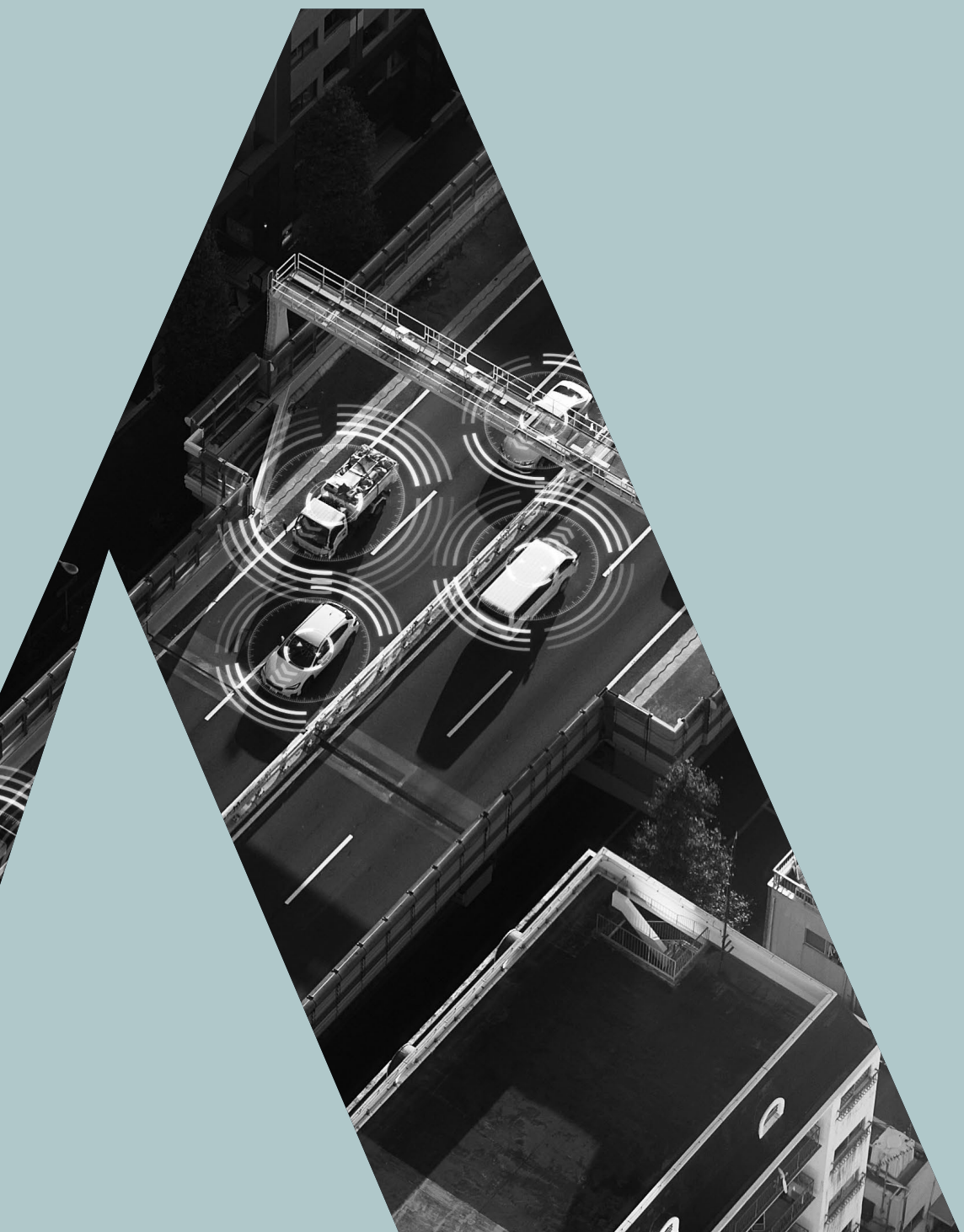
Autonomous Systems & Advanced Mobility

2023 Trends & Predictions



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The Autonomous Systems & Advanced Mobility (ASAM) space is headed for more change in 2023, generating new opportunities and challenges for a growing list of industry players. The adoption of new, complex and connected technology comes with a wide range of possible benefits, and more than a few risks.

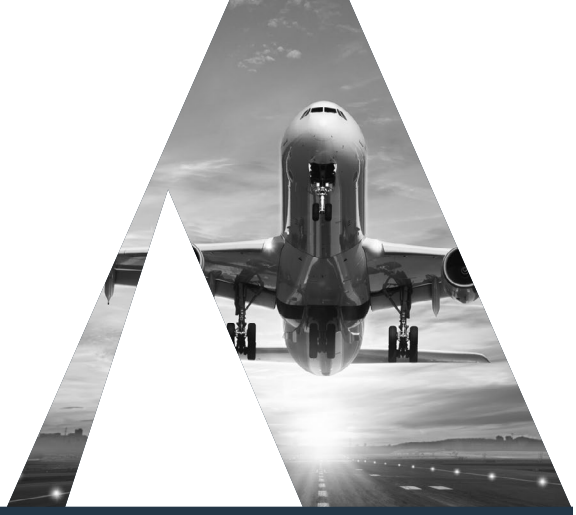
As the movement of people and goods becomes smarter, more integrated, more software-focused and more autonomous, very few sectors will be left untransformed.

Government response to the burgeoning tech innovation in this sector will be an interesting balancing act as agencies and lawmakers attempt to address safety and security matters while also allow mobility businesses to blossom.

We are excited to share this piece to guide you through the new trends and legal developments of the ASAM space. Our cross-practice team is well positioned to advise leading companies on all of the following issues in the year ahead: communications; advanced aviation; cybersecurity and data privacy; environmental, social and governance (ESG) issues; government contracts; intellectual property (IP); international trade; labor issues; litigation; class actions; tax issues and transportation regulation.

Our team is ready to work with you on all these issues and more, as well as provide updates as the year unfolds.

Advanced Aviation



Why do we want to take to the air with people, packages and cargo? To find faster, safer, more efficient and environmentally friendly ways to move them. Imagine if moving these things by air were as common as moving them by car or truck. That is the promise and vision of advanced aviation.

Well-worn comparisons to a Jetsons-type world of the future seem fantastical, but are no longer a pipe dream. Industry and government have been working to make this a reality for over a decade. For proof that this is real, you need only look to recent headlines:

- **"American Airlines to Pre-pay for 50 Air Taxis from Vertical Aerospace."**
- **"Why United Airlines is Betting $1 Billion on Flying Cars."**
- **"Delta Air Lines and Joby Aviation Want to Fly You to the Airport Before your Flight."**

Transportation around cities is more challenging every year, with some of the most congested cities in the world inside the United States. Building more roads to move people, packages and cargo may not be possible, but finding pathways in the sky, the third dimension, is a greenfield opportunity. This was the original concept behind Urban Air Mobility (UAM) or Advanced Air Mobility (AAM). AAM refers to air transportation systems that move people and cargo between places, **both urban and rural**, using new aircraft designs, principally electric vertical take-off and lift (eVTOL) aircraft.

Advanced aviation encompasses AAM and operation of large and small uncrewed aircraft systems (UAS or "drones") operating at varying altitudes, vertiports with electric charging for take-off-and landing and UAS Traffic Management (UTM) that helps to safely coordinate flight for all these new aircraft and devices.

Just as interest in larger eVTOLs for passengers and cargo has grown, so has the promise of smaller drone operations. The Federal Aviation Administration (FAA) has granted many companies authority to make drone deliveries, including UPS Flight Forward,[1] Google's Project Wing,[2] Amazon's Prime Air[3], DroneUp's partnership with Walmart[4] and Zipline[5]. The FAA has granted Zipline some of the most advanced waivers and exemptions for its drone delivery operations.

