Cooperative self-declaring of truck weigh may give free pass at traffic control

This article explains how a new concept with cooperative self-declaring of truck weight may reduce time lost for trucks at control stations as well as improve the traffic controls for public authority.

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Non Stop Trucks
In several European countries the weight of heavy trucks is controlled in order to ensure compliance with weight regulations. Today, trucks usually have to make a time consuming stop on a scale at a weigh station and inspections are carried out, in addition to road safety considerations, to ensure equal competitiveness within the transport sector. Since the vehicles have to stop and often stand a line waiting for these checks, a negative impact is caused both from an environmental perspective and a transport efficiency perspective. A control increases the time it takes to transport the goods to the final destination, which means that the total throughput of the whole transport system is decreasing. Also, queuing at the weight stations increases the fuel consumption and thus have a negative impact environment on the environment as well.

In the European project MOBiNET, the Norwegian Public Roads Administration (NPRA), Volvo Technology and SINTEF are cooperating to devise a new solution for more effective truck control. A truck voluntarily shares its weight and identity with a roadside station that in turn shares the info with a dedicated back office system. The back office system controls the weight and checks the administrative registers for traffic remarks, insurance and public fees. Based on the check the system gives a recommendation to the inspector (by iPad) if it is recommended that the truck be called in to a control station for manual control, or given the green light to pass. The driver is also given feedback via an on-board unit. The driving force for the voluntary information sharing from a driver’s point of view is the possibility to bypass roadside controls while other vehicles are stopped.

Figure 1: Cooperative ITS allows law compliant trucks to pass the control. Photo: Ørjan Tveit.

Building Blocks In The Concept: Volvo Trucks Know Their Weight
The improvement of the in-vehicle weight sensors over the last decade, combined with standardized CAN interfaces for transferring data between the trailer and the truck, means that today’s heavy vehicle combinations have on-board access to accurate weight information, which certainly wasn’t the case 10-15 years ago. Meanwhile the recent innovative cooperative-Intelligent Transport Systems (C-ITS) utilize both vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication technology to enable wireless communication between vehicles and between vehicles and roads for various safety and efficiency applications.

The idea of this service is to use V2I communication technologies developed within the field of cooperative-ITS, in order to transfer the weight information from the truck, directly to the road administrator, while the truck is driving. When the vehicle passes a roadside ITS Station (R-ITS-S),
the in-vehicle ITS-Station (V-ITS-S) broadcasts the weight of the vehicle together with an identifier to the R-ITS-S. The R-ITS-S then communicates the weight information to a back-office service that is used by the road-administrator to monitor the road usage.

**Efficient Control From Public Authority**

NPRA is responsible for control of heavy vehicles with the objective to identify factors affecting road safety and factors affecting competition in the transport industry. Examples are driving with excess weight, breach of drive/rest regulations or driving with material that is not in proper working condition. NPRA has together with SINTEF and the Norwegian Truck Owners Association (NLF) established a selective recommendation system to pick out transporters who speculate in breaking existing laws and rules.

Based on ANPR cameras and OCR-reading the licence tags are identified. Weigh-in-Motion (WIM) sensors embedded in the pavement are providing axles and total weight of the vehicle. This is the basis for evaluating and recommending if NPRA should manually control the truck. When the identity of a truck is provided before it arrives at the control, NPRA are able to check the registers for traffic remarks, insurance and outstanding public fees. Even though this is a powerful set-up, it still depends on fixed sites with embedded equipment. A technical upgrade with self-declaration and (mobile) roadside units will also provide freedom to check trucks anywhere in the network and it will also create more possibilities to stop rule breakers. The development done by Volvo will be incorporated in a national NPRA scheme to reduce the time trucks with legal weight and paid insurance/taxes spend at control stations.

**PROMISING FIRST TESTS**

From a technical aspect the focus is currently on evaluating recognition of trucks, as well as checking if the self-declared weight is in line with the scale weights on the public control stations. The technical solution and dataflow were implemented during the third quarter of 2014 and during 2015 development of the system will continue to ensure a robust and fail-proof system.

A full scale test at Taraldrud control station in February 2015, as a proof of concept, was successful. The information flow was steady and the focus was therefore on the reported weight. The internal difference in the self-declared truck weight for each axle was very low – with less than 1% difference between the test runs. Compared with the scale weight at Taraldrud the self-declared truck weight was approximately 5% too low. This was considered as a good start for the concept.

Later this year 4 trucks will be equipped with communication units for sharing the current weight for a two month period.

**MOBiNET**

MOBiNET is “the Internet of (Transport and) Mobility”. It is an Internet-based network linking travellers, transport users, transport system operators, service providers, content providers and transport infrastructure. It connects users (people, businesses, objects), with suppliers (operators, providers, systems), and brokers (or helps to broker their interactions). At its core is a “platform” providing tools and utilities to enable those interactions, with components both for users and for suppliers.

**Progress Of The C-ITS Solution**

In the near future this system will be used together with existing weight control stations. Vehicles detected to be within the weight limits by the non-stop system will be free to pass the weight station. However, overweight vehicles will have to stop at the station for an additional control and possibly be subject to law enforcement. This all takes place without having to alter existing law enforcement processes. The overall concept is that the solution should be so appealing due to the potential time saving that the truck operators voluntarily install the C-ITS solution.