



MPEG-2 / H.264 Mini Encoder / Transcoder



User's Manual

Version: 1.0 Date:May 2013

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Outline

The device can work in two modes “Encoder” or “Transcoder”. The necessary mode is selected by program switching.

The Encoder is intended for real time encoding of SD/HD signal into MPEG-2 SD or H.264 SD/HD format.

The Transcoder is intended for real-time transcoding / transrating of an SD/HD program from MPEG-2 to H.264 format or vice versa.

The Encoder / Transcoder can output two independent Transport Streams (TS) which are broadcast simultaneously. One of the two TS provides high resolution (1920x1080 or less) for high quality broadcasting, the other TS provides low resolution (320 x 240 or less) for broadcasting to mobile devices or Internet. The Encoder / Transcoder enables multiplexing of the two TS onto any of the two ASI outputs or any of the two IP addresses.

Key features:

- HD/SDI video input.
- Full HD 1920x1080 50i:
- 1920x1080 59,94i:
- 1920x1080 60i support.
- SD/SDI video input -
- 720x576 50i:
- 480x576 59.94i support.
- Serial Digital embedded audio input.
- Provides internally generated PSI.
- Selectable MPEG-2 SD or H.264 SD/HD real-time video encoding.
- ASI Output with UDP/IP or RTP/IP transport stream simultaneously.
- CBR or VBR outputs.
- User selectable resolution and bit rate.
- MPEG-1 Layer audio encoding. II
- Control and monitoring via LAN (Ethernet).
- Transcoding SD/HD program :
 - MPEG-2 (SD/HD) to MPEG-2 (SD) format;
 - MPEG-2 (SD/HD) to H.264 (SD/HD) format ;
 - H.264 (SD/HD) to MPEG-2 (SD) format;
- Digital to digital decode and re-encode with minimum loss in video quality;
- Multi-bit rate transcoding supports;
- Up to 1080i HD output;
- Audio is passed through;
- PID filtering;
- Built-in multiplexer allows to generate output TS with transcoded programs and/or original programs which are being applied at the input;
 - PSI generation;
 - OTA, EPG supports ;
 - Input interface: DVB ASI (1) ;
 - Output interface: DVB-ASI(1) and IP(1) ;
 - Variable images resolution in the main stream: from HD resolution to the mobile devices resolution.
- Variable output transport stream rate up to 60 Mbit / sec.
- Ability to select "CH1", "CH2", "Multiplex" for ASI and IP outputs.

Specification

Input	Video	1×SDI o	
Video	Resolution	Input	Output
		1080i@60	1920x1080,1440x1080, 960x1080,
		1080i @59.94	720x1080,1280x704,1280x768,
		1080i @50	1024x768, 720x576, 704x576,
		576i @50	544x576, 480x576, 720x480,
	480i @59.94	704x480, 640x480, 544x480,	
		480x480, 480x256,320x224,	
		240x180	
	Encoding	MPEG-2 HD/SD; MPEG-4 AVC/H.264 HD/SD	
	Bit-rate	4 Mbps~15Mbps	
	Rate Control	CBR/VBR	
	GOP Structure	IPB, IBBP, IPPP.	
	Aspect Ratio	SD- 4:3; 16:9; HD-16:9	
	Chroma	4:2:0;	
Output			
Video	Resolution	1920x1080,1440x1080,960x1080,720x1080,1280x704,1280x768,	
		1024x768,720x576,704x576,544x576,480x576,720x480,704x480,	
	Encoding	640x480,544x480,480x480,480x256,320x224,240x180	
		MPEG-2/H.264; H264/MPEG2; H264/H264;MPEG2/MPEG2	
	Bit-rate	~15 Mbps	
	Aspect Ratio	4:3; 16:9;	
Audio	Encoding	MPEG-1 Layer II, Audio output level adjustment +6/-6.7 db	
	Resolution	24-bit	
	Bit-rate	64Kbps~384Kbps	
Stream output		1×ASI output ports, BNC interface	
		2xIP, MPTS/SPTS over UDP/RTP, 10/100 Ethernet interface (UDP/RTP multicast/unicast) Rj45 interface	
		Language: English-Russian	
		Ethernet software upgrade	
General	Dimensions	120mmx80mmx44mm (W x D x H)	
	Approx weight	400g	
	Power requirement	External power supply + 12V	
	Power consumption	17W	

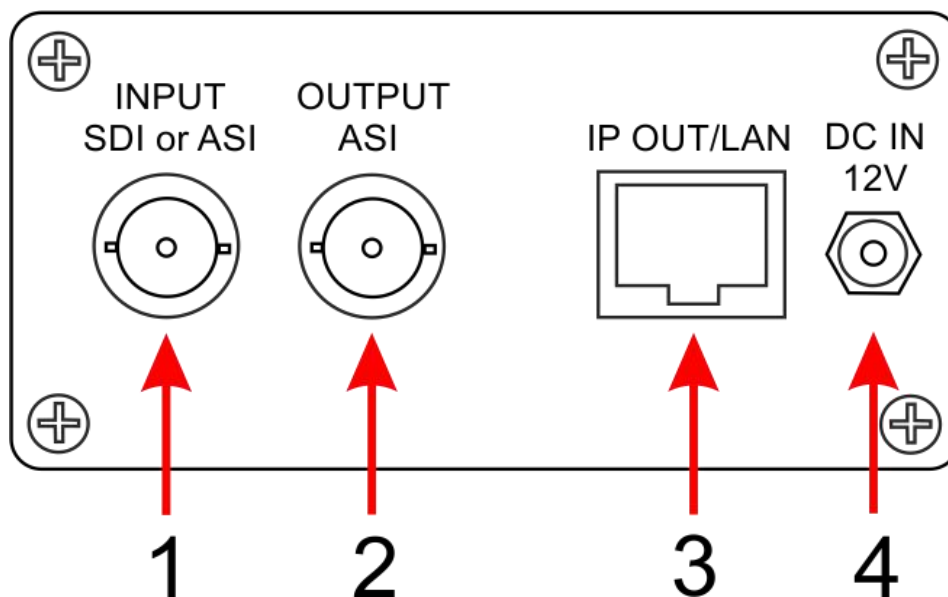
Environment Requirement

- Environment Temperature 5~40 C(sustainable), 0~45C (short time),
- Installing air-conditioning is recommended
- Power Requiring device power, air-conditioning power and lighting power are independent to each other. Device power requires DC power 12V. Please carefully check before running.
- Machine Hall Floor Electric Isolation, Dust Free, Ground anti-static material.

