Comments:
Consultation Paper on Migration to IP based Networks

1. Sistema Shyam Teleservices Ltd (SSTL) welcomes opportunity extended by TRAI to comment on the important issue of Migration to the IP based Network.

2. Encouraging the ubiquitous deployment of Next Generation Broadband infrastructure is one of the main objective of the National Telecom Policy and achieving that goal would largely depend on completing the transition to all-IP networks at an early date and an essential component of which will be "IP-to-IP interconnection". The Consultation Paper raises many core issues concerning IP-to-IP interconnection, developing efficient ENUM-type mechanisms for associating IP addresses with telephone numbers for migration to IP based Networks.

3. IP networks are far more versatile and efficient than e TDM-based PSTN. IP-to-IP interconnection is an essential element in completing the transition from TDM to IP networks and services. The IP to IP interconnection would boost VoIP and broadband deployment. Therefore, TRAI should closely monitor industry progress in this field and facilitate industry progression to all IP networks by eliminating barriers to IP-to-IP interconnection.

4. Our specific comments on issues raised in the Consultation Paper are given below.

Q1. Is there a need to mandate IP interconnection? If what should be the time frame for implementation of the same? Please comment with justifications.

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Q2. Whether both TDM and IP interconnection should be allowed to coexist? If so, whether the existing regulation i.e. 'Reference Interconnection Offer dated 12th July 2002' addresses the requirements of IP interconnection also? Please comment with justifications.

(i) SSTL recognizes that there can not be a 'flash cut' from TDM to IP. There has to be a migration path which will involve TDM and IP telecom systems running on parallel tracks, with IP-based providers having to interconnect with the PSTN. However, TRAI must manage and facilitate the process of transition to the IP based interconnection by notifying the sunset date of the TDM. After this date service providers should not obligated to interconnect via TDM only, rather obligation should be on TDM operator to interconnect with IP operator.

(ii) As part of this migration TRAI must also guard against any inappropriate delay from the TDM world to ensure that IP based operators a defined date are on an equitable basis. TRAI's support would hasten the migration process and spur IP based interconnection agreements. This migration process will present challenges but we are confident that, with the industry and regulators working cooperatively, and not at cross purposes, the ultimate goal of a new and dynamic all-IP ecosystem would be within our grasp.

(iii) In view of the above it is suggested that:

a) TDM and IP interconnection may be allowed till sunset Date.
b) After the subset date there should not be any obligation on IP operator to interconnect through TDM and the obligation should be on TDM for interconnection with IP networks.

Q3. In case IP interconnection is mandated in India, whether the enforcement of interconnection agreements should rely on

(i) Bilateral agreements and dispute resolution; or
(ii) Mandatory reference offer

(i) The Indian Telecom market place is marked by operators having huge differences in their market share, both in terms of number of subscribers and revenue. As a result there is unequal negotiation power amongst operators Large operators consider smaller operators as their customers rather than peers and charge accordingly. It would be almost impossible for a new operator to establish IP interconnection with the TDM world.

(ii) In view of the above it is suggested that:

a) TRAI should continue to regulate Interconnection Usage Charges like port charges. so that operators do not charge exorbitant price.
b) There should be mandatory reference offer for IP interconnection.

Q4. In an IP based network scenario, which mode of interconnection is preferable to carry traffic:- peer-to-peer, Interconnect Exchange or combination of both? Please comment with justifications.

(i) SSTL supports setting up of Interconnection exchanges facilitate interconnection amongst different service providers including access providers, NLDOs and ILDOs. Mandated interconnection w exchange would provide easy interconnection amongst IP and TDM networks and would also facilitate smooth transition to the Next Generation IP networks.

(ii) The existing interconnection arrangement are rigid, inefficient and not appropriate for the IP networks. The legacy limitations of geography should also be not necessarily imported to the IP world. The interconnection exchange should do away with the requirements like SDCA wise handing over of calls to the wireline networks.

(iii) In view of the above SSTL suggests that:

- Interconnection Exchanges should be setup in the country;
- There should be obligation on all NLDOs, ILDOs and access providers to interconnect with interconnect exchange.

Q5. In case an Interconnect Exchange is required, should such Exchange be placed within each licensed service area or a single Interconnect Exchange will be adequate for the entire country? Please comment with justifications.

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Q6. Whether any regulatory intervention is required to mandate the locations and structure of points of interconnection (POI) for IP based network architecture? Please comment with justifications

(i) SSTL suggest that as far as possible Interconnect Exchange should be placed within each Licensed Service Area. Service area wise placement would save on Bandwidth requirement and would also take care of any possibility of single point of failure.

Q.7 What are your views on the migration from the existing interconnection regime-measured in terms of minutes of traffic to an IP interconnection regime replaced by measures of communication capacity? Please comment with justifications.

