



FREILOT

Urban Freight Energy Efficiency Pilot

D.FL.2.3 Bilbao prototype



Version number
Main author
Dissemination level
Lead contractor
Due date
Delivery date

Version 1.0
Fernando Zubillaga, MLC ITS Euskadi
PU
ERTICO – ITS Europe
31.10.2010
27.01.2011



Information and Communications Technologies Policy
Support Programme (the “ICT PSP”)
Information Society and Media Directorate-General
Grant agreement no.: 238930
Pilot type B

Revision and history sheet

Version history			
Version	Date	Main author	Summary of changes
0.1	08.12.2010	Fernando Zubillaga, Irantzu Bores	Initial version
1.0	13.01.2011	Fernando Zubillaga	Updated the document and added Executive summary
		Name	Date
Prepared		Fernando Zubillaga	13/01/2011
Reviewed		Giulia Pontani	14/01/2011
Authorised		Zeljko Jeftic	17/01/2011
Circulation			
Recipient		Date of submission	
European Commission		27/01/2011	
Project partners		27/01/2011	

Authors (full list)

Fernando Zubillaga, MLC ITS Euskadi
Irantzu Bores, GERTEK SA

Project co-ordinator

Zeljko Jeftic
ERTICO – ITS Europe
Avenue Louise 326
1050 Brussels, Belgium

Tel.: +32 2 300 07 31
Fax: +32 2 300 07 01
Email: z.jeftic@mail.ertico.com

Legal Disclaimer

The information in this document is provided “as is”, and no guarantee or warranty is given that the information is fit for any particular purpose. The above referenced consortium members shall have no liability for damages of any kind including without limitation direct, special, indirect, or consequential damages that may result from the use of these materials subject to any liability which is mandatory due to applicable law.

© 2011 by FREILOT Consortium

Table of Contents

TABLE OF CONTENTS	4
TABLE OF FIGURES	5
ABBREVIATIONS AND DEFINITIONS	6
EXECUTIVE SUMMARY	7
1. INTRODUCTION	8
2. DELIVERY SPACE BOOKING	9
2.1. SYSTEM COMPONENTS.....	9
2.1.1. <i>Roadside unit – control</i>	10
2.1.2. <i>Roadside unit – signaling</i>	11
2.1.3. <i>Onboard unit</i>	12
2.1.4. <i>Web tool for bookings</i>	13
2.2. SELECTED DELIVERY AREAS.....	14
2.2.1. <i>Licenciado Poza</i>	15
2.2.2. <i>Pérez Galdós</i>	16
2.2.3. <i>General Concha</i>	18
2.2.4. <i>Santutxu</i>	19
2.3. CONFIGURATION OF THE DELIVERY SPACE	21
2.4. LIGHT PROTOCOL	23
3. ACCELERATION LIMITER, SPEED LIMITER AND ECO DRIVING SUPPORT	24
3.1. VEHICLE INSTALLATIONS	24
ANNEX I – THE LIST OF 16 ORIGINAL FLEET OPERATORS	26
ANNEX II – THE LIST OF 30 NEW FLEET OPERATORS	27

Table of Figures

Figure 1: Bilbao FREILOT area.....	8
Figure 2: Delivery space booking (UMDM) components.....	9
Figure 3: FREILOT identification machine for drivers.	10
Figure 4: PLC from Siemens (S7-224).....	10
Figure 5: Inductive Loop Detector.....	10
Figure 6: Light signalling.....	11
Figure 7: LED set-up at every delivery space.....	11
Figure 8: Vertical and horizontal static signalling.....	12
Figure 9: Chip card to identify on the identification machine.....	12
Figure 10: Web tool for bookings.....	13
Figure 11: Web tool for bookings.....	14
Figure 12: Selected delivery areas marked in yellow.....	14
Figure 13: Overall situation of Licenciado Poza with the FREILOT delivery area and conventional ones.....	15
Figure 14: Picture of Licenciado Poza before introduction of the system.....	15
Figure 15: Picture of Licenciado Poza with FREILOT system.....	16
Figure 16: Overall situation of Perez Galdos with the FREILOT delivery area and conventional ones.....	16
Figure 17: Picture of Pérez Galdós before FREILOT installations.....	17
Figure 18: FREILOT Delivery Space Booking System in Pérez Galdós.....	17
Figure 19: Overall situation of General Concha with the FREILOT delivery area and conventional ones.....	18
Figure 20: Picture of General Concha.....	18
Figure 21: Overall situation of Santutxu with the FREILOT delivery area and conventional.....	19
Figure 22: Picture of Santutxu. Current delivery space.....	19
Figure 23: FREILOT delivery area. Parking in a reserved place.....	20
Figure 24: Correctly using space.....	20
Figure 25: Configuration of the delivery space (18 meters long 3 spaces).....	21
Figure 26: Trucks proceeding with the download operation.....	21
Figure 27: Empty delivery space with light in green.....	22
Figure 28: Delivery space with LED's.....	23
Figure 29: Installation works on the first Nanuk truck.....	24
Figure 30: Installation works on the second Nanuk truck.....	24
Figure 31: Antenna installations on a Nanuk truck.....	24
Figure 32: Driver cabin from before (top left), during (top right) and after (bottom left) installations.....	25

