

**CONSUMER PROTECTION ASSOCIATION  
HIMMATNAGAR  
DIST. : SABARKANTHA  
GUJARAT**



**Comments  
On**

**Connectivity to Access Service VNOs From More Than one NSO**

**Introduction :**

Connectivity is typically required to access services from Virtual Network Operators (VNOs) that utilize Network Service Orchestrators (NSOs) from more than one provider. NSOs are responsible for the orchestration and management of network services, including provisioning, configuration, and optimization. VNOs, on the other hand, are entities that provide network services using resources from multiple network infrastructure providers.

To access services from VNOs that leverage NSOs from different providers, connectivity is necessary to establish communication between the various components of the network infrastructure. This connectivity allows for

the coordination and integration of services across different NSOs, enabling seamless provisioning and management of network resources.

In essence, without connectivity, it would be challenging to access services from VNOs that rely on NSOs from multiple providers, as the essential communication and coordination between these components would be hindered.

Connectivity to access services from Virtual Network Operators (VNOs) utilizing Network Service Orchestrators (NSOs) from multiple providers can offer several benefits to consumers:

**Service Flexibility:** With connectivity to VNOs using multiple NSOs, consumers have access to a wider range of services and offerings. This flexibility allows consumers to choose services that best meet their specific needs and preferences.

**Improved Reliability:** By leveraging resources from multiple NSOs, VNOs can enhance the reliability of their services. If there are issues or outages with one NSO, the VNO can seamlessly switch to another NSO to maintain service continuity, thereby reducing the risk of service disruptions for consumers.

**Increased Innovation:** Competition among VNOs utilizing different NSOs can drive innovation in service offerings and technologies. Consumers may benefit from new features, improved performance, and enhanced user experiences as VNOs strive to differentiate themselves in the market.

**Better Service Quality:** Connectivity to VNOs using multiple NSOs can lead to improved service quality, as VNOs may leverage the strengths and capabilities

of each NSO to deliver optimized performance and reliability. This can result in faster speeds, lower latency, and better overall network performance for consumers.

**Cost Savings:** Competition among VNOs leveraging multiple NSOs may lead to competitive pricing and cost-saving opportunities for consumers. VNOs may offer more competitive pricing plans or bundle services to attract customers, ultimately providing consumers with more affordable options.

Overall, connectivity to VNOs from more than one NSO can empower consumers with greater choice, reliability, innovation, quality, and cost savings in the services they access.

When connecting to services provided by Virtual Network Operators (VNOs) from multiple Network Service Orchestrators (NSOs), several precautions should be taken to ensure smooth operations and optimal performance. Here are some precautions to consider:

**Interoperability Testing:** Before implementing connectivity to VNOs from multiple NSOs, thorough interoperability testing should be conducted to ensure seamless integration and compatibility between different network components and systems.

**Security Measures:** Implement robust security measures to protect sensitive data and prevent unauthorized access. This includes encryption, access controls, intrusion detection systems, and regular security audits to mitigate potential security risks.

**Redundancy and Failover Mechanisms:** Set up redundancy and failover mechanisms to ensure high availability and reliability of services. This may involve redundant network links, backup systems, and failover protocols to minimize downtime and service disruptions.

**Performance Monitoring:** Implement comprehensive performance monitoring tools and processes to continuously monitor network performance and identify any potential issues or bottlenecks. This allows for proactive management and optimization of network resources to maintain optimal performance levels.

**Service Level Agreements (SLAs):** Establish clear SLAs with VNOs and NSOs to define expectations regarding service availability, performance, and support. Ensure that SLAs are regularly reviewed and enforced to hold service providers accountable for meeting agreed-upon service levels.

**Scalability:** Ensure that the connectivity solution is scalable to accommodate future growth and increasing demand for services. This may involve designing a flexible architecture that can easily accommodate additional users, applications, and network resources as needed.

**Compliance with Regulations:** Ensure compliance with relevant regulatory requirements and industry standards governing network connectivity and data privacy. This includes compliance with concerned laws as well as industry-specific regulations and standards.

**Regular Maintenance and Updates:** Implement regular maintenance schedules and software updates to keep network infrastructure and systems

up to date with the latest security patches, bug fixes, and feature enhancements.

By taking these precautions, organizations can mitigate risks, enhance security, and ensure the reliability and performance of connectivity to VNOs from multiple NSOs.

