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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. 5G has been paralleled to a “general purpose technology” like the printing press or electricity, in that it has the potential to fundamentally and pervasively alter work, leisure and daily life.¹

Telecommunications companies across the globe have already begun investing in the opportunities that 5G offers. The Global Mobile Suppliers Association (GSA) reported that 537 commercial LTE networks were launched between 2008 and 2016, representing significant capital expenditure.² These LTE networks can act as a foundation for future 5G network upgrades, demonstrating existing market interest and commitment to progress in this field. 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. An IHS Markit study analyzed possible technical contributions of 5G via a representative sample of use-case scenarios. Based on their sample analysis, the study estimated that “5G has the potential to stimulate \$12.3 trillion in global sales.”³

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) and significant developments in the use of virtual or

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>.

² 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>

³ The 5G Economy: How 5G Technology will Contribute to the Global Economy, IHS, January 2017, p.16. <https://www.qualcomm.com/media/documents/files/ihs-5g-economic-impact-study.pdf>

Market projections are not representative of future fund growth. Past performance does not guarantee future results



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.⁴



5G applications

Widespread 5G connectivity 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.

⁴ 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>

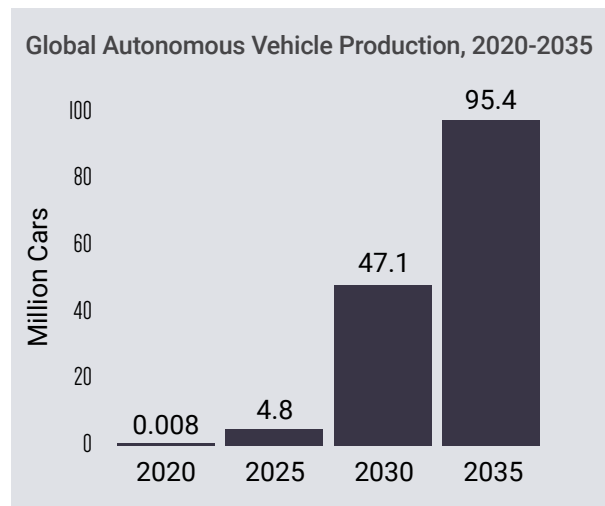


Massive Internet of Things (MIoT) – 5G’s economies of scale and deeper, more flexible internet coverage will drive down costs and allow for the vastly increased scale of IoT and greater uptake of relevant technologies. Research suggests that there are currently over 11 billion IoT connections worldwide, and that by 2020 there could be over 20 billion connections between people, things, and organizations.⁵ Such interconnectedness results in and supports new requirements for communication networks.⁶

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 accidents.⁷ Furthermore, Accenture have suggested that all new cars will be connected by 2025.⁸ Smart driving is a clear example of how strong consumer and industry interest and uptake of 5G technology will likely give telecom companies the confidence to invest in the necessary research and development (R&D) and infrastructure to partner with industry for market share.



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.⁹

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.

⁵ “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>

⁶ 5G Opening Up New Business Opportunities, Huawei White Paper, December 2016, p.4.

⁷ 5G Opening Up New Business Opportunities, Huawei White Paper, December 2016, p8.

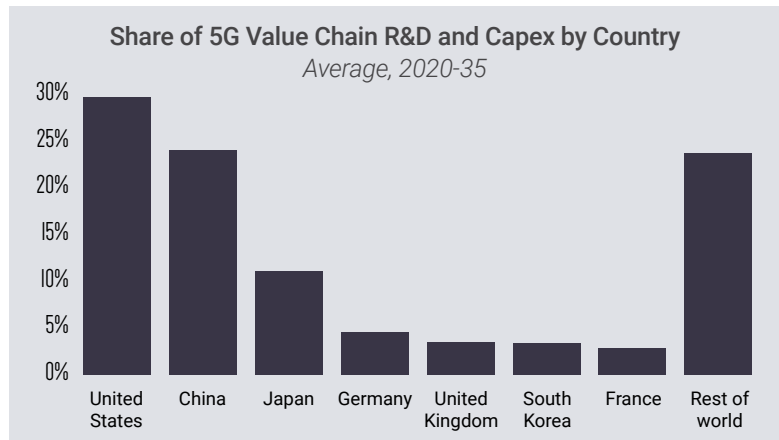
⁸ Accenture, Connected Vehicle, April 2016. https://www.accenture.com/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Dualpub_21/Accenture-digital-Connected-Vehicle.pdf

⁹ 5G Opening Up New Business Opportunities, Huawei White Paper, December 2016, p5.



By the Numbers: 5G's Global Value Chain

The pervasiveness and universality of 5G's potential impact makes it challenging to quantify specific market sectors. A January 2017 study modeled the economic activity of the 5G value chain for 7 countries which the authors estimated could be at the forefront of 5G development. The study found that those 7 countries could see over \$200 billion investment in research and development and capital expenditure from 2020 to 2035, with the possible creation of 22 million jobs.¹⁰



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.

Potential Benefits of ETF Investing:

Defiance Next Gen Connectivity ETF:

- Invests in a rules-based index comprised of equity securities of leading companies engaged in the research & development or commercialization of systems and materials used in 5G communications.
- 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.¹¹
- Will be exposed to those leading the market, including Verizon, AT&T, Nokia, Ericsson, Qualcomm, Skyworks Solutions, Cisco, Broadcom and Xilinx.
- Is a cost-effective way to access this market at 0.30% gross expense ratio.

¹⁰ The 5G Economy: How 5G Technology will Contribute to the Global Economy, IHS, January 2017, p.4 Market projections are not representative of future fund growth. Past performance does not guarantee future results



The Fund is distributed by Quasar Distributors, LLC.

Fund holdings and sectors are subject to change at any time and should not be considered recommendations to buy or sell any security. See the list of the fund's top ten holdings as of 02/19/2019.

| Percentage of Net Assets | Name |
|--------------------------|--------------------------|
| 5.00% | XILINX INC |
| 5.00% | COMMSCOPE HOLDING CO INC |
| 5.00% | SKYWORKS SOLUTIONS INC |
| 5.00% | NOKIA CORP-SPON ADR |
| 5.00% | ERICSSON (LM) TEL-SP ADR |
| 5.00% | FINISAR CORPORATION |
| 3.70% | INTELSAT SA |
| 3.13% | UBIQUITI NETWORKS INC |
| 3.00% | BROADCOM INC |
| 3.00% | CISCO SYSTEMS INC |



About Defiance ETFs, LLC

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

*A commission may apply when buying or selling an ETF.

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.

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.

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 information technology 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.

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

