



Telecom Regulatory Authority of India



Recommendations

on

‘Introducing Virtual Network Operators in telecom sector’

New Delhi, 1st May, 2015

Mahanagar Doorsanchar Bhawan

Jawahar Lal Nehru Marg

New Delhi-110002

CONTENTS

TITLE		PAGE NO.
CHAPTER -I	INTRODUCTION	1
CHAPTER -II	DOES THE INDIAN TELECOM SECTOR REQUIRE VNOs?	5
CHAPTER -III	VNO: INFRASTRUCTURE AND SERVICES	14
CHAPTER -IV	LICENSING PROVISIONS FOR VNOs	25
CHAPTER -V	TERMS AND CONDITIONS FOR UL(VNO) LICENSE	32
CHAPTER -VI	REGULATORY COMPLIANCE BY VNOs	50
CHAPTER -VII	SUMMARY OF RECOMMENDATIONS	61
ANNEXURE		68
ABBREVIATIONS USED		70

CHAPTER I: INTRODUCTION

- 1.1 The advent of modern Information and Communication Technologies (ICT), has led to a paradigm shift in the communication and broadcasting industries. It has radically transformed the way people communicate using traditional telecom pipes as a medium. Mobile data, content and applications (apps) are proving to be game changers for both industry and society at large. Social media, hand-held smart devices, cloud computing and big data are major enablers. They have opened up new dimensions of social communication, new economic opportunities, and new business models. The convergence in technologies has also led to convergence in licensing so that various services can be delivered under single license.
- 1.2 India has so far been able to keep pace with the rapid evolution of telecom technologies and resultant services in the country by adopting suitable telecom policies from time to time. So far three national telecom policies have been enunciated by the Government, starting with the National Telecom Policy (NTP)-1994 followed by NTP-1999 and the recent NTP-2012. NTP-2012 was issued with a vision to transform the country into an empowered and inclusive knowledge-based society, using telecom as a platform. One of the objectives of NTP-2012 is to deliver high-quality seamless voice, data, multimedia and broadcasting services on converged networks for enhanced service delivery to provide a superior experience to users.
- 1.3 One of the strategies envisaged in the NTP-2012 is to move towards a Unified License (UL) regime to exploit the benefits of convergence, spectrum liberalisation and facilitate delinking of the licensing of networks from the delivery of services so as to enable the Telecom Service Providers (TSPs) to optimally and efficiently utilise their networks and spectrum by sharing active and passive infrastructure. Another strategy is to facilitate resale at the service level, both wholesale and retail, for example, by introduction of virtual operators – in tune with the need for promoting robust competition

while ensuring due compliance with security and other license-related obligations. NTP-2012 also aims to achieve rural tele-density of 100% by the year 2020.

- 1.4 Over the last two decades, the licensing regime for access services also underwent periodic transformations to accommodate technological evolution and changing market requirements. The evolution of the licensing framework starting from the separate licensing framework for various services to the UL regime in 2013 has been described in the Consultation Paper on the subject. The new UL regime has been brought in with the objective of providing a single license for all types of telecom services. In this regime spectrum allocation has been delinked from the License. Further it has been mandated to obtain a UL for any one or more services and for one or more licensed service areas (LSAs).
- 1.5 While introducing the UL regime (in its first phase), the Department of Telecommunications (DoT) decided that this regime may be introduced over two phases with the delinking of licensing for networks from the delivery of services be taken up in a second phase. In this backdrop, the DoT on 7th July 2014 sent a reference to the Authority seeking its recommendations for delinking of licenses for networks from the delivery of services by way of Virtual Network Operators (VNOs) including associated issues of definition of Adjusted Gross Revenue(AGR) under the UL regime (**Annexure-I**).
- 1.6 In order to have detailed deliberations on the matter, the Authority issued a Pre-Consultation Paper (PCP) on 3rd September 2014. After carefully considering the inputs received from various stakeholders, the Authority on 05th Dec 2014 issued a Consultation Paper (CP) titled 'Delinking of the license for networks from delivery of services by way of Virtual Network Operators'. On the requests of various stakeholders, the last date of the comments and counter comments was extended to 15th January 2015 and 22nd January 2015 respectively.

- 1.7 The CP elicited varied and detailed responses from stakeholders. A total of 26 comments and 2 counter-comments were received from stakeholders and then were placed on the TRAI website. An Open House Discussion (OHD) with stakeholders was organised on 31st January, 2015. Stakeholders were given time up to 6th February to submit comments on any other related issue of the CP. In response, 5 more comments were received.
- 1.8 After considering the comments of the stakeholders and its own analysis, the Authority has finalized these recommendations. The issue of the AGR was taken up separately by the Authority in another CP on AGR and the recommendations on this have been sent to the DoT on 6th January, 2015. Accordingly, the issue of definition of AGR has not been covered in these recommendations.
- 1.9 The present reference from the DoT has the potential to change the entire licensing framework in India. However, the Authority is acutely conscious that the telecom sector is highly capital intensive and pay-offs are realized over a long period of time; hence, it is necessary that regulatory policies are predictable and stable. Therefore, while formulating these recommendations, the Authority has taken a pragmatic view and adopted a futuristic approach, keeping in mind various Government policies and programs, and without introducing any major or disruptive changes to the existing licensing regime for the TSPs.
- 1.10 In the CP, a complete chapter was dedicated to the prevailing licensing regimes the world over, which are facilitating one or more types of VNOs. Therefore, in these recommendations international practices have not been given separately.
- 1.11 As discussed in the CP, VNOs are called differently in different regions/countries across the world; in Saudi Arabia they are called Service Based Provider (SBP) while in Singapore they are known as Services-Based

Operator (SBO). Similarly Network Operators are called Facility Based Operator (FBOs), Facility Based Providers (FBP), Network Services Operators (NSO) etc. These all have similar meanings. Therefore for the purpose of these recommendations Mobile Network Operators (MNOs), FBOs, FBPs and other network providers are denoted as Network Services Operators(NSO), while Service Delivery Operators, SBPs, SBOs etc. have been denoted as VNOs.

- 1.12 The recommendations comprise seven chapters. Chapter-II discusses the reasons for introduction of VNOs in the telecom sector. Chapter-III covers the issues of infrastructure and services offered by VNOs. Chapter-IV elucidates the licensing provisions for VNOs. In Chapter-V terms and conditions for the proposed UL (VNO) are provided. In Chapter-VI regulatory compliance by VNOs has been discussed. Chapter-VII lists a summary of the recommendations.

CHAPTER II: DOES THE INDIAN TELECOM SECTOR REQUIRE VNOs?

- 2.1 Telecommunication is globally recognised as one of the basic infrastructure required today for economic growth and modernisation of various sectors of a country. It is therefore imperative that telecom services are made available to all sections of society at affordable rates. Multiple service providers can play an important role in reducing the price of services and aid in penetration of services across service areas, particularly those areas which hitherto remained underserved or unconnected. This is especially important in the context of penetration and adoption of broadband services. Wide penetration of broadband services is essential to achieve goals of social inclusion.
- 2.2 In India most of the access service licensees are integrated TSPs providing access, long distance and internet/broadband services. They provide services either by using their own infrastructure or by sharing infrastructure of other TSPs. In the wire-line segment, apart from the presence of a few private players in some pockets/areas of the country, the market is mainly dominated by Public Sector Units (PSUs) viz. BSNL and MTNL. In the wireless segment there are 7-13 access service licensees in various service areas. In the Internet Service Provider (ISP) market, though there are 443 licensees (including 118 TSPs authorised under UL), the market is dominated by the top 10 ISPs who are having a market share of 98% (as of December, 2014). In the National Long Distance (NLD) segment, out of 37 licensees only 13 licensees are in voice segment. In the International Long Distance (ILD) segment there are 29 licensees (including 5 authorised under UL). In the Very Small Aperture Terminal (VSAT) segment, there are 11 licensees of which 10 are providing services.
- 2.3 Despite the presence of so many TSPs there is still a wide digital divide between urban and rural India. As per February, 2015 figures urban tele-

density has reached about 149% while rural tele-density is lagging at around 47%. Against a target of achieving 175 million broadband connections by 2017, only 85.74 million connections (Dec, 14) have been achieved and that too with the current broadband speed (download) definition of 512 kbps.

- 2.4 The above statistics point to the fact that there is enough competition in all the segments of telecom sector. Accordingly, in the CP, issues were raised whether there is any need to introduce more competition in service delivery by the way of introduction of VNOs in the sector and whether it is the right time to introduce VNOs? Views were also sought whether VNOs can be a solution to achieve targets defined in NTP-2012 for 100% rural tele-density by the year 2020 and whether VNOs will pose a threat to NSOs.
- 2.5 In response, stakeholders had divergent opinions. Even within the TSPs there were contradicting views. Many stakeholders including some TSPs, who favored introduction of VNOs in the sector, have opined that introduction of VNO will lead to faster penetration of telecom services besides encouraging lower rates and introduction of new & innovative services including machine-to-machine (M2M) communication services. In their opinion, there are many un-served and under-served areas where basic telecom connectivity, internet and broadband services need to be provided. Further, current level of competition in Indian telecom market may get reduced due to possible merger/acquisition (M&A) among NSOs. Therefore, introduction of VNOs will ensure to maintain the level of competition for the benefit of end customers. According to them, the mature Indian telecom market is ripe for entry of VNOs for providing differentiated, value added and customized services for which competition is practically non-existent. In their opinion, VNOs are likely to invest in less competitive areas (like 'C' class towns / villages) where NSOs have not ventured. This will increase the rural tele-density and broadband penetration in such areas. Once the basic infrastructure using OFC is put

in place through National Optical Fibre Network (NOFN) project, introduction of VNO may help in quick and efficient utilization of the OFC network. Also, VNOs may have ability to sell the services of existing NSO(s) which is beyond their marketing reach. Therefore, VNOs can be an important stakeholder to achieve targets defined in NTP-2012.

- 2.6 On the contrary, some stakeholders expressed views that Indian telecom market is extremely competitive and fragmented. In such a scenario, introduction of VNOs/MVNOs will not only lead to further disruption of the market structure but will also adversely affect the financial health of the industry. Further, VNOs will not provide any additional benefits such as new services or more affordable tariffs to customers in a sustainable manner. Additionally, investment disincentives created as a result of VNOs entry will hamper the growth of network infrastructure which is critical for achieving national goals. As a result, the existing infrastructure will become inadequate and hence will lead to customer service issues and poor networks. This would have a direct negative impact on consumers and, in turn, on the overall economy of the country. They have argued that VNOs cannot be a solution to achieve targets defined in NTP-2012 for rural tele-density as the proliferation of the infrastructure in the rural areas would be done by the NSOs. To achieve 100% rural wireless tele-density by the year 2020, the sector requires incremental Capex of Rs. 80,000-90,000 crore; hence, there would not be any business case for VNOs. As per these stakeholders, in India most of the TSPs follow the Opex model, where capacity is scaled up dynamically based on demand. Therefore, it is very unlikely that there are large unutilized capacities available with the TSPs. Since VNOs' very existence require sufficient leasable infrastructure, until there is significant surplus infrastructure set up by existing TSPs there is no rationale for introduction of VNOs. Stakeholders argued that the question of a wide digital divide between urban and rural area will be addressed not by introduction of VNOs but by proliferation of

infrastructure in rural/remote areas by the existing TSPs.

- 2.7 On the issue of whether VNOs would pose a threat to NSOs or would they complement their operations, there were divergent views. One set of stakeholders opined that VNOs will complement the operations of NSOs by increasing their revenue and will also offer more choices to the customers. Another set of stakeholders opined that VNOs will not complement the operations of NSOs because existing NSOs offer numerous plans for different segments viz student, friends & families etc for different services. As VNOs are known to adopt cream-skimming approach for quick returns through price erosions, these NSOs will have reduced incentives to further invest in the telecom sector in case VNOs are introduced.
- 2.8 Some stakeholders have suggested that measures like active infrastructure sharing, spectrum trading and sharing, harmonization of existing spectrum allocations, quick Right of Way (ROW) approvals and facilitating Mergers and Acquisition (M&A) policy will help in efficient utilisation of available resources.

Analysis

- 2.9 The Authority has carefully examined the comments of the stakeholders. As mentioned earlier, one of the strategies envisaged in the NTP-2012 is to move towards a Unified Licence (UL) regime to exploit the benefits of convergence, spectrum liberalisation and facilitate delinking of the licensing of networks from the delivery of services so as to enable the Telecom Service Providers (TSPs) to optimally and efficiently utilise their networks and spectrum by sharing active and passive infrastructure. Another strategy is to facilitate resale at the service level, both wholesale and retail, for example, by introduction of virtual operators.
- 2.10 In the present licensing regime, there are no separate licences for network and services. Both are combined in the same licence and resale of services

is not permitted except in case of IPLC services. The issue which needs to be decided first is whether there is a requirement of delinking the two at this juncture. Today, we are in the convergence era where the same network is capable of providing various services and where the application or services are independent of the underlying network layer, i.e. it is possible for one entity or operator to own the network and for another to independently provide a service to consumers using the network. There can be a number of small entrepreneurs (VNOs), who desire to provide a service to a niche consumer group but do not have either the resources or expertise to build and operate a telecommunication network. In the present licensing framework, they simply cannot do so.