## **ISSUES FOR CONSULTATION**

**Q1. In your view, what is the maximum number of Network Service Operators (NSOs) from whom a UL (VNO) licensee holding Access Service Authorization should be permitted to take connectivity in a licensed service area (LSA) for providing wireline access service? Kindly provide a detailed response with justification.**

### **Comments :**

Determining the maximum number of NSOs that a UL (VNO) licensee can connect with may have implications for competition, market structure, and the quality of services provided to consumers. Setting such a limit could help ensure fair access to network resources, prevent anti-competitive behavior, and promote a level playing field among market players.

However, the decision to impose such a limit would involve considerations of market dynamics, technological advancements, and the overall regulatory framework. It would also require economic analysis, and assessments of potential impacts on the industry.

The TRAI should set guidelines and limits on the number of NSOs that a UL (VNO) licensee can connect with in order to ensure fair competition, efficient use of resources, and quality of service for consumers. The specific maximum number of NSOs permitted may be determined based on factors such as market dynamics, infrastructure availability, spectrum availability, and regulatory objectives.

Ofcom, the UK's communications regulator, typically focuses on promoting fair competition and efficient use of resources in the telecommunications sector. They may set guidelines and regulations to ensure that access to network services is provided on fair and non-discriminatory terms. However, the specific arrangements regarding the number of NSOs that a UL (VNO) licensee can connect with are often subject to negotiation between the parties involved and may vary depending on market conditions and specific agreements.

The FCC typically regulates the telecommunications industry in the United States with a focus on promoting competition, ensuring consumer protection, and managing spectrum allocation. However, specific arrangements regarding the number of NSOs that a UL (VNO) licensee can connect with are often determined by market dynamics, business negotiations, and contractual agreements rather than explicit FCC regulations.

Deciding on a maximum number of Network Service Operators (NSOs) from whom a UL (VNO) licensee holding Access Service Authorization should be permitted to take connectivity in a licensed service area (LSA) for providing

wireline access service in India can have both advantages and disadvantages. Let's explore some of the pros and cons:

### **Pros:**

**Promotes Competition:** Setting a maximum number of NSOs can prevent market concentration and promote competition by ensuring that multiple operators have access to network infrastructure.

**Ensures Fair Access:** It can ensure fair access to network resources, preventing dominant operators from unfairly limiting access to smaller players like UL (VNO) licensees.

**Encourages Innovation:** Competition among multiple NSOs can drive innovation and the development of new services, technologies, and business models.

**Improves Service Quality:** Increased competition can lead to improved service quality as NSOs strive to differentiate themselves and attract customers.

**Protects Consumers:** By fostering competition, consumers may benefit from a wider range of choices, better pricing, and improved service offerings.

### **Cons:**

**Administrative Burden:** Implementing and enforcing a maximum number of NSOs could create administrative complexities for regulators, operators, and stakeholders.

**Market Distortions:** Setting artificial limits on the number of NSOs may distort market dynamics and hinder the natural evolution of the telecommunications industry.

**Potential for Regulatory Capture:** Regulatory decisions on setting limits could be influenced by powerful incumbents, leading to regulations that favour their interests over smaller competitors.

**Impact on Investment:** Operators may be less inclined to invest in network infrastructure if they are limited in their ability to monetize their investments by serving additional NSOs.

**Reduced Flexibility:** Imposing strict limits on the number of NSOs could reduce flexibility and innovation in business models, potentially stifling competition and market development.

In summary, while setting a maximum number of NSOs can have benefits in terms of promoting competition and ensuring fair access, it also poses challenges related to administrative complexity, market distortions, and potential regulatory capture. Finding the right balance between promoting competition and fostering market stability is crucial for regulators when considering such policies.

**Q2. In case your response to the Q1 is a number greater than one, what should be the associated terms and conditions for permitting such connectivity? Kindly provide a detailed response with justification.**

**Comments :**



When connecting to a Virtual Network Operator (VNO) service from multiple Network Service Operators (NSOs), there are several associated terms and conditions that should be considered. These terms and conditions may vary based on the specific agreements between the parties involved and Regulatory Framework in place, but here are some common considerations:

**Service Level Agreements (SLAs):**

Define the expected level of service, including uptime, latency, and reliability.

Specify penalties or credits for failure to meet SLA targets.

**Interconnection Agreements:**

Detail the technical specifications for connecting to the VNO service from multiple NSOs.

Specify the responsibilities of each party in maintaining and managing the interconnections.

