



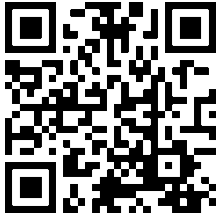
VIDEOBOX USER MANUAL

Feb. '20

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Updated version



Content subject to change.
Download the updated version: www.productselection.net

Important notes

This section contains important safety-related information to be followed when installing, operating and maintaining the equipment. We strictly recommend respecting these rules to avoid damages to devices or machinery and injury or death to people. Please read this manual carefully before beginning any installation, maintenance or operational activity.

-  **Electrical components constantly under high voltage**
-  **Important information for safety and to prevent physical damage**
-  **Important information for a proper use of the system**

Safety notes

Preventive precautions for installation



All personnel involved in the installation of the sensor must use appropriate PPE (Personal protective equipment) in compliance with Legislative Decree no. 9 April 2008, n. 81 "Consolidated Law on Health and Safety at Work" (text coordinated with Legislative Decree 3 August 2009, No. 106).



All personnel involved in the installation of the sensors or must comply with the recommended limits for lifting and manual transport in compliance with Legislative Decree no. 9 April 2008, n. 81 "Consolidated text on health and safety at work" and technical standard UNI ISO 11228.

In any case and following the failure to comply with the above, Carlo Gavazzi declines all responsibility for any damage caused to persons and / or property during or following the installation of the sensors.

Glossary

Parking bay: parking space for vehicles delimited by strips (blue, white, yellow)

System requirements

We assume that installers have a basic understanding of computers, Microsoft Windows and networking.

- **SBPVBE videobox**

One SBPVBE videobox for up to 8 IP cameras

- **IP cameras**

The IP cameras must meet the system requirements

- **Network devices**

Network devices such as Ethernet switches or W-LAN adapters to connect the IP cameras to the SBPVBE videoboxes

Computer with Windows 10 or later

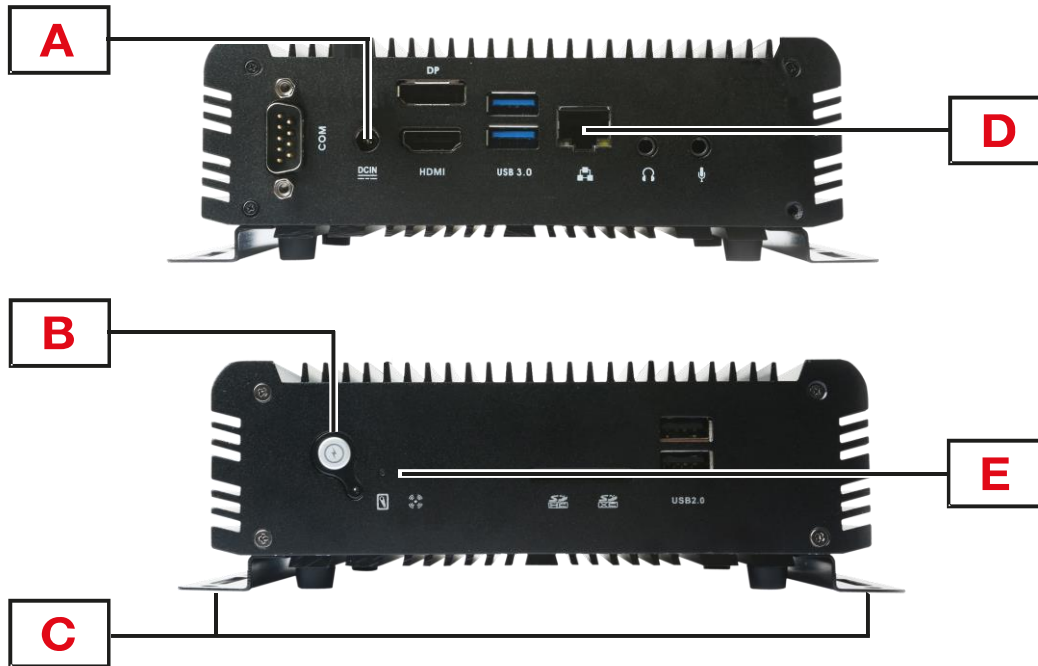
A PC is required to configure the SBPVBE videobox. TeamViewer/Anydesk must be installed

Internet access

The SBPVBE must have Internet access. If a LAN network is not available, a 4G/LTE router must be used

