

Consultation Paper on Internet Telephony (VoIP)

Dear Sir,

We welcome the opportunity to submit our views on the Consultation Paper on Internet Telephony (VoIP), dated 22nd June 2016, by the Telecom Regulatory Authority of India (TRAI).

We are providing a general response to the topic raised in the -Consultation paper followed by a detailed response to each of the questions.

Regards,

Authors:

- Prof. Rekha Jain, Executive Chair, IITCOE, IIM Ahmedabad
- Mr Amod Prakash Singh, Researcher, IITCOE, IIM Ahmedabad
- Ms Jyoti Panday, Researcher, IITCOE, IIM Ahmedabad
- Mr Rishabh Dara, Student, IIM Ahmedabad
- Mr Pranesh Prakash, Policy Director, Centre for Internet and Society Bangalore

*All views expressed are personal.

Dear Sir,

We welcome the Consultation on Regulation of VoIP Services initiated by TRAI. We strongly feel that a regulatory framework needs to be put in place for encouraging and allowing interconnection between Internet Telephony services and domestic PSTN voice services. The present lacunae in the regulations is leading to uncertainty in interpretation of what is permissible; creating a black market for such interconnection; and acting as a barrier for new businesses to consider this as a serious economic opportunity. Further, interconnection between Internet Telephony and domestic PSTN services will promote the regulatory objectives of lawful interception, emergency services and quality of services; besides substantially expanding the network effects of PSTN, thus elongating its life as it competes with the Internet to stay relevant.

Our response is structured as follows. We first provide a general framework of principles on the basis of which regulations should be framed by TRAI. We then provide answers to the specific questions asked by TRAI.

Overall Principles/Framework of Response

- TRAI should recognize three classes of VoIP services
 - **Class 1 - Unlicensed Peer to Peer Internet Telephony** - This class refers to Internet Telephony services that do not want to interconnect with the domestic PSTN; and want to remain outside the scope of the domestic licensing framework.
 - **Class 2 - Licensed Interconnected Internet Telephony** - This class refers to Internet Telephony services that want to either terminate calls on the domestic PSTN or receive calls from the domestic PSTN. We propose a new light licensing framework for this class of services.
 - **Class 3 - Licensed Specialized/Managed VoIP Telephony** - This class refers to VoIP services over managed networks. This should not be confused with Internet Telephony. Managed VoIP services should only be allowed by UL (Access) licensees.

- **Framework for Class 1 VoIP providers:**
 - Class 1 services should be regulated by the IT Act.
 - Class 1 services should **not** be regulated by TRAI.
 - Class 1 services should **not** be licensed.
 - Class 1 services should **not** be allocated E.164 numbers.
 - Class 1 services should **not** be allowed interconnection between Internet Telephony and domestic PSTN calls for both outbound (calling to PSTN) and inbound (calling from PSTN).
 - Quality of Services regulations or Emergency Services regulations should **not** be mandated for Class 1 services.

- **Framework for Class 2 VoIP providers:**
 - Class 2 services should require an Internet Telephony license. The Class 2 Internet Telephony license should be distinct from and should not be confused with the Unified License (Access) or Unified License (Internet). The new license may be called Unified License (Interconnected Internet Telephony)
 - It should be voluntary for **Class 1** providers to take a Internet Telephony license and convert to a **Class 2** provider.
 - Class 2 licensees should be allowed to terminate calls on the PSTN (outbound) and receive calls originating from the PSTN (inbound).
 - A Class 2 Licensee would require collaborating with UL (Access) for interconnecting with the PSTN. Two options are suggested:
 - ***Option 1:*** The Class 2 Internet Telephony license would be similar to the MVNO licensing regime.
 - Class 2 licensees will only be interconnected with one Primary TSP having a Unified License (Access).
 - Class 2 licensees will not be permitted interconnection equipment for interconnection with any TSP other than the Primary TSP.
 - Class 2 licensees will not be permitted RAN equipment.
 - Class 2 licensees would not be directly allocated E.164 numbers. Numbers would be allocated to the Primary TSP. The Primary TSP would be responsible for sub allocation of numbers to the Class 2 licensees.
 - Primary TSP cannot be a Unified License (Internet) or ISP License holder since these do have access to the PSTN network. ISP may take a UL (Access) in case it wants to become a Primary TSP.
 - Commercial terms between the Class 2 Licensee and Primary TSP should be left to market forces with overall requirements for FRAND terms. The Class 2 Licensee should be able to port all its customers from one Primary TSP to another in case of failure of negotiations.
 - The Primary TSP would be responsible for enabling lawful interception and number portability. Subscriber verification may be done directly by the Class 2 licensee or by the Primary TSP for a charge.
 - Option 1 offers higher accountability for subscriber verification, lawful interception and number portability since the Primary TSP would be responsible for infrastructure and compliance. Option 1 also does not require changes in POI ports and CMS capabilities as the present framework may continue. It also reduces monitoring costs for DoT TERM cells to check for compliance. However, in Option 1, the Class 2

