5G AND NETWORK SLICING TECHNOLOGY

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Abstract: The arrival of 5G technology will trigger an even bigger transformation than it. It will fundamentally improve the data throughput and ultralow latency of current mobile networks, therefore greatly expanding their capacity and reach. However, in a broader sense, 5G will serve as the foundation for several Industrial Revolution 4.0 (IR 4.0) technologies, including telemedicine, drones, virtual reality, augmented reality, and driverless cars. Through 5G, billions of different types of devices will be linked together and provide a level of functionality and user experience that has never been possible before. Our daily operations and way of life will alter forever. Fifth-generation (5G) applications improve services in line with availability, which depends on the significance of urgent situations and client preferences. Managing network traffic is still in high demand since there are so many people wanting to use the numerous services at once during peak times. This demand increases network traffic, slows down services, and limits access to service provider-owned facilities. The availability of 5G slices in network management can be assessed by using the fundamental specifications of the three slice types standardised by the Internet of Things (IoT), Enhanced Mobile Broadband (eMBB), and Ultra-Reliable and Low Latency Communications (URLLC) 5G slice committees. Through system modelling, rate, latency, and connectivity-based network slicing techniques make these issues simpler. The following three methods can be used to increase availability in response to demand for accessing issues. To boost service availability, which might not be reliant on latency and connectivity, rate levels are given precedence first. In order to enhance service availability, which may not be dependent on rate and connectivity, latency levels are given importance. In order to boost service availability, which may not be reliant on latency and rate, connection levels are given a higher importance. We may use software-defined network (SDN) technology to solve the problems since it allows for flexible settings as users deploy different services and applications. This strategic study article will look at novel slice algorithms of the network traffic system based on software-defined multiple access (SoDeMa) in order to enhance network traffic performance. Based on the average response time to the services, we may boost the availability of 5G slices with the aid of this system modelling.

I. INTRODUCTION TO 5G

Over the past two decades, both the number of mobile users globally and their data demands have grown dramatically. We have witnessed enormous advancements in mobile technology throughout the same time span. But the current mobile technologies are at their apex. If the new 5G technology in not switched, service quality and efficiency will substantially decline as more users and gadgets join the network.

5G technology for mobile networks is attracting interest from all across the world thanks to its promises of extremely fast data speeds, extremely low latency, and billions of connections. Consumers in Norway, Monaco, Australia, Ireland, Romania, New Zealand, the Philippines, China, and South Korea may access the first 5G mobile networks. Other nations, like Pakistan, Germany, and Finland, have already had 5G spectrum auctions and are preparing to construct and deploy networks shortly. 5G has already been introduced by more than 40 telecom carriers globally [1].

High data throughput is a feature of the highly scalable 5G technology. Different 5G cell types may handle various deployment scenarios, including residences, coffee shops, tiny offices, aeroplanes, retail establishments, airport terminals, transit hubs, and expansive open spaces. It is projected that, when fully deployed, it would completely replace Wi-Fi and the cellular mobile network, offering a unified user experience across all mobile and Internet of Things (IoT) devices. Power consumption, technical complexity, and cost will all be significantly reduced as a result of the cellular network and Wi-Fi's convergence.

The mobile telecoms industry in India has lately witnessed a seismic change. With the entry of new competitors, the industry has become extremely competitive, with improved coverage and cheaper, better voice and data options being offered to customers. All cell providers are now involved in a pricing war as a result of this. Their debts have increased while their revenues have decreased. In order to generate economies of scale and align synergies and improve competitiveness in the market, this move has also led to consolidation among mobile service providers [2]. In addition, the Supreme Court dismissed the appeals of the incumbent mobile operators in October 2019 and mandated that they pay back the government US$13.9 billion in penalties, licence fees, and interest payments (roughly US$3 billion for Bharti Airtel, US$1.8 billion for Reliance Jio, and US$3.9 billion for Vodafone Idea) [3]. The Supreme Court has granted a 10-year timeframe for paying the outstanding licensing fee in equal year installments [4]. These events appear to be obscuring India's 5G deployment.

The telecom equipment market is expected to grow to US$26.38 billion by 2020, helped in part by the country's predicted rise in internet users to 829 million by that year. With a 30% CAGR, the overall volume of internet traffic might quadruple by 2021. The Mobile Value-Added Services (MVAS) market is projected to grow at a CAGR of 18.3% to reach US$23.8 billion by the end of 2020 [5]. The National Digital Communications Policy of 2018 also aims to draw investments of $100 billion USD by 2022 [6]. Due to the potential for exponential development, mobile carriers in India are vying for the top spot in the country's future 5G market.

1.1 FREQUENCY SPECTRUM FOR 5G

One of the fundamental differences between 5G and prior generations of wireless networks is the frequency of the electromagnetic spectrum that the most recent standard of wireless technology employs. The most data that can be sent through a mobile network depends on the channel bandwidth, or the difference between the highest and lowest signal frequencies, that the technology can use. Lower frequencies on the frequency spectrum have narrower channel bandwidths, whereas higher frequencies have wider channel bandwidths. Even though digitalization, multiplexing techniques, and software-based data compression algorithms allow us to fit more data into the same channel bandwidth, the limitations of physics inevitably restrict future progress.

