

INDUSTRY MARKET

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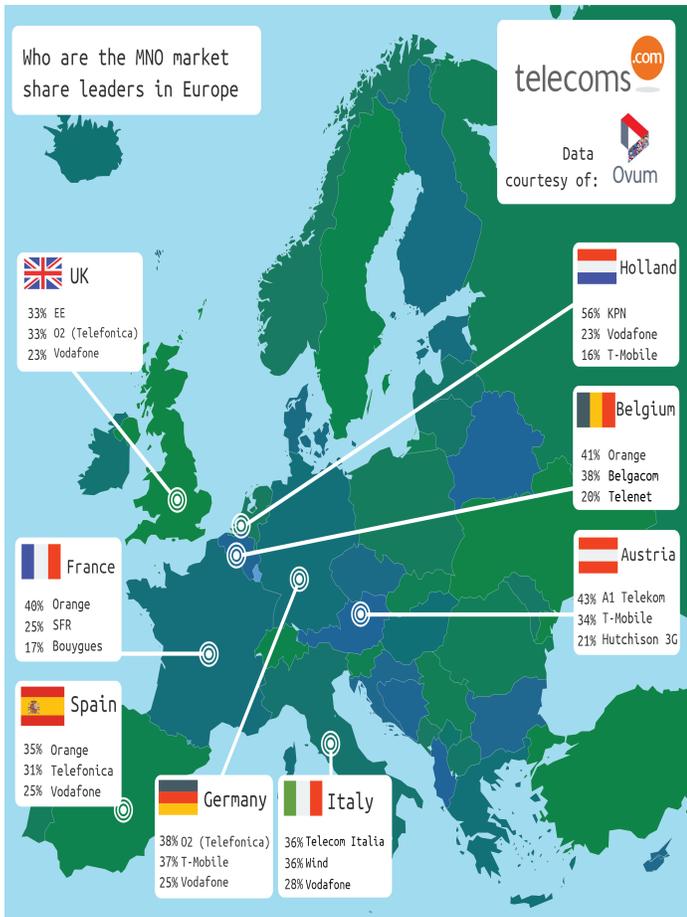
Telecommunications is one of the world's largest markets, especially in the current digital age. Cellular networks drive the majority of all communication and business relationships. In central Europe, telecommunication companies make up a competitive industry amongst themselves competing for spectrum space, infrastructure needs and ultimately customers. Infrastructure companies such as Ericsson, Nokia and Huawei look to get hired by these telecom companies to build their wireless networks. The emerging 5G networks in central Europe pose both benefits and risks for the market itself, especially for companies that are looking to secure a place in the implementation of new 5G networks.

SPECTRUM AUCTION PRICING

Firms that are looking to enter central European 5G markets have to consider the cost of spectrum auctions as a primary source of risk. The previous spectrum auction that occurred in Germany left top companies paying upwards of €2.17B for spectrum space compared to Austrian firms that only spent about €64.3M.^{i, ii} This was in part paid for by new German companies, like Drillisch, who drove up the

prices on spectrum frequencies paying €1.1B for the smallest slice of the German spectrum.ⁱⁱⁱ The CEO of Deutsche Telekom, Dirk Wossner, claimed that 50,000 new stations could have been implemented to bolster wireless infrastructure, showing that the increased prices had a lasting effect on the company's ability to provide quality service.^{iv} Austrian prices were considered reasonable but not overly inexpensive. If spectrum auction prices are driven too high, the budgets for other important aspects of the business suffer, such as infrastructure, wages, and financial investment.





them to secure 16.3% of the new network. This strategy ultimately drove up auction prices but allowed Drillische Netz to secure a significant share of new 5G frequencies. Proper budgeting is a possible way of winning the auction.

