



**COAI Response -
TRAI Consultation Paper on Migration to
IP based Networks**

19th August 2014



I. INTRODUCTION & EXECUTIVE SUMMARY

- 1) The issues related to IP based networks are a matter of ongoing debate and consultation amongst stakeholders as the Authority periodically reviews the status as regards the migration of telecom networks from the historical/legacy TDM based networks to IP based networks and the implications thereon.
- 2) As the Authority has itself noted, it has been monitoring and reviewing the status of NGN/IP based network evolution since 2005 and has been taking the feedback from the various stakeholders in this regard.
- 3) **COAI has consistently maintained that migration to IP based interconnection is an ongoing process and that this evolution /progression should be allowed to take place naturally based on the business plans and strategies of respective TSPs.**
- 4) **The Authority too, has recognized in its consultation that there is no network that is fully on IP and that only major TSPs in India have implemented IP and that too, in the core network.**
- 5) COAI has also consistently maintained that any forcible or mandatory migration to IP based networks/interconnection is not desirable as investments have been made, agreements signed and interconnection established based on the classical TDM based networks. Further huge costs will be involved in moving to IP networks. The financial implications cannot be disregarded, especially given the precarious financial situation of the industry and the need to use valuable investments/resources towards more worthy end objectives such as delivering on the Government's broadband targets.
- 6) **COAI maintains that TDM and IP based networks should be allowed to co-exist and operators be given the flexibility to migrate /evolve to IP based networks based on their own commercial and business strategies.**
- 7) Further, the term IP Interconnection has not been defined – a clear definition is required for proper clarity. IP interconnection should not be confused with Internet Interconnectivity and IP interconnection strictly would mean PLMN/PSTN to PLMN/PSTN voice / sms traffic only and will not mean any data /packets through internet. It is reiterated that IP interconnection should not be mandated as this will entail huge costs - fresh investments and also wasted costs of existing investments, which is not justified.
- 8) Peer-to-peer interconnectivity should be continued with, as extensive hierarchy of interconnection has been established. Consideration of an Interconnect Exchange at this belated stage is not desirable. There will also be concerns around competition issues, bottleneck facilities, redundancy aspects, etc. that would arise in this case.
- 9) COAI believes that Wholesale interconnects costs and charges include an entire range of elements and costs of which IP based interconnection is only a very miniscule element. We therefore do not expect IP interconnection to have any significant impact on any IUC costs.
- 10) It is also submitted that issues related to interconnection charges based on capacity, criteria to estimate traffic minutes in an IP environment, review of the numbering scheme, emergency dialling in IP networks etc. are very premature at this stage as the large parts of the networks continue to be TDM based.



- 11) We believe that it may be more opportune and timely to raise such issues at a later date when there has been a significant migration to IP based networks.
- 12) Agreements with application and content service providers are already in place on a revenue share basis.
- 13) We also believe that there are several technical challenges and other implications as regards ENUM and emergency number dialling that need to be addressed through a proper technical consultation, with inputs from TEC.
- 14) We believe that there is no need to review the QOS framework at this stage and the existing regulatory framework should be allowed to continue.
- 15) Network sharing, in principle is a welcome step as it would allow for more cost efficient delivery of services. However, there is need for more clarity around what elements are envisaged for sharing. Also the DoT's decision to permit active infrastructure sharing in 2008 is still to be operationalized through a license amendment. Authority may like to expedite this process.

II. ISSUE WISE RESPONSE:

A. Issues in IP Interconnection:

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.

COAI Comments:

- 1) Firstly, the term IP interconnection has not been clearly defined - a clear definition is required for proper clarity. IP interconnection should not be confused with Internet Interconnectivity.
- 2) Also, as the Authority has itself noted in the present consultation, historically the network/interconnection has been based on circuit switched technology and it is on this basis that investments have been made, agreements signed and interconnection established.
- 3) The Authority has also recognized in its consultation that there is no network that is fully on IP and that only the major TSPs in India have implemented IP and that too, in the core network.
- 4) Migration and adoption of IP based network/interconnection is a constant evolution and as the Authority has noted, this evolution is happening in the networks of the TSPs. However, we believe that this evolution should happen as a natural progression and not be mandatorily thrust upon the TSPs as this would have several undesirable consequences.
- 5) We would like to submit that the IP based interconnection should not be mandated due to following reasons:

- a) **Mandatory migration will lead to wastage of existing investments:** We respectfully disagree with the view of the Authority that traditional telecommunications systems are nearing the end of their product lifecycles. It is submitted that investments continue to be made even today based on TDM based interconnection. Any attempt to mandate IP interconnection will lead to waste of all existing non depreciated investments of TSPs which would run into thousands of crores. Further, huge investments will be involved in moving to IP based networks. The financial implications of such migration cannot be disregarded, especially given the precarious financial situation of the industry and the need to use valuable investments/resources towards more worthy end objectives such as delivering on the Government's connectivity and broadband targets.
- b) **Mandatory migration will have high cost burden on operators:** Mandatory migration to IP interconnection will result in very high immediate cost for the operators in deploying network elements such as Media Gateways, SIGTRAN Signalling Gateway, Session Border Controller (SBC), Routers and IP Switches, etc. Also, it is questionable whether the TSPs would be in a position to incur such costs and make fresh investments given that they are currently under a very high burden of debts of around **Rs. 240,533 crores**, due to deteriorating economic situation, high inflation, fiscal constraints, depreciating Indian currency, etc. Additionally the telecom sector has also been going through severe financial duress leading to drastic fall in operating margins, uncertain policy and regulatory environment. The industry has also faced high costs in acquiring spectrum in the recent auctions. Given that the industry is already under such severe financial stress, it will be extremely difficult for the operators to bear such cost of mandated IP interconnection. **As submitted above, it should be left to operators to decide based on their techno-economic considerations regarding migration to the IP based network.**
- c) **Operators are at different stage of migration to IP Network:** It is highlighted by TRAI in its Consultation paper that different operators in India are at various stages of migration to IP based networks; we are thus of the view that this evolution should be allowed to progress naturally and that at this stage both TDM & IP interconnection should be allowed to co-exist. The choice and time of migration to IP based network should be left to the operators based on their individual business plans and strategies.
- d) **Mandatory migration will hinder innovation and competition:** In an environment of technology neutrality as well as emerging trend towards all IP based networks, mandating any migration may hinder innovation and competition. Thus any migration to IP network should be left to the commercial decision of the operators concerned.
- e) **Mandatory migration will limit the choice of optimum technology:** Technology evolution is a constant process. The investment in building IP networks may become redundant in future in case of emergence of new network technology. Any mandated migration may place restrictions on the flexibility of the operator to choose the most optimum technology and may not result in the most efficient usage of the infrastructure. We also believe that as all operators have incurred large cost in creating predominantly circuit switched network and same cannot be scrapped / discontinued in near future, unless there is very strong business case by the operators for doing so.
- f) **Competition will naturally drive roll out to IP network:** In today's scenario, we believe that high competitiveness among the operators will naturally drive the migration to the IP network, if the same is techno economically prudent. Further, the advantage and market drivers for IP based networks, if any, as highlighted by TRAI in its



consultation paper will ensure that migration from TDM to IP based network is accelerated.

- g) **Security related issues:** In today's scenario, IP based Network has high risk of security breach such as Network hacking, Data theft and revenue leakage as compared to TDM Network. The issue is far more complex than TDM and operators have to deploy multiple SBC's to secure the Network.
- h) **Lack of skilled Manpower:** Skilled IP/MPLS resources are limited in industry and today also many configuration and fault escalations are handled only by highly skilled Vendor Engineers from their respective Global Service Centres.
- i) In light of above, we are of the view that it should be left solely to the operators based on their network planning, techno-commercial feasibility and future scope to migrate to IP based network. Further, we believe that the existing interconnection regime and the rules governing interconnection should continue, irrespective of the interconnecting technology, to be the basis for all network roll outs in order to ensure spread of infrastructure to the remotest area of our country.

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.

COAI Comments:

- 1) Yes, for the reasons pointed out in our response above, TDM and IP interconnection should be allowed to co-exist and any migration from one technology to other should be left to mutual agreement.
- 2) In India, telecom operators have made huge investments in GSM technology. Based on technology advancements these networks have migrated from 3GPP R-99 to R-4/R-5 Architecture for 2G/3G based GSM networks in the year 2007, 2008 and 2009. The standard lifespan for the equipment committed by Telecom Equipment providers is about 10 – 15 years. The Return on investment and Project viability are also evaluated in these Telecom networks is based on the assumption that Telecom gear procured for GSM services will last for minimum 10 years. As already mentioned in the consultation paper, telecom operators will face considerable risk in committing significant investment in upgrading infrastructure for migration towards IP networks in current regulatory environment. Our member operators have already strategized their networks to run on IP networks in their Transport layer and have decided to continue in R-4 & R-99 GSM architecture which operates the Voice on Circuit Switching only. **With this hybrid approach our members are able to ensure the Return on Investments realized in traditional / legacy Network and at the same time not losing ground in competitive market to provide new emerging services.**
- 3) Further, the IP based network architectures (e.g. ETSI-TISPAN, IMS, 3GPP Rel x etc.) provide breakout functions to interconnect with the legacy TDM networks. There are provisions of MGCF (Media Gateway Control Function) to have Interconnection with the TDM Networks.