The FAA forecasts that by 2026 the recreational drone fleet will increase from 1.58 million to 1.81 million. Commercial drones in use for package deliveries and other industrial uses also will grow from 622,000 to 858,000. "The commercial drone industry in particular is expected to expand rapidly as commercial drones become more operationally efficient and safe, battery life expands and drone regulations evolve to support more complex drone operations."[6]

Although these developments paint a picture of significant forward movement for advanced aviation, the United States has fallen behind globally. A Government Accountability Office (GAO) report released in January 2023 titled, "Drones: FAA Should Improve its Approach to Integrating Drones into the National Airspace System," suggests this is because the FAA has not yet developed a comprehensive strategy for advanced aviation.[7] Full integration of advanced aviation will require new regulations, new industry standards, new aircraft certification requirements and new infrastructure such as UTM in order to provide air navigation services in low altitude airspace where none exists today. The GAO

report concludes that the FAA needs to develop a drone integration strategy that is comprehensive. The FAA also should determine how it can more clearly communicate how applicants can (1) satisfy drone operational requirements and (2) better understand the FAA's internal process for reviewing and approving drone operational requests.[8]

While we await a comprehensive advanced aviation strategy for the United States, government and industry will continue in 2023 to move this dream forward. Congress will surely include advanced aviation requirements in the new FAA Reauthorization bill, due September 30. And there are four other initiatives to watch: (1) the Department of Transportation (DOT) will stand up an AAM interagency working group; (2) the Federal Communications Commission (FCC) will undertake its first rulemaking to consider service and technical rules for spectrum and critical enabling systems; (3) the FAA will initiate a rulemaking to consider beyond visual line of sight (BVLOS) flight rules; and (4) Europe will implement U-Space regulations for 31 countries, their version of UTM, which was invented in the United States by National Aeronautics and Space Administration (NASA) scientist Dr. Parimal Kopardekar.

The Advanced Air Mobility Interagency Working Group

One important development to watch in 2023 is the work of the Department of Transportation, and their AAM interagency working group. The AAM working group was created because of The Advanced Air Mobility Coordination and Leadership Act (the "Act"),[9] signed into law on October 17, 2022. This group will work together to push advanced aviation forward by planning and coordinating efforts, and making recommendations, related to safety, infrastructure, physical security, cybersecurity and the federal investment necessary to bolster the AAM ecosystem, particularly passenger-carrying aircraft.[10] The goal is to help advance the maturation of AAM aircraft operations.

The Under Secretary of Policy at DOT will be the chair of the working group,[11] and many agencies will participate with the DOT and FAA, including NASA, the Department of Commerce, the Department of Defense, the Department of Energy, the Department of Homeland Security, the Department of Agriculture, the Department of Labor and the FCC.[12] The AAM working group also must coordinate with state, local and tribal governments, as well as aviation industry and labor stakeholders and associations. This includes manufacturers, commercial operators, academia and groups representing the telecommunications industry.[13]

Within one year, the AAM working group must complete a review and examination of:

- The steps that will mature AAM aircraft operations, concepts and regulatory frameworks beyond initial operations.
- The air traffic management and safety concepts that might be considered as part of evolving AAM to higher levels of traffic density.
- Current federal programs and policies that could be leveraged to advance the maturation of the AAM industry.
- Infrastructure, including aviation, cybersecurity, telecommunication, multimodal and utility infrastructure, necessary to accommodate and support expanded operations of AAM after initial implementation.
- Steps needed to ensure a robust and secure domestic supply chain.
- Anticipated benefits associated with AAM aircraft operations, including economic, environmental, emergency and natural disaster response, and transportation benefits.
- The interests, roles and responsibilities of federal, state, local and tribal governments affected by AAM aircraft operations.
- Other factors that may limit the full potential of the AAM industry, including community acceptance or restrictions of such operations.[14]

Following this work, within six months thereafter, the

> **"Building more roads to move people, packages and cargo may not be possible, but finding pathways in the sky, the third dimension, is a greenfield opportunity."**

AAM working group must submit a report to Congress and provide an AAM National Strategy that includes recommendations regarding safety, operations, security, infrastructure, air traffic concepts and other federal investments or actions to support AAM as well as a plan to implement and facilitate those recommendations.[15] The Act and the AAM working group have broad industry support.[16]

The FCC's Spectrum for UAS Rulemaking

As noted in the discussion regarding the AAM working group, infrastructure is a key for advanced aviation, and this includes telecommunication infrastructure to support communications functions for advanced aviation operations. To this end, the FCC commenced its first rulemaking in 2023 to consider service and technical rules for the spectrum to support command and control links for UAS.

In many respects, the FCC presents forward-looking proposals for a UAS spectrum. The specific focus of the rulemaking is to create service and technical rules for the 5030-5091 megahertz (MHz) spectrum, but the FCC doesn't stop there. The FCC acknowledges that the 5030-5091 MHz band, recommended for allocation to UAS by the International Telecommunications Union, is not the only band that will be utilized to support UAS communications. The FCC also presents a number of innovative proposals or questions:

- Should the FCC utilize dynamic frequency management system (DFMS) administrators, private third parties, to manage the band? DFMS administrators would determine and assign frequencies to UAS operators through an automated for temporary use in a particular geographic area and for a particular time period tailored to an operator's flight plan.
- Assuming adequate interest in the 5030-5091 MHz spectrum, should the FCC rely on competitive bidding to assign much of the spectrum? The FCC also may consider whether to choose licensees from submitted applications based on criteria established by the FAA or a multi-stakeholder group. The FCC asks whether there should be spectrum limitations for any party seeking to acquire this spectrum, and notes its expectation that the spectrum can be secondarily used for the provision of commercial wireless network services.
- The FCC notes that use of existing wireless networks in bands other than the 5030-5091 MHz band also must be considered for UAS, and may be a low cost alternative compared to building dedicated UAS networks to provide added benefit in the near term. The FCC recognizes that there is stakeholder interest in using a wide range of bands and notes that mobile wireless operators are developing network-based UAS applications to operate over commercial wireless networks using flexible-use spectrum.

- The FCC broadly seeks comment on the spectrum bands that might be utilized for UAS as well as bands that would not be suitable for UAS operation. The FCC notes that there are many bands that prohibit airborne use (in the Table of Frequency Allocations or by rule) and many bands that are silent on airborne operation.
- Citing the need for a technology neutral approach, the FCC also seeks comment on whether to authorize network-supported service for UAS either through satellite or terrestrial networks.

Comments and reply comments are due in this proceeding in the Spring of 2023, but this rulemaking will be ongoing for all of 2023.

The FAA's Rulemaking to Enable BVLOS Flight

With an increasing number of industries now relying on drones for their operations, it is widely recognized that enabling routine BVLOS operations will unlock critical benefits for drone operations at scale. To fly BVLOS today, operators must seek waivers or exemptions from the FAA—a process that is both lengthy and cumbersome. This year, 2023, the FAA is expected to commence a rulemaking to consider BVLOS rules and regulations that will make these operations more routine. According to FAA officials, this is a top priority for the agency.

The foundation for the rules should emanate from the work of the BVLOS Aviation Rulemaking Committee (ARC),[17] whose findings and recommendations were published on March 10, 2022.[18] The BVLOS ARC was tasked with providing recommendations for BVLOS operations focused on long-

line linear infrastructure inspections, industrial aerial data gathering, small package delivery and precision agriculture operations including crop spraying.[19]

The ARC report contained over 70 recommendations and suggested a complete overhaul of existing FAA regulations. Key recommendations to the FAA from the report include:

- Establish a flexible, risk-based approach to regulate drone operations—setting an acceptable level of risk (ALR) for UAS that is consistent across all types of operations being performed, including BVLOS, and taking into account air and ground risks and levels of automation.
- Create a new BVLOS rule for UAS and associated equipment, which would include a process for qualification of drone and drone systems, applicable to drones up to 800,000 foot pounds of kinetic energy, in accordance with the Operation Risk Matrix.
- Modify the rights-of-way rules to give UAS priority in both Low Altitude Shielded Areas (within 100 feet of a structure or critical infrastructure) and Low Altitude Non-Shielded Areas (below 400 feet) to accommodate drone operations.
- Include BVLOS operations as part of the remote pilot license by updating operator licensure requirements. Create a new Remote Pilot certificate rating to cover BVLOS operations beyond the scope of the extended Part 107 rating. The qualifications would be based on specific drone systems, use cases and operational restrictions.
- Create a non-mandatory scheme for third-party service providers that support drone BVLOS operations, such as the wireless networks.

