Network Slicing as the Ultimate Enabler of Enhanced Service Quality in Vehicular-to-Everything (V2X) World

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Abstract—**Connected and Automated Vehicles (CAVs) are revolutionizing the automotive industry by improving real-time situational awareness, and road safety. Connectivity and latency are critical for the secure and efficient operation of CAVs. The evolution of Cellular Vehicular-to-Everything (C-V2X) technology, particularly through Long Term Evolution V2X (LTE-V2X) and its successor New Radio-V2X (NR-V2X), is essential to address these challenges. LTE-V2X and NR-V2X are intended to coexist, complementing each other to cover a broad spectrum of vehicular communication needs. However, network overload is a critical issue, which risks severely degrading the performance of V2X applications and compromising road safety. This study delves into the practical implementation of Network Slicing within a real-world 5G environment, incorporating a modular Open Radio Access Network (O-RAN) architecture on the radio side, and Service-Based Architecture (SBA) principles on the core. We present a Network Slicing configuration that deploys a synergy between the 5G Core (5GC) and the Radio Access Network (RAN). Through strategic placement and policy application across multiple User Plane Functions (UPFs), our configuration enhances network performance and reliability for V2X applications. We validate our approach by demonstrating how this setup effectively manages the high demands of diverse and rigorous applications, ensuring the network requirements for enhanced V2X scenarios under various network conditions. Our results highlight the importance of synergy between 5GC and RAN for the application of an efficient network slicing mechanism in NR-V2X networks.**

Index Terms—**5G, network slicing, C-V2X**

I. INTRODUCTION

Connected and Automated Vehicles (CAVs) are revolutionizing the automotive industry with technologies such as real-time situational awareness, high-definition maps, and cooperative sensing. However, such applications present complex connectivity and latency challenges.

Within the emerging technologies supporting CAVs, Cellular Vehicular-to-Everything (C-V2X) technology is standing out, actively supported by major automakers, telecommunications companies, and chip manufacturers [1]. This development underscores the accelerating adoption of advanced communication solutions needed to realize the full potential of CAVs. In March 2017, a significant milestone was reached when the 3rd Generation Partnership Project (3GPP) completed the standardization of the Long Term Evolution (LTE) protocols for vehicle communication under Release 14. This standardization laid the foundation for widespread vehicle communication adoption by leveraging LTE technology to reduce latency and facilitate direct vehicle-to-vehicle communications. Following this, in 2018, 3GPP introduced a new initiative focusing on the next generation of C-V2X based on the 5G New Radio (NR) technology, known as NR-Vehicle-to-Everything (V2X). Documented in Release 16, NR-V2X aims to support enhanced V2X applications, addressing the limitations of LTE-V2X and expanding capabilities to accommodate more advanced use cases. It is important to note that NR-V2X does not aim to replace LTE-V2X but rather to complement and coexist with it, marking a significant evolution in vehicular communication technologies.

5G NR-V2X supports advanced use cases and higher automation levels, as described in 3GPP technical report 22.186 [2]. The use cases are divided into i) Vehicles Platooning: a dynamic formation and management of groups of vehicles in platoons, ii) Advanced Driving: vehicles share data obtained from their local sensors with surrounding vehicles to enable automated driving, iii) Extended Sensors: Roadside Units (RSUs), User Equipments (UEs), and V2X application servers, exchange data, and iv) Remote Driving: enabling the remote driver to operate a vehicle (Table I). However, these V2X applications have diverse and stringent requirements, such as low latency (5 ms for Remote Driving), high reliability (99.999%), and enhanced data rates (1 Gbps for Extended Sensors), which are compounded by high vehicle mobility and density. For such a diverse system, the traditional practice of medium sharing in a *one-size-fits-all* manner does not work.

When multiple critical services, such as V2X ones, compete for the same network resources, the network quality usually deteriorates, but preserving the Quality of Service (QoS) for mission-critical services at any moment is essential. To cope with such a challenge, 5G is bringing Network Slicing mechanisms that enable the creation of multiple logical and virtualized networks over a common multi-domain infrastructure. Each virtual network is designed to meet the specific requirements of a particular type of service i.e., enhanced Mobile Broadband (eMBB), Ultra-Reliable Low-Latency Communication (URLLC), and massive Machine-Type Communications (mMTC).

