

D450.47 (D4.7)	Volvo demo vehicle
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SubProject No.	SP4	SubProject Title	ecoFreight & Logistics
Workpackage No.	WP4.5	Workpackage Title	Integration and verification
Task No.		Task Title	
Authors		Guillaume Vernet	
Dissemination level PU/PP/RE/CO		PU	
File Name		130315-DEL-SP4-D450.47-D4.7-Volvo demo vehicle-v03	
Due date		01-03-2013	
Delivery date		08-08-2013	

Abstract	This document presents the Volvo demo vehicle used in eCoMove.
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	<p>Project supported by European Union DG INFSO ICT-2009-6.1, ICT for Clean and Efficient mobility</p>
Project reference	FP7-ICT-2009-4 IP Proposal - 247908
IP Manager	Jean Charles Pandazis, ERTICO – ITS Europe Tel: +32 2 400 0714, E-mail: jc.pandazis@mail.ertico.com

Control sheet

Version history			
Version	Date	Main author	Summary of changes
01	2013-03-15	Guillaume Vernet	Initial content
02	2013-05-14	Guillaume Vernet	Complete truck description
03	2013-05-22	Guillaume Vernet	Harmonized document structure with D4.6, to serve as template for all demo vehicle deliverables, incl. SP3.
		Name	Date
Prepared	Guillaume Vernet		2013-03-15
Reviewed	<i>Not applicable</i>		
Authorized	Jean-Charles Pandazis		2013-08-08
Verified	Manuela Flachi		2013-08-08
Circulation			
Recipient		Date of submission	
Project partners		2013-07-18	
European Commission		2013-08-08	

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TERMS AND ABBREVIATIONS

Abbreviation	Definition
TGW	Telematics Gateway
OBU	On-board Unit

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1. Introduction

This document describes the test truck used by Volvo in the eCoMove European project. It is, together with the test truck from DAF, one of the two trucks equipped in sub-project 4 “ecoFreight and Logistics”.

This truck is a conventional truck which was adapted to integrate the eCoMove system and perform field tests. This document will describe:

- The general characteristics of the truck
- Equipment to accommodate the eCoMove platform
- The different Hardware components of the eCoMove platform.

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2. Demo vehicle description

The truck demo vehicle used by Volvo in eCoMove is a Renault Trucks Premium Distribution of 19t gross vehicle weight. This is a typical truck for inter-urban and urban distribution.

2.1. Physical description

The test truck has the following characteristics:

Engine	DXi 11, 410hp
Gross vehicle weight rating	19 t
Length	8.9m
Width	2.55m
Height	3.5m
Wheelbase	4.75m
Cab type	Extended, bed removed

Table 1: Truck characteristics



Figure 1: Test truck

It has a rigid body, loaded with concrete blocks to match the behaviour of a fully loaded truck. The total weight was measured at 18t.

2.2. Special hardware Integration

Special equipment has been installed in this truck to allow easy integration of project equipment. It was used in previous research projects such as CVIS and Safespot, which made the eCoMove specific integration quite easy, as most of the facilities (cabling, fixing, screen & KVM support) were already present.

The following section describes the setup of the facilitating hardware and eCoMove specific hardware.

2.2.1. Generic equipment integration

A metal cabinet is installed behind the driver seat (instead of the driver bed). It gives easy access to power, vehicle CAN networks, screen and antenna cables. This is depicted in Figure 2 below.

Power converters and splitters allow easy connection for 12V DC, 24V DC and 220V AC, which covers the most common input voltages. Power in the metal cabinet comes from an extra 24V battery set (separated from the regular 24V battery of a truck), which is recharged by the engine generator or an additional 220V AC -> 24V DC charger.



Figure 2: Metal cabinet and power rack

The driver has his touchscreen located on the right side of his dashboard.

A secondary screen (17") is installed on a foldable support in front of the passenger seat, as well as a mouse and keyboard. A KVM switch (Keyboard, Video and Mouse) allows the secondary screen to display and control up to four computers. This makes the driver seat a good place for an engineer to control easily the system.