In order to provide a wider channel bandwidth, 5G is planned to operate in three distinct frequency bands: low-band, mid-band, and millimetre wave (mmWave). Low-band 5G operates in the same spectrum as 4G, often below 3GHz. At up to 250 Mbps, it delivers slightly faster internet speeds than 4G. Mid-band 5G uses a frequency range up to 6 GHz, which is typically used by Wi-Fi, and provides a downlink speed of up to 1 Gbit per second (Gbps). Using a significantly greater frequency band between 24GHz and 300GHz, millimetre wave 5G can deliver high-speed data at downlink speeds of up to 20 Gbps [7].

The 3GPP, a confederation of leading telecommunications standards development bodies, has proposed 5G NR (New Radio) as a new international standard for the air interface of 5G Networks. Under 5G NR, there are two frequency groups: FR1 (Frequency range 6 GHz), which covers the frequency range of 3.3–4.2 GHz and has a maximum channel bandwidth of 100 MHz, and FR 2 (Frequency range > 24 GHz), which covers the frequency range of 24–300 GHz and has a minimum channel bandwidth of 50 MHz and a maximum of 400 MHz. See Figure 1 for details on the 5G frequency spectrum in relation to audible sound and visible light.

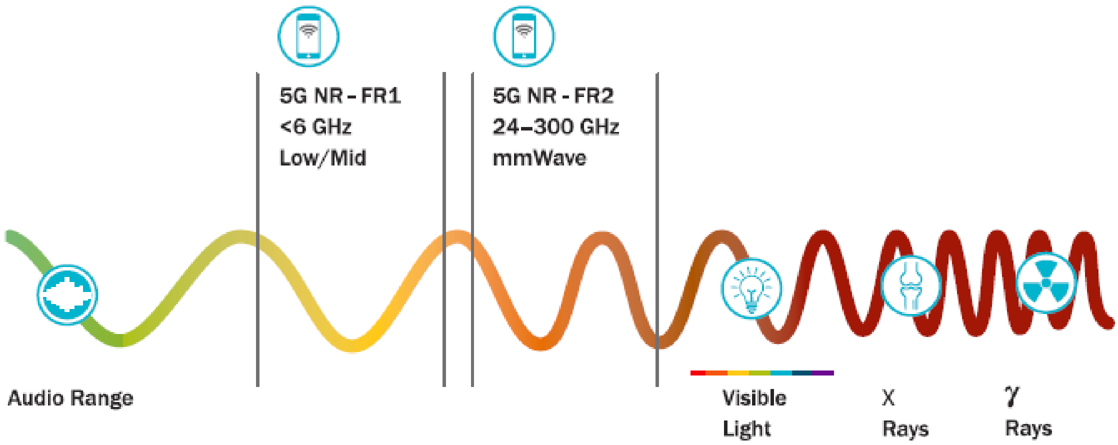

Figure 1. 5G Frequency Spectrum

Since low-band 5G can be developed on the current 4G infrastructure while mid-band and mmWave require new spectrum auctions, low-band 5G is anticipated to emerge a few years before 5G in the other two bands. However, the full potential of 5G will be realised once mmWave 5G is deployed. Many countries have reserved or started to release millimetre wave spectrum for 5G. The deployment of mmWave 5G would take several years.

Shorter distances are covered by the signal since mmWave 5G employs a higher frequency. To create a seamless 5G network, many additional cell towers will be needed due to the coverage area's limitations. The size of the cell tower antenna will be significantly smaller and less noticeable. Due to the enormous throughput capacities, each cell will be able to support up to 10 times more connections (such as mobile phones, tablets, and IoT devices) in the same locations as 4G. In heavily populated metropolitan regions, this 5G technology will thus be particularly beneficial.

1.2 PROS & CONS OF 5G

Like previous technologies, 5G offers both advantages and disadvantages as shown in Figure 2.