Grounding Requirement

- Good grounding is the basis of reliability and stability of devices. Good grounding are the most important guarantee of lightning arresting and interference rejection.
- Coaxial cable's outer conductor and isolation layer should keep proper electric conducting with the metal housing of device.
- Grounding conductor must adopt copper conductor in order to reduce high frequency impedance, and the grounding wire must be as thick and short as possible.
- It is prohibited to use any other device as part of grounding electric circuit
- The area of the conduction between grounding wire and device's frame should be no less than 25mm².

Front panel illustration



1	HD/SD-SDI or ASI input	BNC Connector 1 is switchable HD/SD-SDI or ASI device input : In the Encoder mode it is HD/SD-SDI Embedded audio input, In the Transcoder mode it is DVB ASI stream input.
2	ASI output	The Encoder has one ASI outputs, operate in one of the following modes: Mode 1. Channel 1 or Channel 1 + Mode 2. Channel 1 and Channel 1 +
3	IP / Ethernet	The Encoder/Transcoder has 2 IP output with low and high resolution separately. It is also possible multiplex mode, in that case first IP out is transmit High resolution stream (Channel 1) and second IP out – both of streams (Channel1 and Channel1+). The channel with "+" is the channel with the lower resolution). IP output may be used for monitoring or IP broadcast Supported protocols UDP, RTP.
4	Power	DC 12 V 10W

How to Work with Encoder/Transcoder MPEG 4/MPEG 2

Software installation steps.

First at all set the network settings of the computer intended for work with the system (Server Computer) - Page 9.

The next - you need install the **DVBToolkit program** - it is a set of software tools to configure and control DVB devices produced by DVLab.

After installation the DVBToolkit you get the main tools:

- EthernetSetup – the separate utility for the Ethernet Connections settings.
- DVBToolkit Server – it lives in the system tray and is necessary for proper system operation (Log, Debug etc) The DVCrypt Server can be started from the taskbar. To open the DVCrypt Server log you can click left mouse button the Server Icon - the Server Log Window appear. The Server Icon right click is open the Server Settings window.
- DVBToolkit Client – this software allows you to select the encoder operation mode, input signals format, adjust the output stream parameters, the output resolution etc.

To install DVBToolkit - simply run the installation file (it is supplied) and follow the prompts.

Encoder/Transcoder basic steps

- Preparing relevant environment for installation (page 6).
- Connect output of device (Connector 2) to the destination equipment of the system.
- Connect input signal (Connector 1) accordingly the device mode -Encoder or Transcoder.
- Connect Ethernet cable to connector RJ 45 (3)
- Check the Server computer setting (page 9)
- Install the DVBToolkit program
- Start DVBToolkit program
- Set DVBToolkit Client (page 11)
- Set DVBToolkit Server (page 12)
- Change the Encoder/Transcoder IP address (page 13)
- Add the Encoder/Transcoder to System. The wizard will help you connect it to the system (page 15).

Encoder Mode Settings (page 18):

- Start DVBToolkit Client program .
- Select Encoder Mode -
- Preset Encoder parameters you need.
- Click "Parameters Settings" button. After recording, the Encoder is ready to use.

Transcoder Mode Settings (page 21):

- Select Transcoder Mode -
- Preset Transcoder parameters you need-
- Click "Parameters Settings" button. After recording, the Transcoder is ready to use.

Output Settings:

- IP Outputs Settings - page 26.
- ASI Outputs Settings - page 29.

Server computer setting

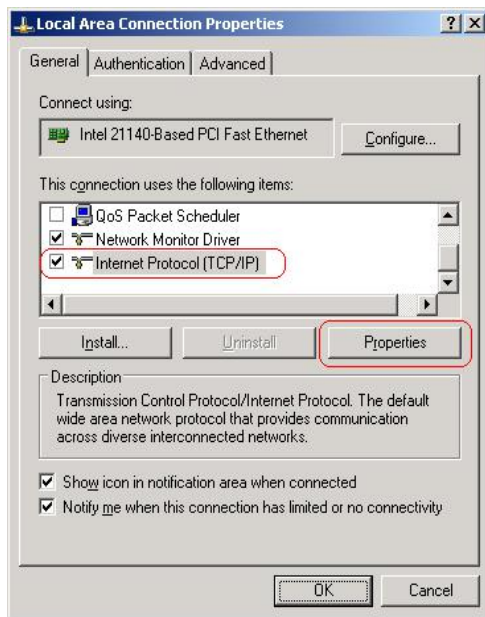
Server PC requirements:

Please check that following requirements are met:

- CPU: 1 GHz or faster;
- RAM: 1 GB or more;
- HDD: at least 1 GB of free space;
- LAN adapter and/or USB for modules interface;
- Operating System: Windows XP, or Windows server 2003/2008.

Required PC settings:

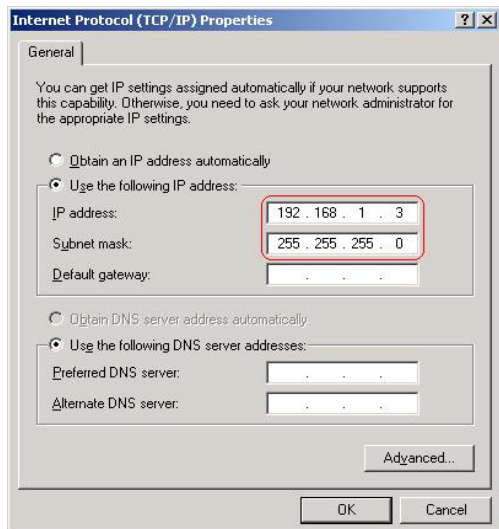
The computer should be equipped with network adapter with installed TCP/IP:



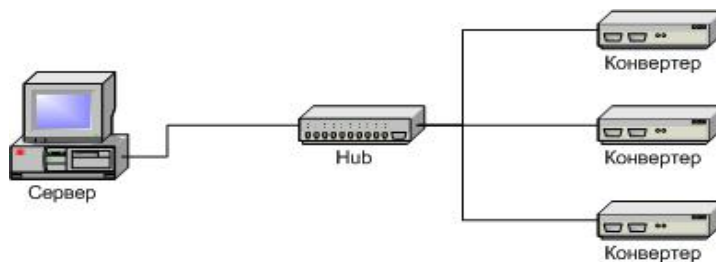
Network adapter properties setting:

The computer IP address can be assigned statically or dynamically (DHCP).

