DOI: http://dx.doi.org/10.26483/ijarcs.v16i6.7389

Volume 16, No. 6, November-December 2025

ISSN No. 0976-5697

International Journal of Advanced Research in Computer Science

RESEARCH PAPER

Available Online at www.ijarcs.info

# EVENT-DRIVEN PROVISIONING ARCHITECTURES FOR MODERN TELECOM NETWORKS: OVERCOMING LEGACY LIMITATIONS AND ENABLING AUTONOMOUS 6G OPERATIONS

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***Abstract*—**The Telecommunications industry is preparing to enter the post-5G phase, and the paper undertakes the task of outlining the pillars and visionary future that shape the course of the 6G wireless communication systems. As the industry recognizes the insatiable need to increase data rates and expand network coverage, this article traces the evolution of the current 5G infrastructure to the emerging 6G framework, which lays the groundwork for revolutionary strides in the 2030s. This review examines the transformation of telecom provisioning from outdated, tightly interlinked systems to contemporary, event-driven, cloud-native architectures that sustain the growth of intelligent, scalable communication networks. It highlights the disadvantages of SOA-based systems and illustrates how Event-Driven Architecture (EDA) offers greater modularity, faster responsiveness, and real-time processing. The paper discusses infrastructure auditing, the 5G transition, and security improvements as part of modernization processes, while considering integration challenges in mixed, multi-supplier environments. It further analyzes the use of Kafka and similar streaming technologies for the purpose of automated user provisioning, which in turn, leads to higher operational efficiency. The research forecasts 6G and identifies major architectural paradigms and enabling technologies such as AI, Integrated Sensing and Communication (ISAC), and blockchain, highlighting their role in creating resilient telecom systems ready for the future.

***Keywords*—**6G Networks, Telecom Provisioning, Legacy Modernization, Event-Driven Architecture (EDA), Cloud-Native Systems.

## I. INTRODUCTION

Communication technologies are undergoing a series of revolutionary changes due to the rapid development of communication applications. Cellular mobile communication technologies have seen five generations of development to dat[1][2]. Higher frequencies, wider bandwidths, and higher data rates are gradually introduced in each new generation of wireless communication systems, from the first generation (1G) analogue systems to the 5G online systems. Globally, 5G technology has being used to address the growing need for mobile data services. Nonetheless, it is clear that a more sophisticated technology than the present 5G networks is needed to manage the increasing data flow as the world becomes more automated. Herein lies the role of the sixth generation, or "6G," network [3], which should be able to handle this exponential increase in data traffic while offering consumers high-quality service[4]. The 6G network's lightning-fast data speeds, minimal latency, and massive connection capacities have revolutionized mobile wireless technology[5]. Mobile networks are being revolutionized by 6G networks[6] with its capacity to seamlessly blend the digital, biological, and physical realms by combining AI and ML. Furthermore, 6G networks serve as the foundation for the development of driverless cars, smart cities, and other applications that require dependable, high-bandwidth, and low-latency connections.

In the field of environmental monitoring, such as oil pipelines and fences, there is a high need for remote wireless sensors that can collect crucial data, identify occurrences, and communicate critical data for analysis[7]. The potential of human activity recognition using kinetic energy harvesting (HARKE) was evaluated, achieving 80-95% accuracy. "Event-driven" sensing systems typically use domain knowledge to extract characteristics of the voltage signal, then use those characteristics to interpret the signal and identify various environmental vibration modes.

The use of legacy systems remains crucial in today's ICT deployments. These systems are still used by large enterprises to run their operations, including providing essential services[8]. However, legacy systems that rely on outdated technology make it difficult for businesses to conduct day-to-day operations. 6G wireless networks[9] is a paradigm shift in the field of telecommunications since it is the first time that AI and more advanced radio technologies are so closely combined [10]. This development is not a simple upgrade to 5G but rather the leap forward in the revolution in terms of intelligent, adaptable, and highly efficient communication.

