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Research Examining and Project Deployment Using Huawei Telecom's Global Mobile Network

MA BINCHANG [1], DR MOHAMMAD NIZAMUDDIN INAMDAR [2a]
[1] PhD. Research Scholar in Engineering, Lincoln University College Malaysia
[2] Professor in Lincoln University College Malaysia
Contact Details: [a] nizamuddin@lincoln.edu.my

Abstract

The purpose of this master's thesis is to illustrate the procedures—identification, classification, and application—by which standards are "born." The initiative is also driven by a desire to clarify the complexities of the standardization process, in this case as it relates to mobile communications, and thereby benefit business and industry. The next generation of mobile technology will have many improvements over the current 4G services, such as lower latency, faster speeds, more devices, and new features like Internet of Things architecture and Machine to Machine (D2D) and Device to Device (M2D) communication [17]. Networking specialists and developers must investigate how the ITU sets standards that are subsequently adhered to. by telecom companies, as it will enable them to gain a deeper understanding of the evolution of mobile communications and the different standards that have accompanied it. 5G, the next generation of wireless networks, has already been tested and implemented in real-world environments. According to tests by telecom carriers and 5G equipment manufacturers, the enhancements allow a stable connection 14 times better than current 4G [18]. Manufacturers of smartphones are beginning to offer 5G-capable devices, and over the coming years, this trend will continue. It's time to compare the IMT-2020 standard to different implementations and solutions, as well as how the new standard compares to earlier ones, after all the excitement surrounding 5G and faster data transfer speeds. Additionally, there is a lack of information about the major telecom companies' involvement in standard-setting and the kind of "advancement" they have. As a result, it's critical to evaluate each company's degree of progress in the 5G space [19].

Keyword: Networking Experts, Mobile Technology, IOT, Tele-communications, Machine to Machine

INTRODUCTION

With a focus on the impending 5G technology, this thesis "will examine the evolution of mobile telecommunications technologies." Examining Huawei's advantages and disadvantages in the mobile network and device sectors is the aim of this project [1]. The center of technological attention will be on the development of the 5G standard and Huawei's involvement in the IMT-2020 standards. The business will center on Huawei's activities in network markets, where they oversee mobile networks for "mobile operators," in addition to their strategy for breaking into the smartphone market [2].

This study will cover the development of mobile communication technologies, their categorization according to International Mobile Telecommunication (IMT) standards, and how the world of

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handsets and mobile devices is heading for 5G, which will enable faster, better, and more effective communication [3]. Motivation for this endeavor will be provided to the reader in addition to the "challenge specification."

REVIEW OF LITERATURE

Since Motorola created the first mobile phone in 1973, people have "always strived towards smaller, smarter gadgets and better services." Originally intended only for voice interactions, mobile communication technologies have evolved to offer much more. When the first mobile service was introduced in 1981, voice and mobile phone communication were the main features. A 1G mobile communication device was designated for it [4]. The development of different generations of mobile communication technologies and their related features was categorized by the International Telecommunication Union (ITU) using G nomenclature, or so-called Generation. It presents a clear, recognizable idea that the general public can easily understand and that service providers can market. Moreover, the term "G" proved to be essential in describing the services rendered by a specific generation [5]. Generations to come "will be able to move data via the network as a consequence of additional development. The second generation (2G) adds GSM to allow data transmission (SMS) and roaming communication (Global System for mobile). Up until then, data rates could reach up to 9.6 kbps. In reaction to the Internet boom, Third Generation (3G) was created with a focus on reducing latency (delay) and facilitating faster data transfers [6]. The spread of devices that are addicted to data, like smartphones, has accelerated the advancement of wireless communication technology. The Visual Networking Index (VNI) from Cisco predicts that traffic will increase fourfold between 2019 and 2020. Data traffic is also increasing due to the variety of multimedia content being transported over the network, including 3D and high definition video, as well as other real-time services. , in addition to the growing popularity of these gadgets. Social networking also piqued the interest of mobile users, leading to new consumption patterns and a notable rise in data traffic. Thus, in 2009, global voice traffic was eclipsed by mobile data traffic [7]. Future network challenges will come from the sheer volume of devices connected to the mobile communication infrastructure in addition to the exponential increase in network traffic. Machine-to-machine (M2M) connectivity will be ubiquitous by the 2020s. This kind of communication requires a very low latency. Additionally, manufacturers are switching from lower-generation (2G) to higher-generation (3G) networks (3G, 4G, and now 5G), in addition to optimizing mobile devices' computational capabilities. In other words, in not too distant a future, nearly all, if Not every device will use and rely on data [8].