Based on the absence of aggressive FAA action in the past, and concern that the FAA may not move rapidly enough on BVLOS regulations, Sens. Mark Warner (D-VA) and John Thune (R-SD) introduced BVLOS legislation to update rules for allowing commercial use of unmanned aerial vehicle (UAVs). The Increasing Competitiveness for American Drones Act of 2023 would order the FAA to develop a more efficient commercial drone flight approval process to allow BVLOS operations in select situations, which would help maintain U.S. standing in the global drone market. To guide the implementation of the updated rules, the bill proposes the creation of an unmanned aerial system certification unit and new a new associate administrator of UAS integration position at the FAA.

Europe's Implementation of U-Space Regulations

UTM, traffic management for all the new aircraft and devices that are flying in uncontrolled airspace, was invented in the United States by NASA scientist Dr. Parimal Kopardekar. The first large region of the world to enable this type of system in 2023 will be Europe.

Beginning January 26, 2023,[20] U-Space became effective for 31 European countries. U-Space is a set of new rules for the establishment and governance of dedicated airspace for UAS and UTM. The "rising number of UAS entering the airspace and increased complexity of operations of UAS beyond visual line of sight" lead to "safety, security, privacy and environmental risks." For this reason, the European Union (EU) Aviation Safety Agency developed the U-Space framework.[21]

U-Space has three primary functions: (1) to "mitigate the risk of collision with manned aircraft and among UAS, controlling subsequent air and ground risks," (2) to "enable efficient and fair usage of the airspace" and (3) to "enable safe dense and complex drone operations" including BVLOS.[22]

The U-Space framework directs the 31 member states to designate U-Space areas, volumes of airspace in which a number of mandatory services will be available in order to facilitate safe and efficient UAS operations.[23] The mandatory services to be available in each designated U-Space area are:[24]

- Network Identification: providing the identity of UAS operators and the location and trajectory of drones during operations.
- Geo-Awareness: providing information on operational conditions, airspace limitations or existing time restrictions.
- Flight Clearance: ensures free-of-conflict operations with other UAS operating in the same volume of airspace.
- Traffic Information: alerts operators of air traffic that may be found near the aircraft.

By Jennifer Richter

Emerging Legal Issues with Autonomous Vehicles

The increased testing and deployment of autonomous vehicles means the debate over regulatory authority and liability is coming to a head. While cities and states are welcoming autonomous vehicles on their streets, NHTSA is exercising safety oversight and grappling with when and how to exempt vehicles from safety standards designed for vehicles with drivers. Congress, at the same time is under pressure to pass legislation to establish a nationwide rubric for the regulation of these vehicles. Look for pressure on regulators to rise as courts attempt to apply last century's products liability and consumer protection laws to a new class of consumer technology.

Momentum in Congress to Regulate Autonomous Vehicle Technology

While a divided Congress may face gridlock on most issues, there is a growing bipartisan interest in passing legislation to regulate autonomous vehicles (AVs), both to address safety concerns and to forge a pathway for the U.S. to effectively compete against China, which has been a leader in encouraging the operation of autonomous vehicles. In September 2022, U.S. Rep. Bob Latta (R-OH) and U.S. Rep. Debbie Dingell (D-MI) formed the bipartisan **Congressional Autonomous Vehicle Caucus** "to educate Members of Congress on AV technology and to work towards a national framework so that AVs can continue to safely expand throughout the country." Rep. Cathy McMorris Rodgers (D-WA), who has long prioritized support for AV legislation, has taken over as Chair of the powerful House Energy & Commerce Committee and there currently are competing bills being circulated in the House taking different positions on liability and preemption issues. This follows **efforts in 2018 and 2021** to "modernize motor vehicle safety standards" via legislation, which stalled due to debate on safety standards and cybersecurity concerns, as well as **active lobbying** by plaintiff lawyers to preserve state law remedies. Meanwhile, states continue to attract autonomous vehicles to operate on public roads that transport people and/or packages with and without a driver, with a patchwork of state and local laws and regulations governing vehicle operations. This sets the stage for a push for federal standards for autonomous motor vehicles and the ultimate resolution of the debate over the role of the federal government and states in regulating autonomous vehicle safety.

NHTSA Attention and Investigations Increase

As more autonomous and driver-assisted vehicles are operated on roadways, we expect more investigations by the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) and the FTC over consumer privacy concerns respectively. NHTSA has initiated investigations into multiple autonomous vehicle pilot programs to investigate alleged failures to report vehicle incidents and address unanticipated vehicle behavior such as sudden stopping. Members of Congress have also urged the FTC to investigate makers of autonomous vehicle technology concerning representations that may lead consumers to over-rely on autonomous driving capabilities. They have also lobbied the agency to monitor the activities of larger tech companies such as Apple and Google over privacy and anti-trust concerns. Even so, such calls for action have occurred over the last five years with limited action by other agencies, which suggests NHTSA will take a leading role over other agencies.

Whistleblowers on the Rise

We expect to continue to see whistleblower complaints submitted to NHTSA from employees and former

employees of motor vehicle manufacturers, vehicle parts suppliers and car dealerships. As part of the whistleblower program established in 2015 by the Motor Vehicle Safety Whistleblower Act, NHTSA made its **first-ever whistleblower payment** in November 2021, paying over $24 million to a whistleblower with information related to certain auto manufacturer violations of the Vehicle Safety Act that led to a consent orders totaling $210 million in penalties. Under the program, whistleblowers have the potential to receive awards from 10 to 30% of sanctions collected over $1 million.

Products Liability Lawsuits Test Limitations of Sensor-Driven Technology

Class action lawsuits will become more prevalent as automakers continue to roll out more driver-assisted and ultimately fully autonomous technology. Expect a battleground to be whether a system is defective or operating within the known limitations of its sensors and other components. A key defense for automakers defending against such claims may be that sensor-based technology such as an autonomous emergency braking (AEB) systems have recognized potential limitations for the systems to misinterpret the environment around a vehicle. Plaintiffs may allege this constitutes a defect, while automakers may argue that government agencies such as NHTSA recognize the limitations of such systems as a small price to pay for the overall safety benefits they provide. Even so, courts have allowed claims to proceed where it was alleged the company was aware of concerns related to a system, suggesting that whether such limitations are a "defect" may become a question for fact for the courts.

Tort Lawsuits and Securities Class Actions Grapple with Lack of Industry Standards

With more vehicles incorporating driver-assisted technologies, expect lawsuits to allege both strict liability for alleged product defects and negligence claims, with limited case authority guiding the standard of care and potential heavy reliance on NHTSA and other government guidance. Look also for securities class actions involving investments in autonomous vehicle technology. In recent securities class actions, plaintiffs alleged that the acquired company's prospects were weak because it did not have patents on software for autonomous vehicle trucks. This poses a conflict between the approach of many autonomous driving technology companies relying on trade secrets protections versus plaintiff stockholders' potential view of patents, rather than trade secrets, as more tangible value.

By Susan Lent, Natasha Kohne, Hyongsoon Kim and Kelsey Morris

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Cybersecurity, Privacy & Data Protection

Issues involving data privacy and cybersecurity have had a profound and growing impact on just about every industry sector the past few years, and this one promises to be no exception. There are several crucial areas to watch that we believe will particularly impact autonomous and advanced mobility systems.