### *A. Structure of the paper*

The organization of the paper is as follows: In Section II, discuss the transformation of telecom provisioning from traditional systems to event-driven architectures. The implementation of event-driven provisioning workflows is the subject of Section III. Section IV, would like to shed some light on the forthcoming infrastructures of 6G and technological advancements, Section V summarizes the pertinent literature while Section VI wraps up with the conclusion and recommendations for future research.

## II. DEVELOPMENT OF TELECOM PROVISIONING: FROM LEGACY SYSTEMS TO EVENT-DRIVEN ARCHITECTURES

An alternative approach called Event-Driven Architecture (EDA) is based on listening for events and intended to address the drawbacks of SOA. In recent years, the software industry has embraced event-driven design at scale. The increased software flexibility and, more importantly, the need to decompose monolithic programs are the driving forces behind its acceptance. As a result, event-driven architecture is adopted by developers and architects based on "expert advice" rather than empirical data.

### *A. Modernizing the Legacy Systems in Telecommunications*

The renewal of ancient telecommunications infrastructure is necessary to provide the networks [11] that able to satisfy the requirements of the modern technologies of communication.

#### *1) Infrastructure Assessment and Assembly*

In the telecom industry, infrastructure is crucial for older systems. Planned obsolescence has greatly influenced consumer behaviour, particularly in the smartphone industry, which is a highly dynamic technology. The systematic intervention known as audit and feedback (A&F) aims to gather data, compare it with reference standards, and then provide it back to telecom operators through feedback sessions.

**Comprehensive Audit:** An audit is a methodical process of gathering and comparing data to improve the quality and outcomes of procedures or activities by adjusting problematic factors. Data is gathered using a set of quality indicators supplied by an interdisciplinary audit team, and the results are compared to the reference standards[12]. After that, any deviation resulting from these standards is reported to professionals in a well-organized stage known as feedback. This leads to the audit being viewed as a quality-improvement procedure aimed at enhancing patient care and outcomes.

#### *2) Adoption of Next-Generation Technologies*

The need for new applications, research advancements, and other significant opportunities for improvements at different levels have fueled the quick development of architecture, communication services, and technology. Historically, communication systems have been designed and operated as centralized, secure utility services with limited room for customization and specialization, particularly at the network edge.

**5G Deployment:** 5G has the potential to offer unlimited wireless connectivity, and offer the World-Wide Wireless Web (WWWW) is the ideal real-world wireless network. The latest level of mobile communications standards is 5G, in addition to the 4G/IMT improved standards. As of now, telecom companies or standardization organizations such as 3GPP, WiMAX Forum, or ITU-R have not published any formal specifications or documents under the term "5G." Every update adds new features and application areas while also enhancing system performance.

#### *3) Enhancing Network Security*

Network security is a major problem in the digital world because cyber threats are becoming more advanced [13]. Conventional security systems are not usually very effective in offering effective security against the emerging attacks. The telecommunications systems ensure efficient communication but are sophisticatedly targeted by malicious cyber threats. In this regard, therefore promising of good protocols of secure data may be viewed as core in maintaining integrity and confidentiality of data being transmitted.

**Data security Protocols:** Securing data protocols has become much more complicated now than when the telecommunication systems first started to be designed [14]. The initial systems relied on the use of only simple encryption protocols and the current systems have multi-layered security models [15] and quantum-resistant algorithms with AI-systems to detect threats.

### *B. Event-Driven Architectures in Telecommunications*

Event-Driven Architecture (EDA) is considered an attractive approach to overcoming these issues, as it represents a radical transformation in system communication and information processing. EDA has been shown to be of great benefit in the management of the elaborate streams of events within the telecom environment, whether in customer interaction or network surveillance in a large telecom environment [16]. The decoupled architecture enables telecom providers to handle millions of events each day while still scaling the system reliably with demand and quickly. Telecom platforms support event flow management, which entails the complex coordination of event streams across two or more services. This operation leverages advanced event management capabilities in a telecommunications network, such as dynamic event routing and priority-based processing. Figure 1 shows the event processing distribution.