licensee would be susceptible to arm-twisting by the Primary TSP in case TRAI does not prescribe a framework for porting customers from one Primary TSP to another.

- **Option 2:** Open Market Class 2 Internet Telephony License
 - Class 2 licensees may interconnect with any number of TSPs with UL (Access).
 - Class 2 licensees can take E.164 numbering directly from DoT.
 - Class 2 licensee would directly comply with lawful interception, subscriber verification and number portability.
 - Option 2 reflects a market oriented practice. In comparison to Option 1, it gives freedom to Class 2 licensees to renegotiate terms with the UL (Access).
- Entry fee for Class 2 licenses should be minimal. The objective should be to incentivize Class 1 to migrate to Class 2. The license fee should be fixed at a flat 8% of AGR to prevent arbitrage between UL (Access) and Class 2 Internet Telephony that may be misused.
- Quality of service regulations should **not** be mandated for Class 2 licensees since QoS cannot be guaranteed over the best efforts delivery on the Internet leg of the call.
- Class 2 licensees should be required to provide emergency calling services including location.¹
- **Framework for Class 3 VoIP Services**
 - Managed VoIP services should only be allowed through a Unified License (Access).
 - Class 3 is equivalent to regular PSTN calls wherein TSPs have migrated from circuit switched to packet switched.
 - Quality of service regulations should continue to be mandated for Class 3 VoIP services.
- **Interconnection Charges for Class 2 Services:**
 - In case of interconnection between PSTN and Internet Telephony for Class 2 Licenses, the PSTN leg should be treated as distinct from the Internet leg for the calculation of interconnection charges.
 - Scope of CPP & IUC should be restricted to PSTN leg of the call. The CPP & IUC Regime is a PSTN concept that should not be applied to the Internet Telephony leg of the call. The Internet functions on a Bill & Keep Regime – everyone charges their own customers for data and keeps the money collected. Therefore, termination charges should not be applied to that part of the call that has been switched to the Internet.

¹ For example, this requirement exists in FCC Regulation 2005

- In case of calls that switch between PSTN and Internet Telephony, the IUC regime should be restricted to the portion of the call from PSTN to PSTN. The IUC regime should cease to apply for the portion of the call that is switched to Internet Telephony. Each time the call re-enters the PSTN network, it should be treated as a new PSTN call for application of the IUC termination/transit charges.
 - For a call originating from a customer of a Class 2 licensee and terminating on the PSTN of Airtel, if the call enters the domestic PSTN via the Vodafone network, then termination charges should be payable by Vodafone to Airtel. Vodafone would need to be compensated by the Class 2 licensee according to the commercial arrangement between them for switching of Class 2 calls in addition to the termination charges payable to Airtel. The Bill and Keep regime would apply to the Internet Telephony leg of the call.
 - For a call originating from a customer of a Class 2 licensee and terminating on the PSTN of Airtel, if the call enters the domestic PSTN via the Airtel network itself, then no termination charges should be payable. Airtel would need to be compensated by the Class 2 licensee according to the commercial arrangement between them for switching of Class 2 calls. The Bill and Keep regime would apply to the Internet Telephony leg of the call.
 - For a call originating from a customer of the Airtel PSTN and terminating on a Class 2 Licensee, if the call first travels via PSTN to the Vodafone network, and is then switched to Internet Telephony by Vodafone, then termination charges should be payable by Airtel to Vodafone. Vodafone may also charge the Class 2 licensee for switching the call to Internet Telephony according to the commercial arrangement between them. The Bill and Keep regime would apply to the Internet Telephony leg of the call.
 - International Termination Costs: The arbitrage between international and domestic termination charges is artificial. The cost of termination remains the same regardless of whether call originates in India or abroad. While the current arbitrage between domestic and international termination charges may continue for regular PSTN calls, if a call originates on Internet Telephony abroad, but enters the PSTN domestically, then domestic termination charges should apply.
- **Numbering:**
 - A system of mapping E.164 numbers to SIP/H.323/other addresses needs to be established. An example of the mapping is called ENUM.
 - The question of whether such mapping is maintained in a centralized database or in a decentralized manner with TSPs is important as it will determine flow of termination charges for calls originating on the PSTN:
 - If the ENUM file is centralized and a copy available with all TSPs, then the originating network can directly switch to Internet Telephony and circumvent termination charges payable to the Primary TSP that has been assigned the E.164 number in case of Option 1. While a

