A BRIEF STUDY FOR RESOURCE MANAGEMENT IN 5G HETEROGENEOUS NETWORKS

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***Abstract*:** Fifth generation networks are also referred to as the appearance in upcoming generation mobile broadcasting systems. This is the advance of Long Term Evolution (LTE) and IMT systems. Due to the high growth of phone data traffic and storage of unnatural resources, 5G networks are expect to have heterogeneous network (HetNet) architecture. The capacity which merges the multiple radio entry technologies into a single concatenate network. Coexistent with this multi-tier construction will create new challenge like resource management and security provisioning. These problems may arise due to the lack of standard interface and undeviating policy across HetNets. One of the problems with the small cells is, security key management could be difficult where users join and leave the network frequently. Also, additional latency will arise due to frequent handovers an authentication in small cells. To address these problems in 5G HetNets, software-defined networking [SDN] enabled fast authentication scheme is used.

***Index terms*: 5G, fast authentication, SDN enabled HetNets.**

I. Introduction:

5G networks are going to be designed to be open, more flexible, and able to evolve more efficiently than the traditional networks, and will not be based on routing and switching technologies anymore[1]. They will be able to provide open communication system to cooperate with satellite systems and convergent network communication across multi-technologies networks, cellular networks, clouds and data-centers, home gateways, and many more open networks and devices. Also, 5G systems will be autonomous and sufficiently able to adapt the situations depending on required QoS to handle

Application- driven networks dynamically [2]. Resiliency, security, robustness and data integrity will be the priority in the design of future networks. Nowadays, the continuous use of computing environment, made mobile networks continuously increasing their demand for high data rates and mobility. To fulfill that issues, 5G technology has become the most famous technology and a lot of work is going on it since the few years. 5G main aim is providing the big data bandwidth, an infinite capability of networking and more signal coverage for giving best services to users. To achieve this, 5G is trying to copy with many with innovative new techniques.

II. Literature Survey:

An aim of this literature review is to discuss the previous research on SDN Enabled HetNets, in the different aspects like Authentication and Handover in HetNets, SDN enabled fast Authentication . In addition, the studies for Security in 5G are also presented[3]. Wang, has investigated on overlay coverage through coexisting heterogeneous networks with small cell deployment for 5G mobile networks.He first introduced, how to identify the challenges in 5G Het- Nets, especially in security management and 5G background. Based on his survey and analysis, he believed that new solutions meeting the latency and complexity requirements of 5G HetNet communications are not yet developed. After his observation, For efficient security management, he introduced a new 5G network structure enabled by software-defined networking (SDN) to bring intelligence and programmability into 5G networks. The software could be performed on the central SDN controller to supply consistently and efficient management of the whole 5G HetNet as SDN introduced, and the control logic was eliminated from the underlying infrastructures to a controller in the control layer[4]. With this paradigm, he proposed an SDN-enabled user-specific secure context information transfer for privacy protection in 5G to achieve seamless authentication and efficient authentication hand over during periodic hand - overs, and Simultaneously meeting the privacy and latency requirements effectively.The key security concepts which are present in the existing systems and some of the disadvantages related to them which must be considered and improved in the design of 5G technology, various disadvantages are Confidentiality of user identity and device identity, Authentication and Key Agreement, Confidentiality and integrity in data signaling and Network interface security[5].

III. BRIEF STUDY ON 5G NETWORKS:

So, in this project, we propose a software-defined networking (SDN) enabled fast authentication scheme which improves authentication efficiency during handover process and also meets 5G latency requirement. SDN- enabled security solutions are highly efficient through its centralized control capability, which is essential for delay-constrained 5G communications [6]. Firstly, we identify the challenges of security management in 5G HetNets Authentication. Based on the observation, a new 5G management structure enabled by Software-Defined Networking (SDN),too bring intelligent and programmability into 5G HetNets for efficient security. bring intelligent and programmability into 5G HetNets for efficient security.to bring intelligent and programmability into 5G HetNets for efficient security[7].

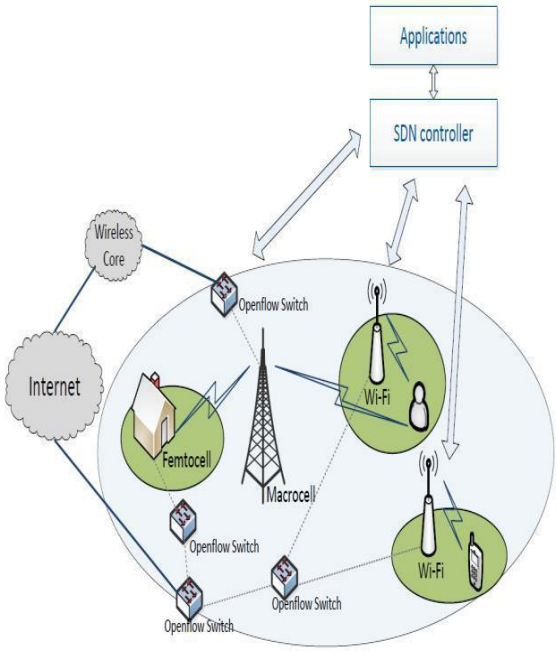

Figure1. SDN-based wireless heterogeneous network structure with control plane design

