

VigilCast

- Technical Description -



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1. Introduction to the VIGIL product family

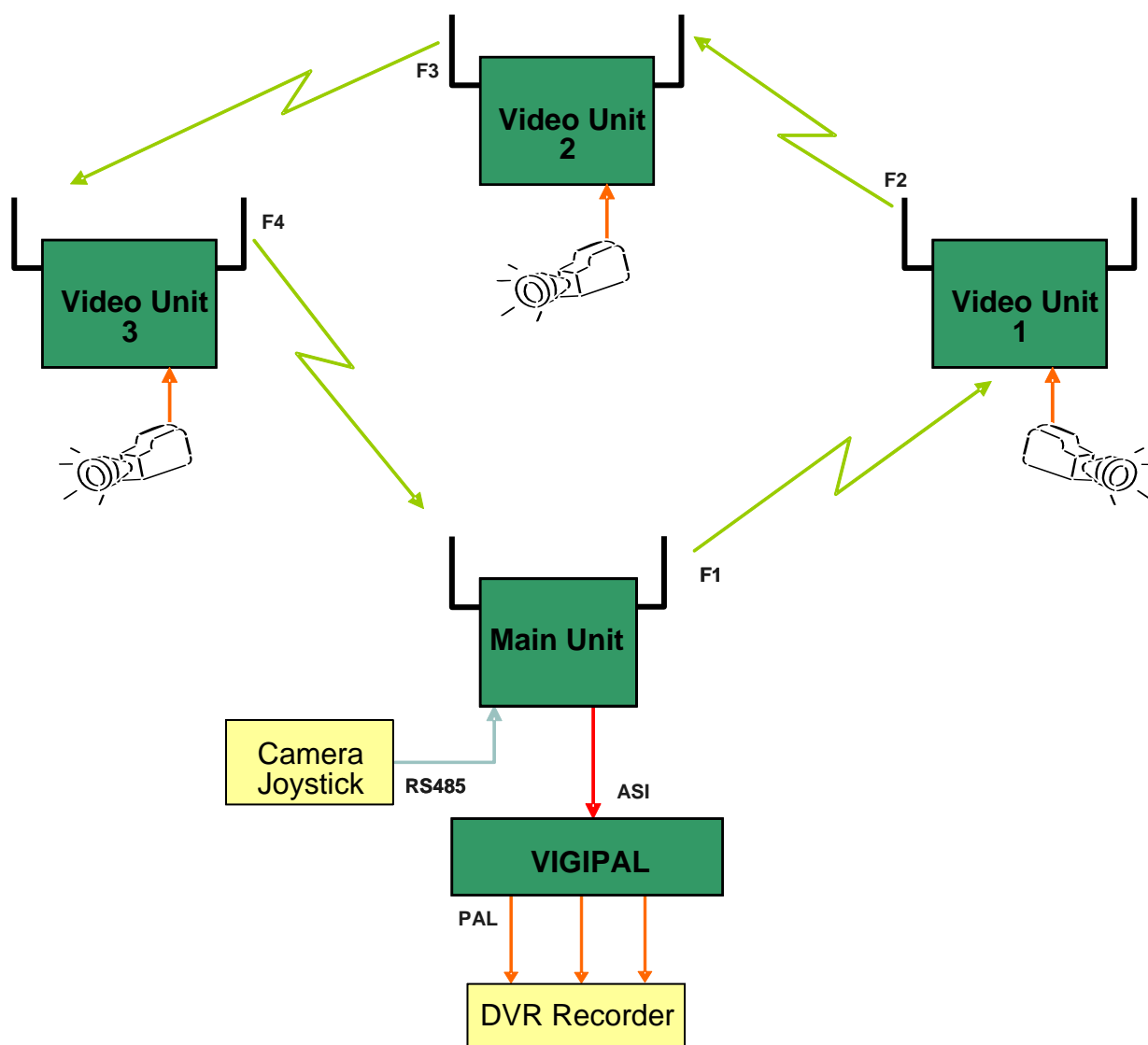
The VIGIL product range makes it possible to implement wireless video surveillance networks with literally dozens of units spaced hundreds of meters apart.

