

Unlimit's Response to the Consultation Paper on Enabling Unbundling of Different Layers Through Differential Licensing

Executive Summary

- A. In order to attract investment and strengthen the service delivery segment, Network services layer and Service delivery layer (Services that amalgamate the licensed network services into their services) needs to be separated by introducing specific license for Network Layer alone.**
- B. The Need for Separation of Network Services Layer and Service Delivery Layer**
- i. With 5G enabling network slicing and SDN, the network has the ability to deliver customised QoE, for the digital services, to the users through the flexibility and agility of the network itself. Therefore, the network too is required to be considered as a service only viz, Network As A Service (NaaS).
 - ii. There is a need for a multiple technologies and cross functional sectoral policy and regulation synergy in the era of modern communication systems.
 - iii. Imposing restrictions / controls only in the telco domain, for securing / controlling digital services, potentially either stifles innovation or results in cost escalation for the service leading to adoption issues.
 - iv. The concept of reselling of telecom services can only be done away with when a clear separation is introduced between the licensed activity of provisioning NaaS and building innovative Digital Services by utilizing NaaS.
 - v. Realization of the full potential of the future communication systems services would require revisiting the existing licensing and regulatory regimes of the voice centric networks and splitting them into multiple layers to create the environment conducive for enabling innovative digital services.
- C. Need for Specific License for Network Layer Alone – The Evolution to Separation of Services from the License.**
- i. For simplifying the regulatory regime for the network services itself, retaining the regulatory freedom for development of innovative services and creating a competitive environment for the basic telecom services there is a need to cascade the earlier evolutionary step of delineating the license from Spectrum to delineating the license from services as well.
 - ii. Since, it's only the network layer that is utilizing the national resource of licensed Spectrum, therefore, only this layer alone should be subjected to licensing and the balance of the service delivery eco-system, i.e. who amalgamate the underlying licensed network services as part of their services, should be mandated to get themselves registered for provisioning their services.
- D. Need for attracting investment into the telecom sector for strengthening the service delivery -** Given that the telco network is the blood line for Digital Services, it would be prudent to create an environment that shall spur this vast eco-system of innovative digital services to contribute towards augmenting the telco network, its capabilities and capacities. Separation of the network layer from the services layer shall facilitate creation of such an investment friendly environment.

- E. The Network Services Layer licensee should be permitted to get itself registered as for the Service Delivery Category and provide the service.**
- F. As a safeguard against any anti-competitive practices by the Network Services Provider, TRAI's Net-Neutrality guidelines for non-discriminatory access to telecom resources should be implemented with due benchmarks for time-lines of provisioning and configuring telecom resources and audits for detecting any wrong doings on part of the entity holding the license for Network services as well as a registered Service delivery entity.**
- G. The license should be applicable only for the entity utilizing the national resource of Spectrum viz, the Network Service Provider. The eco-system of Services delivery layer, viz, service providers retailing the basic telecom services with some value add as well as, those who amalgamate the underlying licensed network services as part of their services, should be subjected to a simple registration with DoT.**
- H. Voice, Messaging and Data services should be considered as the product of the Network layer which would be sold (Not Re-Sold but Retailed), on a non-discriminatory basis, only through DoT registered eco-system of Services delivery layer, i.e. service providers who amalgamate the underlying licensed network services as part of their services and sell it under their own brand name.**
- I. The scope of Network layer should comprise of the physical infrastructure, active and passive elements and cloud-based instances of the network elements that are required to deploy a telecom network.**
- J. The scope of service delivery layer eco-system should comprise of infrastructure deployment for augmenting the infrastructure of the licensed network, sale of services, tariff definitions, subscription management.**
- K. Various responsibilities and obligations enumerated in Unified License should be applicable for Network layer licensees only. In case the discharge of those obligations and responsibilities has a direct dependency on the service providers of the service layer eco-system then the same should be passed on as additional responsibilities as part of registration for the service providers of the service layer eco-system.**
- L. Certain mandatory obligations should be imposed on Network layer licensees to provide the network resources in a time-bound, transparent and non-discriminatory manner to the digital services providers in conformity of TRAI's Net-Neutrality regulations. There is a need to strengthen these Net-Neutrality regulations, that mandate provisioning of access services on a non-discriminatory basis, by defining benchmarks for time bound provisioning and configuration of telecom resources by the Network Services Licensees post their requisitioning by the Services Delivery eco-system services providers.**
- M. The taxation for telecom sector should be aligned to newer taxation regime of GST adopted in India. All existing levies viz, LF and SUC should be replaced by a simple administrative Fee of 1% of the audited financial results of the TSP which can be charged annually in addition to the GST on the services.**