Abbreviations and Definitions

Abbreviation	Definition
CPU	Central Processing Unit
GPRS	General Packet Radio Service
LED	Light Emitting Diodes
PLC	Programmable Logic Controller
UMDM	Urban Merchandising Distribution Management

Executive Summary

Partners in the pilot site Spain use four out of five defined FREILOT services to improve transport efficiency: Delivery Space Booking, Acceleration Limiter, Adaptive Speed Limiter and Eco Driving Support. The original idea was to pilot all four mentioned services in Bilbao but due to (non-)availability of suitable trucks at Nanuk Transportes (the fleet operator piloting the three vehicle/driver-supporting services), these are piloted in Madrid. Only Delivery Space Booking system is installed in the Bilbao city area. The implementation of FREILOT services on trucks in Madrid helps the FREILOT partners achieve higher outreach and promote FREILOT in Madrid as well. In addition to the change of location, the piloting fleet operator has requested to reduce number of trucks in the pilot from 5 to 3. The reason is less favourable economical situation for the partner (Nanuk Transportes), who has had to reduce number of trucks in their daily operation. The FREILOT management team is investigating if it is possible to find a replacement with another fleet operator for the 2 missing trucks. The operational stage has started through collection of baseline data on these 3 trucks.

In Bilbao there are four FREILOT Delivery Space Booking areas, all of them located in the centre of the town, where the road transport of goods causes severe congestions and consequently a lot of fuel consumption. The pilot areas are: Licenciado Poza, Santutxu, General Concha and Pérez Galdós.

The operational phase for this service started already in July 2010. The Delivery Space Booking scheme was implemented and started in October with 16 fleet operators (30 trucks in total) as members of the FREILOT pilot. These companies belong to delivery service and catering companies. Once the system was in use, many other fleet operators expressed their interest in joining. The "Second Period" was opened in the middle of January where 30 new fleet operators were included in the pilot with 65 additional trucks. At the moment of writing this report preparations are being established for the "Third period", where another 16 chip cards for 7 new fleet operators (incl. one old one) have been requested.

Fleet operators contact FREILOT Delivery Space Booking "hotline" because the drivers are very interested in the service, as they see that a special delivery area is available for them, without the problems that they usually have in other current delivery areas.

In this deliverable, the Delivery Space Booking service is described in more details than the vehicle/driver functionalities since the Delivery Space Booking functionality implementation is specific for this site. Vehicle and driver functionalities are very similar between the different sites and will therefore be described only in D.FL.2.2. Lyon prototype deliverable.

While for vehicle and driver functionalities, increasing number of vehicles used in the pilot is preferable but not necessary, the case for Delivery Space Booking is different. In order to achieve sustainable after-project life, large user-base is needed.

Overall, it can be concluded that one of the biggest FREILOT successes until now is the Bilbao Delivery Space Booking, where the number of users of this scheme has grown from:

- 2 fleet operators with 10 trucks (in the original Description of Work 12 January 2009) to
- 9 fleet operators with 35 trucks (in the amended Description of Work 27 August 2010)
- 46 fleet operators with 95 trucks at the time of writing this report in January 2011.

The keys to this success have been the commitment from the FREILOT partners and excellent dissemination towards public.

1. Introduction

This document describes the actual implementation of the FREILOT scheme in Bilbao, Spain.

Taking in account that the FREILOT service aim is to increase energy efficiency drastically in road goods transport in urban areas, the places where the Delivery Space booking systems are located are in the center of the city of Bilbao (see Figure 1). This system has been performed with an Urban Merchandising Distribution Management system (UMDM), which has been implemented by GERTEK.