2.11 There are several areas where VNOs can be useful in service provisioning. They can provide localized services in small towns and rural areas using the networks of existing NSOs or by laying last mile connectivity. The VNO model of service delivery can also be effective in structurally defined geographic areas like airports or smart cities. In such well defined geographical areas, since the planning and development of the projects takes time, it is not economically feasible or practical for TSPs to lay the last mile infrastructure. The developers themselves have to plan and lay the telecom infrastructure in the form of Optical fiber cables (OFC), ducts, towers etc. Therefore, the developer can become a VNO and extend telecom services to residents/users of such entities. In upcoming green-field smart cities like GIFT, Dholera, Dahej, the city services providers can set up their own infrastructure at the development stage and take a VNO license to provide broadband and other telecom services to their residents inside the smart cities.

2.12 There can be several organizations that want to make their controlling areas/premises Wi-Fi enabled. For example, cities like Delhi are aiming to become a fully Wi-Fi enabled city to provide broadband services to its citizens so that various e-Governance services are available on their mobile

devices. Similarly, the Indian Railways is aiming to make railway stations Wi-Fi enabled for the benefits of its passengers. In the present setup they need to rely exclusively on existing NSOs for provisioning of such services in the controlling area/boundaries. If they are allowed to become VNOs within their boundaries, they can provide such services according to the needs of the customers and can design innovative tariff plans to suit customers' needs. However, for connecting to the external world they still need the infrastructure of the existing TSPs.

2.13 In the broadcasting sector, there is significant penetration of Hybrid Fiber Coaxial (HFC) cable network laid by Local Cable Operators (LCOs) and Multi-Service Operators (MSOs) in India. These HFC cables remain under-utilised as the available video content occupies only a portion of the network. This HFC infrastructure holds out huge potential for deployment of broadband and wireline/landline telecom services. According to an industry estimate, the last mile local loop that cable operators have at their disposal reaches into over 10 crore homes and the High Frequency Cable(HFC) Network created over the past two decades by numerous LCOs runs over lakhs of Kilometers. If this infrastructure can be exploited by VNOs with appropriate up-gradation of networks, it can enhance the broadband penetration in these un-served and under-served parts of the nation.

2.14 Internationally, VNOs have focused mainly for provisioning of mobile access services; and are known as Mobile Virtual Network Operators (MVNOs); however, there are other services also where VNOs can be useful to increase their penetration. For example, VSAT operators like Telestra Global (Australia), Orbit Research (UK) and VSAT Systems (USA) are providing satellite based VSAT services by leasing hub space to VNOs in some of the countries. The VNO needs to purchase only a line card to establish a High Throughput Satellite (HTS) service and has full control of its own network and end users. This is an attractive model for VNOs for

getting quick access to the HTS market at low investment and expansion of their network based on demand.

- 2.15 The Government is executing a project for the creation of 'Broadband Highways' by laying Optical Fibre Cable (OFC) to connect 2,50,000 'Gram Panchayats' and to provide 100 Mbps connectivity to each of them. This backbone infrastructure will be open access and can be utilised/hired by anyone, after paying the charges, for providing broadband to the end consumers. It is expected that the private TSPs will use it as a backbone to provide broadband to the villagers. However, it will be primarily for the mobile voice and broadband services, as fixed broadband requires laying of last mile, Customer Premises Equipment (CPE) at affordable rates and local manpower for periodic maintenance. A local entrepreneur with small investment can use this opportunity for providing various services to a number of villages in few blocks or District by becoming a VNO.
- 2.16 In addition, under the 'Digital India' program the Government has identified three key areas viz. 'Digital Infrastructure as a Utility to Every Citizen', 'Governance & Services on Demand' and 'Digital Empowerment of Citizens'. It aims to create infrastructure including public wi-fi hotspots for citizens and wi-fi in 2.5 lakh schools and all universities. This program envisages VNOs for service delivery and mandate communication infrastructure in new urban development and buildings.
- 2.17 With the increasing deployment of Smart Grids, Smart Transportation, Smart Cars, Smart consumable durables, Machine-to-Machine (M2M) communication and Internet of Things (IoT) converged technologies are coming to occupy centre stage in peoples' lives. This will require that the machines or the equipment is embedded with a device at the manufacturing stage itself which has the capability of communicating with either other devices or a central controller through wireless or on IP platform. The present licensing framework does not have adequate provisions to facilitate these new developments. With the introduction of

VNOs, a system integrator for such a network can acquire a VNO licence and get into an agreement with a TSP for such services.

- 2.18 Another area where the introduction of a VNO is required is re-selling of services except in case of IPLC. The Authority recently issued Regulations for issue of Calling Cards by an ILDO for International calls. In case resale is permitted through a VNO, there is a strong possibility that some small entrepreneurs may start providing national/international calling cards by buying voice minutes in bulk from the NLDOs/ILDOs selling them to a niche group of consumers.
- 2.19 In response to the CP, many NSOs, particularly BSNL & MTNL have submitted that they have infrastructure and spare capacities available with them and are willing to share the same. In order to increase the penetration of broadband and to reduce the gap between urban and rural tele-density, one solution could be to facilitate enabling provisions to bring in some operators in the service delivery segment as VNOs. They can provide various telecom services using either the infrastructure laid by the existing NSOs (if the same is available) or by laying a part of infrastructure by themselves. Such an arrangement will also help the existing NSOs to optimally and efficiently utilise their networks including spectrum by sharing active and passive infrastructure and optimize the returns on their investments.
- 2.20 The Authority also recognizes the fact that there are 7 to 13 TSPs in various service areas. Hence mandating TSPs/NSOs to provide access to VNOs can adversely affect some NSOs in certain sectors. The Authority is of the opinion that it's best left to the market forces to determine the optimum business model with regards to VNOs and the congruence of interests of the NSOs and VNOs should be determined by stakeholders through mutual agreement. However, the present licensing framework does not recognize the VNO as an entity. Hence there is a need to make an enabling provision for the introduction of VNO which can provide telecom services based on

mutual agreement with the NSO. VNOs should be seen as a facilitator of services by being a natural extension of the NSO and not as its competitor.

2.21 Accordingly, **the Authority recommends that:**

- (a) VNOs be introduced through a proper “licensing framework” in the Indian telecom sector.**
- (b) VNOs that enter the network would do so based on arriving at a mutual agreement between an NSO and a VNO.**

CHAPTER III: VNO: INFRASTRUCTURE AND SERVICES

- 3.1 Having decided that VNOs ought to be permitted in the Indian telecom market, the next question is: (i) what should be the scope of VNOs in terms of the services that can be offered by VNOs (ii) infrastructure it can share with NSOs (iii) part of the infrastructure it can lay to facilitate service provisioning to its customers. This chapter deliberates these issues.

A. Services to be offered by VNOs

- 3.2 On 19th August, 2013, the DoT issued guidelines for the grant of an UL. In the new licensing framework, spectrum allocation has been delinked from the License and it has been mandated to obtain an UL for any one or more of the services listed below:

- a. Unified License (All Services)
- b. Access Service (Service Area-wise)
- c. Internet Service (Category-A with All India jurisdiction)
- d. Internet Service (Category-B with jurisdiction in a Service Area)
- e. Internet Service (Category-C with jurisdiction in a Secondary Switching Area)
- f. National Long Distance (NLD) Service
- g. International Long Distance (ILD) Service
- h. Global Mobile Personal Communication by Satellite (GMPCS) Service
- i. Public Mobile Radio Trunking Service (PMRTS)Service
- j. Very Small Aperture Terminal (VSAT) Closed User Group (CUG) Service
- k. INSAT MSS-Reporting (MSS-R) Service.
- l. Resale of International Private Leased Circuit (IPLC) Service

- 3.3 The Authority in its recommendations of 2008 and 2011 has recommended introduction of Mobile VNO (MVNO) in the sector. Four years have already passed since then and many technological developments have taken place in this time. Accordingly, in the CP a question was raised whether the Indian telecom market was ready for the introduction of VNOs in all segments of Voice, Data and Video, including those in V-SAT, PMRTS/CMRTS, GMPCS services, and whether any business case/revenue potential existed for these services?
- 3.4 In response, stakeholders who favour the introduction of VNOs have opined that the regulatory framework should not identify or dwell on whether there is a supporting business case for VNOs to provide service. Instead, VNOs should be allowed to provide services, based on their business judgment, wherever it is profitable to do so in the light of available market opportunities. These stakeholders have argued that, in an era of convergence; voice, video and data cannot be seen as separate avenues from both technological and economic perspectives. Combining these services will make a stronger business case for introduction of VNOs. One stakeholder opined that since technologies are breaking barriers, the inability to reach all screens/devices will weaken the business case for limited service capability networks; therefore, there is a case to universalize VNO introduction.
- 3.5 Some stakeholders who are opposed to the idea of VNOs in the sector opined that that there is no stand-alone business case for the VNOs in all segments because of the absence of any clear benefits that can be achieved. Because of this, NSOs would be forced to match their (VNOs) offerings. And, as witnessed in the past, when the large players with relatively higher fixed costs matched the tariffs/products offered by small operators to the cost of the entire industry; such frenzied competition leads to irrational and unsustainable tariff wars; it has reduced the profitability of all NSOs and left them with little to reinvest in network expansion and upgrades.

Therefore, in their view, there is no need or justification for the introduction of VNOs in all or some of the services notified in the UL till favorable market conditions are in place. However, in case a VNO is to be introduced they ought to be required to take an UL with necessary authorizations.

- 3.6 A few stakeholders have opined that VNOs need to be introduced for internet services as well as for GMPCS services. They have submitted that in case of internet services, introduction of VNO would lead to entry of district based ISPs who can provide internet services using infrastructure of NSOs. They have further submitted that in respect of GMPCS services, only one operator is planning to provide GMPCS infrastructure with the Government's financial support and there is a case for introduction of VNOs in this space to improve the competitiveness.

Analysis

- 3.7 As mentioned in the previous chapter that internationally, VNOs have focused mainly for provisioning of mobile access services; and are known as Mobile Virtual Network Operators (MVNOs). There are many types of MVNOs, which can be classified based on the degree of dependency on NSOs like (a) full MVNO who used their own brand infrastructure and SIM cards, (b) enhanced service provider (ESP) MVNOs who have their own service platform and telecommunication facilities but do not own SIM cards (c) Service Provider MVNO who can provide mobile services by purchasing capacity from NSOs but do not own their own telecommunication line equipment and SIM cards.
- 3.8 However, in the converging digital environment, where the boundaries between voice, data and video are blurring, it would be unnecessarily restrictive to confine the services of VNOs to any particular service segment. Since at this point of time only enabling and facilitating provisions are being envisaged for the entry of VNOs and the arrangement

between VNOs and NSOs is being left to mutual commercial considerations, the Authority is of the opinion that all types of VNOs should be permitted for all segments of voice, data and video and all services notified in the UL.

- 3.9 In view of above, **the Authority recommends that VNOs should be permitted for all services notified in the UL.**

B. Sharing of Infrastructure between NSO and VNO

- 3.10 In the initial phase of mobile telecom roll-out in the country, the Government consciously decided that all NSOs would have their own network for providing services to their customers. The main reason for this policy decision was to ensure deployment of multiple telecom infrastructure and networks in as wide geographical area of the nation as possible. In March 2006, to encourage tower sharing amongst TSPs, the Government initiated a project 'Mobile Operator Shared Tower (MOST)'. CMTS/UAS Licensees were permitted sharing of "passive" infrastructure viz., building, tower, dark fiber etc. Today, existing TSPs are sharing passive infrastructure which has helped in reducing costs of operations and increase resource-use efficiency.
- 3.11 In April 2008, for optimum utilization of the available resources and to reduce the cost of providing services, the Government issued 'Guidelines on Infrastructure sharing among the Service Providers and Infrastructure Providers'. As per these guidelines, TSPs were permitted to share active infrastructure limited to antenna, feeder cable, Node-B, Radio Access Network (RAN) and transmission system only (no spectrum sharing was permitted). However, these guidelines never became operative for want of an amendment in the license conditions.
- 3.12 In a VNO type model, the role of the NSO is vested with the existing TSPs. Infrastructure which can be used by VNOs ranges from active and passive infrastructure, including access spectrum, available with the TSPs. The

primary requirement for a VNO is that the existing setup must have enough infrastructure to be made available to the VNOs. Keeping the possibility of sharable infrastructure in mind, an issue was raised in the CP as to whether there was sufficient infrastructure (active and passive including access spectrum) available with a TSP to meet its own requirements as also for sharing it with VNOs. Further, 'if sharable infrastructure is available with a TSP' comments were sought on what should be the broad terms and conditions for sharing this infrastructure.

