

MB-1 Single channel video analytics encoder module datasheet

1. Product overview

1.1 Introduction

MB-1 is a high performance, temperature hardened, ONVIF compliant, video analytics encoder module for mission critical customers in Defense, Transportation and Energy Infrastructure.

MB-1 enables ONVIF-based video and analytics on thermal, television other special purpose cameras with analogue output.

MB-1 fits a standard camera housing and delivers DVD-like quality video and accurate analytics metadata from analogue cameras to ONVIF network video clients (NVC).

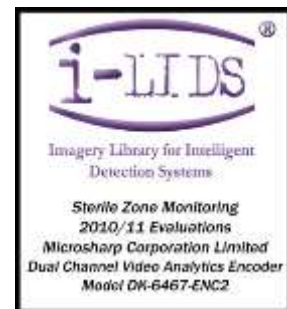
MB-1 features Fast Ethernet network connection, one analogue video input (BNC and JACK MCX connectors) and digital I/O interfaces.



1.2 Embedded video analytics

MB-1 is self contained video analytics machine enabling robust object detection in an outdoor environment, rule-driven event recognition and advanced tracking features such as multiple camera tracking, real-time map positing and PTZ camera targeting.

The encoder is i-LIDS[®] approved primary detection system both for operational alert use and event recording in sterile zone monitoring applications. i-LIDS[®], the Image library for intelligent detection systems, is the UK government's benchmark for video analytics systems.



MB-1 embedded video analytics is optimized to run on DSP at the native resolution and frame rates to ensure maximum accuracy. This concept embedded analytics ensures scalability and avoids bottlenecks in large networks.



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1.3 Native ONVIF support

The encoder is based on ONVIF, the global standard for the interface of IP-based physical security products. The ONVIF specification ensures interoperability between MB-1 and video management systems (VMS), network video recorders (NVRs) and other third-party products.



Unlike competitor encoders, MB-1 is natively based on ONVIF and use no other proprietary protocol for its advanced functionality. All the following features are implemented in accordance with the ONVIF standard:

- 1) Network device discovery
- 2) Live video streaming
- 3) Video compression configuration
- 4) Video analytics configuration
- 5) Event and metadata configuration
- 6) Rule management for alerts
- 7) PTZ camera control
- 8) Firmware update

1.4 Open source ONVIF Device Manager and ONVIF NVC Library

ONVIF Network Video Client (NVC) Library implements the protocol to manage video analytics devices such as MB-1. Based on the library, ONVIF Device Manager is a Windows application providing the graphic user interface (GUI). Both the application and library are developed by Synesis and released to the public domain under GNU GPL. This free software is written in C#, F# and C++ are useful to implement video analytics GUI in third-party systems. The source code and binaries are available at <https://sourceforge.net/projects/onvifdm/>.

1.5 Customization options

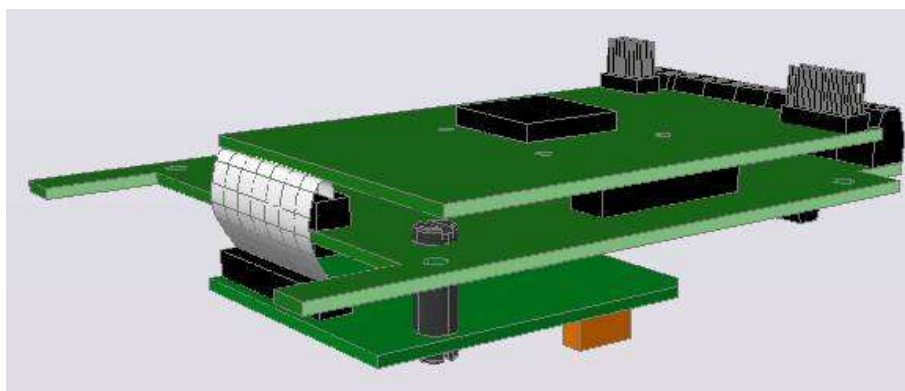
The encoder can be customized both on the ARM side (Linux-based middleware) and DSP side (video analytics and codecs). Examples of customization include custom protocol handling (in addition to ONVIF), third-party device support (over USB and RS485 interfaces) and custom video analytics.