Figure 1: Bilbao FREILOT area

2. Delivery Space Booking

2.1. System Components

The figure below illustrates the components of the Urban Merchandising Distribution Management System (UMDM).



Figure 2: Delivery space booking (UMDM) components

All the equipment and components are classified in two environments: Delivery spaces and Web.

Both environments communicate with a server that hosts database and control centre, where a web service handles all data and logic so that both systems can work. Communications between control center and Delivery spaces are done by GPRS technology.

In the Delivery spaces there are some basic components:

- Road side unit – control → a parking toll machine with a Programmable Logic Controller (PLC) and an inductive loop detector.
- Road side unit – signalling → a vertical information signal, painted signals on the road and light signals on the road (beacons).
- On board unit → chip card to validate reservation on the delivery spaces.

The Web is the interface through which users can make and manage their reservations, so communication with database is needed.

2.1.1. Roadside unit – control

The identification machine is similar to the toll machine used in Bilbao to regulate the parking. In each delivery space one identification machine is needed to manage places and reservations.



Figure 3: FREILOT identification machine for drivers.

The identification machine (Figure 3) is built in steel and has screen, buttons, chip-card reader, module for coins and module for devolutions. For this pilot the coin and devolution modules have been disabled and the machine has been customized with stickers and vinyl.

Inside, there is the following equipment:

- Programmable Logic Controller (PLC): Siemens S7-224 (Figure 4) which handles logic for beacon's colour code lighting.

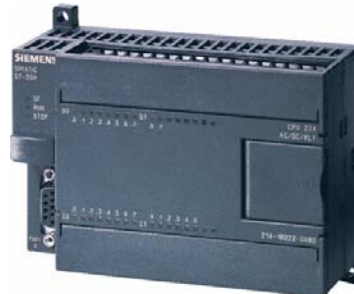


Figure 4: PLC from Siemens (S7-224)

- Inductive loop detector: Nortech PD400 (Figure 5) with four canals (one or its place).



Figure 5: Inductive Loop Detector

The PLC receives places occupancy from the detector and communicates via Modbus RS485 with machine's Central Processing Unit (CPU) to get and send data to the control center. From the control centre the PLC will receive commands for beacons lighting.

2.1.2. Roadside unit – signaling

One important component for informing the users/potential users of the delivery spaces are the (Light Emitting Diodes) LEDs. This a dynamic signalling and the chosen beacon is the model SR-30 from Metrolight.



Figure 6: Light signalling

The SR-30 is a two side beacon with six LEDs in its side. Each beacon side has three green LEDs and three red LEDs. Both colours are controlled independently and can be lighted up in a continuous or flashing way. Group of beacons interconnected has been designed for each place in the delivery spaces, to simplify installation on the road.

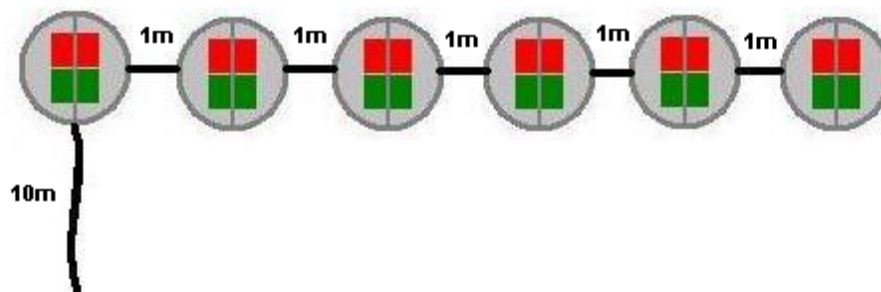


Figure 7: LED set-up at every delivery space

Each beacon in the group is separated one meter from the other. From one of the sides, there is a cable that goes to the identification machine, to the PLC. This are power-cables, so the PLC can turn on and off colours of the beacons, changing the whole group at once.

In the delivery spaces there is also static “signaling”. Figure 8 presents how places are delimited with horizontal painted lines.