We design, implement, and validate an end-to-end framework for realizing Network Slicing for C-V2X services over a fully operational 5G testbed. Our configuration is designed to enable a synergistic interaction between the 5G Core (5GC) and the Radio Access Network (RAN), facilitating the deployment of Network Slicing in NR-V2X networks. Specifically, we increase the ability of the network to support mission-critical applications by programming the network functions and flows via i) creating multiple User Plane Functions (UPFs), ii) strategically positioning the UPF instances close to the end users, iii) applying different network policies per UPF, and iv) coupling the configuration of the 5GC with the RAN for radio resource allocation. In addition, we assess the effectiveness of our network configuration in sustaining and improving the performance and reliability of critical communications for various V2X applications.

TABLE I: Requirements for the 3GPP Use Case Groups [2].

Group	Payload [Bytes]	Data rate [Mbps]	Latency [ms]	Reliability [%]
Vehicles Platooning	50-6500	65	10-500	90-99.99
Advanced Driving	300-12000	DL: 50 UL:10	10-100	90-99.999
Extended Sensors	1600	10- 1000	3-100	90-99.999
Remote Driving	16000-41700	DL:1 UL:25	5	99.999

II. NETWORK SLICING CONCEPTS

A. General Overview

Network Slicing, introduced by the Next Generation Mobile Networks (NGMN) in 2015 [3], is a paradigm that facilitates the creation of multiple virtual networks within a common physical infrastructure e.g., 5G base station, using two main technologies: Software Defined Networking (SDN) and Network Function Virtualization (NFV) [4]. Each virtual network is called slice [5], which is given a specific set of resources (e.g., hardware, spectrum) to meet different network requirements in terms of bandwidth, latency, and reliability, to support a large variety of service types i.e., eMBB, mMTC, and URLLC.

The eMBB services aim to provide high transmission rates and handle large volumes of data [6], requiring a minimum throughput of 50 Mbps for outdoor and 1 Gbps for indoor, with half of these values available for the uplink [7]. For instance, Remote Driving applications require a high transmission rate i.e., 25 Mbps in uplink, to send video data to the remote operator [2]. On the other hand, mMTC services aim to connect many (a minimum of 1.000.000 devices per km^2 [7]) low-complexity, low-bandwidth devices that often operate with intermittent data transmissions, such as sensors and actuators [6]. Within the V2X context, Extended Sensors applications collect and send crucial data from sensors mounted in vehicles or along the road infrastructure to increase the awareness of their environment and enhance road safety. On the other hand, the URLLC services require a maximum end-to-end latency of 50 ms with reliability of 99.9999% [7]. In the case of vehicle platooning, where vehicles exchange information within a platoon, to save fuel, and reduce the number of drivers, it is essential to ensure low latency i.e., 25 ms, and high message reliability i.e., 99.99% [2].

To guarantee the network requirements of those services, indicated in Table I, slices can be specifically designed to offer URLLC, eMBB, and mMTC. The set of resources assigned to each slice can be i) hardware e.g., memory, storage, and core, ii) radio e.g., Resource Blocks (RBs), and iii) architectural e.g., change in the network design. Each slice must be isolated and operate independently without affecting the operations of other slices within the same physical network [3]. In a NR-V2X context, 5G networks play a crucial role by creating dedicated slices for enhanced V2X scenarios.

B. Network Slicing in 5G

The 5G Standalone (5G SA) architecture consists of three main components: i) UE with a Universal Subscriber Identity Module (USIM), ii) the RAN, which connects UEs to the network, and iii) the 5GC, the central unit managing authentication, session, mobility, and network policy control [8]. At its core, 5G SA employs a cloud-native infrastructure to enhance the modularity and flexibility of the network. The deployment of such infrastructure is microservices-based [4], involving virtualization, container-based deployments of NFV, and orchestration techniques [4].

