

Executive Summary:

- Our 5G-enabled truck teleoperation safety system is a groundbreaking solution that leverages AT&T's advanced 5G network to address significant challenges in trucking. Most specifically, it serves as a failsafe for when AV trucks and their onboard intelligence systems experience failures. This innovative teleoperation safety system offers increased connectivity, real-time monitoring, improved safety, enhanced efficiency, and cost savings for US trucking companies, as well as manufacturers and distributors. However, just to clarify, for the purposes of this paper, we'll be speaking to our solution mostly in the context of trucking companies.
 - a. **Technology Analysis & Assessment of Fit of Need and Solution:**
 - The trucking industry is currently facing several critical challenges such as driver shortages, safety concerns, and increasing costs. Our 5G-enabled truck teleoperation safety system is a safety driven solution that combines cutting-edge technology with AT&T's 5G network to remotely control trucks, reduce dependency on drivers, enhance operational efficiency, and minimize costs.
 - The system differentiates itself from competing solutions due to its seamless integration with existing OEM vehicle platforms, our industry leading partnerships, and tailor-made, scalable offerings. In addition, strategic collaborations with firms like Daimler and Waymo further reinforce its credibility and market positioning.
 - b. **Industry and Market Analysis:**
 - The outlook for the trucking industry is promising, with continued growth expected as demand for freight increases. Early adopters of advanced technology solutions, such as our teleoperation safety system, are poised to reap significant benefits and gain a competitive advantage. Market segmentation includes high-volume trucking companies (Top 15% of the industry) and large-scale manufacturers and distributors with private fleets. But again, within this paper, our principal focus is on trucking companies.
 - c. **Production and Operations Plan:**
 - Because our teleoperation safety system is network based (AT&T 5G), it should be capable of integration with any OEM vehicle platform and AV tech suites. This configurability is what will allow teleoperators at Remote Operating Centers (ROCs) to remotely operate trucks. Capital expenditures include retrofitting existing facilities or building for new ROCs, purchasing teleoperation equipment, and enabling and maintaining the 5G network.
 - d. **Marketing and Financial Plan:**
 - The marketing plan and market entry strategy focus on promoting the teleoperation safety system to top trucking companies, as well as leading manufacturers, and distributors. AT&T will offer a subscription-based service and provide assistance in building ROCs for customers. Market positioning highlights the system as an advanced, cutting-edge solution for trucking companies, manufacturers, and distributors, who are seeking state-of-the-art technology and connectivity. Various marketing channels, such as digital marketing, industry events, and targeted sales campaigns, will be utilized to reach potential customers.
 - Financial projections for the teleoperation system are promising, with strong revenue growth, high gross profit margins, and a positive Net Present Value (NPV) of \$1.5 billion. The

Break-Even Point is reached in Year 4 after recuperating an estimated investment of \$924 million.

- In conclusion, our 5G-enabled truck teleoperation safety system presents a unique and financially attractive opportunity for AT&T and its customers. The system's innovative approach to addressing emerging safety challenges within the trucking industry, combined with AT&T's 5G network capabilities and strategic partnerships, positions it for strong growth and success.

Technology Analysis & Assessment of Fit of Need and Solution:

- The trucking industry is at a crossroads as it faces growing demands for efficient, cost-effective, and sustainable solutions.
- As global trade continues to expand, the need for innovative approaches to address driver shortages, high labor costs, and environmental concerns has become increasingly pressing. In response to these challenges, this section presents an in-depth analysis of a groundbreaking technology: the 5G-enabled truck teleoperation safety system.
- By examining the unmet needs within the trucking industry, the proposed solution's value proposition, and a comparison with competing approaches, this analysis demonstrates the potential this cutting-edge technology has to revolutionize trucking and pave the way for a more efficient, profitable, and sustainable future.

The Problem:

The trucking industry is currently facing numerous challenges and unmet needs, all of which significantly impact its efficiency, profitability, and overall growth. Some of these issues are highlighted below...

- *Driver Shortage:* The trucking industry is experiencing a severe driver shortage, with the American Trucking Association estimating that a current shortage of 80,000 drivers could grow to more than 160,000 by 2030. Several factors are contributing to this problem, including an aging workforce (30.3% of US truck drivers over the age of 55), increased demand for transportation services due to the rise of e-commerce, and the unappealing "lifestyle" associated with long-haul trucking.
- *Regulatory Challenges:* Legislative changes, such as the ELD mandate and stricter enforcement of the Hours of Service (HOS) law, have contributed to drivers leaving the industry. The ELD mandate, which more strictly enforces the HOS law, reduces the number of miles drivers can travel in a day, which affects their earnings (Because most driver are paid by the mile). Additionally, changes in worker classifications in California have brought into question independent contracting, which is a hiring model that has been long leveraged within the industry. Should the contract model come under further legal scrutiny, it's possible that the industry's already shrinking labor pool could contract even further.
- *Utilization and Efficiency:* Due to the limitations imposed by the ELD Mandate and HOS law, trucks only spend around 40% of their time carrying goods. Autonomous trucks and teleoperation technology can address these limitations, increasing truck utilization and easing the driver shortage crisis.
- *Rising Operational Costs:* The cost of trucking has increased significantly, with several industry forums reporting cost of ownership had hit its highest level in 15-year when it reached a \$1.86 per

mile in 2021. These rising costs create opportunities for disruption within the industry and put immense pressure on trucking companies to find innovative solutions to remain competitive.

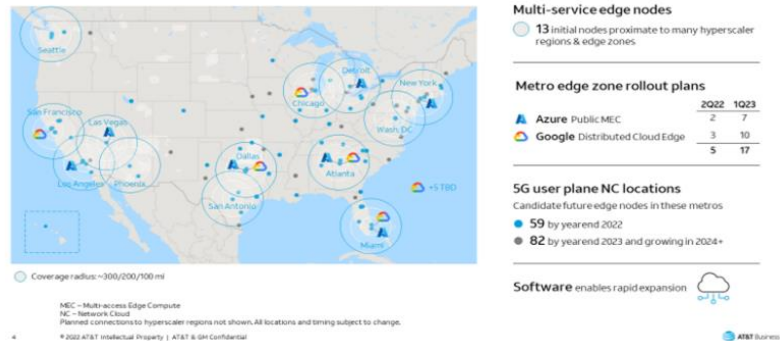
Motor Carrier Costs	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<i>Vehicle-based</i>										
Fuel Costs	\$0.641	\$0.645	\$0.583	\$0.403	\$0.336	\$0.368	\$0.433	\$0.384	\$0.308	\$0.417
Truck/Trailer Lease or Purchase Payments	\$0.174	\$0.163	\$0.215	\$0.230	\$0.255	\$0.264	\$0.265	\$0.256	\$0.271	\$0.279
Repair & Maintenance	\$0.138	\$0.148	\$0.158	\$0.156	\$0.166	\$0.167	\$0.171	\$0.149	\$0.148	\$0.175
Truck Insurance Premiums	\$0.063	\$0.064	\$0.071	\$0.074	\$0.075	\$0.075	\$0.084	\$0.071	\$0.087	\$0.086
Permits & Licenses	\$0.022	\$0.026	\$0.019	\$0.019	\$0.022	\$0.023	\$0.024	\$0.020	\$0.016	\$0.016
Tires	\$0.044	\$0.041	\$0.044	\$0.043	\$0.035	\$0.038	\$0.038	\$0.039	\$0.043	\$0.041
Tolls	\$0.019	\$0.019	\$0.023	\$0.020	\$0.024	\$0.027	\$0.030	\$0.035	\$0.037	\$0.032
<i>Driver-based</i>										
Driver Wages	\$0.417	\$0.440	\$0.462	\$0.499	\$0.523	\$0.557	\$0.596	\$0.554	\$0.566	\$0.627
Driver Benefits	\$0.116	\$0.129	\$0.129	\$0.131	\$0.155	\$0.172	\$0.180	\$0.190	\$0.171	\$0.182
TOTAL	\$1.633	\$1.676	\$1.703	\$1.575	\$1.592	\$1.691	\$1.821	\$1.699	\$1.646	\$1.855

- These unmet needs and challenges highlight the pressing demand for innovative solutions within the trucking industry. Thus, implementation of our 5G-enabled truck teleoperation safety system has the potential to address many of these issues and improve the industry's efficiency, safety, and profitability.

