

About Us

Geodesic Information Systems Ltd is a reputed publicly held company listed on the BSE and NSE. Our business interests also include Internet based, real time communication services like the *Mundu Messenger*.

GISL has committed itself to being a serious player in the next generation communication networks by launching the Mundu Speak, Mundu Internet Radio and the Mundu Messenger.

Heading our voice services architecture is **Mr. Ashhar Farhan**, the Chief Architect of the *Lightweight Telephony Protocol* which is a public standard published under LGPL license for free usage. He is an expert on VoIP and has engaged with IETF discussions on the SIP protocol as well. He has authored this response. For further discussions, you can reach him on +91-9849026029 or afarhan@gmail.com.

Technical considerations

When we speak of the Internet, we usually refer to one of the two things: First is the protocol of TCP/IP as defined by the IETF RFC and the second is the public global TCP/IP cloud that is usually referred to as the Internet (with an upper case I). Our reference to the word 'Internet' in this document is to the second interpretation of the term.

The Internet is defined by a number of host computers that efficiently route data packets from origination host to the destination by taking simple independent decision about the next hop. They need neither interpret the content of their data envelopes nor bother about the expected packet loss. It is the responsibility of the communicating end points to number these packets properly, reassemble them as they arrive from different pathways, request for retransmission of the missing packet, slow down or speed up the transfer rate, etc. In effect, the Internet leverages the computational power of the end points to provide the intelligence and relieving the network itself of interpreting the packets. There are several technical aspects of the Internet that bear on the issues raised by the consultation paper. We would like to summarize these as following:

1. *The Public Internet like most packet based networks cannot promise quality of service.*

The Internet, by design, does not guarantee virtual circuits between end points. It is a best effort network that depends upon all the hosts in the path to co-operate in forwarding the packets between the communicating end points. Thus, for there to be a guaranteed throughput between two hosts on the Internet, it requires the co-operation of all the possible hosts and routers in the way.

2. *The data transmission is co-ordinated by the end points, not the network.*

The Internet is cheaper to operate by a magnitude over traditional circuit switched networks (like, for instance the PLMN) primarily due to off loading of intelligence to the end points. Hence, it is a distributed model where the intelligence is in the end points that interact with each other following very simple protocols published by the IETF. The best illustration of this is that the GSM protocol as published by the ITU runs over 3000 pages while the entire TCP/IP protocol definition (as per RFCs 791, 768, 793 and 903) can be printed on less than 30 singly spaced, type written pages.

3. *The economy of the Internet is derived from the separation of the pipe from the application.*

The Internet protocol does not mandate any particular physical layer. Hence, it is possible for a typical Internet user to access his services from any ISP. Hence, on a typical working day, user will check his mail account from home in the morning on his broad band connection, then while driving to work on his GPRS connection and at work through his employer's leased line.

It is powerful illustration that none of the current day big names in the Internet businesses are ISPs or have leveraged their ISP status. Examples of the top five Internet Telephony players reveals thus: Skype, Vonage, Yahoo, MediaRing and Dialpad.

4. Limiting service areas to specific geographies is challenging.

While localizing content is highly desirable (example: Baidu, Rediff, QQ, etc.) and profitable, it is impossible to practically limit the reach of any service to certain geographies and locales. This is due to several reasons on both technical account as well as commercial account. Technical problems like the lack of peering arrangements between local ISPs will make it compulsory for data to flow in and out of geographic boundaries to local end-points.

Regulatory Considerations

Although Internet Telephony does offer a radically different technology platform from the traditional PSTN networks, it still demands that the social and personal concerns associated with the traditional networks still be addressed. These include Quality of Service, Billing, Customer relationships, Interoperability, etc.

Apart from these, the regulations should also balance the reasonable expectations of level playing field for operators who have heavily invested in traditional networks with the need to encourage the next generation players with much more sophisticated and economical business and technology offerings. It is against this background that we propose the following guidelines to formulate our response to the consultation paper:

1. *Accept the inevitability of the future of an all IP network*

It is a given that almost every information, communication and entertainment service will migrate now or later to the Internet. Given the launch of several services like the Mundu Internet Radio, TRAI's initiatives on IPTV, MTNL's triple play service, etc., it is time that we as stakeholders and regulators accept the inevitability of all IP networks and work towards that evolution. This has several implications.