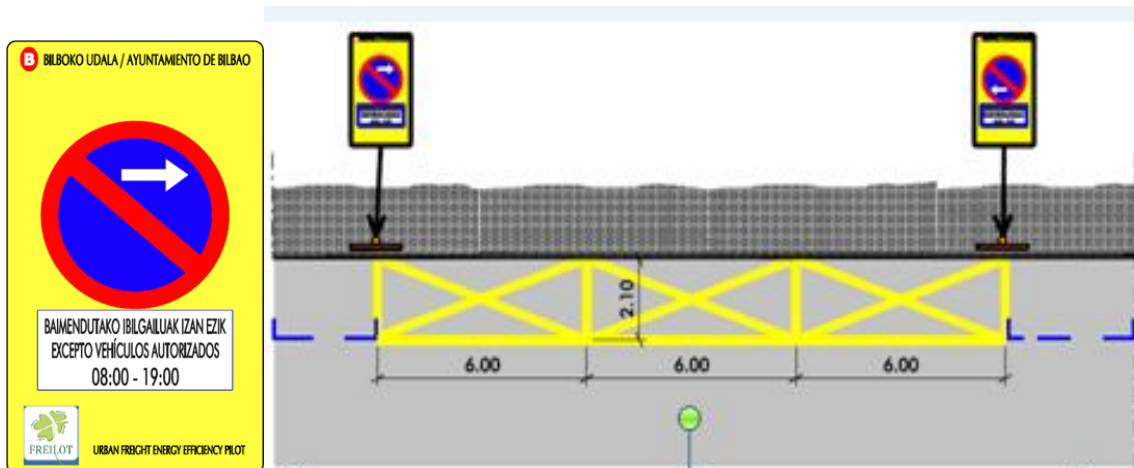


Figure 8: Vertical and horizontal static signalling

Information signs provide information to users about the delivery space using hours.

2.1.3. Onboard unit

The chip cards (Figure 9) are codified with the following data:

- Card id: e.g. 0100
- User id
- User name: e.g. GERTEK
- Company type (not visually visible)
- Vehicle type: It depends on the length of the vehicle. e.g. 1-P
 - 1-P → for vehicles shorter than 6 meters
 - 2-P → for vehicles larger than 6 meters but shorter than 12 meters
 - 3-P → for vehicles larger than 12 meters but shorter than 18 meters

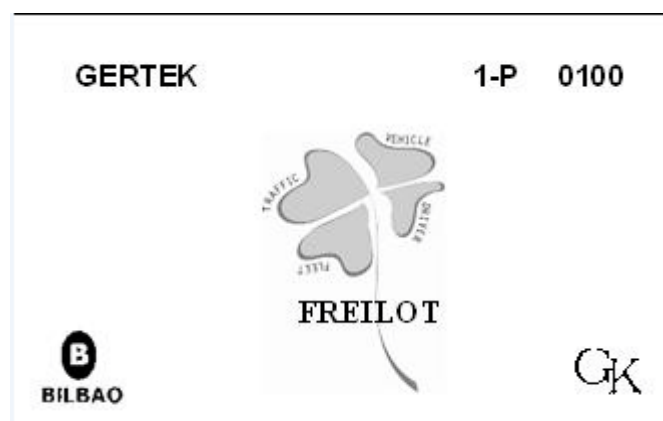


Figure 9: Chip card to identify on the identification machine

2.1.4. Web tool for bookings

On the Web, users can make and manage their reservations. For this purpose, each user is provided with an user and password. Once logged, they enter the principal page (Figure 10) where they can book a time at a specific delivery space.

RESERVA

Tipo de Reserva:

Fecha:

T. Vehículo:

■ Libre
■ Ocupada
■ No disponible

	Licenciado Poza			Pérez Galdós		General Concha		Santutxu 13	
	A	B	C	A	B	A	B	A	B
08:00 - 08:29	Orange	Orange	Orange	Orange	Orange	Green	Green	Orange	Orange
08:30 - 08:59	Orange	Orange	Orange	Green	Green	Green	Green	Orange	Orange
09:00 - 09:29	Green	Green	Green	Green	Green	Green	Green	Green	Green
09:30 - 09:59	Orange	Orange	Orange	Green	Green	Orange	Green	Green	Green
10:00 - 10:29	Green	Green	Green	Green	Green	Green	Green	Green	Green
10:30 - 10:59	Orange	Orange	Orange	Green	Orange	Green	Green	Green	Green
11:00 - 11:29	Orange	Orange	Orange	Green	Green	Green	Green	Green	Green
11:30 - 11:59	Green	Green	Orange	Green	Green	Green	Green	Orange	Green
12:00 - 12:29	Orange	Green	Green	Green	Green	Orange	Green	Orange	Green
12:30 - 12:59	Green	Green	Green	Green	Orange	Orange	Green	Orange	Orange
13:00 - 13:29	Orange	Green	Green	Green	Green	Green	Green	Orange	Orange

Figure 10: Web tool for bookings

First of all, it is necessary to full fill some data:

- Type of reservation
 - Sporadic: one reservation.
 - Periodic: a reservation that repeats for the entire period (periodicity defined by user).
- Date
- Vehicle type: 1, 2 or 3 places.