The Solution:

- The solution to the challenges faced by the trucking industry lie in implementing our 5G-enabled truck teleoperation safety system. This technology addresses the pressing issues of driver shortages, operational efficiency, and safety. The key components of this solution include:
 1. *Truck Requirements:* To enable teleoperation, trucks must meet specific criteria, including:
 - A 5G module installed within the vehicle
 - AT&T SIM card
 - A minimum of eight cameras and sensors for enhanced visibility and safety
 2. *Network Requirements:* For teleoperated capabilities to function efficiently, the network must provide the following:
 - Less than 50-millisecond latency for real-time responsiveness
 - Network slicing to prevent interference with other 5G users and maintain a dedicated connection for teleoperation
 - Broad, uninterrupted network coverage to ensure seamless operation
 3. *Infrastructure and Coverage:* AT&T's existing MEC footprint already covers a significant portion of the contiguous United States, thus allowing for teleoperated driving in 20-30% of the country already. With AT&T's continued expansion of its edge computing capabilities and data centers, its coverage area only stands to extend to other regions, including the North Central United States.
 - 5G Network Architecture: Successful teleoperations require three main components:
 1. The remote vehicle (equipped with the necessary technology)
 2. The 5G network (providing reliable connectivity)
 3. Remote operation centers (to receive and process data from the vehicle)

Multi-service edge can connect to many clouds & easily expand



4. **Remote Operation Centers:** These centers are crucial for managing teleoperated trucks and processing data such as video decoding and screen rendering. They must be readily available to receive uplinked data from the remote vehicle via the 5G network and return the processed information back to the vehicle.
5. **Client Safety:** To ensure safe transmission of data, a teleoperation specific “data pipe”, with end-to-end QOS, enabled by a network slice, will be installed on AT&T’s network. This “data pipe,” will ensure the segregation of our data traffic from other 5G operators/users. Further, in case of network issues (Latency, bandwidth, video feeds) or disruptions to the truck’s on-board intelligence system (Hardware, software, radar, lidar, sensors, camera etc.) the truck will begin reducing its speed, engage its hazards, communicate its problem(s) back the “ROC” and prepare for “teleoperation” hand-off to the ROC operator. This process is or “RAP” (Risk Aversion Protocol) must happen before an MRM (Minimal Risk Maneuver) can be executed. But why is the set of box checks we must follow? See, all mechanical issues will still involve tow trucks, as it’s entirely too risky to teleoperate a truck even with the smallest physical complications. However, that said, in the case of most hardware/software or AV equipment problems, a truck will likely still be operable, which is where our solution comes in. Thus, the “RAP” is an important preliminary step before engaging an MRM. Yet, both must work together to ensure total client safety. Because once the vehicle is on the side of the road the “ROC” operator can gauge the extent of the issue, the time required to fix it, along with the necessary duration of the teleoperation session (Time, mileage etc.). Making this standard procedure will prevent accidents thereby increasing safety.
 - By employing our 5G-enabled truck teleoperation safety system, the trucking industry can address its major challenges, revolutionizing how goods are transported and improving efficiency, safety, and profitability.

Value Proposition:

- **How the Solution is Creating Value:** The implementation of our 5G-enabled truck teleoperation safety system for autonomous trucks offers numerous benefits, including:

1. *Increased operational efficiency:* Trucking companies can significantly reduce operating expenses by maximizing the utilization of their trucks. This increased utilization will serve as an offset to the industry's shrinking labor pools. Moreover, this increased efficiency can only be achieved if trucking companies' new AV assets are properly safeguarded, thus they have a strong incentive to make this network investment.
2. *Cost savings:* Additionally, investing in AT&T's 5G network, to enable our teleoperation safety system, also opens trucking companies up to a host of data services. Leveraging these data services, such as real-time GPS tracking, route optimization, and predictive maintenance, will allow trucking companies to streamline operations, reduce costs, and improve customer satisfaction. These savings can greatly impact a company's competitiveness and bottom line in an industry with thin margins.

- **Where value will Be Added (B2B & AT&T):**

1. *Improved revenue streams:* We've established that autonomous trucking systems can revolutionize transportation and logistics through cost reduction and vastly improved operational efficiency. Further, companies adopting this technology will benefit from faster delivery times, improved safety, and reduced costs, leading to increased revenue. Lastly, the ability to operate trucks 24/7 without breaks or rests allows for more deliveries and shipments, further boosting revenue.
 2. *New revenue opportunities for AT&T:* The rise of autonomous trucking offers AT&T the chance to capitalize on this technological disruption by providing connectivity solutions, such as 5G networks and GPS tracking systems, to B2B customers.
 3. *Data management and analysis services:* AT&T can offer data management and analysis services to B2B firms, providing valuable insights to optimize their operations. Vehicle-to-vehicle communication capabilities can improve routing, runtime, and safety.
 4. *Cybersecurity expertise:* AT&T's expertise in cybersecurity will be crucial in protecting autonomous trucks from cyber-attacks, ensuring the safety and reliability of these systems.
 5. *Remote monitoring services:* AT&T can offer remote monitoring services, enabling trucking companies to address issues quickly and efficiently in real time, further enhancing their operations.
- Obviously, implementing autonomous trucking systems brings significant value to the transportation and logistics industries. But this technology also represents new revenue opportunities for AT&T. That's why our teleoperation safety system is such a perfect marriage here. Trucking companies want to unlock all the economies of scale and efficiencies that come along with AV technology. And AT&T wants a seat at the table in this growing ecosystem. A teleoperation system does both. It gives trucking companies the safety plank they need to take AV trucking from the theoretical to the actual and it makes AT&T a prime player at the nascent stages of an industry that's about to explode. So, AT&T, in providing these key services and technology, can play a crucial role in this rapidly evolving market, driving innovation and creating value for both trucking companies and itself.

Network Competition:

Who are AT&T's network competitors for this solution?

- Deutsche Telekom AG and two of its subsidiaries, T-Mobile US Inc and T-Systems, are AT&T's biggest competitors in the Teleoperations space. Verizon wants badly to break in here. But they do not possess the necessary network capabilities or customers relationships to do so.

How is T-Mobile US Inc competing in Teleoperations?

- T-Mobile US has a deep partnership with HaloCar, an on-demand, EV rental car company, that delivers vehicles to customers via mobile app and remote piloting.
- HaloCar has developed a proprietary toolkit they call "HaloPilot," which is a combination of cameras, sensors, modems, compute, and antennas that can be installed on cars, specifically EVs.
- After installation of HaloPilot on an EV, HaloCar can stream real-time video and sensor data from the vehicle and their remote operators can steer/accelerate and brake the car from their remote location.
- Currently, HaloCar is only offered in select areas of Las Vegas. Further, the HaloCar experience, right now, is not contactless. The company has put in two layers of safety redundancies to ensure nothing happens on the streets in which they operate. The first redundancy is physically having a safety driver in the remotely operated EV, at least for now. The second is something HaloCar calls a "Chase Car," which is a follow vehicle for the remotely operated EV. This second layer ensures HaloCar has another intervention plan if both the in-car driver and network connection experience issues.
- While HaloCar uses AT&T and Verizon, their principal interaction is with T-Mobile and its 5G networks in Las Vegas.

How is T-Systems Inc. competing within Teleoperation?

- Firstly, one point of clarification. T-Mobile US is best known as a network operator which provides wireless voice, messaging, and data services. T-Systems on the other hand is an ICT provider in European markets, mainly for the Automotive industry. T-Systems supplies Auto OEMs with outsourced and on-premises cloud and edge IT infrastructure.
- T-Systems has partnered with Ottopia, a software start-up specializing in the design, development, and commercialization of teleoperation systems. In this partnership T-Systems and Ottopia are operating "live," pilot projects, along with investigating other scenarios, across a variety of industry verticals, where teleoperations can add value.
- In 2021, T-Systems leveraged its network capabilities, multi-disciplinary expertise, and end-to-end integration experience and Ottopia supplied its core/proprietary technology suite in a PoC demo. In the demo a remote driver in Stuttgart, Germany teleoperated a car in Tel-Aviv, Israel, which is a distance of 2500 miles.

