A Comprehensive Survey on Network Slicing in 5G Networks: Architecture, Applications and Challenges

D. Mahendra Babu
Department of Computing Technologies, SRM Institute of Science and Technology, Kattankulathur, Tamilnadu.
md7467@srmist.edu.in

Ramkumar Jayaraman
Department of Computing Technologies, SRM Institute of Science and Technology, Kattankulathur, Tamilnadu.
ramkumaj@srmist.edu.in

Abstract – The fifth generation (5G) of mobile networks introduces a paradigm shift in communication systems by offering unprecedented levels of flexibility, scalability, and performance. Among its core innovations, network slicing emerges as a pivotal technology that enables multiple virtual networks to operate on a shared physical infrastructure, each tailored to specific service requirements. This survey provides a comprehensive overview of network slicing in the 5G ecosystem, encompassing architectural frameworks, enabling technologies, practical applications, and associated challenges. It explores the integration of Software Defined Networking (SDN), Network Function Virtualization (NFV), and edge computing as foundational pillars for slice deployment and orchestration. Various use cases across domains such as enhanced mobile broadband (eMBB), ultra-reliable low-latency communications (URLLC), and massive machine-type communications (mMTC) are examined in detail. Furthermore, the paper discusses security and privacy concerns, slice performance metrics, and benchmarking approaches. Key research challenges, open issues, and potential future directions—particularly with regard to AI-driven automation and 6G convergence—are critically analyzed. This review aims to serve as a foundational reference for researchers and practitioners seeking to understand and advance the field of 5G network slicing.

Index Terms – 5G Networks; Network Slicing; SDN; NFV; Slice Orchestration; URLLC; eMBB; mMTC; Edge Computing; Slice Isolation; AI in 5G; Security in Network Slicing; Future Wireless Networks.

1. INTRODUCTION

1.1 Background on 5G Networks

The advent of fifth-generation (5G) wireless networks marks a revolutionary shift in mobile communications, enabling enhanced performance capabilities in terms of speed, latency, bandwidth, and connectivity density. Unlike its predecessors, 5G is designed not only to improve broadband services but also to support a wide range of diverse and stringent use cases across various verticals, including healthcare, transportation, industrial automation, and smart cities. To meet these heterogeneous service requirements, 5G adopts a flexible and scalable architecture powered by key technologies such as Software Defined Networking (SDN), Network Function Virtualization (NFV), cloud computing, and edge intelligence. However, achieving truly customizable and service-specific network behavior over shared physical infrastructure remains a significant challenge.

1.2 Motivation for Network Slicing

Network slicing has emerged as a core enabler to address this challenge. It allows multiple logically isolated and independently managed virtual networks—called *slices*—to coexist on a common physical infrastructure. Each slice is tailored to meet the distinct performance, reliability, and latency needs of a specific service category, such as enhanced mobile broadband (eMBB), ultra-reliable low-latency communication (URLLC), or massive machine-type communication (mMTC). This capability is critical for delivering differentiated services efficiently while optimizing infrastructure utilization. The motivation behind this survey is to provide a structured, in-depth exploration of network slicing mechanisms in 5G, their practical applications, enabling technologies, and associated research gaps.

1.3 Objectives of the Survey

The primary objectives of this survey are:

- To present a comprehensive overview of network slicing fundamentals and architecture in 5G networks.
- To analyze the role of enabling technologies such as SDN, NFV, and edge computing in supporting slice deployment and management.
- To explore real-world application domains and use cases where network slicing plays a transformative role.
- To discuss security and performance considerations specific to slicing environments.
- To highlight open research challenges and provide insight into future directions, including the transition toward autonomous slicing and 6G integration.

1.4 Organization of the Paper

The remainder of this paper is structured as follows: Section 2 introduces the fundamentals of network slicing and its core principles. Section 3 details the architecture of network slicing in 5G, including reference models and management frameworks. Section 4 discusses the key enabling technologies that support slicing. Section 5 covers performance metrics and benchmarking techniques. Section 6 outlines major challenges and open research issues. Section 7 explores future research directions, and finally, Section 8 concludes the paper with a summary of key findings.