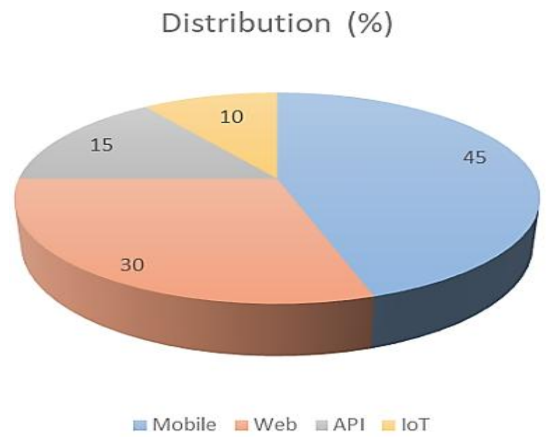


Fig. 1. Event Processing Distribution

#### *1) Fundamental Principles of EDA*

Three guiding concepts underpin the paradigm change in system design known as event-driven architecture, i.e, event production, event detection and event consumption. The principles are expressed in telecom platforms in the form of loosely coupled architecture in which services interact by events and not through direct calls. The architecture uses event brokers that would be used as middlemen and deliver and receive events reliably. This greatly minimize system dependencies and able to handle complex telecom operations better.

**Event Production:** Event production refers to the act of creating and releasing events - structured signalling that informs a change of state or occurrence in a system - so that they can be consumed by other components so that they can be subject to real-time processing (or automated actions).

#### *2) Key Technologies of EDA*

Modern EDA implementations in telecom environments rely heavily on robust event-streaming platforms. The technologies evolved in EDA, such as Apache Kafka and Azure Event Hub.

**Azure Event Hub:** Azure Event Hub also supplements this ecosystem by offering event processing that is cloud-native with inbuilt support of different protocols and automatic scalability. These technologies give the telecom platforms the capability to support millions of events within any given second yet with low latency and high reliability.

#### *3) Performance Optimization*

EDA has a variety of performance strategies, including asynchronous communication platforms, latency minimization, and load management.

**Asynchronous Communication Patterns:** A key component of telecom EDA implementation performance improvement is asynchronous communication. The architecture uses basic asynchronous designs such as message queuing, event streams, and publish-subscribe designs. Such patterns allow managing the telecom operations in an efficient manner by decoupled communication, where system can process the events without considering the time of arrival. To achieve a high level of event delivery and system responsiveness to varying load conditions, callback mechanisms and promise-based processing are implemented.

## III. Implementation of Event-Driven Provisioning for Modern Telecommunication

The current paradigm for building scalable and resilient distributed systems is event-driven architectures (EDA) that are able to support the gigantic increase in the real-time demands in data processing. The distributed systems of the modern architecture require low-latency and fault-tolerant event processing that goes beyond the capacities of the traditional messaging designs [17]. Despite the fact that serverless event buses, Apache Kafka, RabbitMQ, Apache Pulsar, NATS Jet Stream, and other frameworks have matured, there are no comparatively conducted frameworks that test them in integrated conditions.

### *A. User Provisioning Automation Event-Driven Workflows*

Provisioning of users plays a very important role in enterprise IT management. It is the process of developing, updating and maintaining user accounts in different systems to maintain that the employees, contractors and other users are provided with the corresponding access within their stay [18]. Manual user provisioning, however, is subject to delays, human error and security risks.

#### *1) Event-Driven Architectures in Enterprise Systems*

The popularity of event-driven architectures (EDA) in enterprise systems is that they allow real-time response to change by relaying events as they are received. Kafka LinkedIn created Kafka which is now an open-source project based on Apache, is a popular distributed event streaming system designed to offer high availability and scale.