- 4) It is reiterated that such co-existence has been the basic features of the networks evolutions and should be allowed to continue. Further there should not be any timeframe for migration to the IP network, thereby allowing operators to plan their migration on the basis of their techno-economic considerations.
- 5) With regard to RIO, it is first pertinent to note that this matter is pending before the Hon'ble Supreme Court. Having said that, we submit that existing regulation of 'Reference Interconnection Offer dated 12.07.2002' is quite comprehensive and does cover National standards for interconnection of Networks including future technologies. The relevant extract from RIO are given below:

“6.1 National Standards

Interconnection of Networks and Systems shall conform to National Standards as set by the Telecom Engineering Centre and Regulations applicable to Telecommunications Services in India. In the absence of National Standards set by the TEC and Regulations, they shall conform to the relevant Recommendations of the ITU. References to typical standards have been indicated in Schedule 4 of this Agreement.

6.4.5 PSTN/ VOIP Interoperability Standards:

For Interoperability between Circuit based switching and IP based networks, the interface will conform to relevant national standards or guidelines of Licensor/ Regulator. Media gateway, Signaling Gateway and Gatekeeper shall conform to relevant ITU-T Recommendations and Internet Engineering Task Force (IETF) standards, as applicable.”

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

COAI Comments:

- 1) We reiterate that IP interconnection should not be mandated in India. The detailed reasons and justification for the same are given in our response to Issue 1 above.
- 2) As per industry practice, the interconnection has been as per bilateral agreements with dispute resolution and this practice should continue.
- 3) Further, migration of interconnection with any technology has to conform to the time tested interconnection regime set under the RIO regulation. A change in the interconnection technology does not warrant any change in RIO regime.

B. Issues pertaining to IP Interconnect Exchange:

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.

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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

- 1) The answer to the above has to be given in the context of the ground reality of interconnection having established on a peer-to-peer basis due to the nature of the regulation and licensing conditions and techno economic feasibility. Investments have been made and continue to be made on this basis.
- 2) Direct peering, both for TDM as well as for IP technology, is the only economical options at high volume being handled by the present Point of Interconnections. This is quite evident from the fact that not only for TDM connectivity but even for IP connectivity the operators have established the peer to peer connectivity instead of using any kind of transit/interconnecting points. Therefore an option of exchanging traffic only through interconnect exchange is ruled out at the very outset.
- 3) Further the operators have already established their interconnection and thus any connectivity through interconnect exchange will be additional cost burden on them. Hence at this stage, because of well spread networks in India we do not consider it technically and commercially a viable option to have an interconnect exchange.
- 4) Against the above backdrop, we are of the view that there is no need to consider setting up an Interconnect exchange for interconnectivity of various operators as it will only introduce another and additional element of cost in providing the service. This additional cost is also not desirable given the precarious financial situation of the industry.
- 5) Also, an interconnect exchange may not bring much value in the chain as the issues like Inter-Carrier Billing, Intelligent Network Services are already being addressed under the current framework. There could also be concerns related to ownership of the facility, competition issues, creation of a bottleneck facility, redundancy concerns, etc.
- 6) Further, any interconnect exchange at such high traffic volume would substantially add to the cost of operators. Failure of such additional switching/transit point can be seen from the fact that despite BSNL providing an indirect path/transit facility to terminate the calls to their mobile network via their L1 TAX acting as an interconnection exchange/transit switch; almost all private operators have stopped using that facility due to additional cost. The fate of the interconnect exchange if at all set up; can be gauged from the above. .

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.

COAI Comments:

- 1) We would again like to reiterate that IP interconnection should not be mandated and be left to mutual agreements between the operators concerned. The present interconnection regime gives flexibility to the operators to interconnect in a service area and the same may be continued with. There is therefore no need to mandate locations and structure of point of interconnection for IP based network architecture which will continue to be governed as per the mutual consent between the interconnecting operators.



C. Wholesale Interconnect Charges:

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.

COAI Comments:

- 1) We first submit that Wholesale interconnects costs and charges include an entire range of elements and costs of which IP based interconnection is only a very miniscule element.
- 2) Further a majority of the mobile and fixed line network are TDM based where all costing etc. is done on the basis of Minutes and cannot be done in terms of bandwidth.
- 3) The IUC charges for voice, such as Termination charge, involves determination of the cost of operations of all elements and is not based upon just the cost of interconnecting links.
- 4) Voice is sold to the customers on minute's basis and is likely to be sold so for many years to come. Therefore the IUC regime, which is primarily the revenue sharing regime for voice calls, has to be on the same basis and cannot be changed just because of any change of technology at the interconnecting points.
- 5) Therefore we believe that the issue of measuring traffic in terms of capacity instead of minutes is premature at this stage. At present, we are of the view that the Charging for IUC (termination and carriage) should be retained as per existing basis of Minutes of Usage
- 6) Further, we are of the view that there is need to clearly differentiate between Internet, which is a public switched packet data network (PSPDN), and PSTN/PLMN. The wholesale interconnect usage charges(IUC) for voice are for PSTN connectivity and not for internet connectivity
- 7) We believe that the current issue raised by TRAI is limited to PSTN/PLMN connectivity based on TDM and IP networks and not internet connectivity for which such charges are under forbearance.