As an example IP address is 192.168.1.3 (shown at the Figure below).



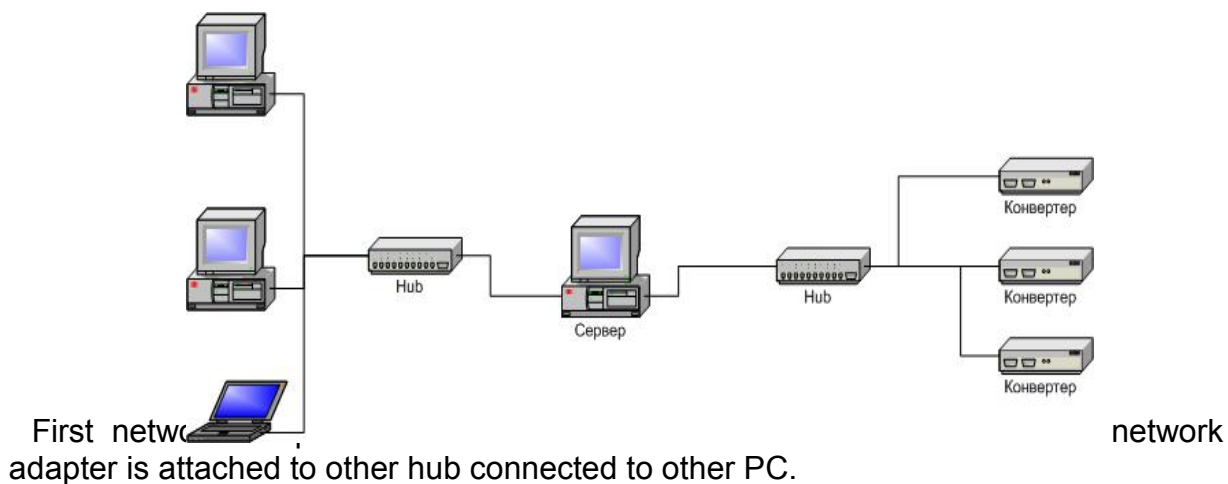
Wiring diagram is as follows:



The server is connected to a standard Ethernet hub/switch. The Device are connected to the Ethernet hub/switch, too. There can be other computers in this local network.

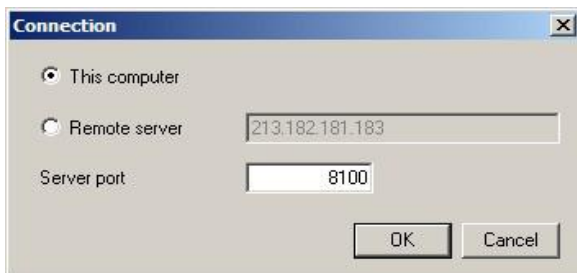
If the server is connected to a local network containing other PC, it is recommended to install the second network adapter in the server in order to guarantee fail-safe and secure connection.

In this case the connection scheme should be the following:



DVBToolkit Client Start Settings

The DVBToolkit Client is started from the Start menu: Windows/Start Menu /All Programs /

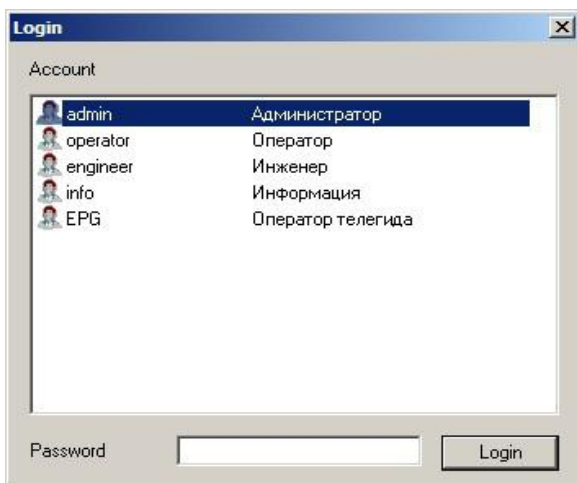


DVBToolkit / DVBToolkit Client

When you start the program – it is necessary to choose the type of connection:

“This Computer” - if the program “DVBToolkit Server” is installed on the same computer, or “Remote server”- if it is installed on another PC. In tis case it is necessary to enter the IP address and port of the PC on which you have installed the DVBToolkit Server.

Click “ OK” - the window Login (below) will open:

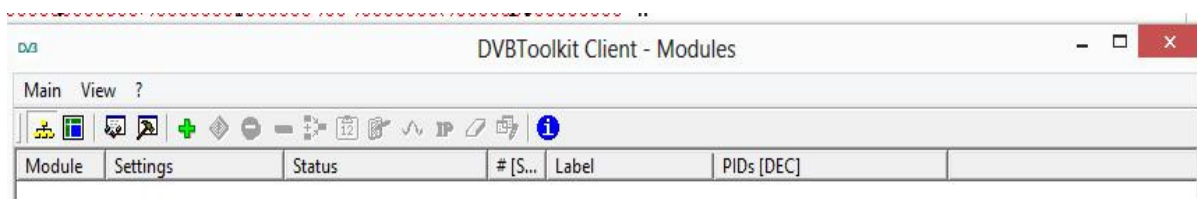


The program uses a system of administration which is structured as follows:

- There is a main user of the program DVBToolkit – Administrator.
- All rights to use these functions (on / off) belong to the administrator.
- Administrator is enters to the program as an “administrator” with personal password and appoints the other users.
- The administrator also can on / off some of the functions of the program DVBToolkit.
- The number of users and their rights determined by the administrator.

All default passwords is empty.