Such a flexible and modular approach enables i) dynamic network configuration of resource allocation, such as CPU, memory, and radio frequencies, crucial for deploying Network Slicing and ii) the portability of Network Functions (NFs) across different physical locations and different hardware. To fully leverage the flexibility and modularity of the 5G SA network, it is necessary to facilitate communication between the 5GC and the RAN through open and standardized communication channels (interfaces). The Open Radio Access Network (O-RAN) paradigm standardizes and facilitates the integration of the different segments of the 5G architecture by considering open interfaces between RAN and 5GC. As follows, we describe the main components of the 5GC architecture, the O-RAN paradigm, as well as the synergy between the 5GC and the RAN to enable Network Slicing.

1) 5G Core Architecture: The 5GC employs a Service-Based Architecture (SBA) with NFs as key components (as described in Table II). These NFs are software entities responsible for networking tasks e.g., authentication, routing, and forwarding. Enabled by NFV, NFs operate on virtual machines and containers, like Docker[1], and communicate through a Service Based Interface (SBI), which facilitates API-based interactions. This architecture enhances flexibility, scalability, and cost-efficiency by enabling dynamic deployment, management, and scaling [8]. Key components of the 5GC include the Access and Mobility Management Function (AMF), which is part of the Control Plane (CP), managing user registration, handovers, and authentication over the N2 interface using the Next-Generation Application Protocol (NGAP)[2]. The Session Management Function (SMF), another CP function, manages session contexts, coordinates session setup with the AMF, and manages the User Plane (UP) with the UPF via the N4 interface, including IP address allocation. The UPF, crucial for the UP, handles data routing and policy enforcement, deep packet inspection, charging data collection, and interfacing with the 5G base station via the N3 interface. The Network Slice Selection Function (NSSF) manages network slice selection and access based on UE configurations and coordinates this with the AMF and SMF over the N22 interface. The 5GC uses Slice/Service Type (SST), Session Description (SD), Data Network Name (DNN), and 5G QoS Identifier (5QI) to manage slice descriptions and slice configuration.

2) O-RAN: The RAN enables communication between UEs and the network infrastructure, making it self-critical for 5G networks. The RANs has a monolithic architecture in which all components are integrated into a single vendor-developed system, limiting flexibility and modularity and leading to vendor lock-in of the 5G infrastructure. To overcome these limitations, the O-RAN Alliance has launched the transition to a 5G architecture that emphasizes openness, intelligence, and innovation [9]. In practice, the O-RAN paradigm involves the separation of RAN software and hardware, resulting in desegregation into Radio Unit (RU), Central Unit (CU), and Distributed Unit (DU). The CU handles higher-level RAN functions, such as session management, mobility management, encryption, and interfacing with the 5GC. Furthermore, O-RAN introduces two types of RAN Intelligent Controllers (RICs): the Non-Real-Time RIC, which oversees the high-level orchestration of the RAN, and the Near-Real-Time RIC, which manages precise control policies, including slicing, scheduling, and load balancing. Moreover, the O-RAN architecture integrates xApps

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[1] Docker: https://www.docker.com/resources/what-container/

[2] NGAP protocol: https://docs.magmaindia.org/Free5gc_5gCore/amf/amf.html

TABLE II: Network Functions and Configuration settings.

Architecture Segment	Name Element	Interface	Name Paramenter	Value	Scope
5GC	AMF	N2,N11	PLM_ID	Num	Identify mobile networks globally.
	SMF	N4,N11	DNN	String	*Specifies the name of the network to which the device connects*
			5QI	1-90	Define the specific QoS characteristics of data traffic
	UPF	N4,N3,N6	DEV	String	Interface where the data traffic pass
	NSSF	SBI	SST	URLLC=1 eMBB=2 mMTC=3 V2X=4	Identifies the type of service the slice is intended to support
			SD	24 bit (optional)	It distinguishes between multiple network slices that share the same SST
RAN	DU	E2	RBs	12 sub-carriers per RB	Small units that divide the radio frequency (spectrum) and are used to transmit data.
	CU	E2,E1, F1C,F2C	RRM Policy Ratio	Dedicated Ratio	The amount of resources that are dedicated to a slice and cannot be used by other slices
				Min Ratio	The minimum guaranteed resources that a slice will always have available.
				Max Ratio	The maximum limit of resources that a slice can use,if resources are available

[9], software applications that operate on the Near-Real-Time RIC and are used by developers to interact with the RAN to deploy applications e.g., dynamic control and optimization of RAN resources. The flexibility and modularity offered by the O-RAN architecture enable a customized allocation of radio resources e.g., RBs, per slice, enabling a customized scheduling mechanism to guarantee network requirements for different types of applications e.g., enhanced V2X scenarios in Table I.