- 3.13 In response, some stakeholders stated that spare capacities are available in the market for the introduction of VNOs. They were of the opinion that the matter relating to availability of infrastructure for sharing is best left to the NSO and VNO to decide on mutually agreed commercial terms. They have argued that, by sharing infrastructure, existing NSOs stand to benefit as they get an additional revenue stream and a higher Return on Investment (RoI). With the growing demand for bandwidth for all services, NSOs are continuously increasing their capacities and VNOs can help their cause by utilizing surplus capacities of NSOs.
- 3.14 On the other hand, some stakeholders stated that in India, the average spectrum holding per operator is around 13.8 MHz, which is perhaps the lowest in the world. With such low spectrum holdings, it will be very difficult for Indian mobile operators to spare spectrum for any VNOs/MVNOs as their first priority is to meet their own ever increasing requirements. While small NSOs may hold some spare capacity, they do not have sufficient coverage and equivalent Quality of Services (QoS) standards. Further, any spare capacity, if at all it exists, is likely to be only in the rural areas, where the case for introduction of a VNO is not likely to be very attractive.
- 3.15 On the issue of the terms and conditions for sharing of infrastructure, the majority of stakeholders have suggested that the arrangements between VNOs and NSOs should be settled on purely commercial terms and there is

no need for regulatory intervention in these arrangements. Also, the licensing and regulatory framework should allow complete sharing of active and passive infrastructure in all respects across all categories of licenses.

Analysis

- 3.16 An examination of the responses given by the TSPs who are opposed to the introduction of VNOs reveals that the comments of these TSPs are basically premised on the assumption that VNOs will be providing mobile access services only and they will be competing with the NSOs for the same service in the same geographical area. However, as discussed earlier (Chapter 2), there are a number of other services which a VNO can provide to the end-consumer without being a competitor to its NSO. Moreover, even in respect of access services, some TSPs have responded that they have spare capacity which they can gainfully employ for increasing revenue. A VNO with a strong marketing network and brand value can utilize such spare capacity and sell services under its brand. Similarly, in the broadband sector, with the availability of additional capacity likely to be created through the NOFN project, there seem to be immense opportunities for an entrepreneur to provide niche services. In other sectors such as V-SAT, PMRTS/CMRTS, GMPCS services, VNOs can utilize available infrastructure, based on market conditions and on a mutually agreed basis with the NSO. With regard to the extent of regulatory intervention on the agreement between a NSO and the VNO, the Authority has already taken the view that it is for the NSOs and VNOs to come to an agreement on mutually agreed commercial terms and the Authority would not like to intervene except in cases of unfair market practices.
- 3.17 In view of the foregoing, the **Authority recommends that the terms and conditions of sharing of infrastructure between the NSO and VNO**

should be left to the market i.e. on the basis of mutually accepted terms and conditions between the NSO and the VNO.

C. Creation of infrastructure by VNOs

- 3.18 There may be some areas where the NSO may not have laid its infrastructure even though it may have spectrum. In such a scenario it may be beneficial for the NSO that the VNO provides the network in those areas so that both earn revenues from the new area(s). Similar arrangements are permitted in many countries, where an MVNO may enter into a commercial agreement with the NSO to access its spectrum via the NSO's radio access network. It may itself provide other requirements such as Core network (switching points, packet gateways, internet access point), Home Location Register (HLR), client management activities, and SIM cards. In its recommendation on MVNO, in 2011, the Authority recommended permitting MVNOs to set up their own infrastructure including MSC, Radio Access Network (RAN)/Base Station Subsystem etc. Therefore, in the CP, the Authority sought stakeholders' view on whether VNOs should be allowed to create their own infrastructure to reach out to niche markets and the extent to which they should be allowed to do so.
- 3.19 In response, some stakeholders have suggested that a VNO should be allowed to lay infrastructure to service areas where the NSO does not have a reach or does not want to invest; should be in compliance with security concerns in order to facilitate connectivity and penetration. They state that this will enhance competition, lead to expansion of services and improvement of QoS. Also, the cost sharing model with NSOs to lay additional infrastructure should be encouraged on mutually negotiated commercial terms. Some stakeholders have stated that VNOs may be allowed to create their own service delivery platforms in respect of customer service, billing and VAS, to reach out to niche markets. However, the ownership of core network and spectrum should remain with the NSO.

3.20 On the other hand, some stakeholders have argued that VNOs should not be allowed to create their own infrastructure. According to them, permitting the same would lead to extreme fragmentation of the licensing regime which is against the principle of one nation one license enunciated under NTP-2012 as also, this may lead to enormous complexities in regulation, monitoring and enforcement.

Analysis

3.21 In a vast country like India, there are several areas where NSOs are yet to provide last mile connectivity for want of a viable business case. VNOs can facilitate connectivity in such unserved areas using access spectrum of the NSOs. The VNOs may bring innovative business models in providing last mile connectivity through a technology-neutral platform. Therefore, the Authority is of the view that the VNOs should be viewed as an extension of the NSO for service delivery and should be permitted to set up their own network equipments viz. BTS, BSC, MSC, RSU, DSLAMs, LAN¹ switches, where there is no requirement of interconnection with other NSO(s). However, they should not be allowed to own/install equipment viz. GMSCs, Soft-switches, TAX where there is a requirement of interconnection with another NSO. Equipment owned/installed by VNOs should conform to prescribed technical standards of standardisation bodies like Telecom Engineering Centre (TEC) and International Telecommunications Union (ITU). VNOs may also be allowed to create their own service delivery platforms with regard to customer service, billing and Value Added Services (VAS), in order to enable them to reach out to niche markets. However, the ownership of the core network and spectrum shall continue with the NSO. The conceptual diagram of an overall NSO infrastructure and

¹ BTS—Base Tran Receiver; BSC—Base Station Controller; MSC-Mobile Switching Centre; DSLAM- Digital Subscriber Line Access Multiplexer; TAX- Trunk Automatic Exchange; LAN-Local Area Network

infrastructure allowed to be created by a VNO is shown in **Figure 3.1** below.

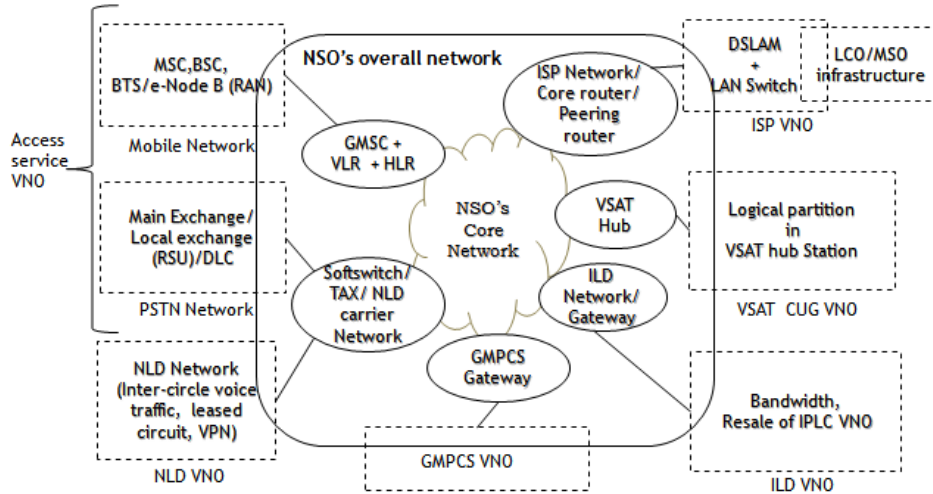


Figure 3.1: Conceptual diagram of NSO-VNO infrastructure

3.22 For provisioning broadband services using networks of existing NSOs and cable operators, VNOs should be permitted to lay infrastructure, if required, to prevent delay in provision of services. For VSAT services also, VNOs may require to install line cards and other associated infrastructure to ensure backward connectivity with the VSAT licensee. VNOs shall also require servers for billing, customer service and ensuring customer relationship. However, since VNOs are being treated as an extension of the NSOs, they will not be allowed to have equipments that require interconnection with another NSO. Further, it needs to be ensured that all equipment installed by VNOs is compliant with technical standards prescribed by standardization bodies like TEC and ITU.

3.23 In view of the above, **the Authority recommends that:**

- (a) VNOs be permitted to set up their own network equipment viz. BTS, BSC, MSC, RSU, DSLAMs, LAN switches, where there is no requirement of interconnection with other NSO(s). Therefore, they**

should not be allowed to own/install equipment viz. GMSCs, Soft-switches and TAX.

(b) Equipment permitted to be owned/installed by VNOs should conform to the technical standards prescribed by standardization bodies like TEC and ITU.

(c) VNOs may also be allowed to create their own service delivery platforms in respect of customer service, billing and VAS.

D. Use of Cable TV infrastructure

- 3.24 The country has a large cable TV network which reaches about 100 million homes. The cable TV network is getting digitized in a phased manner. The first two phases covering 42 cities are complete; and the third and fourth (final) phases are underway. Broadband can be effectively delivered through digitized cable infrastructure. This can be achieved by either the MSO/LCO becoming a VNO to deliver broadband services or the MSO/LCO share the cable infrastructure with other prospective VNOs who want to deliver broadband services.
- 3.25 In the CP, an issue was raised whether LCOs or MSOs with cable networks could be permitted to share infrastructure with VNOs to provide last mile connectivity?”
- 3.26 In response, some stakeholders have suggested that LCOs and MSOs should be allowed to share infrastructure for last mile connectivity. It would help reduce CAPEX cost and help in optimal utilization of network as well as increase penetration of services. A few stakeholders are of the view that the LCOs or MSOs with cable networks can be permitted to share/lease their last mile infrastructure with licensed ISPs and an ISP (VNO) can provide service using such last mile connectivity from the licensed ISP.

3.27 Some stakeholders have suggested that LCOs and MSOs should not be allowed to share infrastructure for last mile connectivity as they work under a different regulatory regime. Once broadcasting services are provided under UL and the Licensee is permitted to resell all services, this issue will be addressed automatically.

Analysis

3.28 As stated in the earlier chapter, as per an industry estimate, the last mile local loop that cable operators have reaches into more than 100 million homes and the High Frequency Cable (HFC) Network of the LCOs covers lakhs of kilometers. This huge, under-utilised infrastructure can be effectively exploited by the LCOs/MSOs for extending converged telecom services over broadband. In a number of countries, the cable TV operators are the predominant broadband providers. However, in India, because of attendant regulatory and licensing conditions, the LCOs/MSOs are reluctant to provide telecom services. With the introduction of VNOs, where some of the licensing conditions like lawful interception and roll-out obligations (discussed later) are to be complied by the NSO only, it is expected that some of the LCOs/MSOs having large networks and willing to invest in upgradation of their existing cable network to Data Over Cable Service Interface Specification (DOCSIS or Dx) systems or Dx3 will be willing to become VNOs. It will open up huge revenue opportunities for such LCOs because of the introduction of DAS in the country.

3.29 In view of the above, **the Authority recommends that :**

- a) MSOs/LCOs who want to provide broadband services through their cable network may do so by obtaining a VNO license.**
- b) MSOs/LCOs may also share their cable infrastructure with VNOs, after the MSO/LCO register themselves as an IP-I service provider.**

CHAPTER IV: LICENSING PROVISIONS FOR VNO

A. Type of License Required for VNOs

- 4.1 This chapter discusses and recommends the appropriate licensing framework applicable for VNOs.
- 4.2 Issues about complexities in different licenses in the Indian telecom sector have been highlighted in the CP. Starting with the first license issued in 1994, access services alone have seen five different types of licensing regimes namely Basic Service Operator (BSO), Cellular Mobile Telephone Service (CMTS), Unified Access Service License (UASL), UL(Access Service) and Unified License. At present all these licenses are still in operation until the expiry of UL (AS) licenses (unless these are migrated to UL) after which all licenses will necessarily be the ULs. Besides access services, there are separate licensees for NLD, ILD, ISP and other services. Also there is a registration mechanism for IP-I, Other Service Providers (OSPs), telemarketers and sellers of SIMs of other countries. All these verticals have added to the complexities of the existing licensing framework.
- 4.3 The Authority, through its recommendations of 2003 and 2005 had highlighted the necessity of introducing UL and had suggested migration of existing TSPs to the new licensing regime. The Authority in its recommendations on 'Guidelines for Unified License/Class License and Migration of Existing Licenses' on 16th April 2012 recommended that all the existing licenses issued under Section 4 of Indian Telegraph Act 1885 shall automatically stand converted to ULs. Such licenses should be known as Unified License (restricted).
- 4.4 Through NTP-2012, the Government introduced '*One Nation - One License*' as UL as authorization for various services and service areas. As per UL guidelines, the Government has not mandated migration of existing licensees to UL till the expiry of their existing licenses. The licensees,

however, have an option to migrate to the new regime, before the due date of expiry of their existing licenses. After expiry of their existing license, the licensees will have to take a UL for extending their services to the customers.

