

**5G Network Rollout:  
a Contest of Countries or Companies?**

5G hálózat kiépítése:  
országok vagy vállalatok versenye?

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# KKI Policy Brief

Series of the Institute for Foreign Affairs and Trade

Publisher:

Institute for Foreign Affairs and Trade

Reviewers:

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Typesetting:

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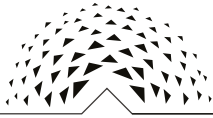
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ISSN 2416-0148

<https://doi.org/10.47683/KKIElemzesek.E-2021.14>



**Abstract:** In terms of the number of 5G subscriptions, Northeast Asia, including China, is currently ahead of the rest of the world. The global 5G infrastructure market is expected to continue to grow rapidly over the next five years, but the elite club of global companies capable of building it is not expected to expand in the short term. Despite restrictions on Huawei's participation in some tenders and possible Chinese retaliation against European companies, neither the Chinese company nor Ericsson is expected to be sidelined from the global market for 5G network infrastructure devices. The new networks are likely to be future drivers of economic growth, and the '5G competition' of countries aims to create the necessary technological foundations. Western sanctions against Chinese technology companies will not hold back the construction of 5G and, through it, the future development of the Chinese economy. In addition to establishing a network, countries need companies that really transform their activities by building on new technologies. In the absence of these, 5G rollout can easily remain an unfulfilled promise for economic growth.

**Keywords:** 5G, Huawei, Ericsson, Industry 4.0

**Összefoglalás:** Az 5G előfizetések számát tekintve Északkelet-Ázsia, és azon belül Kína jelenleg a világ többi része előtt jár. Az 5G infrastruktúra globális piaca várhatóan továbbra is gyors ütemben bővül a következő öt évben, a kiépítésére képes globális cégek szűk klubja azonban rövid távon várhatóan nem fog bővülni. A Huawei részvételének korlátozása egyes tenderekben, illetve az európai cégekkel szemben hozott esetleges kínai retorziók ellenére sem a kínai vállalat, sem az Ericsson nem fog kiszorulni az 5G hálózati infrastruktúra eszközeinek globális piacáról. Az új hálózatok várhatóan a gazdasági növekedés jövőbeni mozgatórugói lesznek, az országok „5G versenye” az ehhez szükséges technológiai alapok megteremtéséért folyik. A kínai technológiai cégekkel szembeni nyugati szankciók nem fogják vissza az 5G kiépítését és ez által a gazdaság jövőbeni fejlődését Kínában. A hálózat létrehozása mellett az egyes országoknak ugyanakkor szüksége van olyan vállalatokra, amelyek az új technológiákra építve valóban átalakítják tevékenységüket. Ezek hiányában az 5G kiépítése a gazdasági növekedés szempontjából könnyen beváltatlan ígéret maradhat.

**Kulcsszavak:** 5G, Huawei, Ericsson, Ipar 4.0

## INTRODUCTION

The construction of the fifth-generation mobile network (5G) and the international debates and tensions associated with it are now a constant topic in the world press. At the same time, accurately defining this frequently mentioned technology is not an easy task at all. By 5G wireless network, the literature refers to a network architecture based on the 802.11ac IEEE wireless network standard. In addition to the well-known advantages associated with the technology (higher bandwidth, up to hundreds of thousands of connections, increased coverage, more energy-efficient operation, reduction of latency, etc.), a wireless network must therefore meet the criteria listed in a multi-page standard to be considered fifth generation.

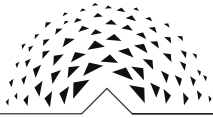
The complexity of the technological definition is similar to the plethora of market, geopolitical, and security interests and considerations that determine government and corporate decisions and resolutions on the deployment of 5G networks. This policy brief explores to what extent 5G is about competition between companies and countries, thus facilitating evidence-based decision-making regarding the introduction of the technology. Some of the findings of the analysis are based on background interviews with Huawei, Ericsson, Vodafone, the National Media and Infocommunications Authority and the Information and Technology Ministry of Hungary.

This policy brief does not present arguments for and against the security risks associated with Huawei's involvement.