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.**

COAI Comments:

- 1) As highlighted in above question, we are of the view that this issue is premature at this stage and at present, the minute based charging should continue.
 - a) IUC charging: Existing logic of MoUs for billing should be retained. Even in case of present IP Interconnection established by some operators from NGN Soft-switch / IP TAX, the charging is being done on Minutes basis using the voice CDRs generated by those switches and using the same interconnect billing system.



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.

COAI Comments:

- 1) The interconnection usage charges for voice are computed and billed using the voice CDRs generated by the switches irrespective of technology of interconnection e.g. TDM or IP.
- 2) As highlighted in above question the widely commercially available platforms of MSS/MGW and SBCs for routing etc. of the IP voice traffic (which would be deployed for the interconnection) are capable of generating the minute based CDRs which are used for interconnect billing.
- 3) Hence, existing framework for IUC should continue.

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?

COAI Comments:

- 1) The IUC charges are dependent on cost of whole networks and are not fixed on the basis of the cost of the interconnection links. Therefore any change in technology at interconnecting points/links has a miniscule effect on the IUC costing. It is reiterated that wholesale interconnect costs and usage charges include an entire range of elements and costs of which cost of IP based interconnection is only a very miniscule element. We therefore do not expect IP interconnection to have any significant impact on any IUC.

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.

COAI Comments:

- 1) The interconnection arrangements are between licensed operators. Therefore, we do not envisage any interconnection requirement for application and content services.
- 2) It is submitted that the present revenue sharing arrangement framework between the TSPs and the application & content service providers should continue.
- 3) The application and content service providers provide services that are our value addition to the core services being provided by the TSPs. The revenue share arrangement depends upon a number of factors such as utility of content, availability in a local language, demand from customer, pricing, innovation, etc.
- 4) Further, the application and content service providers work in alignment with the network of operators. With advanced IP based networks being deployed, operators would in any case push for better delivery of services, VAS etc. including through application & content



providers as well. Thus, there should be no charging mechanism prescribed for them and current practice should continue.

D. Quality of Service Related Issues:

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.

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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.

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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.

COAI Comments:

- 1) The level of competition in India is far higher than witnessed in any other part of the world. Further, the sector is characterized by very low ARPU and tariffs that are the lowest in the world. In fact, it is this affordability of mobile services that is driving the take up and usage of service.
- 2) In such a scenario of intense competition, every service provider is making an all-out effort to retain existing subscribers and increase market share. The endeavor of every service provider is to provide best quality seamless service to their subscribers. Hence Quality of Service (QoS) is driven by market forces rather than by Regulatory intervention.
- 3) Thus as the competition increases and market evolves, Regulator needs to move towards a regime of forbearance with regard to QoS for Mobile & Fixed line services.
- 4) Even internationally, mostly the regulators do not specify the QoS parameters. They either stop regulating when there is enough competition or they just monitor QoS parameter.
- 5) **In light of the above, we are of the view that with respect to both the IP and TDM network, TRAI should not specify any QoS benchmarks infact. It may be left to operators to monitor.**



- 6) Further, if at all QOS is to be regulated, the existing framework for the TDM networks should be allowed to continue for the IP networks as well and if at any future stage, any review is required, this may be done after due consultation.

E. Operational Issues:

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.

COAI Comments:

- 1) Network sharing, in principle, is a welcome step as it would allow for more cost efficient delivery of services. However, there is need for more clarity around what constitutes the Access and Core network in IP based networks and what elements are envisaged for sharing.
- 2) Also, as noted by the Authority, DoT in its 2008 Guidelines on infrastructure sharing had stated that “Sharing of active infrastructure amongst Service Providers based on the mutual agreements entered amongst them is permitted. Active infrastructure sharing will be limited to antenna, feeder cable, Node B, Radio Access Network (RAN) and transmission system only. Sharing of the allocated spectrum will not be permitted. The licensing conditions of UASL/CMSP will be suitably amended wherever necessary to permit such sharing.”
- 3) However, the above, is still to be operationalized through a license amendment. The Authority may like to expedite this process.

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?

COAI Comments:

- 1) As noted by the Authority, the inter-relationship of the numbers and addressing schemes, and their management mechanism that will be required during the migration to IP based network, will be a major task. We believe that, it is too premature at this stage to raise these issues.



Q20. Is there a need to mandate Emergency number dialing 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.

COAI Comments:

- 1) We also believe that there are several technical challenges and other implications as regards emergency number dialling that need to be addressed through a proper technical consultation, with inputs from TEC.