1.6 Main profile H.264 encoding

The encoder features high quality H.264 (MPEG-4 Part 10 / AVC) with Main Profile (MP) and Basic Profile (BP) and Variable Bit Rate (VBR) control algorithm targeting low latency applications.

1.7 Hardware configuration options

MB-1 is available in single or dual channel versions. Instead of PAL/NTSC decoder, a high definition (HD) sensor front-end can be connected to the encoder over its digital interface.



Video analytics module design:

- 1) processor board (top);
- 2) carrier board (middle);
- 3) encoder board (bottom)

2 Specifications

2.1 Hardware

2.1.1 Operating environment

Operating temperature range	- 40° ... +50° C
Storage temperature range	- 50° ... +70° C

2.1.2 Video input

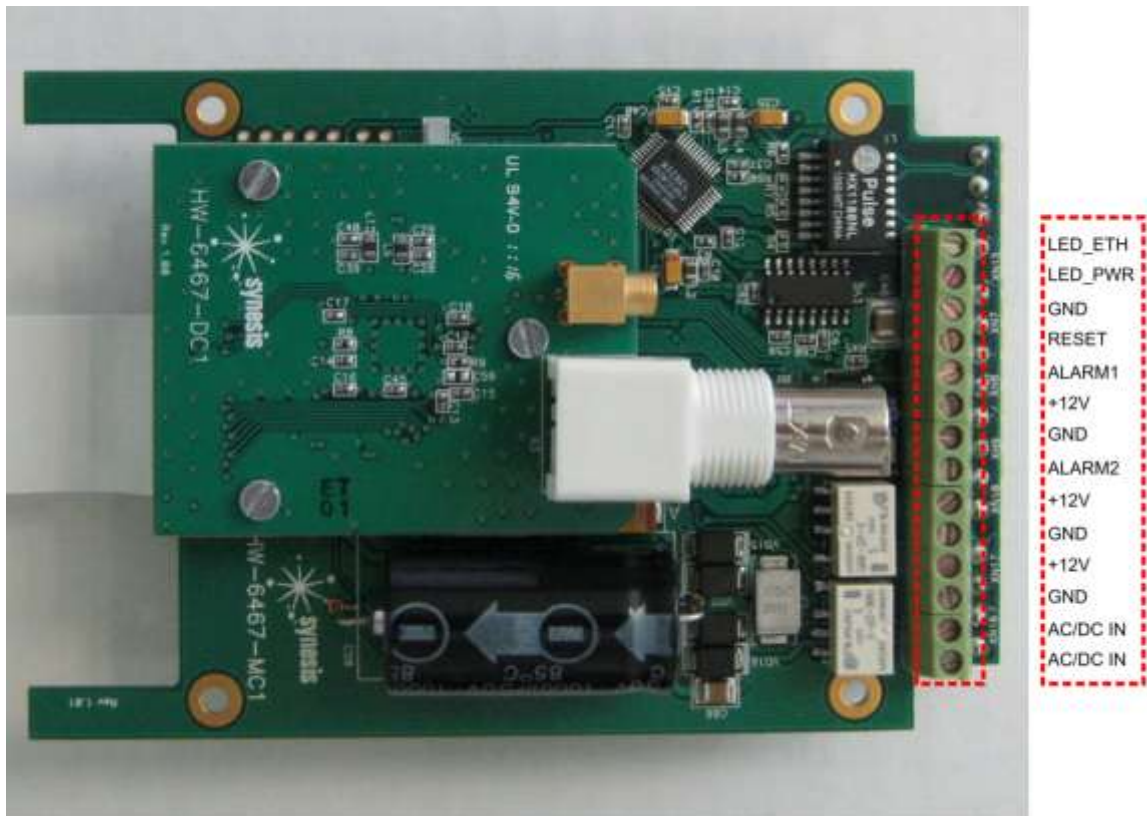


Video decoder	Composite (M, J) NTSC, NTSC 4.43, (B, D, G, H, I, N, M) (Combined-N) PAL, PAL 60, SECAM
Connectors	BNC 75 ohms RADIALL R213665000 - JACK MCX, right angle, 75 ohms