3) Synergy between RAN and 5GC: V2X applications such as Vehicle Platooning, Advanced Driving, Extended Sensing, and Remote Driving have specific requirements in terms of latency, throughput, reliability, and coverage. Table I illustrates the network requirements for each application.

For instance, Remote Driving applications necessitate 5 ms of latency and 25 Mbps of uplink throughput for transmitting video from the cameras in the vehicle to a remote operator. In contrast, it requires just 1M pbs for downlink throughput and 5 ms of latency, for receiving control commands from a remote operator. Advanced Driving, which involves transmitting sensor data from vehicles and road infrastructure, demands between 10-100 ms of latency (depending of the degree of automation) and 10 Mbps of uplink throughput, but requires 50 Mbps of downlink throughput to enable safety messages in broadcast, particularly in the proximity of road intersections.

To accommodate these diverse requirements, the 5G network needs to be configured to guarantee different performances e.g., high uplink and low downlink throughput for Remote Driving, and the reverse for Advanced Driving, while maintaining low latency for both applications. The synergy between RAN and 5GC enables fain-grained network resource management, allowing radio resources, physical resources, and architectural design to be allocated separately for each type of slice i.e., URLLC, eMBB, or mMTC. For eMBB slices, the RAN is able to allocate specific radio resources e.g., RBs, differently for uplink and downlink traffic. The Radio Resource Management, (RRM) Policy Ratio is a set of policies defined in the 3GPP TS 28.541 for Release 16 [10] that guide the allocation of radio resources, such as RBs, to ensure an efficient and fair distribution of resources across slices. Table II contains information about the parameter of RRM Policy Ratio. For URLLC applications, the 5GC can move the UPF closer to end users, improving latency and reliability in receiving packets and conserving valuable radio resources for other slices. Moreover, the 5GC can be configured to implement specific network policies e.g., limiting the uplink capacity for applications using the URLLC slice, since URLLC requires low latency and not high throughput.

Therefore, to guarantee different network requirements within the same network infrastructure, a synergy between the 5GC and the RAN is needed. A key element in enabling such synergy is the development of xApps, which can interact with the RIC, matching the configuration of RAN with the slice configuration in the 5GC. The xApps can allocate radio resources, e.g., RBs, for specific values of SST, SD, and DNN, configured in NSSF and SMF, and set network policies in the UPF, ensuring i) precise distribution of RBs, ii) appropriate location of the UPF, iii) network policies for each slice.

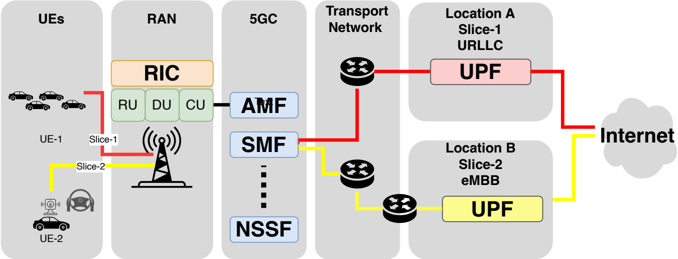

Fig. 1: Decentralized 5G Architecture.

III. 5G SETUP

By configuring the 5G network to have a decentralized architecture, the elements of the 5GC and the elements of the RAN can be dislocated. In this section, we describe how we configure the main elements of the 5G SA architecture to enable network slicing by leveraging the modularity offered by the 5G technology, including some details about our 5G testbed.

A. Decentralized Architecture

The 5GC makes a differentiation between CP and UP elements. This differentiation is achieved through an SDN approach. The combination of NFV and SDN within the 5GC contributes to realizing a SBA [8]. The SBA establishes an interaction model where NFs can discover each other and communicate, supporting a distributed architecture. A distributed architecture is a modular architecture, where each module can be placed in a different location e.g., the UPF can be moved close to the user to guarantee lower latency, lower packet loss ratio, and higher reliability [4].