Competing Solutions:

- Several competing solutions and approaches address the challenges facing the trucking industry. These alternatives can be grouped into the following categories:
 1. **Traditional trucking companies:** Major asset carriers in the US are already exploring ways to adapt to the changing landscape of the trucking industry. These companies are focusing on

improving their existing infrastructure, operational efficiency, and cost management. For example, they may invest in advanced routing algorithms, optimize their fleets, and implement stricter maintenance and safety protocols. However, these traditional approaches are limited in the way they can address issues such as driver shortages, labor costs, and environmental concerns.

2. **Autonomous Vehicles without our safety protocol:** As stated, multiple companies are developing autonomous vehicle platforms and tech suites. And yes, while this technology is still in its infancy and faces several legal/regulatory hurdles, it's going to revolutionize the trucking industry. However, the broader roll-out and wider spread adoption of AV trucks likely cannot occur with a "human in the loop." Thus, all the firms and their stakeholder partners pursuing this, without such consideration, are making a grave mistake.
 3. **Electric and hybrid trucks:** To address environmental concerns, some firms are exploring the use of hybrid or electric trucks. These vehicles can significantly reduce greenhouse gas emissions and fuel consumption, making them an attractive option for environmentally conscious businesses. However, the high upfront costs of electric and hybrid trucks, limited charging infrastructure, and concerns over battery life may slow their adoption in the trucking industry, thus limiting their near-term viability.
 4. **Fully Remote Teleoperation Systems:** An emerging solution to the trucking industry's challenges is fully remote truck teleoperation systems, which, like our solution, combine advanced communication technology with remote operation capabilities. By allowing remote operators to control trucks over long distances using 5G networks, this system can address driver shortages, reduce labor costs, and improve overall efficiency. It also offers potential environmental benefits by optimizing routing and reducing fuel consumption. However, this solution requires long-term investments in infrastructure, and network enablement/maintenance that ours doesn't. The beauty of our truck teleoperation safety system is that it works with not against AV vehicle platforms and tech suites. It achieves this symbiosis through its adaptive qualities. What we mean by that is our teleoperation safety system has the flexibility to be a transition or "bridge" safety technology while AV works out its kinks or it can be a permanent industry safety feature. Either way, the solution has utility. We're betting against fully remote teleoperation, over the first, middle and final mile. We just can't see trucking companies and other potential users of the technology committing to it long term. Now, obviously, what we are betting on is teleoperation monitoring and override where necessary, which is why teleoperation in this form is seen as competition.
- Each competing approach has its strengths and weaknesses, and the most effective solution for the trucking industry may involve a combination of these technologies. Nevertheless, we feel our 5G-enabled truck teleoperation safety system presents a promising and innovative option that can work with AV trucking to address many of the industry's pressing challenges.

Present Approach Vs. Competing Approaches:

- The present approach of a 5G-enabled truck teleoperation safety system offers several advantages over competing approaches:
 - Compared to traditional human-driven trucks, the proposed solution saves significant costs by reducing labor expenses and improving operational efficiency. It also addresses the issue

of driver shortages and enhances safety by minimizing the risks associated with human error and fatigue.

- Partially automated trucks with ADAS still require human drivers, limiting the potential for cost savings and operational efficiency improvements. However, our teleoperation safety system can take advantage of ADAS technologies to enhance safety and efficiency even further.
- Fully autonomous trucks are still in the developmental stage, with several legal/regulatory hurdles to overcome. However, our teleoperation safety system addresses a lot of these challenges, while also offering an immediately viable solution through the leveraging of AT&T's existing infrastructure and 5G connectivity.
- EVs address environmental concerns but are limited in capacity, range, and suitability for long-haul transportation. Our teleoperation safety system, by enabling AV trucks to hit the road, creates a bevy of environmentally friendly transportation solutions.
- Right now, L4 and L5, driver out solutions, in commercial trucking is an absolute arms race. Unfortunately for fully remote teleoperations, whether it's over the first/middle or final mile, full AV vehicle platforms and tech suites are receiving most of the attention and investment backing. Which is we pivoted our solution, so we could work with, not against this wave of moment. Again, we see teleoperation as an essential cog in the larger machine that is AV truck technology. But we don't see it as some superordinate solution, that holds absolute primacy over everything else in the space. Which is why we don't feel anyone should push all their chips in on fully remote teleoperation because it's just not capable of being a standalone, total solution.

Conclusion:

- The trucking industry is in crisis, overwhelmed with current freight demands and unable to scale to future demand with the traditional model of human drivers.
- Small, under-resourced fleets are vulnerable to major consolidations by heavily capitalized and well-managed large market participants that can capture technological efficiencies out of reach for smaller companies.
- Investors and innovators recognize the crisis, and significant capital has been invested in leveraging technology to scale up freight shipping capacity to meet increasing demand.
- AV trucking solutions, when co-mingled with a teleoperation safety system, are an attractive 5G segment for further investment by AT&T, with the need for wireless transfer of vast amounts of data along major trucking routes.
- Texas is well positioned as the initial launch site for AV truck solutions due to favorable environmental factors, such as high freight volumes, robust highway infrastructure, and favorable legal/regulatory frameworks.
- If AT&T leverages its 5G infrastructure to capture this growing market segment, especially in the southwestern US, AT&T can differentiate its data services from its competitors, while avoiding future commodity traps.
- AT&T's marketing messages should focus on ensuring that people remain the true drivers (pun intended) of AV technology.

- Our 5G-enabled truck teleoperation safety system is an immediately viable and forward-looking solution, which addresses the unmet needs of the trucking industry. Further, because it is a nearly out of the box solution, it offers cost savings, operational efficiency, enhanced safety, and environmental sustainability competing approaches just don't. Additionally, including this technology in a business plan will demonstrate that AT&T is committed to innovation within the industry.

Industry and Market Analysis:

Market Overview:

- Remote driving technology can bring significant advantages to the trucking industry, such as improved safety and efficiency of operations. However, it is important to note that technology does not replace human drivers entirely. A human operator will still be necessary to monitor vehicles and take control in the event of on-board intelligence failures.

Target Market Analysis:

- *Importance of the Trucking Industry:*
 - The trucking industry is crucial to the US economy, ensuring the timely delivery of goods and products to meet growing consumer demands.
 - In 2021, the trucking industry generated \$327 billion in revenue and employed several million people.
 - Revenue is projected to grow to over \$507 billion by 2029, with a compound annual growth rate (CAGR) of 3.86%.

NAIC	484100
Title	General Freight Trucking Industry (U.S.)
Revenues (2021)	\$327,709,193,215
Employees (2021)	1,143,603
Annual Revenue Growth Rate (2021)	27.00 %
CAGR*, Estimated (2015 through 2021)	6.48 %
Revenues (2029)	\$507,713,433,368
CAGR*, Estimated (2022 through 2029)	3.86 %

* Compound Annual Growth Rate

- *Trucking Methods and Services:*
 - The trucking industry utilizes various methods and services, including local pickup/delivery, sorting, terminal operations and final mile and line haul services. Some companies also offer storage, warehousing and logistics services.
 - The trucking industry is vital to the US economy. It is the most relied-upon transport mode (Surpassing rail and air by a wide margin), moving 12.5 billion tons of freight valued at over \$13.1 trillion (These figures came from the Bureau of Transportation Statistics, 2022 Annual Report).
 - North America ranks as the second-largest region when it comes to trucking, with its highest volume concentrations being in Texas, California, and Illinois.
 - The industry is also deeply fragmented and tremendously competitive in nature. Why? Well, entry barriers are extremely low. Further, the industry has high boom or bust potential. So, many

people, willing to bet on themselves, lease a truck, which is all that's required to become a market participant.

Industry Population Analyzed, U.S.