2.1.3 Clump connector specification



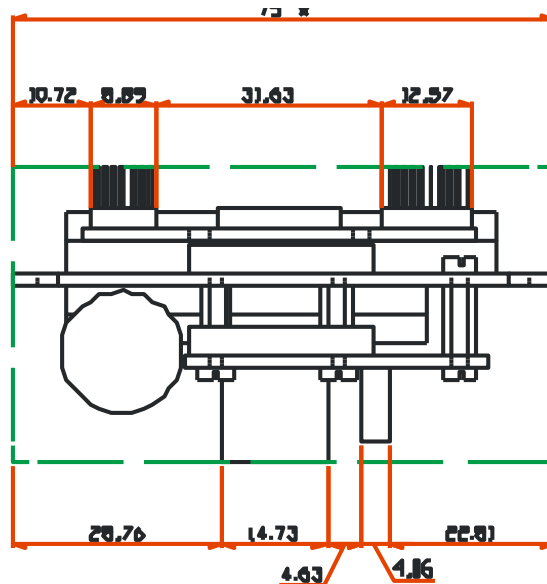
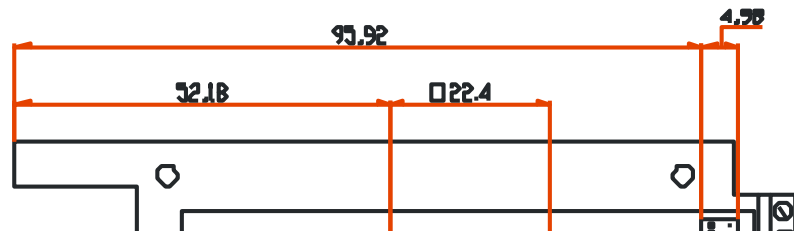
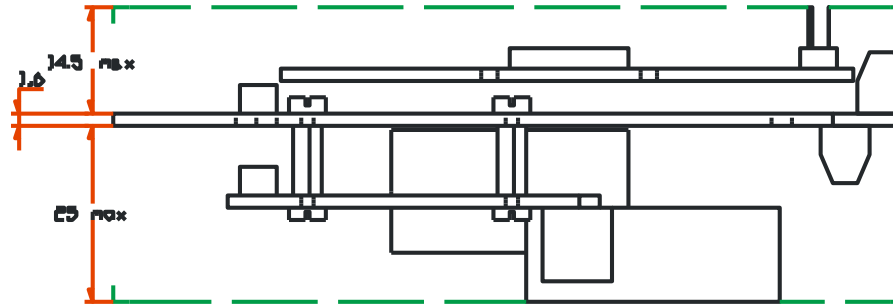
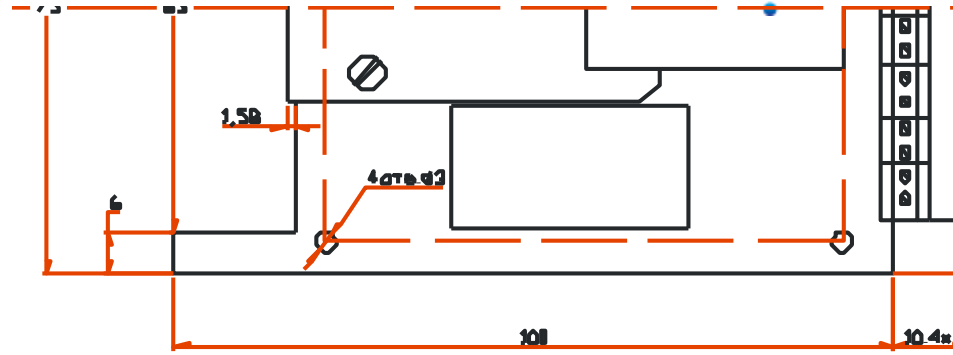
XN6.2	REL2.2	Relay output 2
XN6.1	REL2.1	Normally open DC up to 60B 1V AC up to 125B 0.6V
XN5.2	REL1.2	Relay output 1
XN5.1	REL1.1	Normally open DC up to 60B 1V AC up to 125B 0.6V
XN14.2	TX-	RS485
XN14.1	TX+	Up to 1 Mbps half duplex
XN13.2	GND	
XN13.1	RX-	
XN12.2	RX+	
XN12.1	TX	RS232
XN11.2	GND	Up to 250 Kbps
XN11.1	RX	
XN2.2	TXRXN_BXRX (TX-)	10/100 Base-T Ethernet
XN2.1	TXRXP_BXRX (TX+)	Auto-sensing
XN1.2	TXRXN_A (RX-)	Half/full duplex
XN1.1	TXRXP_A (RX+)	