DOMINATION OF INCUMBENT COMPANIES

The larger, incumbent companies Deutsche Telekom in Germany and A1 Telekom in Austria have a strong share of the market,^{vii, viii} making it difficult to attract both capital and investment for new firms. As infrastructure costs are high, the larger companies hold a competitive advantage in the acquisition of spectrum space, rolling out strong infrastructure fields and maintaining proper upkeep of the networks. Due to these large companies playing such a large roll in the market, the bar for entry is high. Alone in Germany, Deutsche Telekom comprises 30% of the market,^{ix} and the company has only added to their share in the recent spectrum auctions. With large corporations taking up a strong portion of the market investment is hard to attract due to the large barriers for entry in the field.

MITIGATION: Overbudgeting Spectrum Auctions

Overbudgeting seems like a simple solution but depending on the circumstances in a spectrum auction, prices can vary dramatically. Companies should plan to spend high in hopes of spending low. In some cases, companies like Drillische Netz attempt to drive up prices, while the Austrian auctions prices stayed low. When policy allows for advantage, like Germany for example, companies should use these rules as a way to determine strategy. In the 2019 German auction, new companies entering the market were not required by law to spend an allotted amount bolstering current infrastructure and were able to save capital and gained valuable spectrum at the higher frequency speeds needed for 5G.^v Drillische Netz, used this strategy which allowed



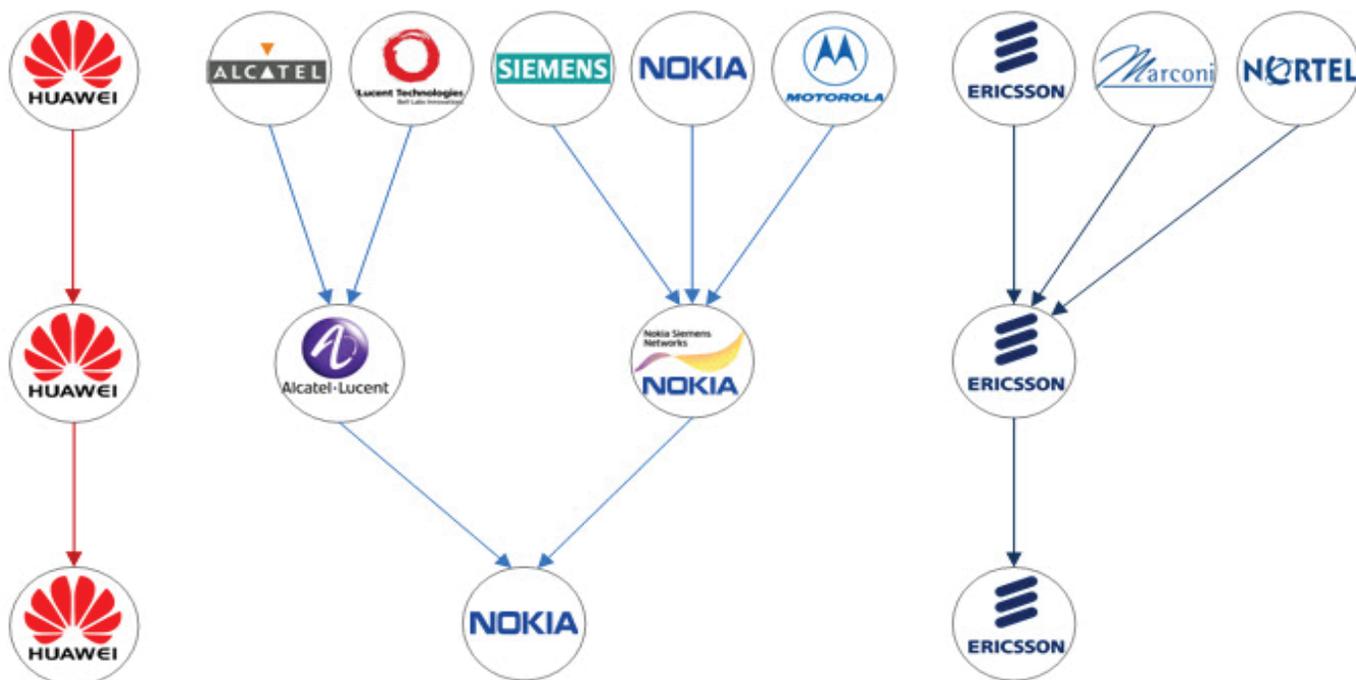
MITIGATION:

Spectrum Sharing

Aside from utilizing the strategy of “overbudgeting” for spectrum auctions, spectrum sharing is a way to mitigate the costs of spectrum auctions. “Overbudgeting” simply means planning to spend more with the goal of spending less. Spectrum sharing allows for the companies to enhance their spectrum space by either accessing unused spectrum on a needs basis or by renting spectrum space on contract from agencies that are not using the spectrum at that time.^x Utilizing spectrum sharing allows smaller firms to use a higher portion of spectrum that they already have, partially mitigating the risk that comes with competing with larger companies. Deloitte published a report that claims the European market could increase €86B if telecom companies engaged in spectrum sharing.^{xi} If spectrum sharing is utilized companies may run the risk of interference or potentially termed contracts that could expire. In order to mitigate this risk companies should look to careful legal council and carefully manage frequency when sharing spectrum.

CHINESE INFRASTRUCTURE SPECULATION

Infrastructure, created and operated by Chinese firms, have speculative risks that could hinder customer incentive to use networks supported by Chinese infrastructure. Media attention and international pressure have especially highlighted the risk placed on companies in regard to security but the use of Chinese infrastructure can also have implications on the market and investment.^{xii} This is due to bias and consumers lack of faith in Chinese infrastructure. Although Chinese infrastructure companies lead their field in speed and advanced technology, safety concerns from bias, stock speculation, and media discourse can cause loss of investment due to uncertainty. Uncertainty can cause companies evaluations to vary depending on the public perception and released security risks on the Chinese infrastructure projects.

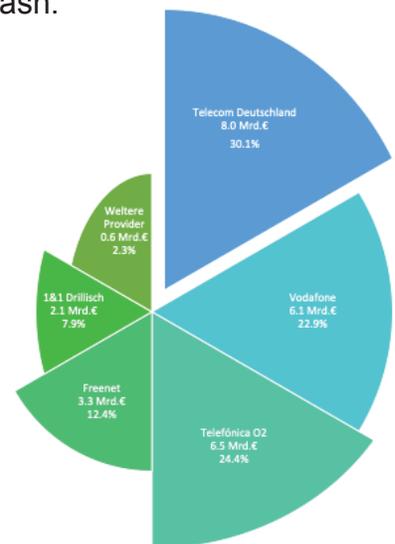
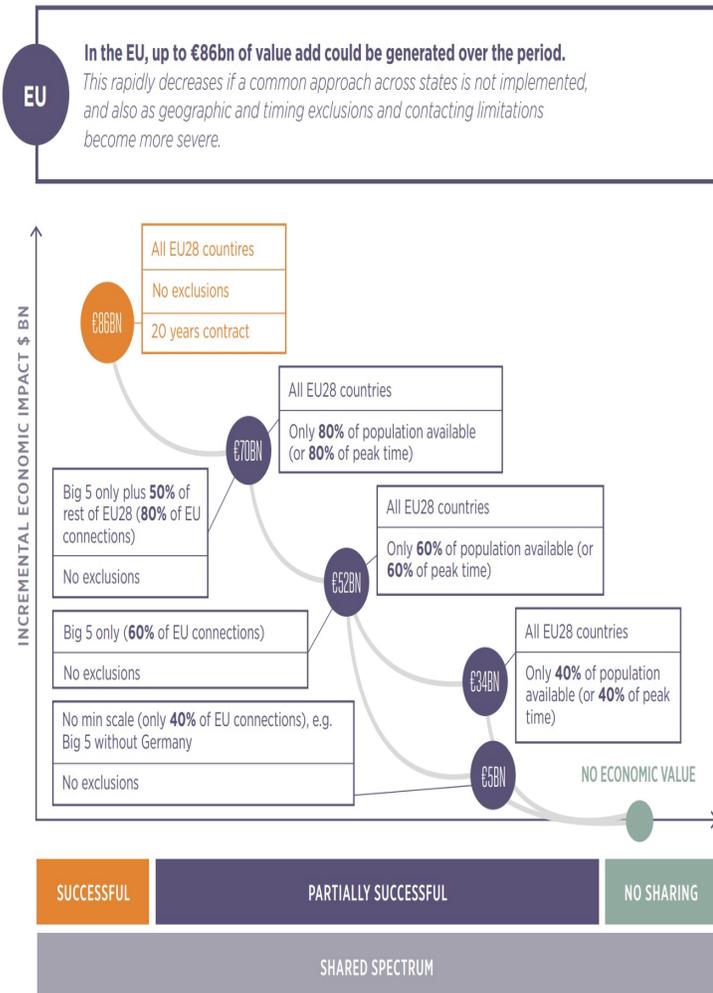