More Cyberattacks Targeting Autonomous Vehicle Supply Chains

If cybercrime was a country it would have the third largest economy in the world, according to Cybercrime Ventures forecasts, which predict cyberattacks will cost $8 trillion this year. Increased connectivity is making vehicles generally more vulnerable to cyberattacks, but the greatest specific threat comes from the vulnerability of the autonomous vehicle manufacturer supply chain.

More advanced vehicle subsystems for things like collision avoidance, pedestrian detection, traffic sign detection, lane keep assist, among others, require powerful embedded systems typically referred to as electronic control units (ECUs). These ECUs are distributed across the vehicle, communicating over the in-vehicle network. Different subsystems may have ECUs different memory and compute capabilities. The average car may have over 100 ECUs, each with its own functional requirements and dedicated operating system.

Cars also rely on an increasingly diverse range of data from external systems. According to Upstream Security's 2022 Global Automotive Cybersecurity Report, approximately 84% of all vehicle cyberattacks in 2021 were remote attacks, not requiring direct access to the vehicle. Wi-Fi, Bluetooth, keyless entry systems, mobile phone apps and telematics have greatly increased possible attack vectors, further complicating an already very heterogeneous system. The application program interfaces (APIs) connecting these programs can be particularly vulnerable. Upstream estimates that the number of vehicle API-driven hacks increased 380% from 2021 to 2022. This adds up to modern car makers dealing with ever more complex software in the hands of multiple different players. With no standard cybersecurity practices among the many interconnected suppliers managing increasingly complex software for increasingly connected cars, cybersecurity will continue to be a top challenge for autonomous vehicles.

The complexity of the autonomous vehicle supply chain requires vigilance at each stage. A primary supplier with robust cybersecurity practices may be undermined by other suppliers further down the chain adding new unsecured or unpatched features. Cyber attackers often target the weak link in the digital ecosystem chain: usually small-to-medium enterprise manufacturers and suppliers. Threat actors may wait years after gaining access before staging their attack, looking for an opportune moment to deploy malware. Autonomous vehicle makers will need to be vigilant, adopting increased testing and better integration to mitigate the greater risk.

Greater Emphasis on Drone Cybersecurity

This new year will likely see a push for more protection for expanding drone fleets against cyberattack. Due to the increasing role of drones in both public and private sectors, the amount of valuable and sensitive information they collect will continue to skyrocket. State and local governments might use drones for tasks like disaster management, urban planning or infrastructure maintenance. Meanwhile federal actors are using drones for collecting important national security information,

including monitoring sensitive or dangerous areas. Government contractors and other private companies also collect a range of valuable information from growing fleets of drones, adding up to an impressive host of tempting targets for would-be hackers. Drones usually lack the cybersecurity measures of manned aircraft, partly due to their systems' greater need for interconnectivity. The Department of Homeland Security's (DHS) Cybersecurity & Infrastructure Security Agency (CISA) put out general guidance on drone cybersecurity and data privacy at the beginning of this year to address this issue. This guidance included a warning about the use of foreign-made drone components, a concern DHS has voiced for years. Regardless of the origin, cybersecurity remains a key concern for drone development and deployment, and 2023 will see a significant movement to secure this growing network of connected airborne computers against cyberattack.

Increased Use of AI

While artificial intelligence (AI) is likely to become more prevalent across many industries in 2023, we expect more makers of autonomous vehicles, drones and other advanced mobility systems to use cybersecurity solutions that leverage AI in the design and deployment of their products. ECUs can become compromised downstream after initial setup, so car manufacturers need an intrusion detection system (IDS) that continuously monitors for unauthorized access, instead of just authenticating. Traditionally, IDS solutions have consisted of firewalls and rules-based systems to screen for threats, but these do not address the complex dependencies and communications between ECUs and external systems.

Future mobility systems will rely heavily on communications technology known as vehicle-to-everything (V2X) communication, which includes vehicle-

to-vehicle (V2V) and vehicle-to-infrastructure (V2I). These technologies enable the real-time communications that vehicles will use to interact which each and their environments, underpinning advanced mobility systems such as autonomous and assisted driving. AI-based solutions more capably account for these systems, enabling car makers to parse vehicular network data. IDS that leverages AI during V2X communication can detect and mitigate anomalies in vehicle networks and vehicle response after being trained on driving data. One example might be an AI trained to predict vehicle acceleration raising an alert when acceleration exceeds the prediction by a certain threshold.

With the greater connectivity and complex dependencies of new vehicle systems, traditional methods of prevention such as firewalls are inadequate against increasingly sophisticated cyberattacks. AI's greater ability to detect, prevent and combat advanced cyberattacks will make it essential for those in the autonomous vehicle space. AI-based cybersecurity solutions can be used to parse vehicular network data between ECUs and external systems, as well as continuously monitor the network. Security-aware designs with AI-based solutions, in conjunction with integrated, secure supply chains, will help

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autonomous vehicle companies face tomorrow's cyber threats on vehicle infrastructure.

Data Privacy Questions for Carmakers

Evolving data privacy regulations will play a larger role in car manufacture due to the information collected by autonomous vehicles. Autonomous vehicles collect image and sensor data from video cameras, thermal imaging devices, radar and LiDARs (laser imaging, detection and ranging), location data from GPS, V2X data, as well as data from passengers and owners. According to one study by Intel, autonomous vehicles will generate over 4 terabytes of data every day from their AV-specific sensors alone, assuming one hour of driving. This explosion in new volume and variety of vehicle-collected information means that these veritable data centers on wheels will be a big factor in the data privacy regulatory landscape. All these new data-hungry vehicles could collect enormous amounts of personal information from passengers to share with third parties, implicating a growing number of state data privacy laws along the way. Amendments to the California Consumer Privacy Act (CCPA) under the newly effective (as of January 1, 2023) California Privacy Rights Act (CPRA) provide consumers with certain rights regarding personal information gathered by vehicles, along with similar laws in Colorado, Virginia, Utah and Connecticut. These emerging laws raise important questions for makers of autonomous and connected cars, such as how will they deal with the CPRA's right of consumers to limit sensitive personal information such as geolocation data. Questions like these will only multiply as the data privacy regulatory environment continues to evolve.

By Natasha Kohne, Michelle Reed, and Joseph Hold

Energy & Decarbonization

The decarbonization of global transport (across cars, motorbikes, vans, heavy good vehicles, buses, rail, maritime and aviation) is an increasingly key focus for governments seeking to reduce greenhouse gas (GHG) emissions. The United Nations calculates that the transport sector is responsible for approximately 23% of global GHG emissions, with 95% of the world's transport energy still produced from fossil fuels and transport and mobility accounting for 57% of global oil demand and 28% of global energy consumption.

Sector-wide emissions reductions need to be achieved against the backdrop of significant forecast increases in global transport demand as national economies develop and populations increase.

Decarbonization in the sector is being driven principally by the transition to (i) electric vehicles, (ii) hydrogen fuel cells, (iii) liquid and gaseous biofuels and (iv) power to liquid (PtL) fuels (otherwise known as e-fuels or synthetic fuels).

This transition is taking place alongside improvements to the energy efficiency of conventional internal combustion engine vehicles and policy frameworks designed to reduce unnecessary travel.

Electrification is expected to play the most significant role in reducing aggregate emissions, with a huge contribution to the light-duty road vehicle sector in particular. Heavy-duty road vehicle decarbonization is forecast to be led by a combination of electrification (where feasible), hydrogen fuel cells and "drop in" biofuels and PtL fuels. The rail sector will depend on a combination of electrification (where feasible), hydrogen fuel cells, battery powered trains, biofuels and PtL. The maritime sector is expected to rely initially on biofuels before transitioning to PtL fuels such as green ammonia produced from clean hydrogen. The decarbonization of aviation is expected to be dominated by Sustainable Aviation Fuel (SAF), initially produced from biofuels, but over time produced by PtL fuels given the scale of the market.