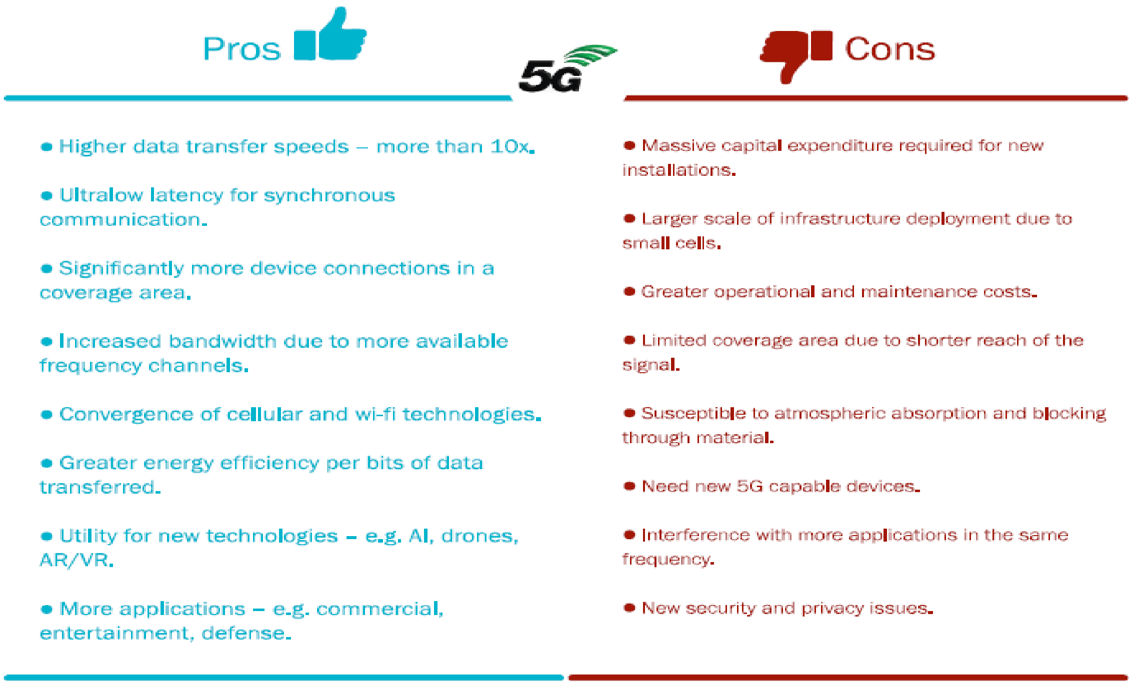

Figure 2. 5G: Pros and Cons

II. NETWORK SLICING: DIVIDING A SINGLE NETWORK INTO MANY SLICES

One advantage of 5G mobile networks is its ability to deliver broadband and low latency connections even when there are many devices connected to the network. Each use case has a distinct set of requirements, many of which may be orthogonal in terms of quality, enabling efficiency in situations like infrastructure sharing [8].

For example, while considering the use case of an autonomous car in virtual reality, which asks for high dependability and high throughput for safety, it also calls for high throughput with relaxed reliability because missing a few pixels, frames, or a lower resolution may be doable. Each of those quality metrics might be delivered simultaneously by the same physical infrastructure. On top of the same hardware, it is possible to build two network slices: one for the Vehicle Network with specific KPIs for latency and the other to provide high throughput for VR applications.

Network Slicing will be feasible from an implementation perspective thanks to the considerable usage of the Software Defined Networking (SDN) paradigm to manage the multiple devices involved and Network Functions Virtualization (NFV) to construct logically independent functions for each of the slices.

As an example, mobile network operators can divide their network into smaller virtual sub-networks and connect them. Due to the autonomous network operations provided by each partitioned virtual network, the services and functionalities may be customised to meet the needs of the customer. Slicing can theoretically separate the wireless access network, the core components of the Evolved Packet Core (EPC), or the data centres. The characteristics of network slicing include flexibility, common infrastructure, isolation, and a specialised network, as shown in Figure 3.

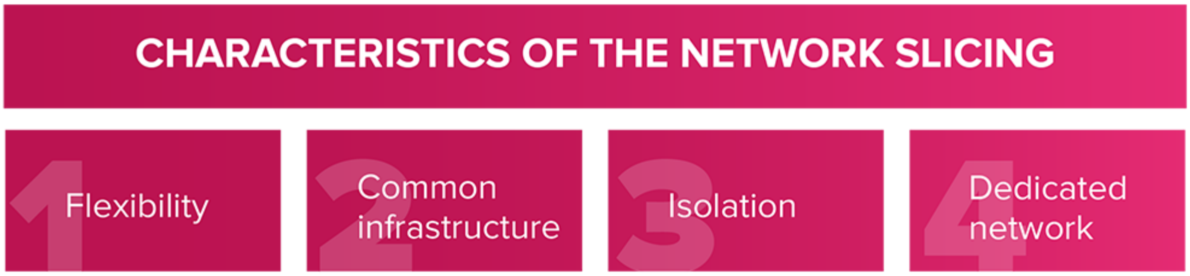

Figure 3. Network slicing characteristics

2.1 NECESSITY FOR NETWORK SLICING

When each application has to "see" a network configured in the optimum way to manage its traffic, network slicing is necessary. This is still possible with slicing, even if the network that the software sees is a "slice," a virtual "slice" of the actual network. Beyond merely showing the ideal network for an application, network slicing has further advantages.

The physical network's many "slices" are also separated from one another, which, among other things, guarantees greater communication security and the flexibility to modify the functionality of one slice without affecting the others. By acting specifically on just one slice, an operator can significantly alter the service it provides to its clients. As a result, testing and research on dedicated slices would be made possible. These slices could individually mirror an existing network and offer real services on top without interfering with other slices that maintain the existing network.

2.2 NETWORK SLICING APPLICATIONS

When a network service provider wants to offer several services, each with different requirements, they must share a physical infrastructure. Infrastructure sharing is made possible in a flexible and efficient way since the virtual slice may be "tailored" for the specific service without incorporating all the capabilities of the underlying network.