## THE ROLLOUT OF 5G NETWORKS AND THE GLOBAL INFRASTRUCTURE MARKET

In 2020, despite the COVID-19 pandemic, the rollout of 5G networks continued worldwide. According to Ericsson data,<sup>1</sup> in November 2020 there were a total of 118 commercial 5G networks in 54 countries. This means that by the end of the year, roughly 1 billion people (more than 12,5 percent of the world's population) were living in areas where 5G coverage was achieved. At the end of 2019, only [5 percent](#) of the world's population could say this about themselves, which highlights the pace of the rollout. However, there are significant differences in the development level of individual countries. South Korea, for example, aims to achieve national coverage by 2021, and Switzerland already provides access to the new network technology for 90 percent of the population. However, [Ericsson](#) says that the UK's coverage of 30 percent can

1 Source: Presentation by Miklós Istvánffy, Ericsson's Head of R&D Customer Relations, at the Institute of Foreign Affairs and Foreign Affairs on 18 November, 2020



only be considered “average.” Figure 1 highlights that, in terms of the number of 5G subscriptions, Northeast Asia, including China, is currently ahead of the rest of the world, and this advantage is not expected to disappear in the coming years.

[Figure 1](#)

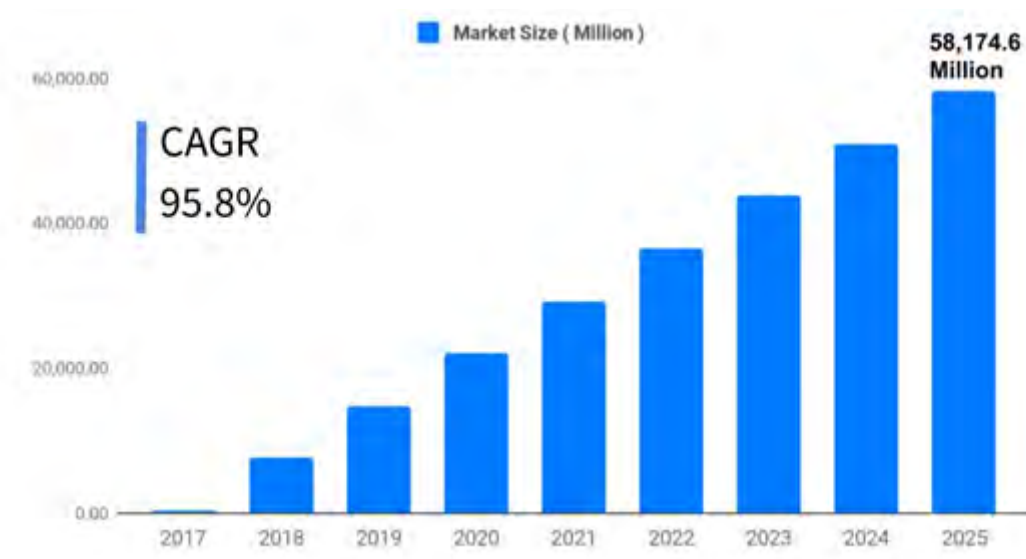
Number of 5G subscriptions in selected regions of the world (in millions)

	2019	2020	2026 (forecast)
<b>North America</b>	1	14	340
<b>Latin-American</b>	0	1	180
<b>Western Europe</b>	1	6	350
<b>Central and Eastern Europe</b>	0	0	200
<b>Northeast Asia</b>	9	193	1 470
<b>China</b>	5	175	1 220
<b>Southeast Asia and Oceania</b>	0	2	380
<b>India, Nepal, and Bhutan</b>	0	0	350
<b>Middle East and North Africa</b>	1	1	130
<b>Sub-Saharan Africa</b>	0	0	50

*Note: The number of Chinese subscriptions is also included in the data for Northeast Asia.*

The global market for 5G infrastructure consisting of macro and small cell base stations and associated computer capacity totalled at USD 374.1 million in 2017. It is estimated that the size of the market will increase to [USD 58.2 billion by 2026](#), representing a CAGR of 95.8 percent (compound annual growth rate) (Figure 2). The growth of the market is driven primarily by the increase in demand for internet-based connectivity between machines and mobile broadband communication. Important factors hindering market expansion include the risks associated with cybersecurity and data protection.

**Figure 2**  
Growth of the global 5G infrastructure market by 2025



The European 5G infrastructure market is expected to expand from USD 319.3 million in 2019 to [USD 42.7 billion in 2027](#), achieving a slightly lower growth rate compared to the global market.