General description

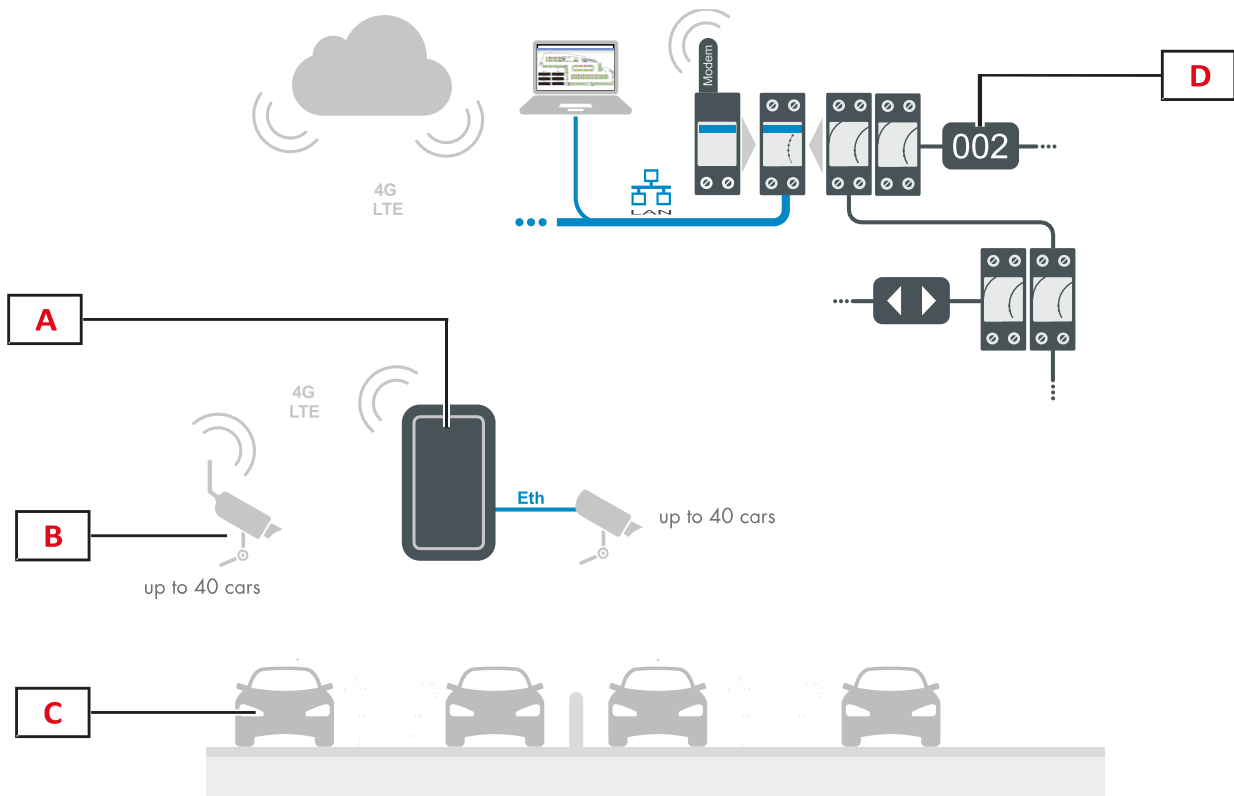
The SBPVBE videobox is part of the Carpark system, which contains other variants of sensors, controllers and displays. We briefly describe the SBPVBE videobox parts:



Part	Description			
A	Plug connector for 12 VDC. Included AC power adapter specifications:			
	<table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>100-240 VAC, 50/60Hz</td> <td>12 VDC, 5A (60W)</td> </tr> </tbody> </table>	Input	Output	100-240 VAC, 50/60Hz
Input	Output			
100-240 VAC, 50/60Hz	12 VDC, 5A (60W)			
B	Power button			
C	L-shape mounting brackets for DIN-rail or VESA mounting			
D	1x Gbps LAN port			
E	LED indicators			

Architecture

The SBPVBE videobox uses IP cameras to detect cars parked in outdoor parking lot. A sophisticated algorithm converts the camera images into occupancy information: no sensitive data (car plate number, people's faces, etc.) are either sent over the Internet or stored. This information will be sent to the cloud in real-time and the CPY Server gathers the information by means of the cloud.



Element	Component	Function
A	SBPVBE videobox	It converts the video-stream into data (occupancy information) and it sends them to the cloud server.
B	IP cameras	They take the pictures of the parking area.
C	Parking bays	
D	UWP 3.0/SBP2CPY System	It gathers occupancy information from the cloud.

System overview

This manual describes the procedures to install the SBPVBE Car Park videobox and gives general instructions to properly place the IP cameras used to detect cars in the parking bays.