It may be said that slicing is utilised whenever there is a common infrastructure and on-demand customisation is feasible since it ensures isolation, ensured performance, scalability, and support for multi-vendor and multiple-operator scenarios.

2.3 PRINCIPAL PLAYERS AND APPLICATIONS

Due to the ability to utilise a shared hardware infrastructure that supports several logical and virtual networks and offers a choice of independent services, various players will benefit from network slicing.

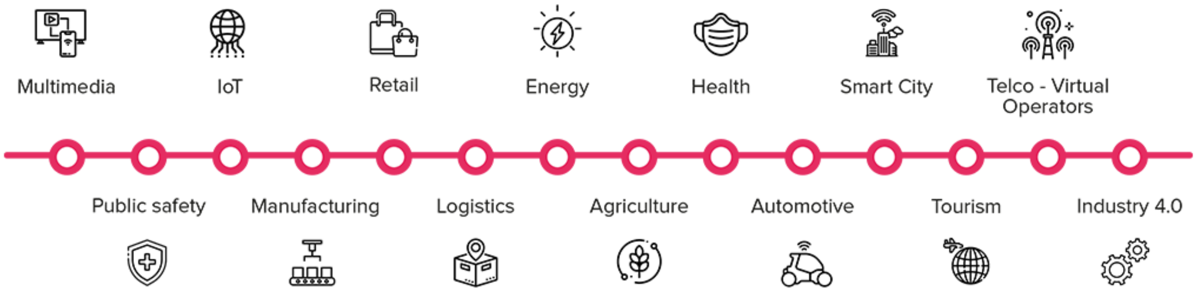

Figure 4. Applications of Network slicing

These participants may be the creators, suppliers, or consumers of such virtual services. Tourism, Multimedia, Manufacturing, Agriculture, Retail, Energy, Health, Public Safety, Logistics, Smart Cities, Automotive, Industry 4.0, Telco and Virtual Operators, and IoT in general are just a few of the industry sectors that are interested in the effects of Network Slicing. Figure 4 lists more business sectors as well.

III. CASE STUDY: THE SDN-BASED 5G NETWORK SLICING TECHNOLOGY FOR MANAGING NETWORK TRAFFIC

SDN-based technology is used to slice the 5G network and manage network traffic. Modern technologies prepare for significant network strain when numerous people simultaneously utilise several services and apps. Furthermore, a number of variables, such as how the channel between users and base stations varies depending on the location, affect the devices that users use and the services they require. Principles of network slicing and the availability of network slices provide the necessary assistance with the most modern SDN technology to improve these conditions. The main factors that promote boosting availability in the architecture of 5G network slices are latency, connectivity, and data rate [9–14]. When consumers access services and applications, connection, data throughput, and latency are requirements for traffic management.

Non-orthogonal multiple access (NOMA) and Orthogonal multiple access (OMA) are key components of the 5G network that improve the channel, transmission, and reception performance of data. SoDeMa, which was influenced by the delta OMA standard announced in [15], is currently thought to be a new multiple scheme for 5G and beyond. Despite being built on several OMA and NOMA schemes, the SDN concept has gained traction as a means of enhancing traffic throughput. When SoDeMa uses other numerous schemes that are impacted by OMA and NOMA, the switching capabilities of SDN swiftly pick the many NOMA and OMA kinds. Although customers have high hopes for 5G and 5G+, the network's availability is still being held back by high data traffic. This forecast is dependent on the transmission rate and channel capacity, two aspects of the 5G standard. User devices should be able to rapidly interface with internet services and apps, despite high expectations. The multiple access (MA), channel capacity, transmission rate, and other factors should be at the core of the management of the data flow. Due to the large volume of traffic and the necessity to find ways to increase the uptime of online services and apps, we are inspired to evaluate, monitor, and manage the traffic in this research. We developed a ground-breaking network slicing method and SoDeMa-based algorithm for the contribution based on the core properties of SDN. By defining network issues and settings through the SDN, which streamlines 5G slicing for regulating network traffic using SoDeMa, we may be able to speed up the reaction time for machine learning (ML) applications involved in fast timing.

IV. EVALUATION OF THE LITERATURE AND RELATED WORK

This section discusses the 5G network slice and how it manages network traffic using SoDeMa to improve the availability and accessibility of network services. The network slice method based on the requirements enables us to maximise the service availability by delivering the necessary functionality, despite the fact that SDN technology increases the 5G requirements. Network slices are essentially logical networks that provide precise and specific networking resources and network features.

Network slicing enables the creation of traffic isolations that give optimum solutions for different market clients. Network slicing is one of the key technologies of the 5G mobile networks, according to [16]. The slicing technique enables virtual networks and personalised, on-demand services. By 2030, a wide range of services and applications with possibly disparate technological requirements will be made possible by the network slicing capabilities of the 5G+ network. 5G+ slices for a mobile network operator should evolve into an end-to-end adaptive, scalable, and demand-oriented system to fulfil the variety of demands [17].