centralized ENUM file is more efficient, it may discourage incumbent TSPs as they may lose termination revenue.

- If the ENUM file is decentralized and each TSP maintains the mapping file for the E.164 numbers allocated to it, then all calls must terminate on that TSP before they can be switched to Internet Telephony. This way, the termination charges are received by the Primary TSP that has been assigned the E.164 number for Internet Telephony in case of Option 1.
 - The Class 2 Licensee and Primary TSP may be held jointly responsible for subscriber verification. The Primary TSP may charge a fee to the Class 2 licensee for each subscriber verification; or the Class 2 Licensee may directly verify subscribers.
 - If numbering series is same as mobile, then a call originating/terminating on Internet Telephony (Class 2) should be preceded with a voice/other warning that quality of service cannot be guaranteed. If numbering series is different from mobile (such as 11 digit starting with 33), then quality of service warnings will not be required. However, MNP between mobile numbers and Class 2 VoIP numbers will remain an issue in the future. That issue may be incrementally dealt with in the future once QoS becomes a redundant issue due to higher data speeds.
- **Lawful Interception:**
 - Interconnection via primary TSP for Class 2 licensees will ensure that the call over Internet Telephony is capable of being intercepted since it must switch to PSTN and the facilities of the Primary TSP with UL (Access) are already compliant with lawful interception requirements. No additional infrastructure will be required.
 - **Why Class 2 Licenses should be encouraged and promoted?**
 - Standardizing numbering in a network agnostic manner will help overcome silos that exist with many VoIP providers due to their service specific account naming/numbering. Allocation of E.164 numbers to VoIP services will elongate the life of E.164 numbers as it fights the network effects of Internet Telephony to stay relevant. Otherwise, E.164 numbering will start to collapse once Internet Telephony standards reach a threshold value that tip off the PSTN network. Though this is a distant problem in India given rural dependence on the PSTN, foresight can only be prudent.
 - Class 2 licenses will incentivize Internet Telephony providers to become a part of the Lawful Interception regime as all voice at the Primary TSP would be susceptible to targeted Lawful Interception under existing license arrangements

- **Problems with 2008 recommendations:**
 - Recommendations permit ISPs to interconnect with PSTN and handle numbering
 - Unclear arrangement between Class 2 Internet Telephony providers (such as Skype, Hangout, Nanu) and ISPs. Unclear whether recommendations expect Internet Telephony providers to take an ISP license, which seems unreasonable and overburdening. Unclear whether it assumes that ISPs will provide internet telephony; and not the Skypes and Hangouts.
 - ISPs have no experience in handling numbering; or interconnecting with the PSTN.
 - Recommendations mandate NLDOs as the intermediaries to interconnect ISPs with PSTN access providers
 - No distinction between NLDO and access provider in UL regime
 - In the absence of an intermediary, interconnection with PSTN may need to be facilitated using an arrangement similar to NIXI.

