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Investment Case for FIVG: The First 5G ETF

Investment Case for FIVG

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5G describes the technological innovation and infrastructure that will likely support the next era of mobile connective technology. Its adoption should provide faster speeds, more functionality and lower latency (the delay between input into a system and the desired outcome, i.e. the time for data to travel between two points), facilitating substantial innovation in a much wider number of use cases than previous mobile technology. 5G applications do not focus purely on the consumer; they can also transform work practices and production in industry, healthcare, transportation and manufacturing, gaming, retail, business and education.

5G is the technology that will support smart cities, remote medicine and eSports

Major market actors, including telecommunications companies, governments, infrastructure providers and hardware firms, have been researching and developing 5G capacities for years. AT&T, T-Mobile, and Verizon have already launched their networks across thousands of US cities, with Verizon's 5G Nationwide service alone covering 2,700+ cities in the US [1]. Rising mobile data traffic and the increased adoption of virtual networking architecture in telecommunications continues to push the technology to fruition. Gartner analysts predict that the largest cities will have 60% 5G coverage by 2024, having noted that 5G accounted for 39% of total wireless infrastructure revenues for communication service providers (CSPs) by August 2021. It predicted that revenues would rise further to $19.1 billion by the end of 2021, up from $13.7 billion in 2020. [2] This will build on the LTE (4G) networks run by 791 operators in 228 countries worldwide, which provide mobile and/or Fixed Wireless Access (FWA) services, and which act as a foundation for future 5G network upgrades. [3]

[1] "Verizon Stock: Outsized Returns With Extended 5G Rollouts In 2022" January 14, 2022 https://seekingalpha.com/article/4479585-verizon-stock-5g-rollouts-2022
[2] "Gartner Forecasts Worldwide 5G Network Infrastructure Revenue to Grow 39% in 2021" August 4, 2021 https://www.gartner.com/en/newsroom/press-releases/2021-08-04-gartner-forecasts-worldwide-5g-network-infrastrucutre-revenue-to-grow-39pc-in-2021
[3] “NTS Statistics January 2022 ,” GSA.com, January, 2022 . https://gsacom.com/technology/lte/

5G International

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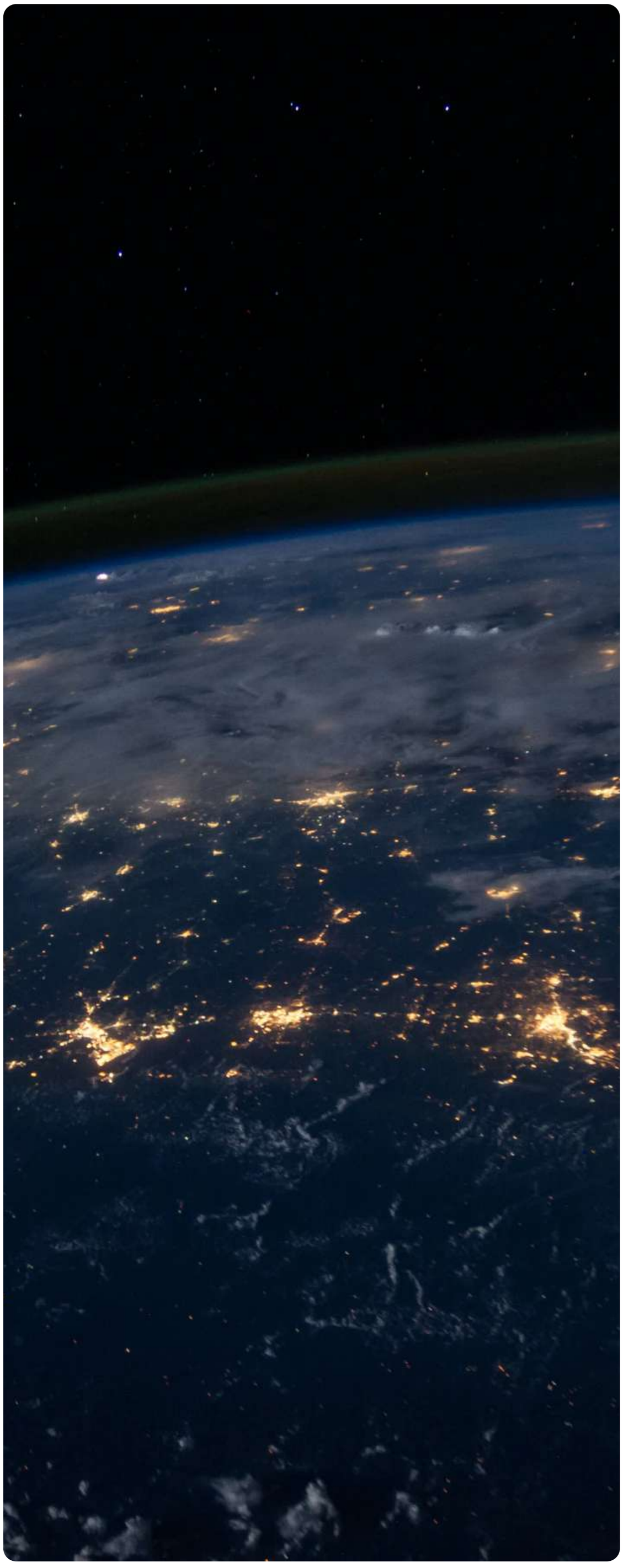

