
5G NETWORK IN CHILE

“TENDERING SPECTRUM AND DEPLOYING 5G NETWORKS ... IS THE CORNERSTONE OF OUR STRATEGY TO TURN CHILE INTO A DIGITAL HUB OF THE REGION AND THAT WILL ALLOW OUR COUNTRY TO STRONGLY JOIN THE NEW DIGITAL ECONOMY 4.0” - GLORIA HUTT, MINISTER OF TRANSPORT AND TELECOMMUNICATIONS

On Thursday December 16, 2021, the President of Chile, Sebastián Piñera, the Minister of Transport and Telecommunications, Gloria Hutt and the Undersecretary of Telecommunications, Francisco Moreno, announced the activation of the fifth-generation network of mobile phone technology in Chile, thus making it the first nation in Latin America to have 5G nationwide. This article looks at explaining what 5G is, and what it means for industries in Chile and globally.

By Charles Buchanan, CFA

"Spectrum pipeline should become a national priority because 100 MHz of spectrum is equal to \$30 billion to the economy and 1 million jobs." This was the comment made by CTIA's president and CEO, Meredith Baker, on March 26, 2016. CTIA was established in May 1984 as the Cellular Telecommunications Industry Association, and it represents carriers, suppliers, manufacturers, and providers of wireless technology in the USA. The other major international economy, China, has also emphasized the importance of advancing 5G technologies as part of its "Made in China 2025" plan issued in May 2015. The race between the two world superpowers to lead the 5G expansion globally is not surprising given the potential societal and economic benefits. It also appears that Chile is leading the way in Latin America, but before we identify the potential benefits, we will first establish what 5G is.

“5G is a little more confusing as we think about it”¹

What is 5G and what is spectrum?

Wireless network infrastructure includes different types of technology such as cell towers and antennas. As we move from 4G networks to 5G networks, these cellular technologies improve, and with them, the quality of our wireless connections. To fully understand 5G, one should also review what spectrum is, and what makes telecommunication companies willing to spend billions of dollars to acquire it. Every time you make a phone call, your voice is sent by invisible electromagnetic waves to a cell tower where it is then transferred to its destination. Spectrum refers to these invisible electromagnetic waves, and they range from radio waves to gamma rays. Electromagnetic waves are measured in Hertz (Hz), a measurement of frequency, and higher frequencies such as X-rays have between 30 billion to 30 trillion megahertz (MHz). Cellular frequencies are much lower and tend to fall between 700MHz to 26+GHz (26,000MHz). This works well because lower frequencies are better for long-distance communication.

¹ Verizon News Archives, *5 Quotable Quotes About 5G* (Sept 2014, <https://www.verizon.com/about/news/vzw/2014/09/5-quotable-quotes-about-5g>)

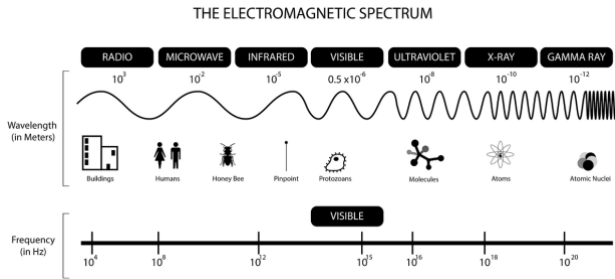


Figure 1. Infographic of the Electromagnetic Spectrum

Sources: Wikimedia Commons by Jonathan S Urie, Jul 30, 2013, https://commons.wikimedia.org/wiki/File:BW_EM_spectrum.png

Why are there auctions for spectrum?

In Chile, the spectrum auctions are categorized into four bands. The 700MHz band auction (703-768MHz), the AWS band (1.8GHz – 2.2GHz), the 3.5GHz band (3.3GHz – 3.7GHz) and the 26GHz band (25.9Ghz – 27.5GHz). Telecommunication companies want exclusive access to frequencies, so their customers don't have to worry about signal interference from competitors in the same area. Like an electromagnetic real estate auction, the winners of the current spectrum auctions in Chile will be awarded the right to use a particular frequency in the area where they won the bid for 30 years.

