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Integration of digital devices and data streaming by Network Slicing Methods in IoT in 5G networks – A review

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ABSTRACT

The IoT having a large scale of integration of Digital devices in various fields of Engineering & Technology. It provides effective communication of sensing the objects which is placed remotely. The Integration of devices is playing a major role in data transfer effectively with Accuracy, Data Integrity & Latency while making the network safely. Especially in smart devices connectivity is the emerging trend in IoT which will be focused in 5G networks. In this paper the proposed study will be very supportive to effective utilization of devices & provide more secure & QoS services while communication among any devices through a common network.

Keywords- *5G, RSP (Route Selection Policy), FSS (Fixed satellite services), MIM-NOMA (Milimeter Ware Cellular Networks with D2D communications)*

1. INTRODUCTION

IoT(Internet of Things) is the networking of Physical smart devices (or) objects embedded with network connectivity, sensors, electronic components which allows to transfer & process the data .To get the improved accuracy of data, more effectively & economically beneficial to the users. Internet connected devices are increasing worldwide year by year in all industries. Due to the complexity of the various components in IoT based system 25% projects can be successful [1]. The average time to develop the project is around 1 year. The implementation of IoT needs technical tools, human resources, focus on proof concepts (POC). The basic idea to develop the design is to take initiative on digital transformation. IoT device interfaces are suppose to integrate the devices which is known as IoT application development [2]. The following are the consideration while connection of devices in network:

- The distance range of the devices.
- The architecture of the IoT including the devices.
- The structure of a single device.
- A group of single & multiple data values to innovate.
- Determining the data platforms & function interfaces.

2. THE COMPONENTS OF IOT IMPLEMENTATION

The requirements are sensors, gateways, communication protocols, IoT platform & cloud data storage management & Analysis software.

3. RESEARCH METHODOLOGY

The 5G planning Aim is to implement the system of 4G network Integration in higher density of mobile broadband users for machine communication. In the year 2025, The Internet node will exist in each and every object. Hence the number of devices connected to the internet to rise[3] to improve the Quality of Service(QoS) in 5g requires more impact of the integration of 5g with IoT & AI. The 5G network system can be provide the on demand network slices to satisfy the different service requirements & challenge is how to create traffic connection for the network slicing in 5 G devices internally in still in research[5]. Network slicing is a method of creating multiple unique logical and virtualized networks over a common multi-domain infrastructure. The Aim is to provide procedures for Packet Data Unit(PDU) transfer session & to design a protocol for OS based URSP and Network based application id and make more effective data driven network while data streaming in between host and destination.

4. DATA AND SECURE OF DATA

For this study Nov 2018 to July 2021 data & statistical information has been collected and the major network slicing methods are gathered from a real time based projects.

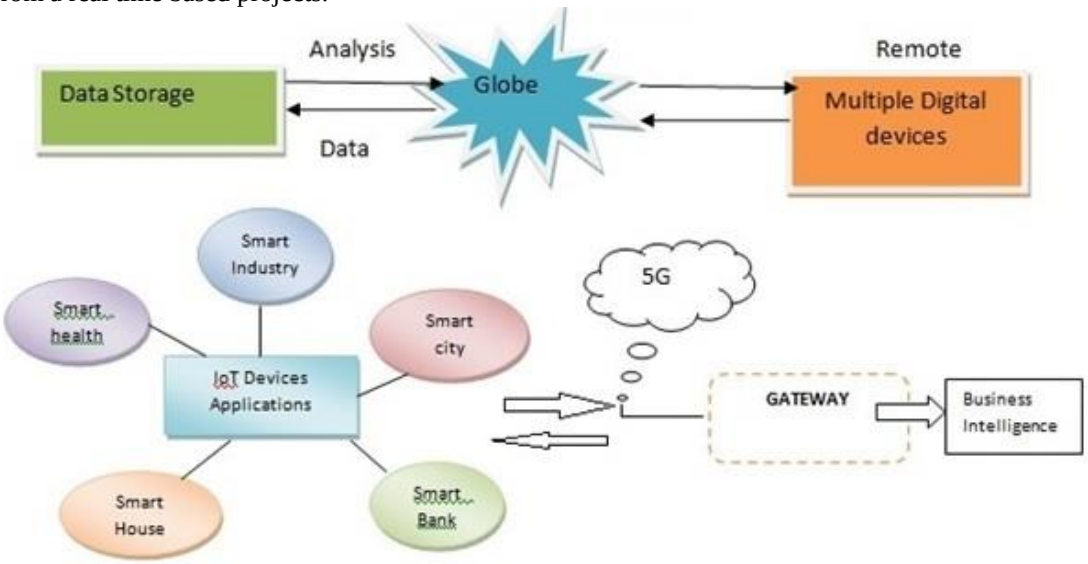


Fig 1: IoT Architecture

5. FUNCTIONALITY & PARAMETERS

The configuration of devices NSSAI (identifier for a Network Slice across the 5GC) for PLMN which provides communication services according to the specifications to mobile users. The device Should request for an NSSAI that can be under the current PLMN.After receiving the requested NSSAI, The network will determine the entire set of network slices in which to register the UE Capability Information is an RRC message that UE sents to Network while registration processand return it to the device allowed in NASSAI. The following table SLA requirements for HD video playback (combined interaction)