For enhancing and controlling network traffic, the 3GPP (3rd Generation Partnership Project) and telecommunications groups have standardised three types of slices [18]. Several high-speed communication and service sectors that rely on 5G slice management are combining with several automation industries. Different services, business models, etc. are among them. Basic network slices are only one of the numerous internal and external elements that make managing data traffic in 5G environments more difficult. Additionally, it makes it possible for big apps to use 5G networks' Quality of Service (QoS) mechanisms more easily.

The effective design of MA protocols makes the MA useful for controlling data flow. They include random access for brain communication, channel partitioning, cooperative content caching, cache management, dynamic resource management, etc. The development of MA protocols based on SoDeMa techniques will have several benefits, including an increase in data flow.

According to the authors of [19], TM is in charge of the lightweight data, which could only be 40 bytes in size. The admission control method improves TM and enables service providers to divide the 5G network, which handles monitoring and other light data traffic. This is done with the use of SDN. It's important to use effective algorithms for classifying sliced services in 5G mobile networks' data flow. SoDeMa may be used in these situations to streamline and distribute traffic based on the circumstances and priorities.

SDN-based traffic engineering solutions offer effective TM in any circumstance [20]. Instead of using a fixed weight setting for routing algorithms, service providers can improve network management and traffic performance by using dynamic weight settings. The conditions for TM are the traffic measures taken into account in the network applications. Despite the existence of several traffic models, the SDN idea dynamically monitors traffic measurements, improves monitoring capabilities, and systematically manages and regulates traffic.

Future network generations, such 5G+, will need to manage traffic and applications intelligently and dynamically in order to handle the numerous network communication services. Femtocells may be conceived of as having greater energy efficiency (EE) than giant cells in this scenario due to their broad coverage. Energy-efficient management through traffic monitoring, analysis, and measurement is a consideration while employing femtocells. We are eager to look into the traffic modelling utilised in IoT-femtocell based applications and slices related with accessing technologies, despite the many challenges. Different traffic models, such as the dynamic and static models shown in [22], enable us to develop an original plan that produces effective TM.

The innovation and full integration of microscopic cells may be foreseen in the 5G domain's coming forms. These cells are mobile phone nodes that improve frequency utilisation within the limited region while enhancing bandwidth efficiency, one of the metrics taken into consideration when assessing network traffic performance. The rapid spread of condensed networks among many connected Internet of Things devices is brought on by the improvement of bandwidth efficiency, which precludes any further range extension. Small cells in the upcoming 5G-based IoT support the development of traffic modelling with network slices, which enhance the network TM with the QoS and the availability of services during the peak period [23].

V. PERFORMANCE OF 5G SLICES

The TM depends on the network slice administrators, who organise the available slices according to user preferences and priorities. Based on the characteristics given in Table 1, we can create the network slice algorithm for managing services, network traffic, and ML-based 5G network applications.

Table1. Expected 5G MA functionalities in standardised slice types

Standard types of Slices	**Expected functionalities of 5G MA**	**Measurement details of SoDeMa used for managing traffic**
eMBB	High user density, large network capacity standardised user experience MU-MIMO is a simple multi-user multiple input multiple output system, transmission of many traffic kinds, highly effective transmission of small packets	Bandwidth, Power, spectrum Uptime, spectral efficiency, availability of EE, etc
URLLC	Ultra-low latency transmission, Ultra high-reliability transmission, Highly efficient small packets transmission	Rate details, EE Packet size Accuracy of latency Lifetime.
IoT	Large-scale connectivity	Scalability and Complexity.

Table 1 lists the anticipated capabilities of generic MA, SoDeMa measurement information, and traffic management for a few chosen 5G network slices. These selected slices consider eMBB, millimeter-wave (mmWave), long term evolution, URLLC, massive machine-type communications (mMTC), IoT, relay, WiFi, and vehicle to vehicle (V2V) communications. The URLLC-aware frame structure and integrated mmWave-microWave communications are introduced in article [24]. Even though mmWave communication alone might not be enough support, the expanding wireless communication is improved by an integrated version of 5G network slicing with SoDeMa.

5.1. RATES AND AVAILABILITY

The network slicing algorithm's rate-dependent services and applications, including enhanced mobile broadband services, are made more readily available when a large number of customers utilise them. Holograms, 4K/8K Ultra-High Definition (HD) video, virtual reality, augmented reality, and other fast and excellent multimedia services are a few examples of rate-dependent services. The users may obtain these services whenever they need them. Slice m's total transmission rate is calculated similarly to (1) by:

$$R_m(t) = \sum_{n=1}^{N} \sum_{i=1}^{k_m} c_{i,m}^{n}(t) R_{i,m}^{n}(t) \quad (1)$$

where, slice m's total user equipment (UE) rate is $R^n_{i,m}(t)$. There are M slices in the network. The k_m is a slice m active UE. N (n€N) subchannels are present. The sub-channel allocation adjustment action is also known as $c^n_{i,m}(t)$. Higher data rates are necessary for improved media capability and consumption since there will be more consumers and devices. Future network traffic will be increased by HD and multi-view HD screens, mobile 3D projections, sophisticated network services, and immersive video conferencing, and

