Vodafone Response to TRAI Consultation Paper on
Migration to IP based networks dated 30th June 2014

INTRODUCTION

We submit that any discussion on migration of existing networks to full IP based networks requires a holistic view of Indian Telecom scenario.

The existing 2G networks, which interconnect on TDM, are critical to the mobile telephony in India and will remain so over a period of time considering the eco system, spectrum fragmentation, existing investments and high voice traffic.

While data is picking up, the growth of 3G services is constrained by the fact that no existing operator in India has pan India 3G network and as of now the existing services on such networks are severally constrained by lack of spectrum. Also, smartphone penetration is still at only 10-12%.

Similarly the rollout of 4G networks has been delayed mainly due to lack of eco-system and the spectrum related issues. We have seen very little rollouts of the 4G networks even though the 2.3Ghz/2.5Ghz spectrum was allotted in 2010 and in any case there are only few operators who will be providing these services in near future.

Hence, India is still a predominantly voice driven market and will continue to be so for at least the next 5-10 years.

With this background, we are of the view that any migration to part or full IP networks must be left to choice of the operators, this being a business decision dependent on many factors like spectrum availability and use, individual rollouts, investment potential, business model, etc.

Further, while interconnection between operators is necessary, the type of interconnection should not be mandated and be left to agreements between operators. There are existing interconnect agreements that are already in place - these are based on mutual agreement and cannot be unsettled. In any case an interconnection is between two networks mainly for voice and SMS; and if majority of the networks are today on 2G technologies for PSTN/PLMN voice and SMS, then the interconnection has to cater to those technologies.

Data "best effort" traffic is an altogether different matter and best left to competitive market forces that the internet ecosystem has brought about.

It is important to note that going forward different requirements for voice and data services remain important. While both may use Internet protocol as a technology in the future, voice services (e.g. Voice over LTE) in IP networks would still continue to remain a real-time and priority service requiring different and more stringent set of technical and administration rules for interconnection to ensure end-to-end quality of service.

Against this background, we are pleased to provide our response to specific questions as follows:

ISSUE-WISE RESPONSE

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.

a. **No, we believe that IP interconnection cannot be mandated. We enumerate the reasons for the same**:

(i) An interconnection between operators is necessary but type of interconnection should not be mandated but be left to agreements between operators. There are existing interconnect agreements that are already in place - these are based on mutual agreement and cannot be unsettled. These agreements can be changed, if and only if, the Parties mutually agree for the change and there cannot be any mandate in this respect.

(ii) In any case an interconnection is between two networks mainly for voice and SMS; and if majority of the networks are today on 2G technologies for PSTN/PLMN voice and SMS then the interconnection has to cater to those technologies.

(iii) The bulk of the interconnection is predominantly on TDM. There is thus no basis or justification to consider mandating IP interconnection and then move the cost of deploying media gateways to the TDM operators. This is completely contradictory to the practice followed so far where it is the seeker who has to bear the costs of interconnection, irrespective of the technology.

(iv) Admittedly under the present regime, TDM interconnection is mandated. Investments have been made and interconnection established on this basis. These cannot be disregarded.

(v) IP interconnection involves purchase of new equipment such as routers, SBCs, LAN switches, gigabit ethernet equipped transport boxes, apart from IP addresses, security software, etc IP interconnection will thus entail a huge financial cost which the operators are not in a position to bear at this stage.

(vi) Any regulatory mandate for IP interconnection will adversely impact the existing and 'in pipeline' TDM equipment and investments of operators and leading to wastage of existing investments, which is not desirable.

(vii) It has to be noted that circuit switched 2G networks constitute 75-85% of the total sites/network and are likely to remain at the core of voice services at least for the next 5-10 years. While service evolution along with technological efficiency gains will drive the deployment of IP infrastructure, India is still at the beginning of this transition and complete 'IPfication' of networks will be a lengthy process given India's geographical scope and dominance of legacy telecom networks

across the country. Customers generally do not attach much importance to the network technology in place. They are rather concerned with the usefulness of the service and QoS. At present voice is a key need, which can be delivered on existing 2G networks. Eventually operators will move towards full IP or a better / efficient technology if that would become available in future.