Scenario	Uplink Data rate	Downlink Data rate	Network delay	Reliability	Mobility speed
VR/AR devices	50	150	20	99.9	low

Methods and Procedures:

5.1. Protocol signalling registration.

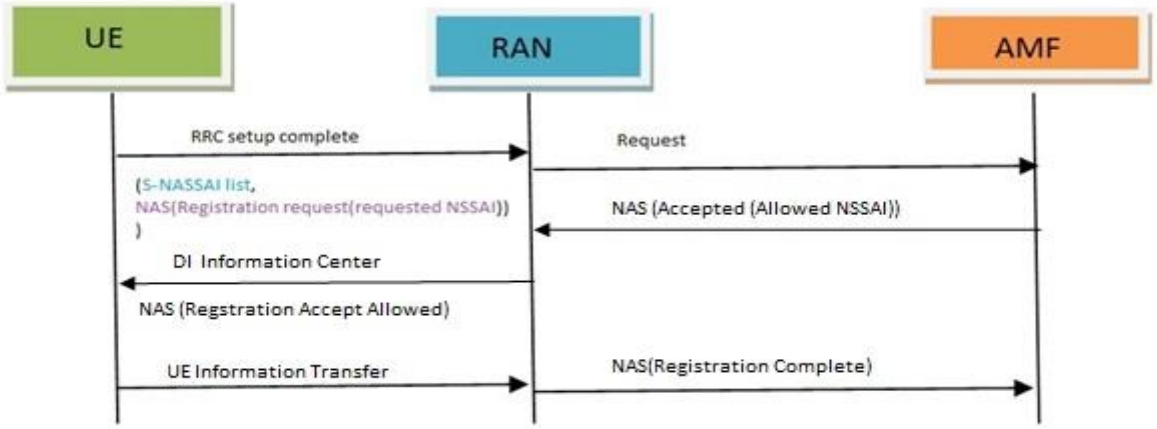
5.2. PDU session establishment.

5.3. UE configuration update.

5.1. Protocol signalling registration

In Protocol registration in networks from UE RRC set up will send to RAN and the request session to AMF will be proceeded.

Function NAS setup()
(
S-NASSAI List,
NAS(Registration Request(requested NSSAI))
Request AMF(NAS)
NAS (Accepted (allowed NSSAI))
Registration True;
)



Flow 1: Protocol signaling.

5.2. Packet data Unit Carried Session (PDU) establishment

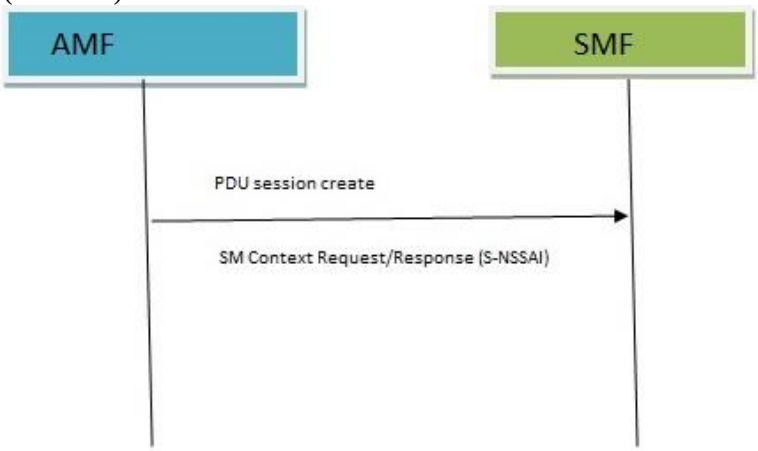
In the sequence of UE→ RAN → AMF→ SMF, PDU is placed in between AMF and SMF.

Function PDU()

(

Create session PDU;

SM Context request-response(S-NSSAI)