To realize Network Slicing and configure different isolated logical networks, we designed a 5G network architecture, illustrated in Figure 1 with multiple UPFs, for different types of slices. We place one UPF closer to the user to support URLLC applications where low latency and high reliability are critical e.g. Advanced Driving and Vehicles Platooning. On the other hand, to support eMBB applications we located the UPF far from the user. The eMBB slice is designed to support applications with high bandwidth requirements e.g., Remote Driving applications. In that case, we use the RRM Policy Ratio to guarantee more RBs to the slice dedicated for eMBB services. The creation of different UPFs allows us to create two separate and isolated logical networks (slices). In that way, is possible to apply different network policies for each UPF. For instance, since the radio resources are limited due to hardware limitations, we use Linux Traffic Control (TC)[3]

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[3] Linux Traffic Control: https://man7.org/linux/man-pages/man8/tc.8.html

TABLE III: Testbed Components Overview.

Component	Software	Role	Slices	Characteristics
5GC	Open5GS	CP	-	16GB of RAM, Intel Xeon E5-2620 v4-4 cores at 2.10GHz, 120GB of storage space.
		UP	eMBB	140GB storage, Intel Xeon Silver - 4 cores 2.40GHz, 8GB RAM.
			URLLC	Same characteristics as CP.
RAN	OAI	gNB	eMBB-URLLC	Intel i7-11700K - 8 cores, 64GB RAM, NVIDIA RTX 3060 GPUs, USRP B210, dual 10 GB SFP
RIC	FlexRIC	RAN controller	-	Same specifications as the CP VM for 5GC.
UEs	Real equipment	users	eMBB	Intel NUC connected to a Quectel RM500Q 5G module.
			URLLC	Same as eMBB UEs.

to apply network policies in the UPF of the URLLC slice to limit the uplink traffic and guarantee more radio resources in the uplink to the eMBB slice.

B. *O-RAN Testbed*

The main components of our testbed are illustrated in Table III. Our 5G SA testbed is designed to be O-RAN oriented. The testbed runs open-source solutions software to deploy a 5G SA network. This setup integrates Open Air Interface (OAI)[4] for the RAN functionalities and Open5GS[5] for the 5GC, with FlexRIC[6] serving as the RIC to facilitate advanced radio network management. To conduct over-the-air transmission experiments within our real-world testbed, we obtained the appropriate spectrum licenses, which include 50 MHz within the 5G NR band 77. For the5GC, our infrastructure leverages three separate Virtual Machine (VM) to distinctly support different type of slices and CP elements related to the 5GC and the RIC. Significantly, our UE comprises real devices in the testbed environment.

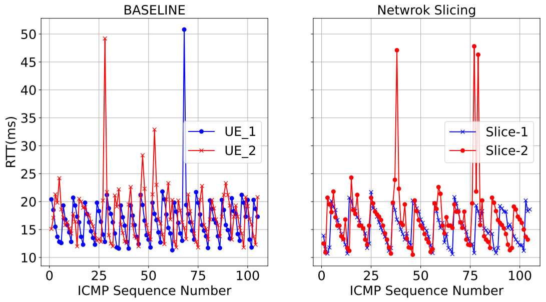
IV. 5G EXPERIMENTS

To validate the configuration and the design of our 5G SA setup discussed in Section III, we conducted real-world experiments using our testbed, described in Section III-B. We used Open5GS as the 5GC, OAI for the RAN, and FlexRIC for the RIC. We used two UEs i.e., UE_1 and UE_2, with the same hardware characteristics described in Section III-B.

Regarding the 5GC, we used three VMs, which we will call VM1, VM2, and VM3. VM3 is dedicated to the CP operations of the 5GC and the RIC. This means that AMF,SMF, NSSF, RIC, and xApps are located in VM3. VM1 is dedicated to the UPF of the URLLC and VM2 is dedicated to the UPF of the eMBB. This approach allows us to manage the 5GC more easily since the CP is centralized in VM3. Finally, we used a remote VM as a server to generate/receive data traffic. To generate the data traffic, we used Iperf[7]. We will call the remote VM as Iperf server. To get the Round Trip Time (RTT) latency, we used ping[8]. In this experiment, we aim to reproduce a V2X scenario where critical V2X applications i.e., Vehicles Platooning, Advanced Driving, Extended Sensors, and Remote Driving, are performing within the same network infrastructure i.e., 5G base station. We consider Slice-1 as representing aggregate throughput for critical V2X applications and Slice-2 as throughput for non-critical V2X applications.