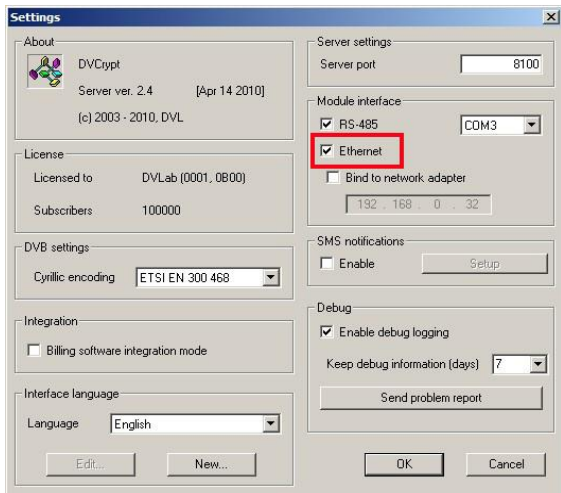
Click the “Login” button is brings you to the main window:



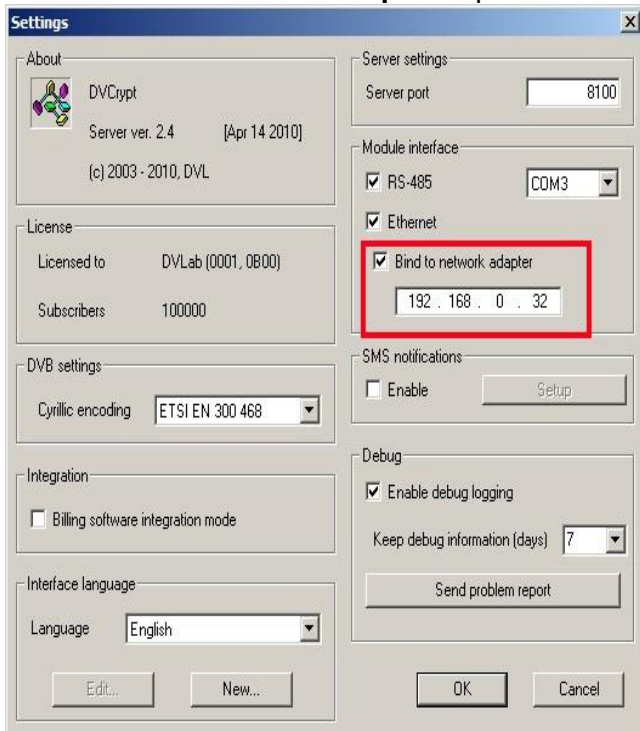
DVBToolkit Server Start Settings

To open the DVCrypt Server Settings click right mouse button on the Server Icon and select Settings.

Select **“Module interface/Ethernet”** option in Server settings:



If the server contains special network adapter for connection to Device, it is necessary to select **“Bind to network adapter”** option and assign its IP address.

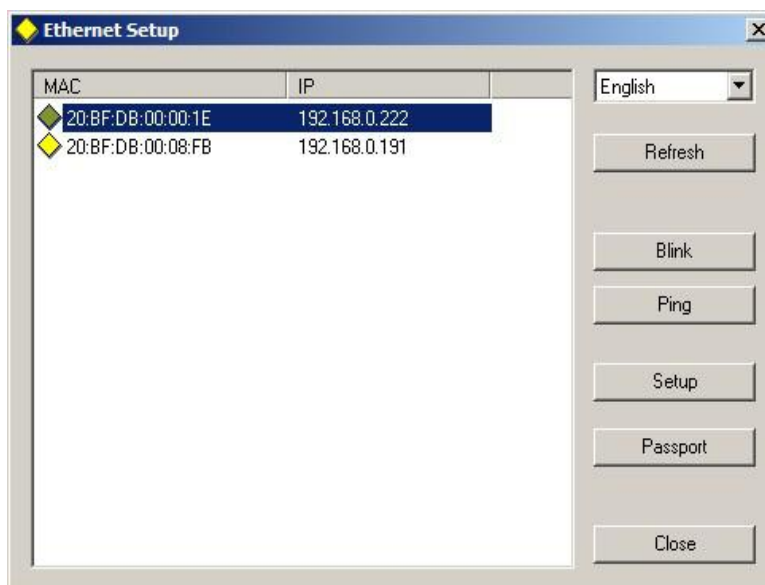


After that you can close the Server settings window and go to the Encoder / Transcoder installation.

How to change the Encoder/Transcoder IP address. EthernetSetup utility

All Devices are delivered with IP address **192.168.0.254** or **192.168.0.253**, network mask **255.255.255.0**.

The Devices should have different IP addresses when you add them to the system. The delivery set includes **EthernetSetup.exe** utility which makes it possible to change Device IP address and network mask. Before changing the IP address connect the Device to Ethernet hub/switch, connect to it also a PC having installed network board (network board IP address should be in the Device IP address range. For example, the Device IP address is 192.168.0.254, then network board IP address can be in 192.168.0.1. 192.168.0.254 range, network mask 255.255.255.0). Then run **EthernetSetup.exe**, the program will find the Device.



elect the device and press **Setup** button



The **Network parameters** window will appear, where you can change the Device IP address and network mask. The procedure of assigning IP address should be performed for all Devices before adding them to the system. Pressing **Ping** button you can check connection between the PC and the Device. If you press **Blink** button,

the selected Device will flash red LED (built in Ethernet connector) three times.

Attention!

It is not recommended to change the Device IP address after the Device has been already added to the system as it will cause connection failure. To re-establish connection it is necessary to repeat procedure of adding the Device to the system again.

The factory IP address of the new device must be changed accordingly to the you current network settings. Select any free IP address in the range of this local network (for example, we use addresses from 92.168.1.100 to 192.168.1.200) and enter it. Network mask and Default gateway should be set only if the Device will work in other subnetworks for the new Device and add it to the system. The IP address and MAC will be shown in Devices window in Control Software. It will be impossible to change the Device IP address hereafter. To change the Device IP address it is necessary to delete the Device from the system and add it again.

The DVBToolkit Client is started from the Start menu: Windows/Start Menu /All Programs / DVBToolkit / DVBToolkit Client

How to connect new Device to the System through Ethernet (TCP / IP) and add it to the system.

Attention! All connection to the PC is required to be switched off power and grounded equipment

- Connect the Encoder/Transcoder via the HUB or Switch to PC
- Set the Server PC network parameters.
- Install and run DVBT toolkit program
- Click the "Module" icon - appear the "Module" window
- Click the + icon and follow the wizard's instructions to install the Encoder/Transcoder.