- N. The existing Unified Licensees should be mandated to immediately migrate to the unbundled licensing regime to achieve separation of the network from the services.
- O. The existing VNO licensees should be mandated to immediately migrate to service delivery category registration and not licenses as per unbundled licensing regime.
- P. A VNO should be permitted to be parented by more than one Network Service layer licensee as it shall provide the requisite flexibility to a VNO for sourcing the best of services from multiple Network Service layer licensees and is considered a necessity for the success of the VNO model.
- Q. With the impetus being given to adoption of cloud computing, the licensing of the telecom networks too needs to evolve and permit virtual cloud instances, of various network elements, to be considered as a physical part of the network itself.
- R. Network Infrastructure services viz, voice, messaging and data volumes are required to be classified as 'Bottleneck Services' and bulk provisioning and configuring of the same under a B2B agreement, for provisioning digital services, should be mandated with reasonable ceiling of the commercial terms.

Q1. Do you agree that in order to attract investment and strengthen the service delivery segment, Network services layer and Service delivery layer needs to be separated by introducing specific license for Network Layer alone? Please justify your answer.

Our Response

Yes, we do agree that in order to attract investment and strengthen the service delivery segment, Network services layer and Service delivery layer (Services that amalgamate the cellular network services into their services) needs to be separated by introducing specific license for Network Layer alone.

A. The Need for Separation of Network Services Layer and Service Delivery Layer

1. Networks As A Services (NaaS). The aim of every Telecom Network technology post 2G has been to enable development, deployment and availability of services that are delivered by utilizing the network, i.e. over the network. The initial services development phase was dominated by voice and messaging services but each subsequent telecom services network generations viz, 4G or 5G (or beyond) have been developed with the sole purpose of effecting improvement in QoS of the services by addressing the twin aspects of lowering the latency while simultaneously increasing the availability of bandwidth. **With 5G enabling network slicing and SDN, the network has the ability to deliver customised Quality of Experience (QoE), for the digital services, to the users through the flexibility and agility of the network itself. Therefore, the network too is required to be considered as a service only viz, Network As A Service (NaaS).**
2. Digital Services Need Multiple Technology and Functional Domains Regulatory Support. Digital services are an amalgamation of a vast number of different individual digital services. Large amount of data is a major by-product of any Digital service. Therefore, data security, protection and privacy regulations have a direct bearing on their provisioning. Similarly, the policies for block chains, data analytics, data storing and transfer and cloud computing or cloud-based services need to be developed in consonance with the aim of enabling digital services. Additionally, these modern-day

digital services cut across a wide variety of market and functional sectors from health, to agriculture, to smart cities, to assembly lines of various industries, etc. Therefore, **the need for a multiple technologies and cross functional sectoral policy and regulation synergy too assumes significance.**

3. Support for Innovation and Better Ability for Securing the Services. Till now the controlling plane for services viz, QoS, security, billing, etc, was limited to the physical network only, whereas the 4G or 5G networks, cloud computing and edge computing technologies empower these controlling abilities from the services plane, i.e. over the network; to provide the same level or at times even better level of controlling these aspects of services. Consequently, **imposing restrictions / controls only in the telco domain, for securing / controlling digital services, potentially either stifles innovation or results in cost escalation for the service leading to adoption issues.**
4. Regulatory Simplicity and Reduced Litigations. The concept of reselling of telecom services was intricately related to the fact that provisioning of telecom services required licensed spectrum and has led to regulatory complexities and massive litigations leading to financial collapse of so many telecom companies in the last 4 years. **This concept of reselling of telecom services can only be done away with when a clear separation is introduced between the licensed activity of provisioning NaaS and building innovative Digital Services by utilizing NaaS.**
5. Recognizing these requirements of digital services, the NDCP 2018 [Para 2.1(b)(v)] has aptly recommended “Enabling unbundling of different layers (e.g. infrastructure, network, services and applications layer) through differential licensing” as a means of “Reforming the licencing and regulatory regime to catalyse Investments and Innovation, and promote Ease of Doing Business”. However, **realization of the full potential of these future communication systems services would require revisiting the existing licensing and regulatory regimes of the voice centric networks and splitting them into multiple layers to create the environment conducive for enabling innovative digital services.**