#### *2) User Provisioning Systems and Automation*

Conventional user provisioning systems are rooted on Identity and Access Management (IAM) platforms, and they have manual procedures to add, modify or delete user accounts. The challenges experienced with these systems, however, include a failure to provide real time updates, high administrative overhead, and the inability to enforce compliance policies.

#### *3) Kafka's Role in Automated Workflows*

Kafka provides a disconnected, asynchronous messaging system suitable for automated workflows. The use of Kafka in conjunction with IAM, customer relationship management (CRM), and enterprise resource planning (ERP) systems to deliver real-time updates is becoming increasingly popular among organizations. Consistency is ensured by Kafka's ability to store messages and replay events even in a distributed environment.

### *B. Integration with Existing Telecom Ecosystems*

The integration of existing telecom ecosystems remains an ambitious task that requires the creation of new solutions, such as network services, applications, or platforms, to work smoothly with outdated infrastructure, OSS/BSS systems, and multi-vendor network components. The procedure requires adherence to industry norms (3GPP, TM Forum, ETSI), the use of common APIs, and careful administration across different network levels to deliver outputs that meet the performance, expansion capacity, and security requirements.

#### *1) Interworking with OSS/BSS, NFV, and SDN Controllers*

Telecommunications is the backbone of modern society, enabling all interactions, business transactions, and global connectivity. This massively huge network centers on the important concept of telecom service stability. Dependability of digital infrastructure  The ability of telecom networks to provide dependable and steady connection is known as telecom service dependability, and it is a fundamental component of digital infrastructure.

**OSS/BSS Systems:** Business Support Systems (BSS) and OSS are crucial parts of contemporary telecommunications infrastructure that track and improve a range of business and operational procedures[19]. Essential functions including network operations, service delivery, customer administration, invoicing, and revenue assurance are supported by a set of software applications, platforms, and tools called the OSS/BSS architecture.

**SDN and NFV Systems:** NFV provides considerably more flexibility by moving network services from specialized hardware to commodity hardware-based virtual machines [20]. As several industry and technological drivers collide, SDN has emerged as a driving force behind networking innovation and transformation. These include an emphasis on converged infrastructure (compute, storage, and network), software-defined data centers, and the expansion of cloud applications and services across business and cloud providers [21].

#### *2) Integration of Cloud-Native Telecom: API Exposure and Microservices*

To achieve flexible, dynamic computing, connection service scheduling, and real-time, accurate discovery of available computing power, communication and computing elements must work together.  Cloud-native computing is becoming more and more popular in the telecom sector [22]. Telecommunication services have higher performance, security, and resilience requirements than nearly any other service[23]. To improve application speed and manageability, cloud-native design emphasizes container-based architecture, microservices, continuous delivery, and automated management.

**Role of APIs in the Telecom Transformation:** The contribution of APIs [24] to this change has become particularly important as it can be said that it is the basic building blocks which can be used to facilitate the seamless integration and automation [25]. The market analysis reveals that telecom operators using cloud-native architecture are recording significant gains across various operational metrics.

**Micro-Service Approach:** Despite the lack of full support for the present 3GPP protocol stack's purest use of cloud-native application design [26], Partial RAN components can be modified or refactored into microservices. Future RANs are expected to be service-flow-oriented and user-centric [26]. Typically, several bearer sessions from the same user or inter-user telecom service data flows are intended to be independent.

#### *3) Managing heterogeneity across multi-vendor environments*

The telecommunications infrastructure is experiencing a paradigm shift as operators all over the world shift into 5G and beyond [27]. The increasing number of connected devices and the need for low-latency services, such as augmented reality, industrial internet of things, and driverless cars, have forced several network providers to reevaluate their conventional methods. The current telecom networks are defined as multivendor environments, unlike the legacy single-vendor ecosystems in which equipment, software, and services are obtained via diverse suppliers [28]. Classical orchestration approaches fail in heterogeneous, multivendor settings. With AI-controlled orchestration, implemented within a cloud-native architecture, a number of benefits are introduced:

**Vendor-agnostic interoperability:** Native APIs and microservices separate configurations and vendor-specific syntax. High-level intents are converted into vendor-compliant commands with the help of AI models. Service meshes ensure seamless communication between multivendor functions.

