



VEHICLE PLATOONING POLICY

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Glossary of Terms

Definitions of the Technology Components

“Driver-Assistive Vehicle Platooning (DAVP).” “Vehicle automation and safety technology that integrates sensor array, wireless vehicle-to-vehicle communications, active safety systems, and specialized software to link safety systems and synchronize acceleration and braking between vehicles while leaving each vehicle’s steering control and systems command in the control of the vehicle’s driver in compliance with the National Highway Traffic Safety Administration rules regarding vehicle-to-vehicle communications.”

Definitions of Market Segments/Players

“Platoon Operator.” A firm or a person who files a plan with the Department to operate a platoon on a highway of the commonwealth.

“Driver” A natural person who drives or is in actual physical control of a vehicle in a platoon.

“Lead Vehicle.” The front vehicle in a series of platooning vehicles. The driver in the lead vehicle drives normally, controlling throttle, brakes, and steering.

“Non-Lead Vehicle.” Any vehicle in a platoon that is not the lead vehicle. The driver in the non-lead vehicle allows the DAVP system to control throttle and brakes, while the driver or the ADS retains the responsibility for the remaining dynamic driving tasks.

“Person.” A natural person, firm, co-partnership, association, or corporation.

“Platoon.” A group of buses, military vehicles or motor carrier vehicles, when engaged, traveling in a unified manner at electronically coordinated speeds at following distances that are closer than would be reasonable and prudent without the coordination. The term does not include a school bus or a school vehicle.

Other Definitions

“Automated Driving System (ADS).” The hardware and software that is collectively capable of performing all aspects of the dynamic driving task for a Highly-Automated Vehicle

“Crash.” For purposes of required reporting for platooning, an accident involving either injury to or death of any person; or damage to any vehicle or property involved.

“The Department.” The Pennsylvania Department of Transportation.

“Dynamic Driving Task.” The operational (steering, braking, accelerating, monitoring the vehicle and trafficway) and tactical (responding to events, determining when to change lanes, turn, use signals, etc.)

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aspects of driving, but not the strategic (determining destinations and waypoints) aspect of the driving task.

“Engaged.” When the DAVP system is activated by the driver.

“Fallback” The response by the user or by the DAVP system to either performs in event of system failure(s) or upon Operational Design Domain (ODD) exit.

“Headway.” The distance or time between the vehicles in the platoon.

“Highly Automated Vehicle (HAV).” A motor vehicle with equipped with an ADS that can operate in high or full automation and where the ADS performs the dynamic driving task with no requirement that a driver respond to any request to intervene or take control of the vehicle. This definition encompasses automated vehicles considered to be Level 3, 4 or 5 under SAE J3016.

“Operational Design Domain (ODD).” The platooning operator’s definition of the conditions in which vehicles with DAVP systems are intended to “operate with respect to roadway types, geographical location, speed range, light conditions for operation (day and/or night), weather conditions, and other operational domain constraints”.

“Weigh Station.” A checkpoint along a highway to inspect vehicles. Usually trucks and commercial vehicles are subject to the inspection.

“Visual Identifier.” A sticker, as specified by the department (PennDOT), required to be displayed under 75 Pa.C.S. §3317(c) that informs motorists and law enforcement that the vehicle is capable of being part of a platoon.

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Acronyms

CDL	Commercial Driver License
DAVP	Driver-Assistive Vehicle Platooning
FMCSA	Federal Motor Carrier Safety Administration
FMVSS	Federal Motor Vehicle Safety Standards
ODD	Operational Design Domain
HOS	Hours of Service
OEM	Original Equipment Manufacturer
PennDOT	Pennsylvania Department of Transportation
PSP	Pennsylvania State Police
PTC	Pennsylvania Turnpike Commission
PUC.....	Public Utility Commission
USDOT	United States Department of Transportation
V2V	Vehicle-to-Vehicle

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Introduction

The trucking industry is the lifeblood of the American economy. Over 70% of all freight tonnage in the United States is carried by trucks. Pennsylvania is the Keystone State for truck freight, linking its roadway network to consumers across the states, across the country, and throughout the world. With the growth of e-commerce and just-in-time deliveries, trucking is increasingly crucial to retain the competitiveness of Pennsylvania's businesses. By 2040, Pennsylvania truck traffic in state is projected to grow by 72% by weight and 138% by value (Pennsylvania Comprehensive Freight Movement Plan, 2010).