2. *Licensing must separate the pipe and the service.*

In the broad future, a single Internet connection is going to bring in every entertainment and communication service to the subscribers.

TRAI Consultation Paper

These Internet connections can range from 3G networks, WiMax, DSL to direct satellites networks (like the Iridium). The license for these services will address issues of spectrum, data interconnects, right of way (RoW), medium (radio, copper, fiber, etc.), geographies, etc. Simultaneously, the services provisioned on these networks could be hosted anywhere in the world. Routinely, subscribers in India watch videos on YouTube, access emails on Yahoo, buy music from iTunes and buy on eBay. Thus, the service providers that do not own 'facilities' (or, the pipes to the subscribers) need to be regulated under a different regime.

3. Services based operators can be the next big thing for India

India has successfully leveraged its highly skilled, motivated human resources to become the services hub of the world. From software services to ITES, Indian story has been remarkable for its quality, price and efficiency. By opening up SBO segment to Internet telephony, India can also become the telecom hub for the world. Wherein, it can operate telephony businesses across the globe with its customer support, network operations, sales and marketing situated in India.

4. Evolve the regulatory framework instead of disrupting it.

Technology obsolescence is accepted by all stakeholders; however, without a clear roadmap of the evolution of regulatory framework, it is difficult for the legacy players as well as the next generation players to plan their roll outs.

TRAI Consultation Paper

Hence, the policy of this response is to move towards an all IP network in the future while protecting the interests of the legacy players and encouraging them to adopt the newer technologies.

4.1 Whether Internet service provider should be permitted Internet Telephony services to PSTN/PLMN within India? If yes, what are the regulatory impediments? How such regulatory impediments can be addressed? Please give your suggestions with justifications. (Para 3.10)

It is recommended that a separate category of telephony service providers be created who do not have to own any network infrastructure (as opposed to facilities based service providers like the BSOs and the CMOs who own the copper or the radio infrastructure).

These SBOs will provision service using the Internet network infrastructure of the ISPs. All the existing ISPs can be promoted to being SBOs though it should not be mandated that every SBO should also be an ISP.

The Key Recommendations are:

a) Create a separate license for ITSP, which is licensed to operate telephony services based purely on the public Internet. It should not be necessary for the ITSP to also be an ISP with active subscriber base as the two requirements are unrelated.

b) The number series of the ITSP should be non geographic and not shared by any of

TRAI Consultation Paper

the PLMN or PSTN plan. This will differentiate them on basis of nomadic usage (from any end user device and network).

c) An ISP should report their ITSP operation's revenues separately as a different business unit and the revenue share of the AGR should be levied upon the ITSP operation as applicable to other operators (10/8/6 % depending upon the service areas).

d) The service should be declared as a best-effort service that is not on par with regular telephony service primarily due to the nature of the public Internet, lack of emergency services, etc.

e) Accordingly, like with the ISP policy, the license fee and application fee for this category of license should be nominal to foster competition and growth.

f) As the numbering plan is a scare resource, the number blocks must be auctioned among the ITSPs. If the numbers are not deployed within a specific time limit, they will revert back to the administering authority.

g) The national PSTN/PLMN should be allowed to interconnect with each other and the ITSPs over the public Internet using SIP protocol

Discussion:

TRAI Consultation Paper

1. Throughout the world, the most successful ITSPs are those who are purely services based operators utilizing the public Internet infrastructure. Therefore, mandating all ITSPs to be an ISP and also limit the service to it's own network is severely limiting and of questionable feasibility. Among the top five global operators: Skype, Vonage, Yahoo, MediaRing and Dialpad, none have had these limitations. Out of the 14 countries discussed in the consultation paper's annexure-1, only 2 countries have tried the model of restricting Internet telephony service to the ISPs and they haven't been very successful either.

2. Separating out the ISP license from ITSP license will allow for terms of licensing that can create a more level playing field than the ISP license while still providing for the advantages of using Internet as the bearer of voice.