	2014	2015	2016	2017	2018	2019	2020	2021
Firms	29,247	31,506	31,776	33,026	34,270	35,538	36,860	38,367
Establishments (all major business units)	32,786	35,554	36,330	37,759	39,181	40,631	42,142	43,865
Employees	501,100	506,900	509,200	503,800	512,500	531,467	551,229	573,763
Growth Rate, Employees	N/A	1.16 %	0.45 %	-1.06 %	1.73 %	3.70 %	3.72 %	4.09 %

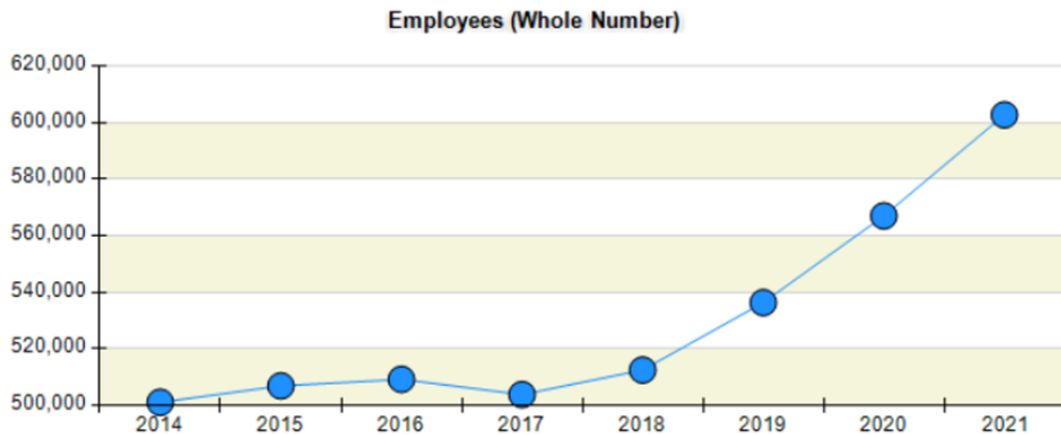
- But this market saturation, along with the industry's high volatility, means margins are generally razor thin, which results in net income, after tax, that's lower than what's typical of most industries. See the Table below.

Profits and Income Taxes as a % of Total Revenues

	This Industry	All Industries
EBIT (Operating Earnings Before Interest and Taxes)	11.06 %	12.40 %
EBITDA (Operating Earnings Before Interest, Taxes, Depreciation & Amortization)	16.89 %	18.84 %
Net Income Before Income Taxes	10.48 %	13.14 %
Income Taxes Paid	2.62 %	2.41 %
Net Income After Tax	7.86 %	10.61 %

Target Market Selection:

- As acknowledged in trade publications and SEC filings of publicly traded trucking companies, the trucking industry faces a persistent shortage of truck drivers.
- The industry is attempting to manage this labor shortage through better working conditions, increased wages, aggressive recruitment, and enhanced benefits.
- JB Hunt, the largest US trucking company, when highlighting risks in its 2022 10-K SEC filing, noted that if they fail to attract and retain a sufficient number of qualified employees, they might need to increase compensation packages, let equipment sit idle, dispose of equipment, or rely on higher-cost third-party carriers.
- A recent comprehensive study on the labor market of the trucking industry found that truck driving is a relatively stable occupational choice, with job migration mostly predicted by earnings and hours.



Future Outlook and Trends:

- Due to technological advancements, regulatory shifts, and environmental concerns, the trucking industry is expected to undergo significant changes in the coming years. Key trends that will shape the future of the industry include:
 1. *Increasing adoption of advanced technologies:* The industry is expected to increasingly rely on technologies such as automation, AI, IoT, and 5G communication systems to improve efficiency, reduce costs, and enhance safety.
 2. *Focus on sustainability:* With growing awareness of environmental issues, the trucking industry will continue to explore and adopt more sustainable solutions, such as hybrid and electric trucks and optimized routing algorithms that reduce fuel consumption.
 3. *Workforce transformation:* The industry must adapt to the changing workforce landscape, addressing the driver shortage problem and upskilling existing employees to operate new technologies.
 4. *Legal/Regulatory changes:* The trucking industry may face more stringent regulations regarding emissions, safety, and autonomous vehicles, which could have a direct impact on operational practices and technology adoption.

Competitive Dynamics Assessment:

1. *Market Fragmentation:* As stated, the trucking industry is highly fragmented and competitive, with numerous players ranging from large fleet operators to smaller trucking companies and owner-operators. This fragmentation presents opportunities for innovative solutions to address industry-wide challenges, such as driver shortages and operational inefficiencies.
2. *Driver Shortage:* One of the most pressing challenges in the trucking industry is the need for more truck drivers. Companies are addressing this issue by improving working conditions, raising wages, aggressively recruiting drivers, and offering better benefits. In addition, solutions that mitigate the impact of the driver shortage, such as AV trucks & remote driving technologies, should prove helpful.
3. *Technology Adoption:* The trucking industry is increasingly adopting technological advancements to improve safety, efficiency, and operational effectiveness. Technologies such as autonomous trucks, remote driving, real-time GPS tracking, route optimization, and predictive maintenance

are being integrated into operations. Companies that can successfully leverage these technologies will have a competitive advantage.

4. *Connectivity and Data Services:* As the trucking industry embraces advanced technologies, reliable connectivity, and data services will become paramount. AT&T can capitalize on this growing demand by offering trucking companies 5G networks, GPS tracking systems, data management, and analysis services.
 5. *Cybersecurity:* With the increasing reliance on technology and connectivity, protecting autonomous trucks and remote driving technologies from cyber-attacks is crucial. Companies offering robust cybersecurity solutions will have a competitive advantage in this market.
 6. *Legal/Regulatory Environment:* The trucking industry is subject to various regulations that can impact adopting and deploying new technologies. Companies that can navigate this legal/regulatory landscape and ensure compliance will be better positioned to compete in the market.
- In conclusion, the competitive dynamics in the trucking industry are influenced by factors such as market fragmentation, driver shortages, technology adoption, connectivity and data services, cybersecurity, and legal/regulatory environments. Companies that can address these challenges and capitalize on the opportunities presented by emerging technologies will have a competitive advantage in the market.

Market Segmentation:

- The trucking industry can be segmented by service type, vehicle type, technology adoption, and geography. Key market segments include:
 1. **Service type:** Long-haul, regional, and local trucking services cater to different customer needs and distance requirements.
 2. **Vehicle type:** Conventional diesel, electric, and hybrid trucks offer various advantages and cater to different market needs.
 3. **Technology adoption:** Companies that focus on traditional trucking practices or those that invest in advanced technologies such as automation and AI and adopt sustainable solutions like electric and hybrid trucks should be considered separate market segments.
 4. **Geography:** The industry can also be segmented regionally, with different legal/regulatory environments, infrastructure, and customer needs in each regional market (California, Pacific Northwest, Mountain, Southwest, Great Plains, Great Lakes, Southeast, Mid-Atlantic, Northeast)

Industry and Market Forecasts:

- The trucking industry is expected to grow steadily over the next few years, driven by increasing demand for freight transportation and technological advancements. Adopting advanced technologies such as our 5G-enabled truck teleoperation safety system is expected to accelerate, with more companies investing in infrastructure and network enablement to stay competitive in the market.
- The market for electric and hybrid trucks is also expected to grow, driven by increasing environmental concerns and supportive government policies. However, the pace of adoption will depend on factors such as battery technology improvements, charging infrastructure development, and cost reductions.

- According to industry forecasts, the global market for autonomous trucks is projected to reach over \$1 billion by 2025, with a compound annual growth rate (CAGR) of around 10%. Additionally, the 5G network infrastructure market is anticipated to grow at a CAGR of 67% between 2021 and 2025, reaching a value of \$42 billion.
 - These projections highlight this market's immense potential for growth and underscore the importance of being well-positioned to capitalize on these opportunities.
- In summary, the trucking industry is poised for significant transformation in the coming years, with new technologies, sustainability initiatives, and workforce changes shaping its future. By understanding the industry's future outlook, trends, competitive landscape, and market segmentation, industry leaders and AT&T managers can make informed decisions about their strategic direction and investment priorities.

