

# The Review of Energy Efficient Network

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In recent years, with the explosive growth of mobile communications in terms of number of connected devices, and the demand for new services and better connectivity, the consumption of wireless access networks is experiencing a significant increase [7]. This situation imposes a big challenge for mobile operators not only because due to soaring cost of energy, but also increasing concern for global warming and sustainable development. Hence, it becomes important for mobile operators to support vastly different quality of service requirements of increasing number of users in an energy efficient manner. To support access to information anywhere, and anytime at low energy consumption, would require a paradigm shift in the network design objective.

## II. LITERATURE REVIEW

**Chang et al (2017)** the research paper entitled "Towards Service-Oriented 5G: Virtualizing the Networks for Everything-as-a-Service" describes the coming 5G technology that will be heterogeneous and deployed with high degree of density. The paper clears the advantages of 5G that is no longer limited by hardware and software. The paper explains everything-as-a-service taxonomy do design different service oriented wireless networks.

**Ali et al (2017)** the research paper titled "Beamforming techniques for massive MIMO systems in 5G: overview, classification and trends for future research" describes the MIMO systems and its combination with beamforming

## ABSTRACT

Energy consumption is a primary concern in design and operation of wireless communication networks based on environmental concern and cost. The coming 5G network proposes better data rates but also speaks about energy efficiency in its agenda. In order to achieve high energy efficient.

**Keywords:** 5G, 4G, MIMO

## I. INTRODUCTION

In order to have high energy efficiency, we should have less energy consumption. It is seen in 4G network that as traffic load increases the energy consumption also increases thus decreasing energy efficiency [1]. But there occurs a defect in 4G system that at no traffic load the system utilizes energy, which should not be the case this problem occurs due to design of the said system. 5G network is the most awaited mobile technology development in the next 5 years. A lot of talks, proposals and ideas have been put forwarded in many conferences, congresses and events across the globe regarding the deployment and requirements of this technology [3]. The upcoming next-generation cellular communication systems, or 5G, will be assisted by technologies that produce significant improvements in cell throughput. In recent years, various studies have been focused on massive multiple input multiple output (MIMO) systems, which are considered to play a significant role in 5G [6].

antenna array technology to offer better services for coming 5G technology. The paper also outlines classification of optimal beamforming techniques deployed in wireless communication systems.

**Charis and Showme (2017)** the research paper entitled "Beamforming in Wireless Communication Standards: A Survey" defines different beamforming technologies and beamforming method used in wireless applications. The paper explains in deep the concept of beamforming with methods and statistical analysis.

**Islam et al (2016)** the research paper entitled "Suitable Beamforming Technique for 5G Wireless Communications" presents the telecommunication standards used for the coming 5G communication. The 5G system will achieve more than 10 Gbps deployed in 2020 and there are number of problem that need to be solved to go through this speed means high frequency wave is needed to transmit data through a wider bandwidth. The paper also describes the importance of MIMO for the coming 5G technology. At last the paper demonstrates the simulation of performance of conventional, adaptive and hybrid beamforming techniques for 5G system so that we can find the best beamforming technique.

**Tang et al (2015)** the research paper entitled "Energy-Efficient Transmission Scheduling in Mobile Phones using Machine Learning and Participatory Sensing" describes the

importance of energy efficiency for smart phones. Existing research shows that 3G and 4G network interface on a mobile device would lead to low energy efficiency. The paper clears the tail energy minimization problem by introducing techniques of machine learning and participatory sensing.

**Tall et al (2015)** the research paper titled “Multilevel beamforming for high data rate communication in 5G networks” describes the large antenna arrays and can be used to generate highly focused beams to support high data rates and minimize energy consumption. The paper also describes the methodology for designing a multilevel codebook of beams in an environment with low number of multipaths.

**Andrae and Edler (2015)** the research paper entitled “On Global Electricity Usage of Communication Technology: Trends to 2030” describes the estimation of the global use of electricity that can be ascribed to communication technology between 2010 to 2030.

**Saxeena et al (2014)** the research paper entitled “Traffic-Aware energy Optimization in Green LTE Cellular Systems” describes the rapid increase of wireless data traffic and greenhouse CO2 emission. The paper clears the concept of green 4G LTE networks that is in the development of energy

efficient LTE systems for minimizing the greenhouse emissions and the bill of operators.

**Wu et al (2014)** the research paper entitled “Green Transmission Technologies for Balancing the Energy Efficiency and Spectrum Efficiency Trade-off” describes the rapid growth of 4G network technology across the globe and the welcome of 5G network technology. The paper outline the increasing energy consumption of networks has become a worrying economic issue for operators and a very big challenge for sustainable development. The paper also describes that in wireless networks the energy efficient design of physical layer transmission technologies and MAC layer radio resource management is the focus area.

**Wang et al (2014)** the research paper entitled “Cellular Architecture and Key Technologies for 5G Wireless Communication Networks” describes the fourth generation wireless communication systems worldwide. The paper outlines the challenges that are not resolved using 4G like energy consumption. The paper clears the introduction of fifth generation wireless systems with a cellular architecture that separates indoor and outdoor scenarios. The paper also describes the promising technologies for 5G networks like MIMO, Energy Efficient Communications, Cognitive Radio Networks and Visible Light Communications.

### III. COMPARATIVE ANALYSIS OF LITERATURE REVIEW

Reference	Title	Technique	Research Findings
Chang et al	Service-Oriented 5G: Virtualizing the Networks for Everything-as-a-Service	5G Technology	The paper presents the coming 5G technology that will be heterogeneous and deployed with high degree of density
Ali et al	Beamforming techniques for massive MIMO systems in 5G: overview, classification and trends for future research	MIMO	Presents the MIMO systems and its combination with beamforming antenna array technology to offer better services for coming 5G technology
Charis and Showme	Beamforming in Wireless Communication Standards: A Survey	Beamforming	The paper defines different beamforming technologies and beamforming method used in wireless applications
Islam et al	Suitable Beamforming Technique for 5G Wireless Communications	5G	Presents the telecommunication standards used for the coming 5G communication
Tang et al	Energy-Efficient Transmission Scheduling in Mobile Phones using Machine Learning and Participatory Sensing	Smart Phones	Presents the importance of energy efficiency for smart phones
Tall et al	Multilevel beamforming for high data rate communication in 5G networks	Antenna Arrays	Presents the large antenna arrays and can be used to generate highly focused beams to support high data rates and minimize energy consumption
Andrae and Edler	On Global Electricity Usage of Communication Technology: Trends to 2030	Communication Technology	Describes the estimation of the global use of electricity that can be ascribed to communication technology between 2010 to 2030

### IV. ENERGY EFFICIENCY IN FUTURE WIRELESS NETWORKS

5G also known as the 5th generation wireless systems, or beyond 4G or beyond 2020 mobile communications technologies is one of the upcoming buzzwords for the future’s mobile communication world. It can be seen as a user-centric network, as opposed to the operator centric approach seen in 3G and the service centric in 4G. 5G is not yet detailed in any particular specification in any official document by any telecommunication standardization body. However, the 5G terminals are expected to be software defined radios that are able to utilize access to different wireless networks simultaneously. They are expected to be capable to

download and incorporate new modulation schemes and error control schemes into use, and they should also be able to join different data flows together from different technologies commonly known as multi-mode MTs.

### V. CONCLUSION

The research paper presents the review of Energy Efficient Networks with complete literature survey. The paper is describing the basic fundamentals of the proposed topic and the need of energy efficiency in coming 5G technology.

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