The products take advantage of the innovative technologies of COFDM modulation and MPEG4 video compression, which makes them particularly adapted to application such as the video surveillance of industrial sites, urban areas, road traffic conditions and public events.

The product is designed for fixed point to point use.

The product range is composed primarily of the wireless video surveillance unit VigilCast, and the video decoder equipment VigiPal:

- Video surveillance unit VigilCast: ~TCP-VIG0-1400,
- 8 channels decoder VigiPal: ~TCP-VIG0-1280.



2. Technical Description

2.1 General overview of the VigilCast unit

The VigilCast unit is a unit allowing building wireless video surveillance networks. According to its configuration, the VigilCast unit could be a Video Unit (VU), an Extension Unit (EU) or a Main Unit (MU).

Built in a compact chassis which is proof against the bad weather, the VigilCast unit is equipped with very advanced technologies like:

- The DVB-T demodulation,
- The MPEG4 video compression,
- The ADPCM audio compression¹,
- The DVB-T demodulation,
- The wireless transmission in ISM band (2.4 GHz ... 2.483 GHz).

The ensemble of the VigilCast units is a system of which the start point and the finish point are the Main Unit (MU). Each video unit (VU) (or EU), of which a camera and a microphone could be installed, is linked to the previous link and the following link through a Hertzian link.

The progressive collection principle of the audio and video contributions for each unit is the following:

Each Video Unit (VU) or Extension Unit (EU):

- Receives an uphill signal (from the previous unit or from the Main Unit) which it demodulates,
- Adds its local contribution (video, audio and data) to the demodulated stream,
- Builds a signal by modulating the stream according DVB-T,
- Transmits the DVB-T signal (to the following unit or to the Main Unit).

The Main Unit (MU):

- Receives an uphill signal (which contains the ensemble of the contributions),
- Manages the ensemble of the Video Units,
- Transmits the signal containing the control information (to the Video Units).