- 4.5 The DoT, in its present reference in the context of UL, has quoted para 3.3 and 3.8 of NTP-2012:

“3.3 To move towards Unified Licence regime in order to exploit the attendant benefits of convergence, spectrum liberalisation and facilitate delinking of the licensing of Networks from the delivery of Services to the end users in order to enable operators to optimally and efficiently utilise their networks and spectrum by sharing active and passive infrastructure. This will enhance the quality of service, optimize investments and help address the issue of the digital divide. This new licensing regime will address the requirements of level playing field, rollout obligations, policy on merger & acquisition, non-discriminatory interconnection including interconnection at IP level etc. while ensuring adequate competition.

3.8 To facilitate resale at the service level under the proposed licensing regime – both wholesale and retail, for example, by introduction of virtual operators – in tune with the need for robust competition at consumer end while ensuring due compliance with security and other license related obligations.”

- 4.6 As stated in the CP, the DoT’s reference has the potential to completely change the entire licensing framework. In a scenario where multiple licensing regimes co-exist, bringing a new licensing regime is a challenging task. In their comments to the PCP/CP, stakeholders had raised concerns regarding frequent changes in the licensing regime that may lead to uncertainty and instability in the market. In a sector, typified by long gestation periods, such concerns are valid to some extent, since huge investments are required to rollout and maintain telecom networks. A stable and transparent policy is required to attract investments including Foreign Direct Investment (FDI) and help create additional business

opportunities.

- 4.7 In the CP, issues were raised regarding: (i) moving towards a NSO and VNO based licensing framework so as to reduce the complexities in licensing, and, (ii) whether NSOs should be mandated to migrate to a new licensing regime. A connected issue was whether adoption of the VNO model requires an entirely new licensing regime or would a chapter or a separate section added to the existing UL for VNOs suffice.
- 4.8 In response, some stakeholders have opined that very little has been achieved by the recently issued UL and it is odd that a view has been formed that this regime is complex. They have stated that the NSO and VNO based licensing regime will not simplify, but will further fragment the existing licensing framework and make it more complex. The stakeholders have further opined that a stable and predictable licensing regime is critical to encourage the huge investments that are required to meet government objectives. Therefore, the correct approach would be to continue with the existing UL regime, introduced only a year ago, so as to avoid risks to critical investments and to achieve the objective of '*One Nation- One license*'. In their opinion there is no need for a new licensing regime for VNOs. VNOs, if at all introduced, should be required to take a UL with necessary authorizations and offer all services permitted under the respective authorisations. One stakeholder has suggested that a chapter for VNOs can be added to the existing UL, covering all the necessary terms and conditions of operations. The scope of terms and conditions of VNOs should not exceed that of the TSPs.
- 4.9 Another stakeholder has proposed a three-tier licensing structure i.e. a) Converged UL with Network & Service b) UL (Network Service) and c) UL (Service Delivery). It has stated that this will address all concerns relating to networks and delivery of services as contemplated in NTP-2012 as it would lead to sharing of network resources, sharing of active/passive

infrastructure, sharing of spectrum, resale of services etc. In its model, the existing NSOs can be assumed to possess a) and b) and c) type of licenses mentioned above. Some stakeholders, on the other hand, have supported a light touch authorization process in the form of registration for VNO in the UL akin to the practice prevailing in UK, Norway, Sweden, Singapore, and Australia.

- 4.10 On the issue of migration of existing licensee to a new regime, many stakeholders have opined that migration cannot be mandated on existing NSOs and that migration has to be at the choice of the NSO. Even today, there are operators who have Basic Service Operator (BSO)/CMTS licenses and have chosen not to migrate to UASL/UL. One stakeholder has stated that any forceful migration to a new licensing regime will undermine the existing licensing regime and create uncertainty in the industry more so among investors. Historically, neither the government nor the regulator has ever forced the operators to migrate to a particular licensing regime.

Analysis

- 4.11 Having recommended entry of VNOs in the Indian telecom market, there are two options available to license them. The first option could be to notify an entirely new regime exclusively for VNOs thus creating a separate license other than UL. The second option could be to add a separate chapter or section to the existing UL regime without altering its present format.
- 4.12 The Authority agrees with the views of the stakeholders that the existing UL guidelines should not be altered as they have come into force only a year ago. Therefore, the second option, i.e. a separate authorisation for VNOs, is a better approach. Since VNOs will be a new entity and will be given a separate authorisation, it may be possible to bring some changes in the VNO licenses based on feedback from stakeholders and initial learning.

- 4.13 In 2011, the Authority in its recommendations on MVNO, recommended that the UL holder without spectrum can become an MVNO to another NSO. In case an existing licensee wishes to become a VNO in a license area where it does not own spectrum, a separate VNO license can be mandated for such licensees, thus making a clear distinction between his existing license and additional license as VNO.
- 4.14 In view of the above discussion, there will be three broad categories of licenses/registration. For operators who want to provide only infrastructure, they can do so by obtaining IP-1 registration. Other operators who want to provide both infrastructure and services will obtain UL license. However, the new category of operators who want to deliver only services as a VNO using the NSO's infrastructure, either partially (by laying the balance infrastructure on their own) or fully, such service delivery operators, will have to apply for a new category of UL termed as **UL(VNO)** license. This new category of license will contain similar authorizations as mentioned in the existing UL. Like the existing UL, the UL (VNO) will have two parts i.e. Part- I and Part – II. The Part-I shall contain the general terms and conditions for UL (VNO) license and Part – II will be the terms and conditions specific to the respective service authorization for the VNO, which shall be in addition to the terms and conditions in Part- I.
- 4.15 **Accordingly, the Authority recommends that:**
- (a) For introducing VNO in the sector, there should be a separate category of license namely UL (VNO). This UL (VNO) will contain similar authorizations for services and service areas as provided in the existing UL.**
- (b) The UL (VNO) license will have two parts i.e. Part-I and Part-II. Part-I will be the general terms and conditions for the VNO license and Part-II will be the terms and conditions specific to the service**

authorization for the VNO.

(c) An operator who wishes to provide telecom services to its customers utilizing the underlying network and/or access spectrum of an existing NSO will have to obtain UL (VNO) license. Such UL (VNO) licensee will be permitted to build its own infrastructure as already recommended in Para 3.23 of the recommendations.

B. Shifting of ‘Resale of IPLC’ licensees from UL authorization to UL(VNO)

4.16 The present UL allows for authorization of resellers under the ‘Resale of IPLC’ service segment. The Authority has noted that there should be a clear distinction between resellers/service operators on the one hand and network and service operators (in a combined role) on the other, to avoid any complexities in licensing of such entities. Resale of IPLC is essentially a VNO function and therefore should fall under the proposed regime under deliberation. ILD operators are integrated ‘network and service providers’ like existing TSPs while resellers of IPLC are pure service providers using networks of ILDOs. Also at present, eligibility conditions viz. networth, equity etc. are the same for an ILD operator and for a ‘Resale of IPLC’ operator, whereas the role of ILD operator is much larger when compared to a ‘Resale of IPLC’ operator. There is little difference with respect to the amount payable in the form of Performance Bank Guarantee (PBG) and the only significant difference is in the amount payable as Financial Guarantee (FBG). In order to avoid any ambiguity and to enable such segmentation, it is essential that the ‘Resale of IPLC’ operator be brought under the proposed UL (VNO) license.

4.17 Therefore, keeping in view, the earlier recommendation regarding introduction of VNOs and in order to maximize long term benefits of UL

(VNO), the **Authority recommends that, resale of IPLC presently under the UL shall be shifted from the existing UL to UL (VNO) licensing in order to make a clear distinction among the class of operators.**

CHAPTER-V: TERMS AND CONDITIONS FOR UL (VNO) LICENSE

5.1 This chapter deals with the detailed terms and conditions for UL(VNO) license. The issues discussed in this chapter include scope of the license area(s) for UL(VNO), duration of license, number of VNOs in a service area, parenting options between VNO and NSO, eligibility, PBG, FBG, Networth, Paidup equity conditions, Cross Holding restrictions, Merger & Acquisition (M&A) conditions, prerequisites for existing NSOs to be VNO in the same and different service area(s), and allocation of numbering resources to VNO.

A. License Area for UL(VNO)

5.2 Under the present UL licensing regime, an UL is granted with authorization for one or more than one service for operation in one or more than areas as per the guidelines² notified by the DoT. Different service areas have been defined for Access Services, Carrier Service, Data Services etc. For example, service area authorization for ISPs can vary from Secondary Service Area (SSA) level to national level under the same UL. NLD/ILD licenses have been authorized for service at national level. In the CP, a question was raised as to whether the VNO should be issued a license at the national level or should it be restricted to the LSA as in the case of UL or should it be based on the host NSO license area.

5.3 In response, many stakeholders have stated that if at all VNOs are to be introduced, they should be introduced as part of the UL regime. The scope of terms and conditions of VNOs should not exceed that of the TSPs/NSOs, to ensure a level playing field. The VNO's license should reflect the same service area as that of the parent TSP. One stakeholder has stated that VNOs may be permitted to provide services on LSA basis or even below the LSA, depending on mutual agreement between the Unified Licensee and the reseller/VNO. Another stakeholder has stated that VNOs should be

² <http://www.dot.gov.in/sites/default/files/Amended%20UL%20Guidelines%2013112014.PDF>

licensed in a manner that allows them to provide existing or future services, domestic or international services, on a resale basis in any geographic location throughout India.

- 5.4 One stakeholder has stated that since the existing UL regime allows for authorization of access services, at national level and service area wise, it would not be viable for a company to acquire a national license if it wishes to provide telecom services only in a particular region. Therefore, the company should be allowed to acquire license as per the current framework of UL.
- 5.5 Some stakeholders have opined that for ISP services, a VNO should be issued a license to operate at the national or LSA level or district level and for GMPCS service a license should be issued at the national level, whereas for other services it should be based on the licensing framework viz. LSA based for access services and national level for all India services (NLD/ILD etc.).

Analysis

- 5.6 As per prevailing licenses issued under various license regimes for delivery of the services, service areas are defined at National, Circle and SSA levels, depending on the type of service a licensee wants to provide. Therefore, the service area of a VNO cannot be beyond the service area of its NSO. Even though a VNO may not wish to serve the entire service area and may want to confine itself to a district area it will not be practicable to carve out an area specific to a VNO; parity has to be maintained as per the existing license area(s) of NSOs.
- 5.7 As stated in the previous chapter, UL (VNO) will have similar authorization for services as that of existing UL; similarly, the VNO's license area has to be the same as defined in UL. UL (VNO) licensee will be able to service an area within the LSA of the NSO with whom the VNO has entered into an

agreement for delivering services.

- 5.8 Accordingly, the **Authority recommends that like UL authorization, only pan-India or service area-wise authorizations may be granted under a UL (VNO) license. However, UL (VNO) licensee will be able to service an area within the LSA of the NSO with which the VNO has entered into an agreement for delivery of services.**

B. Duration of UL (VNO) License

- 5.9 The licenses for telecom services in India are issued for a period of 20 years through different licensing regimes. The licenses are bundled with spectrum in the CMTS and the UAS licensing regimes. However, with introduction of UL, spectrum has been delinked from license and all services have been brought under the umbrella of one license. Therefore, parity must be maintained with the prevailing license regime.
- 5.10 The issue that arises for consideration is what should be the duration of a VNO's license i.e. whether the license of a VNO should be co-terminus with that of the parent NSO or whether it should be kept 20 years subject to the VNO entering into a mutual agreement with another NSO in case its agreement comes to an end due to the validity of license of the NSO.
- 5.11 On the issue of duration of VNO license, most stakeholders are of the view that duration of the VNO's license should be 20 years as prescribed in UL. The duration of VNO license should not be linked with the duration of its parent NSO operator. However, some stakeholders have also opined that the duration of the license of the VNO should be linked to the duration of the license of its parent NSO's in a particular service area.
- 5.12 One stakeholder has stated that the license in case of VNOs should also have a validity of 20 years in the first instance, with provision for extension of 10 years at a time. The duration of VNO license and NSO license should not be linked as both would be independently holding a valid telecom

licenses. Moreover, one VNO can always move from one NSO to another in the same service area based on commercial arrangements. Another stakeholder has stated that the duration of authorization for reseller should depend on the mutual agreement between the Unified Licensee and the reseller/ VNO.