For eCoMove, only the application unit had a graphical environment (router was headless, accessed via command line interface), so it was the only computer connected to the KVM switch.

Moreover, a VGA splitter was used to direct the video signal from the application unit to both the driver touchscreen and the KVM screen. This means that the eCoMove system can be running and controlled while the driver screen is off. This was in practice how baselines were recorded: the driver has no information from the eCoMove system, but it had to be running to perform data logging.

The following diagram shows these connections between the application unit and the two screens.

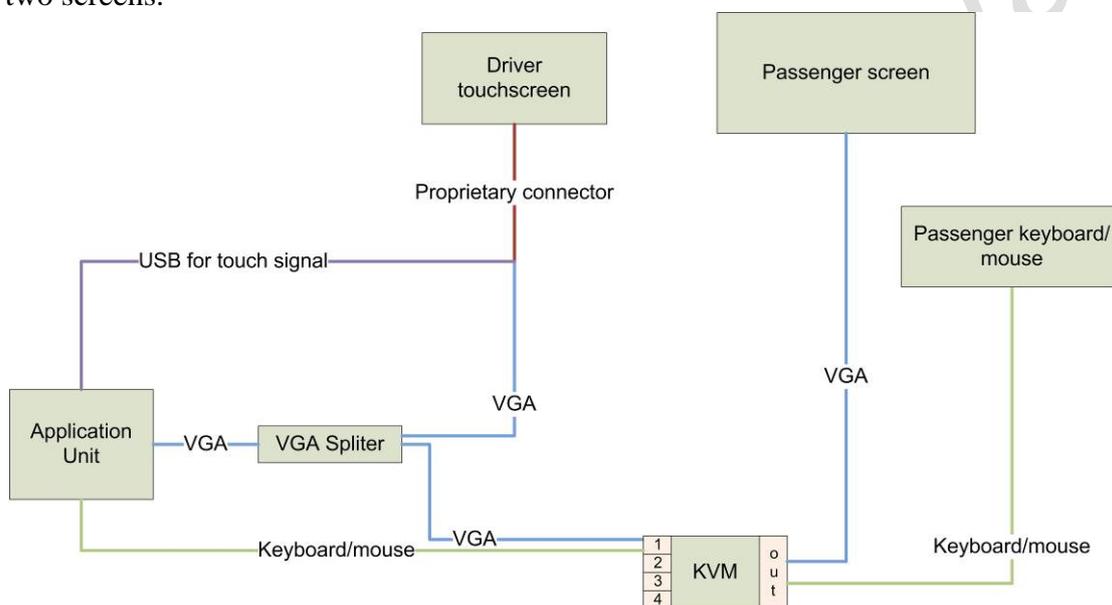


Figure 3: Screens connections



Figure 4: Driver touchscreen and passenger screen

The eCoMove platform is composed of the communication unit (Q-Free router), the application unit and an access to vehicle data, which is realized by Volvo TGW (Telematics Gateway). An external 3G modem is connected via USB on the communication unit.

These components are installed on a single shelf inside the metal cabinet behind the driver seat.

Figure 5 shows a diagram with the different components of the eCoMove platform and how they are linked. Note that for sake of clarity, the connections to driver and passenger screens are not repeated (see Figure 3).

