

CONSULTATION PAPER ON MIGRATION TO IP BASED NETWORKS

Introduction

In India, just as cellular networks evolved from analogue to digital and television made the same transition, the life of the most widely used communications transport in history – Time Division Multiplexing (TDM) – is drawing to a close, with newer Internet Protocol (IP) network standing ready to pick up where TDM left off. The opportunities presented by IP based networks are immense as they help telecom service provider (TSPs) converge their network infrastructures, increase efficiency and scalability, provide huge bandwidth, consolidate terminating traffic and reduce long-distance charges. The benefits of migration to an IP based network are well known and there is no doubt that IP based networks are the future. Traditional telecommunications systems are nearing the end of their product lifecycles worldwide and regulators and service providers everywhere are strategizing on the logistics of migration from TDM to IP based network. Networks based on TDM number in the hundreds of thousands or perhaps even more and the transition from TDM to IP should not be done in a hasty manner and without adequate infrastructure, regulations or standards in place.

Before discussing the modalities of the functioning of an IP based network, it is pertinent that adequate study/research is undertaken to ensure that migration to an IP network will be economically viable due to the changes in plant machinery and the other infrastructural changes such a migration will require. In-depth analysis of the cost of migration as well as the cost of doing business using an IP based network needs to be conducted. Moreover, impact of migration to an IP based network on national security needs to be studied. Questions such as how to identify a user using an IP network and how to prevent misuse of the network need to be answered before migration is considered. This is of prime concern and needs to be studied in detail before any final plans for migration are drawn-up. While it is commendable that the government is planning ahead and looking to switch over to next generation technology, in the absence of adequate information gathering/study about the above-mentioned concerns, migration to IP networks will be ill-advised.

We are of the opinion that DoT should be the pilot of this issue, specially keeping in mind security considerations. Security is not something that will be of any concern to service providers. It is upto the Government to ensure that all security concerns are addressed before migration is carried out.



In short, to start with a basic background study covering all the above-mentioned aspects should be undertaken. This should be made the basis of broad guidelines to be framed by TRAI. Experience shows that everything that is mandated meets with resistance from industry. It is wiser to suggest broad guidelines covering all key aspects of migration from legacy networks to IP based networks. Moreover, guidelines should be such that the inevitable migration to IP network is not thwarted because of poor planning and lack of foresight. Once the broad guidelines have been framed, DoT must drive the issue and be the nodal agency that deals with all aspects of migration from a TDM network to an IP based network. DoT must ensure that adequate infrastructure is put in place and concerns of national security are adequately addressed. We are of the view that the government should act as the facilitator and accelerator for all common infrastructure such as interconnect exchange required for the introduction of IP based services.

ISSUES FOR CONSULTATION

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.

The benefits of an IP network are unquestionable. Advantages include high economies of scale, greater flexibility with respect to future requirements of technological developments, high efficiency and easier integration of applications - to name a few. There is no doubt about the fact that migration from TDM to IP is the next step. However mandating the same may not be advisable. Experience shows that everything that is mandated meets with resistance from industry. It might be wiser to suggest a broad time-frame within which TSPs may migrate from their legacy networks to IP based networks. Government could even incentivize the same by giving tax incentives and/or subsidies. There should be a commercial rationale for TSPs to make the substantial financial commitment that migration to IP network requires.

Q2. Whether both TDM and IP interconnection should be allowed to co-exist? 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.

Both TDM and IP networks should be allowed to co-exist. TSPs should be given the choice as to when and how they wish to upgrade their networks to IP based. Making migration



mandatory could possibly have unintended consequences. That said, a broad time-frame may be suggested within which TSPs may migrate from their legacy networks to IP based networks. Government could incentivize the same by giving tax incentives and/or subsidies. There should be a commercial rationale for TSPs to make the substantial financial commitment that migration to IP network requires.

We believe that the existing regulations are largely sufficient to address the requirements of IP networks also. If at all need is felt in the future for additional regulations a suitable amendment may be made to the 2002 Regulations. An enormous amount of work and thought has already gone into framing the 2002 Regulations. It will be counter-productive to put all of that aside and start work from scratch.

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**

In our opinion IP interconnection should rely on bilateral agreements between TSPs. It is pertinent to reiterate here that mandating something usually results in resistance from the industry and could possibly result in unintended consequences. Neither should migrating to IP networks be made mandatory, nor should enforcement of IP interconnection be carried out through a mandatory reference offer. TSPs should be given the freedom and space to decide what terms work best for them and enter to bilateral agreements with each other.