**Scalability and Elasticity:** Kubernetes clusters can be scaled on need basis. AI predicts traffic peaks and resources are distributed in advance [29]. This minimize service interruptions, as well as enhance SLA compliance.

## IV. 6G Network Architecture and Enabling Technologies

The intersection of 6G and Artificial Intelligence (AI) represents a major technological advancement in the communications network arena. With the demand of the world to have ultra-fast, highly reliable and intelligent communication systems persisting to increase [30], 6G is scheduled to be able to outdo 5G by bringing in new features like ultra-low latency, massive connectivity and terahertz communication.

### *A. Network Architecture towards 6G*

Network architecture is an essential issue in the 6th generation (6G) research. It should adapt the requirements of emerging service scenarios, and promote the implementation of promising innovative technologies [31]. In addition, 6G is expected to solve the bottlenecks exposed by the current network, and consider the friendliness and sustainability of the communication industry ecology. This section describes the 6G network architecture.

#### *1) Service Framework of Three-Layer-Four-Plane*

The four-plane three-layer service structure is discussed below.

**Three Layer:** Adhering to the principles of network cloudification and servitization, the three layers, from bottom to top, are the network function layer, application enablement layer, and cloud-network resource layer.

**Four Plane:** Inheriting and enhancing the current control plane and the user plane, the 6G network functional plane expanded to the intelligent plane and the data plane for the service requirements of “connectivity plus”.

#### *2) DDAA Towards 6G*

DDAA towards 6G is proposed and explained below [32]. The masses of NFs are reduced to four NFUs, which correspond to the four planes in the network function layer: network control unit (NCU), network packet unit (NPU), network intelligence unit (NIU), and network data unit (NDU).

**NCU in the Control Plane:** NCU covers the basic capabilities of 5G NFs in the control plane and further provides adaptive access, digital twin UE (DUE) and other extended capabilities. First, as the primary element of the network control center, NCU is responsible for the signaling interaction and inherits existing network capabilities, including mobility management, session management, policy management, billing, authentication, and access management.

**NPU in the User Plane:** Under the principle of control and forwarding separation of design, NPU achieves the servitization improvement relying on UPF. NPU inherits the traditional functions of service data routing and forwarding, operation and policy execution, path measurement. And NPU evolves towards user plane programming, deterministic communication, cross-domain connectivity, and computing-networking services such as resource perception, service perception, task offloading, QoS identification and service routing.

### *B. Potential 6G Enabling Technologies*

The development of intelligent smart telecom systems might undergo a radical shift with the incorporation of cutting-edge 6G communication technology into telecommunication applications.

#### *1) Role of AI in 6G*

In contrast to earlier generations, sixth-generation (6G) networks must accommodate a wide variety of linked intelligent devices, each with extremely high data rates, broad frequency bands, ultra-low latency, and great energy efficiency[33]. 6G networks are able to overcome network obstacles with more agility, intelligence, flexibility, and resilience thanks to the application of AI. AI can effectively support 6G networks as well as evaluate, manage, and optimize resources.

#### *2) Role of Integrated Sensing and Communication (ISAC)*

In order to maximize and share the use of limited resources, ISAC procedures combine sensing and communication activities, which improves service efficiency [34]. There are several ways to make this sharing easier, such as co-design, co-existence, and collaboration. Communications and sensing activities in ISAC are completed utilizing shared resources such frequency bands, hardware modules, and time slots.

#### *3) Blockchain in 6G*

The distributed ledger approach is the foundation of blockchain[35]. This enables a decentralized, irreversible setup that eliminates the need for middlemen and enables participants to independently transact and validate the data on the ledger[36]. In a blockchain, self-executing smart contracts based on cryptographic protocols connect blocks.