The 5G rollout became a global phenomenon in 2019, when South Korea was the first country to achieve a nationwide network. It saw 1 million subscribers within 69 days of launching, finished 2020 with nearly 12 million [4] and 2022 with over 28 million. [5] International commitment to the 5G rollout has also been demonstrated by the passage of the Biden Infrastructure Plan in November 2021, which allocated $65 billion to growing access to broadband and 5G connectivity [6], and the trade wars between the US and China for dominance over 5G infrastructure with reciprocal bans on 5G companies Huawei and Ericsson. By January 2023, there were 229 commercial 5G networks globally and more than 700 5G different smartphones available to users. Consumer connections exceeded one billion at the end of 2022 and are set to reach around 1.5 billion in 2023 and 2 billion by the end of 2025. This makes the 5G roll-out significantly faster compared to 3G or 4G. [7] All told, a March 2023 assessment predicted that global 5G fixed wireless access market size will reach over US $342 billion by 2030, registering a CARG (compound annual growth rate) of 39.9% from 2023 to 2030. [8] GSA's recent announcement indicated that over 30 countries would launch services during 2023, of which 15 will be 5G s tandalone networks. [9]

[4] https://www.gsma.com/newsroom/press-release/second-wave-of-5g-30-countries-to-launch-services-in-2023
[5] https://www.globenewswire.com/news-release/2023/03/10/2625064/28124/en/5G-Fixed-Wireless-Access-Market-Report-2023-Rising-Demand-for-High-Speed-Internet-Bolsters-Growth.html
[6] https://www.gsma.com/newsroom/press-release/second-wave-of-5g-30-countries-to-launch-services-in-2023/
[7] https://www.gsma.com/newsroom/press-release/second-wave-of-5g-30-countries-to-launch-services-in-2023/
[8] https://www.globenewswire.com/news-release/2023/03/10/2625064/28124/en/5G-Fixed-Wireless-Access-Market-Report-2023-Rising-Demand-for-High-Speed-Internet-Bolsters-Growth.html
[9] https://www.gsma.com/newsroom/press-release/second-wave-of-5g-30-countries-to-launch-services-in-2023/

5G Potential

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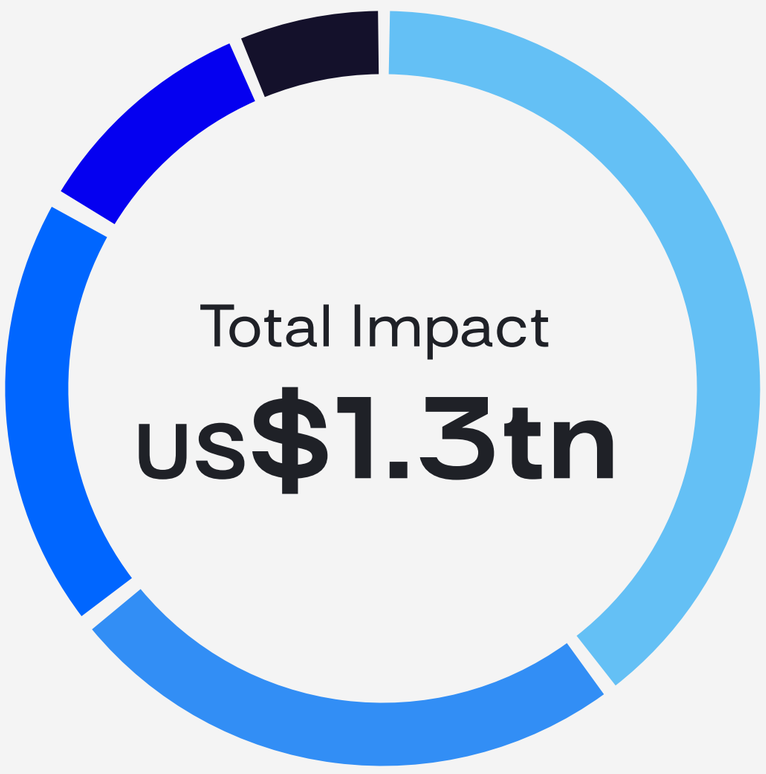
Expansion of 5G infrastructure has an impact potential far beyond the smartphone industry, promising to impact every aspect of society and drive new economic activity. Analysts at PWC calculated that 5G could bring an economic uplift of at least $1.3 trillion in the US alone, driving up sectors that include healthcare, utilities, financial services, manufacturing, and consumer and media applications [10]