Things to know

Each SBPVBE videobox can handle a maximum of 8 IP cameras, therefore, the minimum number of videoboxes for covering an area is the number of IP cameras divided by 8. One camera detects an average of 40 parking bays: this depends on the mounting height, positioning and technical specifications of the IP camera. The videobox works with a wide range of standard IP cameras, even with those already present in the installation if the framing and positioning are compatible with the system requirements.

Since the IP cameras are installed in outdoor spaces, their choice should be properly evaluated according to the weather conditions (fog, cold, humidity, etc.). In case of fog it is essential to equip the IP camera with a fog filter.

Day & night condition

Since the detection algorithm operates continuously, the IP cameras must be able to detect the parking bays also at night time. This means that the parking areas must have an adequate light level.

If the light level is not adequate, or too low, the IP cameras may not recognize the cars and consequently, the occupancy information might be wrongly managed. Should this be the case, it is suggested to evaluate IP cameras with built-in *IR functionality* which ensures that cars can be detected in dark conditions.

Please be aware that most of the IP cameras available in the market, even working without the IR functionality, have better low light response than the human eye. The *minimum illumination* specification refers to the lowest light level (*Lux*) an IP camera is able to recognize the environment.

Refer to the IP Camera’s manufacturers documentation. See the example below:

OPERATIONAL	
IR Viewable Length	30m (98.43ft)
Day & Night	True Day & Night

VIDEO	
Min. Illumination	Color: 0.15Lux (30IRE), B/W: 0Lux (IR LED on)

Note: Please consider that the distance between the IP camera and the furthest car must be less than the **IR Viewable length** an IP camera is capable of.

The installation of the system is designed for outdoor spaces (see the [SBPVBE videobox installation](#) procedure)

Recommended IP camera specifications

The table below shows the recommended IP camera specifications:

Feature	Requirement
Video resolution	2 (Minimum) / 4/ 8 Mpx
Pan / tilt / zoom	They must be disabled before configuring the camera with the SBPVBE algorithm
Video data transmission method	LAN network through UTP/STP cable, better if PoE 4G/LTE network (router is not included)
Required protection degree	For an outdoor installation: IP66 or higher
Video compression	H.264, H.265, MJPEG
Protocols	RTSP, TCP

Note: Regular maintenance guarantees correct functioning of the system. Keep the IP camera's lens clean.

Suggested models

Below some IP cameras are listed which meet the recommended requirements:

Model	Manufacturer
Hanwha Techwin QNO-7010R Hanwha Techwin QNO-7020R Hanwha Techwin QNO-7030R 	https://www.hanwhasecurity.com/
Axis M3106-LVE Mk II 	https://www.axis.com/

Positioning of the IP cameras

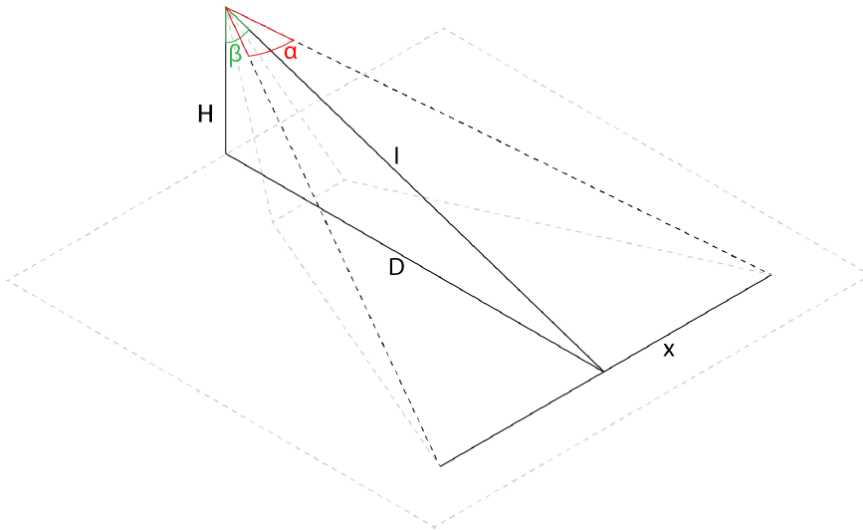


The verification of the site where the IP cameras will be installed is a very important phase: the environmental and physical conditions must be evaluated to avoid detection problems.

Calculation of the covered area

The IP cameras must be positioned at a minimum height of 8 meters (recommended 10 meters) in order to achieve the best coverage.