## V. Literature Review

According to recent studies by experts, automation at the highest levels is enabling real-time event processing and service orchestration in modern telecom networks. However, there are still some issues regarding scaling event-driven provisioning across legacy systems, ensuring model reliability, and validating performance under complex conditions, which are of great concern, especially as networks evolve towards self-controlling 6G operations.

Hidalgo (2025) proposed a hybrid intelligent system for customer retention in the Peruvian telecommunications sector, combining a Bayesian classifier and a knowledge-based agent within an event-driven architecture. The system can identify users at high risk of churn in near real-time and generate personalized retention recommendations, achieving an average latency of 2 seconds and computational complexity of $O(1)$ for prediction and $O(r \times c)$ for rule evaluation. The solution follows the CRISP-DM methodology, processing billing, usage, complaints, and top-up data through big data tools such as Kafka and Spark [37].

Kamran *et al.* (2025) Network Functions (NFs) in the 5th Generation (5G) mobile communication system face many security-related challenges. Usage of legacy interfaces/protocols is one of them. The Short Message Service Function (SMSF) in the 5G core is the key network function that delivers short messages (SMS) from the Non-Access Stratum (NAS) to User Equipment (UE). SMS over NAS is an old service, in existence since the 2nd Generation (2G) mobile communication systems. Therefore, the SMSF in 5G core may need to interface with legacy network elements/functions via non-service-based (legacy) interfaces. Typically, these legacy interfaces are based on Diameter and/or Mobile Application Part (MAP) protocols [38].

According to Chen et al. (2024), a key component of 6G mobile communication networks is autonomous intelligent networks that facilitate seamless human-machine interaction. To address the "Enhanced Machine Communication" demands in 6G, they propose an intent-driven cooperative intelligent cluster concept that encompasses scenarios such as intelligent unmanned vehicles, smart factories, smart farms, smart warehouses, and intelligent home systems. This intent-driven cooperative intelligent cluster service necessitates new strategies for dynamic workgroup creation, cooperative operation among diverse devices, adaptive traffic management, task-level QoS management, and intelligent head node management, crucial for meeting the complex demands of 6G autonomous intelligent networks [39].

Arnez, de Souza and e Silva (2023) In the Global System for Mobile Communications (GSM) mobile system, cell broadcast (CB) is a crucial feature that enables messages to be broadcast to mobile users who are inside cell coverage. For example, weather warnings, public safety messages, and any kind of emergency alert (such as tornadoes, hurricanes, floods, kidnappings, or other dangerous circumstances) are sent via CB technology. However, it is difficult to ensure that mobile users receive the alert CB messages in remote regions due to dispersed populations and inadequate cell coverage[40].

Salazar-Chacon and Marrone (2022) Modern data center infrastructures are necessary for modern telecom service providers. One Overlay encapsulation protocol, "VXLAN," offers simplicity, adaptability, and responsiveness, facilitating technological advancements that meet consumer needs. This work uses the Open Networking paradigm to demonstrate a VXLAN proof-of-concept emulation and verifies the protocol's stated features using two methods: For large-scale installations, the less-used techniques of Ethernet VPN (EVPN) and Lightweight Network Virtualization (LNV) provide scalable, affordable, and high-performing solutions[41].

Dulong *et al.* (2021) presented NVCACHE, a method to enhance the writing performance of older programs by using a non-volatile main memory (NVMM) as a write cache. They contrast NVCACHE with I/O-intensive programs (SQLite, RocksDB) and file systems designed for NVMM (Ext4-DAX and NOVA). According to their analysis, NVCACHE achieves the same level of performance as the most advanced NVMM systems now in use, but without their drawbacks: Additional durability assurances are provided by NVCACHE, which operates transparently with legacy programs that have not been altered and does not restrict the size of the stored data to the capacity of the NVMM, even in cases when the source code is unavailable[42].