Against that background, we see the following energy trends fueling the decarbonization of transportation and mobility:

- The continued growth in electric vehicles (EVs) and EV charging infrastructure.
- Accelerated investment in battery metal extraction, lithium processing and gigafactory development in North America and Europe.
- Increased focus on the role of clean hydrogen and SAF.
- Continued CO2 emissions trading and pooling between automotive original equipment manufacturers (OEMs).

In the U.S. government, new tax credits established in the Inflation Reduction Act (IRA) coupled with federal grants and low-cost loans with favorable repayment terms for investments across the transport sector, including for EV charging infrastructure, port electrification infrastructure, heavy duty electric trucks and buses, SAF and battery manufacturing facilities, paid out and available over years to come, will make these investments more attractive.

Inflation Reduction Act

The IRA, passed in 2022, modified the requirements for clean vehicle tax credits available for purchases of new electric vehicles (EVs). Pursuant to the changes made by the IRA, clean vehicle tax credits are now available for purchases of EVs that meet certain baseline criteria: vehicles that (1) have a capacity of at least 7 kilowatt hours, (2) have a gross

vehicle weight rating of less than 14,000 pounds, (3) are made by a "qualified manufacturer," (4) undergo final assembly in North America and (5) meet critical mineral and/or battery component requirements (as of April 18, 2023). The total tax credit available for EVs is as high as $7,500 per vehicle, depending on whether it meets only one or both of the critical minerals and battery component requirements:

- The critical minerals requirement: The IRA provides for a $3,750 tax credit for vehicles that meet the baseline criteria and include batteries with certain threshold levels of critical minerals extracted or processed in the United States or "in any country with which the United States has a free trade agreement" (FTA) in effect." The threshold starts at 40% and increases to 80% in 2027.
- The battery components requirement: The IRA provides for a $3,750 tax credit for vehicles that meet the baseline criteria and include batteries that contain certain threshold levels of components that were manufactured or assembled in North America. The threshold starts at 50% and increases to 100% in 2029.
- The United States only has comprehensive FTAs in force with 20 countries (Australia, Bahrain, Canada, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Israel, Jordan, Korea, Mexico, Morocco, Nicaragua, Oman, Panama, Peru and Singapore). But, because FTA is not defined in the statute, Treasury is proposing a broad interpretation of the term, to include additional countries that have entered into agreements with the United States that satisfy certain factors (including the March 2023 agreement between the U.S. Government and the Government of Japan on strengthening critical minerals supply chains). This interpretation could make it possible for European countries including France and Germany to benefit from the clean vehicle tax credit.

The IRA specifies that the critical mineral and battery component requirements shall apply to vehicles placed in service after the date on which proposed guidance described in new section 30D(e)(3)(B) is issued. As such guidance—proposed regulations detailing the critical minerals and battery components value calculations—was published in the Federal Register April 17, 2023, the requirements apply to new clean vehicles placed in service after April 17, 2023. Of note, the proposed regulations contain a "50% of value-added test," which is a transition rule only applicable to vehicles placed in service in 2023 and 2024. The transition rule provides that if 50% or more of the value added to a critical mineral is derived from certain activity conducted in the United States or in a country with which the United States has a free trade agreement, then the entire value of the applicable critical mineral will be considered to constitute a qualifying critical mineral (making it easier to satisfy the critical mineral requirement). The transition rule essentially allows for constituent materials to factor into the qualifying critical mineral determination in certain cases, which is an expansive interpretation of the statute that will be viewed favorably by some industry players and criticized by others.

Thus far, the changes to the clean vehicle tax credit made by the IRA have caused significant confusion within the automobile industry, as it was unclear until December 19, 2022 that the critical mineral and battery component requirements would not be applicable until Treasury and the IRS published proposed guidance that explicitly triggered the new requirements. Further, Treasury has yet to issue guidance on a separate provision in section 30D that disqualifies vehicles from being eligible for the credit if the vehicle's battery contains critical minerals or battery components from a foreign entity of concern.

The proposed regulations and future anticipated guidance are expected to shift the domestic U.S. and North American supply chain for finished vehicles, as well as critical minerals and advanced batteries, with increased investments likely at all levels, including recycling. Also watch for increased interest in international discussions between the United States and other major auto-exporting nations (e.g., Japan, Korea and the European Union) regarding the qualification of products from those countries for the incentives.

200 million EVs are forecast to be on the roads globally by 2030, representing over 20% of vehicle sales and a 12-fold increase on the current global stock of 16.5 million EVs. These EVs will need access to power through a network of millions of chargepoints and a smart new EV charging ecosystem that manages the impact of that charging demand on national electricity networks, particularly at times of system stress and peak."

EVs and EV Charging Infrastructure

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Exactly when, where and how we will charge those EVs remains uncertain and is likely to change over time, particularly as we commute less and work more from home, as we shop more online reducing personal vehicle miles and increasing last mile delivery mileage and as we transition to increased ride-sharing models and AVs.

EV charging business models vary across the Home, Workplace, Destination and En Route market segments, with solution providers looking to combine different sources of income such as (i) chargepoint sales and installation revenues, (ii) electricity sales revenues, (iii) chargepoint operation and maintenance and energy as a service (EaaS) revenues, (iv) user subscription revenues, (v) retail services sales revenues, (vi) data/digital sales revenues, (vii) Vehicle to Grid (V2G) or V2X revenues and (viii) fiscal or government incentives/subsidies.

EV charging solution providers need to determine how best to address a number of specific risks including (i) multifaceted demand risk, (ii) location and land right risks, (iii) grid connection risks, (iv) supply chain risks, (v) legislative and regulatory compliance, (vi) change in law/technical standards and related political risks, (vii) wholesale electricity price risk, (viii) how to fund scaling and growth, (ix) V2G and V2X specific risks and (x) other notable risks, such as product liability, intellectual property, data protection and cyber security.

The global battle for EV charging infrastructure market share is being fought between traditional fueling retailers, such as oil majors, energy utilities, technology companies, automotive OEMs, pure play EV chargepoint operators, strategic investors and EaaS solution providers. Success is likely to depend on ability to scale and differentiate in order to build customer volumes, track-record and stickiness over time and on a business's ability to manage wholesale electricity price risk and generate and stack multiple revenues streams.

We have produced an in-depth client note on these issues. Please let us know if you would like to receive a copy.

Battery Metal Extraction and Processing

The massive forecast increase in demand for EVs, together with the need to address intermittency issues associated with renewable energy, means that there is an unparalleled call for batteries. These processes require an unprecedented volume of lithium extraction, processing and battery manufacturing (as well as other battery metals). As a consequence, the battery value chain is in the spotlight more than ever before.

Investment is already flowing into battery and cathode manufacturing, as well as the subsequent manufacturing of EVs and utility-scale batteries by automakers and OEMs. Equally, investment in new raw material production is increasing, albeit the dependence on a limited number of countries for that raw material supply creates its own complexities. However, there is a notable gap in the value chain; investment in lithium processing and conversion facilities is lagging far behind required capacity, with China currently controlling 65% of the world's lithium processing. Unless addressed, this will create a critical bottleneck in the production process.

There is an abundance of both subsidies and regulation emerging across the U.S., Europe and the U.K., all of which are designed to promote battery component manufacturing, stimulate the extraction and production of critical materials, encourage investment in lithium conversion and processing in the West, and facilitate a repositioning of the battery value chain more generally.

New battery metal extraction projects abound across South America, North America and Europe, but competition for capital is growing and the willingness of national governments to foster investment is becoming a clear differentiator. Equally, finding ways to combine multiple sources of capital (such as equity, senior debt, mezzanine finance, royalties and streams) is increasingly important as the capital cost of projects grows and this requires careful consideration and planning.

We are also seeing signs of new lithium processing facilities being developed in the U.S. and Europe, including Albemarle's facility in the U.S., Keliber in Finland, Tees Valley and Green Lithium in the U.K., and Rocktech in Germany, but these are still in their infancy and their development requires a significant amount of capital, as well as a recognition that lithium refining is complex and a fully-optimized plant is unlikely to materialize for years.