A. *Results*

Initially, we tested the 5G network without Network Slicing to establish a baseline. Subsequently, we activated Network Slicing enabling a synergy between the 5GC and the RAN, to explore the differences in terms of network performances. We evaluated the RTT latency, jitter, throughput, and packet loss across these two scenarios, to further compare them with the network requirements presented in Table I. To test the limits of the network, we generated 90 Mbps of downlink traffic for each UE. With network slicing enabled, each UE is associated with a distinct slice i.e., Slice-1 and Slice-2.



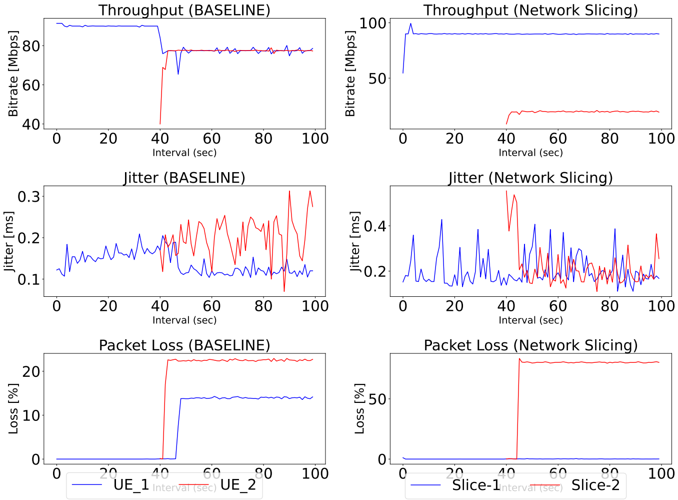


Fig. 3: Throughput, jitter, and packet loss ratio between the baseline scenario and Network Slicing scenario.

The results related to the RTT latency are shown in Figure 2 and reported in Table V. Our tests indicate that Slice-1 experienced a reduction in latency under the Network Slicing setup, decreasing from an average of 17.53 ms to 15.43 ms. This improvement was primarily due to the optimized placement of the UPF, which was moved closer to the users, as described in Section III, in order to approach the network requirements in Table I. Additionally, latency values for Slice-1 showed increased consistency, as evidenced by a decrease in standard deviation from 4.9 ms to 2.95 ms, indicating a more reliable network performance, in terms of latency.

Regarding jitter, throughput, and packet loss, the results from Figure 3 revealed that the BASELINE scenario suffered from performance degradation. The graphs for the BASELINE case show a decline in the performance of UE_1 from the 40-second mark, the time when the onset of an additional 90 Mbps traffic directed to UE_2 occurs. This observation highlights the difficulties of the network in maintaining optimal performance under high network demand from different applications, diverging from the network requirements reported in Table I. In V2X contexts, packet loss and degraded throughput can severely compromise road safety. It is crucial that the network continuously guarantees the requirements for critical V2X services i.e., Vehicles Platooning, Advanced Driving, Extended Sensors, and Remote Driving, ensuring consistent performance without failures. For the BASELINE case, Table VI clearly

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[4] OAI: https://gitlab.eurecom.fr/oai/openairinterface5g

[5] OPEN5GS: https://open5gs.org/

[6] FLEXRIC; https://gitlab.eurecom.fr/mosaic5g/flexric

[7] Iperf: https://iperf.fr/iperf-doc.php

[8] Ping: https://linux.die.net/man/8/ping

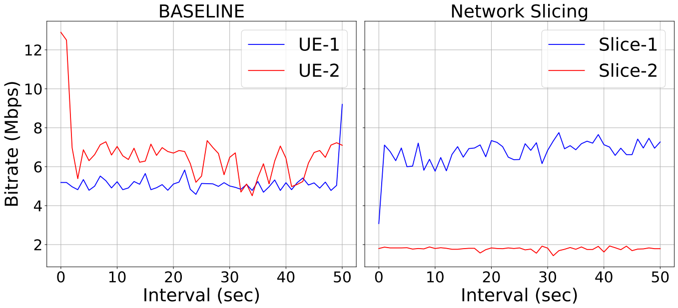

Fig. 4: Uplink Traffic.

