



**Reliance Jio**  
Infocomm Limited

RJIL/TRAI/2014-15/4000  
19<sup>th</sup> August 2014

To

**A.Robert . J. Ravi,**  
**Advisor (CA & QoS),**  
**Mahanagar Doorsanchar Bhawan (next to Zakir Hussain College),**  
**Jawaharlal Nehru Marg (Old Minto Road),**  
**New Delhi: 110 002**

**Subject: TRAI's Consultation Paper on Migration to IP based Networks.**

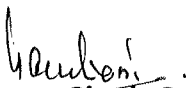
Sir,

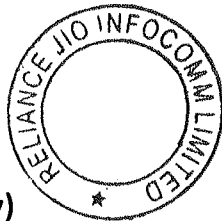
Pl find attached comments of Reliance Jio Infocomm Limited (RJIL) on the issues raised in consultation paper No. 08/2014 on "Migration to IP based Networks".

Thanking You,

Yours Sincerely,

**For Reliance Jio Infocomm Ltd.,**

  
**Kapoor Singh Guliani**  
**(Authorised Signatory)**



**Encl.: As above.**

**COMMENTS ON TRAI CONSULTATION PAPER ON MIGRATION TO IP BASED NETWORKS (No. 8/2014)**

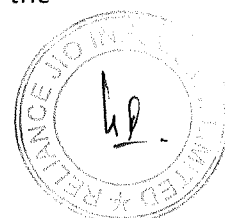
From the evolutionary trends across the world, it can be observed that there is remarkable shift towards IP technology. This has enabled greater network efficiencies, network optimisation and service offering optimisation to achieve convergence of voice, video and data services over integrated networks. The Indian market also has to step ahead with the time and recognise the immense benefits of the newer technologies. Thus the transition towards IP-based networks is imperative for us to create digital economy for the benefit of all Indians and enabling environment for IP based interconnection is one of the most important step in that direction.

The current licensing and regulatory regime in India does not permit IP- based interconnection. Therefore, the operators who are deploying IP networks have no other choice but to undertake additional investments in the TDM technology to interconnect with other operators which is limiting the network efficiencies of IP-based networks thus affecting their growth and depriving the consumers of the benefits of low cost converged networks and services. Reliance Jio Infocomm Limited (RJIL) appreciate TRAI's timely initiative of bringing out this Consultation Paper on "Migration to IP based Networks" which will enable IP based interconnection and provide regulatory clarity on other important aspects of the IP networks and propel growth of IP-based networks in the country for the benefit of the consumers. Our comments on the issues raised by TRAI in this consultation paper are submitted as below:

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

Ans: Yes, there is an immediate need to mandate IP interconnection in a time bound manner. As submitted above, the transition towards IP-based networks is imperative for us to create digital economy for the benefit of all Indians and IP based interconnection is one of the most important step in that direction.

However, the current licensing/regulatory regime and market forces are inhibiting migration to IP interconnection thus hindering wide adoption of IP technology across the networks. For example clause 27.3 of Unified License under Chapter IV- Technical condition mentions "*Interconnection between the networks of different Licensees for carrying circuit switched traffic shall be as per national standards of CCS No.7 as amended from time to time by Telecom Engineering Centre (TEC) and also subject to technical feasibility and technical integrity of the Networks and shall be within the overall framework of interconnection regulations/ directions/ orders issued by the TRAI/ Licensor from time to time. For inter-networking between circuit switched and IP based network, the Licensee shall install Media Gateway Switch. Further, the*



*Licensor may direct the LICENSEE to adopt any other technical standards issued by TEC on interconnection related issues."*

In the absence of explicit permission for IP interconnection from the Licensor, even bilateral IP based interconnection arrangements are being denied to the new entrants. As a result, in the current interconnection regime the provision with respect to IP based interconnection gets limited to *"Both the Parties agree to migrate the links to IP (Internet Protocol) as and when permitted by DoT."* and the new operators have no other choice but to undertake additional investments in the TDM technology. Therefore, as a first step, it is necessary that the service providers having IP networks are permitted to have IP interconnection amongst them with immediate effect.