We anticipate that project finance solutions will be needed to secure the level of capital required to meet the current infrastructure gap. To access project finance, developers and funders will need to successfully navigate a number of threshold issues including feedstock volume, specification and price risk, offtake volume and pricing certainty, mine integration and "project on project" risk, recycling and ethical sourcing, construction delay and cost overrun risks, access to stable and affordable electricity and hazardous waste and by-product management.

We have produced an in-depth client note on these issues. Please let us know if you would like to receive a copy.

Gigafactories

There is a global battery arms race unfolding with governments, corporates, car manufacturers and investors increasingly focused on the integrity and independence of the EV supply chain. Gigafactories are a key part of that puzzle.

China has established a dominant position with an 80% market share of global lithium-ion battery cell production and the vast majority of gigafactories are currently located, or being built, in China. This has created geopolitical, commercial and ESG issues for Europe and the U.S., which is stimulating development and investment in the sector.

The IRA has had significant ramifications for the EV industry more generally but, chief amongst them, is the extension and expansion of a clean vehicle tax credit. Critically, eligibility for this tax credit is based (in part) upon the critical minerals and batteries being sourced and assembled in the U.S. or in countries with whom the U.S. has a free trade agreement. Further, phasing in through the end of 2024, there's a complete prohibition on inputs sourced from companies that are subject to the jurisdiction of China or a few other countries. The Inflation Reduction Act also contains separate manufacturing tax credits at a rate of 10% of the cost of critical mineral production, 10% of the cost of electrode active materials and $45/KWh for cell and module production located in the U.S. Unlike most other U.S. tax credits, the battery manufacturing tax credits are refundable from the U.S. government for up to five years.

Similarly, EU Rules of Origin will from 2027 impose greater scrutiny on the extent to which the components of a finished car have been sourced from outside the EU. Failure to meet the required thresholds will lead to tariffs being imposed on goods.

Whilst there is significant political and commercial support for the development of new facilities, a gigafactory developer or investor will need to navigate a number of bespoke issues:

- **Construction delivery risk and cost overrun risk** – these are enormous facilities, requiring multiple independent specialties to be integrated in a single plant, with significant levels of automation and computer aided manufacturing (CAM). They will inevitably be delivered under a multi-contract supply chain structure which creates associated interface risks.
- **Feedstock and offtake risk** – regardless of the ultimate composition of their batteries, gigafactories will invariably need refined battery-grade lithium, nickel and cobalt feedstock (or some of them) and therefore a fundamental consideration for a gigafactory owner is how it can control its feedstock (for which see above). While new supply will emerge in Europe and North America, it is likely that there will be considerable demand for product and the gigafactories that will succeed will be those that are able to control their own feedstock requirements and costs.
- **Power** – the process of producing battery cells is energy intensive and manufacturing capacity of this scale requires a significant amount of stable and reliable power. That power must be 'green'. Any dependency on fossil fuels or other products generating carbon emissions would otherwise undermine the role of the gigafactory in the energy transition.
- **Site** – a gigafactory will have a unique footprint. Not only is a huge amount of land required, but its proximity to other key features is important. Ideally the factory would be situated close to major transport infrastructure (such as a deep sea port or railway), a renewable energy source, a significant water resource and the remainder of the EV manufacturing plant.
- **Sales strategy for the battery** – to date, lots of the battery manufacturers have been producing a somewhat generic 'off-the-shelf' battery for the automotive industry. That works well for small, relatively inexpensive cars where the primary differentiator will be cost rather than range or

performance. However, approximately 30% of European-made vehicles are premium models (and in fact in the U.K. that figure is closer to 65%) and so, as gigafactories open in Europe seeking to capture European market-share, they will need to tailor their batteries accordingly for much heavier, higher-value models where range will be a key factor.

We have produced an in-depth client note on these issues. Please let us know if you would like to receive a copy.

Clean Hydrogen Production

Clean hydrogen was the number one topic on the energy conference circuit in 2022. It has a critical role to play in the decarbonization of transportation system (road, maritime and aviation) as well as our power and gas networks, agricultural economy and energy and carbon intensive heavy industries.

To commit to developing new or expanded production facilities, clean hydrogen producers need a clear route to market with adequate control over feedstock availability and cost and certainty in respect of off-take volumes, pricing and revenue. Whilst there is a growing abundance of viable clean hydrogen use cases (including for major transportation and mobility), the off-take market remains immature at scale, with an uncertain growth curve, creating significant demand and price risk for producers. Clean hydrogen production also relies heavily on the availability of large quantities of cheap electricity, creating a clear feedstock cost risk for producers.

Clean hydrogen can be used, in the first instance, to displace existing grey hydrogen applications such as refining petroleum, treating metals, producing fertilizer or processing foods. But, clean hydrogen can also play a much broader role as a fuel for mobility or energy generation via internal combustion or fuel cells (for example for fueling long distance trucks or buses), for energy storage and as a feedstock in the production of green ammonia or synthetic or liquid fuels such as SAF.

Green ammonia produced from clean hydrogen can, in turn, be used to produce green fertilizer or to power maritime and other low carbon mobility solutions or as a sustainable fuel for industrial energy generation and energy storage.

SAF produced from clean hydrogen that is synthesized with carbon (i.e., PtL or e-fuel) is set to dominate the decarbonization of aviation with SAF forecast to be capable of delivering about 65% of the required carbon emissions savings for the sector and the market for SAF PtL fuels forecast by KPMG to grow to six times the size of SAF produced from biofuels.

Clean hydrogen feedstock and offtake volume and price risks are likely to be significant for early producers seeking to invest in anticipation of investor demand. They will need to be carefully addressed to ensure project success. There are a number of potential solutions, including take or pay, fixed price feedstock supply and clean hydrogen offtake agreements, cap and collar or cost plus tariffs, stacking multi-source feedstock and offtake arrangements, ensuring access to multiple offtake markets for different clean hydrogen use cases, vertically integrated solutions, tolling arrangements, front ending merchant risk, "soft" demand underpins relying on factors that create monopolistic routes to market, traditional price or volume hedging and/or potentially some form of regulatory offtaker of last resort or special administration protection to ensure

service continuity.

Early projects will also face other major risks that they will need to successfully navigate including construction risk, particularly if a multi-contract supply chain solution is deployed, technology risk in relation to the performance and reliability of the electrolyzer and change in law and change in regulation risk as existing energy regulatory models are adapted and applied to hydrogen. The optimal solution to all of these issues will depend on the risk appetite of a project's developers and its funders. Project financing is expected to play a key role on the debt side in scaling the market, but there will also be opportunities for the private credit funds seeking higher returns and a corresponding risk profile.

We have produced an in-depth client note on these issues. Please let us know if you would like to receive a copy.

Sustainable Aviation Fuel

We expect SAF production to move forward at pace in 2023.

300 airlines comprising 83% of global air traffic have signed up to a goal for the global air transport industry to achieve net-zero carbon emissions by 2050. This "jet-zero" commitment aligns with the United Nation's Paris Agreement's goal to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels.

Aviation emissions are expected to be abated through a combination of SAF, new aircraft technology, more efficient operations and infrastructure and the development of new zero-emissions energy sources such as electric and hydrogen power, with any remaining emissions addressed by carbon capture and storage solutions and/or credible offsetting schemes.

SAF is a "drop-in" liquid hydrocarbon jet fuel produced from renewable or waste resources that can be blended with existing jet fuel and is compatible with existing aircraft and engines. SAF is produced from biofuels or PtL technologies otherwise known as e-fuels or synthetic aviation fuels. SAF produced from biofuels is expected to prevail over the next decade before SAF produced from PtL becomes dominant.

Early SAF producers will need to determine how best to address a number of specific risks including: (i) first of a kind technology and certification risk; (ii) demand uncertainty; (iii) feedstock and offtake price volatility; (iv) the dependency on government support to help increase the competitiveness of SAF in the short to medium term; (v) supply chain immaturity and interface risk; (vi) regulatory, political and change in law risk; and (vii) competing commercial use cases for the same feedstocks (e.g., from the power sector, road and maritime transportation sectors and from hard-to-abate heavy industry), which may reduce feedstock availability or increase its cost.

