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5g Conundrum and Emerging ICT Issues in a Post-Covid-19 Economy

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ABSTRACT
Technological advancement is one of the key strengths in the current era to overcome the challenging society's burden like covid-19 which has been attributed to severe acute respiratory syndrome (SARS). The world economy in the face of post-covid-19 will be a safeguard and well manage through the appropriate application of relevant intelligent technologies. The novel ICT technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), Big Data, 5G communications, cloud computing and blockchain analytics can play a vital role to facilitate environmental sustainability, fostering protection and improvement of people and economies. This paper aims to discuss the riddle behind the emergence of the 5g network in the phase of the Covid-19 pandemic and the economic implications in a developing country like Nigeria. It further analyzes notions as it relates to health, world politics and religion. The paper is concluded with a summary of the impact of 5g beyond the 21st century.

Keywords: Covid-19, Pandemic, 5G, IoT, Conundrum, Economy

I. INTRODUCTION

The recent spread of Coronavirus Disease (Covid-19 pandemic) which has been attributed to severe acute respiratory syndrome (SARS) has caused substantial changes in the lifestyle of humans, societies, organizations and nations all over the world. "By the end of June 2020 over eleven million positive cases of COVID-19 were recorded, causing over 500,000 deaths worldwide leaving countries to face healthcare, financial, and societal challenges" (Yushan, Gurkan, Mika andMadhusanka, 2020).

To mitigate against the spread of the virus, governments of nations imposed strict restrictions and control on travel and movements within, outside and between countries. Schools were closed and some are still closed, cities were isolated and public interactions were curtailedand are still being curtailed as a result of variants such as the London, Indian and Delta variants, thus affecting the regular lifestyle of people. Health and hygienic measures and policies were taken by Governments in most countries as guidelines on social distancing, hand washing/sanitization and use of facemasks and or face shields to prevent the spread of the virus.

These restrictions and ban negatively affected the world's economies which led to collapse, bankruptcy and shut down of some industries and organizations, introducing the concept of working from home or remote locations, telecommuting and telecomputing.

Yushan et al., (2020) posited that "while the remote work was considered as an alternative with limitations, certain jobs became obsolete. Apart from that, governments' expenditure on the unemployed workforce, losing income from sectors associated with tourism such as airlines, hotels, local transport, and entertainment were major challenges for the economies".

Technological advancement is one of the key strengths in the current era to overcome the challenging society's burden such as the covid-19 outbreak. The timely application of relevant technologies will be imperative not only to safeguard but also to manage the post-covid-19 world economy. According to Yushan et al., (2020, paraphrased), "The novel ICT technologies such as Internet of Things (IoT), Artificial Intelligence (AI), Big Data, 5G communications, cloud computing and blockchain can play a vital role to facilitate environmental sustainability, fostering protection and improvement of people and economies. The capabilities they provide for pervasive and accessible services are crucial to alleviate pandemic related problems".

As a technological innovation, "5G communications presents a paradigm shift from the present mobile networks to providing universal high-rate connectivity and a seamless user experience" Boccardi, Heath, Lozano, Marzetta, and Popovski (2014).

Nature, this time through a virus (so difficult to handle), has hit us so hard, lethally and

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only apparently without warning. The covid-19 pandemic will be remembered for many things and among them will be that the economies of countries were never the same anymore.

II. AIM

This paper aims to discuss the riddle behind the emergence of the 5g network in the phase of the Covid-19 pandemic and the economic implications in a developing country like Nigeria. It further analyzes notions as it relates to health, world politics and religion. The paper is concluded with a summary of the impact of 5g beyond the 21st century.

This paper is divided into six sub-sections for purposeful discussion and analysis including introduction, aim, 5g conundrum, the historical progression of the spectrum, covid-19 and 5g issues and their implications.

III. 5G CONUNDRUM

According to Osseiran, et al (2014), "5G networks target delivering 1000 times higher mobile data volume per square area, 100 times higher number of connected devices, 100 times higher user data rate, 10 times longer battery life for low power massive machine communications and 5 times reduced End-to-End (E2E) latency". These objectives will be realized by the key technologies such as "mmWaves, small cell networks, massive Multiple Input Multiple Output (IMO) and beamforming" (Andrews, et al, 2014).

By utilizing these technologies, 5G will be made to support enhanced Mobile BroadBand (eMBB), Ultra-Reliable & Low Latency Communication (URLLC) and massive Machine Type Communication (MTC) as service classes. Yushan et al., (2020) posited that "the novel 5G networks will be built alongside fundamental technologies such as Software Defined Networking (SDN), Network Function Virtualization (NFV), Multi-access Edge Computing (MEC) and Network Slicing (NS)". From this concept, it is summarised that SDN and NFV will enable programmable 5G networks to support the fast deployment and flexible management of 5G services while MEC will be responsible to extend the intelligence to the edge of the radio network along with higher processing and some form of storage capabilities and NS will create logical networks on a common infrastructure to enable different types of services with 5G networks.