In the summary list of Table I, major studies are identified that addressed the above-mentioned problems in the areas of event-driven architectures, security, virtualization, autonomous networking, and legacy optimization in the context of telecom networks. Network operators and service providers who have invested in AI, big data, and cloud-native technologies can now process and interoperate instantly, yet the problems of legacy integration, scalability, and the reliability of distributed models remain.

TABLE I. SUMMARY OF RECENT STUDIES ON MODERN TELECOM NETWORKS AND 6G OPERATIONS

| Author & Year | Domain | Problem Addressed | Application Area | Relevance to Telecom Modernization |
|---|---|---|---|---|
| Hidalgo (2025) | Customer analytics, Big Data, Event-Driven Architecture | Inefficient churn detection and slow, non-personalized retention processes in telecom | Real-time churn prediction and retention recommendation | Demonstrates how EDA, AI, and big-data pipelines (Kafka, Spark) enable real-time decision systems, supporting digital transformation in customer management. |
| Kamran et al. (2025) | 5G Core Networks, Network Security | Security risks from legacy interfaces (Diameter, MAP) used by SMSF in 5G | SMS delivery over NAS and interworking with legacy network functions | Highlights how difficult it is to integrate 5G with older systems, underscoring the need for protocol development and secure modernization. |
| Chen et al. (2024) | 6G, Autonomous Networks, AI-driven orchestration | Lack of frameworks for intent-driven, cooperative | Smart vehicles, smart factories, IoT clusters, enhanced | Defines future 6G intelligent architectures that guide modernization |

 

| | | | | |
|---|---|---|---|---|
| | | intelligent clusters in 6G scenarios | machine communication | toward autonomous network operations and machine-centric services. |
| Arnez, de Souza & e Silva (2023) | GSM, Cell Broadcast Systems | Difficulty ensuring reliable alert delivery in rural areas with poor coverage | Emergency alert broadcasting (disaster, weather, public safety) | Addresses modernization needs for improving coverage and broadcast reliability, especially in underserved environments. |
| Salazar-Chacon & Marrone (2022) | Data Center Virtualization, Network Overlays (VXLAN, EVPN) | Need for scalable, flexible, low-cost data center networking for modern telecom | Data center network virtualization and large-scale overlay deployment | Supports cloud-native telecom infrastructure modernization through virtualized, scalable, and high-performance networking models. |
| Dulong et al. (2021) | Legacy Systems, Memory Optimization (NVMM) | Poor write performance and rigidity of legacy applications without code modification | Write-cache acceleration for legacy applications | Enhances modernization by enabling legacy systems to achieve near-state-of-the-art performance without requiring rewrites, supporting gradual migration. |

## VI. Conclusion And Future Work

The objective of the 6G network is to improve device-to-device connectivity. The benefits of employing AI algorithms and security measures outweigh those of 6G networks, which offer faster data rates. Cloud-native and event-driven architectures are seen as the new normal in telecom provisioning, as the industry prepares for more complex, data-intensive communication networks. Event-Driven Architecture (EDA) is a fundamental technology that enables communication between heterogeneous systems to occur instantaneously and incrementally, leveraging the resilience of the entire operational environment. The unification of several technologies such as Kafka-based automation, microservices, SDN/NFV, and cloud-native APIs has a paramount impact on the whole provisioning process, which turns out to be not only more efficient but also more flexible to diverse systems. Indeed, the telecom industry is quite optimistic about 6G and that AI, ISAC, and blockchain among the distinguished key enablers of future telecom ecosystems—smart and autonomous infrastructures. In view of the above, the study results confirm that the use of EDA and cloud-native paradigms is the mainstay of security, scalability, and the development of future-proof telecommunications networks.

In the future, researchers will have to test the performance of EDA-based provisioning in different telecom environments. Creating universal benchmarks for event-streaming platforms will be one of their tasks, along with studying the AI-controlled orchestration of networks across several vendors. Another way of gaining the understanding of 6G-native infrastructures, ISAC merging, and blockchain-powered automation will be via the development of fully autonomous and smart telecom ecosystems.

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