5G Towers, What's Next?

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Abstract: **This article highlights the development of the internet throughout the years. Starting with the history of the internet from the 1960s through internet development trends, the article shows how it progressed to 1G and advanced to 5G. In addition, the article touches the future of the internet and predictions about 6G.**

Keyword: **Internet, CDMA, BDMA, 5G, WiMAX, 6G.**

I. INTRODUCTION

Like other technologies, internet advancement has undergone various phases. The first internet was developed in the 1960s and was called the Advanced Research Projects Agency Network (Patel, Shah, and Kansara 55). It was considered slow and inefficient. Therefore, with time, researchers discovered more efficient versions, which ran from 1G through 5G. Although 5G offers the best connectivity and stability ever, researchers could still invent more improved versions.

II. INTERNET DEVELOPMENT TRENDS

1G was the first internet for which development occurred over 1970-1984, and it had the following features. First, it used AMPS, TACS, and NMT technologies. Concerning frequency, 1G had a speed of 30 kHz (Net Information Table.1). About connectivity, 1G had a bandwidth of 2 kbps, and its Access System was called FDMA. Finally, the 1G Core Network was PSTN. Generally, 1G was slow because it was the first; and technology had not advanced.

The next internet was 2G for which development ran from 1980 through 1999 and had the features listed below. One, 2G used the GSM technology and had a frequency of 1.8 GHz, which was faster than for 1G (Patel et al. 55). Another notable characteristic is that bandwidth for 2G ranged from 14.4 kbps to 64 kbps. The 2G Access System was referred to as TDMA or CDMA, and its Core Network was called PSTN. Overall, 2G was more efficient than 1G.

Afterward, 3G took over after being developed from 1990 to 2002. The first 3G feature was that it relied on the WCDMA technology and had a frequency of between 1.6 to 2 GHz. Next, 3G connectivity was faster than for the previous version, having a bandwidth of 2 Mbps (Net Information Table.1). Meanwhile, the 3G Access System and Core Network were called CDMA and Packet, respectively. In general, 3G development took a relatively shorter time than the previous versions but still gave a better result.

Notably, 4G is the second last internet type so far. Scientists began developing 4G in 2000 and continued to 2010 (when the technology passed all pretests) (Patel et al. 55). 4G uses two technologies: WiMAX and LTE. Performance-wise, 4G is far better than 3G. For example, 4G bandwidth runs from 2000 Mbps to 1 Gbps, which yields fast internet connectivity. Besides, 4G has a frequency of between 2 and 8 GHz, which offers a stable internet connection (Net Information Table.1). Lastly, the 4G Core Network is called "Internet," whereas its Access System is CDMA. In short, 4G is a reliable internet at the personal and corporate level.

So far, 5G is the latest internet on the market. Considerably, 5G development took the shortest time (five years) compared to previous versions, running from 2010 to 2015. Concerning features, 5G uses MIMP and mm-Wave technologies (Patel et al. 55). 5G also provides a stable connection, with a frequency ranging from 3 GHz to 30 GHz. Similarly, 5G offers a fast connection with bandwidth ranging from 1 Gbps and above. Regarding Access System, 5G uses OFDM or BDMA. Finally, the 5G Core Network is referred to as "Internet" (Net Information Table.1. Overall, 5G is a reliable internet; however, its application has faced various concerns, including the possibility of causing health issues.

What is Next?

Possibly, 5G is not the ultimate internet version. As a result, 6G internet could emerge in the coming years. So far, various phenomena have indicated the possibility of creating 6G. First, Nokia Corporation admitted setting aside $285 million to facilitate studies to develop 6G (Venture Beat para.5). Richard Li, Huawei's chief scientist, also forecasted the emergence of 6G (Koziol para.9). President Trump provided political endorsement when he challenged American companies to be the first ones to discover 6G. It is predicted that 6G development will be complete by 2029, and devices with the network will hit the markets in 2030 (Venture Beat para.6). Generally, 6G is the potential internet type after 5G.

While it is still unclear about what 6G will look like, most of its features will be more efficient than those found in 5G. Historically, the latest internet has been providing better performance than the previous technology, which could prevail in 6G. For example, the maximum frequency for 6G could exceed that of 5G 30 GHz. Also, 6G bandwidth could be larger than that for 5G, which can go as high as 20 Gbps. Finally, a 6G Access System could use the 5G BDMA or OFDM, or a better option (Venture Beat para.6). However, the survival of 6G will depend on whether it will address 5G weaknesses, like not exposing users to unhealthy electromagnetic waves. 6G should also not be too expensive to avoid discouraging potential users. According to Richard Li, the biggest challenge to actualizing 6G is the absence of infrastructure to sustain it (Koziol para.9). In general, 6G will be the fastest internet in the 2030s.

III. CONCLUSION

In summary, the internet development journey started in the 1960s. Scientists began with 1G and improved it to 5G with time. A similar trend could facilitate the invention of 6G in the 2030s. While 6G could be more stable and faster than 5G, its adoption will depend on factors like cost and health concerns.

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