**Traffic Management:**

Outline policies for traffic routing, prioritization, and congestion management.

Ensure fair and equitable distribution of network resources among connected NSOs.

**Pricing and Payment Terms:**

- Specify the billing arrangements, including pricing, invoicing, and payment terms.
- Address how costs are allocated among the NSOs based on their usage of the VNO service.

- Outline the pricing structure for access to NSOs' network infrastructure and any revenue-sharing arrangements between the NSOs and VNOs.

### **Compliance and Regulatory Requirements:**

Ensure compliance with applicable laws, regulations, and industry standards including Licensing obligations, Spectrum Usage, and Consumer Protection Regulations.

Specify requirements for obtaining necessary licenses or permits.

### **Dispute Resolution:**

Establish procedures for resolving disputes between the VNO and NSOs.

Define escalation paths and mechanisms for mediation, arbitration or litigation procedures.

### **Termination and Exit Strategy:**

Outline conditions and procedures for terminating the agreement, including notice periods, liabilities, and arrangements for transitioning customers and services.

Address transition planning and data migration in the event of termination.

### **Intellectual Property Rights:**

Address ownership and licensing of intellectual property rights related to network infrastructure, technologies, and services deployed by both parties.

**Liability and Indemnification:**

Define liability limits and indemnification obligations for each party.

Allocate responsibility for damages resulting from breaches or misconduct.

**Monitoring and Reporting:**

Specify procedures for monitoring network performance and security.

Define reporting requirements for incidents, outages, and performance metrics.

**Change Management:**

Outline procedures for implementing changes to the VNO service or network infrastructure.

Address notification requirements and approval processes for changes that may impact NSOs.

**Service Level Agreements (SLAs):**

Define the quality of service parameters such as network uptime, latency, and packet loss that the NSOs must maintain for the VNOs.

**Access to Infrastructure:**

Specify the access rights of VNOs to NSOs' physical infrastructure including towers, cables, and other network equipment necessary for providing services.

**Technical Standards Compliance:**

Ensure that VNOs adhere to technical standards and specifications set by regulatory authorities or industry standards bodies to maintain interoperability and compatibility with NSOs' networks.

**Security and Data Protection:**

Define measures to ensure the security and integrity of the network infrastructure and customer data, including protocols for handling security incidents and breaches.

**Customer Support and Service Assurance:**

Detail the responsibilities of both parties regarding customer support, fault resolution, and service assurance, including escalation procedures for resolving disputes.

**Network Interconnection and Roaming:**

Specify terms for network interconnection between NSOs and VNOs, as well as provisions for national and international roaming services.

**Business Continuity and Disaster Recovery:**

Define strategies and responsibilities for ensuring business continuity and disaster recovery in the event of network outages or natural disasters.

**Competition and Non-discrimination:**

Prohibit anti-competitive behavior and ensure non-discriminatory access to network infrastructure and services for all VNOs operating in the license area.

These terms and conditions should aim to establish a mutually beneficial relationship between NSOs and VNOs, fostering competition, innovation, and efficient use of network resources while safeguarding the interests of consumers and promoting the development of the telecommunications sector.

**Q3. Whether a UL (VNO) licensee holding Access Service Authorization in an LSA should be permitted to take connectivity from one NSO for wireless access service and other NSO(s) for wireline access service in the LSA? Kindly provide a detailed response with justification.**

**Comments :**

In most regulatory contexts, such arrangements are typically subject to regulatory guidelines and policies set forth by the relevant telecommunications authority. The decision on whether such mixed sourcing arrangements are permissible would depend on various factors including regulatory frameworks, competition policies, and specific licensing conditions.

Some factors to consider might include:

**Regulatory Framework:**

The regulatory framework governing the telecommunications sector can stipulate guidelines regarding interconnection and access agreements between UL (VNO) licensees and NSOs.

Guidelines regarding interconnection and access agreements between UL (VNO) licenses and NSOs (Network Service Operators) are essential for ensuring fair competition, efficient network operation, and consumer welfare.

Here are some key aspects that TRAI may consider when formulating such guidelines:

**Interconnection Standards:**

Establishing technical standards for interconnection between UL (VNO) networks and NSO networks is crucial to ensure seamless communication between different operators' networks. These standards may include protocols, interfaces, and performance benchmarks.

**Access Pricing:**

TRAI may set guidelines for pricing access to NSO networks for UL (VNO) licensees. This could involve cost-based pricing methodologies to ensure fairness and prevent anti-competitive behavior.