B. Need for Specific License for Network Layer Alone – The Evolution to Separation of Services from the License

1. Amongst all the various layered models for Telecom networks and Digital services, that have been proposed in the pre-consultation phase and described in the current consultation paper, it is only the Network layer that uses the ‘National Resource of licensed Spectrum’ for provisioning its services. The balance of the telecom / Digital services eco-system components, with the exception of passive network infrastructure, are utilizing the network as a service to build value added innovative services.
2. The introduction of UL for the Indian Telecom Industry was the evolutionary step of separating the Spectrum from the License for Telecom services. This separation provided the requisite flexibility of delineating the Spectrum from the technology being used for provisioning telecom services. Consequently, the benefit of Network technological advancements like ‘Carrier Aggregation (CA)’ which enable provisioning of larger bandwidths was reaped by the network services providers resulting in better QoS for the end consumer of telecom services. **Now there is a need to cascade such evolutionary steps further by delineating the license from services as well. Apart from**

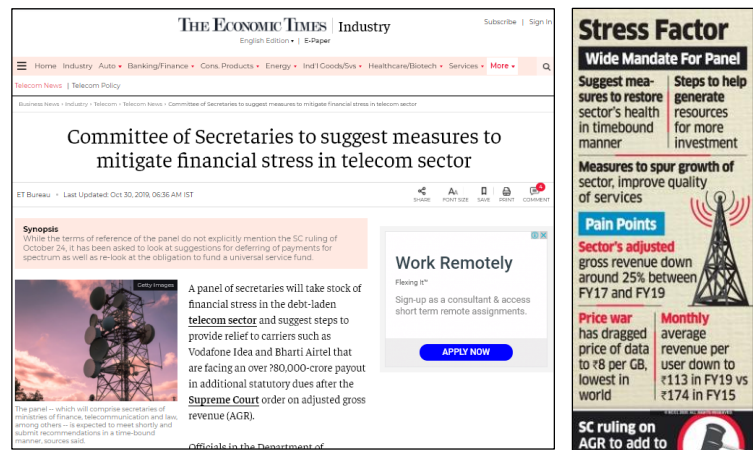
simplifying the regulatory regime for the network services itself, such a step shall retain the regulatory freedom for development of innovative services as well as create a competitive environment for the basic telecom services.

3. **Since, it's only the network layer that is utilizing the national resource of licensed Spectrum, therefore, only this layer alone should be subjected to licensing and the balance of the service delivery eco-system, i.e. who amalgamate the underlying licensed network services as part of their services, should be mandated to get themselves registered for provisioning their services.** This shall provide the added advantage of a light touch regulatory environment and the requisite freedom for innovative digital services to blossom.

C. Need for attracting investment into the telecom sector for strengthening the service delivery

1. Provisioning telecom service is a Capex heavy business proposition. In the erstwhile voice-based networks, the services were limited to simple voice or messages and sizing the network for estimating the Capex required for infrastructure deployment, over a period of time, was a much easier task. Even the addition of capacities, based on the loading of the network, was almost like extrapolating the growth curve arrived at from historical data of service provisioning. All in all, formulation of the business case required solving a simple mathematical estimation problem.
2. However, with the separation of the networks from the services, estimating the growth rate of the service consumption has become a challenge.
 - a. According to a March 2019 Assocham-PwC study, "Data consumption in India will grow from the level of 71,67,103 million MB in 2017 to 10,96,58,793 million MB (megabytes) in 2022, growing at a compound annual growth rate (CAGR) of about 72.6 per cent".
 - b. In March 2019, it was impossible to predict the current pandemic situation, which has upset these calculations by large margins. Ericsson, in its Mobility Report for June 2020, said that, "Total traffic is projected to triple, reaching 21 exabytes per month in 2025. This comes from two factors: high growth in the number of smartphone users, including growth in rural areas, and an increase in average usage per smartphone...".
 - c. Patrick Cerwall Head of Strategic Marketing Insights, Ericsson and the author of Ericsson's report has stated that "the largest share of traffic increase during the Covid-19 pandemic has been absorbed by fixed residential networks, which have experienced a 20-100% growth".
3. Despite the fact that the number of non human subscribers of data services is / has surpassed the number of human subscribers, the increase in data traffic from digital services, especially M2M and IoT services, has not been projected in these reports.