XN15.2	LED_ETH (diode cathode)	External Ethernet LED
XN15.1	LED_PWR (diode anode)	A resistor of at least 510 ohms is required to limit the current, serially connected On – connection present Flashing – data transmission
XN7.1	GND	Reset button (Normally open)
XN7.2	RESET	
XN8.1	ALARM1	Alarm input 1 Normally open or normally closed 12V 20 mA (without 12V DC input) 12V 50 mA (with 12V DC input)
XN8.2	+12V out	
XN9.1	GND	
XN9.2	ALARM2	Alarm input 2 Normally open or normally closed 12V 20 mA (without 12V DC input) 12V 50 mA (with 12V DC input)
XN10.1	+12V out	
XN10.2	GND	
XN17.1	+12V in	12V DC input for external sensors 50 mA max
XN17.2	GND	
XN16.1	AC/DC IN	DC 9-35V, AC 8-27V 50-60 Hz 6W typical, 9W max
XN16.2	AC/DC IN	

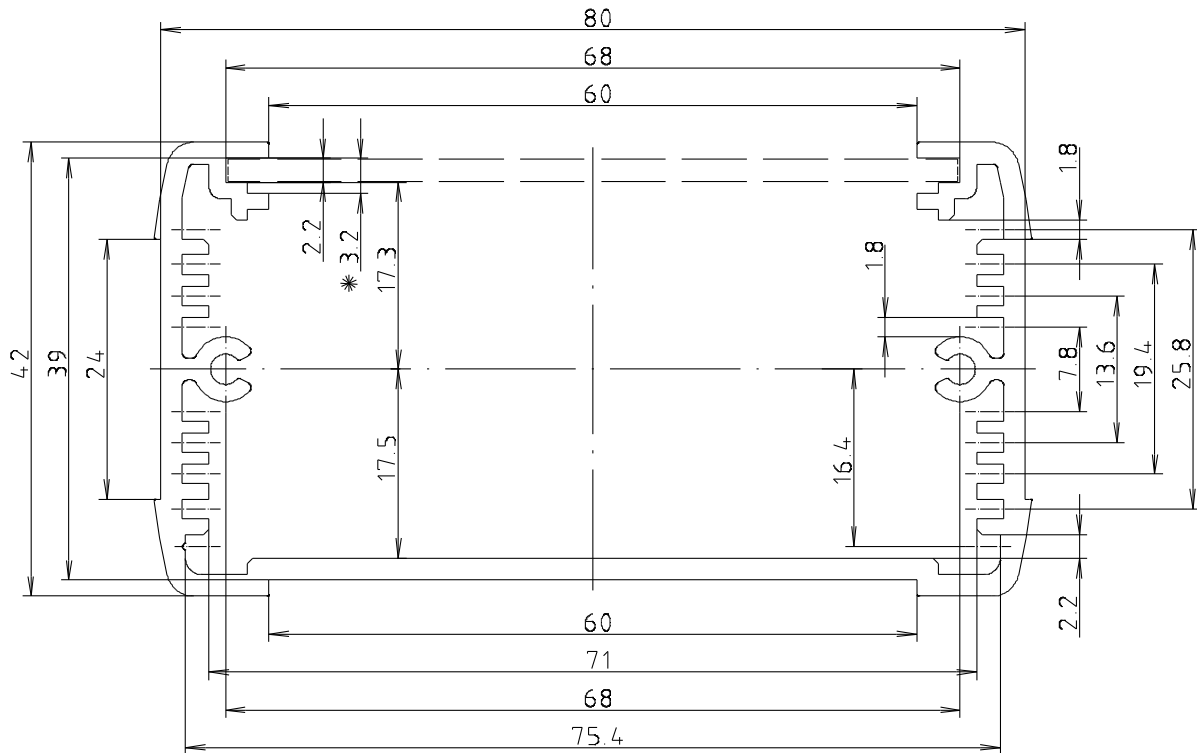
2.1.4 Mounting and dimensions

Mounting holes	4 x M2.5
Dimensions	114 x 75 x 41.1 mm
Weight	150 g (approximate)



2.1.5 Recommended enclosure

ELPU 840



BOBLA U-shaped profile, part number 83847100.S1

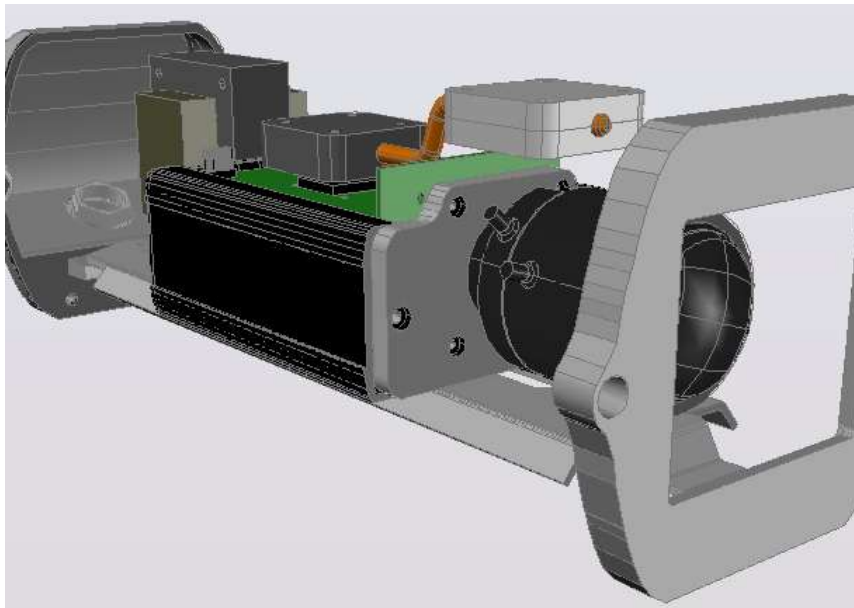
http://www.bopla.de/index.php?id=65&tx_commerce_pi1%5BcatUid%5D=487&tx_commerce_pi1%5BshowUid%5D=8788&cHash=e3eda38b5c&L=0