If all is OK and Encoder/Transcoder is found, it will appear in the "Modules" window.

- Double click the left mouse button on the number of the Encoder/Transcoder will open the Settings window, where you must point the name of the channel fed to the Transcoder inputs.

Step-by-step instruction:

1. Connect the device to the PC via Ethernet and switch it on.

2. Click icon



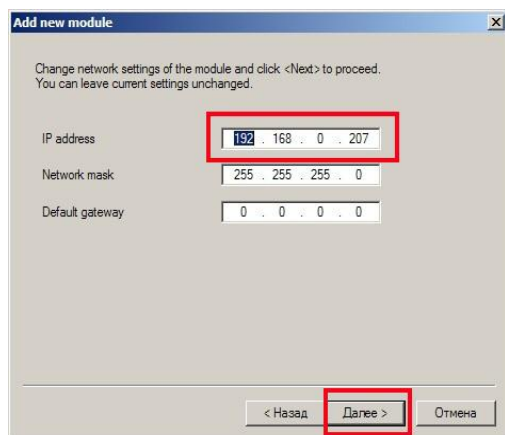
"New Modules"

3. Click icon



"Add new module"

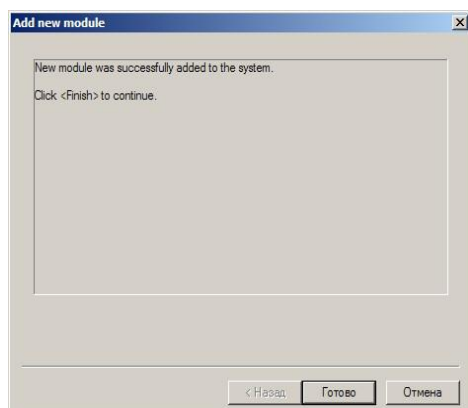
The "Add new module" window is appear. The connected to the system New Device will be searched. It MAC and IP addresses will be listed. You can repeat the search – just click "Refresh" button.



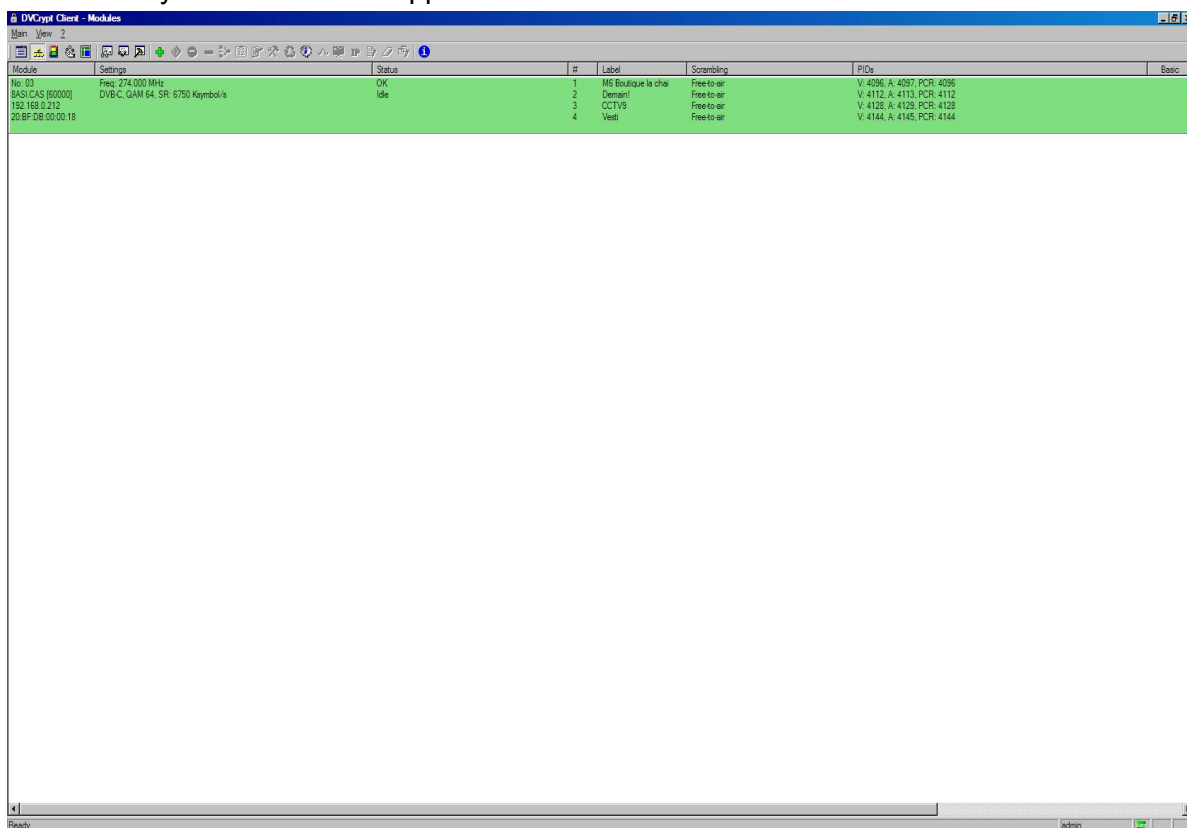
*Note: If there are a few Devices, it is difficult to determine the Device among others. In this case you can select the Device in the list and press **Blink** button. The selected Device will flash red LED (built in Ethernet connector) three times.*

4.The next step - Set the new IP address to the new Device – you can do it by the EthernetSetup utility (Pages 8 and 15)

If all is correct – the Successful notification will appear:



Click “Ready”- the device will appear in the DVBCrypt Client /Module window:

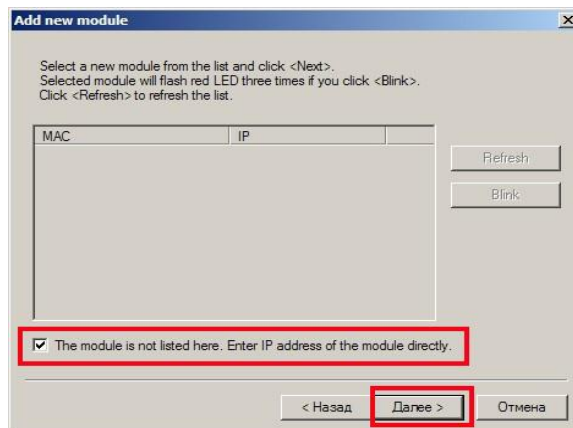


Notes

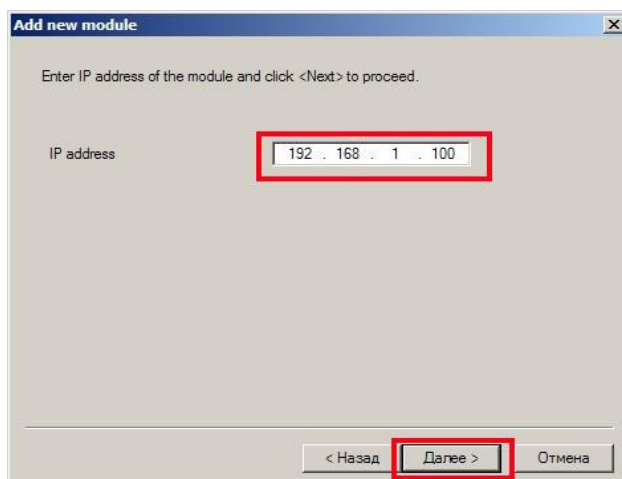
If the distance between the Server and Devices is rather long and there are routers, and automatic search doesn't work - in this case it is necessary to do the following:

Connect the new Device to the local network or to the Server directly and set the IP address as described above. Not waiting that the system will find and add the Converter, interrupt the adding procedure.

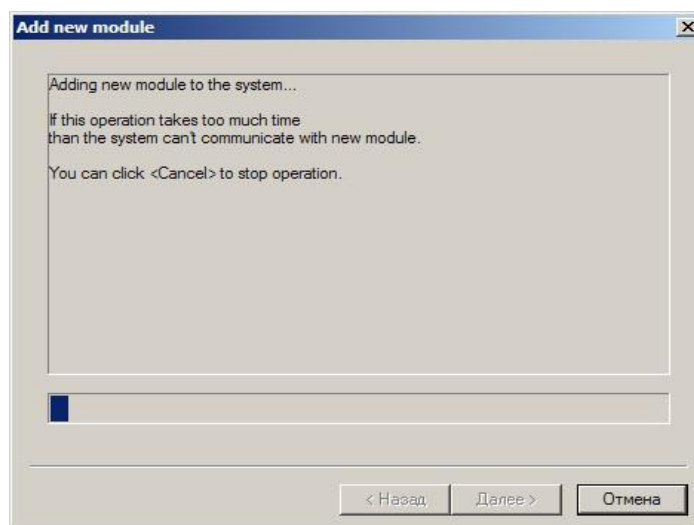
Connect the new Converter to remote network. Run adding procedure and select the option “The module is not listed here. Enter IP address of the module directly”



Enter IP address of the Device (Module).



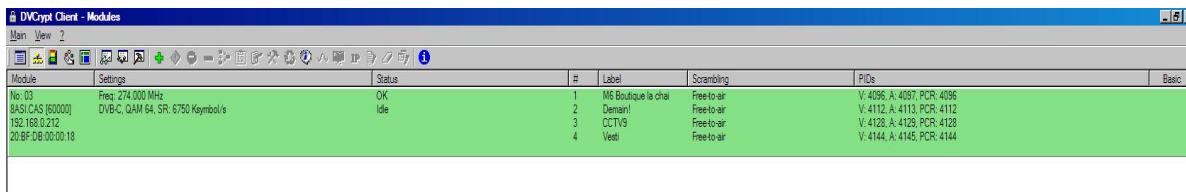
The Server will try to communicate with the Device and add it to the system:



After success finishing the new Encoder will be added to the window DVBToolkit-Modules.

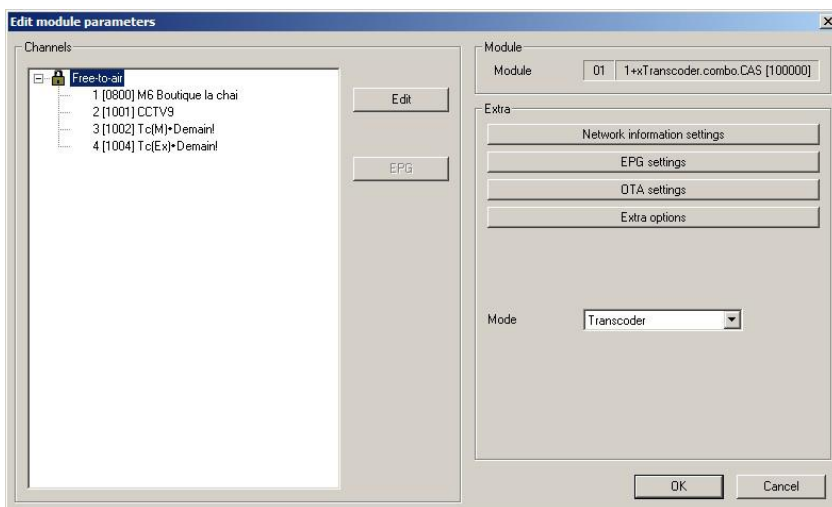
The Encoder Settings.

If Encoder/Transcoder is already added to the System, It Number you can find in the green

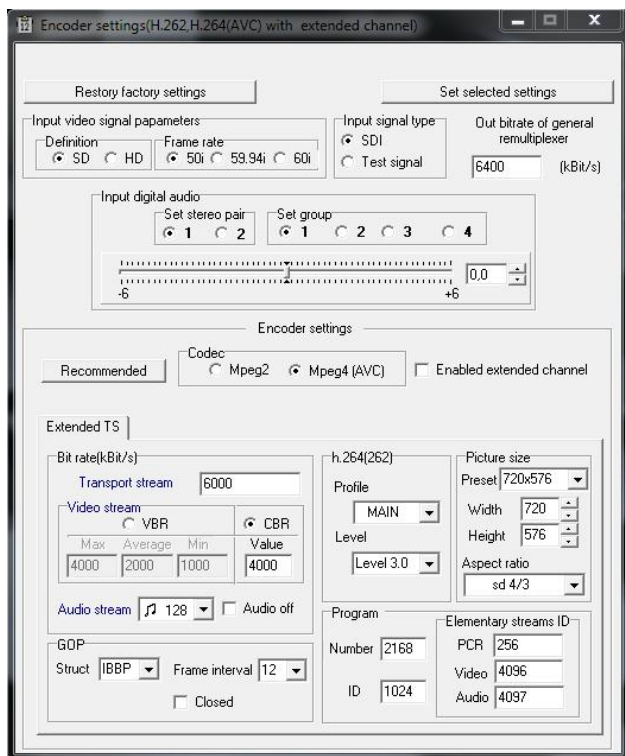


field of the window DVBC Toolkit Client /Module:

double-click on green field will open the Module Parameters window:



Set ENCODER and click OK – the Encoder settings window is appear:



Settings Recommendations:

1. Output stream should not be more 15 kbits / sec.

2. CBR Mode

The speed difference between the transport stream (TS) and video stream (TV +TA) is recommended to choose at least 400 kbit / s:

$TS - (TV + Ta) \geq 400 \text{ kbit / s}$

Where TS-traffic. TV-video stream. TA-audio stream.

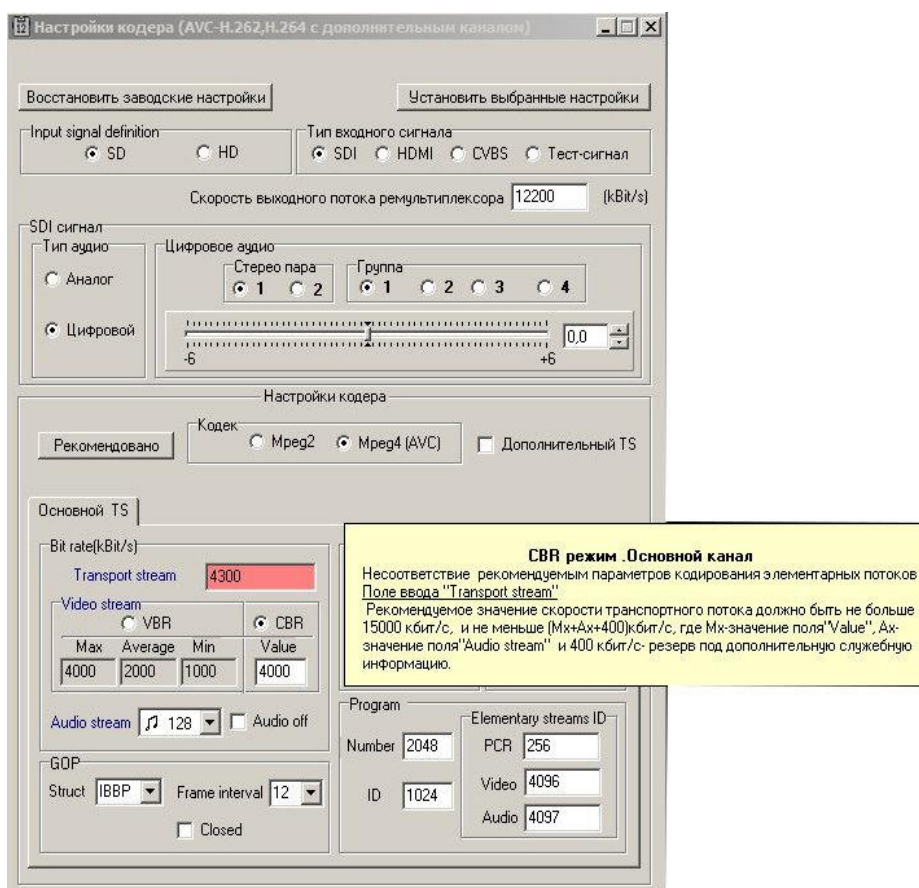
3. VBR Mode.

Minimum bitrate (min) 0-0,75 on average bit rate.

Maximum bit rate (max) 1.75-2 average bitrate.

Transport stream bit rate not less than 800 kbit / s greater than the Maximum bitrate + audio.

But even if you set the non recommended values , the program will warn you and allow you to change settings – it will return you to the correction of errors, where at hover the cursor over the highlighted red input field will be prompted how to correct the mistake:



4. Mode " Test Tone " allows you to turn on the sound output of the encoder and the color bar generator.

5. Recommended Encoder resolutions:

HD Mode:

1920x1080 50i

1440x1080 50i

960x1080 50i

720x1080 50i

SD Mode:

720x576 50i

704x576 50i

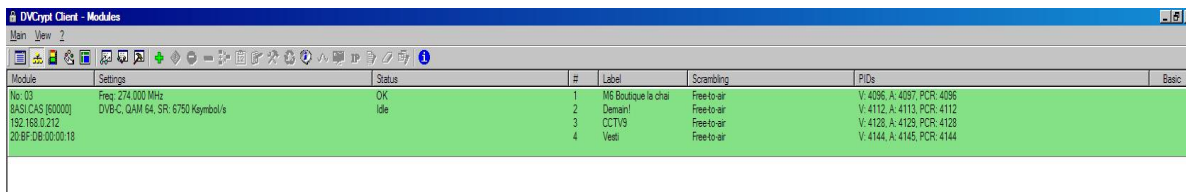
6.The button "Recommended" sets the operating parameters that can be recorded by pressing the "Save settings"

7. The button "Restore factory settings" is used to return the encoder The "Restore factory settings" to return the encoder to the working condition in the event of incorrect settings. in a case of incorrect settings parameters.