- **TRAI should retain the present distinction between UL(Access) and UL(Internet)**
 - UL (Internet) and ISP Licensees should **not** be allowed to provide switching services between Internet Telephony and domestic PSTN because they do not have domain expertise of handling PSTN services including E.164 numbering, lawful interception etc.; and due to large numbers will require an intermediary to interconnect with the PSTN (for example, refer 2008 recommendations that suggested NLDO as the intermediary).
 - UL (Access) and UASL Licensees should be allowed to provide switching services between Internet Telephony and domestic PSTN.
 - UL (Internet) may migrate to a UL (Access) License since entry barriers for UL (Access) are low.
 - Customers of UL (Internet) should be able to access Class 2 Internet Telephony services even though UL (Internet) cannot provide interconnection with the PSTN itself. The two issues should not be conflated.

Responses to Specific Questions.

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?

Presently, UL (Access) can interconnect Internet Telephony with the domestic PSTN whereas UL (Internet) is not allowed to do so. In the envisioned framework, we have proposed an additional Class 2 Interconnected Internet Telephony License that will require such Class 2 licensee to latch on to a Primary TSP for numbering, interconnection, lawful interception etc. Alternatively, a Class 2 licensee may directly procure numbering from DoT and interconnect with as many Primary TSPs as it wishes. The question thus is whether only UL (Access) should be allowed to be that Primary TSP or whether UL (Internet) should also be allowed to be the Primary TSP?

There are two motivations to this question that should not be conflated:

1. Is there a need to establish a level playing field between UL (Internet) and UL (Access) to enhance competition in Internet Telephony?
2. If UL (Internet) is not permitted interconnection between domestic PSTN and Internet Telephony, will customers of UL (Internet) be able to access Class 2 Interconnected Internet Telephony Services provided using the facilities of UL (Access)?

The thrust of the first question is to establish a level playing field between two unequal licensees in order to facilitate competition. Service Providers with ISP Licenses or UL (Internet) do not presently interconnect with the PSTN and have no experience in handling E.164 numbers, emergency services, IUC termination charges, CPP billing and voice lawful interception. In our opinion, interconnecting with PSTN should continue to remain the exclusive domain of UL (Access) since they have expertise and capacity that UL (Internet) do not have. Further, given the vast number of UL (Internet) / ISP licensees, if all of them are given permission to interconnect with the PSTN in one go, then the TRAI will need to fall back on creating an intermediary (NLDO) to facilitate interconnection as it did in the 2008 recommendations that added additional complexities to the regulatory regime.

The entry barriers for UL (Access) are sufficiently low for UL (Internet) to migrate to UL (Access) in case UL (Internet) licensees want to compete with UL (Access). Thus, TRAI should not prescribe additional PBG and FPB to for ISPs for provision of unrestricted Internet Telephony.

However, this does NOT imply that end customers of UL (Internet) would not have access to Class 2 Interconnected Internet Telephony services that switch to PSTN using the switching facilities provided by UL(Access). We hope that these two issues are not conflated in the deliberations of TRAI.

We recognize that no Interconnected VoIP services have seen the light of day despite UL (Access) presently having permission to interconnect Internet Telephony and PSTN. We believe this lack of commercialization can be attributed to regulatory uncertainty, which this consultation should seek to address by introducing Class 2 licenses as proposed. However, following an approach similar to the 2008 recommendations that merely give permission to UL (Internet) without Class 2 licensing will not address this issue.

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?

We have recommended two options for interconnection.

In Option 1 we suggest that Class 2 Internet Telephony license would be similar to the MVNO licensing regime. In this, Class 2 licensees will only be interconnected with one Primary TSP having a Unified License (Access). Class 2 licensees will not be permitted interconnection equipment for interconnection with any TSP other than the Primary TSP. Class 2 licensees would not be directly allocated E.164 numbers. Numbers would be allocated to the Primary TSP. The Primary TSP would be responsible for sub allocation of numbers to the Class 2 licensees. Commercial terms between the Class 2 Licensee and Primary TSP should be left to market forces with overall requirements for FRAND terms. The Class 2 Licensee would be able to port all its customers from one Primary TSP to another in case it wants to switch the Primary TSP. The Primary TSP would be responsible for enabling lawful interception and number portability. Subscriber verification may be done directly by the Class 2 licensee or by the Primary TSP for a charge.

Option 1 offers higher accountability for subscriber verification, lawful interception and number portability since the Primary TSP would be responsible for infrastructure and compliance. Option 1 also does not require changes in Point of Interconnection as the present framework may continue. It also reduces monitoring costs for DoT TERM cells to check for compliance. However, in Option 1, the Class 2 licensee would be susceptible to arm-twisting by the Primary TSP in case TRAI does not prescribe a framework for porting customers from one Primary TSP to another.