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Q.8 In an IP interconnection between networks, comment on the type of charging principles that should be in place

(a) Capacity based in terms of Mbps.
(b) Volume based in terms of Mbps.
(c) QoS based.
(d) a combination of the above three.

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Q9. What should be the criteria to estimate the traffic minutes in IP environment if interconnection charges continue to be minute based? Please provide justification in support of your answer.

Q10. In addition to the above, any other modifications or components of IUC which are required to be reviewed in the IP based network scenario? Please provide all relevant details?

(i) The IUC regime is a system of regulated payments in wh service providers compensate each other on per minute basis for termination and carriage of telecommunications traffic. The current per-minute IUC regime is not consistent with the IP world and would not promote deployment of broadband networks. The IUC regime is required to be reformed to reflect the fundamental, ongoing shifts in technology and consumer behavior. The current IUC system is not sustainable in Internet

Protocol (IP) world as payments for the exchange of IP traffic is not based on per-minute charges.

(ii) The current IUC regime provides operators above cost compensation for termination of calls and thus the current system creates disincentives for TSPs to migrate to all IP-based networks. To retain revenue from termination of calls old TDM service provider would never enter into IP to IP connectivity. While this is in the short-term interest of a TDM service provider seeking to retain IUC revenues but it actually seriously hindering the proliferation of IP networks in the country.

(iii) Internet applications like whatsapp are growing exponentially as these service do not require rates to be paid on per message or per minute basis. On the other hand revenue from SMS and voice are falling as charging is based on per minute or per message basis. Thus flat rate charging mechanism as prevalent in the IP networks promotes usage and expansion of the market which is not possible in the current IUC regime. Any regulatory intervention to specify termination charges in the IP world on per minute basis would stop innovation and restricts broadband expansion.

(iv) TRAI in its affidavit before the Supreme court had proposed Bill and Keep(BAK) IUC regime wherein interconnecting partners do not settle interconnection on the basis of capacity or duration/usage. In BAK charging methodology, traffic originating operator does not pay to the recipient operator for termination of traffic. BAK also solves the problem of determining cost of termination for each technology and reduces the complexities involved. The BAK regime if implemented would avoid the administrative burden of billing one another for exchanged traffic. From the regulatory perspective it eliminates the need for the TRAI to review among other things, cost studies, rates in interconnection agreements and also reduce the innumerable disputes between the operators. Thus the frequent disconnection of POIs for settlement of compensations would also abate.

(v) In order to promote IP networks it is suggested that Bill and Keep Regime should be notified at the earliest.

Q11. Do you envisage any interconnection requirement for application & content service providers? If so, what should be the charging mechanism? Please provide all relevant details justifying your comments.

(i) Service providers work closely with all major application and content providers to efficiently deliver content and services. Service providers aims to deliver content and services with high performance, high reliability, and low latency for users. For this purpose direct interconnect via peering is also carried out whenever it is essential. On the other hand peering with each and every content provider irrespective of traffic and cost involved would inefficient and any regulatory directive for mandated interconnection would distort the market. In view of this there is no requirement of regulatory intervention required.

Q12. Whether the existing regulatory framework for measuring and reporting quality of service parameters as defined for PSTN/PLMN t may continue to apply for IP based network services? Please comment with justifications.

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Q13. In the context of IP based network Migration, if parameters in the existing QoS regulation are required to be reviewed immediately then please provide specific inputs as to what changes, if any, are required in the existing QoS regulations issued by the Authority. Please commen justification.

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Q14. In case new QoS framework is desirable for IP based network, do you believe that the QoS be mandatory for all IP based network services. If yes, what should be QoS parameter and their benchmarks?

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Q15. What should be the mechanism for monitoring the parameters for end to end QoS in IP based network environment? What should be the reporting requirement in this regard? Please comment with justification.

(i) As internet services are becoming popular and increasingly being used, the need for QoS is becoming more relevant. Although needs are genuine but it would have to be appreciated that the quality of mobile internet service depends on several parameters inherent to mobile networks such as coverage, quantum of spectrum, spectrum band. Many exogenous variables like user behavior and their mobility, location and consumption pattern, also impacts quality of service of mobile internet. Thus mobile network QoS for download speeds should not be regulated.

(ii) Each mobile network has unique topology as on a single network many technologies or various version of a technology are coexisting. It could be possible that with the change in a cell site, there is change in technology and user may have different experience in these two cell sites which user may perceive to be improvement or degradation of service. Thus same subscriber would get different service experience at different locations.