Flow 2: PDU session

5.3. NSSAI configuration updation

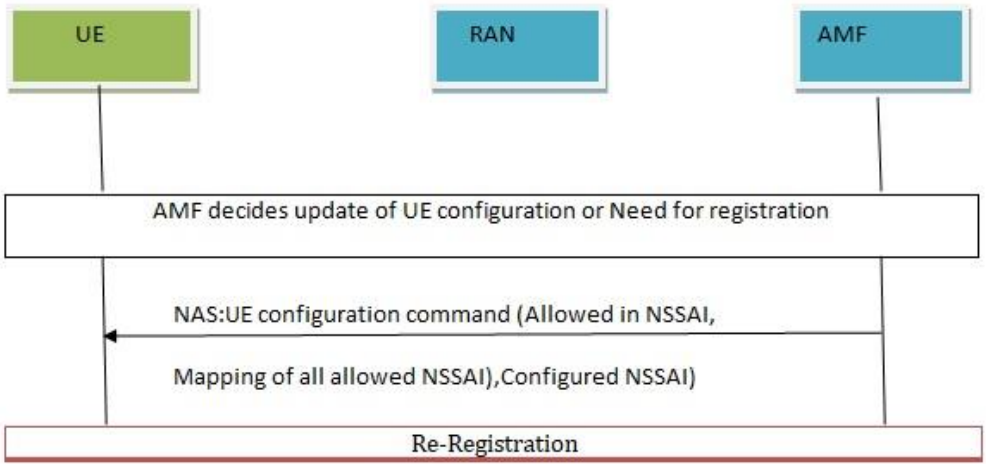
This process will be carried out while need of registration from UE side.

Function NSSAI-setup()

{

NAS: UE Configuration command(Allowed NSSAI,Mapping of allowed NSSAI),Configured NSSAI)

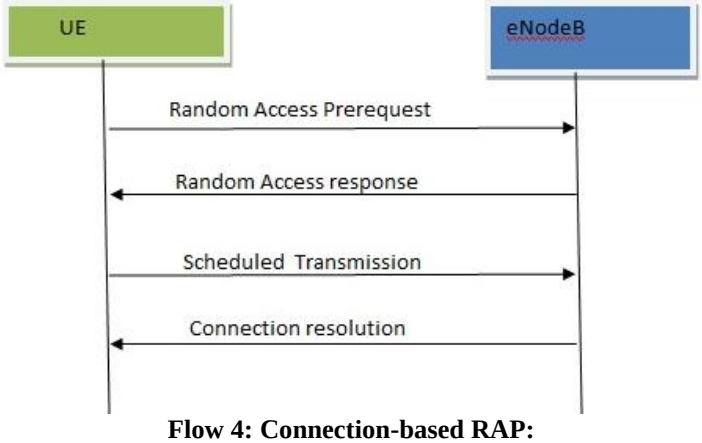
}



Flow 3: NSSAI configuration flow

6. FUNCTIONALITIES

The LTE protocol stack(UE side) establish the security parameters and sends the security mode complete message to Node B. All the messages exchanged between the UE and eNode B on the radio interface are ciphered as well as integrity-protected. The UE can utilize the services of the network once3 the network uplink by Random Access Procedure(RAP) in synchronize with uplink direction.



Flow 4: Connection-based RAP:

The network slice is defined within a PLMN and includes the 5G core & 5G RAN network control plane and user plane networks.The establishment of user plane connectivity to the network via network will be taken consideration under 2 steps:

1. RM procedure to select an AMF that supports the required network slices.
2. Establish one or more Packet Data Unit session to required data network slice instances.

7. ESTABLISHING PDU SESSION ON NETWORKS:

The DN allows the data transmission in a network slice instance. A PDU session is associated to an S-NSSAI & DNN. The AMF queries the relevant NRF to select a particular SRF in a network slice instance based on UE subscription and local operator polices,when the UE triggers PDU session establishment.The selected SMF established an PDU session.

7.1. Configuration updates in UE:

Whenever the serving AMF provides the configured NSSAI to the UE ,the UE will be indicated it supports to subscription-based restriction to simulation. Registration of Network slices feature,The AMF also provides the UE mapping information shall only include requested in NSSAI that share a common NSSRG as per received data packets. At a particular time ,a UE supporting subscription registration of network slices & that has received NSSRG information together with the configured NSSAI that share one or more common NSSRG.

7.2. Data rate transfer Network slice for a UE:

An UE subscription information may be include maximum bitrate for UE.In case of roaming UE,the S-NSSAI provide mapping to only one S-NSSAI of the HPLMN,to ensure the accuracy of performing data rate limitation for the corresponding slice of HPLMN.The PCF for the Packet Data Unit session with additional configuration to monitor the data rate per network slice for a UE & to strengthen the PDU session.

8. CHALLENGES

The value of your network will be determined only customer-centric based services at speed while managing cost and complexity of implementation process. In case of of traditional network operations the approaches is getting failure in maximum cases.In certain circumstances to create value for customers there is a need of Network Operations center which provides services and automation of networks to avoid the delaying of information time to time perfectly.

9. CONCLUSION

Network slicing is emerging as best methodology to allow the network operators to create services quickly and enabling different services to have their own logical slice instances on a shared infrastructure. Network slicing together with UE→ RAN → AMF→ SMF and other technologies will become a key in the service-oriented 5G network architecture. In this paper, The background for network slicing technology and the Implementation by Protocol signaling steps as PDU session establishment & UE configuration update.The data streaming will be a comfortable by using the above study methods and in future this network slicing technology will be the more demandable in 5G systems.

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