2.1.6 Recommended outdoor camera housing



WizeBox Street SVS26 24V

http://www.wizebox.com/index.php?id_page=14&id_catalog_group=163&id_catalog_item=424



Assembly of the video analytics module, BOBLA U-shaped profile and WizeBox Street SVS26

2.2 System software

Operating system	Linux kernel 2.6.18, libc 2.5.90 MontaVista Linux 5.0, BusyBox v1.9.1
Application software	Synesis MW-ONVIF-NVT
Network video protocol	ONVIF 1.02 (upgradeable to ONVIF 2.0)
Supported services	<ol style="list-style-type: none"> 1) Network device discovery 2) Live video streaming 3) Video capture configuration 4) Video compression configuration 5) Video analytics configuration 6) Event and metadata configuration 7) Rule management for alerts 8) Firmware update 9) Network storage recording 10) PTZ camera control
Network protocols	Data: RTP, UDP, TCP, IP, RTSP, RTCP, HTTP, XML Management: ONVIF 1.02, DHCP, SSH, Telnet General: DHCP, DNS, ICMP, IGMPv3, ARP, NTP, QoS
Firmware upgrade protocol	ONVIF 2.0 (HTTP POST)
PTZ-camera control	ONVIF 1.02 to Pelco D, Pelco D Extended over RS485 Automatic camera targeting using video analytics