## THE ROLLOUT OF 5G AS A CONTEST OF COMPANIES

When it comes to building 5G networks, there is a predominant consensus as to which large global enterprises can play a major role in the market competition. The widely shared opinion among professionals is that Huawei and Ericsson stand out, while Nokia and ZTE are mentioned mostly<sup>2</sup> as companies 'capable for 5G'. Market analyses mostly confirm these views, and based on the available information, only a small group of global companies can be considered for the construction of 5G infrastructure (Figure 3). Huawei and ZTE are facing increasing difficulties in their external markets, but the size of the Chinese market alone is sufficient to generate substantial demand for the 5G business of the two companies. Samsung has benefited primarily from the aggressive rollout of the South Korean network, as well as orders from North America. In September 2020, for example, the South Korean company landed [a USD 6.6 billion deal](#) from US communications giant Verizon to build 5G infrastructure. Following this decision, Spanish and French

2 Based on background interviews with Huawei and Ericsson.



mobile operators also started negotiations with Samsung. However, European operators are concerned that the South Korean company's devices will not be compatible with Huawei's 4G network.

Figure 3

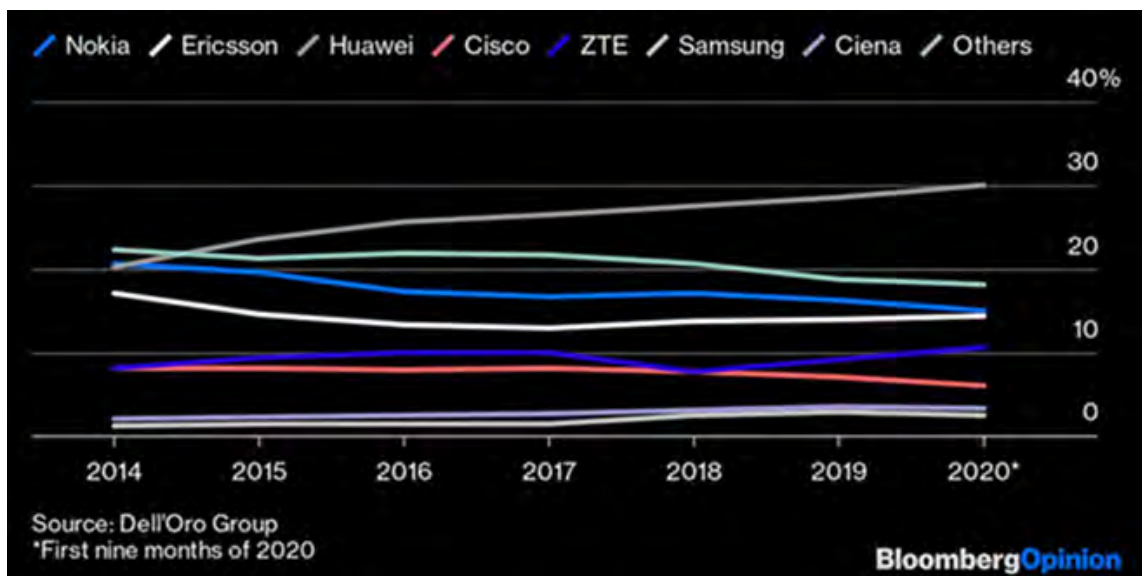
Market shares in 5G base stations, estimated by TrendForce

Supplier	2019	2020
Ericsson	30%	26.5%
Huawei	27.5%	28.5%
Nokia	24.5%	22%
Samsung	6.5%	8.5%
ZTE	6.5%	5%
Other	5%	9.5%

The second quarter of 2020 was the first period in which suppliers also reported revenue from the deployment of 5G core networks. According to a report by Dell'Oro Group, an analyst company for the telecommunications equipment market, [Huawei and ZTE are at the forefront](#) in terms of revenue from core network deployment. Considering the overall telecommunications device market, Huawei's share has steadily increased over the past six years, while its European rivals have lost weight (Figure 4).

Figure 4

Share of major players in the global telecommunications equipment market



As for the competition of Ericsson and Huawei, Ericsson's then managing director [declared in 2009](#) that the Chinese company had a positive impact on Ericsson by motivating it to fight for keeping its leadership position. According to Svanberg, if it were not for Huawei, they would have had a lot more competitors. He pointed out that software companies and niche market players can also be considered increasingly competent rivals.

One of the most important features of the market is that service providers typically prefer to work with at least two device suppliers. Operators benefit from the so-called multi-vendor model due to both security of supply and price competition, so it is expected that this strategy will prevail in the future as well. Therefore, if a European country restricts Huawei's involvement in the deployment of the 5G network, the service providers will most likely entrust two other suppliers. Thus, more and more Western countries seem to be interested in Nokia catching up in the field of 5G technology. During previous management, the Finnish company opted for a base station microchip technology, which offered more flexibility, although at a higher cost. Thus, being less competitive in terms of price, Nokia lost significant market share already in the early stages of the introduction of 5G. Catching up is more difficult, as the company can spend less on R&D than its competitors due to lower turnover. Therefore, it is a great opportunity for the Finnish company that due to the restrictions on Huawei's involvement, it will be easier to gain market share in several countries. In October 2020, Nokia's chief executive declared that the company had captured about 43% of orders from service providers reshaping their supplier partnerships for geopolitical reasons.

