

A SURVEY ON 5G NETWORK ARCHITECTURES

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ABSTRACT

The Fifth-Generation wireless communication was expected to have a major role in the technological transformation of different industries. So many applications which are exciting will be enabled by 5G. The smartphones are getting increasingly smaller But, core algorithms are not evolved to run. So, the power consumption of these 5G systems is high. With the phenomenal increment in the mobile devices and data are challenging the mobile communication of current generation. This survey paper will review the vision of 5G networks, proposed architectures, applications, advantages, implementation issues, testbeds and what are the real time implementations the industries working.

Keywords: 5G-Fifth Generation, Security, D2D Communication.

I. INTRODUCTION

The Fifth generation of cellular networks primarily influenced by the continuous growth in data usage, wireless user devices and need for the better quality of experience. The 5G networks are characterized in to three main features which are low latency, high speed data transfer and ubiquitous connectivity. In the near future various types of devices will be connected ubiquitously and uninterrupted user experience and communication services will be provided. Different methodologies and technologies exists for 5G cellular networks, they are VLC, SIC, SDN, M2M communication, DUD, mmWave and mMIMO. 5G cellular networks will support various real-time applications and services with no delay. The development of 5G networks is challenging. The capacity of the network and data rate should be increased with low power consumption, flexibility, interference, handling, low latency, high mobility, environment friendly, self-healing, security, high reliability, low price, interference, scalability, privacy and high mobility. Some of the architectures which are existing for 5G cellular networks are CRN-based, multi-tier, cloud-based and D2D communication-based architectures. Cognitive radio network-based architecture can be non-cooperative and cooperative CRN.

II. TWO-TIER ARCHITECTURE

In the two-tier architecture, MBS is in top-tier and SBSs stays in lower tier. The main advantage of deployment of the small cells is efficient spectrum use and high data rate. These two-tier architectures have self-healing property which can be achieved through three approaches, they are Centralized approach, Distributed approach and Hybrid or Local Cooperative approach. Some of the advantages of this two-tier architecture are efficient usage of spectrum, high data rate, power saving, easy handoff.

III. COGNITIVE RADIO NETWORK BASED ARCHITECTURE

A CRN architecture creates a two-tier architecture. It is a collection of processors (or cognitive radio nodes) called as secondary users that uses and derive benefit from existing spectrum. In 5G cellular networks the CRN is used to design multi-tier architecture by removing interference and minimizing the power consumption in network. With the help of this Cognitive radio network-based architectures interference can be minimized by enhancing the utilization of the bandwidth and capacity of the network can be increased.

IV. DEVICE-TO-DEVICE COMMUNICATION ARCHITECTURE

D2D communication (Device-to-Device) allows the close proximity UE to communicate on licensed cellular bandwidth. The interface management in D2D communication create interference. Device-to-Device communication could be done in four different ways. They are DR-OC, DC-OC, DR-DC and DC-DC. Some of the advantages of using the Device-to-Device communication are Network Coding Scheme, peer to peer file sharing, Security, Privacy and Multi-Mode Selection.

V. CLOUD-BASED ARCHITECTURE

Cloud Computing infrastructure provides easy, scalable and on-demand accesses to shared pool of resources which are configured. It is also known as Cloud-Based Radio access networks which is provided by China Mobile Research Institute(C-RAN). It provides dynamic allocation scheme of service without the costly installation of network devices. There are many challenges in deployment of C-RAN, they are reliability, Manageability, security, real time performance and efficient data transfer techniques.

VI. REAL DEMONSTRATION FOR 5G NETWORKS

A Real-time simulator is being developed by DOCOMO for the evaluation and simulation of mMIMO, mmWave and small-cell. An experiment on data transmission was performed by Samsung by using mmWave which resulted in achievement of highest data rate in the world.

VII. CONCLUSION

In the above Survey We have discussed the salient features, applications, requirements and challenges behind development of 5G (Fifth generation) cellular mobile communication. The development of novel architectures is not the only solution for 5G cellular networks. There can be a need for handling the other implementation problems in user context. We conclude the discussion with a notion of that designing 5G infrastructures is still under the progress. The prominent issues are Privacy and Security of the devices, network devices development, communication, infrastructures and data transfer are yet to be explored.

VIII. REFERENCES

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