To improve safety and efficiency, the freight industry has improved trucking technologies to include automated systems, alternative fuels and power trains, and connected braking systems. Among all these technologies, Driver-Assistive Vehicle Platooning (DAVP) is the most advanced and ready-for-market, representing an opportunity to reduce fuel consumption and crashes.

A platoon is defined as two (2) or three (3) buses, military vehicles or motor carrier vehicles traveling in a unified manner at electronically coordinated speeds at following distances that are closer than would be reasonable and prudent without the coordination.

In 2018, the Commonwealth of Pennsylvania (PA) passed Act 117, allowing platoons to operate on public highways. Under this law, up to three (3) vehicles may platoon together, provided that the Platoon Operator has submitted a Platoon Operations Plan to the Department.

Pursuant to Act 117, the Department is tasked with issuing policies regarding platoon operations, which we seek to align with model state policies issued as part of comprehensive federal guidance. Accordingly, the Department has developed this policy to regulate the operations of the platoons in Pennsylvania.

The Platoon Operator is required to demonstrate ample assurance that it is capable of establishing, managing, and running a safe and successful platooning operation on Pennsylvania's highways while utilizing successfully tested DAVP technologies. Through the development and Departmental review of a Platoon Operations Plan consisting of the parameters included in this section, residents, visitors, and businesses of Pennsylvania can be assured of platooning operations achieving operational objectives.

Minimum Criteria for Platoon Operations Plan

The Platoon Operator shall submit a Platoon Operations Plan to the Department with the following:

Background Information

- i. Primary Point-of-Contact including:
 - a. Contact Name
 - b. Company
 - c. Title
 - d. Mailing Address
 - e. Telephone

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- f. Email Address
- ii. Company information including:
 - a. Company Name
 - b. Mailing Address
 - c. USDOT Number, if applicable
 - d. PUC Number, if applicable
- iii. Drivers information including:
 - a. Driver Name
 - b. CDL license jurisdiction and number
 - c. Date driver was trained on DAVP system

Route Information

- i. Planned route(s)
- ii. Date(s) and time(s) of planned operations
- iii. Planned operating speeds

Vehicle Information

- i. Makes/Models
- ii. VIN of the vehicles
- iii. Vehicle license plate number and jurisdiction of issue USDOT numbers for vehicles
- iv. PUC numbers, if applicable
- v. Number of vehicles in the platoon (2 or 3)
- vi. Anticipated weight of each vehicle (including any trailers and cargo)
- vii. Load/trailer types (e.g., singles or tandem), if applicable
- viii. Brief description of planned cargo including:
 - a. Hazardous materials (yes or no)
 - b. Livestock (yes or no)
- ix. Oversize/overweight/overheight loads (yes/no)
- x. Vehicle(s) carrying fluids (yes/no)
- xi. Vehicle(s) carrying pipes, lumber, or similar types of loose loads (yes/no)
- xii. Brake types of each vehicle (e.g., disc or drum)
- xiii. Identify lead and non-lead vehicle(s)
 - a. Identify if the lead and non-lead vehicle(s) alternate during operation

Platooning Information

- i. Identify order of lead and non-lead vehicles
- ii. Provider of the DAVP technology
- iii. Planned Operational Design Domain (ODD) for the platooning including:
 - a. Trafficway types on which the DAVP system is intended to operate safely;

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- b. Geographic constraints, if applicable;
 - c. Speed constraints, if applicable;
 - d. Environmental conditions (weather, daytime/nighttime, etc.), if applicable;
 - e. Traffic conditions, if applicable;
 - f. Allowances and process to allow vehicles to merge into a platoon, if applicable; and
 - g. Other domain constraints say may affect the safe operations of the platoon.
- iv. Platooning formation method
 - v. Headway/following distance between vehicles
 - vi. Describe how the platoon disengages
 - vii. Describe platoon fallback