¹ Not implemented in VigiPal decoder

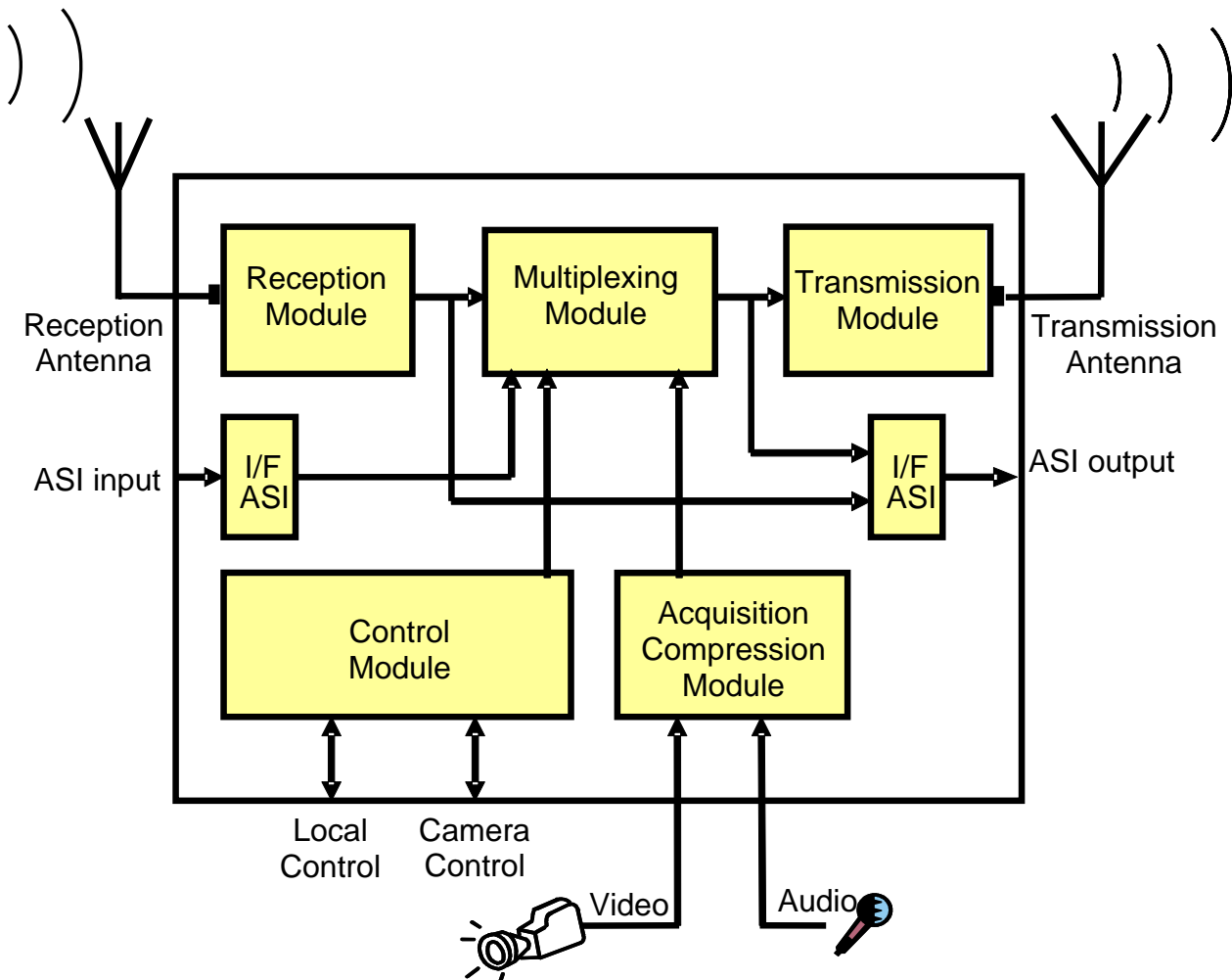
2.2 Block diagram of the VigilCast unit

The VigilCast Unit is made of the following functional entities:

- A reception module,
- An acquisition/compression module,
- A multiplexing module,
- A transmission module,
- A control module.

The control module manages the different functions of the unit and interacts with the outside.

The functional entities are defined as follow:

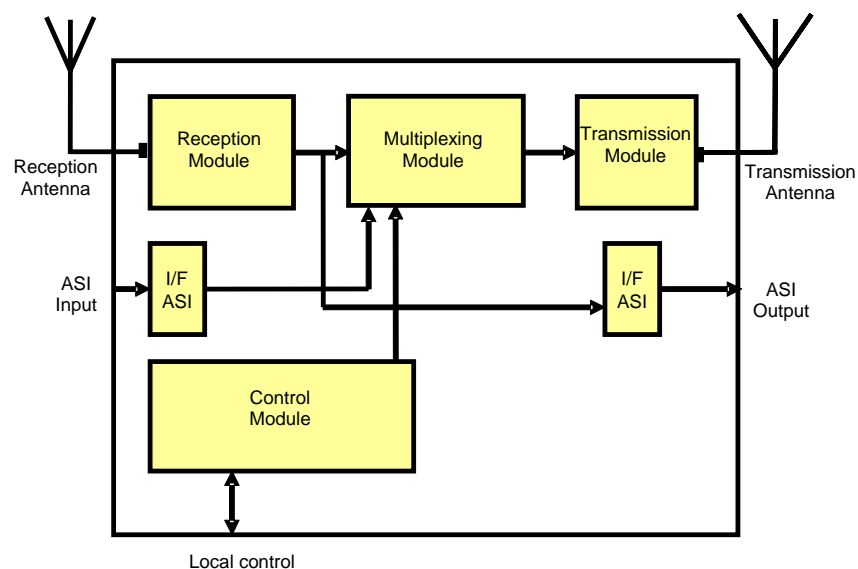


According to its configuration, a VigilCast unit works:

- As a Main Unit,
- As a Video Unit,
- As an Extension Unit².

The following parts give the block diagram for each type of unit.