4. It is no secret that the telecom sector in India has been reeling under financial duress and the government and industry alike have been struggling to find a solution to the financial mess that the sector finds itself in. Graphic 1, sourced from the Economic Times of 20 Oct 2019, clearly brings out the fact that there is a teething need for initiating measures that would spur investment into the telecom sector.

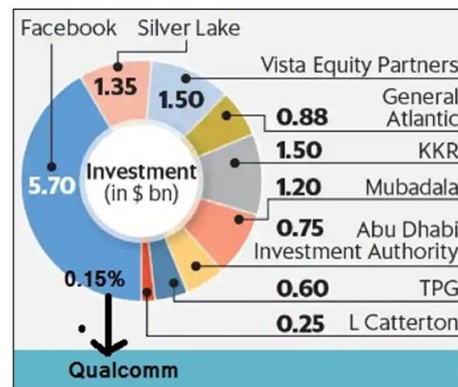


Graphic 1

Source: <https://economictimes.indiatimes.com/industry/telecom/telecom-news/committee-of-secretaries-to-suggest-measures-to-mitigate-financial-stress-in-telecom-sector/articleshow/71805235.cms?from-mdr>

5. The March 2019 Assocham-PwC study has also noted that there has been a value shift to platforms viz,
 - a. "The average monthly spend on voice services in 2013 was Rs 214 compared to Rs 173 spent on data. In 2016, the spend on voice fell to Rs 124, while data spend rose to Rs 225, according to the report."
 - b. "Social media and technology platforms, instead of content creators and packagers, have emerged as the primary beneficiaries of the increase in user time and spending,"

6. In order to improve the commercial health of the telecom sector, it is important to tap into the deep pockets of these digital services providers for contributing towards establishment of a better network. RJio, a leading telco, has been the path breaker towards setting the trend of getting investments from the digital services ecosystem, including hardware industry. As per reports available in the public domain, RIL, Rjio's parent company sold 32.94% (Graphic 2 refers) of the Jio Platforms stake to reduce its debt from the existing Rs. 2.17 lakh crore to Rs. 21,900 crore with an ultimate aim of becoming debt free by March 2021.



Graphic 2: Stake Sale in Rjio Platforms

Source: <https://www.jaaranosh.com/general-knowledge/list-of-top-investors-in-reliance-jo-1594430586-1#:~:text=The%20main%20companies%20that%20invested,TPG%2C%20L%20Catterton%20and%20Qualcomm>

7. The investment into Rjio platforms which is aimed at reducing the debt of the Telco, would ultimately lead to provisioning of better network services. Similarly, even if the VNO's contribute towards expanding the coverage of the network, it would be better for existing TSPs as their capacities shall get utilised.

8. A scenario where the components of the digital services eco-system participate as a partner in contributing Capex for establishment of the network would be a win-win situation for all the stake holders viz,
 - a. The subscribers – would have more options in terms of increased number of service providers providing competitive tariffs.
 - b. The Government – its aim of ensuring adequate competition and a self regulated market would get fulfilled with increased competition.
 - c. The TSPs – Creates a better investment eco-system for expanding their network coverage as well as leads to efficient monetization of their capacities.
9. **Given that the telco network is the blood line for Digital Services, it would be prudent to create an environment that shall spur this vast eco-system of innovative digital services to contribute towards augmenting the coverage of telco network, its capabilities and capacities. Separation of the network layer from the services layer shall facilitate creation of such an investment friendly environment.**