Driver Training Plan

The Platoon Operator shall provide a description of their driver training program. The training program should consist of:

- I. How the platooning system works;
- II. Platoon operations, including communication and visual indicators, and platooning system disengagement and fallback;
- III. Training on the safety measures that are in place in case of any disengagement, regardless of the reason for disengagement;
- IV. Driver engagement, including distracted driving avoidance, fatigue and wellness awareness, and drug and alcohol impairment awareness; and
- V. Continuing education requirement.

Certifications

The Platoon Operator shall certify the following:

- i. The Platoon Operator has met the requirements of **all applicable** Pennsylvania laws governing platooning operations.
- ii. The platoon will operation is in compliance with **all applicable** Federal Motor Vehicle Safety Standards.
- iii. The platoon will operate in compliance with **all applicable** traffic laws and motor vehicle laws.
- iv. The Platoon Operator is in compliance with all applicable sections of the Motor Vehicle Financial Responsibility Law, Title 75 of the Pennsylvania Consolidated Statutes, Chapter 17.
- v. The Platoon Operator has established and implemented process and procedures for inspecting, testing and maintaining sensors used in DAVP operations.
- vi. The Platoon Operator has a process for testing, certifying, uploading and verifying software upgrades.
- vii. The Platoon Operator has implemented procedures to prevents distracted driving and driver fatigue.

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- viii. The Platoon Operator established a driver training program and that all drivers must successfully complete before operating a DAVP system.
- ix. All platooning shall be concluded safely within the date and time specified in the Platoon Operations Plan.
- x. A copy of the Platoon Operations Plan shall be kept in each vehicle in the platoon and turned over to law enforcement upon request.
- xi. Vehicles used for platooning purposes are capable of:
 - a. Establishing, managing, and operating a safe and successful platooning operation on Pennsylvania highways;
 - b. Allowing reasonable access for other vehicles to afford safe movement among lanes and/or to exit or enter the highway;
 - c. Wirelessly exchanging information about their speed, location, and heading with other vehicles within close proximity, operating within the platoon (i.e. V2V communications);
 - d. Ensuring driver engagement;
 - e. Alerting and indicating when platooning is engaged or should be disengaged;
 - f. Monitoring system health and detecting cybersecurity threats;
 - g. Alerting the driver(s) if a DAVP technology failure or cybersecurity threat is detected;
 - h. Allowing for manual intervention by the driver(s) through a safety override in the DAVP system or process to easily engage and disengage the DAVP technology;
 - i. Recording data before a collision occurs (the information shall be made available to the Department and law enforcement post-crash); and
 - j. Complying with the testing process described in ISO 26262, if applicable.

Operating Constraints

The Department may restrict vehicle movement for operational or safety reasons, including, but not limited to, emergency conditions.

- I. Vehicles in a platoon may only operate on approved limited access highways or interstate highways including ramps connecting one highway with another. The list of approved Base Vehicle Platooning Routes is presented on the Department's automated vehicle webpage (www.penndot.gov/av).
- II. Platooning operations are prohibited in work zones when workers are present, tunnels, or through toll plazas.
- III. Platooning operations are prohibited in any lanes where trucks are prohibited.
- IV. Headways
 - A. The platoon shall maintain a safe and reasonable minimum headway distance as determined by the Operator and USDOT/Federal requirements as applicable.
 - B. Each vehicle in a platoon shall maintain a headway of at least 40 feet when traveling over bridges.
- V. A maximum of three platooning vehicles are permitted within the platoon.