5G-powered healthcare
US$530bn

5G-powered smart utilities
US$330bn

5G-powered consumer and media applications
US$254bn

5G-powered industrial manufacturing
US$134bn

5G-powered financial-services and applications
US$85bn

Source: "The global economic impact of 5G" https://www.pwc.com/gx/en/tmt/5g/global-economic-impact-5g.pdf. March 19, 2021

JP Morgan analysts agree, forecasting that enterprise could receive a $700 billion boost from 5G-driven opportunities. [11]

Private 5G Networks

Private 5G networks are those used for internal purposes within an organization or enterprise. They provide lower latency, more privacy and greater bandwidth allocation. Private networks are multiplying due to the increased reliance on mobile devices, the Internet of Things (IoT) and Edge computing. As more such devices connect to the internet, the appeal for business to secure themselves a private slice of the network increases, especially in manufacturing, healthcare and big tech. [12] JP Morgan forecasted that China alone will reach 2.5 billion IoT connections by 2025, with Japan and South Korea hitting 150 million. [13] Private 5G networks thereby present another vertical for 5G growth an expansion.

[10] "The global economic impact of 5G" https://www.pwc.com/gx/en/tmt/5g/global-economic-impact-5g.pdf
[11] "The Future of 5G Adoption" May 24, 2021 https://www.jpmorgan.com/insights/research/future-of-5g-adoption
[12] https://www.forbes.com/sites/forbestechcouncil/2023/02/10/2023-wireless-trends-5g-moves-indoors-private-wireless-proliferates-converged-networking-grows/?sh=6eff32bf4436
[13] "The Future of 5G Adoption" May 24, 2021 https://www.jpmorgan.com/insights/research/future-of-5g-adoption

What is 5G?

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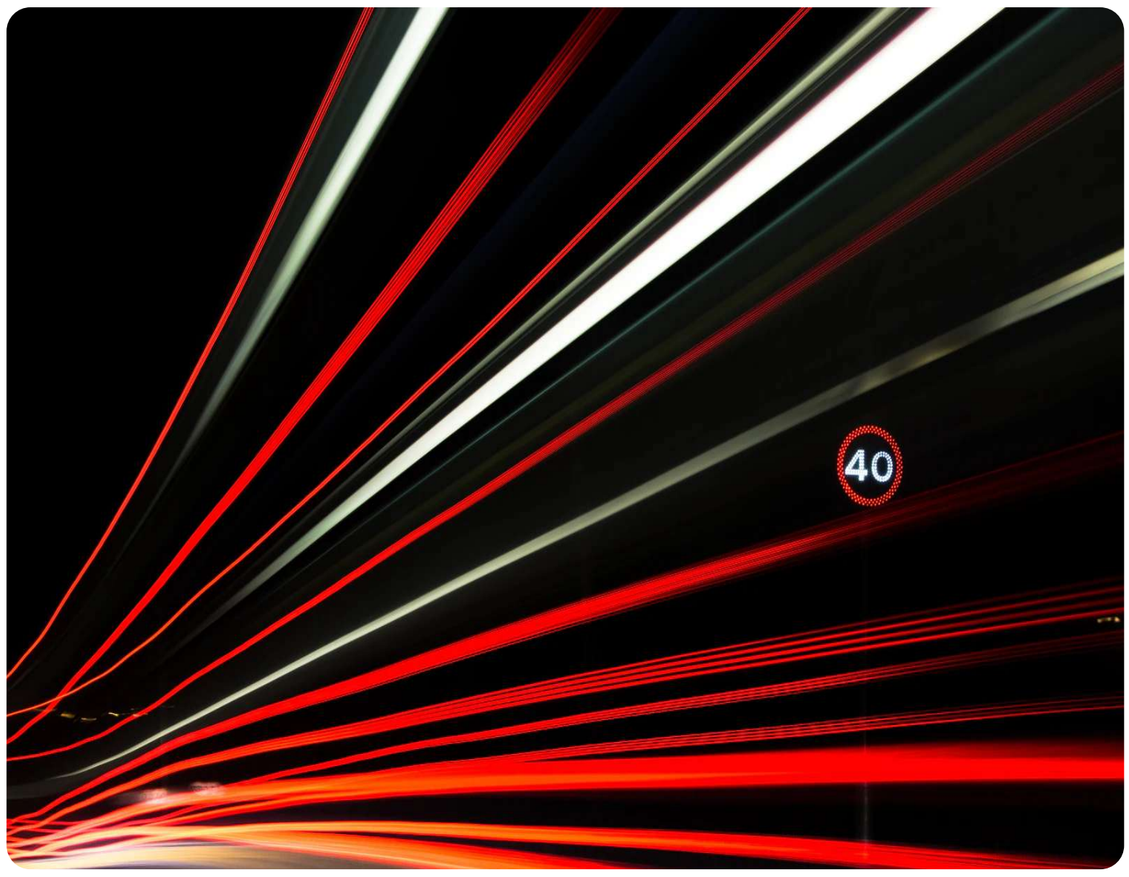
If 1G describes the technology that enabled the first cellphones, 2G brought text messaging, 3G internet access to the cell phone and 4G higher speeds (albeit in an overloaded network); then 5G brings the industry the capacity for even lower latency, more sophisticated apps, instantaneous availability of information and more structured and relevant capabilities. But 5G is not just about cell phones. 5G is the bundle of technological advances that will likely enable autonomous driving, the internet of things (IoT), cloud computing, mass participation in eSports and significant developments in the use of virtual or augmented reality (VR/AR) products.