Consider the following diagram, which graphically shows an assembly configuration:



Parameter	Description
H	Represents the mounting height of the IP camera (min 8 meters)
D	Represents the distance (measured on the ground) between the pole where the IP camera is installed and the parking bays
α	Defines the viewing angle of the IP camera (depends on the IP camera)
β	The angle of tilt (e.g. the angle of tilt of the camera related to the ground)
I	Hypotenuse: To calculate the distance use Pythagoras' Theorem: $\sqrt{H^2 + D^2}$

The **x value** indicates the field of view of the IP camera. This value refers to the parking bays that have to be covered, so this is useful to calculate the total number of IP cameras that have to be used to cover an area.

To calculate the x value, use the following formula:

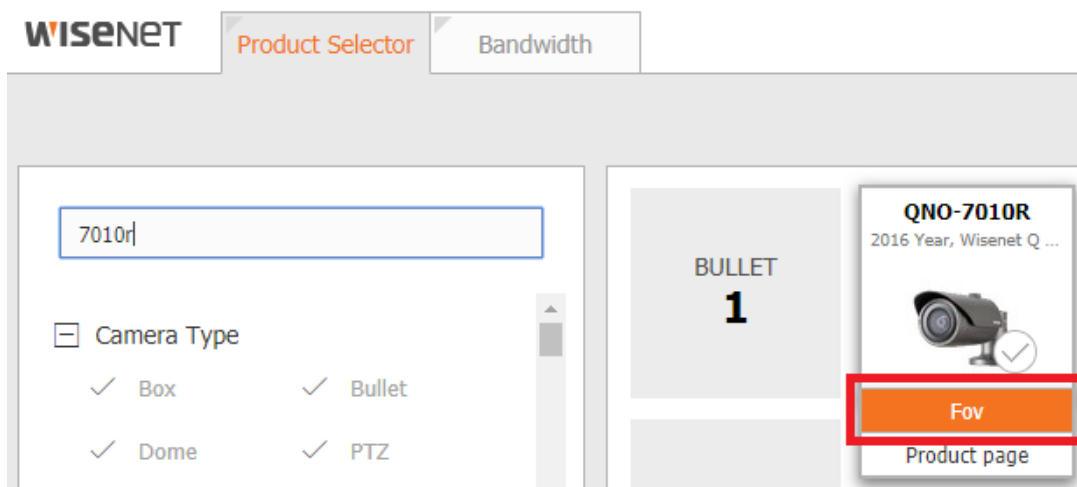
$$x = I * 2 * \tan(\alpha/2)$$

Field of view calculator

Camera's manufacturers generally provide tools to calculate the field of view. The *Field of View Calculator* is a program for calculating the IP camera's visible scene. Fill in the lens format and focal length and distance between lens and object, it will then work out the dimensions of the scene.

For example, here is a link to Hanwa's *Field of View Calculator* for the Wisenet camera NO-7010:

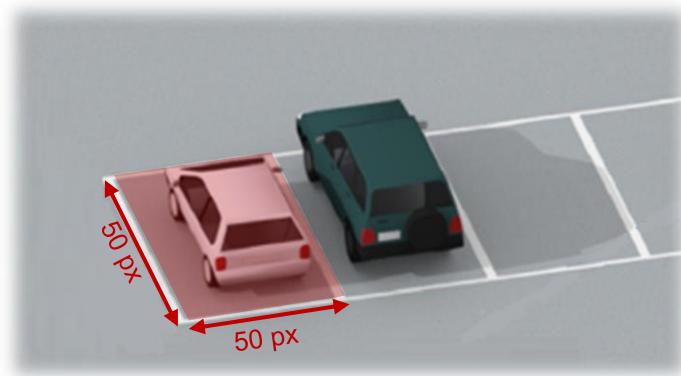
<https://www.hanwha-security.com/wisenettoolbox/index.html#/en/home>



Distance and resolution of the IP camera

The minimum resolution of the IP camera must be evaluated according to the spaces in the installation: the greater is the distance between the IP camera and the parking bays, the higher will be the IP camera resolution.

The positioning is constrained by the camera resolution: a resolution of at least 50x50 pixel is needed to properly detect the car in the parking bay.