Production and Operations Plan:

The Production/Operations Plan for our 5G-enabled truck teleoperation safety system is designed to ensure seamless implementation and operation of the system. Here is a breakdown of the plan:

Company's Operation:

- AT&T's production/operation plans here will involve developing and implementing a 5G-enabled truck teleoperation safety system, so as to not miss out on the revolutionization happening in the transportation industry. This system will leverage AT&T's robust 5G network capabilities to provide low-latency and high-speed connectivity, enabling teleoperators to remotely control trucks from Remote Operating Centers (ROCs) with minimal lag.
- We will collaborate closely with key stakeholders, such as truck manufacturers, software providers, and legal/regulatory authorities, to achieve this goal. This collaboration will ensure the technology is fully integrated into existing vehicle platforms and tech suites, along with meeting safety and performance standards.
- We will also work on PoCs to test and refine the teleoperation system. These PoCs should address any technical or operational issues that may arise during implementation. This will allow for a phased transition to the new system, mitigating risks and ensuring a smooth adaptation to the innovative technology.
- Throughout this process, the company will focus on creating a strong value proposition for industry leaders and partners, emphasizing the benefits of the teleoperation safety system, such as increased efficiency, cost savings, and enhanced safety. The company will also prioritize stakeholder engagement and communication to facilitate the adoption and integration of the 5G-enabled truck teleoperation safety system within the industry.

Ecosystem Partners for the Solution:

- AT&T must collaborate with various ecosystem players to ensure its teleoperation safety system is an end-to-end solution.
- The key ecosystem partners will include technology providers, logistics companies, legal/regulatory bodies, and truck manufacturers.

- Technology providers are responsible for developing and providing hardware and software components for remote truck driving, such as sensors, cameras, and connectivity solutions.
- Regulatory bodies must be consulted to ensure that remote driving solutions comply with necessary regulations and standards and can be integrated effectively into existing transportation infrastructure.
- Truck manufacturers play a critical role in ensuring remote driving solutions can be integrated seamlessly into their vehicles as they design, build, and sell commercial trucks.
- By working closely with these partners, AT&T can develop an effective and compliant solution that delivers the expected benefits to the trucking industry and its customers.

Technology Utilization Timeline:

1. *Research and Development:* The company will invest in research and development to create an innovative teleoperation safety system for the trucking industry. This safety system will leverage cutting-edge 5G technology to enhance connectivity, speed, and reliability, ensuring optimal performance.
 2. *Building of Prototype:* Following the R&D phase, a prototype of the teleoperation safety system will be developed. This prototype will demonstrate the safety system's capabilities, showcasing its potential to improve safety, efficiency, and operational effectiveness in the trucking industry.
 3. *Validation of Prototype through a Proof of Concept (PoC):* A Proof of Concept (PoC) [With Daimler and Waymo] will be conducted to validate our prototype. This PoC will involve rigorous testing and evaluation of the teleoperation system's performance, assessing its viability and effectiveness in real-world scenarios.
 4. *Re-Validation of Prototype through Paid PoC:* After the initial PoC, the prototype will undergo further refinement and optimization. A paid PoC (With JB Hunt as our benefactor and Daimler and Waymo carried over as participants) will be conducted with selected industry partners to gather additional feedback and insights, ensuring that the teleoperation safety system meets the needs and expectations of its target market.
 5. *Final Go-to-Market (GTM) Strategy:* Once the prototype has been validated and re-validated through the PoC stages, the company will develop and execute a GTM strategy. This strategy will outline the implementation timeline (targeted for 2025), the scale of deployment, and the allocation of necessary resources to ensure successful market entry and adoption.
- In conclusion, the company's plan involves a structured approach to developing, validating, and launching an innovative teleoperation safety system for the trucking industry. Leveraging cutting-edge 5G technology and backed by substantial funding from AT&T, the company aims to deliver a solution that addresses the industry's most pressing challenges and revolutionizes how trucks operate.

Personnel, Facilities, and Equipment:

- The company will employ a skilled team of engineers, technicians, and support staff to design, develop, and maintain the 5G-enabled truck teleoperation safety system.
- Facilities will include offices, warehouses, and remote operation centers (ROCs) to support the growing customer base.

- Equipment requirements will involve teleoperation hardware, such as screens, pedals, steering wheels, and the necessary 5G networking infrastructure.

Capital Operating Expenditures

- Capital expenditures will encompass expenses related to upgrading current facilities or constructing new Remote Operating Centers (ROCs) for proof of concept, acquiring teleoperation equipment, and establishing and maintaining the 5G network.
- The network enablement cost is estimated at approximately \$150,000
 - The cost of transforming warehouse space into a ROC for proof of concept is projected to range from \$1.2 to 1.5 million per facility, accounting for personnel and equipment expenses.

Use of Proceeds from Financing:

- *Funding Details:* The company has successfully obtained \$2.5 million in funding from AT&T's IoT budget, which will be allocated to various aspects of the teleoperation safety system's development, testing, and implementation. This financial support will enable the company to conduct R&D activities, build and refine the prototype, and develop and execute a successful GTM strategy.
- *Transition to 5G-enabled Truck Teleoperation Safety Systems:* Much of the funding will facilitate the transition to our 5G-enabled truck teleoperation safety systems. This will involve investing in the required infrastructure, equipment, and personnel training to ensure seamless integration and operation of the teleoperation system.
- *Further Research and Development:* The financing will also enable the company to conduct additional research and development activities to enhance the technology, ensuring that it remains at the forefront of innovation and meets the evolving needs of the trucking industry.
- *Marketing and Promotion:* A portion of the funding will be allocated to marketing and promotional efforts to raise awareness of the teleoperation safety system and its benefits. By increasing visibility and promoting the advantages of the technology, the company aims to encourage widespread adoption within the industry.
- *Growth and Expansion:* The proceeds from this financing will be instrumental in helping the company achieve its growth targets and expand its market presence. By investing in R&D, infrastructure, marketing, and promotion, the company will be well-positioned to establish itself as a leader in the 5G-enabled truck teleoperation safety space and capitalize on emerging opportunities within the industry.

The Marketing and Financial Plan:

- This marketing and financial plan promotes the 5G-enabled automated truck teleoperation system to the logistics and transportation industry, emphasizing its safety, efficiency, and cost savings benefits.
- Targeting top freight fleet companies and partnering with industry leaders like Daimler and Waymo will enhance the 5G-enabled automated truck teleoperation system's credibility and market position.
- The sales cycle includes market research, targeted outreach, demonstrations, pilot programs, negotiation, implementation, training, and ongoing support.

- By leveraging AT&T's 5G network and strategic industry partnerships, the plan aims to effectively penetrate the target market and establish a strong position within the industry while delivering value to customers and AT&T.

Target Market and Market Positioning:

- The market positioning for the 5G-enabled automated truck teleoperation system aims to target truck fleet companies in the United States, emphasizing top freight fleet companies, technology-driven logistics firms, and companies facing driver shortages. This focus will help establish a strong market presence and demonstrate the system's potential to improve efficiency, safety, and cost savings in the trucking industry.
- Key segments within the target market include:
 1. Large freight fleet companies: Early adoption by these industry leaders can drive wider acceptance and showcase the teleoperation system's benefits.
 2. Technology-driven logistics companies: Innovators like UPS are more likely to recognize the system's potential and set industry trends.
 3. Companies facing driver shortages: The 5G-enabled automated truck teleoperation system can alleviate driver shortages by enabling remote operators to control multiple trucks, reducing reliance on a limited driver pool.
- By concentrating on these market segments, the marketing plan can effectively highlight the advantages of the 5G-enabled automated truck teleoperation system and promote its adoption among industry leaders and innovators, laying the groundwork for further expansion and growth within the trucking industry.