Table 1. Comparison of 4G and 5G Technologies

Specifications	4G	5G
Full form	Fourth Generation	Fifth Generation
Data Bandwidth	2Mbps to 1Gbps	1Gbps and higher As per need
Frequency Band	2 to 8 GHz	3 to 300 GHz
Standards	Al access convergence including OFDMA, MC-CDMA,network-LMPS	CDMA and BDMA
Technologies	Unified IP, seamless integration of broadband LAN/WAN/PAN and WLAN	Unified IP, seamless integration of broadband LAN/WAN/PAN/WLAN and advanced technologies based on OFDM modulation used in 5G
Service	Dynamic information access, wearable devices, HD streaming, global roaming	Dynamic information access, werable devices, HD streaming, any demand of users
Multiple Access	CDMA	CDMA,BDMA
Core network	All IP network	Flatter IP network, 5G network interfacing(5G-NI)
Handoff	Horizontal and vertical	Horizontal and vertical

The software can then be implemented upon the central SDN controller to provide consistent and efficient management over the whole 5G HetNets

Further, HetNets into an amalgamated network through a common configuration interface and real-time information exchange is proposed to reach a coordinated spectrum sharing across HetNets, an SDNenabled orchestrated spectrum sharing scheme that integrates participating A real-time 3D interference map is developed to guide the spectrum access based on the SDN global view and to effective occupant users[8]. Network simulations confirm that average interference at occupants is reduced as well as the average number of denied access. So, We need a test hypothesis to authenticate users, which shows enhanced authentication accuracy and reduced latency in Network simulator. Besides, we first analyze the SDN structure using priority queuing theory, and prove the performance of SDN enabled authentication.

3.1 SDN Enabled 5G HetNets:

Open Network Foundation (ONF) and Software-Defined Networking Research Group has investigated SDN from various perspectives. Open network foundation is a non-profit organization founded by Google, Microsoft, Yahoo and some Telecom Operators in March 2011, which aims at the development of SDN-related technology, standardization, and marketing [9].

3.2 Working of Software Defined Networking Enabled 5G HetNets:

SDN-based wireless heterogeneous network structure with control plane design HetNet environment consist of cellular base stations (BSs) and Wi-Fi access points (APs), as shown in below. The BSs communicate over the licensed band and Wi-Fi APs communicate over the unlicensed

band. The Wi-Fi APs are located randomly within each cell. It is assumed that all the base stations and the Wi-Fi APs are connected to Open flow switches, as depicted in Figure. For the cellular network, the switches are co - located with the BSs, i.e., each BS has its Open Flow-enabled switch. While the switches of the Macrocells are connected to the core network, the Femtocell switches are connected directly to the Internet. On the other hand, for the Wi-Fi APs, the switches are located within the Internet service provider infrastructure, and each switch can be connected to multiple Wi-Fi APs. All the switches are controlled by a centralized SDN controller [10]. Controller is only a program running on a server, it can be placed anywhere on the network, even in a remote data center. However, this integration leads to many security problems in which 5G needs to take care of. It is expected that security issues in 5G are due to many factors like:

a) Open architecture of the 5G system

b) The diversity of access network technologies of the 5G system,

c) The large number of interconnecting devices,

d) Battery power and memory storage capabilities,

Figure below shows the difference between macro cell operating in lower frequencies (2G,3G,LTE) and small cell operating in Higher frequency (HetNet in 5G).As shown in figure one cellular network is divided into small cells like microcell ,femtocell And picocell with the high frequency.

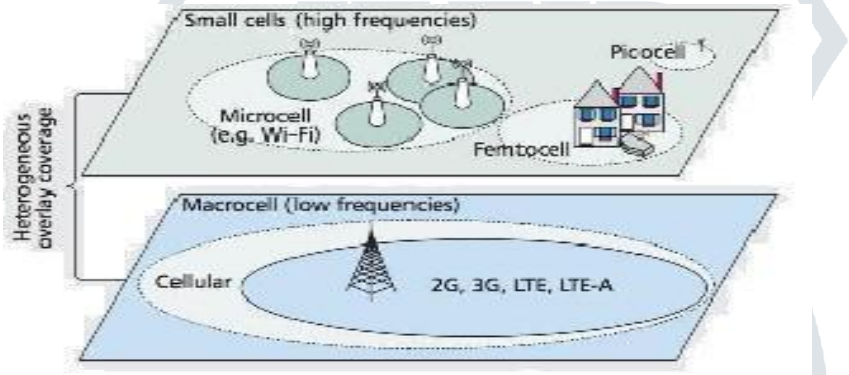

Figure 2: Difference between traditional and 5G network

IV. Conclusion:

Fifth generation mobile networks are also referred to as the emerging next generation mobile communication systems. Due to the high growth of mobile data traffic and storage of spectral resources, 5G networks are anticipated to have a heterogeneous network create new challenges like resource management and security provisioning. So, in this project as explained in previous section, this complexity problem when securing small cell in form of authentication handover can be achieved By SDN which is one of the solutions for many security challenges faced in 5G. With the increase in the number of small cells the complexity on the SDN controller also increases. So, SDN must respond to the computational problems quickly. Future work includes how to secure the SDN controller by various attacks.

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