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- VI. Platooning operations are restricted to an operational design domain (ODD) defined by the Platooning Operator.
- VII. Disengagement Requirements
 - A. To manage traffic flow and ensure road safety, platooning vehicles must disengage platooning technology when:
 - i. It is necessary to allow reasonable access for vehicles to enter or exit the highway;
 - ii. It is necessary to ensure an overtaking/cutting-in vehicle to enter and occupy the space between the two vehicles without danger;
 - iii. Operating on a segment of roadway with a hazardous grade speed limit;
 - iv. Entering a Weigh Station;
 - v. Entering or driving within a work zone when workers are present, or work zone is active;
 - vi. Entering or driving within toll plazas; or,
 - vii. Complying with Department's disengagement requests.
- VIII. The following selected vehicles are not permitted to participate in vehicle platooning:
 - A. Vehicles carrying hazardous materials;
 - B. Vehicles carrying oversize or overweight loads;
 - C. Vehicles carrying fluids (e.g., tankers, concrete trucks);
 - D. Vehicles carrying pipes, lumber, or similar types of loose loads;
 - E. Vehicles carrying livestock;
 - F. Automobile and boat transporter combinations (traditional and stinger-steered);
 - G. Truck and pole combinations;
 - H. B-Train combination;
 - I. Lowboy tractor/trailer combinations (loaded and unloaded); and
 - J. Saddle mount or saddle mount with full mount combinations
- IX. Platoon Operator shall be responsible to ensure that the platoon only operates in conditions the DAVP system is safely capable of handling. Platoon operations shall not operate if the travel lane is:
 - A. *Snow Covered*;
 - B. *Icy*; or
 - C. There is a reduced visibility.
- X. Hours of Service (HOS)
 - A. Drivers must comply with applicable HOS regulations designated by FMCSA.
- XI. Driver Requirements/Driver Qualifications
 - A. The vehicle is operated only by a driver listed in the Platoon Operations Plan.
 - B. A trained driver is required in each vehicle equipped with DAVP system. The driver is responsible for care and control of the vehicle.
 - C. Drivers and monitors must hold an appropriately endorsed and valid commercial driver license (CDL).
 - D. Drivers must pass appropriate practical training provided and/or designated by technology developer, Original Equipment Manufacturer (OEM) or Tier 1 supplier.

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Submission and Review Process

- A. The Platoon Operations Plan shall only be required once per operation for the duration requested, barring any updates to the operation or Vehicle Platooning Policy.
- B. Review Process
 - i. Platoon Operations Plan shall be sent to the Department using the method prescribed on the PennDOT website.
 - ii. Upon receipt of the Platoon Operations Plan, the Department shall have 30 days to reject Platoon Operations Plan. However, if that 30th day falls on a non-business day, the deadline extends to the following business day.
 - a. If clarification of the Platoon Operations Plan is needed, the Department shall outline where additional information is necessary. The Platoon Operator shall have thirty (30) days to respond to the Department with the updated Platoon Operations Plan. The review process will start on the submission of the updated Platoon Operations Plan.
 - b. If denied, the Department shall provide a written explanation to the Platoon Operator providing the reasons why the Platoon Operations Plan was denied.
 - c. If the Platoon Operations Plan is denied, in whole or in part, the Platoon Operator may requesting an administrative hearing under 2 Pa.C.S. § § 501—508 and 701—704 (relating to Administrative Agency Law), 1 Pa. Code Part II (relating to general rules of administrative practice and procedure) and Chapter 491 (relating to administrative practice and procedure).
 - iii. If the Department does not reject the Platoon Operations Plan, the Department will send the visual identifier sticker(s) to the contact person identified in the Platoon Operations Plan at the end of the review period. The Department shall issue a total number of stickers equal to twice the number of vehicles identified in the Platoon Operations Plan.
 - iv. The Operator may operate the platoon after the stickers have been received and placed on the vehicles as required.
 - a. Platoon Operations Plan shall be valid for a specific period of time as identified in the Platoon Operations Plan. The Department may follow-up with Platoon Operators to ensure no material changes have occurred in a platooning operation.
 - b. The operating entity's Platoon Operations Plan shall be present in the vehicle at all times during operation, either physically or electronically, and shall be presented to the law enforcement officer, if requested.
- II. The Platoon Operator shall submit a new Platoon Operations Plan if the DAVP system is capable of operating in new conditions, if there are material changes in the original Platoon Operations Plan, or if the DAVP Operator otherwise modifies the ODD.