2.2.1 Main Unit (MU)



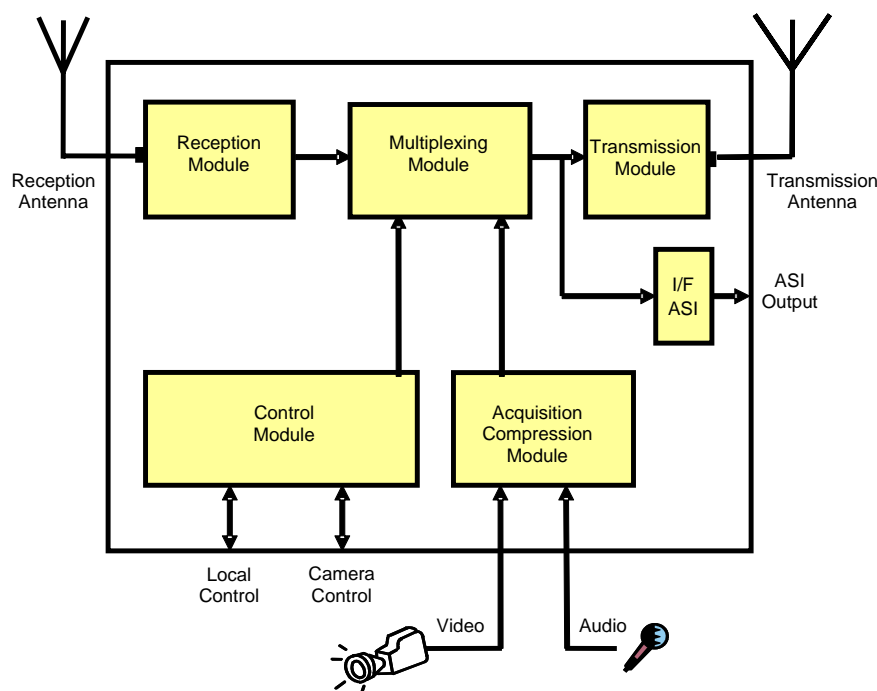
The ASI input is not used.

The ASI output is always activated. This ASI stream is needed by the VigiPal decoder to decode and display the network videos.

Input and output connections of the unit are made through the RF links.

² There are two types of Extension Unit: the Extension Unit with ASI input and the extension Unit with ASI & RF inputs.

2.2.2 Video Unit (VU)



Input connection of the unit is made through the RF link.

Output connection is made through:

- the RF link,
- the ASI link,
- both RF and ASI links.

Note that the ASI output could be used by a VigiPal decoder to decode and display the network videos.

2.2.3 Extension Unit (EU)

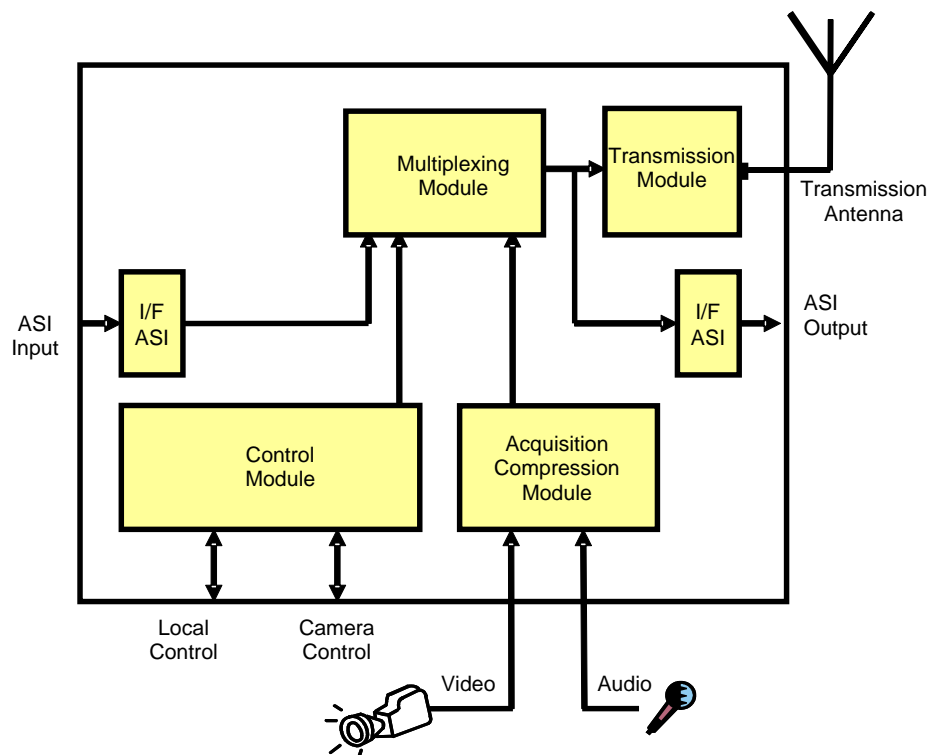
Output connection is made through:

- the RF link,
- the ASI link,
- both RF and ASI links.

Note that the ASI output could be used by a VigiPal decoder to decode and display the network videos.

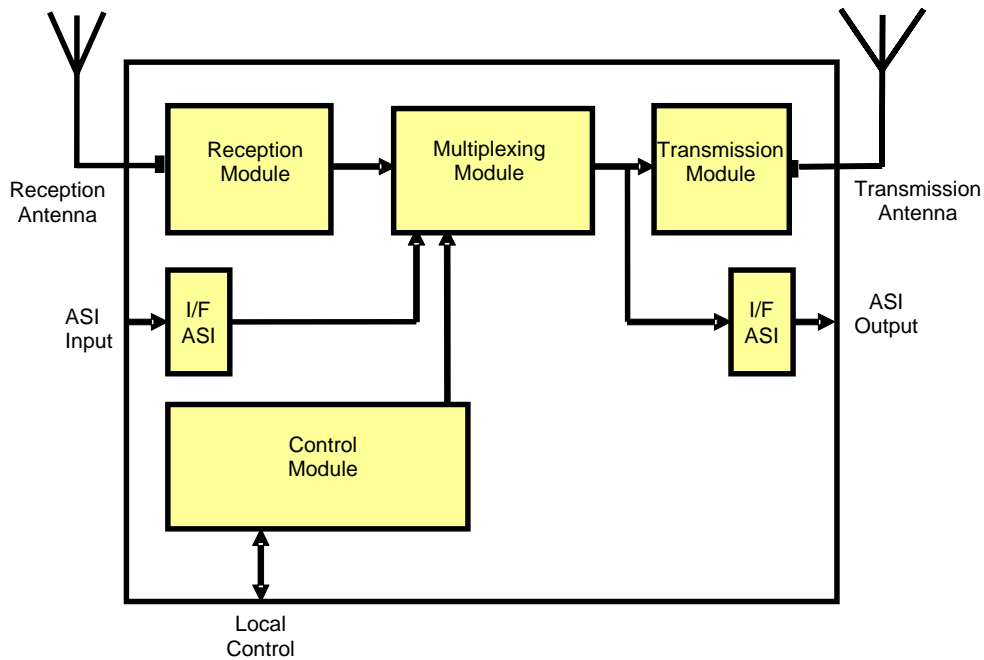
2.2.3.1 Extension Unit with ASI input

Input connection of the unit is made through the ASI link.



2.2.3.2 Extension Unit with RF and ASI inputs

Input connections of the unit are made through the ASI and the RF links.



2.3 Features of the VigilCast unit

2.3.1 RF input/output frequencies

For each unit with a RF output, a channel has to be configured.

For each unit with a RF input, a channel has to be configured.

The selection of the different channels used is done at the network definition phase.