In Option 2 we suggest an Open Market arrangement for Class 2 Internet Telephony License. In this, Class 2 licensees may interconnect with any number of TSPs with UL (Access). Class 2 licensees can take E.164 numbering directly from DoT. Class 2 licensee would directly comply with lawful interception, subscriber verification and number portability. Option 2 reflects a market oriented practice. In comparison to Option 1, it gives freedom to Class 2 licensees to renegotiate terms with the UL (Access). Option 2 may not require changes to the POI as it can be left to market forces.

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.

For the purpose of determining interconnection charges, we propose that the Internet leg of the call should be treated as distinct from the PSTN leg of the call. The Calling Party Pays regime and Termination Charges should only be applicable to the PSTN to PSTN leg. The CPP & IUC Regime is a PSTN concept that should not be applied to the Internet Telephony leg of the call. The Internet functions on a Bill & Keep Regime – everyone charges their own customers for data and keeps the money collected.

Thus public Internet Telephony should **not** be construed as an extension of the landline or mobile services for the purpose of Termination Charges. However, the TRAI should aim to integrate Internet Telephony with the PSTN in the manner described so that both outbound to PSTN and inbound from PSTN are permitted for Internet Telephony.

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.

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

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

The TRAI should eventually transition to the Bill & Keep Regime for the following reasons

- 1) The TRAI is now dealing with a wide array of technologies including PSTN voice calls over 2G, 3G, 4G, 5G, Wi-Fi, managed VoIP, Internet Telephony, video calls etc. The cost of termination will differ for each technology/service. It is not feasible for TRAI to define termination charges for each technology/service as it will substantially increase the complexity of the regime; and make the regime a victim of future technological improvements. The most elegant solution to this complexity is to shift to the Bill & Keep regime in the future.
- 2) Costs of terminating calls are progressively reducing with improvements in technology and will soon become negligible once all calls are packet-switched. TRAI

may set a sunset clause that ends the IUC regime after 5 years as a glide path for adopting the B&K regime.

- 3) The IUC regime is a PSTN invention and should not be applied to the Internet, which operates on different principles.

However, in case the TRAI continues with the present IUC regime that imposes termination charges, the underlying principle should be that “*The scope of the IUC regime is limited to the PSTN.*” In case of calls that switch between PSTN and Internet Telephony, the IUC regime should be restricted to the portion of the call from PSTN to PSTN. The IUC regime should cease to apply for the portion of the call that is switched to Internet Telephony. Each time the call re-enters the PSTN network, it should be treated as a new PSTN call for application of the IUC termination/transit charges. Since a PSTN device can only call a PSTN number, for regulatory purposes, the portion of the call from PSTN to PSTN should be treated as distinct from the portion of the call after switching from PSTN to Internet Telephony.

Thus for calls originating on the PSTN and terminating on Internet Telephony, if the switching to Internet Telephony occurs at the originating network itself using ENUM, which maps PSTN numbers to the SIP device’s IP address, then no termination charges will accrue. However, if the switching to Internet Telephony occurs at another provider’s network using apps or provider facilities (such as BSNL’s new service), then termination charges should accrue to the network that switches the call to Internet Telephony. The call till it remains on the PSTN should be treated as a regular PSTN call and termination charges should accrue from the originating network provider to the network provider that switched the call from the PSTN to Internet Telephony. Likewise, for a call originating on Internet Telephony and terminating on the PSTN, the IUC regime should only apply only for the portion of the network after switching to PSTN. Further, the cost incurred by the terminating PSTN network for switching the call between Internet Telephony and PSTN should not be a part of the IUC regime for calculation of origination or termination charges.

If the call terminates or originates on a PSTN network and is being switched to an Internet Telephony network, there should be a voice message informing the customer that QoS cannot be guaranteed and that the customer may cut the call at this stage in case he does not wish to proceed with the call. Alternatively, a separate numbering scheme should be prescribed for Internet Telephony so that the customer can make an informed decision by looking at caller information.