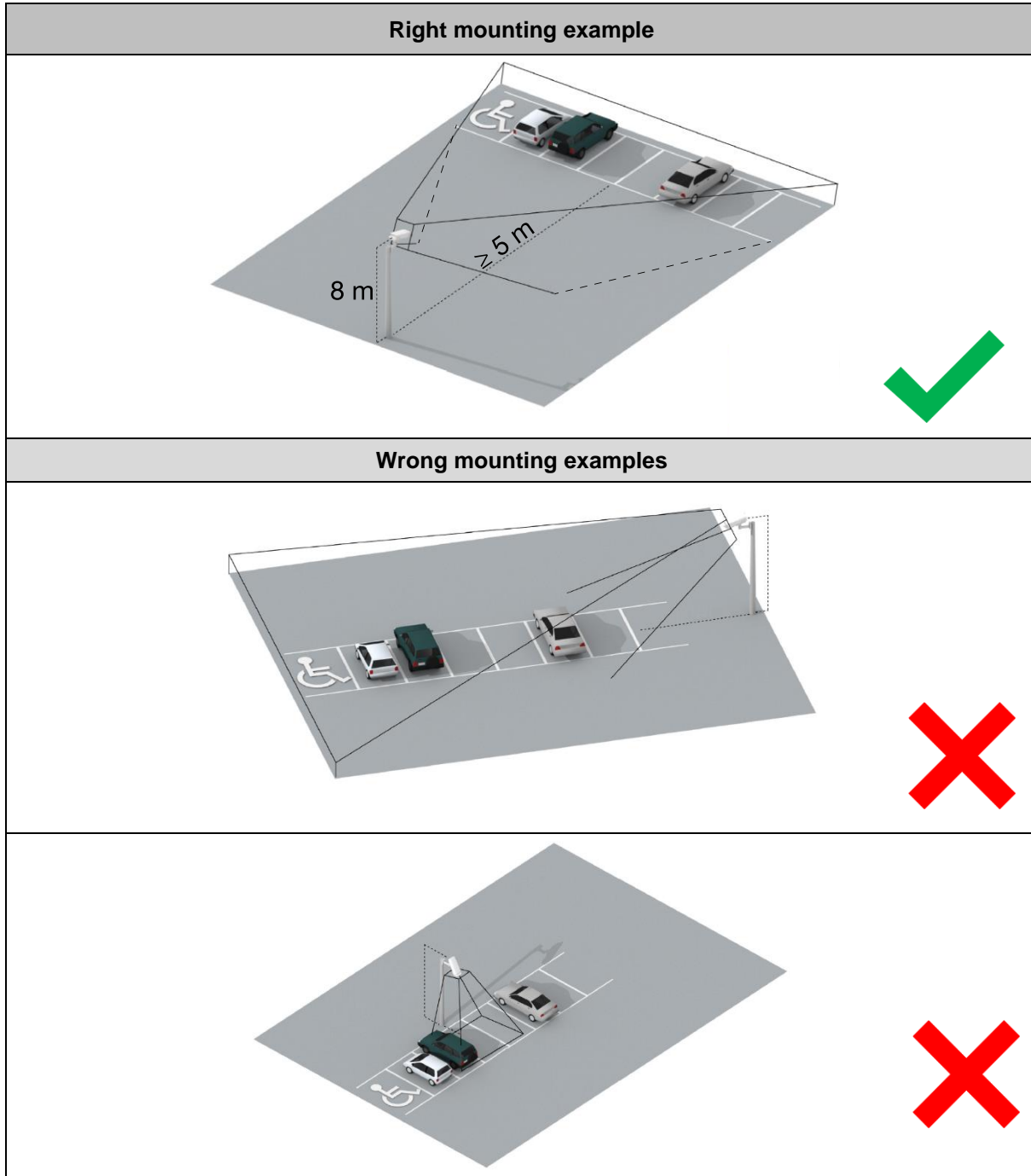


To summarize, these are the guidelines to place the IP camera:

- Install the IP cameras at a minimum height of **8 meters**.
- The minimum distance (measured on the ground) between the nearest parking bay and the IP camera must be at least **5 meters**.
- The IP cameras must be placed in the opposite side of the road from the parking bays and minimizing the presence of any obstacles, type vegetation or other.
- **Each parking bay must be delimited by painted strips.**

Example of positioning the IP camera

Please follow the suggestion below, to define the position of the IP camera. The following examples show general cases of configurations to be adopted or avoided:



N.B. In case of other types of parking facilities or in case of doubts about the positioning of the IP cameras, please contact us.