Visual Identifier

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The Department shall issue, upon receipt of payment from the approved platooning operator, a serialized sticker which shall be displayed at all times to alert law enforcement that the vehicle is capable of being part of a platoon (see Appendix A).

- I. The sticker shall be displayed on the driver and passenger side of the power unit in close proximity to other federal and/or state regulated decals and stickers.

Temporary Platooning Restrictions

- I. Platooning operations may take place as identified in the Platoon Operations Plan subject to the following:
 - A. Emergencies
 - i. The Department and, if applicable, the Pennsylvania Turnpike Commission, reserve the right to temporarily prohibit or restrict platooning on select trafficways or statewide during extreme weather and declared emergencies.
 - a. PennDOT will issue a restriction over the 511PA traveler information service (www.511pa.com) and electronically notify the Platoon Operator.
 - B. Special Events
 - i. The Department and, if applicable, the Pennsylvania Turnpike Commission reserve the right to temporarily prohibit or restrict platooning on specified trafficways during special events including, but not limited to dignitary visits, major conventions/summits, and super load movements. Only special events with potential dynamic closures and/or safety/security concerns should be considered for temporary prohibition or restricted platooning.
 - ii. The Department or the Pennsylvania Turnpike Commission shall electronically notify the Platoon Operator through email about how, where, and when platooning is prohibited or restricted. The Platooning Operator shall acknowledge the receipt of the email with a response email as soon as practicable.
 - iii. The Department or the Pennsylvania Turnpike Commission shall attempt to provide three to five (3 to 5) days' notice to the Platoon Operator.
 - C. Safety Provision
 - i. If a safety concern is identified, the Department and, if applicable, the Pennsylvania Turnpike Commission, reserve the right to temporarily prohibit or restrict platooning on select trafficways or by certain vehicles. Prior to prohibiting or restricting platooning, the Department will provide the Platoon Operator with an explanation that details the safety concern.
- II. When platoon operations are no longer prohibited, the Department and/or Pennsylvania Turnpike Commission shall notify the Platoon Operators within one (1) business day.
- III. The Department recommends that the Platoon Operator contact the Department or Pennsylvania Turnpike Commission or visits www.511pa.com prior to platooning to learn current trafficway conditions. The Department or the Pennsylvania Turnpike Commission may offer the Platoon Operator a data feed of reported incidents and construction events.

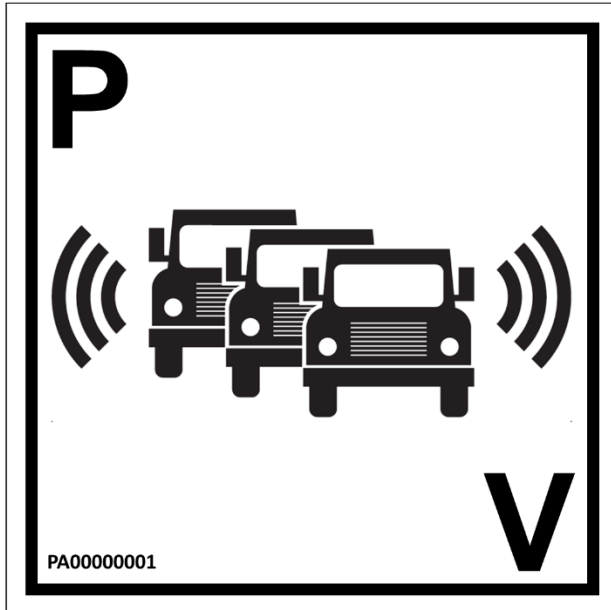
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Policy Disclaimer

This policy is a living document and may be updated to reflect technological changes and national best practices.

Approved Platoon Operators will be notified of any policy changes via email and shall confirm receipt.

Appendix A – Visual Identifier



For illustration purposes only

- I. The black-white sticker shall consist of the letters “P”, “V”, and the platooning logo.
 - i. Background: White
 - ii. Pictogram: Black.
 - iii. Lettering: Black
 - iv. Sticker size: 6 inch by 6 inch