While the configuration and collaboration of technologies that comprise 5G is not yet final, the core features will include:

1. Leveraging of new **bandwidths** – The range of millimeter wave frequencies currently in use (usually up to 6Ghz) are becoming overcrowded, resulting in slower service and mixed connections. 5G will exploit a much greater spectrum (30–300 GHz) of shorter waves, greatly increasing network capacity. The European Commission for the EU, the Asia Pacific Telecommunity for the Asia Pacific (APAC) region, and the Federal Communication Commission (FCC) in the United States are already pursuing initiatives to open up other bandwidths to 5G.

2. Small Cell Antennae – The shorter millimeter waves don't travel well through buildings and are absorbed by rain and plants. They therefore require a network of thousands of small, low powered mini base stations to work in relay to pass data around obstacles and maintain service.

3. Massive MIMO – Multiple Input Multiple Output cellular antennae stations – MIMO stations would have around 100 ports (in contrast to 4G's 12) and could increase capacity of networks by a factor of 22 or more.

4. Beamforming – In contrast to 4G dispersed wave signals, MIMO stations strategize the best route for a focused stream of data from the base to a specific user. This increases efficiency and avoids interference, resulting in a coherent, personalized data stream. It also allows for network slicing, where certain network functions are reserved for certain users– these could be premium customers or mission critical services such as remote driving or medical procedures.

4. Full duplex – Radio waves are reciprocal – they travel forward and back on the same frequency, meaning that today's antennas can only either send or receive data at any one time. To avoid this, researchers are formulating scalable orthogonal frequency–division mulitiplexing (OFDM): using silicon transistors to create high speed switches that momentarily hold back signals, so they can pass on the same frequency. This should bring lower latency and forward compatibility. [14]

As of this writing the following stocks mentioned are current holding of Defiance's ETF, QTUM: Verizon Communications, Inc., Ericsson, Qualcomm Inc., Vodafone Group Plc New,
View the Fund's full holdings at https://www.defianceetfs.com/fivg-full-holdings/

14 "5G's rise set to break the semiconductor market's fall in 2020," October 18, 2019. https://technology.ihs.com/618002/5gs-rise-set-to-break-the-semiconductor-markets-fall-in-2020

5 5G Applications

1. Smart Driving – A 2016 Huawei White Paper reported the estimation that if 90% of vehicles in the United States were automated, the number of traffic accidents would decrease by nearly 80% and the number of fatalities by about 60%. The same paper reported the US National Highway Traffic Safety Administration's prediction that light and medium-sized vehicles with vehicle-to-vehicle communications (V2V) could avoid 80% of accidents, and large vehicles with V2V could avoid 71% of the accidents. [15] Recent research indicates that global connected car sales grew 12% YoY in 2022 with the share of connected cars in overall car sales exceeding 50% [16], and analysts in late 2021 concurred that the market is on track to hit that target [17], with the connected car market in the US having grown 16% YOY in 2021 [18]. Smart driving is a clear example of how strong consumer and industry interest and uptake of 5G technology could encourage telecom companies to invest in the necessary research and development (R&D) and infrastructure to partner with industry for market share.