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.

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.

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.

Establishing an Interconnect Exchange is perhaps the best way forward since even internationally it is the more favoured form of interconnection. An interconnect exchange



would make it possible for operators to exchange their IP traffic for all services through a common interconnect exchange.

It is not desirable to have an exchange within each licensed area nor does it make sense to have just one for the entire country. Placement of interconnect exchange(s) in an area should be dependent upon the IP deployment in that area. An interconnect exchange should be established in locations where IP deployment is high. Placing one in every licensed service area will be wasteful and only having one for the entire country will be inadequate and inefficient as this would result in network traffic being transmitted back and forth for no reason.

We are of the opinion that no regulatory intervention is required to mandate the locations and structure of points of interconnection for IP based network architecture. It should be left to the TSPs to decide the locations and structure of interconnection that would suit best their business needs. TRAI could perhaps give broad guidelines which are not mandatory in nature.

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.

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.**

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?



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.

Before even discussing charging principles it is important to put in place proper measurement tools to calculate the volume of data which is passing through the network. Broadband service providers, worldwide, are hampered by the basic limits of their IP infrastructure to track, monitor and manage applications individually by subscriber or application on their IP networks. Flat-fee pricing models dominate broadband IP service environments worldwide because today's network infrastructure does not have the capability to differentiate and charge for different types of content running on the same transport network. The reporting limitations of existing network infrastructure constrains the options available to service providers to adapt charging and pricing models to services so they can truly value and differentiate content-based or premium IP service offers.

We believe that in an industry dominated by IP interconnection between networks, charging should be capacity based in terms of Mbps. Moreover, no distinction should be made between application and content service providers when deciding on a charging principle. Charging by capacity makes more sense in a scenario where voice traffic is declining as a revenue earner and OTT services such as social media chat services and texting is become ever more popular. Telecom companies are now moving towards bundled voice and data services which are frequently offered at flat rate charges, sometimes with tiered flat rates - each tier with its own capacity ceiling.

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.

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.

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?



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.

QoS is the overall performance of a telephony or computer network, particularly the performance seen by the users of the network. To quantitatively measure quality of service, several related aspects of the network service are often considered, such as error rates, bandwidth, throughput, transmission delay, availability, jitter, etc. Quality of service is particularly important for the transport of traffic with special requirements. In particular, much technology has been developed to allow computer networks to become as useful as telephone networks for audio conversations, as well as supporting new applications with even stricter service demands. Measurements of end-to-end quality of service may address Service Quality e.g. customer satisfaction, Quality of Experience e.g. voice quality and Network Performance e.g. faults. It is important for TRAI to mandate the minimum quality of service which customers should get. Consumers should be given the choice of which service provider to use based on the minimum quality of service promised by the service provider.


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.

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

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.

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?

ENUM seems like the best way forward. ENUM unifies traditional telephony and IP networks, and provides a critical framework for mapping and processing diverse network addresses. It



transforms the telephone number—the most basic and commonly-used communications address—into a universal identifier that can be used across many different devices and applications (voice, fax, mobile, email, text messaging, location-based services and the Internet). Benefits of ENUM include the fact that it uses DNS and thus saves capital expenditure; it is the ultimate solution in number portability and that it enables convergence. That said, it is extremely important that national security concerns are addressed when migrating from a TDM based to IP based networks using ENUM numbering.

There should be a mechanism in place to enable law enforcement agencies to monitor, track and identify activity and usage of the IP network. Usage of ENUM system should be considered only if such a mechanism is put in place. There must be an algorithm in place to make tracking of user identity and location possible. If not addressed right-away or nipped in the bud these issues could reach unmanageable proportions that could haunt us later as has been the case with other such technologies.

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.

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

Yes. There is a need to mandate emergency number dialling facilities to access emergency numbers using telephone over IP based network platforms. Most countries in the world have in place a single number people can call in times of emergency – no matter the nature of the emergency. In fact, in many parts of the world, an emergency service can identify the telephone number that a call has been placed from. This is normally done using the system that the telephone company uses to bill calls, making the number visible even for users who have unlisted numbers. For an individual fixed landline telephone, the caller's number can often be associated with the caller's address and therefore their location. It is time for India to come in sync with the rest of the world and introduce emergency call-in numbers especially in an IP network.