**Non-Discrimination:**

Regulations should prohibit NSOs from discriminating against UL (VNO) licensees in terms of access to network resources, quality of service, or pricing. Non-discrimination clauses help maintain a level playing field in the market.

**Transparency Requirements:**

TRAI may require NSOs to provide transparent information about their network infrastructure, pricing structures, and terms of access agreements to UL (VNO) licensees. Transparency promotes informed decision-making and fosters competition.

### **Dispute Resolution Mechanisms:**

Establishing mechanisms for resolving disputes between UL (VNO) licensees and NSOs is important to address conflicts that may arise regarding interconnection, access, or pricing. These mechanisms could include arbitration, mediation, or regulatory intervention.

### **Service Level Agreements (SLAs):**

Guidelines may outline requirements for SLAs between UL (VNO) licensees and NSOs to ensure the provision of reliable and high-quality services to end-users. SLAs may specify parameters such as network performance, uptime, and fault resolution times.

### **Security and Privacy Standards:**

TRAI may mandate adherence to security and privacy standards to protect sensitive information and ensure the security of communications traversing interconnected networks.

### **Compliance and Monitoring:**

TRAI should establish procedures for monitoring compliance with interconnection and access agreements, including regular audits and reporting requirements. Enforcement mechanisms should be in place to address instances of non-compliance.

### **Promotion of Innovation and Investment:**

Guidelines should strike a balance between promoting innovation and investment in network infrastructure while safeguarding competition and

consumer interests. Encouraging innovation benefits consumers by fostering the development of new services and technologies.

### **Periodic Review and Update:**

Regulatory authorities should periodically review and update interconnection and access guidelines to reflect changes in market dynamics, technology advancements, and regulatory objectives.

By addressing these aspects, TRAI can create a conducive environment for fair competition, efficient network operation, and the delivery of high-quality telecommunications services to consumers.

### **Competition Policies:**

TRAI often aim to foster competition within the telecommunications sector. Allowing UL (VNO) licensees to procure connectivity from multiple NSOs could potentially enhance competition by providing more options to consumers and fostering innovation.

### **Licensing Conditions:**

The specific terms and conditions of the UL (VNO) license might also address the issue of sourcing connectivity from multiple NSOs within an LSA. Compliance with these conditions would be essential.

### **Technical Considerations:**

There may be technical considerations regarding interoperability and network integration when sourcing connectivity from multiple NSOs. Ensuring



seamless service delivery and quality of service could be important factors in making such decisions.

**Consumer Benefit:**

Ultimately, TRAI should assess whether allowing UL (VNO) licensees to source connectivity from multiple NSOs benefits consumers in terms of service quality, choice, and affordability.

**Q4. In case your response to the Q3 is in the affirmative, what should be the associated terms and conditions for permitting such connectivity? Kindly provide a detailed response with justification.**

**Comments :**

Associated terms and conditions for permitting interconnection and access agreements between UL (VNO) licenses and NSOs (Network Service Operators) are critical for ensuring clarity, fairness, and effective operation of telecommunications networks. These terms and conditions may vary depending on the regulatory framework and market conditions, but here are some common elements that could be included:

**Scope of Interconnection:**

Clearly define the scope of interconnection, including the types of services, locations, and network elements covered by the agreement. This helps avoid ambiguity and ensures that both parties understand their rights and obligations.

**Technical Specifications:**

Specify technical standards, protocols, interfaces, and compatibility requirements for interconnecting networks. This ensures seamless communication between UL (VNO) and NSO networks and facilitates efficient service delivery.

**Access Charges and Pricing:**

Outline the charges, fees, and pricing methodologies for accessing NSO networks. This may include one-time setup fees, recurring access charges, usage-based fees, and any applicable discounts or incentives. Pricing terms should be transparent, non-discriminatory, and based on cost-oriented principles.

**Service Level Agreements (SLAs):**

Define service level targets and performance metrics related to network availability, reliability, latency, packet loss, and other relevant parameters. SLAs should specify remedies, penalties, and compensation mechanisms for breaches of service level commitments.

**Interconnection Capacity and Scalability:**

Address issues related to interconnection capacity, scalability, and congestion management to ensure that adequate resources are available to accommodate growing traffic demands and fluctuations in usage patterns.

## **Quality of Service (QoS):**

Specify QoS requirements for interconnection, including minimum service quality standards and mechanisms for monitoring and enforcing QoS compliance. This helps maintain a consistent level of service across interconnected networks.