Problem In the statement

Why should we strive for a new standard and, eventually, a new generation of cellular network,

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considering that "4G meets the needs of the average user"? There are a few main reasons to do this, as previously stated. Mobile broadband and its use were the main forces behind the creation of the 4G categories by the International Telecommunication Union (ITU) and the start of the technology's development [9]. The need for more construction was made worse by additional contributing factors. 4G required expensive hardware and infrastructure. In a few countries, frequency bands were licensed at a hefty price. Better and more efficient mobile communication is therefore needed. As fifth generation (5G) approaches, latency, reliability, throughput, and data are receiving more focus. volume as well as movement. The bigger issue for 5G will be the ongoing need for expanding network capacity, though, as mobile Internet traffic has increased over the preceding two years [10]. According to Rost et al.,
the following are the main reasons why mobile data usage has increased:

• Additional "mobile devices connected to the" network. • Additional "diverse and demanding services, also more bandwidth-hungry".

• Defining "the Device-to-Device (D2D) type of communication"; • Including "the Machine to Machine (M2M) type of communication through the Internet of Things."

• Users are "terminals used as a gateway to access other services – cloud, live TV" and so forth gadgets "that are using the spectrum are more complex and data hungry".

"The service-based paradigm is the focus," which has resulted in a 92% growth in mobile broadband since 2006. This raises concerns about the current mobile network infrastructures' capacity limits, which will soon be exceeded given current development. In today's networks, an intricate and inflexible control plane is paired with expensive, inflexible hardware [11]. Thus, the whole picture suggests that 4G will not be able to meet projected future demand and that it will be challenging to enhance existing networks. Overcoming these limitations and delivering more capacity and performance in an economically feasible manner is the aim of 5G. After that, the following generation ought to provide an exceptional user experience, more coverage, and a lower price than the preceding generations. A potential strategy for technical 5G implementation will be looked at in Chapter 5. Consequently, 5G is among the most effective mobile will emerge as the global "leader in the 5G race, and what changes can we expect to see in the mobile communication industry? We will utilize the answers to these questions to "paint" a picture of the digital world, with a focus on the mobile aspect.
The study aims to "highlight firstly the development of standards, then will reveal the current status of technology development that is compliant with the published 5G requirements and" classifications.

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Questions for Research:

• Will they arrive if we construct it? By tapping into a sizable market for 5G services and equipment, as well as a plethora of new jobs, 5G is anticipated to produce enormous revenues. Nonetheless, a "realistic appraisal of the new generation, with the goal of suggesting a future development route," will be provided to the reader.

RESEARCH DESIGNATION

The dissertation's study section concentrates on standardization as well as the technological ideas that companies that follow these standards use. The reader will gain knowledge about the process of standardization, how companies help develop 5G technology, and how these technologies function. This will act as the basis for the theoretical framework that this dissertation will contain. A survey of the literature and standards will be provided in the theoretical foundation and "State of the Art" chapters. The thesis will combine descriptive, explanatory, and qualitative methodologies for data collection. After it has been gathered, the data will serve as the basis for the ensuing analysis [20]. The research will not rely on any particular "framework," but rather on the previously discussed methodology.