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

The arbitrage between international and domestic termination charges is artificial. The cost of termination remains the same regardless of whether call originates in India or abroad. While the current arbitrage between domestic and international termination charges may continue for regular PSTN calls, if a call originates on Internet Telephony abroad, but enters the PSTN domestically, then domestic termination charges should apply.

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?

Yes. Class 2 Internet Telephony should seamlessly integrate with the PSTN through the framework described in this submission.

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?

Yes. The PSTN leg of the call should be treated as distinct from the Internet Telephony leg of the call for the purpose of calculation of termination charges.

However, for calls originating on the domestic PSTN and terminating on the domestic PSTN, the TSPs could seek to circumvent carriage/transit charges by switching to Internet Telephony for the transit leg of the call. However, quality of service cannot be guaranteed over the Internet leg of the call whereas a caller expects guaranteed QoS in a call from PSTN to PSTN. If TSPs still comply with unchanged QoS standards, then TRAI may take a pragmatic approach and allow this.

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

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

Option 1: An approach similar to that adopted for MVNOs should be considered in which a Class 2 licensee latches onto a Primary TSP with UL (Access). Numbers should only be assigned to UL (Access), with the option of sub-assigning them to Class 2 Internet Telephony licensees. Numbers should not be assigned directly to Internet Telephony services. If an Internet Telephony service wants PSTN numbers, it should do so in collaboration with a UL/UASL licensee. The primary responsibility of complying with MNP, interconnection, etc., should be that of the UL/UASL holder.

Option 2: Option2 suggests an open market approach wherein a Class 2 licensee may interconnect with any number of Primary TSPs. Numbering could directly be allocated to the Class 2 licensee by DoT. In this case, the class 2 licensee would be made responsible for complying with MNP, subscriber verification, lawful interception etc.

Mapping: The TRAI may consider a regulation for mapping of PSTN numbers to VoIP services. For example, ENUM is similar to DNS mapping that translates PSTN phone numbers to URI of VoIP devices. The root file for ENUM may be either centrally maintained with a copy available to all TSPs; or decentralized in the manner that each Primary TSP that has been assigned the E.164 number has the ENUM for those numbers.

In the case that it is centralized, the call could directly be switched to Internet Telephony at the originating network. This would be more efficient but may lead to loss of revenue for TSPs that are the Primary TSP for the Class 2 Licensee since the Primary TSP would not receive termination charges. Alternatively, if the mapping file is decentralized and maintained with the terminating network who holds the terminating PSTN number, then the call would first go from the originating network to the terminating network as a regular PSTN call, and then be switched to Internet Telephony. As a result, the Primary TSP of the Class 2 licensee would receive the termination charges.

Numbering Series: A separate numbering scheme (such as 11 digit starting with 33) should be prescribed for Internet Telephony so that the customer can make an informed decision by looking at caller information and take an informed decision to accept a call where quality of service cannot be guaranteed.

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?

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?

Emergency services should **not** be mandated for Class 1 service providers.

Provision of emergency services **should be** mandated as part of the Class 2 license. Class 2 licensees should not allow customers to opt out of emergency services in the terms and conditions.

In case a Class 2 Internet Telephony call originates from a mobile handset or tablet, the location service/GPS of user must be transmitted with the calls. However, since a Class 2 Internet Telephony call may also originate from a PC where location information is not available, users may be given an option to regularly update their address / location through an online portal.

Subscribers may also be mandated to update an alternate number (PSTN), for the emergency services, to call back upon, if needed.

But due to complex nature of such calls, VoIP users must be given prior information that they can't be assured of emergency service equivalent to PSTN calls. Option must be given to users to file a complaint if they cannot access emergency service through VoIP.

The TRAI may recommend terms similar to the regulations mandated by FCC.

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.

No. Quality of service regulations should **not** be mandated for Class 2 licensees since QoS cannot be guaranteed over the best efforts delivery on the Internet leg of the call.

If the call terminates or originates on a PSTN network and is being switched to an Internet Telephony network where QoS cannot be guaranteed, there should be adequate notice provided to the customer. Alternatively, a separate numbering scheme should be prescribed for Internet Telephony so that the customer can make an informed decision by looking at caller information.

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

1. Protection from Spam / Telemarketing (DND service)
2. Lawful Interception
3. Encryption Standards
4. Security Standards
5. Privacy Standards