10 channels are available among the following list:

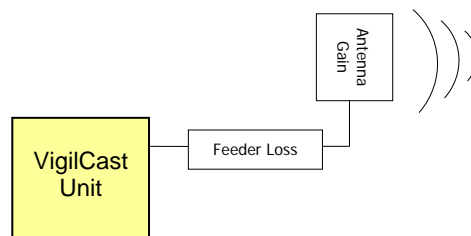
Channel	Center Frequency	Frequency Range
1	2.404 GHz	2.400 GHz to 2.408 GHz
2	2.412 GHz	2.408 GHz to 2.416 GHz
3	2.420 GHz	2.416 GHz to 2.424 GHz
4	2.428 GHz	2.424 GHz to 2.432 GHz
5	2.436 GHz	2.432 GHz to 2.440 GHz
6	2.444 GHz	2.440 GHz to 2.448 GHz
7	2.452 GHz	2.448 GHz to 2.456 GHz
8	2.460 GHz	2.456 GHz to 2.464 GHz
9	2.468 GHz	2.464 GHz to 2.472 GHz
10	2.476 GHz	2.472 GHz to 2.480 GHz

2.3.2 RF output

Configuration	Power
Pmax	200 mW PIRE*
Pmid	50 mW PIRE
Pmin	20 mW PIRE

* Measurement: 197,3 mW.

The 3 power configurations are allowed for all the channels.



Description of the PIRE conditions

The antenna has to be chosen so that the value “Antenna Gain - Feeder Loss” does not exceed 11 dB (at ambient temperature of 25°C). For instance, if the attenuation the cable used between the VigilCast Unit and the antenna is 2dB, the gain of the antenna must be less than 13 dB.

2.3.3 Video bit rate

Each unit manages with video (video unit or extension unit with ASI input) could be configured according to the following list:

Configuration	Bit rate
Qa	2 000 Kbps
Qb	1 000 Kbps
Qc	500 Kbps
Qd	200 Kbps
Video Off	-

2.3.4 DVB-T modulation

The DVB-T modulation of the RF output could be configured with on the six modes defined in the Vigil system.

Mode 1 is the more robust, but allows the smaller bit rate.

Mode 6 allows the higher bit rate, but is the less robust.

Mode	Settings	Bit rate	C/N
1	2K, QPSK, $\frac{1}{2}$, 1/32	6.03 Mbps	5.4 dB
2	2K, QPSK, $\frac{2}{3}$, 1/32	8.04 Mbps	8.4 dB
3	2K, 16-QAM, $\frac{1}{2}$, 1/32	12.09 Mbps	11.2 dB
4	2K, 16-QAM, $\frac{2}{3}$, 1/32	16.09 Mbps	14.2 dB
5	2K, 64-QAM, $\frac{2}{3}$, 1/32	24.13 Mbps	16 dB
6	2K, 64-QAM, $\frac{5}{6}$, 1/32	30.16 Mbps	21.7 dB

2.3.5 Scrambling of the RF link

- To avoid any interference between 2 Vigil networks or more simply the "hacking" of the network, the RF link is coded.

Datas on the RF output are coded by a key with a length from 1 to 512 bits.

Whatever the key length is, an internal algorithm generates a key with a length of 512 bits.

Datas on the ASI output are not coded, because of 2 reasons:

- ASI output could be deactivated,

- A physical access to the unit is needed to get the ASI datas.

The coding key must be the same for all the Vigil network units.

- The coding key can be setted only in FACTORY configuration.
Once a key has been validated on a unit, it is impossible to cancel or modify it.
Once the key configured, it is IMPOSSIBLE to retrieve this key.
The installer has to store the network key in order to be able to configure a new unit to insert it in the network.

In the case where the key is lost, there are 2 solutions :

- Sendind back the unit to factory.
By special process, it is possible to retrieve the key.
This action will be invoiced at an inclusive price.
- Activating of the FACTORY configuration of all the network units and configuration of a new key.

2.3.6 Control of the VigilCast unit

The module could be externally controlled through a RS232 control port or a RS485 control port.

Both interfaces are set with:

- 57600 bauds,
- 8 data bits,
- 1 STOP bit,
- No parity bit.

There is no need to select one or the other port. The module monitors both control ports. Nevertheless only one control port (RS232 or RS485) should be used at a time.

The control port could be used by an external CPU:

- To set the mode of operation of the module and the associated parameters. All these parameters are stored in an EEPROM memory, so that there is no need to initialize the module each time it is powered on, but only when a change of parameter is required.
- To monitor some information from the module and especially status information...
- To download new software versions.