3. By classifying the ITSP as a purely services based operator, we shall be restricting it from effecting the main business of the incumbent operators and the UAS operators while allowing the ITSPs to grow with a light touch regulation so required for it to foster.

4. Being a service based operator implies that the service is provisioned chiefly as a result of a soft-switch and software as a service (SAAS) model. Hence, the traditional Indian strengths of being a software superpower will come to bear on this category. Given that almost all the components for this infrastructure are available freely over the

Internet, licensing should not become a chief impediment to technologists and entrepreneurs who can replicate the cable operator and ISP model of growth. Therefore, it is vital that the terms of licensing should be very reasonable and light. At

TRAI Consultation Paper

the same time, enough precautions should be taken to prevent the entry of non-serious players. Hence, the chief aim of the licensing terms should be a) to provide the revenue share as that of a legacy operator and b) to filter out the non-serious players. We shall discuss this proposal in more detail as we address the other issues raised in the paper one by one.

4.2 Whether allowing ISPs to provide Internet Telephony to PSTN/ PLMN within country will raise issues of non-level playing field? If so, how can they be addressed within present regulatory regime? Please give your suggestions with justifications. (Para 3.11)

We propose the following:

- a) The ITSP be treated as a license category separate from the ISP.
- b) The entry fee for an ITSP be waived entirely or kept very nominal.
- c) The ITSP be subject to the same interconnect fees and the same revenue share with the exchequer as other access service providers.

Discussion:

By keeping the ITSP license separate from the ISP license, it will be possible to create a regulatory framework that is not constrained by the needs of an ISP or that of a legacy

TRAI Consultation Paper

access service provider.

As the proposed entry fee for the ITSP license is nominal, it will be possible for the ISPs to also procure an ITSP license. However, we are proposing that the regulatory framework for the ITSP should reflect the IUC charges and the revenue shares that are currently levied on the access service providers.

There is justification in waiving the entry fee as the ITSPs are not allowed to lay their own copper or provide any access methods (like radio, etc.). They are constrained to use the existing Public Internet or apply for an ISP license. Even as an ISP, as they are not allowed to lay their own copper or operate their own PLMN, they are on an uneven playing field vis-a-vis the access service providers.

There is justification in levying the same taxation, inter-connect charges and revenue share as the access service providers as they will not be able to undercut purely by subsidy on these charges. Thus a level playing field will be created.

4.3 ISPs would require interconnection with PSTN/PLMN network for Internet telephony calls to PSTN/PLMN. Kindly suggest Model/ architecture/ Point of Interconnection between ISPs and PSTN/PLMN? (Para 3.12)

It is best that the regulation provide for multiple ways of interconnection between the

TRAI Consultation Paper

VoIP clouds and the PSTN cloud. Depending upon the expediency and viability of the network and traffic, open competition should result in bringing down of call rates across the country.

We propose the following:

- a) Remove the limitation that prevents the access providers and the NLDOs to interconnect over the public Internet.
- b) Mandate all the access providers to also offer SIP based IP interconnects by certain date.
- c) The regulator can stipulate the maximum charge on a per call minute that will apply to all the operators regardless of their technology and access.

Discussion:

1. By opening up the NLDOs and the BSO/UAS operators to offer inter-connects over the public Internet, we will encourage migration to the unified cloud while also simplifying the interconnect process for the ITSPs.

2. A small ITSP can start with a single interconnect with a single NLDO and can then enter into more inter-connect agreements with operators both inside and outside the country. The NLDOs will not face an immediate challenge to their business because obtaining inter-connects with all the operators is a challenge. However, they will stand to lose business if their rates are on competitive against what the operators are directly offering. On the other hand, the NLDOs can leverage their ability to aggregate

TRAI Consultation Paper

interconnection to offer better coverage and pricing to the ITSPs.

4.4 Please give your comments on any changes that would be required in the existing IUC regime to enable growth of Internet telephony? Give your suggestions with justification to provide affordable services to common masses?
(Para 3.12)

It is increasingly clear after noting the points in raised in all the paragraphs from 3.11 to 3.12.2 that a separate category of ITSP license "UASL without spectrum" is a much needed change.