Further, when the imminent transition towards all IP technology is widely recognised, it no longer makes sense for India to continue interconnection on a declining technology. However, as long as the onus of converting voice traffic in TDM format will rest with the new entrants, there is no incentive for the incumbent operators to migrate to the new regime. Therefore, the adoption of voluntary approach for establishment of IP based interconnection is bound to fail, which has necessitated immediate intervention by the Authority.

**It is therefore essential to mandate IP interconnection, which can be implemented in the phased manner as per following:**

- On immediate basis explicitly permit IP based interconnection between two operators on mutual agreement basis, which at present is construed as 'not permitted' in view of certain license conditions.
- After a certain time period, say two years from now, it should be made obligatory for all service providers to offer IP based interconnection whenever such IP based interconnection is sought by the other operator. From this date onwards, the cost of conversion from TDM to IP and vice versa for any existing POI (by reimbursing costs of Media Gateway already installed by the Operator having IP networks) and future POI (by installation of new Media Gateway for conversion from its TDM to IP and vice versa) should be borne by the owner of the TDM networks.
- If two TDM operators wish to continue on TDM based interconnection, the same should be permitted.

**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.**



Ans: Yes, both TDM and IP interconnection should be allowed to coexist.

While bilateral agreements may be permitted between the operators with light touch regulatory control to begin with, in case of pending finalisation of Interconnection arrangements after a period of 60 days from making request for establishment of IP based interconnection, it should be made obligatory for the Interconnection Provider to offer IP based interconnection based on Mandatory Reference Interconnect Offer. For this purpose, the existing regulation 'Reference Interconnection Offer dated 12th July 2002' may be suitably amended to incorporate the provisions for Unified license, IP based technology and also in its detailed Annexures to make it up to date as per present Licensing and Regulatory guidelines.

**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.**

Ans: IP Interconnection agreements should primarily rely on bilateral agreements. However, it may be noted that given the opposing interests between the existing operators and the new entrants, it may not be possible to conclude any IP based interconnection negotiations strictly on the voluntary basis. Therefore, in case of pending finalisation of Interconnection arrangements after a period of 60 days from making request for establishment of IP based interconnection, it should be made obligatory for the Interconnection Provider to offer IP based interconnection based on Mandatory Reference Interconnect Offer.

**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.**

Ans: A combination of both – peer-to-peer and Interconnect Exchange should be permitted. However, to begin with the peer-to-peer interconnection should be immediately permitted. The interconnection media is already established amongst many of the operators and existing interconnections between IP networks can be immediately migrated to IP interconnection.

In the long run, IP exchange will be required in order to achieve centralised QoS management, ease of connectivity, operations and maintenance and cost effective solution providing Security, easy settlement for operators.

Peering relationships has a cost in terms of transmission to the peering point, co-location, ports and equipment. There is also the operational cost of building and maintaining the peering relationship. The transit interconnection involves paying the transit operator to conduct the peering relationship on behalf of its customers



(which are smaller Operators), since those themselves are too small or remote for wide-scale peering to be cost-effective. Over the time, as the volumes of traffic grow, they can then engage in peering relationships as they become more cost-effective. As the market matures with IP Interconnection, it will by itself switch to most preferred mode of interconnection.

**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.**

Ans: The NTP-2012 provides as one of the Objectives – “Strive to create **One Nation - One License** across services and service areas”. The NTP-2012 also provides for Strategy - To orient, review and harmonise the legal, regulatory and licensing framework in a time bound manner to **enable seamless delivery of converged services** in a technology and service neutral environment. Therefore, there should not be any requirement for establishing an Interconnect Exchange in each service area. It should be left open to the market forces to decide as per their business requirement. To begin with, we can have IP exchanges at Metro & Category “A” service area level and then as traffic volume increases we can have IP exchanges at other service area level as well. The IPX exchange deployments can follow the guidelines provided in GSMA IR.67 which describes the deployment options for IPX and the role of DNS and ENUM servers.