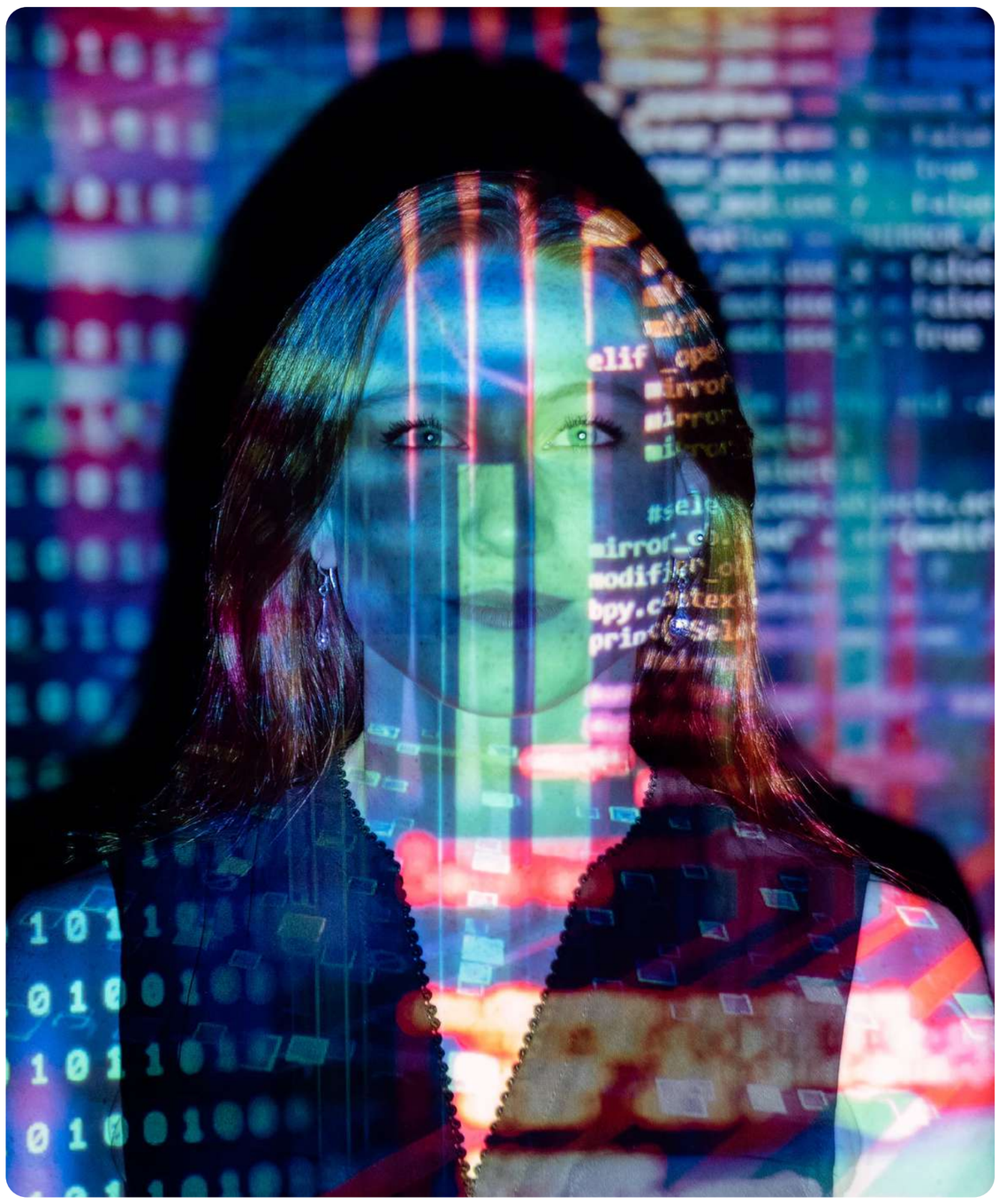
Indeed Nokia was a founder of the "5G Automotive Association" (5GAA)" established in 2016 with 120 plus members. This body aims to unite automotive and telecommunications to accelerate the introduction of intelligent transport and communication solutions. According to CounterPoint, 90% of connected cars will use 5G by 2030[19]. In 2020, Qualcomm launched its first "Car-to-Cloud Service", and has been consistently updating its features to provide carmakers with the best possible connectivity for connected vehicles. The latest Snapdragon digital chassis, launched in February 2022, "brings new technology collaborations to support out-of-the-box connectivity, integrated analytics and a cloud and device developer environment aimed to deliver new technology features, content and services globally". [20]

2. Smart Grids – Based on the principle that everything in the grid is connected, monitored and controllable, smart grids are now regarded as an indispensable component of national energy strategies in many markets, including China, Europe and the United States. They integrate information, telecommunication and automation into traditional power systems, revolutionizing the way energy is stored, delivered and sold. They require 5G's intelligent, comprehensive and reliable network which would provide very low latency for immediate data sharing and wide coverage, high bandwidth and a massive web of connections to millions of smart meters. In return 5G could enable significant social and environmental benefits due to the reduced power usage and wastage. [21] Deloitte reports that 26% of utilities companies are already using 5G, and another 36% intend to incorporate it in the near future. [22]