5.2. LATENCIES WITH AVAILABILITY

Although the predicted delay is less than 1 millisecond, the network slice technique focuses on minimising latencies, whereby low-complex design is the best way to improve the services. For example, medical services employ the lowest latencies to increase precision during surgery and while prescribing drugs online. Low-latency communications with maximal EE are necessary for several delicate and mission-critical applications, including vehicle-to-everything (V2X) connections and remote control of industrial and medical robots. Through the network slice algorithm and functions, many services in various applications will use simpler, low-latency, and maximal EE designs. In general, delays increase the latency of the network slice algorithms' step-by-step slicing operations. By considering the queue length, the amount of data that arrived, and the number of packets that UE i sent in slice m, the average latency (2) may be reduced.

$$D_m = \sum_{i=1}^{k_m} D_{i,m} \quad (2)$$

The $D_{i,m}$ and D_m represent, respectively, the average delay of slice m and the delay of the UE i in slice m. Slice m's maximum delay is determined by the algorithms and slice design.

5.3. CONNECTIVITY AND AVAILABILITY

The mMTC's goal is to make it easier for numerous IoT devices to connect and communicate with one another. Future mMTC hardware ought to be able to control millions of active connections per square kilometre (km^2). Network slicing techniques may also handle numerous concurrent connections (estimated connection density: 1,000,000 devices/km^2). The linkages will be improved if energy is maintained across them [26]. Calculating the connecting energy should take into consideration the energy length, the amount of energy used during the connection, and the amount of transmission energy used by UE i in slice m (3).

$$E_{i,m}^{c} = \min\{[E_{i,m} + A_{i,m} - L_{i,m}], B_{i,m}\} \quad (3)$$

where $E_{i,m}$, $A_{i,m}$, $L_{i,m}$, $B_{i,m}$ stand for the duration, arrival, consumption, and battery capacity of the energy, respectively. Future networks will have more linked devices than human users since more services will be connected to more devices. The degree to which the services are accessible and available may vary on the users' choices, the sorts of devices they choose, and the connecting priorities. With more and more objects becoming connected, various services utilising 5G network slices are available to consumers' devices, such as smart appliances. Services include communication between vehicles and between vehicles and road infrastructure, among other things.

VI. SLICES OF THE NETWORK FOR MANAGING NETWORK TRAFFIC

In order to better cater to customer preferences, service providers leverage the RAN, the availability of network slicing features, and CN, respectively. When there are plenty of people and their devices online, try to just use one service at a time; otherwise, accessing that particular service will be difficult because of the service's delayed connectivity and slower data rate. A necessity for innovative slice algorithms is the network slicing functions, which impact data speed, latency, and connectivity. The management of data traffic via network slicing shown in Figure 5 enhances the usability of services.

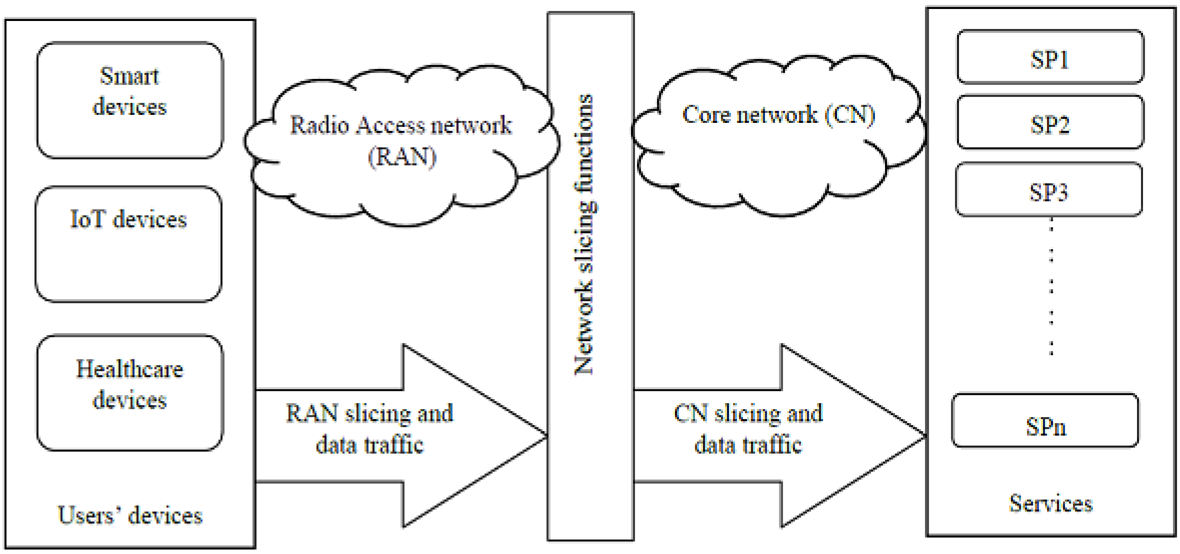

Figure 5. Network slicing for managing services as well as data traffic

In accordance with network slicing, it is feasible to establish classes of service at radio and for end users using the resources of providers. Service providers (SP1, SP2,..., SPn) deliver the services over CN and RAN with the proper slicing in order to maintain QoS. In this way, radio gives transport considerable autonomy so that it may structure its internal resources into services, expose them in the right slices, and dynamically reorganise traffic.

