



ENSEMBLE

Platooning Together



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The ENSEMBLE project

ENSEMBLE is an acronym derived from “**EN**abling **SafE** **M**ulti-**B**rand **p**latooning for **E**urope”. Meaning “together” in French, the word symbolises the joint action of the European truck manufacturers, suppliers and research institutes to develop a platooning system.

The ENSEMBLE project is co-funded by the European Commission under the Horizon 2020 Research and Innovation Programme with a total budget of EUR 25 million. ENSEMBLE started in June 2018 with a planned duration of 36 months. After COVID-19 related delays, the end date of the project was rescheduled for 31 March 2022.

The ENSEMBLE consortium comprises 19 partners from different sectors from seven different EU Member States



TRUCK PLATOONING is the linking of two or more convoys, using connectivity technology and automated driving support system.

- ACEA

The ENSEMBLE project has developed and deployed in a live environment a multi-brand platooning technology agreed between all leading European truck manufacturers

- 📍 Ready for standardisation
- 📍 Coping with current traffic use cases
- 📍 Providing requirements for semi-autonomous platooning, where there is a driver in the first vehicle only



Platooning Support Function (PSF)

PSF is based on mature and proven technology. It fits within the current legislation and can make today's spontaneous platooning safer. This multi-brand solution is ready for standardisation and is able to cope with all the different use cases encountered in current traffic. PSF supports the driver in the task of driving on a highway by issuing a warning in case of impending hazardous events.

Platooning Autonomous Function (PAF)

PAF envisages a driver in the first truck followed by driverless trucks travelling from hub to hub. The V2V connectivity between the trucks acts as an enabler contributing to the automation of the following vehicles. The PAF is the intermediate step between a support function and a fully autonomous truck because following trucks still have the first truck's driver to navigate through traffic to reach the destination.

Platooning functions defined by ENSEMBLE

| Platooning as Support Function - PSF | Platooning as Autonomous Function - PAF (only on theoretical terms) |
|--|--|
| Lead truck driver responsible for driving task | Lead truck driver responsible for driving task |
| Following truck driver responsible for driving task | Following truck driver NOT responsible for driving task |
| Longitudinal support | Both longitudinal and lateral control |
| THW* ~1,5s | THW ~0,3s and 1,2s |
| Quick deployment on road | Limited ODD**: First introduction in confined areas |
| Improved safety and efficiency due to earlier anticipation possibilities V2V offers for following trucks | Improvement in driver productivity and possible solution for current driver shortage problem. Potential decreased time gaps improve efficiency and road capacity. Safety not depending on driver behaviour for the following trucks. |

* THW definition: Time Headway

**ODD definition: Operational Design Domain



ENSEMBLE'S GOAL is to harmonise multi-brand specifications, realising a multi-brand V2V communication protocol leading to standards for multi-brand truck interoperability.

Multi-brand platooning expectations



Europe-wide deployment of platooning with different types of vehicles in real, mixed traffic conditions



Increased safety of heavy duty vehicles in mixed traffic



Increased competitiveness of the European Union as a whole and specifically of OEMs and suppliers in the automotive industry



Improved traffic management due to more efficient utilisation of road capacity



Total cost reduction in logistics and supply chain



Increased road and heavy duty vehicles safety towards a fail-safe objective



Project impacts

On road infrastructure

Road authorities are given the possibility to influence the parameters according to which trucks drive on roadways. As an indirect benefit, the digitalisation enabled by platooning allows road authorities to monitor and regulate freight transport, provided that trucks are willing or allowed to share precise data about their journey.

On platoon matching

At least 15% of all trucks from the current traffic volume could potentially benefit from platooning since they are already within the following distance defined by the ENSEMBLE platooning support function. This finding is helpful for platoon matching services to enable and assist multi-brand platoon formations.

On the economy & society

Economic analysis has shown that for fleet owners there is only a direct business case for the PAF, mainly because of the expected impact on driver efficiency costs. For the platooning support function, the potential benefits are more on a societal level, since it is expected to increase traffic safety, driver comfort (not assessed in the current study) and road capacity.



Project impacts

On fuel consumption & emissions

Fuel consumption and emissions with PSF was at par with the figures for the current driving situation. This is because the Platooning Support Function is following at 1,5 seconds or more, which is not significantly closer compared to the prevailing situations on the roads. Potential effects on fuel consumption and emissions are expected with PAF, which has headways lower than 1 second, but this requires further testing under circumstances that represent real-life logistical operations.

On other road users

Other road users will merge in between relatively long platoons (e.g. seven trucks) when entering the highway at a relatively low speed. To avoid dangerous situations, the developed platooning system increases the gap when a cut-in vehicle is detected. Avoiding long platoons and large time gaps, however, is still advisable in the vicinity of highway entries.

On traffic flow

Truck platooning can increase road capacity. The effect depends on the ratio of truck platoons as part of the total traffic and the location in the network. It is more beneficial for traffic flow that truck platoons are implemented where trucks represent a large part of the traffic, e.g. industry area or port area.





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the project's deliverables