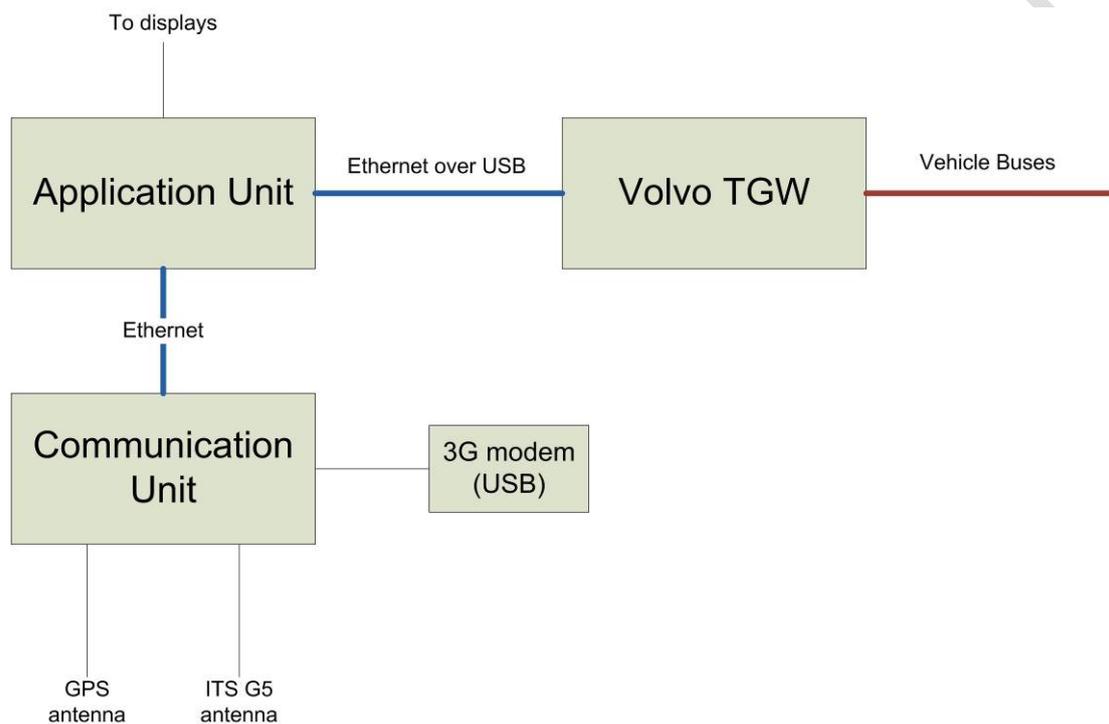


Figure 5: Diagram of eCoMove platform

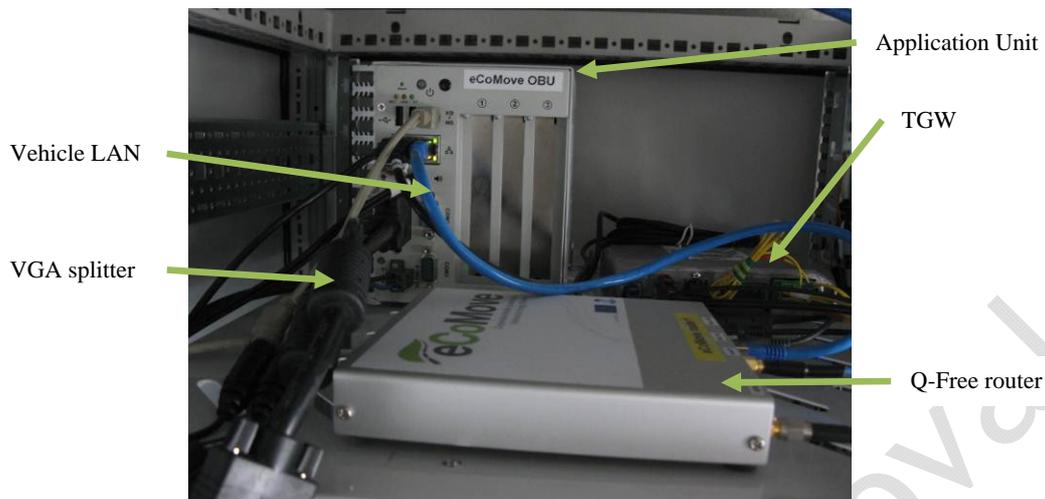


Figure 6: Picture of eCoMove equipment

The truck has antennas mounted on the roof behind the wind deflector, which are connected to the Q-Free router.

