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SUBJECT: The Future of 5G Network and It's Geopolitical Impact

Executive Summary

This report provides an analysis and evaluation of the current/future of the 5G network, business opportunities, and its geopolitical impact. Our method of analysis was sifling through articles, databases, and media via the web with the sole purpose of getting the most relevant information on the next generation of mobile networks. This report finds that the future of 5G will greatly benefit the IT industry. In comparison to 4G mobile services, 5G offers greater bandwidth and a much denser network of base stations. 5G will upgrade our wireless connections by providing increased data capacity, lower latency, and longer battery life, 5G is intended to only support 4G networks instead of completely replacing them.

The race for nationwide 5G is currently underway with world superpowers the US and China leading the charge. This report contains information mainly regarding US 5G development however making a point to address the global effort required to create a true 5th generation network. The progression needed for 5G technology, ranging from transmitters omitting signals to the devices receiving them, requires efforts and collaboration outside of a singular nation itself. The presence of competition and collaboration regarding 5G almost certainly assures amazing innovation to come.

5G is expected to disrupt the technology industry with its widespread benefits that can be taken advantage of by a multitude of industries. As with any emerging technology, being the first-mover can lead to many advantages such as creating long-term relationships with customers before other competitors can move in. This is what makes the race to establishing 5G an increasingly significant one due to its economic gains. The advantages granted to a nation that adopts such advanced mobile networks may serve as problematic. Ultimately modifying the politics surrounding mobile networks.

Definition and History

5G is the abbreviation of 5th Generation Wireless System or 5th Generation Mobile Networks. 5G networks will operate in a high-frequency band of the wireless spectrum, between 28 GHz and 60 GHz. This range is also known as the millimeter wave (mmWave) spectrum. In addition to greater bandwidth, the new 5G networks will have a dense, distribution network of base stations. 5G will provide increased data capacity, lower latency, and longer battery life. However, 5G will not replace 4G and not expected to be operational until at least 2020.

There are three major categories of the use case for 5G. The first one is a massive machine to machine communications (also called the Internet of Things IoT). 5G will also enable ultra-reliable low latency communications and enhanced mobile broadband. 5G connects billions of devices for our smart cities.

1G was analog cellular. It was the first commercially automated cellular network and launched in 1979 in Tokyo. Although it was clear that the technology's potential was massive, there were still some issues, such as poor sound quality and coverage, weak security, and only allowed audio. The second generation launched in 1991 in Finland. People started using text message, images, and videos. Also, it digitally encrypted conversation and improved the quality of voice. Since then network operators started to ascend. The third generation launched in 2001 in Japan. It ensured much better connectivity and offered a superior level of connection than 2G. 3G aimed to provide a single network protocol in order to enable international roaming services. 4G launched in the UK in 2012. Its speed was five times faster than 3G and it is true mobile broadband.

Current Status

5th generation mobile network technology has the potential to change how industries all the way to households interact with and use with data wirelessly. The target markets for 5G networks are transport, health, and manufacturing industries as 5G technology will provide significant benefits and ultimately transforming how these industries conduct business. The providers of 5G are working together and challenging each other in efforts to make 5G a legitimate reality. China and the U.S are frontrunners for implementing massive 5G networks. AT&T and Verizon have both been major players in the initial development of 5G in the United States. Verizon currently provides households 5G wireless home service in a few area small areas in cities around the U.S. AT&T is working at a similar pace where 12 mobile hotspots have been built across the U.S. 5G connections can only be transmitted around 100m in each direction as they are susceptible to disruption. This proves to be a major roadblock. In order for 5G to gain a major presence (similar to that of 4G) in the United States, transmitters will have to be placed in close proximity to one another. The pursuit for national-level 5G will be dependent on ISPs of all tiers (national-local) to work together in an effort to progress towards full deployment of next-generation service.