We have produced an in-depth client note on these issues. Please let us know if you would like to receive a copy.

Alternative Compliance Strategies for Automotive OEMs, Including Market Mechanisms[25]

We expect carbon emissions pooling and trading of regulatory credits between automotive OEMs to continue and potentially increase in scale and value in 2023. A number of jurisdictions around the world have introduced regulatory credit or pooling programs to incentivize automotive OEMs to accelerate their transition to electric and other low emission vehicles.

These frameworks incentivize OEMs to exceed compliance with tailpipe emission standards by creating a market for the pooling or trading of surplus emissions allowances. OEMs with surplus regulatory credits (i.e., have reduced their emissions below compliance standards) may, depending on the jurisdiction, monetize that over compliance by selling surplus regulatory credits r pooling them with OEMs with a compliance deficit or emissions excess. Selling or pooling these credits to other OEMs have been a major source of revenue for pure-play electric vehicle OEMs, such as Tesla, and other OEMs leading the transition to zero emission mobility, and a compliance necessity for others with higher emission profiles.

Penalties for failure to comply with the associated regulatory standards can be significant. OEMs also are highly motivated to avoid the negative publicity and potential reputational damage that could result from a failure to comply. Competition law compliance remains a fundamental area of concern, particularly where pooling is provided for in national legislation.

Akin lawyers have significant experience advising on OEM regulatory compliance strategies and carbon pooling transactions.

By Susan Lent, Alex Harrison, Kenneth Markowitz, Shariff Barakat, Matt Hardwick and Daniel Giemajner

Intellectual Property

As the auto industry shifts to electric and autonomous vehicles, multiple IP issues are set to arise on the litigation landscape for automakers. A split between vertical integration and specialization among EV stakeholders, potential trade secret misappropriation of AV technology, and the prominence of 5G in the auto industry and corresponding licensing efforts by SEP holders are just some of many issues that may come into play across jurisdictions.

Patent Infringement in the 5G Era

Though automakers continued to license cellular standard essential patents (SEPs) (through 4G) under a patent pool model in 2022, multijurisdictional patent infringement battles remain possible in 2023 as cellular infrastructure shifts towards 5G.

In 2022, automakers took their first, albeit tepid, steps in the United States towards the adoption of 5G in the automotive ecosystem. The attendant benefits of 5G, including higher data-transfer speeds, lower latency, and increased reliability, are key enablers to the eventual success and proliferation of AVs. And while full driving automation (Society of Automotive Engineers (SAE) Level 5) may be years away, one piece of the AV puzzle—the one governing the licensing of cellular technology—may be set in place well before AVs roam the streets.

Historically, automotive OEMs have placed IP licensing and indemnification responsibilities on suppliers and that arrangement has seemingly worked well for decades. That framework was largely technology-agnostic until connectivity entered the picture. Many holders of cellular SEPs and non-SEPs presented a united front to automotive OEMs and offered to license their technology under a patent pool model. To be sure, OEMs did not accept the licensing offer overnight. Battles were fought in multiple jurisdictions where licensors in the pool filed individual patent infringement lawsuits until, one-by-one, the OEMs started to toe the line. By the end of 2022, numerous car OEMs from Europe, the U.S. and Asia had licensed 3G and 4G cellular technology under a patent pool model. The going rate oscillates between $15 and $20, depending on when the OEM entered into the license agreement.

The significance of licensing patents directly to OEMs cannot be understated. After all, imposition of a royalty rate at the vehicle level—instead of at the component or module level—is not simply a matter of semantics. For decades, companies in other industries have waged wars on issues such as whether licensing fees and damages calculations should be pegged to the smallest salable patent-practicing unit, or whether the payment of royalties to multiple entities can give rise to royalty stacking problems. The year 2023 may prove pivotal as to whether the patent pool model will extend successfully to 5G. If licensors and licensees of cellular technology for automotive applications can strike a deal, the industry will have seemingly acquiesced to the patent pool model. If, however, a deal cannot be reached by the key stakeholders in the space, then another wave of litigations, potentially involving multiple jurisdictions remains possible.

While important to the industry, a 2023 licensing deal for 5G technology under the pool model may still leave some longer-term questions unanswered. For example, if

not all licensors of 5G technology choose to license their technology through a pool, the potential for future patent litigation brought by non-pool SEP holders against OEMs and their suppliers remains on the table. Thus, while 2023 may bring some answers regarding the path forward in the automotive sector, some questions may remain open for some time. The answers to these questions will take on added importance as the promise of AVs becomes a reality and 5G (and higher cellular technologies) take on added prominence.

A New Take on SEP Infringement Remedies

The federal government's 2022 withdrawal of the 2019 policy statement on SEP remedies presages, at least in the short term, a deference to federal courts and the International Trade Commission (ITC) to establish the proper remedies for SEP infringement.

After two previous administrations had issued diametrically opposed policy statements regarding remedies for SEPs subject to fair, reasonable and non-discriminatory (FRAND) commitments, the current administration ultimately chose to withdraw the operative policy statement and abstain from issuing a new one.

In 2013, the U.S. Department of Justice, Antitrust Division (DOJ), and the U.S. Patent and Trademark Office (USPTO) issued a policy statement that called into question whether injunctions or exclusion orders were consistent with the public interest in cases where an SEP holder had voluntarily committed to FRAND terms. In 2019, the DOJ, the USPTO and the National Institute of Standards and Technology (NIST) took the opposite view and issued a policy statement espousing the notion that all remedies available under U.S. law—including injunctive relief—should be available for infringement of SEPs subject to FRAND, as warranted by the facts of a given case. In effect, the USPTO and the DOJ withdrew the 2013 policy statement and replaced it with the 2019 statement.

In 2021, under a new administration, the DOJ, USPTO and NIST issued a **draft** policy statement that (like the 2013 statement) pointed out that seeking injunctive relief for infringement of SEPs subject to FRAND commitment is inconsistent with the goals of the FRAND framework. The administration subsequently requested comments from stakeholders and the public at large. After conducting a review, the agencies withdrew the 2019 policy statement, but this time they did not replace it with a new one.

While it is hard to predict the precise consequences and long-term implications of a formal policy statement, or the lack thereof, the availability of remedies for SEP infringement in a given jurisdiction is likely to be a consideration in the global chess match affecting the automotive industry. In the United States, governing case law will dictate the appropriateness of injunctive relief in the SEP context for the foreseeable future, just as it does in every other industry for non-SEP patents. For SEP holders of 5G technology, the choice of forum to enforce those SEPs will be an important part of the overall strategy.

IP Ownership in the Dawn of EVs

Ownership and assignment of IP will remain critical as vertical integration, industry consolidation and break-up of joint ventures are all possible scenarios on the path from internal combustion engine (ICE) vehicles to EVs.

The ICE phase-out has started in earnest. As the auto industry continues its transition to EVs with far fewer parts (roughly 7,000 compared to over 30,000 for ICE vehicles, according to some estimates), automakers have adjusted their product development strategies. Relative to traditional ICE-powered vehicles, EVs have adopted a wide assortment of new technologies, including battery, electric motors, LiDAR, control algorithms, connectivity, data analytics and diagnostics.