- GPS antenna
- 5.9GHz antenna

The USB 3G modem connected to the router did not have a specific antenna on the roof.

Component	Picture	Description
QFREE router		<p>Alix board based computer running Linux. It comprises a GPS, 802.11p interface and external 3G modem (USB).</p> <p>More detailed information on Q-Free router can be found in its manual [QFREE-router].</p>
Touch screen and extension cable		<p>Model: CTF700-SH 7inch TFT transfective touchscreen. (more information on website [TouchScreen]).</p> <p>Compared to other</p>

		<p>touchscreen used in other activities, it has been chosen as it has far better readability under sunny conditions.</p> <p>An 5m extension cable (instead of the regular cable) was used to connect the screen to eCoMove application unit in the metal cabinet behind the driver seat.</p>
<p>Application unit</p>		<p>Nuvo 2021 embedded PC. Intel Atom D525 1.8Ghz processor, 2GB or RAM Storage: 60GB SSD Fanless with wide range of operation temperature</p> <p>(More information on website [Nuvo2021])</p>

Table 2: Hardware component description

The application unit was chosen with a solid state drive, which is more resilient to vibrations in a truck environment compared to hard drive disks. However, its 60GB were quickly filled as map data is quite big, with for example:

- 19GB for NAVTEQ Europe map
- 7GB for link situations
- 1.8GB for Volvo fuel consumption per link map

The wide operation temperature range of the application unit makes it also suited for automotive environment (-20 to 70°C).

2.3. Integrated eCoMove applications and software components

SP4 ecoDriverCoaching ([D4.5]) and Truck ecoNavigation ([D4.4]) applications were integrated on the Volvo demo truck and more precisely on the application unit. With them comes a series of required core technologies and facility components, such as ecoMap, ecoCooperativeHorizon, ecoMonitoring...

For more details on the software component integration, please refer to [D4.8].

2.4. Licence plate issue

The truck used in Lyon has no permanent licence plates. When used, temporary test licence plates must be installed. Initially, this demo truck was planned to test SP4

applications in Munich, involving drivers from a transport companies (candidates approached by PTV). With the dropout of fleet company and the change of test site from Munich to Helmond modified the plans.

A Volvo Swedish driver was planned to come with his temporary licence plates to test the cooperative traffic lights in Helmond. But Swedish temporary licence plates used at Volvo were in fact only valid in Scandinavian countries, not in the Netherlands, which prevented this test truck to go to Helmond. The truck could also not be permanently registered in France as it is Euro4/5 transitional, and French legislation forbids now first registration of non Euro5 trucks.

Due to tight planning for finalizing integration and verification early 2013, and considering that the SP4 setup (both hardware and software) is very similar between Volvo and DAF, it has been decided to focus on the DAF truck for test drives in Helmond. The DAF test truck is described in deliverable [D4.6].

For the final event, another truck will be used from Volvo Sweden.

3. References

3.1. eCoMove deliverables and internal documents

The following table lists the eCoMove deliverables and internal documents referenced in this deliverable. They are available on ProjectPlace.

Ref	Doc	Version, Date
[D4.4]	Truck ecoNavigation	
[D4.5]	ecoDriverCoaching System (DEL-D4.5-442.45-ecoDriverCoaching.v8.pdf)	V0.8, 2012-12
[D4.8]	Integration and verification of complete system	
[QFREE-router]	Q-Free router manual (Q-Free Router Manual (v0.9).pdf)	V0.9 2013-05
[D4.6]	DAF demonstrator vehicle	

Table 3: eCoMove deliverables and documents

3.2. External references

Ref	Description
[TouchScreen]	http://www.cartft.com/catalog/il/870
[Nuvo2021]	http://www.neousys-tech.com/fanless-pc/nuvo-2000/nuvo-2021/

Table 4: External references

4. Conclusions

This deliverable presented the test truck used in eCoMove for the SP4 ecoDriverCoaching application development support, the WP4.5 integration activities and field data collection for Lyon rural drives for validation.

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Annex(es)

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