2.3 Embedded video analytics

Scenarios	<ol style="list-style-type: none"> 1. Perimeter security / sterile zone 2. Railway safety/security 3. Automatic camera targeting 4. Multiple camera tracking
Algorithms	N. Ptitsyn, <i>Embedded video analytics for object detection and tracking using multiscale features</i> , Proceedings of GraphiCon'2010, 20th International Conference on Computer Graphics, Computer Vision, Image and Video processing, Saint-Petersburg, 20-24 September 2010 http://synesis.ru/en/surveillance/contents/multiscale-va
Maximum number of simultaneous targets	10
Performance indicators	$F_1 = 0.99$ for operational alert role $F_1 = 0.99$ for event recording role i-LIDS® approved primary detection system both for operational alert use and event recording in sterile zone monitoring applications
Tampering detectors	See section 2.4.2
Rule-based event recognition	See section 2.4.4
Control parameters	Contrast sensitivity (16 levels) Special sensitivity (16 level) Scene stabilization time Object dimension range Object speed range



Digital image stabilizer (antishker)	Multiple scale image analysis Quarter pixel estimation and compensation Shift compensation in both directions Moving object compensation
Live video annotation	Data and time Camera name Device IP address Object bounding box Object trajectory Calibration map System information

2.4 ONVIF event specification

2.4.1 Device monitoring

Device/HardwareFailure/TemperatureCritical
 Device/HardwareFailure/PowerSupplyFailure
 Monitoring/BatteryCapacity
 Monitoring/EnvironmentalConditions
 Monitoring/CPUUsage
 Monitoring/DSPUsage
 Monitoring/MemoryUsage
 Monitoring/NetworkUsage
 Monitoring/NumberOfConnections
 Device/OperationMode/UploadInitiated/Update
 Device/ShutdownInitiated/Reboot
 Device/OperationMode/UploadInitiated/Restore
 Device/FactoryDefault
 Device/NetworkInterfaceChanging
 Device/NameChanged

2.4.2 Digital inputs (dry contacts) and outputs (relays)

Device/DigitalInput
 Device/Trigger/Relay
 Device/SerialInput

2.4.3 Tampering events

Based on 10773r04ONVIF_WG-ENH-BasicSetOfEvents_supplemented.doc
 VideoSource/SignalLoss
 VideoSource/SignalTooNoisy
 VideoSource/SignalTooDark
 VideoSource/SignalTooBright
 VideoSource/SignalTooBlurry
 VideoSource/CameraRedirected
 VideoSource/CameraObstructed
 VideoSource/GlobalSceneChange

2.4.4 Object detector, tracker and feature estimator

VideoSource/Motion with the following Data:



objectid – object id
 point – object center position
 confidence – detector accuracy
 zoneid – zone id

2.4.5 Rule-based video analytics events

VideoSource/MotionAlarm
 VideoSource/StopAlarm
 VideoSource/SpeedAlarm
 VideoSource/TripwareAlarm
 VideoSource/AbandonedItemAlarm
 VideoSource/MeetingAlarm

2.5 Video streaming

Coders	H.264 (MP, BP), MJPEG
Latency	< 240 ms
Frame size	PAL (720x576), NTSC (720x480) 2x and 4x downscaling
Frame rates	1..25 fps (PAL), 1..30 fps (NTSC)
Bitrates	128 Kbps to 6 Mbps, CBR or VBR