[15] 5G Opening Up New Business Opportunities, Huawei White Paper, December 2016, p.8.
[16] Connected Car Sales Grew 12% YoY in 2022 With Volkswagen Group in Lead, April 24, 2023. https://www.counterpointresearch.com/insights/global-connected-car-market-2022/#:~:text=Global%20connected%20car%20sales*%20grew,followed%20by%20China%20and%20Europe.] More than 900 million connected cars are expected on the road at the beginning of the next decade. Expect More Connected Cars on the Road in 2023, Omdia, August 7, 2023 https://www.iotworldtoday.com/transportation-logistics/expect-more-connected-cars-on-the-road-in-2023-omdia
[17] "Mobility Trends report for 2022" December 29, 2021 https://otonomo.io/blog/mobility-trends-report-for-2022/
[18] "Global Connected Car Market Remains Resilient; 5G Cars Deployed Globally" February 15, 2022 https://www.counterpointresearch.com/global-connected-car-market-2021/
[19] https://www.counterpointresearch.com/insights/global-connected-car-market-2022/#:~:text=Global%20connected%20car%20sales*%20grew,followed%20by%20China%20and%20Europe.
[20] "Qualcomm Unveils New Snapdragon Digital Chassis Connected Car Technologies to Accelerate the Future of Automotive" February 28, 2022 https://www.qualcomm.com/news/releases/2022/02/28/qualcomm-unveils-new-snapdragon-digital-chassis-connected-car-technologies
[21] 5G Opening Up New Business Opportunities, Huawei White Paper, December 2016, p.5.
[22] "2022 power and utilities industry outlook" December 2021 https://www2.deloitte.com/content/dam/Deloitte/us/Documents/energy-resources/us-eri-power-utilities-outlook-2022.pdf

3. Smart Healthcare – From remote controlled telemedicine to EMT's having immediate access to information on a patient, there is wide acknowledgment of the potential of eHealth to increase the availability and decrease the cost of medical services. Mobile devices are already being used as part of medical diagnosis or treatment all around the world. 5G advances are starting to actualize market potential in telehealth services, personal health monitoring, remote surgery, and commercial wearables, and there are predictions that augmented reality (AR) headsets that enable physicians to view inside the body are on their way. Robotic surgery through 5G networks has already taken place, and early studies reported positively about the possibility of robotic spinal surgeries. The pandemic continued to drive an uptick in 5G applications for telehealth, remote healthcare, and remote patient monitoring in 2021. 5G is already being applied for collecting and integrating patient data to ensure that all healthcare workers can access accurate information in real time, and 5G connected hospitals are under construction in South Korea. [23] Analysts at JP Morgan predict that using 5G for remote patient monitoring could drive a 16% reduction in costs. [24]

4. Artificial Intelligence – 5G synergy: AI applications have to collect and analyze massive amounts of data and produce recommended actions within incredibly short timeframes. The lightning speeds and low latency of 5G networks power the velocity and accuracy that AI systems require. AI processes are best carried out as close as possible to the end user, in edge networks which only 5G connections can support. [25] Thought leaders have emphasized the importance of combining the two technologies in order to unlock the estimated $17.9 trillion, or 0.7% of global GDP, that they could deliver by 2035. [26]



Tech writer Michael Baxter writes that "the growing importance of AI will go hand in hand with the emergence of 5G. The convergence of the two technologies will have huge economic significance and will transform business." [27]

5. Drones – 5G supported drones (autonomous, unmanned, aircraft) were one of the biggest new tech trends of 2021. August saw Qualcomm launch the first 5G and AI-enabled drone platform for organizations to use to develop customized drones on the 5G networks. [28] Vodafone and Ericsson have already successfully tested sky corridors for 5G drones in Germany, and BT has launched the first commercial drone corridor in the UK. 2021 saw ongoing tests for new drone applications, management, regulations, and more, which will form the foundation of a wider drone network [29]. Imagine, a network of flying machines, independently surveilling, delivering, inspecting and transporting. 5G drones will empower a new digital airspace economy.

[23] "Why 5G is the MVP of the healthcare tech revolution" August 18, 2021 https://www.verdict.co.uk/healthcare-robots-and-rad-realities-wont-happen-without-5g-infusion/
[24] "The Future of 5G Adoption" May 24, 2021 https://www.jpmorgan.com/insights/research/future-of-5g-adoption
25] "What's the role of artificial intelligence in the future of 5G and beyond?" September 20, 2021 https://www.qualcomm.com/news/onq/2021/09/whats-role-artificial-intelligence-future-5g-and-beyond
[26] "How 5G and AI will work together" February 2, 2023 https://www.techrepublic.com/article/how-5g-ai-work-together/
[27] "5G and AI use cases – how 5G lifts artificial intelligence" June 20, 2022 https://www.information-age.com/5g-and-ai-use-cases-how-5g-lifts-artificial-intelligence-19985/
[28] "Qualcomm Unleashes a New Era of Autonomous Drone Capabilities with World's First 5G and AI-Enabled Drone Platform" August 17, 2021 https://www.qualcomm.com/news/releases/2021/08/17/qualcomm-unleashes-new-era-autonomous-drone-capabilities-worlds-first-5g
[29] "5G drones: everything you need to know" August 24, 2021 https://www.5gradar.com/news/5g-drones-take-to-the-skies