However, Ericsson has recently achieved a stronger financial position than its Finnish rival. The Swedish company [reported a higher-than-expected profit](#) in its third quarter report last year. The increase was mainly due to network building deals, particularly in China. According to its CEO, Ericsson has increased its market share mainly at the expense of non-Chinese competitors. By contrast, at the end of October 2020, Nokia [had to reduce its profit forecast for the full year](#). Despite its rivalry with Huawei, Ericsson could also make deals to build [5G in China in 2020](#). The Swedish company has considered it a milestone to deliver hardware and software to all three Chinese mobile operators to build 5G base stations. Ericsson generates 8 percent of its total revenue in China, so the attitude of local service providers and the local government towards the Swedish company is not at all indifferent for the management. Beside the competition, however, the two telecommunication giants also cooperate, for example, in the field of standardization, in order to make their products applicable in combination. Due to the multi-vendor model, the two companies supply to the same service provider in parallel in several locations, including the Chinese operators.





## 5G ROLLOUT AS A COMPETITION OF COUNTRIES

Since 2018, the trade war between the United States and China has increasingly shifted to the field of technology, making it obvious that the two superpowers perceive leadership in technological development as a catalyser of geopolitical influence. This is one of the reasons why it is worth talking about 5G rollout as a competition of countries. In addition, the potential of Industry 4.0 can be unlocked based on the advantages of the 5G network, which is considered to be an [accelerator of future economic growth](#). It is estimated that the leading position in the introduction of 4G technology [has made a significant contribution to GDP growth, job creation, and corporate turnover in the US](#). The world expects the same happening in the case of 5G. And yet in January 2019 [Ericsson's CEO said](#) that China would probably be the first country to have a standalone 5G network. There is also a race to create the globally dominant standards for 5G technology, which will determine the direction of the development of wireless communication in the future.

It is worth considering how the above-mentioned concept of increasing economic competitiveness fits in with the measures taken by some countries to limit the participation of Huawei and ZTE in the deployment of 5G networks. As of the end of January 2021, the US, the [UK](#), [Sweden](#), and [Australia](#) have adopted regulations that do not allow Huawei or other Chinese companies to participate in the deployment of 5G infrastructure. Except for the US, however, Huawei may be present in the three other countries through its other business divisions. Interestingly, in November 2020 Ericsson criticized the Swedish decision, and in January 2021, [the company's managing director was lobbying a member of the government via phone](#) in favour of Huawei. At the same time, other countries impose criteria that limit their participation less directly and without mentioning Chinese companies, or they exclude them from participating only in the construction of the core network. For example, [Belgium](#) restricts the involvement of 'high-risk suppliers' by referring to the '5G Toolbox' developed by the European Commission. [Denmark](#) would ban certain suppliers if they came from a militarily non-allied country. [Romania](#) would exclude those companies from the 5G infrastructure that are controlled by a foreign government, do not have a transparent ownership structure, or have been engaged in unethical business behaviour earlier.

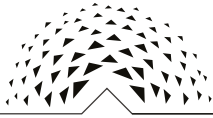
Based on declarations by politicians, countries do not expect that restrictions and bans would contribute to faster and more efficient 5G network rollout or to starting the engines of future economic growth earlier. On the contrary, some analyses foresee negative economic consequences when it comes to limiting the participation of Chinese companies. Various analyst firms and lobby groups ([Oxford Economics](#), [Assembly](#) and [GSMA](#)) have published a number of Huawei-backed studies and data on the topic,

which, unsurprisingly, predict huge additional costs and slower 5G rollout. A calculation made by operator company [Vodafone](#) concludes that it would take five years and EUR 200 million extra to remove Huawei's devices from its European core networks, while the Federal Communications Commission (FCC) estimated the cost of removing Huawei and ZTE devices from networks in the US at [USD 1.8 billion](#). Bans can have additional negative economic impact if Chinese tech companies respond by halting their ongoing investments in Europe or by relocating some of their operations. Concerns about this have so far proved unfounded, as for example [Huawei moves forward with setting up a new R&D centre in the UK](#), despite a ban on its involvement in the 5G network infrastructure. At the same time, China's Ministry of Commerce has warned [that Ericsson and Nokia could be hit with export controls](#) if the EU bans Huawei from 5G networks.