2.6 Audio streaming

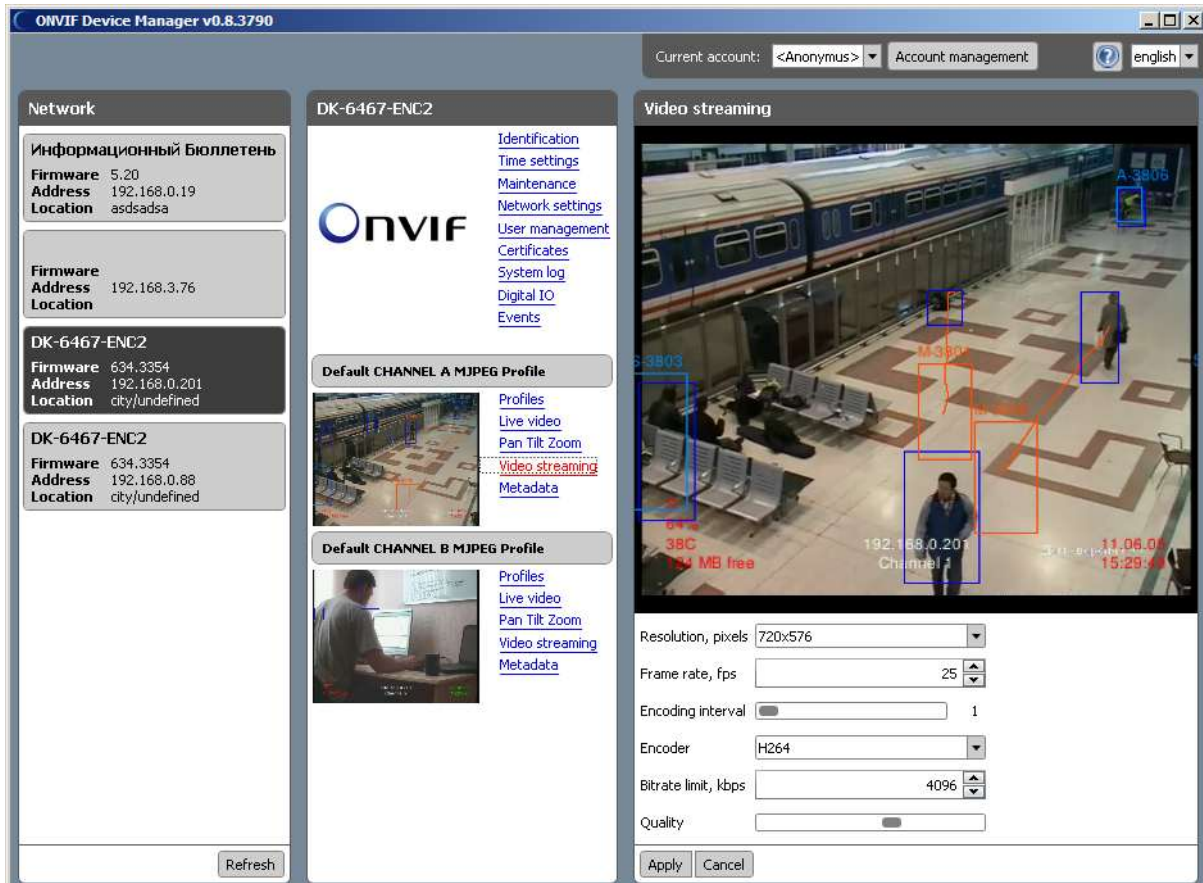
Audio coders	G.711, AAC
Bitrates	Up to 128 Kbps

2.7 Recording

Record triggers	Video analytics event Digital input
ONVIF notification	/Recorder/Record
Recording media	Network drive (NFS) Local drive (USB)
Pre-alarm buffer	Up to 30 s
Post-alarm buffer	Configurable
Container	.TS
Coders	See section 2.5

2.8 Management software

Application name	ONVIF Device Manager
Operating environment	.NET 4.0/Mono
Installers	Windows XP SP3 / Vista / 7
Source code	C#, F#, C++ https://sourceforge.net/projects/onvifdm/



ONVIF Device Manager User Interface