Single IP exchange for the entire country may not be suitable due to the current licensing regime, traffic requirements, transmission costs and security concerns. However, the Authority may also explore feasibility for Four Regional IP exchange with disaster recovery to achieve architecture optimisation and minimal efforts for interconnection.

**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.**

Ans: As submitted above, bilateral agreements should be encouraged between the operators. However, if the bilateral agreements fail to conclude in a time bound manner, the interconnection provider may be mandated to provide IP based interconnection to the interconnection seeker at the location of Level-I TAXs of BSNL.

**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.**



Ans: Regulation applicable for circuit-switched networks should not be extended to the IP-based networks. In the IP environments, the international trends are to move towards establishing 'Bill and Keep' or 'Free Peering' wherever possible and if the termination charges continue to be regulated, these are being brought down towards zero as fast as possible. It is respectfully submitted that India should also move towards establishing 'Bill and Keep' regime as fast as possible in the interest of the consumers.

In the meantime, for the IP based interconnection regime, it is imperative to migrate to the measures of communications capacity as it is more convenient and suitable method than the conventional measure of minutes of traffic. Further, all domestic traffic should be charged in a uniform manner as with IP traffic, the distance is irrelevant as far as cost is concerned and, therefore, it should not be linked for charging.

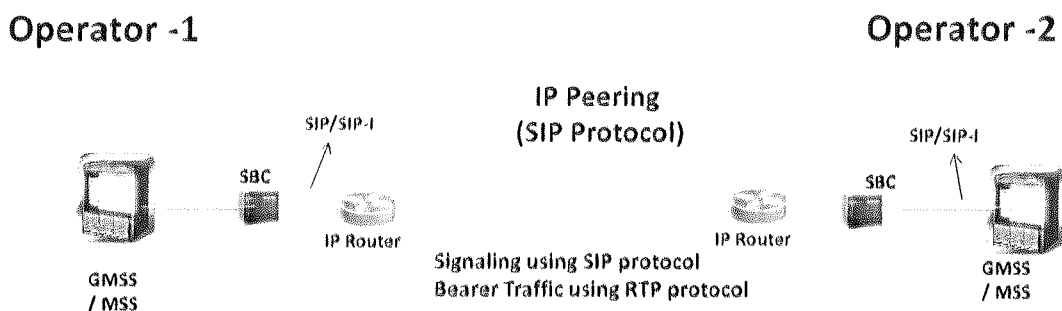
**Q.8 In an IP interconnection between networks, comment on the type of charging principles that should be in place (a) Capacity based in terms of Mbps. (b) Volume based in terms of Mbps. (c) QoS based. (d) a combination of the above three.**

Ans: As submitted above, we should move towards 'Bill and Keep' arrangement with free peering as soon as possible. In the meantime, for the IP interconnection, Volume based charging should be done with QoS as prescribed by TRAI which subsequently can be migrated to the capacity based charging

For TDM based POIs, the existing per minute based charging may continue though this charge may be brought down towards zero as fast as possible.

**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.**

Ans: The IP based interconnection can be depicted as per following



Session Detail Records at Session Border Controller on which the IP interconnection is established at either party end can be used for per minute charging of traffic at IP interconnection.

**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?**

Ans: For IP networks the distance on IP transmission media does not contribute much to the cost and the termination cost on IP networks is lesser being more efficient networks. Accordingly the IUC charges for long distance carriage charges and transit charges need to be revised in addition to termination charges as mentioned above.

Further, for IP Interconnection 1Gbps / 10Gbps Ethernet ports are used in place of conventional 2Mbps TDM ports. The port charges for these 1G/ 10G ports do not have any linear cost relation with 2Mbps ports. Therefore, the cost based port charges for 1G/ 10G ports are required to be prescribed for IP Interconnection before we move to the free peering regime.