In addition to limiting Huawei's market opportunities in Western countries, there is also an example for a state considering buying ownership in competitor companies in order to change market power relations. At least [the US Attorney General made that point in his statement](#) in February 2020, when he proposed that the US should have considered taking control of Ericsson and Nokia through the purchase of ownership share, either directly or through a consortium of private companies. It is worth noting that the US government almost never invests in foreign companies in this way. If a Trump administration official represented the opinion that the two companies should be made flagships of American industry through acquisition, Ericsson and Nokia might even have support from the EU to become some kind of 'European champions' and make them even more powerful players in the global 5G market. However, according to the experts interviewed, this is not a realistic scenario.<sup>3</sup>

However, there are also arguments that it is an exaggeration to talk about competition among countries in the construction of 5G. On the one hand, as mentioned earlier, 5G is a hard-to-define technology, with standards that are constantly under development. Beyond that, a distinction should be made between the truly standalone and the non-standalone version that builds on the background 4G network. Parallel operation of the two is expected to be common practice in most countries in the coming years. Building networks is a long and complex process, so it is not possible to draw a clear finish line and determine the moment when a country can say that it already has 5G. Countries can be compared based on the development level of standalone or non-standalone systems, but the existence of a network does not mean that companies in that region automatically enter the era of Industry 4.0 and switch to smart manufacturing.

3 Based on background interviews with Ericsson and the National Media and Infocommunications Authority.

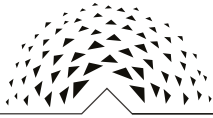


## CONCLUSIONS

Looking at the global rollout of 5G networks from the perspective of market competition, Huawei has overtaken its rivals in terms of market share in base stations and core infrastructure. The elite club of global companies being 'capable for 5G' is not expected to expand in the short term, but with the proliferation of networks, smaller device manufacturers will also be able to enter the market. Beyond Huawei and Ericsson, Nokia is likely to catch up in a few years, and the US, which currently puts 5G in the focus of geopolitics, is expected to make every effort to strengthen its own tech companies in this business. With the proliferation of the OpenRAN technology, which standardizes the design and functionality of the hardware and software used in the Radio Access Network (RAN), the number of companies that can deliver different components may also increase. However, experts say this is still to come.

Despite exclusions and restrictions on Huawei's participation in certain national tenders and possible Chinese retaliation against European companies, it is certain that neither Huawei nor Ericsson will be sidelined from the global market for 5G network infrastructure devices. On the one hand, this is due to the size and growth of the market, which ensures that both large players will have plenty of opportunity to do business. China is currently the world's largest market in this field, offering Huawei the ideal ground for the profitable operation of its 5G business and the further development of the technology. On the other hand, due to the multi-vendor model commonly applied by operators, the two companies can make deals to build the same network in parallel, as the Chinese market does. This shows that beside rivalry, the main suppliers of 5G infrastructure are also destined for cooperation, for example, in the field of standardization. Beside trying to avoid getting banned from the Chinese market, this aspect may also have motivated Ericsson's managing director when lobbying for Huawei in his home country.

The competition of 5G infrastructure suppliers is a complex relationship, although the '5G competition' of countries is determined by even more factors. It is widely acknowledged that new networks will enable changes in industrial production, logistics, and services that will serve as new drivers of economic growth. On the one hand, the '5G competition' of countries therefore aims to create the technological foundations necessary to achieve this next level. In addition to creating a network, there is also a need for innovative companies and industry ecosystems that, building on new technologies, will truly transform their value creation. This requires innovation capacity, a pool of skilled workers, and capital for investment. In the absence of these factors, the roll-out of 5G will not trigger the anticipated economic effects and could easily remain an unfulfilled promise.



Second, geopolitical power games have also made the deployment of 5G a field of competition between countries in the dimensions of cybersecurity and intelligence. In this respect, the bans and restrictions of Huawei's participation can be interpreted as the competition of countries and not as an effort to increase economic competitiveness. Huawei's exclusion from numerous Western markets will not hold back the rollout of 5G in China and, through it, the future development of its economy. Moreover, it will not pull back the company itself, as it can build on substantial demand in the domestic market and other regions, and it can also profit from its other business divisions. Therefore, the US and like-minded countries cannot prevent China from being the first to lay down the technological foundations of the new industrial era.