

BOOK CHAPTER | “Higher Speed at What Cost?”

5G Cellular Network Forensics

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ABSTRACT

The fifth generation (5G) of cellular networks will bring 10Gbps user speeds, have a wider bandwidth which can accommodate 1000 times what the fourth generation (4G) could and 100 times faster than the previous 4G cellular network. This paper’s focus is to highlight on the legal aspects of the 5G cellular network. That is, the health issues, privacy, and security issues on Africans. Most crimes currently are facilitated by cellular network devices and with the improvement that the 5G cellular network brings, there is going to be an increase in cybercrime and hence the need for forensics. These forensics’ techniques used in evidence acquisition violates the privacy and security of the users of the 5G cellular network.

Keywords: Cellular Networks, Fifth Generation (5G), Lawful Interception (LI), Lawful Access Location Services (LALS), Privacy, Security, Africa, Natural Resources, Carbon, Ozone Layer, Internet of Things (IoT)

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1. INTRODUCTION

Cellular networks are simply radio networks distributed over land areas called cells which is served by a transceiver in at least one fixed location known as Cell site or Base station. The type of network has evolved through four generations and the fifth is currently being rolled out. 5G cellular networks are 1000 times faster and have a system capacity that can accommodate 1000 times what the fourth generation could accommodate. To achieve these requirements, 5G will incorporate technologies like Control and User Plane Separation (CUPS), Network Functional Virtualization (NFV), Network Slicing and Cellular Internet of Things (CIOT).[1] . The 5G cellular network uses technologies which require high-powered-frequency base stations, these base stations emit lots of carbon into the environment and thereby endangering the lives of species within it.

1.1 Background

Digital forensics of previous generations of cellular networks (G,2G,3G and 4G) was not as easy. The Fifth generation (5G) for that matter will be much more challenging due to the advancement of the technologies being adopted. Investigations in cellular networks can be done in two ways; Real-time and non-real-time. Real-time forensics is done as and when the crime is being perpetrated and transmitted over the network and to achieve this you need to get a warrant. This is to get the geo-location, browsing sessions, contacts etc. of the perpetrator. Non-real-time forensics deals with evidence gathered from previous locations and browsing history which sometimes get destroyed by the perpetrator.

To be able to properly attain the right evidence during Cellular network forensics, Law enforcement Agencies (LEAs) must establish forensic readiness to ensure secure identification, acquisition, and delivery of cellular network evidence. These operations are realized with two forensics mechanisms, Lawful Interception (LI) and Lawful Access Location Services (LALS). These two mechanisms are incorporated into the 5G cellular network. This paper concludes with a discussion of the legal and privacy aspects of the 5G cellular network. This is because, the technologies adopted by the 5G cellular network (Control and User Plane Separation (CUPS), Network Functional Virtualization (NFV), Network Slicing and Cellular Internet of Things (CIOT)) tends to violate the privacy of the various individuals using the 5G cellular network.

2. RELATED LITERATURE

According to Filippo Sharevski, in an article titled “Towards 5G cellular network forensics”, [1] the article highlighted on the technologies behind the 5G cellular network, the crimes associated with the 5G cellular network and the legal aspects of the way in which evidence is obtained in investigations during crimes committed. Lawful interception (LI) and Lawful Access Location Service (LALS) are the current mechanisms employed in the various technologies used to implement the 5G cellular network. These two mechanisms violate the privacy of the users on the 5G cellular network.

Secondly, according to Myrtil Simko and Mats-Olof Mattsson, in an article titled “5G Wireless Communication and Health Effects”,[2] they highlighted on some health effects of the 5G cellular network and how it will negatively affect the health of humans and animals. The 5G cellular network requires high-frequency-powered base stations, these high-frequencies have negative impacts on the skin or eye. They further stated that the high-frequency-powered base station will not only impact humans and animals negatively but also the environment which consists of plants, animals, humans, natural resources such as water bodies, etc.

Finally, Yangxue Ding et. Al, in an article titled “Carbon emissions and mitigation potentials of 5G base station in China”, [3] this article points to the high raise of base stations needed for 5G transmission and each base station requires emits a reasonable amount of carbon into the environment. The article further stated that the 5G cellular network would deteriorate the promotion of the Green development plan of mobile communication facilities.

3. RESEARCH GAPS

During my study of these related works and analysis of the impact of the 5G cellular network on the environment, none of these papers stated the impact of this technology on Africa. In Africa, most telecommunication companies already violate the Privacy and security of their Customers (Users). The focus of this paper is not to talk about the privacy issues related to network communication in Africa but to highlight the legal aspects of the 5G cellular network. Privacy is a big issue in Africa, Africans do not value the importance of privacy and so do not look deep into the technologies behind the cellular networks and 5G cellular network. Lawful interception (LI) and Lawful Access Location Service (LALS) technologies incorporated into the 5G cellular network will violate the privacy and security of many Africans, which both articles fail to highlight.[1].

Most of the natural resources in Africa, are being exploited by the foreigners who pay little for what they get from our lands and water bodies. These high-powered-frequency base stations which emit massive carbon into the atmosphere will deteriorate the ozone layer which will reduce our shield from the heat radiations from the sun.[2][3]. Africa is vastly adopting new technologies such as Internet of Things (IoT) and new devices such as smart automobiles, higher versions of smart phones, Network devices, etc. these new technologies and devices pose a cyber risk to the continent. With 5G, these risks become widened. 5G enhances network connectivity, some countries in Africa, for example Ghana, have biometric data of almost every citizen exposed to cyber-attacks with their National identification Carding systems. Online safety thereby becomes a greater problem.

Most research on 5G highlights on the damages being done to European countries and others without mentioning Africa. Africa would be greatly impacted in the 5G technology both negatively and positively. Policies and practices which should be established to ensure that the damages being done are contained and or the damages should be avoided totally will be overlooked by those in charge because they will be financially influenced.

4. CONCLUSION

Most articles on 5G cellular network fail to highlight the negative impact of the 5G cellular network on Africa. Filippo Sharevski highlighted on the privacy and security implications of the 5G cellular network. Myrtill Simko and Mats-Olof Mattsson also highlighted on the health issues associated with the 5G cellular network. Yangxue Ding et. Al also raised concerns on the high carbon emission by the high-powered-frequency base stations.

5. RECOMMENDATION FOR POLICY AND PRACTICES

With the rate at which our natural resources in Africa are being exploited by the foreign countries, it is recommended that Africans reconsider the agreements between this telecommunication companies on the 5G cellular network. Issues relating to the several polluted water bodies caused by illegal mining of Gold, bauxite, copper, resulting into cholera and other water borne diseases are still with us. 5G cellular network are expected to have negative implications on the skin and eyes, adding to the health issues from the illegal mining and the massive carbon emission by the high-powered-frequency base stations.

It is therefore imperative that technologies being used in the implementation of the 5G cellular network should be reconsidered and re-assessed and if possible consider other technologies which have less health issues and privacy and security issues on the environment and Users respectively.

6. DIRECTION FOR FUTURE WORKS

The main thrust of this term paper is to highlight on the legal aspects of the 5G cellular network, that is; how the 5G cellular network would negatively impact the lives of Africans and the need for the telecommunication companies to reconsider the technologies used in implementing the 5G cellular network.

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