Our Recommendations

- A. *In order to attract investment and strengthen the service delivery segment, Network services layer and Service delivery layer (Services that amalgamate the licensed network services into their services) needs to be separated by introducing specific license for Network Layer alone.*
- B. *With 5G enabling network slicing and SDN, the network has the ability to deliver customised QoE, for the digital services, to the users through the flexibility and agility of the network itself. Therefore, the network too is required to be considered as a service only viz, Network As A Service (NaaS).*
- C. *There is a need for a multiple technologies and cross functional sectoral policy and regulation synergy in the era of modern communication systems.*
- D. *Imposing restrictions / controls only in the telco domain, for securing / controlling digital services, potentially either stifles innovation or results in cost escalation for the service leading to adoption issues.*
- E. *The concept of reselling of telecom services can only be done away with when a clear separation is introduced between the licensed activity of provisioning NaaS and building innovative Digital Services by utilizing NaaS.*
- F. *Realization of the full potential of these future communication systems services would require revisiting the existing licensing and regulatory regimes of the voice centric networks and splitting them into multiple layers to create the environment conducive for enabling innovative digital services.*
- G. *For simplifying the regulatory regime for the network services itself, retain the regulatory freedom for development of innovative services and creating a competitive environment for the basic telecom services there is a need to cascade the earlier evolutionary step of delineating the license from Spectrum to delineating the license from services as well.*
- H. *Since, It's only the network layer that is utilizing the national resource of licensed Spectrum, therefore, only this layer alone should be subjected to licensing and the*

balance of the service delivery eco-system, i.e. who amalgamate the underlying licensed network services as part of their services, should be mandated to get themselves registered for provisioning their services.

- I. Given that the telco network is the blood line for Services Layer eco-system, it would be prudent to create an environment that shall spur this vast eco-system of innovative digital services to contribute towards augmenting the telco network, its capabilities and capacities. Separation of the network layer from the services layer shall facilitate creation of such an investment friendly environment.*

Q2. Should the Network Services Layer licensee be permitted to take the Service Delivery Category licenses and provide the service? If yes, what kind of restrictions and safeguards are required to be built, in order to protect the competition and innovation in service delivery segment? Please justify your answer.

Our Response and Recommendations

Yes, the Network Services Layer licensee should be permitted to get itself registered as for the Service Delivery Category and provide the service.

As a safeguard against any anti-competitive practices by the Network Services Provider, TRAI's Net-Neutrality guidelines for non-discriminatory access to telecom resources should be implemented with due benchmarks for time-lines of provisioning and configuring telecom resources and audits for detecting any wrong doings on part of the entity holding the license for Network services as well as a registered Service delivery entity.

Q3. Whether certain obligations should be imposed on the existing Unified Licensees, and other measures should be taken to encourage UL licensees to provide their network resources to VNO licensees particularly in mobile service segment? Please suggest the measures in detail.

Our Response and Recommendation

Yes, certain obligations, especially in terms of mandatory provisioning of bulk resources without any discrimination, should be imposed on the existing Unified Licensees.

The spectrum NIA conditions, for rollout obligations, can be amended to mandate a lower level of coverage area for the licensee and the balance should be covered through partnerships with bulk connectivity seekers such as VNO / private network users.

Q4. In case network layer and service delivery layer are separated by creating separate category of licenses, as proposed in Q1;

a) What should be the scope for Network layer license and Service Category licenses?

b) Out of various responsibilities and obligations enumerated in Unified License, what should be the respective responsibilities and obligations of Network layer licensees and Service delivery category licensees? Please elaborate with justifications.

Our Response

Firstly, as stated in response to Q No 1, the license should be applicable only for the entity utilizing the national resource of Spectrum viz, the Network Service Provider. The

eco-system of Services delivery layer viz, service providers retailing the basic telecom services with some value add as well as, those who amalgamate the underlying licensed network services as part of their services, should be subjected to a simple registration with DoT.

Secondly, Various responsibilities and obligations enumerated in Unified License should be applicable for Network layer licensees only. In case the discharge of those obligations and responsibilities has a direct dependency on the service providers of the service layer eco-system then the same should be passed on as additional responsibilities as part of registration for the service providers of the service layer eco-system.