2.4 Performances and technical characteristics

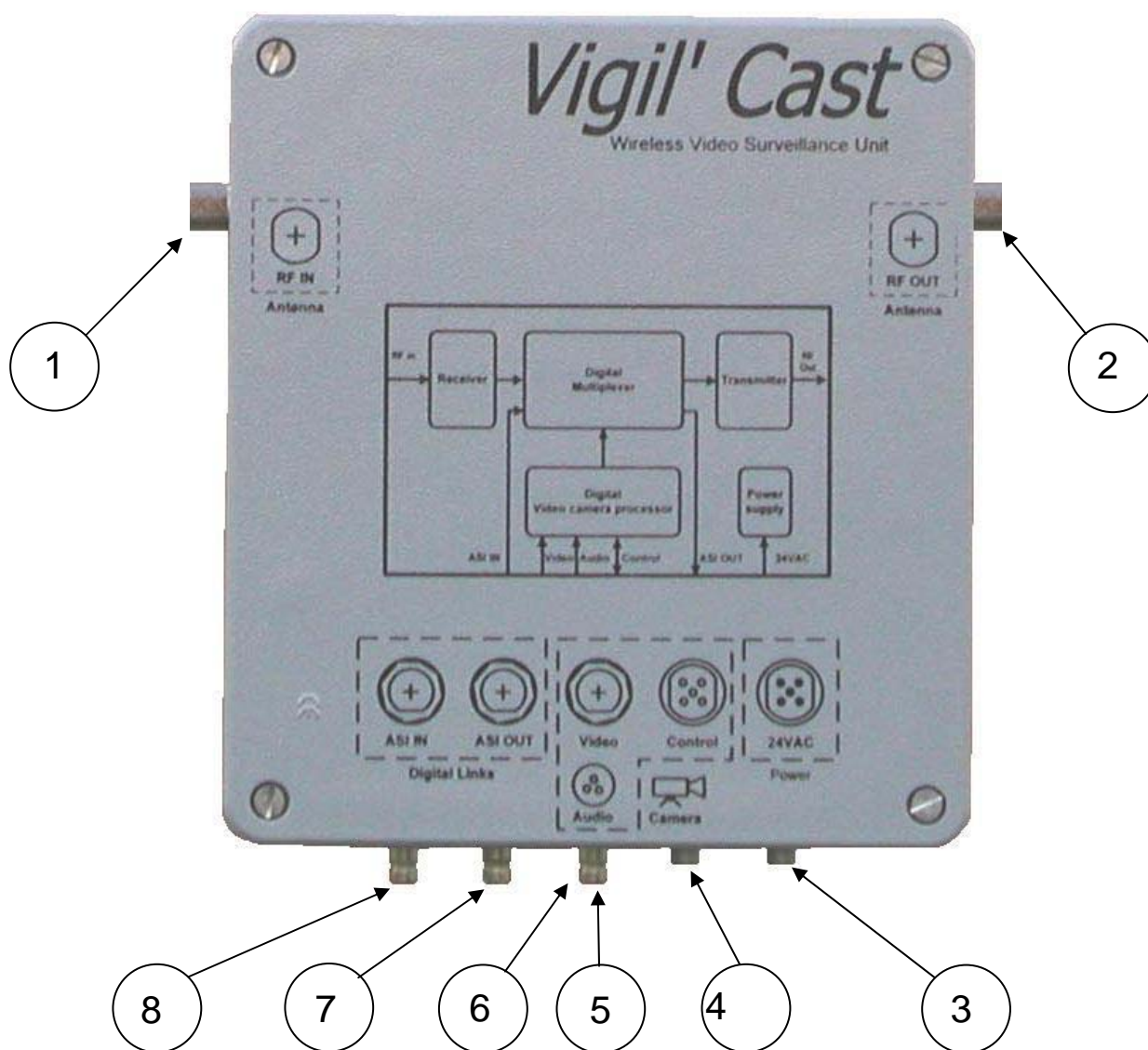
Characteristics	Value
Reception/Transmission	
ISM frequency band	2.400 to 2.483 GHz
Channels number	10
Bandwidth	8 MHz (7.62 MHz at 1 dB)
Output RMS power on 50 Ω load	200 mW
Programmable level adjustment	20, 50 or 200 mW
ROS	< 1.8
Spurious	< - 60 dBc
Input sensivity	See 2.4.2
Maximum RF input level	-20 dBm
Noise factor	< 10 dB
RF connectors	N Female / 50 Ω
Modulation	
Type and standard	COFDM / DVB-T in 2K
MEPG-TS stream	Private Encoding
Modes	See 2.4.2
Bit rates	See 2.4.5
Video coding	MEPG4 4.2.0 frames Simple Profile
Broadcast bit rate after compression	200Kbps, 500Kbps, 1000Kbps, 2000Kbps
Video format	CIF (352x288)
Audio coding	ADPCM / 22Kbps
Audio Input³	
Bandwidth	100Hz at 7KHz
Level	700mV / 600 Ω Symétrique
Connector	3 pins / IP66
Video Input	
Bandwidth	6 MHz
Level	1 Vp-p
Connector	BNC / 75 Ω
Other input and output	
RS485 and RS232	19.2 Kbps – 5 pins female connector
ASI input	DVB-ASI (from 0 to 32 Mbps) BNC / 75 Ω
ASI output	DVB-ASI (from 0 to 32 Mbps) BNC / 75 Ω
Environment	
Power supply AC	24VAC nominal / 20 to 28 VAC
Consumption	< 60 W
Operating temperature	-10° to 50°C
Storage temperature	-20° to 70 °C
Connector	5 pins male
Standards	EN60950 / CE EN 50022 / EN60945
IP protection	IP55
Weight	About 3,6Kgs
Dimensions	270x271x92 mm