Secondly, allowing the existing operators to interconnect over the public Internet with our without committed bandwidth between themselves will enable the ITSPs to integrate and inter-connect quickly.

Interconnecting over the Internet via SIP protocol is quite easy and it does not require dedicated lines between the interconnecting operators. While such a system is prone to

QoS issues, effective Internet peering between them is much easier to attain than PSTN/PLMN interconnects. A single fiber based Internet leased line can effectively directly connect an ITSP to almost any operator anywhere in the world.

This will foster open competition between various players that will directly drive down the prices.

TRAI Consultation Paper

It is vital that the regulator mandates an upper rate limit on the interconnection charges to allow a level field for the ITSPs.

4.5 What should be the numbering scheme for the Internet telephony provider keeping in view the limited E.164 number availability and likely migration towards Next Generation Networks? Please give your suggestions with justifications.

(Para 3.13)

We have a choice wherein

- i) The PSTN operators can resell their numbers to the ITSPs,
- ii) The unused number blocks from PSTN's ranges are reallocated to the ITSPs.
- iii) A new numbering series is established for the ITSPs.

The first option (i) will make the ITSP like an MVNO of the PSTN. This structure will solve the interconnectivity issues as well as numbering series. The PSTN operators will have to establish a VoIP gateway to provide direct inward dialing numbers to their client ITSPs.

The ITSPs will be free to interconnect with any other operator directly over the open Internet (see our recommendations for 4.3). The challenge will be to keep the price of monthly number rental low. This can be mandated by the regulator as well.

The second option (ii) is a complicated one that will involve a survey of the unused number blocks from every BSO and matching them to the requirements of the ITSPs. It may take a long time for the incumbents to release the unused numbering series. Though do-able, this appears to be the least feasible of the alternatives.

TRAI Consultation Paper

The third option (iii) can be used to extend allocate the unused numbering series from the PSTN blocks (like numbers starting with the digits 7 or 8 in the metro areas) to the ITSPs. It must be realized that the ITSP operations will effectively be non-geographic and hence this series has to be declared non-geographic. For the third option, which appears to be the most rational, we propose the following two options:

a) A National Inter-exchange.

1. A National level SIP based interconnection network should be created with initially two nodes. All the operators will be mandated to interconnect to one or more nodes.
2. This network will be run on the public Internet with optimized routes to the operator's POPs.

3. This network will only handle signaling. The key advantage of VoIP is that the media can directly flow between the end points without constraining the switches. Hence, this network infrastructure will be nominal in terms of bandwidth and computing power.

4. The number allotments can be provisioned by simply updating the routing table of such a network. Hence, different ITSPs will be able to provision numbers for their subscribers on demand. This will result in the most efficient utilization of the numbers available.

b) A Distributed System.

1. All the operators including the NLDOs, PSTN and PLMN are allowed to interconnect

TRAI Consultation Paper

freely with each other.

2. Those who do not interconnect with the operators directly will have to pay carriage fees to the interconnected BSOs. Hence, higher volumes will lead to more optimal inter-connects.

Our recommendation is either to opt for option (i) where the PSTN is allowed deal with ITSPs as their MVNOs or option (iii) b wherein a national level inter-exchange is established.

4.6 UASL and CMTS operators are allocated number resources and permitted to provide Internet telephony including use of IP devices/Adopters. Whether such devices should be allocated E.164 number resource to receive incoming calls also? If so, whether such number resources should be discretely identifiable across all operators and different than what is allocated to UASL and CMTS to provide fixed and mobile services? Please give your suggestions with justifications? (Para 3.4)

It is vital that in all cases, for true telephony to take hold, the subscribers of such service must be callable at unique and individual E.164 numbers from any other phone in the world. This must be a non-negotiable and identifiable aspect of any proposed telephony

TRAI Consultation Paper

service (Internet based or not).

As per our commercial guidelines discussed in the earlier, given a numbering series, the regulations must be agnostic to the technology. Hence, it should be freely permitted to map the same numbers between IP devices and their regular fixed/mobile units.

