Level One Truck Platooning: Commercial Deployment Status

Richard Bishop TRB Truck / Bus Safety Committee, Technology Subcommittee January 15, 2019



Truck Platooning Commercial Deployment: Outline

- Who's in the Game?
- How Does It Work?
- Regulatory Factors
- Summary

December 2017: Driver Assistive Truck Platooning Pilot on Florida's Turnpike

PlatoonPro: View from Follow Driver's Perspective



Truck Platooning: Who's In The Game?

Platooning Seeing Extensive Validation of 1st Gen Products, Evaluation of Advanced Capabilities

Commercial/ Research	Country	Organization	Automation Level Leader	Automation Level Follower	Number of Trucks	Year of Operations
Commercial	USA	Peloton	L1	L1	2	2018
Commercial	USA	Freightliner	L1	L1	2	2018
Research	USA/Canada	Auburn University	L1	L2	2-4	2018
Commercial	Germany	MAN	L1	L2	2	2018
Research	UK	Transp. Research Lab (Helm-UK)	L1	L2	3	2018
Research	NL	Rijkswaterstaat	L1	L1	2	2019
Research	Sweden	Volvo/Scania	L1	L2	2	2019
Commercial	Finland	Scania	L1	L2	3	2019
Research	Europe	ENSEMBLE, EC	L1	L2	2	2019
Research	Singapore	Port of Singapore	L1	L4 Driverless	2	2019
Research	Japan	METI	L1	L4 Driverless	3	2019

Auburn University: Quebec (November 2018)

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Real world deployment is defined by what commercial companies are doing!

Trucks

ON-HIGHWAY PLATOONING SHOWCASE

- First public on-highway platooning showcase between a truck OEM and transporter in the U.S
- Volvo Trucks in platooning research collaboration with FedEx and North Carolina Turnpike Authority
- Volvo's Cooperative Adaptive Cruise Control (CACC) using wireless vehicle-to-vehicle (V2V) communication technology



Volvo Group OEM's perspective - need for collaboration through common roadmaps and tests/ pliots together with fleets/users

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MAN Trucks Pilot in Bavaria w/ DB Schenker



Platooning OEM Deployment Prospects

- Daimler/Freightliner?
 - Publicly noted development, test, and evaluation ongoing in recent years
 - Announced at CES they will shift main automation focus to L4 standalone trucks
 - Higher automation platooning still of interest
 - Platooning testing has shown "less than expected" benefits
 - Daimler perspective could reflect EU-centric view (smaller fleets, more need for cross-fleet platooning)
- Commercial trials by others have shown better than expected results re fuel economy improvements
- Daimler view not widely held: Volvo, PACCAR, Navistar continuing to proceed

Peloton Technology: "connected and automated vehicle technology company"

- Startup founded 2011, backed by ten Fortune Global 500 companies.
- 2019 launch of Level 1 twotruck platooning augmented by Cloud Support.
- Most visible player....



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Truck Platooning: How Does It Work?

First Generation Platooning: Not Driverless!

- Level One Automation per SAE J3016
- Leader:
 - driver drives normally
 - may or may not use Adaptive Cruise Control
 - Forward Collision Avoidance and Mitigation always on
- Follower:
 - truck driver still responsible for steering and adjusting to road conditions in real-time (cut-ins, traffic, weather)
 - longitudinal control (throttle, brakes) is automated
 - Forward Collision Avoidance and Mitigation always on
- "Driver-Enhanced" rather than "Driver-less"
 - both drivers in direct radio contact and benefit from teamwork.

Power of V2V





CONNECTED BRAKING KEY TO SAFE TRUCK PLATOONING

Making Close Following Safe: V2V





Safety: Handling Vehicle Cut-ins



Driver sees car cutting in and backs off OR

If driver does not respond, system radar detects cut-in vehicle and automatically begins to back off follow truck









Safety: Only Enabled for Suitable Roads & Conditions

Peloton Network Operations Cloud (NOC) and Procedures limit platooning to:

- Multi-lane, divided, limited access highways
- Moderate or low traffic conditions
- Good traction conditions (no heavy rain, sleet, ice or snow)
- Appropriate topography (good line of sight; no steep grades)

NOC provides over-the-horizon alerts to drivers on roadway conditions





PELOTON TECHNOLOGY Peloton Network Operations Cloud

NOC

Internet/Other Data

Traffic Weather Construction Zones

Vehicle Data

Engine Drivetrain Braking

Platooning Sensors

Radar Video GPS

With Drivers

Link Finding Safety Approvals Platoon Ordering Alerts/Warnings

With Hwy Operators

Granular Weather Hwy Condition Accident Patterns Congestion Monitoring

With Fleet Managers

Analytics Diagnostics Predictive Maintenance





BUSINESS MODEL / DEPLOYMENT

Top Use Case: Single-Fleet, Hub-to-Hub Routes Example Strong Customer Profile:

- 50+ "return-to-hub" runs (regional haul)
- Fleet drivers

- Scheduled and manual NOC pairing
- Homogenous tractor configurations













Solid Demand From Top Fleets





Truck Platooning: Regulatory Factors

National Context:

No Federal Barriers; Govt-Industry Collaboration

- Driver-assistive truck platooning complies with federal law, and requires no changes for commercial deployment, as confirmed by federal regulators.
- USDOT, USDOE, and others have participated in demonstrations and funded studies to promote and understand the benefits of the technology.
- USDOT's recent Policy Guidance 3.0 calls on states to remove barriers to truck platooning, stating:

"States should consider reviewing and potentially modifying traffic laws and regulations that may be barriers to automated vehicles. For example, several States have following distance laws that prohibit trucks from following too closely to each other, effectively prohibiting automated truck platooning applications." – US DOT Automated Vehicles 3.0, Preparing for the Future of Transportation



National Context: State Following Distance Laws

Numerical Minimum Following States

- A defined numeric minimum following distance in 24 states
- Platooning requires change in law
- "Reasonable and Prudent" States
- A flexible, discretionary standard in 26 states
- Platooning can be legal under current law





Full



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Key Activity Ahead – Peloton Technology

- Peloton bringing driver-assistive truck platooning into commercial ops with selected fleets, 2018-2019.
- Robust activity continues in California as Peloton continues joint integration and validation work with OEMs.
- Commercial freight platooning activity over the coming months in Texas with major fleets.
- Activity expanding into other states over next quarters in coordination with major fleets.
- Ongoing work with allies to explore platooning allowance in additional states and international markets.



- Platooning provides significant business and societal benefits at a low level of automation where drivers are fully engaged.
- Platooning systems with best-in-class safety equipment combined with best practices for safety design improve safety of the roadway.
- As long as <u>safety</u> measures are adequate, other impacts can be assessed in parallel with deployment.
- As truck platooning comes into use, empirical data should be collected to further understand safety and traffic factors.

Thank You

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