Analysis

5.13 Under the existing regime, licenses are issued for 20 years. However, unlike a VNO, most of these licensees have to incur huge expenditure in building up infrastructure, complying with the licensing and regulatory conditions. A VNO will be primarily an operator giving various services to an end consumer by using the underlying network of an NSO. Moreover, with the rapid advancement of technology, the business model of a VNO will continuously change. Secondly, as discussed subsequently, a VNO can parent with more than one NSO; the business of a VNO will also depend on that of a NSO for that service. Therefore, the Authority is of the opinion that, being a new concept in India, initially, the duration of License of a VNO should be fixed as 10 years which can be extended for next 10 years at a time by the licensor. However, depending on technological developments and experience gathered, this duration of license can be reviewed after 3-4 years.

5.14 After careful examination of pros and cons, **the Authority recommends that:**

(a) Since VNOs are a new concept in India, initially the duration of the License of a VNO should be fixed as 10 years extendable further for 10 years at a time by the licensor. However, depending on technological developments and experience gathered, this duration of license can be reviewed after 3-4 years.

(b) The agreement of a VNO with a NSO will terminate with the expiry of the license of either party.

C. Number of VNOs in a service area

- 5.15 The issue that follows is regarding the number of VNOs that can be present in a service area. In response to this issue raised in the CP, many stakeholders have stated that there should not be any cap on the number of VNOs that can exist in a service area. Some stakeholders supporting the idea have elaborated further that any cap on the number of VNOs in a service area for a particular service will restrict the level of competition.
- 5.16 One stakeholder has submitted that the present licensing regime does not mandate any caps on the number of providers in a service area. Market forces will determine the ideal number of competitors and allow consumers to enjoy the full benefits of service delivery resulting from the authorization of VNOs; any cap on the number of VNOs would hamper competition.

Analysis

- 5.17 The purpose of introduction of VNO is not only to make way for innovative services in niche, un-served areas but also to facilitate effective and efficient utilisation of the infrastructure/resources created by existing TSPs.
- 5.18 A VNO is primarily a service delivery operator. It is expected that it will provide innovative services to the consumers depending upon the availability of network capable to provide that service and agreement with the NSOs willing to allow it to use its network. Normally, the reasons for restricting the number of operators in a geographical area are to ensure efficient utilization of scarce resources and to avoid duplication of investment on infrastructure. Since in the case of VNOs, these principles are not affected, the Authority is not in favour of placing a restriction on the number of VNOs in a service area.
- 5.19 In view of above, the **Authority recommends that there should not be a restriction on the number of VNO licensees per service area.**

D. Number of VNOs parented by one NSO

- 5.20 In the CP, an issue was raised whether there should be restrictions on the number of VNOs parented by one NSO.
- 5.21 In response, the majority of the stakeholders opined that there should be no restriction on the number of VNOs parented to an NSO. They felt that this will lead to optimum utilization of resources. However, some stakeholders were of the opinion that no restrictions should be placed on the number of VNOs attached to a NSO as long as the NSO has adequate infrastructure and spectrum to share with the one or more VNOs attached to it and is able to meet the QoS requirements for its own subscribers and that of the VNO. One stakeholder has suggested that, initially, only one VNO should be allowed to parent with one NSO for all services and vice versa to enable both parties to can select each other carefully as also to prevent fly-by-night operators entering the field.

Analysis

- 5.22 NSOs have varying quantum of infrastructure service-wise and service area-wise. Restricting the number of VNOs parenting to one NSO has no obvious advantages. Instead, allowing more than one VNOs per NSO for one or more services will improve utilization and efficiency of NSOs and also add an additional stream of revenue to their earnings. Market forces and competition should be able to identify the ideal number of VNOs parented by any NSO.
- 5.23 In its recommendations of 2011 on 'Issues related to Telecommunications Infrastructure Policy' the Authority had recommended that there should be no restriction on the number of MVNOs attached to a MNO subject however to there being only one MVNO in a revenue district. At that time only GSM/CDMA technology based services were on offer by the TSPs. Now, with availability of 3G and BWA spectrum, there are multiple services

available in a service area and, therefore, having only one MVNO in a revenue district may not hold good.

- 5.24 In view of the above, **the Authority recommends that, in order to increase utilization and efficiency of telecom infrastructure, there should be no restriction on the number of VNOs parented by a NSO.**

E. Parenting of a VNO by more than one NSO in a service area

- 5.25 The next issue is regarding parenting of one VNO by more than one NSO in a service area in case the VNO intends to offer more than one service through wireless or wire-line networks. This issue was raised in the CP.
- 5.26 In response, one set of stakeholders stated that VNOs should be permitted to parent by more than one NSO per LSA for optimum utilization of resources. The matter at best is addressed through market based mechanisms based on commercially negotiated agreements between the VNO and the NSO.
- 5.27 Another set of stakeholders opined that the VNO should not be permitted to parent by more than one NSO per LSA. The VNO should be allowed to cater to only one NSO to avoid any chance of fixing of priorities from amongst services of NSOs. Further, parenting of one VNO by more than one NSO will result in enormous complexities insofar as monitoring, regulation, enforcement, segregation of revenue, payment of license fee, SUC, etc is concerned.

Analysis

- 5.28 The Authority has taken note of the stakeholder's comments regarding market forces to determine this issue of parenting of one VNO by multiple NSOs for delivering various services. Allowing a VNO to have agreement with more than one NSO in a LSA may lead to operational complexities like

compliance of various statutory provisions like calculation of Spectrum Usage Charges (SUC) and License Fee (LF). For example:- a VNO 'X' enters into agreement with NSO 'A' which is having administratively assigned access spectrum for getting access to deliver 2G services and also enters into agreement with another NSO 'B' which is holding BWA spectrum for getting access to deliver 4G services. Existing NSOs are paying distinct SUC slabs rates as per the defined licensing conditions for access spectrum bands. Due to these differential SUC slabs the issue of separation of AGR would arise as the VNO may not be able to separate the accounting of revenue generated from various wireless services it provides to the customers.

- 5.29 However, with the proliferation of broadband in the country, some of the VNOs may provide niche services using this platform. Therefore, if a VNO is restricted to only one NSO, it will be only able to provide its services to consumers only of its parent NSO. Consumer who have subscribed to broadband services from other operator will not be able to take services from this VNO. Similarly, if a VNO is providing International Calling Cards service, it will have to buy minutes from more than one ILDO so as to provide competitive tariff to its customers.
- 5.30 In order to facilitate the VNO to provide multiple services, using the networks of multiple NSOs, a solution could be that the VNO be allowed to be parented by more than one NSO for all services other than access services and such services which need numbering and unique identity of the customer. For those services which require unique identity in terms of numbering, lawful interception, spectrum usages etc. the VNO can have parenting with only one NSO for an authorisation. In the proposed framework being recommended by the Authority, the UL (VNO) will seek authorization(s) for various services i.e. Access Service (Basic & Mobile), Internet Service (National, Circle and SSA based), NLD, ILD, GMPCS, PMRTS, etc. in line with the UL. The VNO will be allowed to have agreement

with various NSOs based on its authorization for the service area, in which NSOs are operating. For example, if a VNO wants to provide access services, NLD/ILD services and GMPCS services it can use infrastructure of different NSOs for these services. Such VNO can provide access services using infrastructure of only of one NSO but it cannot use infrastructure of another NSO for the same authorisation (i.e. access services). For GMPCS service, if the VNO can use infrastructure of another NSO it is allowed. For NLD/ILD services, it can utilise the infrastructure of more than one NSO to cater to the requirements of its customers.

- 5.31 In view of the above, the **Authority recommends that VNOs will be allowed to have agreements with more than one NSO for all services other than access services and such services which need numbering and unique identity of the customers.**

F. Allocation of numbering resources to VNOs

- 5.32 The VNO in the access segment is visualized as an operator who can build a part of network infrastructure such as MSC, BSC, BTS etc. It will enter into agreements with parent NSO to provide services to its customers using the RAN of the underlying NSO. For landline and other services also, VNOs will require numbering resources for identification, routing of calls of its customers.
- 5.33 In the CP, an issue was raised whether or not VNO should be allowed to utilise numbering resources, Network Codes and Locational Routing Number (LRN) of the NSO, or, should the Licensor allocate separate numbering resources, network codes and LRN directly to a VNO and how to ensure efficient utilisation of numbering resources.
- 5.34 In response some stakeholders have suggested that VNO should only utilize numbering resources, network codes and LRN of the NSO and the licensor should not allocate separate numbering resource to a VNO. Many

stakeholders have supported this view by stating that such an arrangement would result in better utilization of numbering resources and many complexities relating to routing, regular monitoring and other operational issues can be avoided.

- 5.35 On the contrary some stakeholders have suggested that the Licensor should directly allocate separate numbering resource, network codes and LRN to a VNO, as NSOs at times may not co-operate in timely provision of the number system. One stakeholder has suggested that to ensure efficient utilization of resources, the VNO should be required to employ the allocated numbers within 24 months. The Licensor should issue numbers in blocks of 1000 or 5000 if possible, with a review every five years to ensure that numbers are being utilized efficiently.

Analysis

- 5.36 For access to Mobile services in 22 service areas, there are two Mobile Country Codes (MCCs) i.e. 404 and 405 that have been assigned to India. Then there are Mobile Network Codes (MNCs). A combination of MCC and MNC codes helps in uniquely identifying an operator in India. At present 2-digit MNCs are assigned under MCC 404 and, 3-digit MNCs are assigned under MCC 405. The combination of MCC and MNC provides sufficient number resources for all operators. In case of introduction of MVNOs, one option could be that VNOs are assigned dedicated MNCs by the DoT so that they can have their own International Mobile Subscriber Identity (IMSI) range and SIM cards for uniquely identifying a mobile subscriber. With its own IMSI range it is possible that a VNO will be able to change its underlying NSO without having to change the SIM cards in the devices of all its customers. However, this arrangement has challenges because if large number of MVNOs enter into the market, it will be difficult to manage network codes both operationally and administratively. Moreover, it will be

difficult for the DoT to monitor efficient utilisation of the numbering resources for a large number of MVNOs. For VNOs of other services also there will be an administrative challenge to get the numbering resources allocated from the DoT, particularly for those VNOs who plan to offer services in small districts/towns.

- 5.37 It will be more convenient that NSO allocates resources to its VNOs. It will not increase administrative load on the licensor. As VNOs are extension of NSOs it will be in its interest to allocate numbering resources to VNOs for quick delivery of services which will bring revenue to NSO and VNOs both in shorter period. As the arrangement between NSO and VNO is based on mutual agreement, allocation of numbering resources can be part of their agreement which can be implemented conveniently.
- 5.38 In case of mobile services, the numbering allocation is based on VLR based criteria. Since the numbers used by the VNOs will reflect in the VLR of the parent NSO, the Licensor can verify utilization of the numbering resources allocated to multiple VNOs by a NSO as per the prevailing guidelines. Allocation of numbering resources by the NSO to its VNOs will depend on their commercial agreements and utilization by different VNOs. Similarly, VNOs will utilise the LRN and network codes of the parent NSO for routing of calls of its customers.
- 5.39 In case of landline and other networks too, the numbering series for VNOs should be allocated by the parent NSO for efficient utilisation of NSOs numbering resources.
- 5.40 In view of the above discussion, the **Authority recommends that:**
- (a) An NSO shall allocate a numbering range to their VNO(s) from the numbering range allocated to it by the licensor.**
 - (b) VNOs shall also utilise the LRN and network codes of the parent NSO for the purpose of routing of calls.**

G. Eligibility, PBG, FBG, Networth, Paidup Equity conditions for VNOs

- 5.41 International experience shows that VNOs are basically resellers of the services. VNOs make minimum investments on creation and maintenance of network and infrastructure facilities. The roles and obligations of NSOs and VNOs may not be comparable in terms of investment required and therefore their net worth cannot be treated as equal. However, to discourage fly-by-night-operators entering the market, care has to be taken to ensure that only serious players enter the market. In the CP, comments of stakeholders were called for on to what should be the eligibility conditions for a VNO.
- 5.42 On this issue some stakeholders have stated that a VNO should be a company registered under the Indian Companies Act 2013 as is the applicable condition for any other business entity desirous of entering the telecom sector in India. Other stakeholders have opined that VNO should be required to take a UL with necessary authorizations and offer services permitted under respective authorizations.
- 5.43 One stakeholder has suggested that the eligibility conditions for a MVNO should be (a) Entry Fee and (b) Net Worth restrictions equivalent to 25% of the UL authorization for access service. The other financial obligations like FBG too should be pegged at 25% of the access service authorization defined under UL. PBG should not be applicable since there would be no rollout obligations associated with the MVNO.
- 5.44 Some stakeholders have raised concerns regarding the high entry fee for 'Resale of IPLC' license. They have submitted that the high entry fee has posed a serious hindrance to the growth of IPLC resellers in India. Therefore, they have argued that a careful deliberation is required on the issue of financial obligation of the VNO.