6.1. ALLOCATION OF RESOURCES

Slices offer the virtualization of SDN-dependent network resources, allowing service providers to distribute the physical resources in a programmable way despite having multiple resource distribution characteristics. Allocating physical resources to the virtual slices is a key component of complete 5G network slicing designs. SDN can easily manage all the processes of resource allocation for central slices since it can govern mobility in slicing networks rather precisely. The control of software's hardware and infrastructure also forms the basis for creating the 5G network's slicing architecture. All network slices must share the same network resources and physical infrastructure, but each slice will function separately as a separate network. By exploiting the resources shared between them and the service providers, users should be able to govern their data through network services anytime and whenever they want to. Service providers must thus ensure that all of the network services they provide—sensitive and crucial services based on 5G slices—are available when customers need them. The service time in this case is influenced by temporal complexity and is dependent on how the network services affect the resources, including whether they are up or down.

$$A = \frac{t_s - t}{t_s} \qquad (4)$$

According to (4), it is feasible to calculate the services' availability (A) for use in any application. In this, t stands for service downtime, and (4) represents the service time determined using the network slice approach.

6.2. COMPLETE SLICE ORCHESTRATION

The sliced network in 5G makes end-to-end slice orchestration more challenging. It should be a simple matter to generate a slice using effective slicing and mapping, given the capability of the system. But it must also be flexible in how it deploys the services and must not be constrained. This is the main difficulty in orchestrating crucial flexible slices from beginning to end. In other words, slice orchestration failure brought on by the limited power of virtualization [27]. In 5G core networks, adaptive network slicing with multi-site deployment enhances the functionalities used in the network slice approach [28].

VII. SLICES AND NETWORK TRAFFIC USING SOFTWARE-DEFINED MULTIPLE ACCESS

In spite of the fact that simple MA based on SDN enhances accessing management of network traffic, modelling network traffic is predicted to have the aforementioned characteristics. The devices and services that the 5G slices support for users (U1,U2,...Un) are shown below. With 5G slices in these services, priority (Pu), limited (Lu), energy (Eu), security (Su), etc. may be taken into account. This study suggests that one method for increasing traffic is to develop the network traffic model (NTM) based on SoDeMa [29–33]. NTM monitoring also enables service providers to manage and regulate the dynamic network traffic.

7.1. A SUMMARY OF THE SLICING ALGORITHM

The network TM process, which depends on the SoDeMa slicing algorithm, traffic algorithms, and network slicer properties, is shown in Figure 6. Despite the existence of different slicing methods, we focused on the slice algorithm for latency computation since it speeds up the NTM's response time. The slicing algorithm's stages are as follows: The functions in Section 4 are utilised for network slices of 5G+ traffic, and Section 5 covers how to control data traffic using SDN, if the network slice's throughput is greater than zero. 4) By dividing the capacity by the throughput of a network slice, one may calculate its latency. We used this approach for the priority service (Pu) as an illustration for how we computed and evaluated the response time.