TABLE IV: SIM-card configurations.

Node	Imsi	SST	SD	DNN	5QI	Slice
UE1	001020000008625	1	1	Slice1	9	Slice-1
UE2	001020000008623	2	1	Slice2	86	Slice-2

TABLE V: RTT Latency Comparison.

Statistic	UE_1	UE_2	Slice-2	Slice-1
Mean	16.64 ms	17.53 ms	17.02 ms	15.43 ms
Median	16.30 ms	16.80 ms	15.80 ms	15.20 ms
Std Dev	4.44 ms	4.90 ms	6.11 ms	2.95 ms
5th Percentile	11.80 ms	12.06 ms	11.33 ms	10.88 ms
95th Percentile	21.10 ms	23.24 ms	22.55 ms	20.18 ms

TABLE VI: Packet Loss Comparison.

Statistic	UE_1 / Slice-1 Loss [%]		UE_2 / Slice-2 Loss [%]	
	BASELINE	Network Slicing	BASELINE	Network Slicing
Mean	7.33	0.10	21.67	73.64
Median	13.68	0.07	22.48	80.27
Std Dev	6.95	0.14	4.11	22.34
5th Percentile	0.00	0.00	21.96	0.27
95th Percentile	14.16	1.11	22.78	80.77

shows how the reliability of the packets delivered by the 5G network can not satisfy the network requirements presented in Table I. On the other hand, the relative graphs for the Network Slicing case show effective management of network resources, made possible by the synergy between the 5GC and the RAN. In that regard, Table VI clearly shows how the reliability of the packets delivered by the 5G network in Slice-1 improves concerning the BASELINE case, satisfying the network requirements presented in Table I (for a certain level of automation). Our experiment demonstrates how slicing the 5G network into multiple virtual logical networks coupled with strategic resource allocation can significantly guarantee network requirements for V2X applications.

Additionally, uplink capacity tests in Figure 4 show that in the BASELINE scenario, traffic from the two UEs compete for limited network resources. In the Network Slicing scenario, we configured the UPF for Slice-2 to limit uplink traffic, resulting in improved throughput for Slice-1. This configuration is crucial for applications like Remote Driving, where reliable uplink capacity is vital for transmitting real-time video feeds to a remote operator. These findings demonstrate the effectiveness of network slicing in optimizing bandwidth and prioritizing traffic, essential for ensuring robust communication in V2X environments.

V. CONCLUSION

In this paper, we presented an effective deployment of Network Slicing in a real 5G SA network using a modular O-RAN architecture to guarantee network requirements for diverse V2X applications under network congestion. Our approach considers a synergy between the 5GC and the RAN in configuring the 5G network to enable Network Slicing. We configured the 5G network to locate the UPF close to the user, enabling different network policies for URLLC applications. The obtained results demonstrate the benefits of such an approach, in terms of decreasing latency and improving reliability. Furthermore, our network policies have demonstrated to increase uplink throughput for the eMBB slice. The synergy between the 5GC and the RAN, enhanced by the use of xApps, proved to be essential for the effective allocation of radio resources among different slice types, prioritizing the network resources to be dedicated to V2X applications, to achieve the network requirements in Table I.

Nevertheless, our network configuration does not yet include the allocation of dedicated radio resources for uplink traffic. Although we have solved this problem through the application of efficient network policies, the prioritization of radio resources for uplink traffic is vital to guarantee the necessary network requirements to sustain V2X applications e.g., Remote Driving. To address this issue, we will further i) investigate a mechanism to prioritize radio resources i.e., RBs, for uplink traffic deploying a scheduling mechanism in the RAN, ii) integrate such mechanism with the RIC, and iii) apply this mechanism within our network configuration.

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