1. As proposed in our response to Pre-Consultation paper and described in the current consultation paper as well, the licensing regime should be split into the 3 layers viz, Network Infrastructure Services layer, Network Services layer and Digital Services layer.
2. Such a layered approach would require the following major changes in the existing licensing regime viz,
 - a. Complete separation of the telecom infrastructure from telecom services thereby aligning with modern day technological requirements.
 - b. The network's native services viz, voice, messaging and data to be considered as a product of the Network Infrastructure Services layer.
 - c. Doing away with the concept of re-selling of telecom services. Services layers above the network viz, Network Services Layer and Digital Services Layer, would be selling (Not re-selling but Retailing) the product of the Network Infrastructure Services Layer either as it is or with due value add as part of a bundled service.
 - d. Only the network services layer, which utilizes the national resource of spectrum for provisioning its services, would be provided under a license from DoT. The services would be provided by service providers of the services layer eco-system who are registered with DoT.
 - e. Levying of an administrative fee of 1% of the annual audited revenues of the Network layer Services Provider instead of LF or SUC.
 - f. Only GST to be levied on the services provided by the NSPs or the DSPs.

Scope of Network Layer License

3. This layer would comprise of the physical infrastructure, active and passive elements and cloud-based instances of the network elements that are required to deploy a telecom network. It is proposed that the scope of this layer should be as follows,
 - a. Physical towers.
 - b. RAN.
 - c. OFC / Copper based terrestrial network.
 - d. Submarine Cable Network and the Cable Landing Stations.
 - e. Satellite Uplink and Downlink stations.
 - f. Gateway elements.

- g. Associated spectrum.
- h. Subscription Management.
- i. Bulk sale and Tariff definition of services.

Scope of Registered Service Delivery Layer Eco-System

- 4. The Services Delivery Eco-System would comprise of
 - a. Service Providers who would be associated with selling (Retailing) only the basic network services viz, Voice, Messaging and Data connectivity. They would be permitted to sell these services to retail as well as the corporate (Bulk Usage) customers who requisition the services for their own end usage only.
 - b. Service providers who amalgamate the underlying licensed network services as part of their services or do a substantial value add to the basic network services viz, Voice, Messaging and Data connectivity, before selling it under their own brand name. It is proposed that the scope of this layer should include the M2M / IoT Service Providers and Other Service Providers (OSP).
- 5. It is proposed that the scope of this layer should be as follows,
 - a. Infrastructure Deployment: Services delivery layer eco-system should be permitted to augment the complete network infrastructure of the NISPs, as listed at para 2 above, except the gateway elements for interfacing with other NISPs and spectrum.
 - b. Sale of Services: The Network layer SPs would have a B2B contractual arrangement with the Service Delivery eco-system and should be at liberty to sell these services to retail / corporate customers. Selling of these services shall not be construed as resale of the Network layer Services, albeit it should be viewed as a separate layer that is selling the product of the Network Layer. Additionally, the digital services would be selling the services of the network layer as a component of their bundled digital services.
 - c. Tariff Definition: The Services delivery layer eco-system should be mandated to define the tariff of its services as per TRAI's tariff regulations.
 - d. Subscription Management: The services delivery eco-system too can be entrusted with subscription management in terms of hosting the SMDP – SMSR infrastructure.

Our Recommendations

- A. *The license should be applicable only for the entity utilizing the national resource of Spectrum viz, the Network Service Provider. The eco-system of Services delivery layer, viz, service providers retailing the basic telecom services with some value add as well as, those who amalgamate the underlying licensed network services as part of their services, should be subjected to a simple registration with DoT.*
- B. *Voice, Messaging and Data services should be considered as the product of the Network layer which would be sold (Not Re-Sold), on a non-discriminatory basis, only through DoT registered eco-system of Services delivery layer, i.e. service providers who amalgamate the underlying licensed network services as part of their services and sell it under their own brand name.*

- C. *The scope of Network layer should comprise of the physical infrastructure, active and passive elements and cloud-based instances of the network elements that are required to deploy a telecom network.*
- D. *The scope of service delivery layer eco-system should comprise of infrastructure deployment for augmenting the infrastructure of the licensed network, sale of services, tariff definitions, subscription management.*
- E. *Various responsibilities and obligations enumerated in Unified License should be applicable for Network layer licensees only. In case the discharge of those obligations and responsibilities has a direct dependency on the service providers of the service layer eco-system then the same should be passed on as additional responsibilities as part of registration for the service providers of the service layer eco-system.*

c) What mechanism should be put in place to regulate the access to network services of Network layer licensees by the service delivery Category licensees? Whether certain obligations should be imposed on Network layer licensees to provide the network resources in a time-bound, transparent and non-discriminatory manner?