Figure 11: Web tool for bookings

Then the Web will be uploaded with the situation of the different delivery spaces so that the user can select the place and time for the reservation. Once selected, a dialog window will display to finish with reservation process.

Besides this, users on the Web can delete reservations they do not intend to use and consult their “usage reports”.

The web-portal can be reached through the following web site: <http://bit.ly/cG3twN>

2.2. Selected delivery areas

Figure 12 shows the four selected areas for the delivery space booking in Bilbao.

- Licenciado Poza
- Perez Galdos
- General Concha
- Santutxu



Figure 12: Selected delivery areas marked in yellow

2.2.1. Licenciado Poza

The following image shows the overall situation of the Licenciado Poza delivery area in Bilbao.

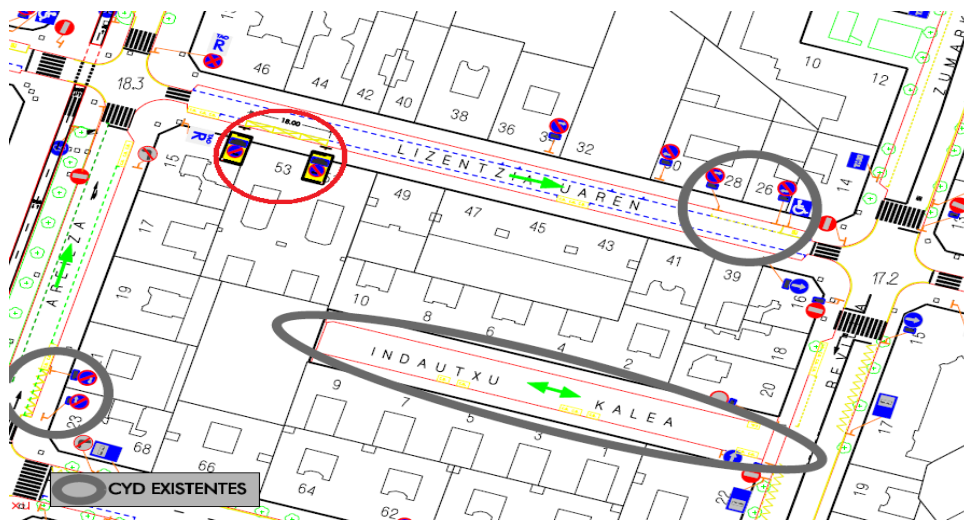


Figure 13: Overall situation of Licenciado Poza with the FREILOT delivery area and conventional ones.



Figure 14: Picture of Licenciado Poza before introduction of the system



Figure 15: Picture of Licenciado Poza with FREILOT system

2.2.2. Pérez Galdós

The following image shows the overall situation of the Perez Galdos delivery area in Bilbao.