(viii) This is also supported by international precedents. The 21st Century Network (21CN) programme announced by the UK telecommunications company BT Group plc in 2004 with the aim of transitioning to an 'all-IP' network over a period of 5 years still remains to be completed in 2014, 10 years after the initial announcement. Similarly, AT&T only recently released plans that indicate a complete 'ipifation' until 2020. The adoption in India will thus largely depend on demand uptake of new IP services over time and commercial feasibility of acquiring new equipment required such as routers, SBCs, LAN switches, gigabit ethernet equipped transport boxes, security software, etc

(ix) Thus the transition to IP networks will depend upon a number of factors such as spectrum availability, market maturity, service quality and commercial feasibility. The decision of establishing IP interconnection is thus best left to bilateral agreements between telecom operators based on the commercial, business and strategic decisions of each operator.

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.

a. As mentioned earlier, the type of interconnection should not be mandated. Further, the existing agreements provide for TDM interconnection and may be changed for IP interconnection or both types of interconnection (IP and TDM), if and only if , both the parties mutually agree.

b. In respect of the Reference Interconnection Offer of 12.07.2002, it is first submitted that the TRAI's appeal against the TDSAT judgment of 27.04.2005 is still pending before the Hon'ble Supreme Court. Important question of law relating to the TRAI jurisdiction on interconnection which has been challenged by BSNL, have been raised in this Appeal, which is still pending consideration of the Apex Court.

c. Having said that we believe that there is already substantial reference in the RIO with respect to IP platforms, PSTN/VOIP interoperability standards, packet switches and IP interfaces and IP protocols. The RIO also refers to interconnection of networks and systems as per the national standards as set by the TEC / relevant recommendations of ITU from time to time.

d. In this regard, we note that apart from the standards for CCS7, the TEC has also, now issued standards for IP networks and IP interconnection which will automatically be available as an option for Interconnection. It may be noted that inclusion of IP standards as one of the options in the RIO will require changes/flexibility in relevant technical sections of the RIO for eg. signalling - allowing CCS7 or R2 in case of TDM as well as SIP/SIP-I/SIP-T/H.323/H.248/SIGTRAN in case of migration to IP.

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

a. We once again reiterate that IP interconnection cannot be mandated in India for the reasons as enumerated in response to Q1 and Q2 above.

b. As mentioned earlier, the type of interconnection should not be mandated. The existing agreements provide for TDM interconnection and may be changed for IP interconnection or both types of interconnection (IP and TDMA) ,if and only if , both the parties mutually agree.

c. We submit that any discussion on migration of existing networks to full IP based networks requires a holistic view of Indian Telecom scenario.

d. The existing 2G networks remain critical to the mobile telephony in India and will remain so over a period of time considering the eco system, spectrum fragmentation, existing investments and high voice traffic.. No existing operator in India has pan India 3G network and as of now the existing services on such networks are severally constrained by lack of spectrum. Similarly the rollout of 4G networks have been delayed mainly due to lack of eco-system and the spectrum related issues. We have seen very little rollouts of the 4G networks even though the 2.3Ghz/2.5Ghz spectrum was allotted in 2010 and in any case there are only few operators who will be providing these services in near future. With this background, we are of the view that any migration to part or full IP networks must be left to choice of the operators, this being a business decision dependent on many factors like spectrum availability and use, individual rollouts, investment potential, business model etc.

e. It is important to note that data traffic exchange is a different matter that is not confined to the telecoms industry alone as it includes other internet ecosystem players, but is well established and does not require further specification and is not part of existing interconnect agreements.

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.

a. It is first submitted that historically, regulation and license has required operators to interconnect on a peer-to-peer basis for voice and sms. We believe that this approach is also desirable/preferable because on the interconnect links, the primary application/service is voice which is highly sensitive to latency on network and non-direct interconnects will not permit an operator to guarantee and maintain end-to-end QoS.

b. In this regard, it is important to highlight different network requirements with respect to voice and data services. While both use Internet protocol as a technology, voice services (or any services with specific quality of service requirements) demand different and more stringent set of technical and administration rules for interconnection.

c. Public peering/exchange will mean a common point of exchange for traffic which will require high redundancy to prevent the significant risk of complete telecom network paralysis in case of collapse/failure. Such an exchange will have to be set up by a neutral third party as otherwise, it could lead to competition issues. There will also be several other issues that will arise in such a scenario such as cost of connectivity and payouts to the exchange, guaranteed QoS with the exchange, use of the exchange for pure traffic routing or additionally as settlement clearing house, etc.

d. Direct inter-operator interconnection facilitates controls with respect to calls allowed and dis-allowed – whereas through interconnect exchanges these controls will be lost.

e. Further, extensive hierarchy of interconnection at huge costs, has been established on this basis. We believe that this legacy and investments cannot be disregarded to introduce any de novo arrangements that will only impose a further additional cost burden on operators.

f. We therefore recommend private peering i.e. direct interconnection amongst operators.