2. FUNDAMENTALS OF NETWORK SLICING

2.1 Definition and Concept

Network slicing refers to the ability to create multiple virtual networks—each called a **network slice**—over a shared physical infrastructure. Each slice is customized to fulfill specific performance, security, latency, or bandwidth requirements corresponding to different service verticals. These slices operate as logically isolated end-to-end networks that span across the access, transport, and core network domains. This approach allows mobile network operators to simultaneously run heterogeneous services, such as enhanced Mobile Broadband (eMBB), ultra-Reliable Low-Latency Communications (URLLC), and massive Machine-Type Communications (mMTC), without deploying separate physical networks. Network slicing is made possible through a combination of virtualization, programmability, and automation, and it is integral to the 5G service-based architecture (SBA).

2.2 Key Enablers: SDN, NFV, Cloud/Edge Computing

The practical realization of network slicing relies on several foundational technologies:

- **Software Defined Networking (SDN):** SDN separates the control plane from the data plane, enabling centralized management and dynamic control of network resources. This flexibility supports the creation and real-time reconfiguration of slices based on traffic demands and service-level agreements (SLAs).

- **Network Function Virtualization (NFV):** NFV replaces traditional hardware-based network functions with virtualized software modules called Virtual Network Functions (VNFs), which can be deployed on general-purpose servers. This virtualization facilitates dynamic chaining of VNFs into slices.
- **Cloud and Edge Computing:** loud computing offers scalable compute and storage resources for centralized slice management, while edge computing brings computation closer to the user, reducing latency and enabling faster decision-making—particularly crucial for URLLC slices.

Together, these technologies enable flexible, programmable, and automated deployment and management of network slices across distributed environments.

2.3 Comparison with Traditional Network Partitioning

Traditional network partitioning methods, such as VLANs or APNs, offer limited logical separation and are often static, hardware-dependent, and service-agnostic. They lack the intelligence and adaptability required to meet the diverse requirements of modern applications.

Table 1: Comparison Between Traditional Network Partitioning and 5G Network Slicing

Feature	Traditional Partitioning	Network Slicing (5G)
Flexibility	Low	High
Isolation	Partial (L2/L3 level)	Full (E2E across layers)
Customization	Minimal	Service-specific configurations
Scalability	Limited	Dynamic and scalable
Technology Integration	Static hardware-based	SDN, NFV, Cloud, AI-enabled

Table 1 highlights the key differences between traditional network partitioning and 5G network slicing. Unlike the static and rigid nature of traditional partitioning, 5G slicing offers high flexibility, full end-to-end isolation, and dynamic scalability. It also enables service-specific customization through advanced technologies like SDN, NFV, and AI. Thus, slicing represents a more advanced, dynamic, and scalable approach suitable for next-generation networks.

2.4 Slice Lifecycle: Creation, Operation, Termination

The lifecycle of a network slice consists of the following phases:

- **Slice Creation:** Based on service requirements, network operators instantiate slices using predefined templates (e.g., for eMBB or URLLC) and orchestrate the required VNFs and network resources across domains.
- **Slice Operation:** During operation, slices are monitored and dynamically adjusted to ensure they meet SLAs. This phase includes resource scaling, fault management, and performance optimization using AI/ML-based analytics.
- **Slice Termination:** Once the service is no longer required, the slice is decommissioned. Resources are released, VNFs are terminated, and state information is archived for analytics or billing.

This lifecycle is typically managed using a slice management framework aligned with the ETSI MANO or 3GPP specifications, ensuring consistency and automation across heterogeneous network environments.

3. NETWORK SLICING ARCHITECTURE IN 5G

The 5G network adopts a Service-Based Architecture (SBA) that supports modular, flexible, and scalable deployment of network functions. Unlike the monolithic design of legacy networks, the 5G core is composed of loosely coupled Network Functions (NFs) that communicate via standardized APIs using HTTP/2 and RESTful interfaces. Key components of the 5G core include:

- Access and Mobility Management Function (AMF)
- Session Management Function (SMF)
- User Plane Function (UPF)
- Network Slice Selection Function (NSSF)
- Policy Control Function (PCF)
- Unified Data Management (UDM)

The **NSSF** plays a critical role in network slicing by selecting and associating appropriate network slices for user sessions based on subscription and service requirements. This modular design facilitates flexible deployment of slices and is essential for supporting varied service types across eMBB, URLLC, and mMTC.