Companies like Movistar Chile, Entel, WOM and Claro buy this spectrum so they can install 5G infrastructure in the area and offer better services to their customers. The government benefits from these auctions because they generate a lot of money. For example, an auction for 5G space in the USA pulled in USD 81 billion in bids in 2021².

DECRETO 77 | OTORGA CONCESIÓN DE SERVICIO PÚBLICO DE TELECOMUNICACIONES A LA EMPRESA TELEFÓNICA MÓVILES CHILE S.A. EN LA BANDA DE FRECUENCIAS DE 3,35 - 3,40 GHZ

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² Kif Leswing, *Companies have bid \$81 billion for the airwaves to build 5G, and winners will be revealed soon.* CNBC, Jan 31, 2021.

Figure 2. Decrees by the Ministry of Transportation and Telecommunication in Chile Granting Spectrum, 2021

Sources: Biblioteca Nacional de Chile/BCN <https://www.bcn.cl/leychile/navegar>

What's so special about 5G?

Although new technology is always exciting, (you may remember the change from 3G to 4G, or 4G to 4G LTE), not every change is equally remarkable (the same way not every new iPhone can be considered a game-changer). Nonetheless, the consensus among industry experts is that the change to 5G will be a significant improvement over the existing networks.

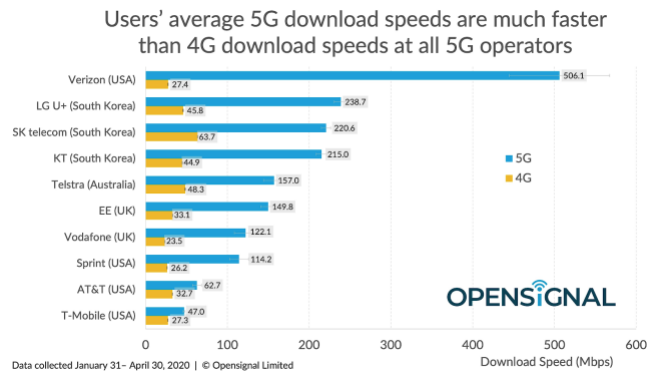


Figure 2. Average Download Speeds 5G vs 4G

Ian Fogg, *Quantifying the global 5G experience across ten operators.* <https://www.opensignal.com>, May 20, 2020.

In Canada, it is expected that 5G will deliver faster connections (up to 20x the speeds of 4G), increased network capacity (up to 100x the traffic capacity of 4G), ultra-low latency (up to 10x lower than 4G), improved reliability, and enhanced security³. Although this is great news for anyone who has experienced slow movie downloads or latency during an international Zoom call, the real power of 5G may be seen in industries like healthcare where the power of 5G may completely transform the industry. In China, it was shown that the 5G technology can cut latency to almost instantaneous levels, and thus allowed doctors to perform remote

³ PWC Canada. *The evolution of Canada's telecom industry and the growing digital economy.* Nov 2021.



brain surgery from a distance of 1,900 miles away from the patient⁴.

How will this affect different industries

Improved 5G connectivity combined with the widespread adoption of IoT (Internet of Things) and AI may lead to several macro changes across industries.

Mass Customization: With big data and direct consumer feedback, the improvements in connectivity and capacity brought on by 5G will allow firms to immediately adapt their products based on feedback from individual customers. With advances in AI and IoT, companies will not need a survey to understand how particular groups or individuals react to different products or services. Will your actions in Virtual Reality translate into information for sellers to identify you as a potential customer? With an increased amount of information being communicated and analyzed instantaneously, companies with access to this data may end up knowing you better than you know yourself!

Production Processes: 5G technology will enable manufacturers to connect more sensors, devices, and assets in a single network. With more data points and better management of big data through AI, these connected devices could help improve predictive maintenance and operational efficiency. They could also improve quality control by immediately identifying and correcting issues. If you consider all the information required to manage the drilling, blasting, loading, and hauling processes at an open-pit mining operation like Chuquicamata or Minera Escondida, 5G may be the missing part enabling these major mining companies to effectively automate and optimize their operations.