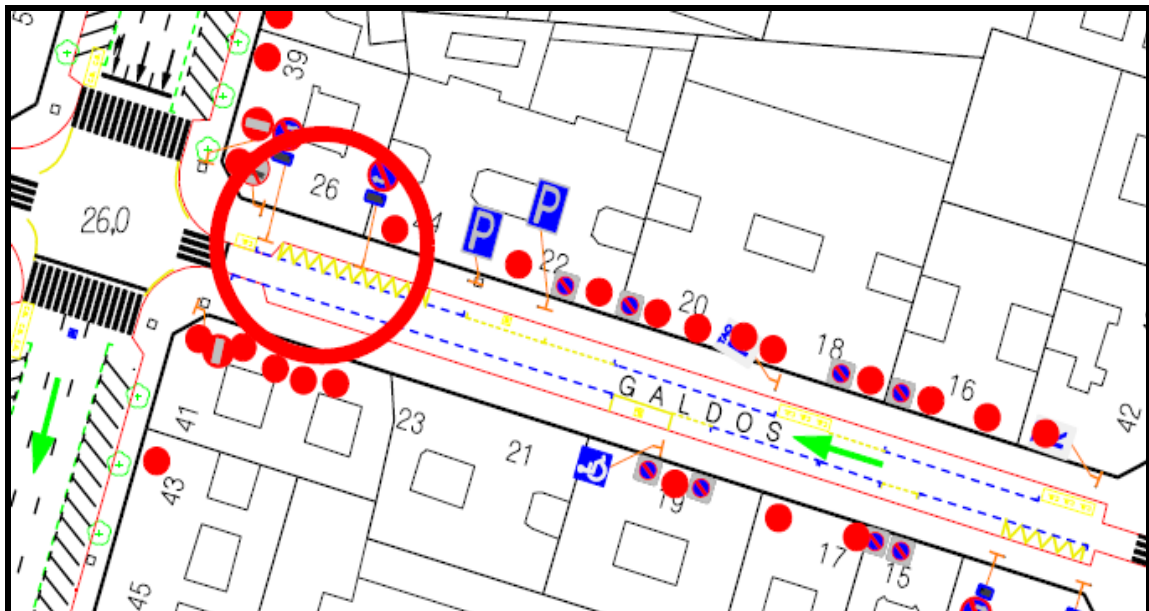


Figure 16: Overall situation of Perez Galdos with the FREILOT delivery area and conventional ones.



Figure 17: Picture of Pérez Galdós before FREILOT installations



Figure 18: FREILOT Delivery Space Booking System in Pérez Galdós

2.2.3. General Concha

The following image shows the overall situation of the General Concha delivery area in Bilbao.



Figure 19: Overall situation of General Concha with the FREILOT delivery area and conventional ones.



Figure 20: Picture of General Concha

The system is installed at this delivery space but not available in a picture.

2.2.4. Santutxu

The following image shows the overall situation of the Santutxu delivery area in Bilbao.

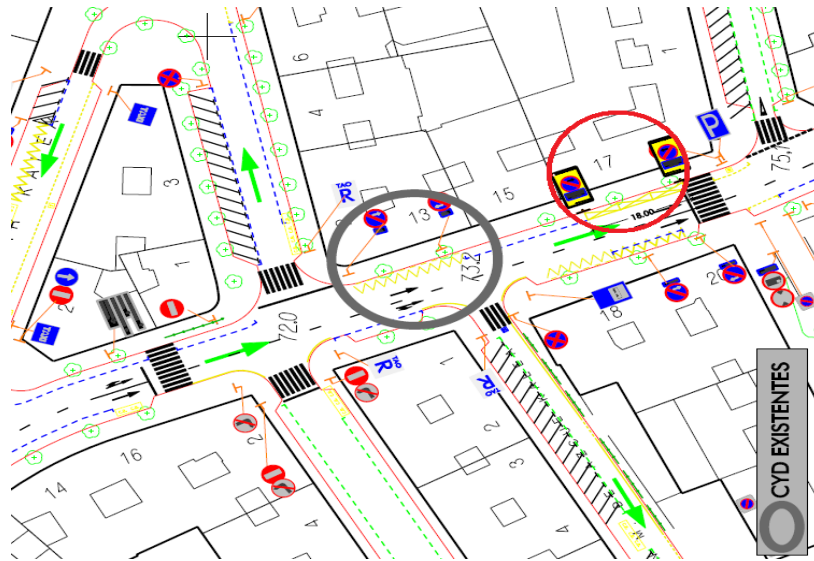


Figure 21: Overall situation of Santutxu with the FREILOT delivery area and conventional