Several juxtapositions have made the advent of the 5G technology a conundrum, a riddle, a tale and a myth. Some even view technology as a necessary evil that may consume humanity. Other considerations have seen the 5G technology as an invention that will bring humanity to be in tandem with nature's light. Where everything is done with the speed of light.

Despite the above assertions, 5G technologies will enable ubiquitous digital service transmissions needed to combat and curtail the prevalence of pandemics such as Covid-19. Capabilities of 5G technologies can be effectively utilized to address the challenges associated with COVID-19 presently and in the post-COVID-19 era.

Every facet of mankind including health care, manufacturing, farming, education, transportation, travelling, sports, and fashion will have a taste of some form of technological revolution. With 5G and in the next ten years, cities will be filled with driverless cars, food will be ordered and delivered through drones, medical surgeons will carry out the human surgeries by being several miles away from the patient. Furthermore, 5G technology will overcome some of society's dilemmas such as road accidents, kidnappings, and armed robberies. According to WHO (2018) "Approximately one million, three hundred and fifty thousand people die annually from road traffic accidents". Maher and Mountain (2009), observed that **"**Driverless cars will become fully autonomous with 5G technology with the ability to process enormous data in milliseconds with zero latency and which can prevent them from crashing, thereby avoiding road traffic accidents"

An agricultural model in which farmers monitor the fields through soil sensors, mounting airborne cameras to detect crop disease, invasion by rodents, birds and pests etc is expected to lead to a robust transformation in the agricultural sector. In education, the closure of schools resulted in students being compelled to attend classes via broadband access from home. "With millions of students moving from conventional face-to-face sessions in the classroom to e-learning, the educational sector will experience unparalleled transformations. It will attend to the resource limitations in schools, the continuation of education without any disruptions, increased family time and increased social connectivity" (Amy and Kristen, 2017). Incorporate employment, most of the white-collar employees will have their offices at home and will be paid according to the tasks they complete.

The reality of the 21st century is that people working from homes and remote locations need a fast internet spectrum. Here, comes the gap to be filled by the 5g network.

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IV. HISTORICAL PROGRESSION OF THE SPECTRUM LEAD

Crises accelerate history and existing trends corroborating the assertion that 'necessity is the mother of invention'. In this section, we are going to discuss the historical progression of the spectrum lead from the first to the fifth generation.

The first generation of internet spectrum technology was launched in the 1980s having a data rate of up to 2.4kbps. "Major subscribers were the Advanced Mobile Phone System (AMPS), Nordic Mobile Telephone (NMT), and Total Access Communication System (TACS)" (Sanou, 2018). 1G (1st generation) spectrum had a lot of drawbacks like performing at a below-expected capacity, reckless handoff, inferior voice associations, and little or no security.

The second generational internet spectrum was introduced in the late 1990s. This digital technology used second-generation mobile telephones, Global Systems for Mobile communications (GSM) with a data rate of up to 64kbps. 2G mobile communications technology employed radio signals having a low power consumption rate. 2G internet spectrum provides services such as Short Message Service (SMS) and e-mail. Further advancement in the 2G technology brought about the deployment of a 2.5G system which generally uses 2G system frameworks by the application of packet switching along with circuit switching and a data rate of up to 144kbps.

"The third-generation internet spectrum, popularly known as the 3G technology was introduced in late 2000. It imparts the transmission rate up to 2Mbps" (Akhil and Rakesh, 2015). 3G systems merge high-speed mobile access to services based on Internet Protocol (IP). Aside from the transmission rate, an unconventional improvement was made for maintaining the quality of service (QoS). Additional facilities like global roaming and improved voice quality made 3G a remarkable generation. According to Akhil and Rakesh, (2015) "The major disadvantage of 3G technology is that they require more power than most 2G models. Along with this, 3G network plans are more expensive than 2G".

The fourth-generation (4G) which came to existence in late 2000 is commonly referred to as the descendant of the 3G and 2G standards. "A 4G system improves the predominant communication networks by conveying a comprehensive and dependable solution based on IP" (Akhil and Rakesh, 2015). Services like voice, data, and multimedia will be transmitted to subscribers at any time, anywhere and at quite higher data rates as against earlier generations. Applications that are being made to use a 4G network are Multimedia Messaging Service (MMS), Digital Video Broadcasting (DVB), and video chat, High-Definition TV content, and mobile TV. The 4G technology is plagued with six challenges: higher capacity, higher data rate, lower End to End latency, massive device connectivity, reduced cost and consistent Quality of Experience provisioning thus creating a wide gap in in-service requirements for the 21st century.

Based on the above deficiencies, an idea to create a paradigm shift towards 5G became predominant in the research world. According to Raphael, Emmanuel and Muhammad (2020), "5G refers to the 5th generation of mobile telecommunications technology which is expected to provide important economic benefits globally". As has been stated above, the main difference between 5G and its predecessor, 4G, is that 5G will have higher data rates, lower latency and higher connection density. This is why it is expected to be the most critical element of the digital society in the next decade. With the advent of COVID-19, this has become even more significant.