³ Not implemented

RF Input sensitivity :

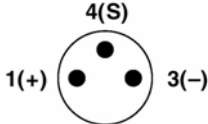
Received Mode	Sensitivity
Mode 1	- 90 dBm
Mode 2	- 87 dBm
Mode 3	- 84 dBm
Mode 4	- 81 dBm
Mode 5	- 76 dBm
Mode 6	- 70 dBm

2.5 Input / Output interfaces



- RF input (1):
 - Connector: Female N,
 - Impedance: 50 Ohms,
 - Input level: -20 dBm...-90dBm.
- RF output (2):
 - Connector: Female N,
 - Impedance: 50 Ohms,
 - Output level: 0 dBm (Pmin), 5 dBm (Pmid) or 10 dBm (Pmax).

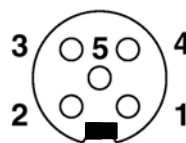
- Video (5):
 - Connector: Female BNC,
 - Impedance: 75 Ohms,
 - Signal format: Composite video according to the PAL standard,
 - Maximal level: 1 Volts p-p.

 - Audio (6):⁴
 - Connector: M8, 3 female points,
 - Impedance: 600 Ohms,
 - Signal format: symmetrical mono audio,
 - Maximal level: 700 mV (0 dBu),
 - Cabling:
 - 1 = Audio_IN+
 - 3 = Audio_IN-
 - 4 = GND
- 
- ASI out (7):
 - Connector: Female BNC,
 - Impedance: 75 Ohms,
 - Signal format: MPEG-TS, 188 bytes per packet, burst mode.

 - ASI in (8):
 - Connector: Female BNC,
 - Impedance: 75 Ohms,
 - Signal format: MPEG-TS, 188 bytes per packet.

2.6 Power requirements

- Power supply (3):
 - Connector: M12, 5 male points,
 - Voltage:
 - 24 VAC (20 to 28 VAC),
 - Frequency: 47-63 Hz,
 - Max. current: 3A,
 - Cabling:
 - 1 = 4 = 24 VAC / DC
 - 2 = 3 = 0 VAC /DC
 - 5 = ground



⁴ Not implemented