Analysis

- 5.45 The Authority in its recommendation on 'Guidelines for Unified License/

Class License and Migration of Existing Licenses' in 2012, recommended an entry Fee of Rs. 1.0 Crore (0.5 Crore for NE & J&K) for all access services in a service area and Rs. 15 Crores for UL (All services). These recommendations were accepted by the Government and detailed guidelines on UL were issued in August, 2013. In the present recommendations, it is envisaged that the VNO would be investing and creating some part of the infrastructure. In order to prevent fly-by-night operators and to have only serious players in the field, the entry fee for UL (VNO) should be the same as that of existing UL. However, since the duration of UL (VNO) is being recommended initially for 10 year period extendable upto further 10 years (half of that of UL), therefore the entry fee should be 50% of that of UL. Regarding Performance Bank Guarantee (PBG), since VNOs will not have obligation to rollout their services, therefore there seems to be no need to prescribe any PBG for VNOs. However like a Unified Licensee, they will have to give FBG equal to the amount of two quarter License Fee.

- 5.46 UL guidelines have prescribed minimum equity and minimum networth each for Rs. 25 crores for obtaining UL (All Services) and Rs. 2.5 crores each for obtaining access service (service area wise), NLD,ILD and GMPCS authorisations. In the proposed framework a VNO would not be forced to create infrastructure and therefore it would not be justified to cast roll out obligations on VNOs. Therefore, the investment made by a VNO, if any, will be solely at its discretion. During the consultation process some stakeholders have indicated that the prescribed high price in terms of minimum equity and networth poses serious limitations on prospective licensees for entry in the 'Resale of IPLC' segment. It is pertinent to mention that till date there is no 'Resale of IPLC' licensee except only one authorized under UL (All services) who also has yet to start services. Therefore it appears there is a fit case to reduce the minimum entry and minimum networth in the proposed framework for VNOs. The minimum

equity and minimum networth can be kept at 40% of the values prescribed under UL.

5.47 In view of the above, the **Authority recommends that:**

- (a) **A VNO should be a company registered under the Indian Companies Act 1956 (as amended).**
- (b) **The entry fee for UL (VNO) with a given authorisation will be 50% of the entry fee prescribed for the UL.**
- (c) **As VNO would not be forced to create infrastructure therefore no roll out obligations may be casted upon VNOs. Therefore, no PBG may be prescribed for VNOs.**
- (d) **Financial Bank Guarantee will be equal to the amount of two quarter license fee.**
- (e) **Minimum equity and minimum networth may be kept at 40% of the amount prescribed under UL.**
- (f) **The proposed financial conditions for services covered under UL(VNO) are prescribed in the table below:-**

Table 5.1

Sl. No.	Service Authorization(s) (VNO)	Minimum Equity (Rs. Cr.)	Minimum Networth (Rs. Cr.)	Entry Fee (Rs. Cr.)
1	UL(VNO-All services)	10.0	10.0	7.5
2	Access Service (Telecom Circle / Metro Area)	1.0	1.0	0.5 (0.25 for NE & J&K)
3	NLD (National Area)	1.0	1.0	1.25
4	ILD (National Area)	1.0	1.0	1.25
5	VSAT (National Area)	Nil	Nil	0.15
6	PMRTS (Telecom circle/Metro)	Nil	Nil	0.0025
7	GMPCS (National Area)	1.0	1.0	0.5

8	INSAT MSS-R (National Area)	Nil	Nil	0.15
9	ISP "A" (National Area)	Nil	Nil	0.15
10	ISP "B" (Telecom circle/Metro Area)	Nil	Nil	0.010
11	ISP "C" (SSA)	Nil	Nil	0.001

H. Cross Holding Restriction

- 5.48 There can be a situation when a NSO in a service area has substantial equity participation in a VNO in its service area which is parented to another NSO. This has implications of possible cartilisation/misuse of market power amongst the service providers. Accordingly, in the CP, the issue of cross holding was raised for comments of stakeholders.
- 5.49 In response, some stakeholders are of the opinion that there should not be any cross holding restriction between a NSO and VNOs. According to them, market conditions, the level of competition, provisions of competition law or M&A guidelines may best address the matter. Some other stakeholders have suggested that there should be cross holding restrictions between an NSO and a VNO to prevent possible cartelization / misuse of market power.
- 5.50 One stakeholder has submitted that the existing cross holding norms may continue to be in force. Under the UL, in the event of holding/obtaining access spectrum, no licensee or its promoter(s) directly or indirectly shall have any beneficial interest in another licensee company holding 'Access Spectrum' in the same service area. However, there is no such restriction between two TSPs if either both of them or one of them is not holding access spectrum.

Analysis

- 5.51 The possible cross holding could be between: (i) a parent NSO and VNO (ii) VNO and another NSO (iii) a VNO and another VNO in the same service area.
- 5.52 On the issue of cross holding restrictions, the conditions operative in UL states that:
- “In the event of holding/obtaining Access spectrum, no licensee or its promoter(s) directly or indirectly shall have any beneficial interest in another licensee company holding “Access Spectrum” in the same service area.*
- Promoter shall mean legal entity other than Central Government, financial institutions and scheduled banks, which hold 10% or more equity in the licensee company.”*
- 5.53 The purpose of above restriction is to prevent cartelization and misuse of market by the NSOs having access spectrum. The arrangement which is prohibited directly, cannot be permitted indirectly too. So, in case of VNOs providing access services using access spectrum of the existing TSPs also, there should be a similar restriction of 10% or more equity clause. This will be applicable between a VNO and another NSO (other than VNO’s parent NSO) and between a VNO and another VNO in the same service area in case they are providing access services using the access spectrum of different NSO. This restriction will not be applicable in case of VNOs parented to the same NSO.
- 5.54 In view of the above, **the Authority recommends that under UL(VNO) the provision for restriction of 10% or more equity cross holding to be applicable between (i) a VNO and another NSO(other than VNO’s parent NSO) and (ii) between a VNO and another VNO authorized to provide access services using the access spectrum of different NSO in the same service area.**

I. Merger and Acquisitions (M&A)

- 5.55 The issue of Merger and Acquisitions (M&A) has been highlighted in the CP. The possible mergers could be between two VNOs, between one VNO and parent NSO, and between one VNO and any other NSO in the LSA. The new M&A guidelines notified by the Government on 20th February, 2014 inter-alia have raised the market share of a merged entity to 50% of the subscriber base and revenue as against the 35% ceiling that existed earlier. The guidelines also state that the merger of licenses/ authorisations shall be for respective service categories. Some of the provisions of guidelines like spectrum cap etc. are not relevant in case of the VNO licensing regime. Therefore, in the CP, an issue was raised as to how matters related to M&A should be dealt with in the VNO/NSO licensing model. Comments were also sought on whether M&A guidelines issued by the Government in February 2014 for existing players, be extended to cover VNOs too or should there be a separate M&A guidelines for VNOs?
- 5.56 In response, some stakeholders have suggested that the M&A guidelines issued by the licensor may also be applicable /extended to the VNOs, so that a level playing field is maintained. However, according to some stakeholders, for the M&A of (a) NSO and MVNO and (b) MVNO to MVNO, Companies Act & Competition Laws should be applicable. Another set of stakeholders have suggested that M&A for NSO/VNO should be left out at this stage. It may be taken up separately in future as it evolves in co-ordination with other ministries/departments entrusted with competition issues and requires clarity on the NSO/VNO based framework and structure.
- 5.57 According to one stakeholder, the VNOs would only hold an access customer base (and not access spectrum), and in the event of a merger, the relevant market cap as prescribed in merger guidelines could be applied. Whereas, for other telecom services (except mobile and fixed line services), merger is permitted as per the provisions of respective licence agreement.

One stakeholder has suggested that M&A between two VNOs should be allowed as they are unlikely to have significant market power since the basic VNO business model caters to niche/ under-served market segments.

Analysis

5.58 Since VNOs will not own any spectrum and VNOs will be licensees under Indian Telegraph Act 1885, therefore, at this stage, it seems that the existing guidelines of M&A shall also be applicable to them. As the VNO framework is still to evolve, if needed, separate M&A guidelines can be formulated at a later stage.

CHAPTER - VI: REGULATORY COMPLIANCE BY VNOs

- 6.1 The previous chapter dealt with the broad terms and conditions for UL (VNO) license. The VNO would certainly be liable to comply with certain terms and conditions after acquiring the UL (VNO) license. These compliances are mostly of periodic nature that have to be met by the licensee.
- 6.2 This chapter discusses and spells out the regulatory compliances by VNOs and NSOs on the issues viz. License Fee (LF), Spectrum Usage charges (SUC), Quality of Service (QoS), Customer Acquisition Form (CAF), Customer complaints, Mobile Number Portability(MNP) process, Roll out obligations, Dispute resolution, Lawful interception, penalty provisions and TTOs/orders/regulations of TRAI.

A. License Fee (LF) and Spectrum Usage charges (SUC) for VNOs

- 6.3 Through the present reference, the DoT has inter-alia sought the recommendation on the associated issue of AGR for VNOs. On the issue of AGR, the Authority has already sent its recommendations titled 'Definition of Revenue Base (AGR) for the Reckoning of License Fee and Spectrum Usage Charges' on 6th January 2015.
- 6.4 On the issue of SUC, though the Authority in 2013 had recommended for a flat rate @3% of AGR, the DoT has made it applicable on a weighted average formula basis for TSPs having access spectrum in various bands assigned administratively and through auction method. In the context of VNOs, the issue relating to the LF and SUC which a VNO will pay was raised in the CP.
- 6.5 In response to the CP, some stakeholders opined that LF should be made applicable so as to avoid any arbitrage opportunity but it also needs to be ensured that this does not result in a multistage levy which entails paying a levy twice on the same revenue. The definition of AGR needs to be

accordingly reviewed to help address this issue. According to some stakeholders, charges paid by reseller/ VNO to NSO should be allowed as pass through charges. As VNOs do not hold spectrum usage rights for the provision of mobile electronic communications; therefore, they should not be charged any fees for the use of the radio spectrum. This fee will be paid by the host network operator.

- 6.6 Some stakeholders have suggested that the annual license fees and SUC for VNOs/MVNO should be the same as for NSO to ensure level playing field. However, LF and SUC paid as statutory deductions should be allowed as pass through charges. Some stakeholders have suggested that the NSO and VNO should pay the applicable SUC separately after adjusting the pass through charges, which should be allowed on accrual basis for all the charges payable to each other to avoid double taxation.

Analysis

- 6.7 Through its recent recommendation on 'Definition of Revenue Base (AGR) for the Reckoning of Licence Fee and Spectrum Usage Charges' dated 6th January 2015, the Authority has recommended reducing the license fee of telecom operators to 6% from the existing 8%. The Authority has also recommended reducing the USOF levy to 3% from existing rate of 5% paid by the licensees. The SUC is payable by the licensees having access spectrum for providing the services to the customers. This would be applicable to the VNOs providing mobile services to the end user. The VNO shall be liable to pay the SUC, since, in absence of a VNO, the services would have been provided by an NSO. In its recommendations on 'Issues related to Telecommunication Infrastructure Policy' dated 12th April,2011, the Authority recommended that since MVNO can share the spectrum held by MNO, the spectrum charges levied on MVNO should also depend upon the spectrum held by MNO. Accordingly MVNO should pay spectrum

charges on its revenue. The slab applicable to MNO will equally be applicable to the MVNO.

6.8 In view of the forgoing discussion, the **Authority recommends that:**

(a) A VNO shall be liable to pay LF as a percentage of AGR at the same rate as that of the parent NSO.

(b) VNO shall also be liable to pay the SUC for the wireless service(s) it offers to the customers. The SUC rate will be same as that of the parent NSO.

B. Quality of Service (QoS)

6.9 Maintaining QoS is an important aspect of customer satisfaction. TRAI has setup various mechanisms for handling of consumer complaints relating to service and billing. However there are QoS parameters directly related to the network of NSOs since roll out of networks is part of the NSO's obligations. Accordingly in the CP an issue was raised as to whether an NSO or VNO or both should be responsible for maintaining QoS standards as per TRAI's regulations.

6.10 Some stakeholders have suggested that for technical / network related QoS, the NSO shall be responsible. However, for QoS pertaining to subscribers, i.e. billing and non NSO network related issues, VNO should be responsible. Some stakeholders have suggested that MVNO should have stringent SLAs with the NSO for ensuring adequate QoS for the services for its customers.

6.11 Some stakeholders have opined that the QoS standards should apply to the party whose network is being utilized. Thus, in the case of simple resale of a retail service using only the network of the NSO, the QoS standards should apply to the NSO as the network operator. To the extent that the VNO provides network elements, it should be responsible for the QoS for those elements. If the QoS standard applies to the overall service, then

both the VNO and NSO should have responsibility, and the commercial agreement between the VNO and NSO can allocate the respective duties to ensure adequate QoS for the overall service.