Catalysts for growth

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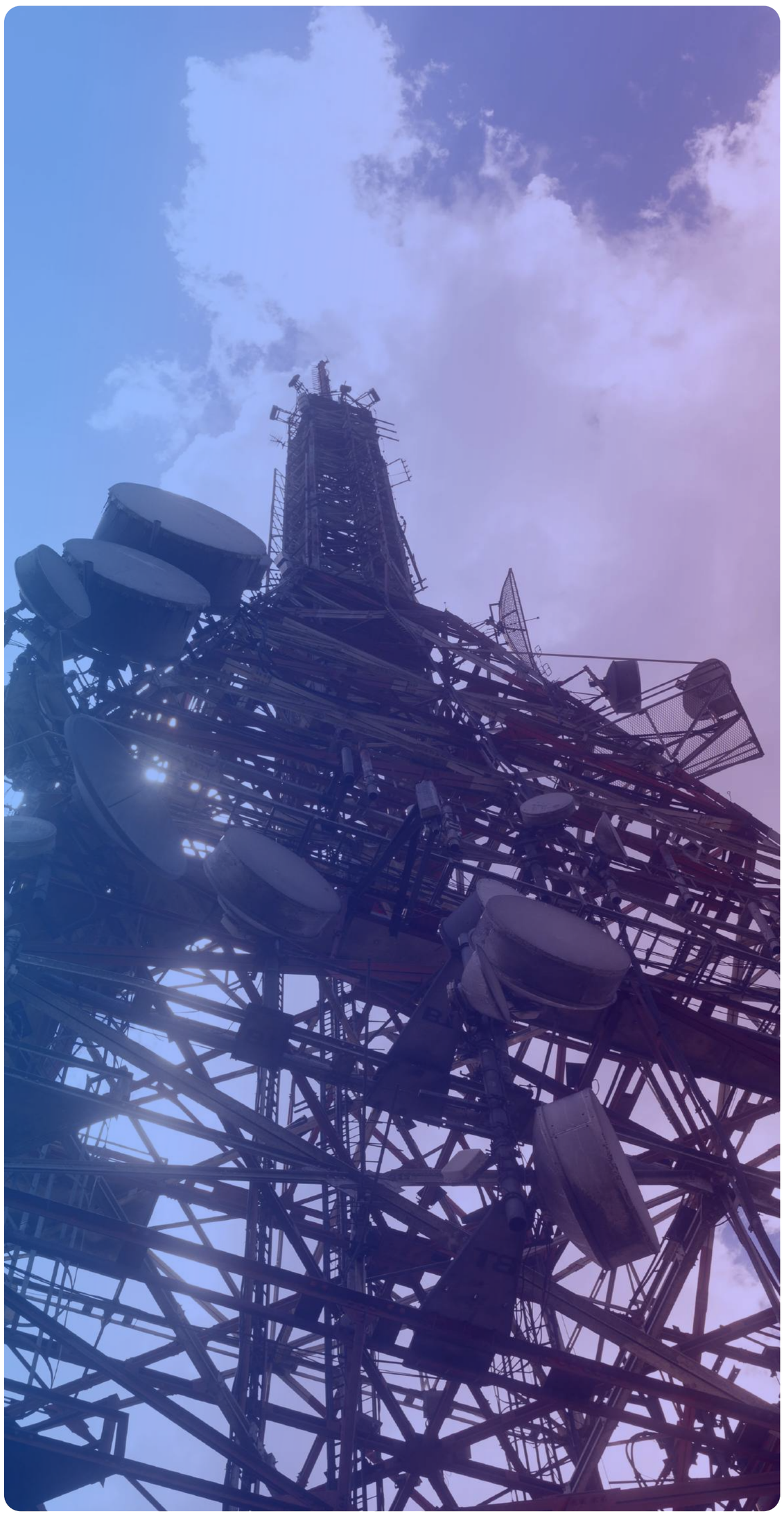

Industry is already partnering with Telecom companies as the 'best enablers' for new applications, giving both partners the confidence to invest in R&D and infrastructure to make the move to 5G effective, sustainable, innovation-welcoming and profitable. For example, automotive manufacturers see the potential in 5G networks as a platform to open up new revenue streams and business models, including in-car entertainment or flexible rental charges based on the car/route used. Their industry-centered technological advancements could propel further investment by 5G providers. Deloitte reports that 58% of networking executives across all industries are deploying 5G or running pilots. [30]

Governments that support private investment in 5G through intellectual property protection, availability of risk capital, spectrum licensing and the facilitation of R&D position themselves to embrace the innovation and potential associated with 5G's ubiquity in the economy.