Business Model, Marketing Strategy:

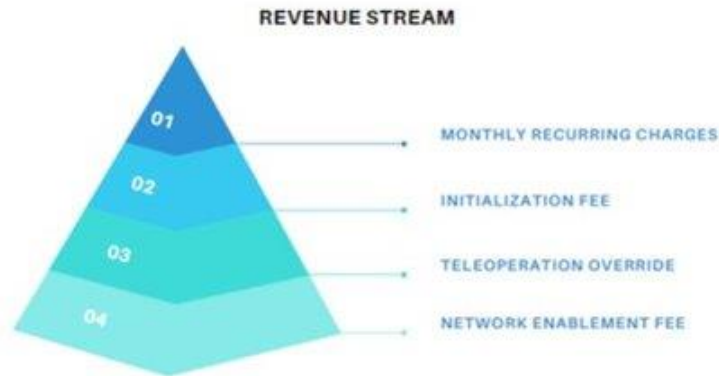
- AT&T will offer the 5G-enabled automated truck teleoperation system as a subscription-based service, enabling customers to access the technology without a substantial upfront investment.
 - The marketing strategy will emphasize the benefits of the 5G-enabled automated truck teleoperation system, such as reduced operating costs, improved safety, and increased efficiency in the logistics and transportation industry.
- To further support customers in implementing the 5G-enabled automated truck teleoperation system, AT&T will also assist in building and setting up their Remote Operating Centers (ROCs).
 - This comprehensive service package will include guidance on facility retrofitting or construction, procurement of necessary teleoperation equipment, and establishing the required 5G network infrastructure. By offering this support, AT&T can ensure a smooth and seamless transition for customers adopting the 5G-enabled automated truck teleoperation system, making it even more appealing to potential clients.
- Additionally, AT&T will offer training and ongoing support to help customers maximize the benefits of the 5G-enabled automated truck teleoperation system.
 - This comprehensive approach to customer service, combined with the subscription-based business model, will make the 5G-enabled automated truck teleoperation system an attractive solution for companies seeking to optimize their operations and leverage the latest technological advancements in the trucking industry.

Advertising, Promotion, and Distribution:

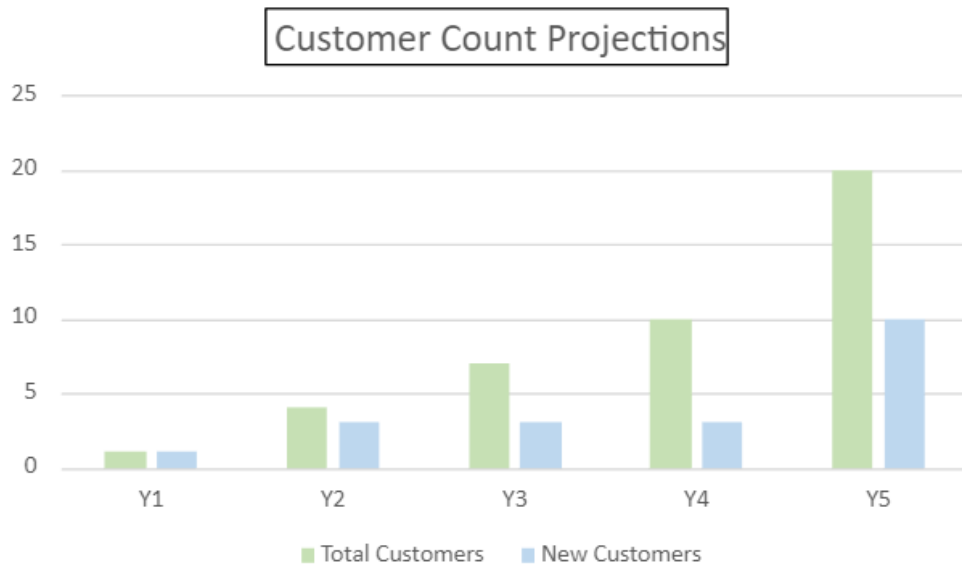
- AT&T will leverage its brand reputation and strong customer base to promote the new 5G-enabled automated truck teleoperation system. In addition, the company will utilize a multi-channel marketing approach to effectively reach potential customers and showcase the system's unique value proposition.
- The marketing channels include:
 - a. Digital marketing: AT&T will develop a targeted digital marketing campaign that includes social media advertising, search engine optimization, and content marketing efforts to raise awareness about the 5G-enabled automated truck teleoperation system among the target audience. This will help position AT&T as a thought leader in the trucking and logistics industry.
 - b. Industry events: AT&T will participate in and sponsor relevant industry events, such as trade shows, conferences, and seminars, to network with potential customers, demonstrate the 5G-enabled automated truck teleoperation system, and gain valuable feedback. This direct engagement with the target market will help solidify AT&T's presence in the industry.
 - c. Targeted sales campaigns: AT&T will deploy a dedicated sales team with in-depth knowledge of the 5G-enabled automated truck teleoperation system to engage with potential customers. They will conduct targeted outreach, product demonstrations, and pilot programs to showcase the benefits of the 5G-enabled automated truck teleoperation system to prospective clients.
 - d. Strategic partnerships: AT&T will work closely with key industry partners like Daimler and Waymo to bolster the credibility and market position of the 5G-enabled automated truck teleoperation system. These partnerships can also help expand the reach of AT&T's marketing efforts and create opportunities for joint marketing campaigns.
- Distribution of the 5G-enabled automated truck teleoperation system will be streamlined through existing AT&T channels, making it easy for customers to integrate the new technology into their operations. In addition, by utilizing its well-established infrastructure and relationships, AT&T can ensure a smooth and efficient adoption process for customers, further enhancing the appeal of the 5G-enabled automated truck teleoperation system in the trucking industry.

Pricing Strategy and Sales Forecasts:

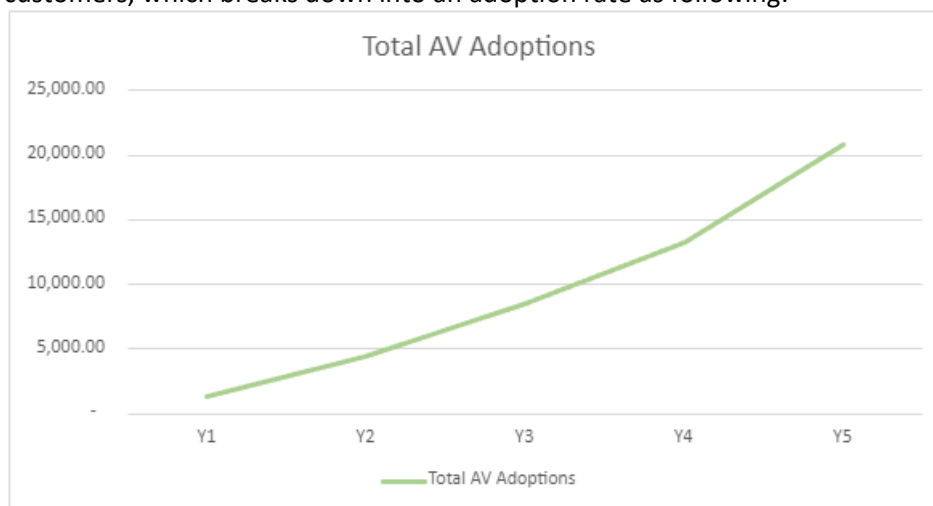
- AT&T's pricing will take advantage of four potential revenue streams. The revenue streams are outlined below:



- The Pricing is as follows:
 - **Monthly Recurring Charges (MRC):** Are the price that fleet operators will be charged to maintain their fleet network
 - *\$20,000/Month*
 - **Initialization Fee:** Is a standard fee of \$20 dollars per new truck introduced into a network – similar to that of adding a new phone into a phone plan
 - *\$20/instance*
 - **Teleoperation Override:** This fee is the bread & butter of our operation and allows for the teleoperator to override the AV technology in the case of a failure/inconvenience
 - *\$120/Hour*
 - **Network Enablement Fee:** Given the sheer size of the networks and the broadband internet that they will call upon, any new customers will be subject to a \$150,000 network enablement fee to set up their VPN, proper prioritization and any other one-time nuisances that come with new customer setup
 - *\$150,000 First-Month only*
- Sales Projections are estimated by using J.B. Hunt's transparent numbers of a 12% replenishment rate
 - This means that they typically retire a truck after it gets to 6-7 years of age and has built up multiple hundreds of thousands of miles
- While it would be too optimistic to assume that all 12% of the replenishment per year would be full Waymo/AT&T capable trucks, for the sake of conservatism we went with *half* of the 12%
 - 6% of the J.B. Hunt trucks will be replaced for Waymo/AT&T trucks per year
- However, since numbers for other fleet operators are not as transparent, we have chosen to go with a 3% adoption rate, in the name of conservatism. Note, these numbers could be exponentially higher
- While we attempt to increase the adoption of Waymo/AT&T Trucks, we are also aiming to increase the total customer count. As of now, we are targeting 20 customers by Year 5 with the following breakdown:



- This leaves us with a 6% adoption for our largest customer (JB Hunt) and a 3% adoption for the remaining customers, which breaks down into an adoption rate as following:



- A steady increase in AV adoptions at a predictable rate that does is correlated to the current customer count
- This trend will eventually plateau with enough time but in the Five-Year Projections given now, it will only increase exponentially

Income Statement for 5 Years:

- As we calculate the Income Statement for the following five years, we must analyze two assumptions:
 - Each hour of teleoperation will be transmitting at 24mbps which equates to exactly 84GB per hour
 - On each GB transmitted, AT&T incurs a .50 cent expense (normal operating expenses)

- *Therefore, we have calculated that for every hour of teleoperation transmitted we will be incurring a \$42.30 expense*
 - These expenses scale with the product
- Tax expenses will remain at 21% despite the new market segment being explored
 - It is not uncommon for business to capitalize the expenses required on financial documents following US GAAP protocols to ensure the minimum tax bill
 - *We did not take this into account as it would complicate and potentially overinflate numbers*
- This trend will eventually plateau with enough time but in the Five-Year Projections given now, it will only increase exponentially

Below is an income statement for the first five years:

Financial Metrics (In Thousands)	2025	2026	2027	2028	2029
Revenue	\$6,463	\$22,882	\$42,785	\$66,641	\$106,186
Cost of Goods Sold	\$(2,215)	\$(7,817)	\$(14,656)	\$(22,861)	\$(36,246)
Gross Profit	\$4,248	\$15,064	\$28,129	\$43,779	\$69,940
Operating Expenses	\$(114)	\$(403)	\$(753)	\$(1,173)	\$(1,874)
Operating Income	\$4,134	\$14,660	\$27,375	\$42,606	\$68,065
Tax Expense	\$(868)	\$(3,079)	\$(5,748)	\$(8,947)	\$(14,294)
Net Income	\$3,266	\$11,582	\$21,627	\$33,658	\$53,772

Investment and Break-Even Analysis:

- An initial investment of \$2.5 million is required to successfully bring this to fruition, this will cover the POC costs including paid-POC
 - The investment can be taken out of the already existing \$80M AT&T IoT budget
- Given the nature that the main service of our product is an already existing 5G network, a large amount of the investment that would go into this is already a “sunk” cost – in theory.
- Therefore, taking a net return of \$124M over five years, and an investment of \$2.5M to get this market segment proved out and functioning, we maintain the following financial numbers
 - **Return-on-investment (ROI):** 4,856.21%
 - **Net-Present-Value (NPV):** \$85,166,930
- The break-even point is reached within the first year thanks to the low initial cost of investment

Review of Overall Business Plan and Recommendations:

I. Executive Re-Summary and Re-Cap:

Our 5G-enabled truck teleoperation safety system leverages AT&T's advanced 5G network to address significant challenges in the trucking and logistics industry. This innovative teleoperation safety system offers increased connectivity, real-time monitoring, improved safety, enhanced efficiency, and cost savings for US trucking companies. Our comprehensive solution combines cutting-edge technology with strategic industry partnerships to create a unique offering that is financially attractive and poised for success.

II. Review of Technology Analysis & Assessment of Fit of Need and Solution:

- a. *The Problem or the Unmet Need:* The trucking industry faces challenges such as driver shortages, high operating costs, and safety concerns.
- b. *The Solution – Technologies, Products, Value Proposition:* Our 5G-enabled truck teleoperation safety system leverages AT&T's 5G network to improve efficiency and safety and reduce costs for trucking companies.
- c. *Competing Solutions/Approaches/Business Models:* Some competing solutions/approaches and or business models include traditional trucking companies, Hybrid or electric trucks, autonomous trucking (Vehicle platforms and AV tech stack) that do not considering teleoperation as a necessary failsafe and fully remote teleoperation systems, where teleoperators are responsible for all first, middle and final mile driving.
- d. *Present Approach Vs. Competing Approaches:* AT&T's solution capitalizes on its advanced 5G network and strategic partnerships to offer a unique value proposition.

III. Review of Industry and Market Analysis:

- a. *Future outlook and trends:* The industry is moving towards increased connectivity, automation, and remote operation.
- b. *Analysis of competitors:* Network competitors include Deutsche Telecom and two of its subsidiaries, T-Mobile USA and T-Systems and Verizon. In industry, truck OEMs, AV software developers and teleoperation start-ups are the principal competition.
- c. *Market segmentation:* The target market includes large trucking companies (Top 15% of the industry) and manufacturers and distributors with extensive private fleets.
- d. *Industry and Market forecasts:* The market is expected to grow as more companies adopt advanced teleoperation and automation technologies.

IV. Review of the Production/Operations Plan:

- a. *Company's operation:* AT&T will leverage its 5G network and expertise to deploy the 5G-enabled truck teleoperation safety system.
- b. *The flow of orders and goods/services:* Trucks will be remotely controlled from Remote Operating Centers, improving efficiency and safety.
- c. *Technology utilization, timeline:* AT&T will develop and deploy the 5G-enabled automated truck teleoperation safety system using its 5G network.
- d. *Personnel, facilities, and equipment:* ROCs, teleoperation equipment, and personnel are required to support this system.
- e. *Capital Operating expenditures:* Costs include network enablement/maintenance, ROC conversion, and equipment purchases.
- f. *Use of proceeds from financing:* Funds will be used for network expansion, ROC development, and technology deployment.

V. Review of the Marketing/Financial Plan:

- a. *Target Market, Market Positioning:* The 5G-enabled truck teleoperation safety system targets top trucking companies and industry leading manufacturers and distributors with large private fleets.
- b. *Business Model, Marketing Strategy:* The 5G-enabled truck teleoperation safety system will be offered as a subscription-based service, with marketing focused on highlighting its benefits.

- c. *Advertising, promotion, and distribution:* Digital marketing, industry events, and targeted sales campaigns will be utilized.
- d. *Pricing Strategy and Sales Forecasts:* Subscription-based pricing will be employed, with sales expected to grow from \$64.63 million in 2023 to \$430.69 million in 2025.
- e. *Income Statement for three years:* Revenue is projected to grow from \$64.63 million in 2023 to \$228.46 million in 2024 and \$430.69 million in 2025. Net Income is expected to increase from \$49.00 million in 2023 to \$173.41 million in 2024 and \$328.34 million in 2025.
- f. *Investment & Break-even Analysis:* The 5G-enabled truck teleoperation safety system is financially viable, with reasonable estimates for network enablement/maintenance costs. Moreover, we see "ROC" conversion costs not exceeding \$1.2 to \$1.5 million per facility. Our paid PoC with JB Hunt will allow for break-even within the first year of operation and revenues and net income will grow quickly from there.

VI. Risk Assessment:

- a. *Technical Risks:* Potential 5G network reliability issues and teleoperation technology performance.
- b. *Market Risks:* Market acceptance, competition, and legal/regulatory changes.
- c. *Operational Risks:* Ensuring smooth integration with existing trucking systems and operations.
- d. *Financial Risks:* Adequate financing and cost management to support the project.

VII. Key Milestones:

- a. *Technology Development:* Building and refining the 5G-enabled automated truck teleoperation system.
- b. *Market Entry Strategy:* Targeting industry leaders and pioneers to establish a market presence.
- c. *Partnership Development:* Collaborating with key stakeholders like Daimler and Waymo.
- d. *Infrastructure Expansion:* Expanding the 5G network and establishing ROCs.
- e. *Revenue Growth:* Increasing sales and market share through effective marketing and customer acquisition.

VIII. Final Recommendations:

- Based on the comprehensive analysis, it is recommended that AT&T proceed with the 5G-enabled truck teleoperation safety system as a "keep-in" project. The project aligns with AT&T's core competencies, offers a strong financial return, and provides an opportunity to strengthen the company's position within the trucking and logistics industry while addressing critical challenges such as driver shortages and operational inefficiencies.
- The focus should be on creating strategic partnerships with industry leaders like Daimler and Waymo, developing a robust marketing plan targeting top trucking companies and manufacturers and distributors and ensuring seamless integration with existing systems. These things will emphasize the advantages of our system, such as improved safety, increased efficiency, and cost savings, to promote adoption.
- Continued investment in technology development and infrastructure expansion, including construction of Remote Operating Centers (ROCs) and the further enablement/maintenance of the 5G network, will be crucial to maintaining a competitive edge and capitalizing on the growing market demand for advanced teleoperation solutions.