Analysis

- 6.12 Quality of Service will be an important aspect in case VNOs are introduced particularly in the mobile segment. Even though, voice quality provided by MVNO could be similar to its parent NSO, however, there could be difference between the quality of service provided by MVNOs as compared to NSOs with regard to web access and video streaming.
- 6.13 There are some QoS parameters like network availability, interconnection, roaming, call completion ratio (CCR), congestion etc. where the VNO may not have any direct control, there are QoS parameters like provision or closure of services, metering & billing, response time to customer for assistance, complaint handling, downtime etc. where VNOs will be directly responsible. The Authority is of the opinion that there must be a clear distinction between the VNO and the NSO while complying with the QoS parameters.
- 6.14 **Since QoS is in the exclusive domain of TRAI, therefore, once the UL (VNO) based regime comes into force, the Authority will put in place comprehensive regulations on QoS parameters to be complied separately by NSOs and VNOs.**

C. Responsibility for compliance of TTOs/orders/regulations of TRAI

- 6.15 The VNO will design and market tariffs to the consumer; this activity does not concern the NSO. At present, TSPs have to comply with the provisions made by the Authority through various Telecom Tariff Orders (TTOs)/regulations/directions/decisions issued from time to time. Additionally there are various reporting requirements such as subscriber

base etc. mandated for TSPs which they have to report to TRAI/Licensor. Accordingly, in the CP an issue was raised with regard to whether a VNO should be treated equivalent to the NSO for meeting obligations arising from Tariff orders/regulations /directions etc. issued by TRAI from time to time.

- 6.16 The majority of stakeholders have suggested that VNOs are also to be treated equivalent to an NSO for meeting obligations arising from Tariff order/regulations/directions. The Authority concurs with the view of the stakeholders.
- 6.17 Accordingly, the **Authority recommends that VNOs should be independently responsible and comply with the Telecom Tariff Orders (TTOs)/regulations/directions/decisions issued from time to time. VNOs shall also comply with all reporting requirements as specified by the Licensor and the Authority from time to time.**

D. MNP facilitation for VNOs

- 6.18 In order to have efficient mechanism of MNP for MVNOs, an issue was raised in the CP regarding as to how MNP can be facilitated in the VNO/NSO model.
- 6.19 In response, some stakeholders suggested that in the VNO/NSO model, MNP should be facilitated only through the network of the NSO to avoid any complexity. One stakeholder has suggested that since numbering scheme is owned by the NSO, an MVNO can request the NSO to port their customers to other service providers as a part of their commercial arrangements. However, for any porting request and other related aspects, the customer should interface with VNOs/MVNOs and not the parent NSOs/MNOs.

Analysis

- 6.20 In the previous chapter the Authority has already recommended that a

VNO shall use LRNs of his parent NSO for the purpose of routing of calls. It would be more cost effective and simplistic for a VNO to facilitate the MNP through the network of parent NSO. To ensure effectiveness and efficiency of MNP process, there are provisions that exist for financial disincentives for non compliance of MNP regulation by NSOs; the same provisions shall be applicable for VNOs also.

6.21 Accordingly, the **Authority recommends that:**

(a) MNP process shall be facilitated for MVNO subscribers through the network (MNP Gateway) of the parent NSO.

(b) All regulations, orders and directions issued by TRAI in connection with MNP will be applicable to VNOs.

E. Access to NSO's network to a VNO

6.22 The role of regulator is to formulate policies, maintain transparency, protect interest of the consumer and to create a level playing field among the service providers. In a competitive market, success and failure of business is part of the business environment. An established NSO may resist further competition from the entry of newcomers in the form of VNOs. There could be occasions where a well-established NSO may deliberately apply tactics for delaying connectivity and other deliverables as per the agreement (Therefore, there may be certain reasons where the regulator may need to intervene to resolve the issues between VNO and NSO). The issue that arises is whether the NSO be mandated to provide access to its network to a VNO in a time-bound manner or should it be left to mutual agreement between them. Therefore, this issue was raised in the CP for comments of the stakeholders.

6.23 In response, majority of the stakeholders have opposed any form of mandated access between NSO and VNOs. According to them, the commercial model between VNO and NSO must be left to mutual

agreement. One stakeholder has stated that regulatory intervention to decide commercial arrangements between licensee and reseller may turn out to be a disincentive for unified licensee to make further investment in infrastructure.

- 6.24 Some stakeholders have supported the idea and stated that there must be a mandate to the NSO to provide access to a VNO in a time bound manner to safeguard consumer interest and ensure that there is no underhand dealing. This view is supported by a stakeholder who stated that this mandatory access should include interconnection and roaming to the VNO in a time bound manner to avoid disputes and service related issues.

Analysis

- 6.25 The Authority is aware that except in few countries, the VNO regime has not been mandated in most markets. VNOs have mostly come into existence through mutual agreements/understanding between the NSO and VNO with minimum regulatory interventions. The minimum regulatory intervention has been advocated by most of the stakeholders through their comments. Since VNO will largely be an extension of NSO, it will be in the interest of the NSO to provide quick access of its network to its VNO(s). It is envisaged that the commercial agreement between both the parties takes care of all obligatory provisions under the UL (VNO) license. However, in order to protect customer interests, TRAI and the DoT may intervene in case of delays which are deliberate in nature.
- 6.26 Considering the views of the stakeholders **the Authority recommends that there should not be any mandate to an NSO for providing time bound access to its VNO³; rather, it should be left to the mutual agreement between NSO and VNO. However TRAI/DoT shall have right**

³ Since a VNO is treated as an extension of NSO and VNO is not allowed to seek interconnection with other NSOs.

to intervene in the matter as and when required to protect the interest of consumers and telecom sector.

F. Responsibility for CAF and Lawful interception

- 6.27 VNOs would be free to set their own tariff and plans to be offered to their customers. The key strength of many VNOs would be their brand name and they would make their own efforts to garner their customer base. An issue was raised in the CP as to who would be responsible for Customer Acquisition/Application Form (CAF) verification and number activation and whether it should be NSO or VNO or both? Another issue was regarding responsibility for lawful intervention of a customer.
- 6.28 In response, most stakeholders suggested that if the customer is acquired by the VNO then all the regulatory compliances, pertaining to CAF verification and number activation should be made applicable to the VNOs. Thus the onus will be on the VNO to comply with all guidelines relating to subscriber verification and National Security. Some stakeholders have stated that the VNO or the NSO who has the contractual agreement with the end user should be made responsible for CAF verification. They however suggest that number activation should be done by the NSO.
- 6.29 According to a stakeholder, onus to verify CAF should be on the VNO but audit rights and responsibility should be given to the NSO. Another stakeholder has suggested that primary obligation should be that of the NSO to comply with all the requirements of customer acquisition, verification and activation etc.

Analysis

- 6.30 In the VNO profile of licensing, some components of the network are directly in control of the VNO whereas there could be some components in the network where a VNO may not have built infrastructure or may not have access to the network of NSO.

- 6.31 The Authority is of the view that since the customer is acquired by a VNO, thus, there appears no scope for the responsibility to be fixed on the NSO in such areas. Regarding the issue of national security and requirement of Law Enforcement Agencies, there may be some components in the network which are out of the direct control of a VNO. Thus in such scenarios it will be the joint responsibility of both VNO and NSO.
- 6.32 In view of the above, the **Authority recommends that CAF verification and number activation shall be the responsibility of a VNO. To fulfill the requirement of law enforcement agencies and national security related issues, there must be joint responsibility of VNO and NSO. The DoT shall clearly spell out the areas of responsibility of VNO and NSO on these issues.**

Other Related Issues

G. Dispute resolution

- 6.33 Dispute resolution in telecom is entrusted with the Telecom Dispute Settlement Appellate Tribunal (TDSAT) established in 2000 through amendment to TRAI Act, 1997. It is the sole dispute resolution body in the communication sector. It can adjudicate any dispute between Licensor (Central Government) and a licensee, two or more service providers, between a service provider and a group of consumers. Since in the proposed licensing framework, it has been suggested that a VNO shall be a service provider, therefore the dispute resolution in context of VNO shall also be determined by the same body which is handling such cases for existing TSPs.
- 6.34 In view of above, the **Authority recommends that dispute resolution in case of VNOs shall be determined by TDSAT as per the prevailing dispute resolution mechanism in TRAI Act 1997.**

H. Penal Provisions

- 6.35 The provisions for quantum of maximum penalty under UL vary from Rs. 10 Lakh to 50 Crore depending on the type of authorization e.g. for 'Access Service Provider' the penalty is Rs. 50 Crore and for Class 'C' ISP the penalty is Rs. 10 Lakh. Some of these financial penalties are associated with failure on the part of service provider to meet the subscriber verification criteria set by licensor. The proposed VNO has to invariably comply with such service related provisions of subscriber verification. Therefore, a VNO shall be treated at par with existing NSOs on subscriber verification related penalties.
- 6.36 In view of the above, the **Authority recommends that a VNO shall bear the penalty on account of failure of subscriber verification norms (for its own customers). Other penalties which are beyond the scope of the VNO viz. roll out obligations, core network issues etc. shall be borne by the NSO as per existing norms defined for them.**

I. Exit from service delivery (business) by a VNO

- 6.37 As per existing provisions, a licensee may surrender the License or any service authorization under this License, by giving an advance notice of at least 60 calendar days. In that case, it shall also notify all its customers by sending a notice 30 calendar days prior to surrender of license. The Licensee shall pay all fees payable by it till the date on which the surrender of the License/Service authorization becomes effective.
- 6.38 With the introduction of MNP facility, a mobile telecom customer has option to port his mobile number to the network of any of the TSPs of its choice. For other services, in order to protect the consumer interests, it is necessary that such customers of VNOs are migrated to the parent NSO without any extra charges such as upfront /activation charges. In the mutual commercial agreement between the NSO and the VNO these

provisions will be built-in as mandatory provisions. Regarding surrender of UL(VNO) license, the time period for intimation to the licensor, TRAI, NSO and customers should be similar to as those mentioned in the UL.

6.39 In view of the above, the **Authority recommends that:**

(a) In case a VNO wants to exit/surrender its License/Authorisation(s), it shall notify 60 calendar days in advance to the licensor, TRAI and NSO and shall notify 30 calendar days in advance to its customers.

(b) For the services other than mobile, all customers of VNO will be migrated to any of the tariff plan of the parent NSO without any extra charges e.g. upfront/activation charges. The mobile services customers of the VNO can port their mobile numbers, using MNP facility, to the service providers of their choice. These provisions shall be built-in as mandatory provisions in the commercial agreement between the NSO and the VNO.

CHAPTER VII: SUMMARY OF RECOMMENDATIONS

7.1 The Authority recommends that :

- (a) VNOs be introduced through a proper “licensing framework” in the Indian telecom sector.
- (b) VNOs that enter the network would do so based on arriving at a mutual agreement between an NSO and a VNO.

[Para 2.21]

7.2 The Authority recommends that VNOs should be permitted for all services notified in the UL.

[Para 3.9]

7.3 The Authority recommends that the terms and conditions of sharing of infrastructure between the NSO and VNO should be left to the market i.e. on the basis of mutually accepted terms and conditions between the NSO and the VNO.

[Para 3.17]

7.4 The Authority recommends that:

(a) VNOs be permitted to set up their own network equipment viz. BTS, BSC, MSC, RSU, DSLAMs, LAN switches, where there is no requirement of interconnection with other NSO(s). Therefore, they should not be allowed to own/install equipment viz. GMSCs, Soft-switches and TAX.

(b) Equipment permitted to be owned/installed by VNOs should conform to the technical standards prescribed by standardization bodies like TEC and ITU.

(c) VNOs may also be allowed to create their own service delivery platforms in respect of customer service, billing and VAS.

[Para 3.23]

7.5 The Authority recommends that :

- a) MSOs/LCOs who want to provide broadband services through their cable network may do so by obtaining a VNO license.
- b) MSOs/LCOs may also share their cable infrastructure with VNOs, after the MSO/LCO register themselves as an IP-I service provider.

[Para 3.29]

7.6 The Authority recommends that:

- (a) For introducing VNO in the sector, there should be a separate category of license namely UL (VNO). This UL (VNO) will contain similar authorizations for services and service areas as provided in the existing UL.
- (b) The UL (VNO) license will have two parts i.e. Part-I and Part-II. Part-I will be the general terms and conditions for the VNO license and Part-II will be the terms and conditions specific to the service authorization for the VNO.
- (c) An operator who wishes to provide telecom services to its customers utilizing the underlying network and/or access spectrum of an existing NSO will have to obtain UL (VNO) license. Such UL (VNO) licensee will be permitted to build its own infrastructure as already recommended in Para 3.23 of the recommendations.