Consumer demand should grow with the understanding that people will benefit from wireless, untethered, immersive experiences that enable them to watch movies and live sports programs, play games, shop online and work remotely with convenience, freedom and efficiency. Such services could also enhance cooperation and interaction in fields like education, training, construction, city planning and oilfield exploration. It's estimated that 5G mobile subscriptions will reach 4.1 billion, or 37.1% of total global mobile subscriptions, by the end of 2026. [31] Another aspect is that Covid has normalized the work from home paradigm with its dependence on smooth communication, data sharing and security and remote collaboration; all of which are facilitated and enhanced by 5G. According to EY, 52% of enterprises chose to investigate 5G and IoT because of the impact of COVID-19. [32]

[30] "2022 power and utilities industry outlook" December 2021 https://www2.deloitte.com/content/dam/Deloitte/us/Documents/energy-resources/us-eri-power-utilities-outlook-2022.pdf
[31] "Global 5G Market Demand and Service Revenue Forecast Report 2021: There Will be 4.1 Billion 5G Mobile Subscriptions Worldwide At year-end 2026" October 13, 2021 https://www.globenewswire.com/news-release/2021/10/13/2313246/28124/en/Global-5G-Market-Demand-and-Service-Revenue-Forecast-Report-2021-There-Will-be-4-1-Billion-5G-Mobile-Subscriptions-Worldwide-At-year-end-2026.html
[32] "How 5G providers can help industries to flourish" May 26, 2021 https://www.ey.com/en_uk/tmt/how-5g-providers-can-help-industries-to-flourish

FIVG, the First 5G ETF:

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- Is a diversified basket of stocks that can potentially benefit from the expansion of the 5G market. Rather than buy one or two individual equities focused on this sector, investors can invest in a way that provides diversification while maintaining a targeted view for their portfolio.
- Will have access to companies leading the 5G rollout, including Verizon, AT&T, Samsung, Nokia, Ericsson, Qualcomm, Skyworks Solutions, Cisco, Broadcom and Xilinix.
- Is a cost-effective way to access the 5G disruptors with an expense ratio of 0.30%.

The Funds' investment objectives, risks, charges, and expenses must be considered carefully before investing. The prospectus contains this and other important information about the investment company. Please read it carefully before investing. A hard copy of the prospectus can be requested by calling 833.333.9383.

Investing involves risk. Principal loss is possible. As an ETF, the fund may trade at a premium or discount to NAV. Shares of any ETF are bought and sold at market price (not NAV) and are not individually redeemed from the Fund. The Fund is not actively managed and would not sell a security due to current or projected under performance unless that security is removed from the Index or is required upon a reconstitution of the Index. A portfolio concentrated in a single industry or country, may be subject to a higher degree of risk. The value of stocks of communications services, information technology and defense sector companies are particularly vulnerable to rapid changes in technology product cycles, rapid product obsolescence, government regulation and competition. The Fund is considered to be non-diversified, so it may invest more of its assets in the securities of a single issuer or a smaller number of issuers. Investments in foreign securities involve certain risks including risk of loss due to foreign currency fluctuations or to political or economic instability. This risk is magnified in emerging markets. Small and mid-cap companies are subject to greater and more unpredictable price changes than securities of large-cap companies.

The "BlueStar 5G Communications Index™", "BFIVGTR™ Index" (collectively "5G Communications Index"), is the exclusive property and a trademark of BlueStar Global Investors LLC d/b/a BlueStar Indexes® and has been licensed for use for certain purposes by Defiance ETFs LLC. Products based on the Global 5G Communications Index* are not sponsored, endorsed, sold or promoted by BlueStar Global Investors, LLC or BlueStar Indexes®, and BlueStar Global Investors, LLC and BlueStar Indexes® makes no representation regarding the advisability of trading in such product(s).It is not possible to invest directly in an index.

The Defiance Next Gen Connectivity ETF is the first ETF to emphasize securities whose products and services are predominantly tied to the development of 5G networking and communication technologies. The fund does this by tracking The BlueStar 5G Communications Index. The Fund attempts to invest all, or substantially all, of its assets in the component securities that make up the Index.

The possible applications of 5G technologies are only in the exploration stages, and the possibility of returns is uncertain and may not be realized in the near future.

Fund holdings and sector allocations are subject to change at any time and should not be considered recommendations to buy or sell any security.

Diversification does not assure a profit, nor does it protect against a loss in a declining market.

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