- Implement a subscription-based pricing model, allowing customers to access the technology without a significant upfront investment, and assist in building their ROCs to facilitate further adoption.
- By pursuing this project, AT&T can play a significant role in revolutionizing the trucking industry and creating substantial value for the company and its customers. In addition, the project has the potential to establish AT&T as a frontrunner in providing innovative teleoperation solutions, leveraging its 5G network capabilities to transform the logistics and transportation sector.

Works Cited:

WA 1:

- Addressing the Autonomous Vehicle Data Problem*. DXC Technology. Retrieved February 8, 2023, from <https://dxc.com/us/en/insights/customer-stories/addressing-the-autonomous-vehicle-data-problem#:~:text=Real%2Dtime%20data%20about%20the,hour%20for%20one%20test%20vehicle>
- How the road freight industry can overcome the present challenges*. The Cooperative Blog. Retrieved February 8, 2023, from <https://www.thecooperativelogisticsnetwork.com/blog/2022/04/12/challenges-facing-the-road-freight-industry-in-2022/>
- AT&T - how 5G will impact the transportation industry*. IoT Automotive News. Retrieved February 8, 2023, from <https://iot-automotive.news/att-how-5g-will-impact-the-transportation-industry/>
- Aurora - Investor Presentation*. <https://aurora.tech/>. (2022, December). Retrieved February 8, 2023, from https://www.reddit.com/r/CYDY/comments/mvfpjr/investor_presentation_is_a_must_read_know_what/
- Aurora Horizon: A safer and more reliable way to move goods autonomously*. Aurora Innovation. Retrieved February 8, 2023, from <https://aurora.tech/aurora-horizon>
- Bertoncello, M., Martens, C., Möller, T., & Schneiderbauer, T. (2021, June 22). *Unlocking the full life-cycle value from connected-car data*. McKinsey & Company. Retrieved February 8, 2023, from <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/unlocking-the-full-life-cycle-value-from-connected-car-data>
- Big Data Management for autonomous vehicles*. Tsecond. (2022, February 26). Retrieved February 8, 2023, from <https://tsecond.us/solutions/autonomous-vehicles/>
- Dawkins, T., & Gündoğdu, C. (2021, March). *Autonomous Trucks: An Opportunity to Make Road Freight Safer, Cleaner and More Efficient*. <https://www.weforum.org/>. Retrieved February 8, 2023, from https://www3.weforum.org/docs/WEF_Autonomous_Vehicle_Movement_Goods_2021.pdf
- Deloitte. (2022, May 23). *Autonomous Trucks Lead the Way*. Deloitte Insights. Retrieved February 8, 2023, from <https://www2.deloitte.com/us/en/insights/focus/future-of-mobility/autonomous-trucks-lead-the-way.html>
- Dima. (2022, October 5). *How big data in Autonomous Vehicles defines the future*. Intellias. Retrieved February 8, 2023, from <https://intellias.com/how-big-data-in-autonomous-vehicles-defines-the-future/>
- Haikong, L. (2022, November 2). *Building Smarter Roads with Digital Technologies*. Intelligent Transport. Retrieved February 8, 2023, from <https://www.intelligenttransport.com/transport-articles/140708/smarter-roads-digital-technologies-huawei/>

Leslie, A., & Murray, D. (2022, August). *An Analysis of the Operational Costs of Trucking: 2022 Update*. TruckingResearch.org. Retrieved February 5, 2023, from <https://truckingresearch.org/wp-content/uploads/2022/08/ATRI-Operational-Cost-of-Trucking-2022.pdf>

Skores, A. (2023, February 1). *Self-Driving Truck firm Aurora Appoints Ossa Fisher as President*. Dallas News. Retrieved February 8, 2023, from <https://www.dallasnews.com/business/local-companies/2023/01/31/self-driving-truck-firm-aurora-appoints-ossa-fisher-as-president/>

WA 2:

<https://www.capitaliq.spglobal.com/apisv3/docviewer/documents?mid=177604893> JB Hunt Transport Services, Inc., 2022 10-K
<https://www.ibisworld.com/industry-statistics/number-of-businesses/long-distance-freight-trucking-united-states/>
<https://commercialfleetfinancing.com/2022-trucking-and-transportation-forecast/#:~:text=According%20to%20the%20American%20Trucking,dominated%20by%20the%20trucking%20segment>
11- JB Hunt 10-k 2022
<https://www.trucking.org/economics-and-industry-data#:~:text=Number%20of%20Trucks%3A&text=4.06%20million%20Class%208%20trucks,%2C%20up%202.3%25%20from%202020.>
<https://www.statista.com/statistics/261416/class-3-8-truck-sales-in-the-united-states/>
[Microsoft Teams Chat Files - OneDrive \(sharepoint.com\)](#)
[Our technology: How we remote pilot \(halo.car\)](#)
[Introducing DRIVE Hyperion 8 Production-Ready Platform | NVIDIA Blog](#)
[All Truck Transportation Updating Trailers With 5G Capability | Transport Topics \(ttnews.com\)](#)
<https://trans.info/en/db-schenker-tests-driverless-yard-logistics-with-fernrides-teleoperation-platform-247234>
<https://www.rcrwireless.com/20221017/analyst-angle/kagan-where-automated-self-driving-vehicles-are-today-and-whats-next>
<https://www.ttnews.com/articles/all-truck-transportation-updating-trailers-5g-capability>
<file:///C:/Users/geoff/Downloads/DL-Flyer-Teleoperated-Driving-T-Systems-Ottopia-2020.pdf>
<https://www.ttnews.com/articles/all-truck-transportation-updating-trailers-5g-capability>
<https://e27.co/teleoperation-its-here-to-revolutionise-the-logistics-and-supply-chain-industry-20201202/>
<https://www.freightwaves.com/news/fmcsa-proposes-new-requirements-for-driverless-trucks>
<https://www.nhtsa.gov/vehicle-manufacturers/automated-driving-systems>
<https://builtin.com/transportation-tech/autonomous-trucking>
<https://www.sdxcentral.com/articles/news/att-invests-in-5g-edge-zones-for-connected-transportation/2022/12/>
<https://bstrategyhub.com/atampt-competitors-alternatives/>
[Perspective: Looking Forward With 5G | Transport Topics \(ttnews.com\)](#)
<https://www.forbes.com/sites/samabuelsamid/2022/12/20/ottopia-and-hyundai-mobis-team-for-automotive-grade-teleoperation-platform/?sh=1c16d1fd6229>
https://about.att.com/story/maersk_teams_with_att_to_track_cold_shipping_containers.html
<https://ottopia.tech/ottopedia/>
https://about.att.com/newsroom/2018/connecting_daimler_truck.html
<https://www.whirlpoolpro.com/news-events/going-the-extra-mile-in-the-last-mile/>
<https://www.wired.com/story/autonomous-vehicles-transportation-truckers-employment/>
<https://www.electrive.com/2019/05/17/db-schenker-einride-have-fully-autonomous-electric-truck-in-operation/>

<https://www.business.att.com/industries/transportation.html>
<https://www.freightwaves.com/news/german-3pl-dbschenker-buying-usa-truck-for-435-million#:~:text=It%20has%20a%20mixed%20fleet,20%25%20of%20Fortune%20100%20companies.>
<https://www.transportdive.com/news/former-usa-truck-ceo-james-reed-on-new-av-role/643195/>
<https://www.forbes.com/sites/tmobile/2021/06/07/how-can-5g-transform-transportation-and-logistics/?sh=5ca6cb0d5e80>

WA 3:

<https://www.fleetowner.com/technology/article/21249308/waymo-to-test-autonomous-cascadia-on-public-roadways>

<https://www.transportdive.com/news/former-usa-truck-ceo-james-reed-on-new-av-role/643195/>

<https://hdstruckdrivinginstitute.com/blog/semi-trucks-numbers/#:~:text=Truck%20drivers%20drive%20an%20estimated,of%20100%2C000%20miles%20a%20year.>

<https://ratings.freightwaves.com/semi-truck-breakdown-on-the-road/#:~:text=How%20Often%20Does%20a%20Semi,event%20of%20a%20truck%20breakdown.>

[Microsoft Teams Chat Files - OneDrive \(sharepoint.com\)](#)