In central Europe, American investment will be hard to attract due to the ban that the United States has placed on Chinese 5G infrastructure.^{xiii} Consumer trends could also be effected with the use of Chinese infrastructure as other companies have used other options besides Huawei and ZTE. Although Germany has not banned Chinese infrastructure companies, all of the major players in the industry have decided to use European based companies to build the first rollout of their network.^{xiv}

MITIGATION:

Using Trust as a Competitive Advantage

Transparency of network infrastructure, shared spaces, and using responsible networks proves to be the best strategy for combating Chinese Infrastructure worries. Consumers in the businesses sector, including industries separate from telecommunications, looking to utilize 5G, will use a network that they can trust to operate efficiently and safely. A study published by the London School of Economics and Political Science found that the companies that were most transparent were more likely to succeed compared to companies that were secretive.^{xv} Companies that remain transparent will protect against the risk of backlash over network infrastructure. Although Germany has not ruled out the use of Huawei and ZTE on their networks, most major corporations have decided to go with European companies.^{xvi} In Austria, ZTE has been contracted to produce Drei's network with no backlash yet,^{xvii} but the larger competitors have opted to use European based companies such as A1 with Nokia. Companies should think carefully about using Chinese infrastructure on their 5G network to protect from varying stock prices and deterrence of investment due to political backlash.



Cost, market share and outside pressures will always be risks when entering any new market but by implementing the above mitigating strategies companies can get more value for the money invested into the venture. Industry markets like in Germany and Austria are both different but have similarities that can pose general risks like the ones outlined above. .

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ⁱⁱ Phoebe Magdrilla. "T-Mobile, A1, Hutchinson Drei secure 5G licenses in Austria." S&P Global Market Intelligence. March 8, 2019. <https://www.spglobal.com/marketintelligence/en/news-insights/trending/UnRRD6WFih53qAqDFF-iQ2>

ⁱⁱⁱ I-Scoop "5G in Germany"

^{iv} I-Scoop "5G in Germany"

^v I-Scoop "5G in Germany"

^{vi} I-Scoop "5G in Germany"

^{vii} Bundesnetzagentur. Telecommunications. 2019.

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^{xii} <https://carnegieendowment.org/2018/12/27/huawei-and-europe-s-5g-conundrum-pub-78045>

^{xiii} <https://rusi.org/commentary/Huawei-debates-other-lesson>

^{xiv} Ericsson. Duche Telecom Ericsson Campus Networks. Accessed Nov. 25, 2019.

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^{xv} Sebastian Buckup and Peter Vanham. "How to turn trust into competitive advantage" The London School Of Economics and Political Science – blog. November 20, 2019.

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^{xvi} Kristi Knolle. "A1 Group chooses Nokia as 5G equipment supplier in Austria". Reuters. March 25, 2019.

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^{xvii} Juan Pedro Tomas "Drei Austria to expand current 5G network based on market demand: CEO" RCR Wireless News. October 23, 2019.

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^{xviii} Knolle. "A1 Group chooses Nokia as 5G equipment supplier in Austria"