIF C536: Emergency Call Service Requirements. There is no requirement in this code to supply location information, rather the obligation is to disclose the number from which the call was made. Telstra will then use its database to automatically identify an address for any geographic number. If the number is not a geographic number, the emergency call operator will need to ask the location of the person making the call.

European Union. The EU regulatory framework obliges undertakings providing end users with an Electronic Communications Service for placing national calls to numbers in a national numbering plan, to provide access to emergency services (the European emergency number '112' and any designated national emergency numbers) free of charge. The undertakings are also required to provide location data of the party calling emergency numbers to the emergency services.

It is acknowledged that it is more complex for nomadic VoIP to ascertain the real-time location of a caller and route emergency calls to the correct emergency centre as routing for fixed services and networks is based on geographical knowledge of the network termination point through E.164 geographic numbers. In most European countries the location information of calls directed to 112 and originated from non-mobile end users is found by the emergency response centre by looking up the telephone number in a database or requiring such information from the operator that provides the service to the customer ("pull" approach). This database contains, at least, the telephone number and address of all subscribers. Such a database is, in some cases, fed with information by all service providers, who periodically update the data to the emergency response centre. This database is, in some countries, the same as the one used for directory enquiry services.

To cover the case of nomadic use, as a first step, the ERG recommends that providers could inform the emergency centers when a terminal can be used nomadically (a "flag" for possible lack of reliability of the address data). A second step that is often discussed is where the provider enables the user to update his current location (via the web), which could be interrogated by the emergency centre if necessary. This approach could also be used when a geographic number might be used nomadically. The database would contain the caller location information and a warning that the address data might not be reliable in the case of a call to 112. This approach assumes that the caller's number (Caller Line Identification (CLI)) is transmitted with the call. The ERG notes that although a push-type provision of location information is to be preferred, a pull approach is recommended for an interim period. Obviously, both the push and the pull mechanism require relevant Public Safety Answering Points (PASPs) to have data network access to be compatible with VoIP networks and platforms, besides a conventional PSTN connection.[12]

United Kingdom. Free and reliable access to emergency numbers is an essential requirement of many telecommunications licenses globally, including the UK. In the UK PSTN, a network termination point is matched with a callers' location which can be identified from the caller line identification (CLI) present even when CLI is withheld by the caller. Fixed Communications

[12] ERG Common Position on VoIP, ERG (07) 56rev2, Dec. 2007, p. 10-11.

Providers maintain a database that associates the calling line identifier with the address to which the line is connected. This means that the information presented on the screens of Call Handling Agent operators should reflect the premises from which the call is being made. In 2007 Ofcom identified a high level of consumer confusion relating to access to emergency services from a VOIP service[13]: A VoIP service provider is expected to provide accurate and reliable CLI 'to the extent technically feasible' and at no charge to the emergency organizations.

This of course is not viable for those VoIP service providers who do not use or assign an E.164 number (telephone number) as a user identifier. If the VOIP service does not provide access to emergency call numbers, this fact must be made clear at the time of signature of the relevant agreement. If the service is to be used principally at a single, fixed location, the service provider must require the customer to register with it the address of the place where the service will be used, in order to assist emergency services organisations.

Customers must also be advised of any limitations on location information. If access to emergency calls is unreliable (particularly if access is cut off in the event of a power cut or failure, or a failure in the broadband connection over which the service is provided) this must be made clear to the customer, and acknowledged by the customer at the point of signature.

Q13: In case it is not possible to provide Emergency services through Internet Telephony, whether informing limitation of Internet Telephony calls in advance to the consumers will be sufficient?

United States. See previous answer.

Australia. Not applicable – see previous answer.

European Union. See previous answer.

United Kingdom. See previous answer.

[13] Please See:
http://stakeholders.ofcom.org.uk/binaries/consultations/voip/statement/voipstatement.pdf

Q14: Is there a need to prescribe QoS parameters for Internet telephony at present? If yes, what parameter has to be prescribed? Please give your suggestions with justifications.

United States. The U.S. imposes no QoS obligations on any type of VoIP service, including interconnected VoIP which is subject to other regulatory obligations.

Australia. Australia does not impose any QoS parameters for Internet Telephony calls.

European Union. Under the EU regulatory framework, providers of ECSs may be required to provide information on the quality of their services, using, for example, parameters suggested in the framework.[14] The application of this transparency obligation to VoIP providers varies considerably among Member States. The regulatory framework also allows for the imposition of minimum quality of service requirements in order to prevent the degradation of service and the hindering or slowing down of traffic over networks. Prior to imposing such requirements, NRAs are required to submit them for review to the European Commission who may provide comments and recommendations, in particular to ensure that the envisaged requirements do not adversely affect the functioning of the internal market. We are not aware of any specific requirements having been imposed in respect of VoIP services to date.

United Kingdom. Through the General Conditions of Entitlement Ofcom may require providers to publish specific comparable information for end-users on the quality of their services, such as supply times, fault rates, fault repair times, billing complaints and complaint resolution times. Providers of non-mobile services with net quarterly relevant revenue above £4 million and more than 100 million call minutes per quarter have been strongly encouraged to publish such information. Providers of PATS are required to "take all necessary measures to maintain, to the greatest extent possible":

a. The proper and effective functioning of public communications network at all times.
b. In event of catastrophic network breakdown or in cases of *force majeure* fullest possible availability of public communications network & PATS services provided.

[14] In Annex III to the Universal Service Directive (Directive 2002/22/EC, as amended by Directive 2009/136/EC).

c. Uninterrupted access to emergency organizations as part of the PATS service offered.

Ofcom acknowledges in the PATS Guidelines that it is possible that a VOIP provider might not provide all network and service elements which control availability. It lists measures that may be taken in respect of elements of the network or service it does control, for example: engineering the VOIP Service to minimize latency and specifying minimum requirements for use of the service such as bandwidth and contention ratios.