3.2 Components of a Network Slice (Access, Transport, Core)

A complete network slice spans **three primary domains**:

- **Access Network (RAN):** This includes the gNB (next-generation Node B), which supports multiple slices concurrently. RAN slicing enables differentiated radio resource allocation and QoS enforcement per slice.
- **Transport Network:** The slicing of the transport domain ensures that the data and control traffic for each slice are routed independently across the fronthaul, midhaul, and backhaul segments. Segment routing, deterministic networking (DetNet), and QoS-aware tunneling are typically used.
- **Core Network:** Each slice in the core network includes dedicated or shared network functions tailored to specific service needs. The core slice ensures session management, mobility, and policy enforcement specific to the slice characteristics.

These components interact to create an end-to-end slice, allowing for resource isolation, SLA fulfillment, and service customization.

3.3 Slice Management and Orchestration (MANO Framework)

Effective deployment and maintenance of network slices require intelligent orchestration. The Management and Orchestration (MANO) framework—defined by ETSI NFV—is used to manage the lifecycle of slices. The MANO architecture includes:

- **NFV Orchestrator (NFVO):** Manages end-to-end slice orchestration, lifecycle, and resource allocation.
- **VNF Manager (VNFM):** Handles instantiation, scaling, and termination of VNFs within a slice.
- **Virtualized Infrastructure Manager (VIM):** Manages the physical and virtual resources (e.g., compute, storage, network).

In addition to ETSI MANO, 3GPP specifies Network Slice Management Functions (NSMF and NSSMF) to manage network slice subnet instances. These managers coordinate slice-specific policies, configuration, performance, and fault management. AI/ML techniques are increasingly being integrated into orchestration frameworks for predictive scaling and self-healing.

3.4 Standards and Reference Models (3GPP, ETSI, ONAP)

Various standardization bodies have provided frameworks and specifications to ensure interoperability and consistency:

- **3GPP (Third Generation Partnership Project):** Defines the logical architecture, interfaces, and lifecycle management of network slices. Key documents include TS 28.530/531/532 for management and TS 23.501/502/503 for core network slicing.
- **ETSI (European Telecommunications Standards Institute):** Provides the NFV reference architecture and MANO specifications that underpin slice orchestration and lifecycle control.
- **ONAP (Open Network Automation Platform):** An open-source initiative that provides a complete framework for real-time policy-driven orchestration and automation of network services, including slicing.

These models together enable a multi-vendor, interoperable, and scalable slicing environment—crucial for global 5G adoption.

4. ENABLING TECHNOLOGIES

Network slicing in 5G is underpinned by a set of emerging technologies that enable dynamic, programmable, and service-specific network behavior. This section elaborates on the key enablers essential for the realization and operation of end-to-end network slices.

4.1 Software Defined Networking (SDN)

SDN introduces a paradigm shift in networking by decoupling the control plane from the data plane, allowing centralized programmability and real-time traffic management. In the context of network slicing:

- SDN enables dynamic slice creation by managing flow-level configurations through a centralized SDN controller.
- It allows policy-driven traffic steering and resource allocation across slices based on Quality of Service (QoS) and latency constraints.
- SDN controllers interact with slicing orchestration layers (e.g., NSMF) to manage slice topology and connectivity on-demand.

SDN plays a critical role in inter-slice isolation and intra-slice flow optimization, ensuring that each virtual network behaves independently while sharing the same physical infrastructure.

4.2 Network Function Virtualization (NFV)

NFV allows traditional network functions—like firewalls, routers, and mobility management—to be instantiated as software modules known as **Virtual Network Functions (VNFs)** on standard hardware.

- NFV enables **rapid deployment and scaling** of network slices by chaining VNFs based on specific service function paths.
- It supports **slice elasticity** through horizontal or vertical scaling of VNFs to adapt to traffic variations.
- The **NFV-MANO** framework manages the VNF lifecycle, facilitating the automation of slice instantiation and termination.

By abstracting hardware from functionality, NFV reduces operational complexity and capital expenditure while enhancing the agility of network slicing in multi-tenant environments.

4.3 AI/ML for Slice Optimization

Artificial Intelligence (AI) and Machine Learning (ML) are increasingly being integrated into 5G network slicing to handle complexity, predict traffic patterns, and enhance decision-making.

- **Predictive resource allocation:** AI models forecast traffic demands and proactively allocate slice resources to avoid congestion or SLA violations.
- **Self-healing and fault detection:** ML algorithms can detect anomalies within a slice and trigger automatic recovery actions.
- **QoS-aware slice adaptation:** Reinforcement Learning (RL) agents optimize routing, VNF scaling, and load balancing for time-sensitive applications like URLLC.