The network of 5G can be applied to machine-machine communication where driverless cars, smart cities, and automation become possible across a commercial scale, but; these are opportunities to only those with the strong and stable countries. Developing countries will struggle to experience the benefits of 5G as 5G is reliant on sound infrastructure. Developed
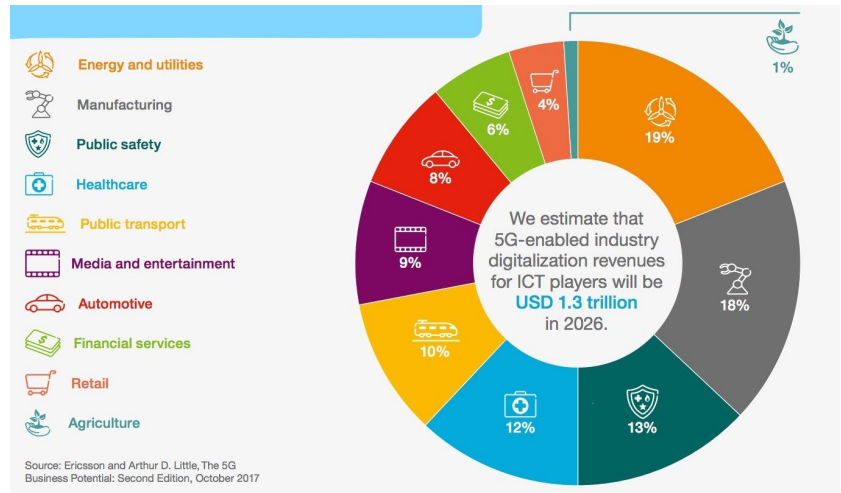
countries like China and the United States have invested heavily for many of years in tech infrastructure will most-likely pose a very significant advantage.

The health industry is currently testing wearable devices that are capable of using 5G. The usage of wearables can ultimately provide considerable cost reductions to companies while making the management of health issues much simpler. In the case of the transport industry, advanced wireless connections will create opportunities by enabling the usage of driverless vehicles. Companies plan on utilizing driverless vehicles and will be able to significantly reduce labor costs by shifting their needs from manual transport towards automatic transport.

Market Trends and Business Opportunities

Over the past few years, leading companies have been changing the way they conduct business. Companies are looking for a way to be innovative and keep up with the fast-paced nature of the technology industry. Cloud computing adoption has gone through a significant increase lately which also ends up being advantageous in companies working towards 5G implementation. Unsurprisingly, it is expected that the technology industry will be majorly disrupted with the introduction of 5G. The following graphic illustrates the new opportunities and revenue streams that will be created by 5G. It shows that there are several various industries that will be impacted by and can benefit from 5G implementation. These industries are a few of many that will experience financial gain from implementing 5G processes.

Energy and utilities
Manufacturing
Public safety
Healthcare
Public transport
Media and entertainment
Automotive
Financial services
Retail
Agriculture

We estimate that 5G-enabled industry digitalization revenues for ICT players will be USD 1.3 trillion in 2026.

Source: Ericsson and Arthur D. Little, The 5G Business Potential: Second Edition, October 2017

In terms of the geopolitical impact of 5G, there are many reasons why governments are paying attention to this next generation of technology. For instance, 5G's potential use for military applications and artificial intelligence make it a point of interest to countries focused on advancing their military forces. Despite the fact that such developments are unlikely to be the early uses of 5G technology, many governments are still becoming increasingly involved in decisions related to their deployment.

Impacts on IT/Telecom Industry

5G will impact the IT/Telecom industry by inspiring new growth, accelerating innovation of technology, and generating new revenue from a broad range of industries within the IT industry. 5G will inspire new growth based on network operators, component suppliers, infrastructure providers, and developers by a grow output of 3.5 trillion estimates in 2035 ("5G Wireless Technology."). 5G can accelerate innovation by enabling new products and services to lead to smarter homes and cities. 5G will generate new revenue by enhancing indoor broadband coverage, AR, VR, tracking of packages, and autonomous vehicles.

A potential problem that 5G could face when rolling out is the number of physical equipment that would be needed to be installed. The number of antennas that wireless companies in the U.S. may need is equal to the total amount of cell towers built in the past three decades ("5G Service Is Coming.") Additionally, the public has concerns with health effects from radiation and that property value could plummet.

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