Figure 22: Picture of Santutxu. Current delivery space



Figure 23: FREILOT delivery area. Parking in a reserved place

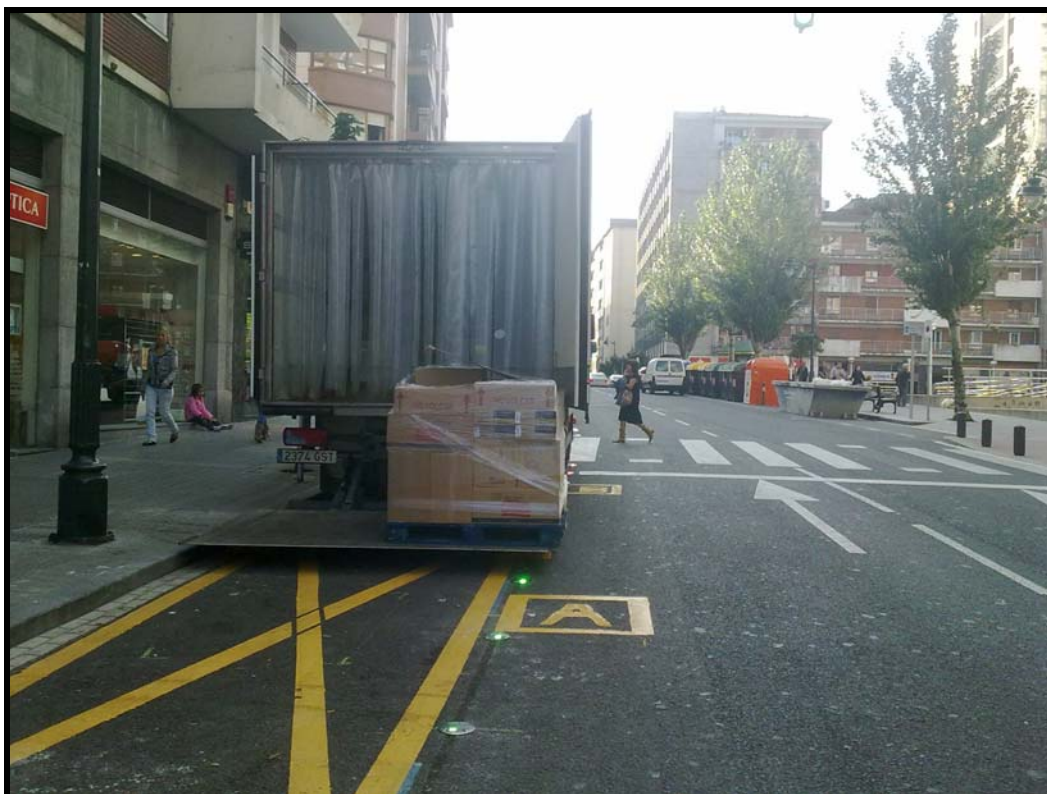


Figure 24: Correctly using space

2.3. Configuration of the delivery space

There are two types of delivery spaces:

- 18 meters long → 3 individual spaces of 6 meters
- 12 meters long → 2 individual spaces of 6 meters

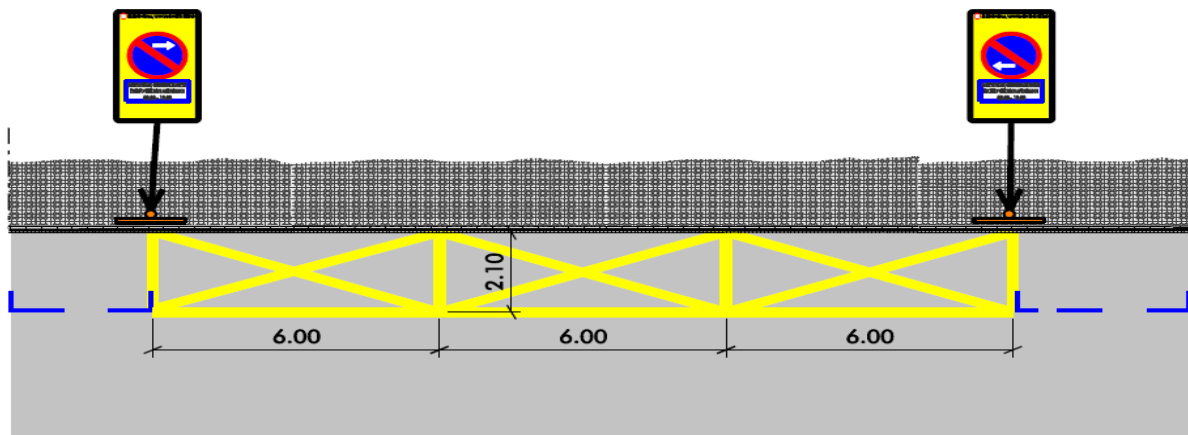


Figure 25: Configuration of the delivery space (18 meters long 3 spaces)



Figure 26: Trucks proceeding with the download operation



Figure 27: Empty delivery space with light in green

2.4. Light protocol

A lighting system allows users and drivers to know the state of the area.