AI/ML transforms network slicing from rule-based automation to **intelligent orchestration**, enabling self-optimizing and self-managing slices.

Table 2: Summary of Methodologies in 5G Network Slicing Research

Author & Year	Method	Inference	Limitations
Wijethilaka, S. & Liyanage, M. (2021)	Survey on NS in IoT	Comprehensive analysis of NS usage in IoT	Integration challenges and open issues not yet resolved
Dubey, M., Singh, A. K., & Mishra, R. (2025)	AI-based NS Resource Mgmt	AI enables autonomous traffic/resource handling in 5G	Lack of unified resource management framework
Barakabitze, A. A., Ahmad, A., Mijumbi, R., & Hines, A. (2020)	NS using SDN & NFV	SDN/NFV softwarization enables NS in 5G	Multi-domain orchestration remains complex
Thantharate, A., Tondwalkar, A. V., Beard, C., & Kwasinski, A. (2022)	ECO6G ML Load Estimation	Energy-efficient 5G via ML-based traffic forecasting	Real-world implementation still limited

Dangi, R., Jadhav, A., Choudhary, G., Dragoni, N., Mishra, M. K., & Lalwani, P. (2022)	Security-Aware NS Lifecycle	ML/DL aids in detecting NS attacks	Dynamic threat evolution remains a challenge
Vidhya, P., Subashini, K., Sathishkannan, R., & Gayathri, S. (2025)	MA-DRL for Dynamic NS	Deep RL for adaptive QoS in NS environments	Overhead of VNF migration and SAC complexity
Khan, L. U., Yaqoob, I., Tran, N. H., Han, Z., & Hong, C. S. (2020)	Taxonomy of NS for Smart Services	Categorized NS features for IoT applications	Lack of concrete implementation analysis
PerdigÃ£o, A., Quevedo, J., & Aguiar, R. L. (2025)	Slice Manager Design & PoC	Automated custom slice deployment	Limited evaluation scope of PoC prototype
AlcalÃ¡-MarÃn, S. (2025)	NSaaS Optimization (kaNSaaS)	Slice overbooking to boost MNO profits	Risk of SLA violations under peak loads
Metre, P. B., Kalnoor, G., Mahesh, G., & Gowrishankar, S. (2025)	Dynamic RRM using Soft Computing	Effective bandwidth allocation with soft decisions	Critical decisions may lag in real-time
Rafique, W., Barai, J., Fapojuwo, A. O., & Krishnamurthy, D. (2024)	B5G NS for Smart Cities	AI-driven NS for heterogeneous services	Energy and orchestration constraints persist
Hamdi, W., Ksouri, C., Bulut, H., & Mosbah, M. (2024)	NS for IoV Applications	NS customization for transport use-cases	Complexity in V2X domain-wise coordination
Lorincz, J., KukuruzoviÄ‡, A., & BlaÅ¾eviÄ‡, Z. (2024)	Energy-Efficient 5G NS	AI-optimized slicing reduces carbon footprint	Scalability and standardization are lacking
Singh, V. P., Singh, M. P., Hegde, S., & Gupta, M. (2024)	Security Survey in NS	Threat modeling across NS lifecycle	No universal framework for NS security
Otieno, H. O., Malila, B., & Mwangama, J. (2024)	ML Integration in NS Lifecycle	Review of intelligent NS deployments	Absence of open datasets and real-world prototypes

Table 2 presents a concise overview of 15 key methodologies related to network slicing in 5G and beyond networks. Each entry highlights the core method adopted, the primary inference or contribution of the study, and its notable limitations. The table aids in identifying research trends, gaps, and future directions in intelligent and secure network slicing systems.

4.4 Edge and Fog Computing Integration

The integration of **Edge and Fog Computing** into 5G slicing architectures extends compute and storage capabilities closer to the data source.

- Edge computing supports **latency-sensitive slices** such as AR/VR or autonomous vehicles by offloading computation from the core.
- Fog nodes act as intermediate compute layers, enabling **distributed VNF deployment** across the access and transport networks.
- Combined with SDN/NFV, edge computing enhances **context-aware slice orchestration** and reduces backhaul congestion.