DESIGN OF RESEARCH

Finding the facts and interpreting them form the basis of this research process. A 2015 forecast for the mobile market is an illustration of descriptive research. That is a description of satiation. This approach will help the thesis and provide a thorough understanding of current mobile technology as well as emerging standards. It will make it possible to compare various 5G implementations, which is necessary. Descriptive research is inadequate due to the nature of the dissertation since it does not provide a fitting conclusion or analysis. In order to get ready for "the next approach, which is explanatory research," descriptive research will be used [21].

By concentrating research investigations on the correlation of various events—or, in our case, various technologies and implementations—explanatory technique strengthens this thesis. In order to explain a technology's components and working principles, the study involves gathering background information and analyzing the technology in question. This dissertation will provide a thorough explanation of 4G and 5G concepts. We will provide a detailed description and analysis of the infrastructure and mobile network functions. The reader will gain sufficient understanding of the mobile network and various 5G applications. The explanatory approach is followed by the qualitative method [22].
There is a strong reliance on qualitative data in this research approach. It is an assortment of non-quantitative data from various research types. Contrarily, non-quantitative data is information that cannot be expressed as a numerical value.
Surveys and interviews are two types of qualitative data sources that we might use [23].
There are three basic principles in it, as stated in the research technique:

• "Meaningfulness"
• "Data classification"

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•"Conceptualanalysis"
“The data collected will have meaning (meaningfulness)."
This dissertation will rely on technological explanations for its facts. It will then be broken down into sections and subsections. Various types of numbers will be taken into consideration and employed, as they provide a more comprehensive understanding of the topic being studied. Technology will therefore be presented in its entirety [24]. The thesis will contain a small quantity of quantitative data to offer pertinent details for the study.

Examination of Data

The investigation will commence with a comparison of 4G and 5G networks. Following an investigation to gather pertinent data, a solution will be suggested. There will be an analysis of various 5G deployments and the roles that big tech companies have played. In order to achieve this, we will examine how the industry as a whole has been impacted by the expansion of 5G adoption at various companies. This thesis will benefit from an exploratory qualitative investigation that conducts "a similar sort of analysis to that which was just described."

Conclusion

This thesis's first chapter contains predictions for "the mobile communication environment," along with a glossary of terms. The numerous organizations and participants in the telecommunications standardization process are introduced in Chapter 3. Chapter 4 then looked at the state of future 5G and the current 4G (LTE) technology. Chapters 6 and 5 will cover qualitative research employing primary and secondary sources, respectively. Consequently, the full 5G mobile landscape is displayed. 2. outlined the methodology to be used for data analysis. We will talk about the analysis's findings at the outset of this chapter.
As a result, this thesis shows that different perspectives exist regarding the development, implementation, and application of 5G. .. Some experts believe that 5G will benefit customers more and be more affordable. Some are skeptical and don't think this technology has a promising future. Nonetheless, Huawei is the industry leader and is investing the most in 5G technology, according to primary and secondary sources.

LIMITATION

In this thesis, the technologies will be looked at more closely. On the other hand, familiarity with mobile data administration and transmission will be necessary. It is imperative to bear in mind that the 5G technologies of individual tech companies are proprietary, meaning exact details and operational procedures are not accessible. Consequently, 5G and general operating concepts will be covered in the exam [14, 15]. There won't be any case studies. since standards and literature will serve as the foundation for the thesis. However, in order to gather as much information as possible about the current state of 5G, a number of expert surveys will be conducted. Gaining access to a more comprehensive explanation of the vendor's solution and speaking with experts in the radio or telecommunications sectors would have enhanced understanding and helped conduct a more in-depth analysis of the issue. A case study would

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have provided additional insider knowledge from the company [16]. The framework that is used increases the limitations. A more thorough investigation would have been produced by utilizing a range of analytical frameworks. Lastly, keep in mind that 5G is still in the early stages of development and is currently considered a brand. novel technology. Future assessments might therefore come to a different conclusion.

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