LIGHTS STATUS:

- **GREEN** → available space for booking (at least 25 minutes).
- **FLASHING GREEN** → correctly parked vehicle (booking in use).
- **RED** → reserved space cannot be used.
- **FLASHING RED** → not authorized parked vehicle.
- **SWITCHED OFF** → not scheduled.

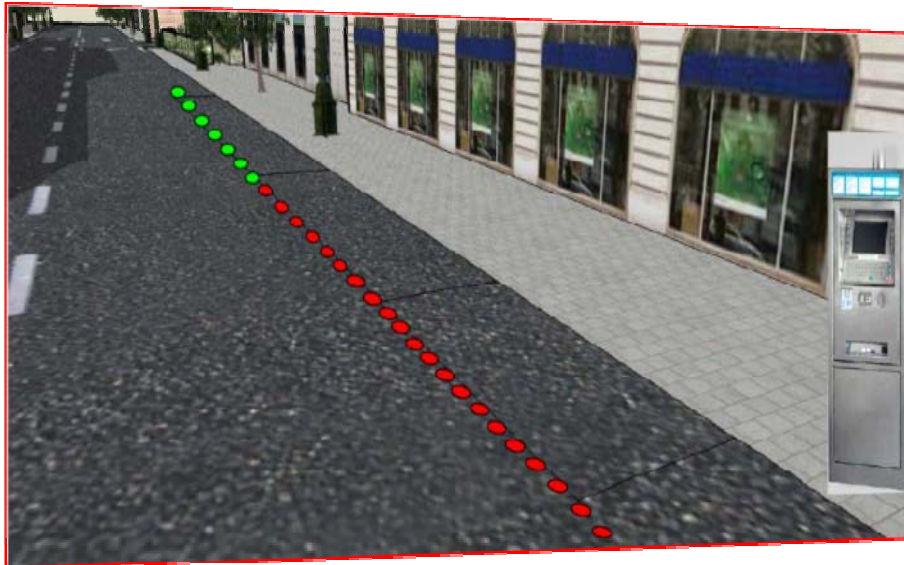


Figure 28: Delivery space with LED's

3. Acceleration Limiter, Speed Limiter and Eco Driving Support

As these three functionalities have similar implementation across the different pilot sites the explanation of System Components and Protocols and file formats will be presented in only one deliverable, D.FL.2.2 Lyon prototype. What is presented in this report is additional information on vehicle installations on the trucks in Madrid.

3.1. Vehicle installations

The installation work to prepare the 3 Nanuk Transportes trucks for the operational phase was done in January 2011. Figures 29-32 present a collage of pictures from the installation works performed at a Renault Trucks workshop in Madrid.



Figure 29: Installation works on the first Nanuk truck



Figure 30: Installation works on the second Nanuk truck



Figure 31: Antenna installations on a Nanuk truck



Figure 32: Driver cabin from before (top left), during (top right) and after (bottom left) installations

Annex I – The list of 16 original fleet operators

Fleet operator	Number of cards/trucks
AZKAR	4
BIZKAI	1
NANUK	1
PATXI	2
ZUBILLAGA	4
MEDRANO	2
VEN	1
UNIALCO	2
ZUBIETA-EROSKI	2
RULASAN-EROSKI	1
EUSKODIS	3
COCA-COLA	2
SEUR	2
MRW	3
DHL	5
Total	35

Annex II – The list of 30 new fleet operators

Fleet operator	Number of cards/trucks
PANRICO	3
CARNICERIA MADARIAGA	1
EDUARDO RUIZ	1
AVINORSA(ARPISA)	1
HNOS LEIVA	1
GREGORIO SOLLANO	1
COMERCIAL YONTXA	2
METRO.MAQUINARIA ELECTROMECHANICA	2
MANTEQUERÍA SANTI	2
COMERCIAL URIARTE	1
ALDEBI	2
ELECTRO VIZCAIA	2
LIMPIEZAS RIVERA	2
AQUA SERVICE	1
MECANOGRAFICA BILBAINA	1
TUSK HOME	1
APLICACIONES LABRADOR	1
ELECNOR	5
SERTRYCO	5
IBON CORMENZANA	1
CASH BASAURI	4
SANEAMIENTOS GRANADA	1
PEDRO SAINZ (EL CORTE INGLES)	8
PARMAX	1
GRANJA HIMA	5
DANONE	1
EUSKOSOL	2
MANUEL RADA	1
CONIFRES	3
RED MARINA PAIS VASCO S.L	3
Total	65