**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.**

Ans: Given the present fiercely competitive landscape in terms of number of application and content service providers as well as telecom service providers along with wide variety in type of customer services, type of contents, type of inter-party roles and the manner by which the end customer can be accessed, the present commercial arrangements for non licensed entities like application & content service providers and telecom service providers may be continued without any regulatory intervention.

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

Ans: In a multi-operator scenario majority of calls especially for newly created IP networks, one leg of call route either terminating or originating shall be in TDM networks only and for uniformity and simplicity of measurement & monitoring, same QoS parameters may continue to be applicable to all types of networks initially. Therefore to begin with, existing regulatory framework for measuring and reporting QoS parameters may continue to apply for IP based network services also till networks of majority of operators are migrated to IP Networks and



these parameters need to be updated later with subsequent consultation.

In case of IP Interconnection the QoS parameters at the POI need to be defined separately by TRAI to ensure same network parameters are available at the IP Interconnection as applicable within the IP network of operators, so that customers can experience the advantage of the technology of IP networks. The Inter Operator service QoS prescribed for the POI traffic measured at Point of IP Interconnection should be aligned to QoS defined in Section 8 of the GSMA IR.34 regarding Inter-Service Provider IP Backbone Guidelines.

Once operators start migrating to the IP based networks, in order to provide guaranteed Quality of Service for the end customers across these networks for all types of services (and not only for voice services), the existing regulatory defined network level QoS parameters need to be reviewed and revised in line with 3GPP and GSMA defined standards for each type of services falling under conversational, Interactive & Streaming category.

**Q13. In the context of IP based network Migration, if the 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 comment with justification.**

AND

**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?**

AND

**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.**

Ans: Please refer to answer to Question 12 above. Existing regulatory framework for measuring and reporting QoS parameters may continue to apply for IP based network services also till networks of majority of operators are migrated to IP Networks. These parameters need to be updated later with subsequent consultation. QoS can be measured using R- Factor and MoS score calculation based on ITU-T model.

**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.**

Ans: Yes, the IP based core and Access network elements may be allowed to be shared by different service providers. With uniform License fees, there is no arbitrage amongst various licenses and operators and it shall be possible to correctly compute the AGR.

With IP based networks the capacity of the core, media and access is not the constraint and can be shared for efficient utilization, faster rollout and lower costs. This will also increase competition due to wider presence of the operators and customer will get benefited out of the same.

Sufficient incentives to operators should however exist to create infrastructure of their own to increase telecom network infrastructure reach and availability so that more and more citizens could be benefitted by wide bandwidth telecom services.

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

Ans: There is no issue concerning the national numbering plan with regard to migration towards IP based networks.

However, keeping in view the future growth of telecom networks and increased number of citizens coming under coverage of telecom networks the move towards converged numbering plan with common numbering plan for fixed and mobile telephone numbers will support the capabilities of IP networks. Further, migration to 11 digit numbering plan can also be planned along with the converged numbering plan to enhance the capability of numbering plan to support pan India telecom subscribers with increasing population and increasing telecom coverage.

**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.**

Ans: ENUM is not mandatory for IP based interconnection. However, with migration to IP based networks, ENUM will be required for translation of E.164 number to SIP Uri & Tel Uri for routing of calls within these IP based networks.

**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?**



Ans: Private Infrastructure ENUM may be implemented and as at present Licensor can continue to issue telephone number blocks to service providers for further allocation to customers. Each Telephone number will be 1-to-1 mapped to a SIP URI and which in turn will map with UE assigned IP address.

**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.**

Ans: Emergency services are already mandated by License Agreement and need to continue. LTE network being implemented in India are capable of location based routing of voice calls over LTE network.

**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.**

Ans: There is no problem in handling of caller location delivery and priority routing of calls to the emergency centre in IP based networks. Caller Location issues can be address by identifying and mapping the current location of end user based on which routing to the nearest location by following methods

1. In case of 2G/3G/VoLTE – using Cell ID,
2. In case of Wire-line / Fixed network - Home ONT/ CPE supplied Mac address / IP address
3. In case of UE behind Wi-Fi network – Access Point Mac address / IP address.