Issues related to the adoption of 5G

Although the potential benefits are tremendous, there are also potential challenges that need to be considered.

Passive Infrastructure: Telecommunication services require passive infrastructure like antennas to enable wireless communication. As companies look to deploy 5G capabilities, the increased capacity will require a significant investment in 5G infrastructure. 5G networks

use more *small cells* compared to the *macrocells* predominately used in 4G networks. As the name suggests, small cells are much smaller than macrocells, and their connections travel shorter distances and handle less capacity. However, their small size allows small cells to be installed throughout a city in inconspicuous places like streetlights or on top of buildings. As well, if many small cells are dispersed throughout the city, it enables companies to “reuse” spectrum more efficiently because not every cell phone needs to communicate with the same large macrocell.

Nevertheless, to deploy the lightning-fast download speeds provided by a 5G network, many new small cells need to be installed throughout the city, especially in dense urban areas. In addition to being a large investment, this also leads to questions of site selection, site acquisition, supplying the site with power, and installing them in the right locations. Therefore, your city may soon be home to many more small cells as 5G is deployed there. It also raises legal questions such as whether small cells can be installed on private properties.



Figure 3. Small Cell situated in the terrace of a building in Bangalore, Karnataka

Sources: Wikimedia Commons by Rohanmkth, Oct 26, 2016, https://commons.wikimedia.org/wiki/File:Small_Cell_by_Samsung.jpg

⁴ Caroline Frost. *5G is being used to perform remote surgery from thousands of miles away, and it could transform the healthcare industry.* Business Insider, August 16 2019.



Figure 4. Macrocell in Yorkshire, UK

Source: Geograph.org.uk, Colin Westley / Triangulation Point, Arras Hill, East Yorkshire (Creative Commons)

Potential Buyers of Spectrum: With the potential benefits of 5G allowing for much better office automation and machine-to-machine communication, non-telecom private companies might consider setting up their own private networks. However, to set up private networks they will need access to 5G spectrum. Unless the government allows these companies to set up private networks without bidding for spectrum, these private companies will need to submit their own bids in the spectrum auctions⁵. Although the government may be tempted to allow any company to bid in the spectrum auctions, the government must consider more than just profit when awarding spectrum.

If Chile strives to be a regional leader in the Digital Economy 4.0, proper integration of 5G technology across Chile is required. To accomplish this, the government needs to award 5G spectrum to companies that will ensure efficient use of it. The most likely candidates are therefore telecom companies, as they have the most experience. Another important aspect the government must consider is whether enough companies are acquiring spectrum to avoid an oligopoly where consumers pay expensive fees due to a lack of competition⁶.

International Politics: The USA banned the use of Huawei 5G technology in May 2019 citing national security risks. Since then, the UK has followed suit while

other countries like Canada are still considering the appropriate course of action. Chile may soon need to consider international politics alongside local economic concerns when deciding whether to allow international firms to deploy 5G technology in Chile.

There could also be potential problems with selling spectrum along the border of Argentina or Bolivia. Ensuring the protection of national airwaves may present an interesting and challenging political issue for Gabriel Boric's new Chilean government.

Conclusion

In today's increasingly connected world, the creation, distribution, and consumption of information has become a major part of our lives. As new 5G technologies become commonplace worldwide, it is good to see Chile taking the first steps in becoming a technological leader in Latin America. Despite potential hurdles, this technology brings tremendous opportunities for Chile to become a regional powerhouse in the digital economy.

⁵ Rio Tinto. (2015, April). Submission to the: Australian Competition and Consumer Commission Comments on the Discussion Paper on the Proposed spectrum reallocation for 1800 MHz in regional Australia. <https://www.accc.gov.au/system/files/Rio%20Tinto%20Submission.pdf>

⁶ Bisson, P. B. (2021, January). The Telecom Oligopoly and the Advent of 5G Networks in Canada. <https://mcgillbusinessreview.com/articles/the-telecom-oligopoly-and-the-advent-of-5g-networks-in-canada>