[Para 4.15]

7.7 The Authority recommends that, resale of IPLC presently under the UL shall be shifted from the existing UL to UL (VNO) licensing in order to make a clear distinction among the class of operators.

[Para 4.17]

7.8 The Authority recommends that like UL authorization, only pan-India or service area-wise authorizations may be granted under a UL (VNO)

license. However, UL (VNO) licensee will be able to service an area within the LSA of the NSO with which the VNO has entered into an agreement for delivery of services. [Para 5.8]

7.9 The Authority recommends that:

(a) Since VNOs are a new concept in India, initially the duration of the License of a VNO should be fixed as 10 years extendable further for 10 years at a time by the licensor. However, depending on technological developments and experience gathered, this duration of license can be reviewed after 3-4 years.

(b) The agreement of a VNO with a NSO will terminate with the expiry of the license of either party.

[Para 5.14]

7.10 The Authority recommends that there should not be a restriction on the number of VNO licensees per service area. [Para 5.19]

7.11 The Authority recommends that, in order to increase utilization and efficiency of telecom infrastructure, there should be no restriction on the number of VNOs parented by an NSO. [Para 5.24]

7.12 The Authority recommends that VNOs will be allowed to have agreements with more than one NSO for all services other than access services and such services which need numbering and unique identity of the customers.

[Para 5.31]

7.13 The Authority recommends that:

(a) An NSO shall allocate a numbering range to their VNO(s) from the numbering range allocated to it by the licensor.

(b) VNOs shall also utilise the LRN and network codes of the parent

NSO for the purpose of routing of calls.

[Para 5.40]

7.14 The Authority recommends that:

- (a) A VNO should be a company registered under the Indian Companies Act 1956 (as amended).
- (b) The entry fee for UL (VNO) with a given authorisation will be 50% of the entry fee prescribed for the UL.
- (c) As VNO would not be forced to create infrastructure therefore no roll out obligations may be casted upon VNOs. Therefore, no PBG may be prescribed for VNOs.
- (d) Financial Bank Guarantee will be equal to the amount of two quarter license fee.
- (e) Minimum equity and minimum networth may be kept at 40% of the amount prescribed under UL.
- (f) The proposed financial conditions for services covered under UL(VNO) are prescribed in the table below:-

Table 5.1

Sl. No.	Service Authorization(s) (VNO)	Minimum Equity (Rs. Cr.)	Minimum Networth (Rs. Cr.)	Entry Fee (Rs. Cr.)
1	UL(VNO-All services)	10.0	10.0	7.5
2	Access Service (Telecom Circle / Metro Area)	1.0	1.0	0.5 (0.25 for NE & J&K)
3	NLD (National Area)	1.0	1.0	1.25
4	ILD (National Area)	1.0	1.0	1.25
5	VSAT (National Area)	Nil	Nil	0.15
6	PMRTS (Telecom circle/Metro)	Nil	Nil	0.0025
7	GMPCS (National Area)	1.0	1.0	0.5

8	INSAT MSS-R (National Area)	Nil	Nil	0.15
9	ISP "A" (National Area)	Nil	Nil	0.15
10	ISP "B" (Telecom circle/Metro Area)	Nil	Nil	0.010
11	ISP "C" (SSA)	Nil	Nil	0.001

[Para 5.47]

7.15 The Authority recommends that under UL(VNO) the provision for restriction of 10% or more equity cross holding to be applicable between (i) a VNO and another NSO (other than VNO's parent NSO) and (ii) between a VNO and another VNO authorized to provide access services using the access spectrum of different NSO in the same service area.

[Para 5.54]

7.16 The Authority recommends that:

(a) A VNO shall be liable to pay LF as a percentage of AGR at the same rate as that of the parent NSO.

(b) VNO shall also be liable to pay the SUC for the wireless service(s) it offers to the customers. The SUC rate will be same as that of the parent NSO.

[Para 6.8]

7.17 Since QoS is in the exclusive domain of TRAI, therefore, once the UL (VNO) based regime comes into force, the Authority will put in place comprehensive regulations on QoS parameters to be complied separately by NSOs and VNOs.

[Para 6.14]

7.18 The Authority recommends that VNOs should be independently responsible and comply with the Telecom Tariff Orders (TTOs)/regulations/directions/decisions issued from time to time. VNOs shall also comply with all reporting requirements as specified by

the Licensor and the Authority from time to time. [Para 6.17]

7.19 The Authority recommends that:

(a) MNP process shall be facilitated for MVNO subscribers through the network (MNP Gateway) of the parent NSO.

(b) All regulations, orders and directions issued by TRAI in connection with MNP will be applicable to VNOs.

[Para 6.21]

7.20 The Authority recommends that there should not be any mandate to an NSO for providing time bound access to its VNO; rather, it should be left to the mutual agreement between NSO and VNO. However TRAI/DoT shall have right to intervene in the matter as and when required to protect the interest of consumers and telecom sector.

[Para 6.26]

7.21 The Authority recommends that CAF verification and number activation shall be the responsibility of a VNO. To fulfill the requirement of law enforcement agencies and national security related issues, there must be joint responsibility of VNO and NSO. The DoT shall clearly spell out the areas of responsibility of VNO and NSO on these issues.

[Para 6.32]

7.22 The Authority recommends that dispute resolution in case of VNOs shall be determined by TDSAT as per the prevailing dispute resolution mechanism in TRAI Act 1997.

[Para 6.34]

7.23 The Authority recommends that a VNO shall bear the penalty on account of failure of subscriber verification norms (for its own customers). Other penalties which are beyond the scope of the VNO viz. roll out obligations, core network issues etc. shall be borne by the NSO as per existing norms defined for them.

[Para 6.35]

7.24 The Authority recommends that:

- (a) In case a VNO wants to exit/surrender its License/Authorisation(s), it shall notify 60 calendar days in advance to the licensor, TRAI and NSO and shall notify 30 calendar days in advance to its customers.**

- (b) For the services other than mobile, all customers of VNO will be migrated to any of the tariff plan of the parent NSO without any extra charges e.g. upfront/activation charges. The mobile services customers of the VNO can port their mobile numbers, using MNP facility, to the service providers of their choice. These provisions shall be built-in as mandatory provisions in the commercial agreement between the NSO and the VNO.**

[Para 6.39]

**F.No.800-23/2011-VAS
Ministry of Communication & IT
Department of Telecommunication
Sanchar Bhawan, New Delhi
Access Services Wing**

Dated the 7th July, 2014

To

The Secretary
Telecom Regulatory Authority of India
Mahanagar Doorsanchar Bhawan
Jawaharlal Nehru Marg (Old Minto Road)
New Delhi - 110002

Subject: Recommendations for delinking of licencing of networks on delivery of services by way of virtual network operators including associated issues of definition of Adjusted Gross Revenue under unified licencing regime.

Sir,

The Government has announced National Telecom Policy (NTP), 2012 which inter-alia stipulates:-

"3.3. To move towards Unified Licence regime in order to exploit the attendant benefits of convergence, spectrum liberalisation and facilitate delinking of the licensing of Networks from the delivery of Services to the end users in order to enable operators to optimally and efficiently utilise their networks and spectrum by sharing active and passive infrastructure. This will enhance the quality of service, optimize investments and help address the issue of the digital divide. This new licensing regime will address the requirements of level playing field, rollout obligations, policy on merger & acquisition, non-discriminatory interconnection including interconnection at IP level etc. while ensuring adequate competition.

3.8 To facilitate resale at the service level under the proposed licensing regime – both wholesale and retail, for example, by introduction of virtual operators – in tune with the need for robust competition at consumer end while ensuring due compliance with security and other license related obligations."

2. TRAI has given its recommendation namely, 'Guidelines for Unified Licences / Class Licences and Migration of existing Licensees' on 16.4.2012 which were deliberated by DoT in the context of NTP 2012.

3. DoT had decided in 2013 that Unified licence may be introduced in two phases with delinking of licensing of networks from delivery of services being taken up in a subsequent phase.

4. Accordingly, Telecom Regulatory Authority of India is requested to submit its recommendations for delinking of licensing of networks from delivery of services by way of virtual network operators etc. Including associated issues such as Adjusted Gross Revenue, terms of sharing of passive & active infrastructure etc. under unified licensing regime.

Yours faithfully,

P.K. Mittal
(P.K. Mittal)

DDG (AS-1)/7/12

Ph.: 23717050

LIST OF ACRONYMS

S.No.	Acronyms	Description
1.	AGR	Adjusted Gross Revenue
2.	ARPU	Average Revenue Per User
3.	BBNL	Bharat Broadband Network Limited
4.	BSC	Base Station Controller
5.	BSNL	Bharat Sanchar Nigam Limited
6.	BSO	Basic Service Operator
7.	BTS	Base Transceiver Station
8.	BWA	Broadband Wireless Access
9.	CAF	Customer Acquisition/Application Form
10.	Capex	Capital Expenditure
11.	CCR	Call Completion Ratio
12.	CDMA	Code Division Multiple Access
13.	CMRTS	Captive Mobile Radio Trunking Service
14.	CMTS	Cellular Mobile Telephony Service
15.	CP	Consultation Paper
16.	CUG	Closed User Group
17.	DOCSIS	Data Over Cable Service Interface Specification
18.	DoT	Department Of Telecommunications
19.	DSLAM	Digital Subscriber Line Access Multiplexer
20.	FBG	Financial Bank Guarantee
21.	FBO	Facilities-Based Operator
22.	FBP	Facilities-Based Provider
23.	FDI	Foreign Direct Investment
24.	GMPCS	Global Mobile Personal Communication By Satellite
25.	GMSC	Gateway Mobile Switching Center
26.	GoI	Government Of India
27.	GP	Gram Panchayat
28.	GSM	Global System for Mobile Communications

S.No.	Acronyms	Description
29.	HFC	Hybrid Fiber Coaxial
30.	HLR	Home Location Register
31.	HTS	High Throughput Satellite
32.	ICT	Information And Communication Technologies
33.	ILD	International Long Distance
34.	IMSI	International Mobile Subscriber Identity
35.	INSAT	Indian National Satellite
36.	IP-I	Infrastructure Providers-Category-I
37.	IPLC	International Private Leased Circuit
38.	ISP	Internet Service Provider
39.	ITU	International Telecommunication Union
40.	Kbps	Kilobits Per Second
41.	LAN	Local Area Network
42.	LCO	Local Cable Operator
43.	LF	License Fee
44.	LRN	Locational Routing Number
45.	LSA	Licensed Service Area
46.	LTE	Long Term Evolution
47.	M&A	Mergers And Acquisitions
48.	M2M	Machine-To-Machine
49.	Mbps	Megabits Per Second
50.	MCC	Mobile Country Code
51.	MNC	Mobile Network Code
52.	MNO	Mobile Network Operator
53.	MNP	Mobile Number Portability
54.	MOST	Mobile Operator Shared Tower
55.	MSC	Mobile Switching Centre
56.	MSO	Multi System Operator

S.No.	Acronyms	Description
57.	MSS	Mobile Satellite System
58.	MTNL	Mahanagar Telephone Nigam Limited
59.	MVNO	Mobile Virtual Network Operator
60.	NLD	National Long Distance
61.	NOFN	National Optical Fibre Network
62.	NSO	Network Services Operator
63.	NTP	National Telecom Policy
64.	OFC	Optical Fibre Cable
65.	OHD	Open House Discussion
66.	PBG	Performance Bank Guarantee
67.	PCP	Pre-Consultation Paper
68.	PMRTS	Public Mobile Radio Trunking Service
69.	PSU	Public Sector Undertaking
70.	QoS	Quality Of Service
71.	RAN	Radio Access Network
72.	ROI	Return On Investment
73.	RoW	Right Of Way
74.	RSU	Remote Switching Unit
75.	SBO	Services-Based Operator
76.	SBP	Service Based Provider
77.	SIM	Subscriber Identity Module
78.	SLA	Service Level Agreement
79.	SSA	Secondary Switching Area
80.	SUC	Spectrum Usage Charges
81.	TAX	Trunk Automatic Exchange
82.	TDSAT	Telecom Dispute Settlement Appellate Tribunal
83.	TEC	Telecom Engineering Center
84.	TRAI	Telecom Regulatory Authority Of India

S.No.	Acronyms	Description
85.	TSPs	Telecom Service Providers
86.	TTOs	Telecom Tariff Orders
87.	UAS	Unified Access Service
88.	UASL	Unified Access Service License
89.	UL	Unified License
90.	UL(AS)	Unified License (Access Service)
91.	USOF	Universal Service Obligation Fund
92.	VAS	Value-Added Service
93.	VLR	Visitor Location Register
94.	VNO	Virtual Network Operator
95.	VSAT	Very Small Aperture Terminal