Our Response and Recommendation

Yes, certain mandatory obligations should be imposed on Network layer licensees to provide the network resources in a time-bound, transparent and non-discriminatory manner to the digital services providers in conformity of TRAI's Net-Neutrality regulations. There is a need to strengthen these Net-Neutrality regulations, that mandate provisioning of access services on a non-discriminatory basis, by defining benchmarks for time bound provisioning and configuration of telecom resources by the Network Services Licensees post their requisitioning by the Services Delivery eco-system services providers.

d) What incentives (for example, lower license fee, lower SUC, etc.) could be provided to Network Layer licensees in the new unbundled licensing regime to encourage the investment in the Network layer? Please justify your answer.

Our Response & Recommendation

India has adopted newer taxation regimes for simplifying the business environment. A similar approach should be adopted for the telecom sector as well wherein all existing levies viz, LF and SUC should be replaced by a simple administrative Fee of 1% of the audited financial results of the TSP that can be charged annually in addition to the GST that is levied on the sale of services.

e) Whether the existing Unified Licensees should be mandated to migrate to the unbundled licensing regime, or the new regime should be introduced, while keeping the existing regime continued for existing licensees till the validity of their license, with an option of migration?

Yes, the existing Unified Licensees should be mandated to immediately migrate to the unbundled licensing regime to achieve separation of the network from the services.

f) Whether existing VNO licensees be mandated to migrate to service delivery category licenses as per unbundled licensing regime?

Yes, the existing VNO licensees should be mandated to immediately migrate to service delivery category registration and not licenses as per unbundled licensing regime.

g) Whether service delivery category licensees be permitted to parent with multiple Network Service layer licensees? Please justify your answer.

Yes, the service delivery category licensees should be permitted to parent with multiple Network Service layer licensees.

1. By entering into a contract with a VNO, the TSP is exercising its right to sell its licensed services through a third party that specializes in selling services / goods or anything.
2. With availability of just 4 TSPs in Indian market, the competitive options for services, especially differentiated services, have dwindled for the Indian consumer. Similar to a DTH operator who sells the content provided by various telecasting channels, a VNO should be permitted to source his services (Telecom services – 2G, 3G, 4G, et al) from multiple TSPs and sell them under his own brand name. This kind of an arrangement shall enable combination of the best services under a single brand and provide the flexibility of 'pick and choose' of services as per the consumer's requirement instead of the compulsory subscription of services from a single Network Service layer licensee only.

Our Recommendation

A VNO should be permitted to be parented by more than one Network Service layer licensee as it shall provide the requisite flexibility to a VNO for sourcing the best of services from multiple Network Service layer licensees and is considered a necessity for the success of the VNO model.

Q5. Any other issue related to the subject may be raised with suitable explanation and justification.

Our Response

1. **Virtual Cloud Instances as part of the physical network.** Deployment of the telecom network is a capex heavy investment. The introduction of technologies such as Network Function Virtualization (NFV) and Software Defined Network (SDN) have enabled optimization of this capex investment. Both NFV and SDN allow leveraging the cloud services for building the physical network infrastructure. These technologies permit outsourcing various network infrastructure functions to the clouds and would be provided as a specialized instance by a single cloud to multiple networks. With the impetus being given to adoption of cloud computing, the licensing of the telecom networks too needs to evolve and permit virtual cloud instances, of various network elements, to be considered as a physical part of the network itself.
2. **Bottleneck Service.** Network Infrastructure services viz, voice, messaging and data volumes are required to be classified as 'Bottleneck Services' and bulk provisioning and configuring of the same under a B2B agreement, for provisioning digital services, should be mandated with reasonable base commercial terms. To realize the aim of Digital India,

this is important for the development of innovative digital services, especially for M2M / IoT / Smart City kind of applications.

Our Recommendations

- A. *With the impetus being given to adoption of cloud computing, the licensing of the telecom networks too needs to evolve and permit virtual cloud instances, of various network elements, to be considered as a physical part of the network itself.*
- B. *Network Infrastructure services viz, voice, messaging and data volumes are required to be classified as 'Bottleneck Services' and bulk provisioning and configuring of the same under a B2B agreement, for provisioning digital services, should be mandated with reasonable ceiling of the commercial terms.*