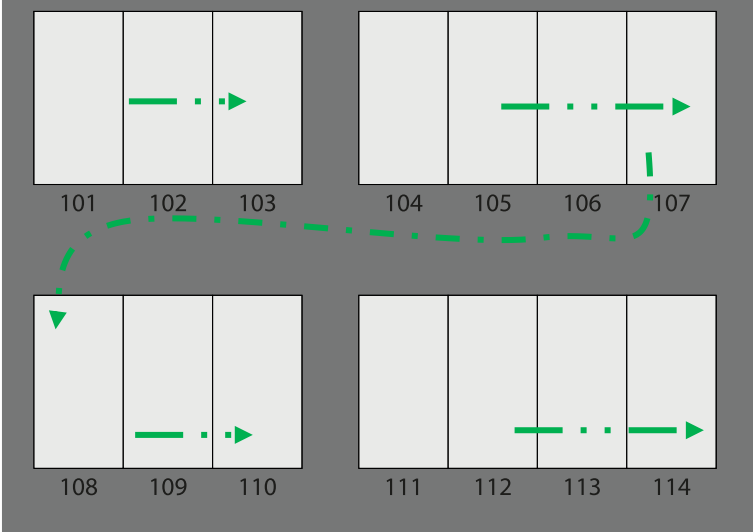
Numbering the parking bays

Arrange a scaled map of the parking area and number every parking bay with an individual number.

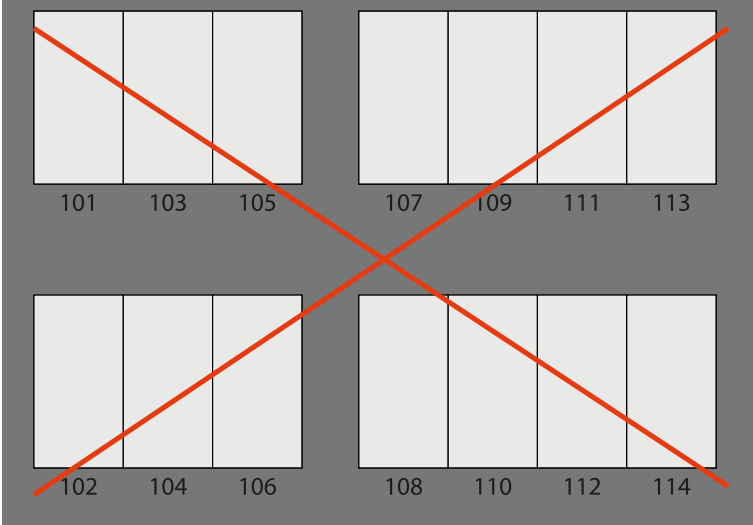
The total number of parking bays is	Start the parking bays numbering with
less than 100	101
between 100 and 1000	1001
higher than 1000	10001

See the indication below to number the parking bays:

Assign to each parking bay a number in line and sequentially as shown below:



Avoid the numbering as below:



Network design

The IP cameras can be connected to the SBPVBE videobox by using network devices, such as:

Device	Description
Ethernet switches	The SBPVBE are connected to the same LAN network by using Ethernet switches.
W-LAN adapters	The SBPVBE are connected to the same LAN network by using W-LAN adapters. To connect the webcams mounted on other poles to the main pole where the SBPVBE is installed



The number of network devices such as Ethernet switches or PoE adapters (and SBPVBE videoboxes) depends on the parking area to be monitored and on the IP cameras needed to cover it.

Below general guidelines are proposed to help the installer to calculate the number of required network devices.

Things to know

One or more Ethernet switches are required to connect one or more SBPVBE videoboxes to one or more IP cameras on the LAN network. The LAN network must have **Internet access and a DHCP Server**. If a LAN network is not available, a 4G/LTE router must be used (the router and the SIM card are not included).

Recommended Ethernet switches specifications

The table below shows the recommended Ethernet switches specifications:

Feature	Specification
Port Standards	IEEE 802.3, TCP/IPv4, TCP/IPv6
Interface	100/1000 Mbps port, RJ45 connector
Number of ports	According to the number of devices (videobox, IP cameras) that have to be connected in the same cabinet
Switching capacity	See paragraph below
PoE	IEEE 802.3at-compliant <i>Note: For Power over Ethernet (PoE) ports to supply the IP cameras, the installer has to consider switches that support this technology, so that a single UTP/STP Ethernet cable can be used for power supply and data</i>

Calculation of the overall switching capacity

The network devices, such as industrial switches or PoE switches, should be selected according to the switching capacity that is required by all the IP cameras that are used in the installation.

The following table shows the bandwidth assessment for streams of different types and resolutions per used camera.