The incorporation of these technologies presents efficiency opportunities to traditional automakers

Joint ventures to develop the technology associated with EVs creates a unique set of IP issues that companies need to navigate carefully. For example, if the companies to the joint venture split in the future, the ownership and licensing arrangements surrounding the jointly developed IP may give rise to unwanted and costly litigation down the line. Stakeholders must thus account appropriately for contingencies and put in place the necessary legal guardrails to minimize the risk of litigation in the future."

looking to enter the EV market. But for some OEMs, the efficiencies of vertical integration do not outweigh the risks associated with potentially costly investments into research and development as well as manufacturing. Some of these OEMs have opted instead for greater collaboration with fewer, but critical, technology partners. Joint ventures to develop the technology associated with EVs creates a unique set of IP issues that companies need to navigate carefully. For example, if the companies to the joint venture split in the future, the ownership and licensing arrangements surrounding the jointly developed IP may give rise to unwanted and costly litigation down the line. Stakeholders must thus account appropriately for contingencies and put in place the necessary legal guardrails to minimize the risk of litigation in the future.

As vehicle manufacturers shift towards EVs, they are faced with the costs and complexities associated with the development of battery technology, as well as their manufacture and supply. By some estimates, more than half of all the partnership deals in the auto industry in recent years were driven by battery technology. But recent moves by some OEMs may presage a move towards vertical integration. For some companies, the impetus behind this move may be IP protection. In particular, concerns over joint IP ownership may be a sufficient deterrent to steer clear from joint research and development in this area of technology. Recently reported rifts between partner OEMs have centered around eventual ownership and control of battery technology.

Vertical integration is also being spurred by the development of self-driving algorithms and other automated control software, which are critically important to safety. This approach eliminates the challenges associated with systems integration from different suppliers. By using their own proprietary technology, vehicle manufacturers are aiming to not only create robust control systems, but also to free themselves from supply chain issues that have, at times, stymied production. In addition to these practical advantages, IP ownership and licensing are also simplified, making vertical integration an attractive option for those stakeholders with the resources to implement it.

The Continued Importance of Trade Secret Litigation

With autonomous driving technology not yet at a mature stage of development, trade secret litigation is likely to continue to play a prominent role in IP battles in this industry sector. This is the case for several reasons. For example, the

software algorithms at the center of autonomous driving lend themselves naturally to trade secret protection. This, coupled with the fact that subject-matter eligibility under 35 U.S.C. § 101 continues to be mired with uncertainty, bolsters the case for trade secret protection over patent protection for the software algorithms at the heart of autonomous driving. In addition, the threshold for public acceptance of autonomous systems appears to require nothing less than absolute infallibility, or at least significantly more than what society accepts as human error. In practice, that level of technological advancement may extend the timeframe for Level 5 autonomy (i.e., full automation) many years into the future, well beyond the limited period of exclusivity that patent rights, currently in existence, would confer on their owners.

Secrecy obligations in employment agreements are intricately tied to potential trade secrets litigation for companies competing for dominance in the development of autonomous systems. Fluidity in the workforce makes potential trade secrets misappropriation scenarios inevitable and employee training and education become critical in proactively managing the risk of litigation. One concept that is particularly critical for AV employers and employees to understand is that of negative know-how (i.e., potential solutions that end up not working). This, and other IP issues arising from employees taking their knowledge from one company to another could take added importance by the FTC's proposal to ban non-compete clauses. In combination, these dynamics place trade secrets at the center of IP issues in the autonomous systems space.

By Ruben Munoz and Lisa Hladik

International Trade

Export controls and other international trade regulations have been in the spotlight for the last several years. Take for instance the unprecedented plurilateral economic sanctions and export controls levied against Russia in 2022, the broad and complex export control restrictions placed on the Chinese semiconductor industry in October 2022, and the increased enforcement of forced labor import prohibitions targeting a broad swath of sectors and products.

We anticipate that international trade will continue to be an area to watch in 2023 as governments around the world grapple with geopolitical tensions and work to ensure that regulations are keeping up (or at least **trying** to keep up) with the pace of global innovation in autonomous systems and other cutting-edge industries. We provide below our predictions across six trade-related areas that may have an impact on autonomous systems in 2023.

Export Controls

In 2022, the Commerce Department's Bureau of Industry and Security (BIS) was focused on developing and enforcing policies and rules to prevent the acquisition of sensitive US technology in China and Russia. These two countries will remain BIS's focus in 2023.

Specifically, building on the **extensive semiconductor regulations BIS imposed on China in October 2022**, BIS will continue to explore new export controls on technology for the development and implementation of AI applications, including autonomous systems. As part of this effort, BIS may consider restricting the involvement of US persons (i.e., individuals and companies) in the development of AI applications in China. Any new restrictions would likely be similar to the October 2022 rules that BIS imposed on US person support for certain activities related to advanced integrated circuits in China. If implemented, we expect any such AI-related restrictions on the activities of US persons to be very narrowly tailored.

In 2022, BIS also prohibited exports of a vast array of commercial products to and in support of Russia. We expect these controls to continue tightening in 2023, mostly through the identification of additional Russian, Belarussian, and Chinese entities on restricted party lists such as the BIS Entity List.

Committee on Foreign Investment in the United States

In September 2022, the Biden administration issued Executive Order 14083, "Ensuring Robust Consideration of Evolving National Security Risks by the Committee on Foreign Investment in the United States," and the Treasury published the first-ever Committee on Foreign Investment in the United States (CFIUS) enforcement guidelines in October.

In light of these developments and our experience with CFIUS, we anticipate the following CFIUS trends in 2023, particularly in relation to drones and advanced clean energy systems (including battery storage systems):

- A continuing focus on risks related to foreign investment in companies with sensitive technology or sensitive personal data.
- Increased enforcement of CFIUS rules mandating filings of certain investments in companies with export controlled technology.

- More review of transactions that were not initially notified to CFIUS.

CFIUS is also increasingly focused on foreign investment in companies that collect or maintain large volumes of sensitive personal data, including geolocation data. This may make transactions involving autonomous vehicle and smart city technology particularly ripe for CFIUS review in the coming year.

Finally, as with other areas mentioned in this alert, the risk of CFIUS scrutiny and enforcement is particularly high in transactions involving China, and is likely to remain so for the foreseeable future.

Information Communication Technology and Services

The Commerce Department's Information Communication Technology and Services (ICTS) rules have been in place since March of 2021. However, there has not yet been any public enforcement activity or other implementation of these rules that provide industry with a sense of how the government intends to wield these regulations going forward. As with CFIUS, described above, we anticipate that the Commerce Department's **ICTS enforcement regime** will increasingly focus on bulk data used and generated by autonomous systems, potentially including data on driver preferences and habits, mapping data, and geolocation information. The tension between commercial systems that gather increasing amounts of data and concern about protecting that data may lead to administrative or legislative action governing the collection and security of such data. Whether this focus will manifest itself in any enforcement actions under the ICTS rules in 2023 remains to be seen.

Forced Labor Enforcement

The United States has prohibited the importation of any good made in whole or in part using forced labor since the 1930s, but U.S. Customs and Border Protection (CBP) has recently increased its enforcement of this law in the face of substantial pressure (and increased appropriations) from Congress. Additionally, in June 2022, the Uyghur Forced Labor Prevention Act came into force, creating a presumption that any good made in China's Xinjiang province or with the labor of Uyghurs and other ethnic minorities is prohibited from importation into the United States. In the latter half of the year, press articles and non-governmental organization (NGO) reports highlighted the risks of forced labor in automotive supply chains in particular, including with respect to advanced batteries, steel, aluminum, copper, electronics, tires and other parts. Both Congress and CBP ramped up scrutiny of the automotive sector following these reports, with the Senate Finance Committee requesting responses from several companies regarding their supply chain tracing efforts and ties to forced labor and the Xinjiang region, and with CBP adding aluminum and polyvinyl chloride (PVC) products to its high-priority targeting areas. CBP has already been targeting another critical input for autonomous systems—polysilicon. While that focus has, to date, been centered on the solar sector, CBP may expand its targeting in 2023. Overall, increased enforcement is likely to continue for the foreseeable future, particularly with respect to supply chains that run through China. Companies are also likely to continue facing demands for greater supply chain tracing and transparency.

By Alan Hayes, Christian Davis, Thomas Krueger, Laura Black, Sarah Kirwin, and Sarah Sprinkle

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25 Subject to U.S. review and input.

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