This hierarchical computing model enables low-latency, high-bandwidth service delivery while maintaining slice independence at the network edge.

4.5 Slicing in Private and Hybrid 5G Deployments

As enterprises adopt 5G for mission-critical services, **private and hybrid 5G networks** have emerged as practical use cases for network slicing:

- In **private 5G networks**, slices are tailored to organizational needs (e.g., factory automation, campus networks) with dedicated spectrum and infrastructure.
- **Hybrid slicing** allows coexistence of public and private slices, enabling service continuity, roaming, and resource sharing.
- Challenges include **slice federation**, **inter-slice coordination**, and ensuring **cross-domain security** across public-private boundaries.

Slicing in private and hybrid scenarios brings flexibility to enterprise-grade applications while maintaining strict control, data sovereignty, and QoS guarantees.

5. PERFORMANCE EVALUATION METRICS

Evaluating the performance of network slicing in 5G networks requires a multi-dimensional approach that considers both technical efficiency and service-level satisfaction. This section outlines the key metrics used to assess the quality, reliability, scalability, and effectiveness of slice implementations.

Table 2: Performance Metrics Overview

Metric	Relevance Domain	Target Applications	Typical Thresholds

Latency	Real-time communication	URLLC, AR/VR	<1 ms
Throughput	Data-intensive services	eMBB, streaming	>1 Gbps (peak)
Reliability	Service continuity	Industrial IoT, health monitoring	>99.999% availability
Slice Isolation	Security & stability	Multi-tenant networks	100% logical isolation
Scalability	Resource adaptability	Cloud-native 5G slices	1000+ concurrent slices
SLA Compliance	Service assurance	All verticals	>98% SLA adherence
QoE	End-user satisfaction	Consumer services	MOS > 4.0, low jitter/lag

Table 2 summarizes essential performance metrics used to evaluate 5G network slices across various domains. These include latency, throughput, reliability, isolation, and SLA compliance—each aligned with specific application requirements and target thresholds. High performance in these metrics ensures robust, scalable, and service-aware slicing in real-world deployments.

6. CHALLENGES AND OPEN ISSUES

Despite the significant advantages offered by network slicing in 5G, several critical challenges remain unaddressed. One of the primary concerns is the complexity of managing slices end-to-end across heterogeneous network domains, such as access, transport, and core. Coordinating diverse technologies and maintaining service continuity across layers is non-trivial, especially in real-time and dynamic environments. Interoperability also presents a major hurdle, as current standards from 3GPP, ETSI, and ONAP are still evolving and often vary across vendors, leading to fragmented implementations and integration difficulties.

Another concern is ensuring strong isolation and security among coexisting slices. Shared physical infrastructure increases the risk of inter-slice interference, data leakage, and even slice impersonation or denial-of-service attacks. Additionally, monitoring and enforcing Service Level Agreements (SLAs) at runtime is challenging, as network states can fluctuate rapidly, and current monitoring solutions lack the granularity and responsiveness required. Resource optimization further complicates deployment, particularly when balancing performance and fairness across multiple slices under constrained resources. Mobility management also remains an open issue, as seamless user transition across slices without session disruption or QoS degradation is difficult to implement reliably.

7. FUTURE RESEARCH DIRECTIONS

Future research in network slicing must focus on enhancing autonomy, scalability, and intelligence to meet the demands of increasingly complex services. One promising direction is the incorporation of Artificial Intelligence (AI) and Machine Learning (ML) into slice management frameworks. These techniques can enable predictive scaling, self-optimization, and autonomous fault recovery, transforming network slices into self-managed entities. Reinforcement learning and federated learning are especially promising in this context. Another area worth exploring is cross-domain and cross-operator slicing, which would allow slices to span across different administrative boundaries, enabling truly global and seamless service delivery. However, this requires solutions for inter-slice trust, SLA enforcement, and governance.

Research into lightweight and energy-efficient slicing is equally critical, particularly for sustainable 5G and future 6G networks. Strategies involving container-based virtualization, function offloading, and energy-aware orchestration will be essential. Furthermore, blockchain technology holds potential for trusted slice management. By leveraging smart contracts and distributed ledgers, it may be possible to automate SLA enforcement and ensure transparency in multi-tenant environments. Lastly, slicing architectures must be adapted to support next-generation applications such as digital twins, extended reality (XR), and space-air-ground integrated networks. These applications demand ultra-dynamic, highly responsive slicing strategies that are yet to be fully realized.