Resolution	Minimum bandwidth	
	H.264	H.265
FullHD@30fps	~ 8 Mbps	~5 Mbps
4K@30fps	~ 28 Mbps	~ 18 Mbps

Note: Please refer to the camera's manufactures documentation

Example

To calculate the overall switching capacity, the sum of the bandwidth consumption of all the IP cameras has to be calculated. For example, if 4K and FullHD cameras are used, the total consumption has to be calculated following the column *Bandwidth consumption* in the table below . H.264 video compression has been selected for all the IP cameras:

Resolution	Quantity	Bandwidth consumption
4K	2	56 Mbps
FullHD	2	16 Mbps
Overall switching capacity		72 Mbps

Suggested models

Below some example of network devices are listed that meet the recommended requirements:

Type	Features	Suggested part number
Industrial Switch	Industrial switch with 4 LAN 10/100/1000 ports and 4 48V PoE ports	Moxa EDS-P206A-4PoE-T
PoE switch	48V PoE switch to supply the webcam on the main pole (the 4 PoE ports of the switch might be used by 3 WLAN devices and other webcams)	Moxa EDS-P206A-4PoE-T
WLAN kit	To connect the webcams mounted on the "slave" poles	Ubiquiti NanoStation

Commissioning guidelines

It is assumed that the necessary infrastructures (poles, road cupboards, ...) have previously been installed. As above described in this manual, the IP cameras have to be mounted on the poles, at a minimum height of 8 meters (recommended height 10 meters).

- a** Provide power for each IP camera (PoE or wiring).

Connect each camera to the LAN network:

- b**
- If the SBPVBE videobox and the IP cameras can be installed on the same lamppost, they can be connected to the same Ethernet switch.
 - Should they be installed at different locations, it is suggested to use W-LAN adapters to connect them together.

For each IP camera, a static IP address has to be set according to the LAN network where the SBPVBE videobox is connected.

The following information must be entered in the appropriate fields in the IP camera's setting page.

IP camera's parameters list

IP Camera name

IPv4 address

Port

Login credentials (username and password)

Manufacturer

Model

Video compression

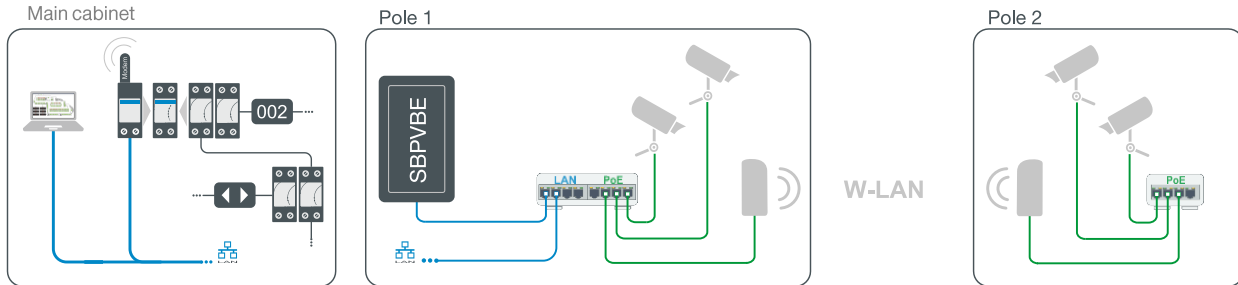
Complete URL of the video stream

N.B: to configure the static IP address of each camera, refer to the manual that comes with the device.

- d** Provide the list of IP cameras and their parameters to Carlo Gavazzi

Architecture example

Please give a look at the diagram below for a clearer understanding:



Location	Devices	Notes
Pole1	1x SBPVBE videobox 2x IP camera 1x PoE switch with 4 PoE ports and 4 Standard Ethernet ports 1 W-LAN adapter	The cabinet contains the PoE power supply and the Ethernet switch with 48V PoE to connect and supply the IP cameras and the W-LAN adapter.
Pole 2	2x IP cameras 1x PoE switch with 4 PoE ports	The IP cameras are powered by PoE and communicate with the SBPVBE by a W-LAN bridge

SBPVBE videobox installation

Installation Warning

WARNING

- Installation must **ONLY** be carried out by a qualified installer.
- Wear appropriate protective clothing / equipment during any maintenance activity.

The Installation procedure involves a series of activities, including work to be carried out on public land. This activity must be carried out in compliance with the local regulations for the safety of workers and strangers (construction site, operational safety plan, signs, fences, etc...).

Things to know



It is assumed that the IP cameras and the network equipment have already been installed and setup and are connected to the SBPVBE videobox(es).

Further readings

The installer can refer to the installation manual available in our Product Selection website:

	Installation manual
SBPVBE	http://www.productselection.net/MANUALS/UK/IM_SBPVBE.pdf

Installation guidelines



The method to install the SBPVBE videobox changes according to the location.