Quality of Service (QoS) standards regarding interconnection and access between UL (VNO) licenses and NSOs (Network Service Operators) are essential for ensuring the delivery of reliable, high-quality telecommunications services to end-users. These standards typically address various aspects of service performance, including network availability, reliability, latency, packet loss, and jitter. Here are some key QoS standards that TRAI may consider implementing:

### **Network Availability:**

Specify the minimum acceptable level of network availability, expressed as a percentage of uptime over a specified period (e.g., 99.9% availability per month). This ensures that interconnected networks are operational and accessible to users most of the time.

### **Reliability and Resilience:**

Define requirements for network reliability and resilience to minimize service disruptions and downtime. This may include redundancy, failover mechanisms, and disaster recovery strategies to ensure continuous service delivery.

**Latency:**

Set maximum allowable latency thresholds for end-to-end communication between interconnected networks. Low latency is crucial for real-time applications such as voice and video calling, online gaming, and financial transactions.

**Packet Loss:**

Specify maximum acceptable packet loss rates to maintain the integrity and reliability of data transmission across interconnected networks. Excessive packet loss can degrade the quality of voice and video communications and disrupt data applications.

**Jitter:**

Define limits on packet jitter, which refers to the variation in packet arrival times over a network. Minimizing jitter is essential for ensuring smooth, consistent performance in real-time multimedia applications.

**Bandwidth and Throughput:**

Establish minimum bandwidth requirements and throughput capacities for interconnection links to accommodate expected traffic volumes and meet users' bandwidth demands. This ensures that interconnected networks can handle peak loads without degradation in performance.

**Service Restoration Time:**

Specify maximum allowable service restoration times in the event of network failures or disruptions. Prompt restoration of service minimizes downtime and mitigates the impact on end-users.

**Quality Monitoring and Reporting:**

Require UL (VNO) licensees and NSOs to implement monitoring mechanisms to continuously assess QoS parameters and report performance metrics to the regulatory authority. This enables proactive management of network performance and facilitates compliance with QoS standards.

**Customer Support and Service Assurance:**

Define requirements for customer support, fault resolution, and service assurance processes to address QoS-related issues promptly. This includes establishing escalation procedures, service level targets, and mechanisms for compensating users for QoS breaches.

**Compliance and Enforcement:**

Establish mechanisms for verifying compliance with QoS standards, conducting audits, and enforcing corrective actions in case of non-compliance. TRAI may impose penalties or sanctions on operators failing to meet QoS requirements.

By implementing robust QoS standards for interconnection and access agreements, TRAI can promote a competitive telecommunications market while ensuring that users receive reliable, high-quality services that meet their expectations for performance and reliability.

**Security and Privacy Protections:**

Implement measures to protect the security and privacy of communications traversing interconnected networks. This may include encryption, authentication, access controls, data protection, and compliance with applicable privacy regulations.

**Dispute Resolution Mechanisms:**

Establish procedures for resolving disputes and disagreements between UL (VNO) licensees and NSOs regarding interconnection, access, pricing, or service quality issues. This may involve mediation, arbitration, regulatory intervention, or other alternative dispute resolution mechanisms.

**Compliance and Reporting Requirements:**

Define obligations for both parties to comply with regulatory requirements, submit periodic reports, and undergo audits or inspections as necessary. Compliance with interconnection and access agreements should be monitored and enforced by the regulatory authority.

**Term and Termination:**

Specify the duration of the agreement, conditions for renewal, and procedures for termination or suspension. Include provisions for orderly transition or migration in case of agreement termination or network disconnection.

## **Regulatory Compliance:**

Ensure that interconnection and access agreements comply with relevant laws, regulations, and regulatory directives governing the telecommunications sector. This may include competition laws, licensing conditions, consumer protection regulations, and other regulatory requirements.

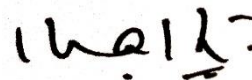
By incorporating these associated terms and conditions into interconnection and access agreements, TRAI can promote fair competition, encourage investment in network infrastructure, and safeguard the interests of consumers and stakeholders in the telecommunications ecosystem.

**Q5. Whether there are any other relevant issues or suggestions related to the parenting of licensees holding Access Service Authorization under UL (VNO)? Please provide a detailed response with justification.**

**Comments :**               **No.**

Thanks.

Yours faithfully,



( Prof. Dr. Kashyapnath )

President

Member Organization : TRAI