An operator should be free to allocate or map a number from their allotted series to any IP device that they may chose to. This will allow them to freely compete with the ITSPs and it can result in overall reduction of call rates as well as inclusion of richer services (like integrating IM with SMS services, etc.)

4.7 If ISPs are allowed to receive Internet telephony calls on IP devices/ Adopters, what numbering resources should they be allocated? (Para 3.13)

The ITSPs to be truly compatible with the global PSTN / PLMN system should provide E.164 numbers to every telephony subscriber. The three approaches have been proposed in 4.7.

4.8 Is it desirable to mandate Emergency number dialing facilities to access emergency numbers using internet telephony if ISPs are permitted to provide Internet telephony to PSTN/PLMN within country? If so, Should option of implementing such emergency Number dialing scheme be left to ISPs providing Internet telephony? Please give your suggestions with justifications. (Para 3.14)

At present the emergency dialing facilities are not entirely operational even in the PLMN networks of this country. Given the non-geographic range of the ITSP's subscribers, it is

TRAI Consultation Paper

difficult to mandate this facility. However, this is a life saving facility that can still be accommodated in some ways.

(i) The ITSPs should be mandated to communicate to the subscribers in writing and orally that emergency services are un-available on these subscriptions.

(ii) The subscribers must also accept in writing and orally that the Internet telephony service depends upon the availability of the public Internet and its reliability and quality is not on par with that of regular PSTN/PLMN.

(iii) The subscribers should be encouraged to provide an ICE number (In-Case-of-Emergency) of a friend, relative or a support line from his local area (where the service

will predominantly be used) that is dial-able with either a single click on the dialer or a three digit code on the IP device.

4.9 Is there any concern and limitation to facilitate lawful interception and monitoring while providing Internet telephony within country? What will you suggest for effective monitoring of IP packets while encouraging Internet telephony? Please give your suggestions with justifications. (Para 3.15)

The growing peril of cyber security needs to be tackled adequately both for voice and non-voice services. These include access to detailed historical data of CDRs and the ability to intercept calls. While call interception is already covered by competent statutes of the Indian law, these should equally apply to the ITSPs too.

TRAI Consultation Paper

Recommendation:

All the Call Data Records must be preserved and submitted to the government at regular intervals. The ITSP should also provide the facility to be able to monitor calls from any specific subscriber and to any particular destination at short notice. The ITSPs should own the servers with exclusive access to them. The ITSPs should also be mandated to provide strict privacy to every subscribers records unless required by the law.

Explanation:

These provisions will adequately cover surveillance to include monitoring as well. However, due to the nature of the business, it is quite possible that for better reliability, these servers maybe located outside India.

As long as these servers are under administration and exclusive control of the ITSPs, they can be located in any part of the world except countries deemed to be of sensitive nature.

4.10 Is there a need to regulate and mandate interoperability between IP networks and traditional TDM networks while permitting Internet telephony to PSTN/PLMN within country through ISPs? How standardization gap can be reduced to ensure seamless implementation of future services and applications? Please give your

TRAI Consultation Paper

suggestions with justifications. (Para 3.16)

It has been the case that the most successful ITSPs in the world like Skype, Dialpad have not used public standards like H.323 or SIP. This is not coincidental but expected as service differentiation will lead to exploration of better technologies and alternatives. Thus, we have to keep the regulations independent of any specific protocols that maybe internally used by any ITSP to connect with their end users. However, as the pointed out, it is vital that the interoperability between various ITSPs and operators follow specific standards.

Recommendation:

We recommend mandating SIP to be protocol of standard protocol to interconnect between VoIP gateways. The recommendation should also include the codecs (which usually cause incompatibility) and all the gateways must be able to handle G.711 and G.729 codecs.

4.11 Is there a need to mandate QoS to ISPs providing Internet telephony to PSTN/PLMN within country? Please give your suggestions with justifications.
(Para 3.17)

The QoS of any Public Internet based service is almost impossible to guarantee as multiple hops of the packet to its end destination (a VoIP gateway in this case) pass through various networks. On the other hand, it is important to mandate that the ITSPs should clearly inform the subscribers of the 'best-effort' nature of the service.