V. COVID-19 VERSUS 5G NETWORK

The Covid-19 outbreak will most certainly define the history of the 21st century by significantly affecting the direction and development of human civilization. As a worldwide, global phenomenon, its reach can only be comparable to the Second World War. Reflecting on the consequences of covid-19 and the level of concern, people are pushed to talk about it, share ideas and posit myths. One of these ideas and or myth is the fact that the 5G technology is the cause of the novel strain of Coronavirus popularly known as covid-19. Somehow as a result of the coincidence of time.

During the covid global pandemic, digital technologies have become a critical enabler of connectivity facilitating the continuity of man's regular life and connecting people more than ever before, turning people to their computers and smartphones as a lifeline tool. "Some of these habits may continue as the "new normal" - or at least until a long-term solution to the current challenges, such as an acceptable, harm-free vaccine, is found. Hence, the need to access a reliable digital infrastructure has become increasingly important, and certain aspects of ICTs are critical in a period of isolation, such as increased ICT opportunities from telework, telemedicine, food delivery and logistics, online and contactless payments, remote learning and

entertainment" (ITU, 2020). A conceptual analysis of this discussion is presented as follows:

Health

Science and technology should be at the service of life. Healthcare is engaged in waging war against this unknown dilemma.Antagonists of the 5th generation internet service have consistently argued that the presence of very powerful radiation emissions can cause serious health challenges ranging from all forms of cancers and viral epidemics through a distortion of the cosmic rays. One of the concerns that have been raised globally is the fact that the launch and testing of the 5g technology in China brought the Covid-19 virus to the limelight. Another concern has it that the current vaccines in circulation contain a metallic chip that is magnetizable and shortening the lifespan of those already vaccinated. Could all this be true? Only time and research will tell.

World Politics

In April 2015, Bill Gates offered a Ted Talk. Gates (2015) warned that "Today, the greatest risk of global catastrophe does not look like war. If anything kills over 10 million people in the next few decades, it is most likely to be a highly infectious virus rather than a war. Not missiles, but microbes. Now, part of the reason for this is that we have invested a huge amount in nuclear deterrence, but we have invested very little in a system to stop an epidemic. We are not ready for the next epidemic". Today, the world knows that the pandemic may have been caused by a virus, but some proponents have posited that it was enabled by human beings with political responsibilities who became irresponsible.The economic and technological competition between the United States of America and the People's Republic of China at the international level may just be the beginning of a broader trend, the revision of the model of globalization and a deviation in international governance. The US had described the virus as a Chinese disease. Accusing China of inventing the virus to destabilize America and the world in general while keeping back the vaccine and its cure. This led to the temporal disbandment of the operations of Huawei (a US Telecommunications Company based in China for their involvement in the 5g invention). The Chinese government had accused the then US government of being partisan and inconsiderate and expressed the ban on international travels as a ploy to obliterate migration and check the world's balance in population. Can all these accusations and counter-accusations be true? Only forensics can reveal.

Religion

The religious faculties were not left out in this as they constantly posited that the 5g network was an invention from the devil to establish a world order, a central monitoring system, a world database and fast track the coming of Armageddon through the implants of chips on the faces and arms of people. According to these proponents, this chip can be used to control and direct the mindset of humanity, the world economy and the belief and worship of the Antichrist. Could this also be true? Only revelation can tell.

VI. CONCLUSION

The covid-19 pandemic is much more than a health disaster. A traumatic event of global impact does not go away without enormous human, economic and social consequences. Uncertainty, pain, confusion, myths, facts twisting and distress will survive this pandemic. The question now is, for how long with the emergence of new variants.

The decline in GDP occasioned by the pandemic will be different for different economies and some regions will be deeply affected. Some regions will recover quickly, while others may take longer than ten years to revert to their pre-Covid19 level of growth and economy.This is a crisis where humanity must act humanly global. We are interconnected and the world will return to normal when everyone comes out of this crisis. It will be the only way to recover the freedom to live a normal life again.Every epidemic does not only test health systems, but also political, economic and religious systems.

5G promises to be a solution for industries, providing an integrated communication platform desired for novel production models, and overcoming the limitations of the existing ways of delivering services to mankind such as video teleconferencing and other internet related operations. The challenges associated with infrastructure and awareness among the populace when properly addressed will ensure a seamless transition to 5G. Nigeria as a developing country is expected to see an increase in GDP within the next 5 years because there is going to be a drastic increase in e-commerce, industrialization, healthcare, transportation etc. This adoption would be very beneficial to the country.

Thus, we can conclude that 5G technology together with the 'Internet of Things (IoT) will be the key drivers of the next economic paradigm shift beyond any form of the conundrum.

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