

2019

Defiance ETFs:

Investment Case for FIVG:
The Defiance Next Gen Connectivity ETF

DEFIANCE | ETFs

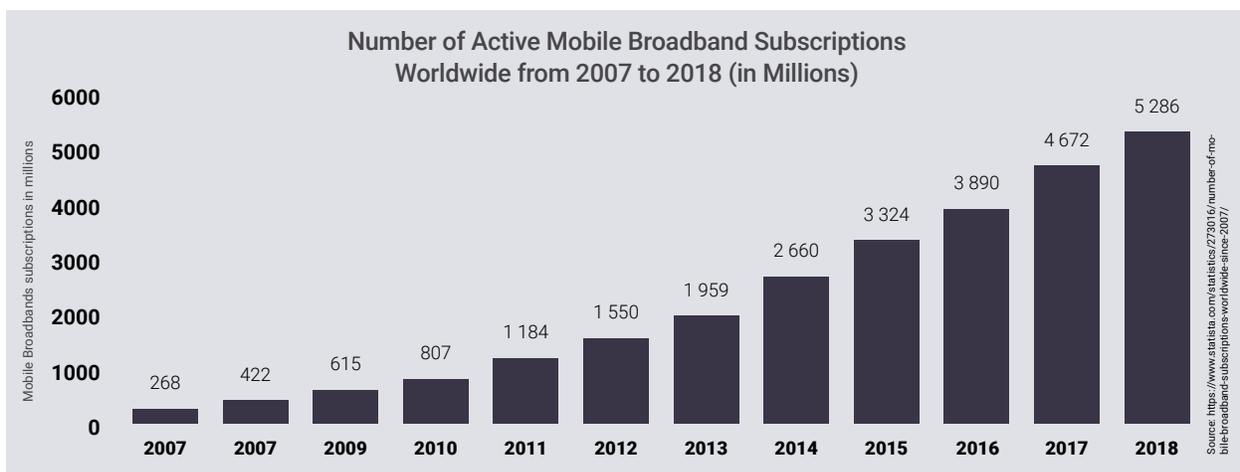


Defiance ETFs: Investment Case for FIVG

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.

Major market actors, including telecommunications companies, governments, infrastructure providers and hardware firms, have been researching and developing 5G capacities for years and are now on the cusp of, or have already launched. The Global Mobile Suppliers Association (GSA) reported that 537 commercial LTE networks were launched between 2008 and 2016, representing significant capital expenditure.¹ These LTE networks can act as a foundation for future 5G network upgrades, demonstrating existing market interest and commitment to progress in this field. 2019 saw the launch of the first 5G networks by Verizon and Sprint in more than 8 U.S. cities, while the first 5G compatible cell phones are now available to buy from Verizon and Samsung.

Cooperation between the supply and demand sides of the market (telecom companies versus industry/energy/transport businesses and consumers) comprises a robust value and supply chain and contributes to the expected success of the 5G market. The consistent and steep worldwide growth in broadband subscription appears to reflect the strong underlying demand for ever-improving data access and processing. (see graph below)



¹ The 5G Economy: How 5G Technology will Contribute to the Global Economy, IHS, January 2017, p.14. <https://www.qualcomm.com/media/documents/files/ihs-5g-economic-impact-study.pdf>



International governments' commitment to the 5G rollout has also been demonstrated recently, with President Trump's statement in April 2019² and the centrality of 5G technology companies like Huawei in the trade war between China and the US.³ Europe lags behind China, the US, Korea and Canada in its readiness for 5G, but the European Commission expresses similar priorities to make this technological leap by the end of 2020.⁴



2019 5G Latest

2019 has seen huge advances in 5G trials and the first networks launched in cities, with continued rollout promised by the end of the year and into 2020.

From the UK Vodafone's February launch of a 5G network in Manchester airport and its March trials in Bristol, Cardiff, and Liverpool; to Verizon's April activation of its 5G network in Chicago and Minneapolis. That month AT&T also launched its network in 7 further cities - Austin, Los Angeles, Nashville, Orlando, San Diego, San Francisco, and San Jose – and Swisscom's 5G network went live across 120 locations. In May Sprint's 5G service became available in Atlanta, Dallas-Fort Worth, Houston, and Kansas City (and in July to Chicago) while Vodafone launched in Milan, Rome, Turin, Bologna, and Naples. Sprint's network requires consumers to have LG's new V50 ThinQ or HTC's 5G Hub in order to benefit fully from the 5G network's faster speeds, that said, the rollout is moving forward. June saw Verizon launch in Denver, and T-Mobile's network available in Atlanta, Cleveland, Dallas, Las Vegas, Los Angeles, and New York. In July 2019 Vodafone switched on 5G in Birmingham, Bristol, Cardiff, Glasgow, Manchester, Liverpool and London.⁵

These launches may blaze the trail for future smart cities, automated driving and telemedicine. Further development is needed in both the hardware and technology aspects, but recent market movements indicate progress in all areas. For example, AT&T and Verizon are turning their attention to 5G mobile hotspots, with AT&T's Netgear and Verizon's Inseego device as their pilots in this area. Companies such as Qualcomm and Intel are advancing 5G modems that should be compatible with network operators and serve smart-home and other devices whose design has not yet been finalized. 20 device manufacturers have already confirmed their use of Qualcomm's 5G components in their tech.