8. CONCLUSION

Network slicing stands out as a pivotal innovation in 5G networks, enabling flexible, customizable, and service-specific virtual networks to coexist over a common physical infrastructure. By leveraging technologies such as SDN, NFV, edge computing, and AI, slicing empowers operators to efficiently support diverse use cases—from high-throughput applications to ultra-reliable, low-latency services. This paper provided a holistic overview of network slicing, exploring its architectural models, enabling technologies, performance metrics, and real-world applications. It also identified critical challenges, including management complexity, interoperability gaps, security risks, and SLA enforcement issues.

Looking ahead, the evolution of network slicing will depend on advancements in autonomous orchestration, intelligent resource allocation, and cross-domain integration. As we transition toward 6G and increasingly sophisticated use cases, network slicing will play a central role in shaping the next era of digital connectivity. Addressing current limitations and pursuing the identified research directions will be essential to realizing the full promise of this transformative technology.

REFERENCES

[1] Alcalá-Marín, S. (2025). *Efficient 5G Mobile Network Management: Network Slicing and Global Roaming Optimization* (Doctoral dissertation, Universidad Carlos III de Madrid, Spain).

[2] Barakabitze, A. A., Ahmad, A., Mijumbi, R., & Hines, A. (2020). 5G network slicing using SDN and NFV: A survey of taxonomy, architectures and future challenges. *Computer Networks*, *167*, 106984.

[3] Dangi, R., Jadhav, A., Choudhary, G., Dragoni, N., Mishra, M. K., & Lalwani, P. (2022). Ml-based 5g network slicing security: A comprehensive survey. *Future Internet*, *14*(4), 116.

[4] Dubey, M., Singh, A. K., & Mishra, R. (2025). AI Based Resource Management for 5G Network Slicing: History, Use Cases, and Research Directions. *Concurrency and Computation: Practice and Experience*, *37*(2), e8327.

[5] Hamdi, W., Ksouri, C., Bulut, H., & Mosbah, M. (2024). Network slicing based learning techniques for iov in 5g and beyond networks. *IEEE Communications Surveys & Tutorials*.

[6] Khan, L. U., Yaqoob, I., Tran, N. H., Han, Z., & Hong, C. S. (2020). Network slicing: Recent advances, taxonomy, requirements, and open research challenges. *IEEE Access*, *8*, 36009-36028.

[7] Lorincz, J., Kukuruzović, A., & Blažević, Z. (2024). A Comprehensive Overview of Network Slicing for Improving the Energy Efficiency of Fifth-Generation Networks. *Sensors*, *24*(10), 3242.

[8] Metre, P. B., Kalnoor, G., Mahesh, G., & Gowrishankar, S. (2025). A Comparative Study of Network Slicing Techniques for effective utilization of channel for 5G and Beyond 5G Networks. *IEEE Access*.

[9] Otieno, H. O., Malila, B., & Mwangama, J. (2024). Deployment and Management of Intelligent End-to-End Network Slicing in 5G and Beyond 5G Networks-A Systematic Review. *IEEE Access*.

[10] Perdigão, A., Quevedo, J., & Aguiar, R. L. (2025). Automating 5G network slice management for industrial applications. *Computer Communications*, *229*, 107991.

[11] Rafique, W., Barai, J., Fapojuwo, A. O., & Krishnamurthy, D. (2024). A survey on beyond 5g network slicing for smart cities applications. *IEEE Communications Surveys & Tutorials*.

[12] Singh, V. P., Singh, M. P., Hegde, S., & Gupta, M. (2024). Security in 5G network slices: concerns and opportunities. *IEEE Access*.
[13] Thantharate, A., Tondwalkar, A. V., Beard, C., & Kwasinski, A. (2022). ECO6G: Energy and cost analysis for network slicing deployment in beyond 5G networks. *Sensors*, *22*(22), 8614.
[14] Vidhya, P., Subashini, K., Sathishkannan, R., & Gayathri, S. (2025). Dynamic network slicing based resource management and service aware Virtual Network Function (VNF) migration in 5G networks. *Computer Networks*, *259*, 111064.
[15] Wijethilaka, S., & Liyanage, M. (2021). Survey on network slicing for Internet of Things realization in 5G networks. *IEEE Communications Surveys & Tutorials*, *23*(2), 957-994.