(iii) TRAI has generally followed free market economics and lowed markets to address tariff concerns. We expect similar forbearance regulations with regard to quality of service as the mobile internet market is highly competitive. In the competitive market the quality of service is a differentiator and consumer decision to choose a particular network based on tariff and quality ensures effective market competition. The uniform quality enforced through Regulation would not correct as mobile networks are unique in terms of technologies deployed, total quantum of spectrum used, number of consumers on network etc.

(iv) The benchmark specified through regulation may not match or create compatibility with mobile service conditions and impose unnecessary cost on networks. Thus external Regulation may be detrimental to the growth of service. Mobile Data services are at a very nascent stage with penetration for less than specified in policy targets. Imposing QoS regulation relating to VoIP etc even before services have been launched would impose unnecessary cost on service provider which otherwise could be used for expansion of coverage and acquiring addition spectrum which could provide long term benefit for consumer and service providers.

(v) In view of the above it is suggested that no QoS Regulation should be imposed on VoIP at this stage. Notwithstanding our views on QoS, if the Authority still feels QoS parameters for IP based are required then TRAI may consider VOIP Regulations of 2002 for Toll Quality networks as the starting point for wireline networks which have been reproduced below:

- MOS = 4 or R-value of 80 or higher
- One-way end-to-end delay = 150 ms
- Packet loss not to exceed 0.1%
- Jitter should not exceed 5 ms

These parameters may be reviewed at a later date when the IP networks have been established and matured.

(vi) Wireless networks are using mix of TDM and IP technologies, with RAN being predominantly TDM network and core being IP network . Since QoS is required to be measured as an end to end parameter, the network QoS parameters should be benchmarked as per the network element that can support the least QoS in the entire chain of communication. Therefore it is felt that at this stage, the existing VOIP QoS benchmarks that were stipulated in 2002 are adequate for a mixed environment of TDM and IP based network.

(vii) In view of the foregoing, SSTL suggests as under:

- QoS is driven by market forces rather than by Regulatory intervention and Service provider are meticulously adhering to the reporting requirement of TRAI.

- Notwithstanding which, the existing QoS benchmarks that were stipulated in 2002 are adequate for a mixed environment of TDM and IP based network and should be persisted with.

Q16. Should sharing of the IP based core and Access network element by different telecom service providers be allowed in IP based network scenario? What are the challenges, opportunities and problems of such sharing? Please comment with justifications.

(i) Sharing of both core and access networks in the new IP scenario will be a great boost to Broadband penetration and delivery of new services. Network sharing can provide better economics and will improve affordability and act as a mean to close the mobile broadband coverage gap.

(ii) Thus Sharing of IP based Core and access networks should be allowed as this will improve network efficiency and cost of delivery of services.

Q17. Do you see any issues concerning the national numbering plan with regard to the migration towards IP based networks?

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Q18. Do you believe that ENUM has to be considered when devising the regulatory policy for IP based networks as it will provide essential translation between legacy E.164 numbers and IP/SIP (Session Initiation Protocol) addresses.

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Q19. Which type of the ENUM concept should be implemented in India? What should be the mechanism for inter-relationship between number and IP addressing, and how it will be managed?

(i) There are number of models like Public ENUM, Open ENUM, Private ENUM, Carrier / Infrastructure ENUM which are being implemented by various regulators/numbering Administrators. As their standards are still being evolved by IETF, it is felt that pinpointing the best UM implementation at this stage would be premature. With ENUM implementation having its own set of advantages and disadvantages, a thorough and detailed study would be required to identify the solution for India.

(ii) In order ensure a smooth transition to IP networks, it is suggested that the TEC should be entrusted to constitute a task force, comprising of the government agencies and industry representatives, study the feasibility and implementation nuances of ENUM numbering in . The similar view was taken earlier by the NGN expert committee, which in its report had recommended that that the '*NNP needs to be modified to include the NGN and TEC should study and g detailed recommendations in this regard'.*

Q20. Is there a need to mandate Emergency number dialling facilities to access emergency numbers using telephone over IP based networks platform? Please give your suggestions with justifications.

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Q21. How will the issues, of Caller location delivery and priority routing of calls to the emergency centre in IP based networks environment, be handled? Please comment with justifications

(i) The ability to access emergency services is a vital component of public safety and emergency preparedness. It is therefore imperative that consumers are able to reach emergency services regardless of the technology used. VoIP service providers connected with PSTN should be mandated to provide Emergency services.

(ii) However, retrieval of caller location cannot be done in IP network and therefore precise routing of Emergency call to the nearest help tre cannot be achieved. So we request TRAI not to mandate based Emergency Number dialing facility for IP Telephone. Only basic emergency calling facility may be mandated wherein all emergency calls would be forwarded to a common help centre. Emergency dialing facility can be reviewed at a later date when some solution is available to provide location based emergency dialing service

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