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.

a. **No, regulatory intervention is not required with regards to location and structure of POIs** and the same should be left to the individual service provider. The principle of regulatory intervention should only be applied in case of market failure. Mandating any specific location and structure of POIs may be counter-productive as operators may not be able to leverage the opportunities/optimal interconnectivity options that they may wish to mutually agree upon, based on their respective technical/network feasibility (given that the no: of POIs are dependent on a variety of factors such as geography, availability and stability of transmission network infrastructure etc.

b. It may also be noted that as per current routing /licensing arrangements, traffic outside the licensed service area can only be carried through an NLDO/ILDO.

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?

a. We first note that the above issue has been raised in the context of wholesale interconnect charges. We would like to submit that estimation of wholesale interconnection costs and charges include an entire range of elements and costs of which IP based interconnection is only a very miniscule element.

b. IP interconnection for voice services (or more generally any service requiring QoS) will require a different approach. Specific standards are required to guarantee the QoS necessary to support the service, and the specific attributes normally expected of the service. More generally services where the originator of the session can be identified and there are strict QoS requirements on terminating traffic to complete that session, charging principles need to ensure that the originator of the session bears the cost, and the transit or terminating networks are paid accordingly. Considering that we expect TDM based 2G voice to remain important in India at least for the next 5-10 years it is reasonable to choose a charging mechanism that allows compatibility with existing systems. Hence, a minute and usage based charging mechanism should be continued.

c. It is also important to note that mechanisms for billing purely on per minute basis will continue to remain relevant for exchange of mobile traffic (Fixed to Mobile/Mobile to Fixed/Mobile to Mobile) as mobile operators need to successfully handle the traffic based upon determination of the location the mobile customer (who is nomadic, unlike in fixed networks), thereby requiring significant investments at the mobile operators' end.

d. Therefore, we are of the view that the current interconnection regime measured in terms of the minutes of traffic should continue.

e. We are also not aware of any instance in the world where the Regulator has mandated IP interconnection on non-per minute basis.

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.

a. It is first submitted that this issue is not linked to nature of interconnection, viz. IP or TDM which is the subject matter of the present consultation.

b. In any event, application and content service providers in the current 'voice' world provide services that essentially add value to the core services being provided by the TSPs and are based on mutually agreed revenue share agreements. Generally, these 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. .

c. Vodafone believes that the current revenue share framework between the TSPs and the VAS service providers should continue to apply.

d. We assume that this question pertains to the VAS service providers only and is answered accordingly.

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.

a. The Authority has itself noted that its QOS regulations cover both TDM and IP networks. We are therefore of the view that there should be no change in QOS framework at this stage and the same maybe considered at a later date when the occasion arises, after due consultation.

b. In fact, we are of the view that there is a need to review the need for QOS regulations, in the present intensely competitive environment. We believe that in such cases, the Authority should let QOS be driven by market forces and adopt an approach of forbearance.

c. This is also the practice internationally, where Regulators stop regulating when there is enough competition or they just monitor QOS.

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.

a. At the outset, we request the Authority to clarify /define the elements /components that are envisaged to be shared in IP access and core networks, so that the types of sharing activities can be envisaged. As a principle, sharing of networks should be permitted regardless of TDM or IP networks, based on mutually agreed solutions amongst operators.

b. We would also like to draw attention to the DoT guidelines of April 2008 which permitted active infrastructure sharing, but which are still to be operationalized. We urge the Authority to recommend that this process be expedited.

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?

a. It is first submitted that issues related to implementation of ENUM, are premature at this stage.

b. There will be several issues and challenges that will need to be examined and addressed in the context of ENUM implementation. For example, it will need to be examined whether lawful interception and monitoring will be supported with ENUM and whether number portability can be ensured while deploying ENUM.

c. Further, 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.

d. We therefore believe that this issue should be addressed at an appropriate stage through a detailed technical consultation.

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.

a. Yes, emergency number dialling needs to be mandated. This is a basic necessity regardless of the type of network deployed by an operator. However there are clearly challenges in this regard in respect of an IP based platform. We urge that these be addressed through a proper technical consultation in collaboration with TEC.

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.

a. This too, will require detailed deliberations between the operators, TEC, and the DoT/TRAI.

New Delhi
19 August 2014