In addition, at the end of July Apple confirmed plans to buy Intel's 5G modem business. This effectively erases Intel as a competitor for Apple in the 5G cellphone business and brings around 2,200 Intel employees, along with their intellectual property, equipment and leases under Apple's purview. Apple has not yet launched a 5G cellphone (Samsung and Verizon devices are available to the consumer in 2019) but it is expected to weigh into this market in 2020.

² Remarks by President Trump on United States 5G Deployment, April 19, 2019. <https://www.whitehouse.gov/briefings-statements/remarks-president-trump-united-states-5g-deployment/>

³ <https://news.defianceetfs.com/investment-cases/5g-the-trade-truce>

⁴ 5G for Europe Action Plan, 22 August 2018, <https://ec.europa.eu/digital-single-market/en/5g-europe-action-plan>

⁵5G: The Latest News & Updates: The latest and greatest that's happening in the world of 5G, Tim Fisher, July 26, 2019. <https://www.lifewire.com/5g-news-4428066>



What is 5G?

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 could bring the industry the capacity for even lower latency, more sophisticated apps, instantaneous availability of information and more structured and relevant capabilities. 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.
5. **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 multiplexing (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.⁶



⁶ The 5G Economy: How 5G Technology will Contribute to the Global Economy, IHS, January 2017, p.13. <https://www.qualcomm.com/media/documents/files/ihs-5g-economic-impact-study.pdf>



5G applications

Widespread 5G connectivity won't just cut download times and enhance online leisure such as eSports. It has the potential to make information universally accessible, foster a digitalized sharing economy, transform diverse industries and enhance people's quality of life. From smart cars to VR/AR functions; from manufacturing to the automotive industry to medicine and healthcare, the impact of 5G could be felt across many spheres, including:

Enhanced Mobile Broadband (EMBB) – Cellphone coverage will be increased and made more efficient, facilitating a lower cost-per-bit for data transmission. The network will be capable of handling many more devices requiring media and data intensive uses (such as AR/VR), especially in specific areas. This will drive the use of broadband apps on mobile networks.

Massive Internet of Things (MIoT) – 5G's economies of scale and deeper, more flexible internet coverage will drive down costs and allow for the vastly increased scale of IoT and greater uptake of relevant technologies. Research suggests that there are currently over 11 billion IoT connections worldwide, and that by 2020 there could be over 20 billion connections between people, things, and organizations.⁷ Such interconnectedness results in and supports new requirements for communication networks.⁸

Mission Critical Services (MCS) - 5G will support applications that rely on low latency, high reliability, strong security and availability, enabling the operation of remote devices where failure is not an option. For example, in autonomous vehicles or remote surgeries.



3 examples of 5G applications:

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 accidents⁹. Furthermore, Accenture have suggested that all new cars will be connected by 2025.¹⁰ 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.

⁷ "Gartner Says 8.4 Billion Connected "Things" Will Be in Use in 2017, Up 31 Percent From 2016," Gartner press release, February 7, 2017. <https://www.gartner.com/en/newsroom/press-releases/2017-02-07-gartner-says-8-billion-connected-things-will-be-in-use-in-2017-up-31-percent-from-2016>

⁸ 5G Opening Up New Business Opportunities, Huawei White Paper, December 2016, p.4.

⁹ 5G Opening Up New Business Opportunities, Huawei White Paper, December 2016, p8.

¹⁰ Accenture, Connected Vehicle, April 2016. https://www.accenture.com/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Dualpub_21/Accenture-digital-Connected-Vehicle.pdf



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.¹¹



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, with 5G advances promoting market potential in telehealth services, personal health monitoring, remote surgery and commercial wearables.

Catalysts for growth

While consumer enthusiasm is important, full commitment by telecom companies to the required investment for the leap to 5G, will be determined by the regulatory framework, market innovation and their cooperation and shared vision with industry partners.

If telecom operators are able to position themselves as the 'best enablers' for industry applications, then both partners will have 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 could 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 would propel further investment by 5G providers.

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

Consumer demand would grow with the understanding that people should 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.

¹¹ 5G Opening Up New Business Opportunities, Huawei White Paper, December 2016, p5.



Benefits of ETF investing:

The Defiance Future Technology ETF-FIVG:

- Is a diversified basket of stocks that can potentially benefit from the expansion of the 5G market and the success of 5G-investing company stocks. 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 be exposed to those leading the market, including Verizon, At&T, Samsung, Nokia, Ericsson, Qualcomm, Skyworks Solutions, Cisco, Broadcom and Xilinx.
- Is a cost-effective way to access this market at 0.30% gross expense ratio.

Top 10 holdings

See the list of the fund's top ten holdings as of 08/06/2019.

Percentage of Net Assets	Name
5.13%	NOKIA CORP
5.13%	SKYWORKS SOLUTIONS INC
5.12%	ANALOG DEVICES INC
4.86%	MARVELL TECHNOLOGY GROUP LTD ORD
4.78%	XILINX INC
4.35%	ERICSSON
3.13%	AT&T INC
2.92%	VERIZON COMMUNICATIONS INC
2.88%	KEYSIGHT TECHNOLOGIES INC
2.70%	CISCO SYS INC

About Defiance ETFs, LLC

Defiance provides investors access to low-cost* ETFs tied to transformative trends, and disruptive sectors.

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

*Commissions may be charged on trades.

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 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.

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

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