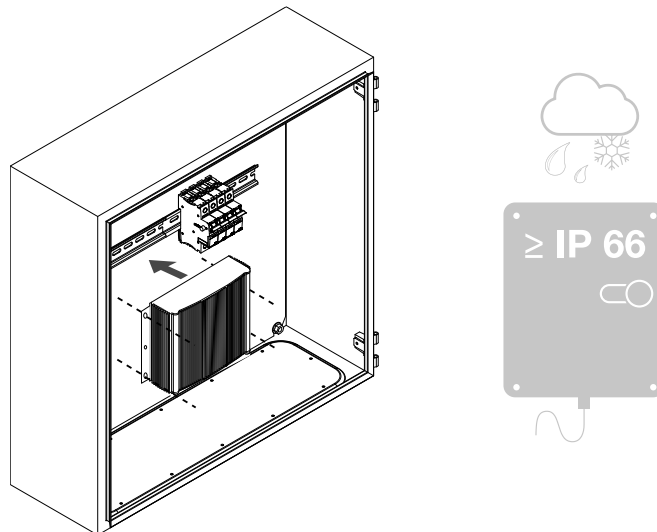
The SBPVBE videobox is designed to be installed into a cabinet mounted on a wall or a pole. The installation can be executed on lamppost, roofs, towers, without visual disturbance, or even in historic centres or in the presence of high-value architectures.

Note: The SBPVBE videobox and IP cameras can be installed on the same lamppost or location.

Step	Procedure
------	-----------

Install the SBPVBE into a cabinet. There should be enough space to accommodate power adapters and the required network devices such as Ethernet switches or PoE adapters or a router

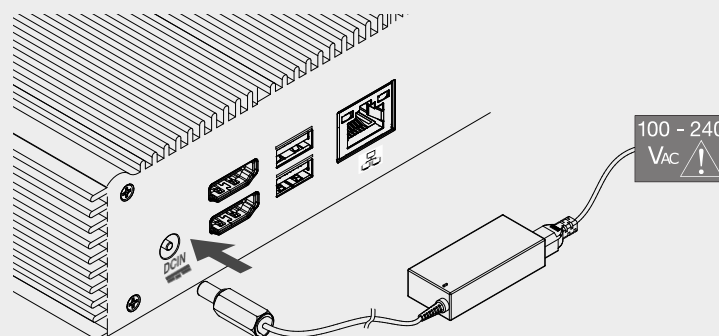
1



Note: For outdoor installation, a cabinet with an IP66 or higher protection degree must be used.

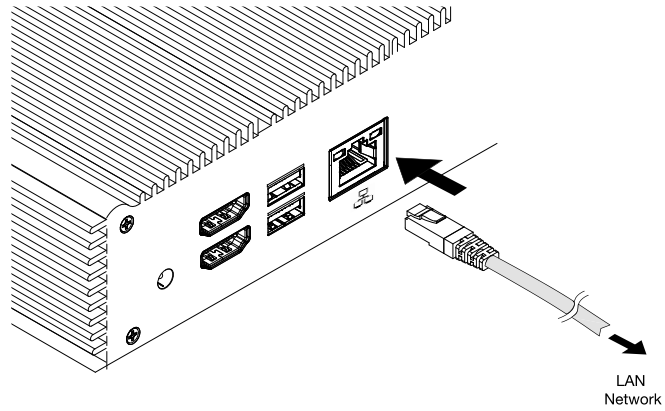
2

Connect the power supply adapter to the 12V power plug



Connect a switch port to the Ethernet port of the SBPVBE by using a UTP-5e cable

3



Suggested cabinet model

Type	Features	Suggested part number
IP66 Box	Polyester general-purpose enclosures	GE ARIA 43 or similar

SBPVBE configuration



The configuration is performed by Carlo Gavazzi. Please check that all the pre-requirement shown below are satisfied before contacting Carlo Gavazzi

Pre-Requirements

- **Connect a Window 10 (or higher) PC with TeamViewer / Anydesk** to the same LAN network of the SBPVBE videobox. The PC must have two network connections:
 - Ethernet used to connect to the switch over the local network.
 - Wi-Fi/Ethernet/USB Modem/Tethering via Bluetooth, for connecting to the Internet.
- Provide to Carlo Gavazzi the list of used IP cameras and the related parameters
- Make sure that the SBPVBE videobox and the IP cameras are connected and powered
- Once the setup has been done by Carlo Gavazzi, access the CPY and add the cloud parameters: it will automatically recognize all the parking bays



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