Base Station Availablity and Telecommunication Network Quality of Service – A Review

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***Abstract*—Network Quality of Service (QoS) is hinged on Base Transceiver Station (BTS) Availability. With the preparation of roll out of Next-generation 5G network, there is bound to be a massive influx of network infrastructure and higher demand for network availability. 5G intends to achieve all-time connectivity for diverse devices and this implies that the devices must remain connected not minding the state of the channel. This paper reviews the significance of a predictive tool for base station availability for Mobile Network Operators (MNO) for better service delivery. This forecast will enhance the smart planning of operations by Managed Service Providers (MSP) in a bid of improving Base Station availability by the reduction of the Mean Time to Repair (MTTR) as well as the increment of Mean Time Between Failure (MTBF) (MTBF can be improved by redundancy) to overcome envisaged network downtimes. It is a common practice for MNOs to engage the services of MSP as they have the capability of efficiently handling technical complexities more than the clients would (client here refers to the MNO). The MSP and the MNO enter into a contractual relationship and a service level agreement (SLA) is issued. This service level agreement is an important document in the contractual agreement binding the client (MNO) and the MS provider (MSP) and it defines the key performance indicators (KPI) that the MSP must meet up with. The parameters include a detailed description of required services, network restoration, network uptime, availability, systems repair, data transfer rate and expected performance measure.**

Keywords— Base Transceiver Station, Availability, Quality of Service, Mobile Network Operator, Managed Service Provider, Service Level Agreement.

I. INTRODUCTION

The massive influx of wireless mobile cellular technologies has made communication and other related applications more available than what it was in a few decades before now. With the emerging 5G, mobile applications will experience a tremendous surge, whereas, the bandwidth requirement of the cellular network becomes very high. To cater for such a great need in the cellular network infrastructure, several base stations have been designed, deployed to appropriate geographical locations to meet the expectations of the service coverage areas and improved quality of service [1], [2]. The base stations are then linked to the carrier network via the backhaul infrastructure using microwave links or fiber-optic lines. Though, this infers that the network service downtime will affect all the dependent base stations. It becomes very essential to consider the need to maintain an acceptable availability for both transmission route and base station so that service availability is sustained. A mobile cellular network is described as a communication infrastructure comprising network elements (NEs) that allow mobile stations or user equipment (UEs) access network services through radio channels [3]. Key performance indicators (KPI) for Quality of service (QoS) such as Call Setup Success Rate (CSSR), Drop Call Rate (DCR), Traffic Channel Congestion Rate (TCH-CR), Hand Over Success Rate(HOSR) are greatly enhanced with optimum base station availability [4]–[16]. In the remaining part of this paper, we will be looking at related work, basic concepts and terminology in the research domain, Managed Service (MS) and Service Level Agreement (SLA) effects on BTS Availability; models and network predictive tools presently in use, future direction and the conclusion.

II. RELATED WORK

Research work on base station availability have centered on optimal resources utilization; power-saving and improved radio network planning and maintenance. In [17], the availability of cloud Mobile Switching Server and Telecommunication Application Server were considered with the redundancy principle. Prior to the deployment of telecommunication networks on cloud, it is very important to have an idea on the level of network availability in comparison with that of the legacy equipment, hence the necessity of the availability prediction. This helps in proper planning of the project implementation and assurance of service quality. The simulated result indicated availability values equivalent to that of the legacy telecommunication equipment is achievable. However, the outcome of the simulation needs to be authenticated by the use of real field dataset. In [18], the paper discusses the evolution of Telecommunication Cloud, availability, basic dimensioning, design concepts and some challenges of practical implementation of the technology. [20] presented a