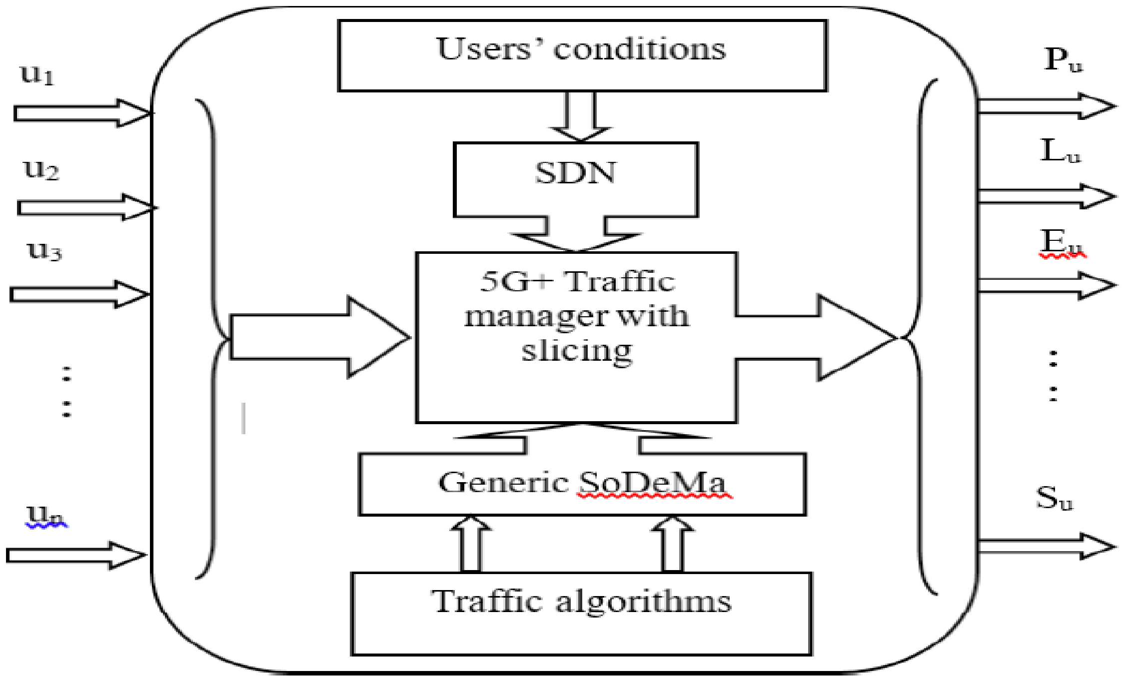

Figure 6. Model for network traffic based on SoDeMa

7.2 CONCLUSIONS AND ANALYSIS

The average response time as shown in figure 7 illustrates the availability, allowing us to use network slices to improve the services. Here, the network slicing method's SoDeMa-based design reduces overall complexity and speeds up response time. Response time is constant when we add more users thanks to the 5G network slicing, which enables the services' availability and access based on the consumers' preferences.

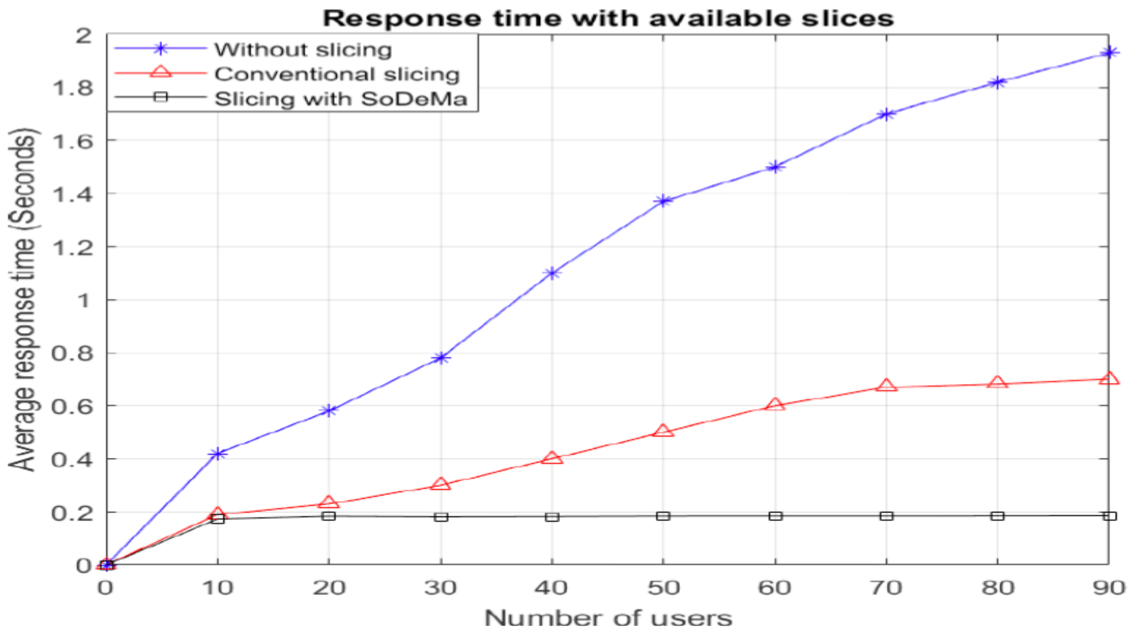

Figure 7. Response time average with and without network slices

Whether network services are available for any applications utilising ML-based accuracy metrics depends on the network slicing method and all active resources between the transmitter and receiver.

VIII. SUMMARY AND FUTURE WORK

Through the use of Software Defined Multiple Access (SoDeMa) and 5G slices, this work example offers improvements to 5G network traffic. We conducted research on the three types of standardised slices (IoT, eMBB and URLCC) that allow us to evaluate the availability of 5G slices. Even though we looked at other accessing methods, SoDeMa is still recognised as an excellent multiple access solution for large wireless connections in 5G and 5G+ wireless networks. An innovative network traffic model was suggested in this theoretical study for effectively managing data flow and services. By utilising a generic SoDeMa, we innovated in this new model. In relation to the availability of 5G network slices, SoDeMa significantly reduces processing time, receiver complexity, and installation costs. Due to the need to manage the continuously expanding traffic among various users, the biggest challenge in future development will be to utilise the least amount of energy while maintaining the greatest degree of security. We want to develop a new network architecture called SoDeMa that might perhaps solve the real-time traffic problems that data handlers, service providers, etc. encounter. [34, 35] argue that data handlers—including data centres using machine learning—should be more proactive in tackling the rising problem of managing data traffic and cybersecurity issues taken into consideration in 5G networks and beyond. The potential of event-driven networking and 5G wireless technology holds promise for the future of telecommunications, but how well the remaining issues are resolved will decide the outcome.

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