8. You can change the PID, and the ID number of the elementary stream.

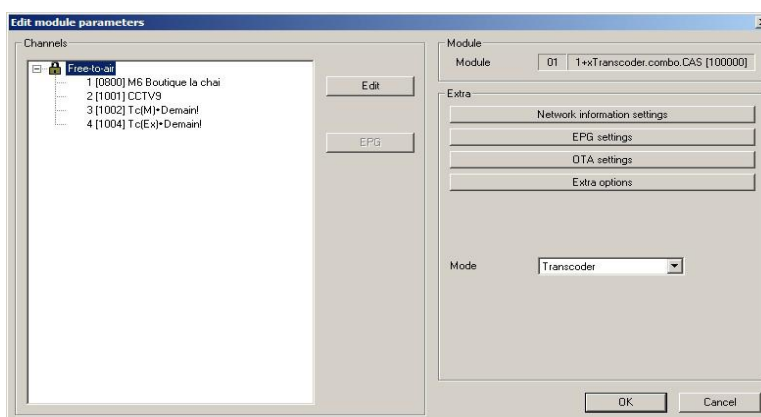
Transcoder Settings

If Encoder/Transcoder is already added to the System, Its Number you can find in the

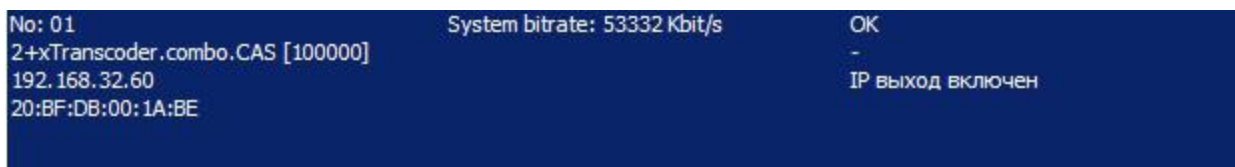


green field of the window DVBTToolkit Client /Module:


double-click on green field will open the Module Parameters window:

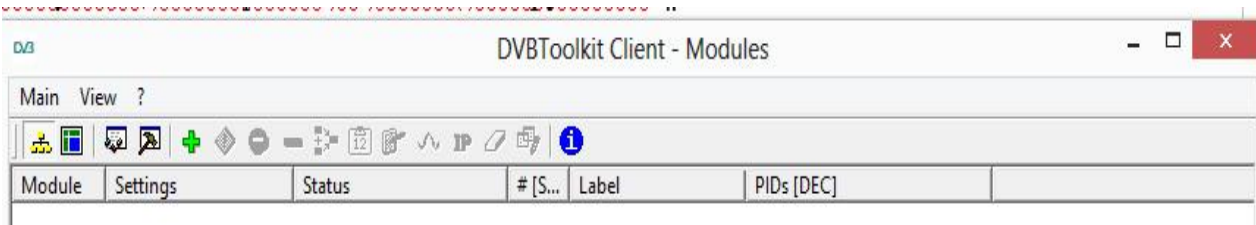


Set TRANSCODER, click OK and wait until the device goes from the "Encoder" to "Transcoder" that can be seen in the status bar DVBTToolkit :

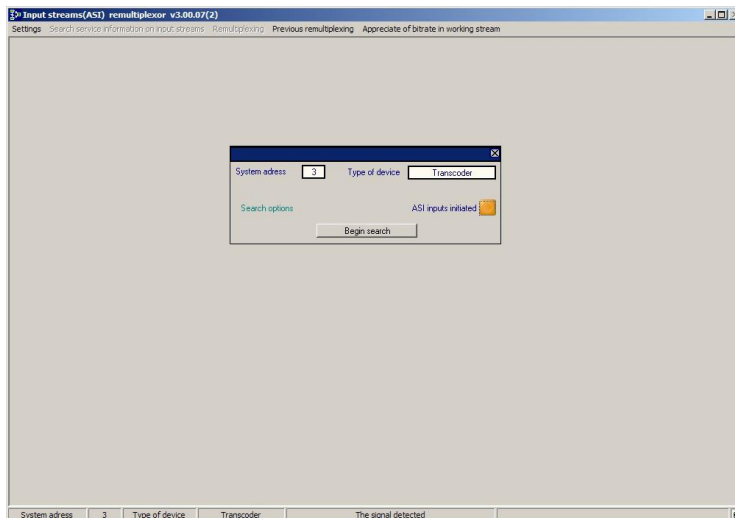


3. Scan inputs ASI streams and take programs for transcoding:

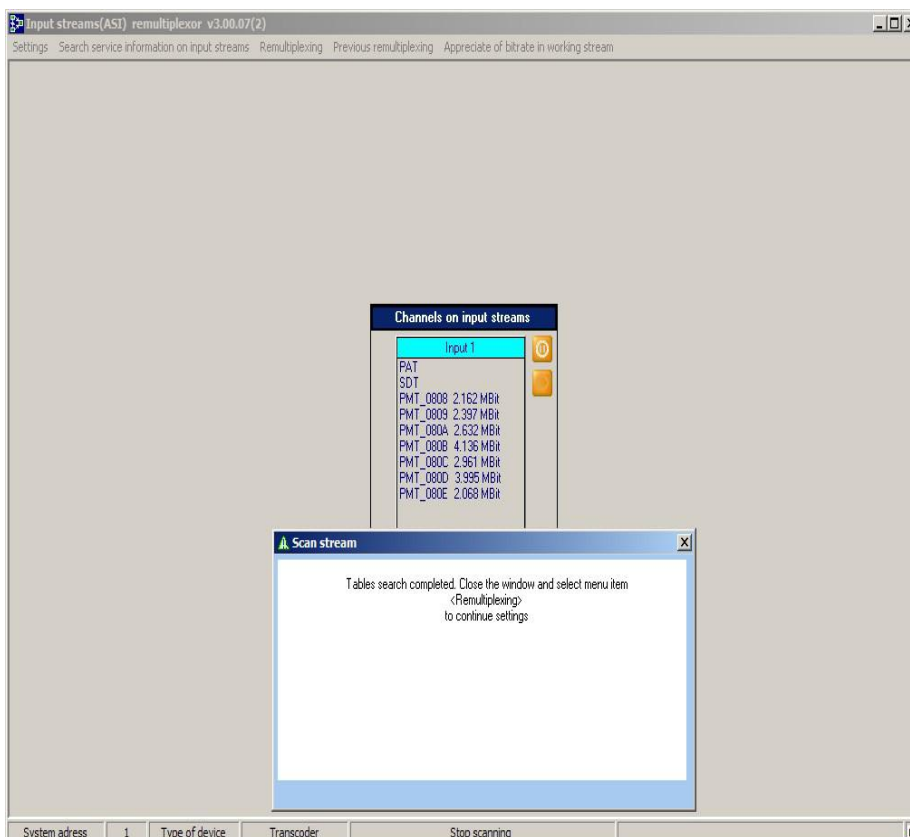
- click icon In  the "DVBTToolkit Client – Modules" window toolbar :



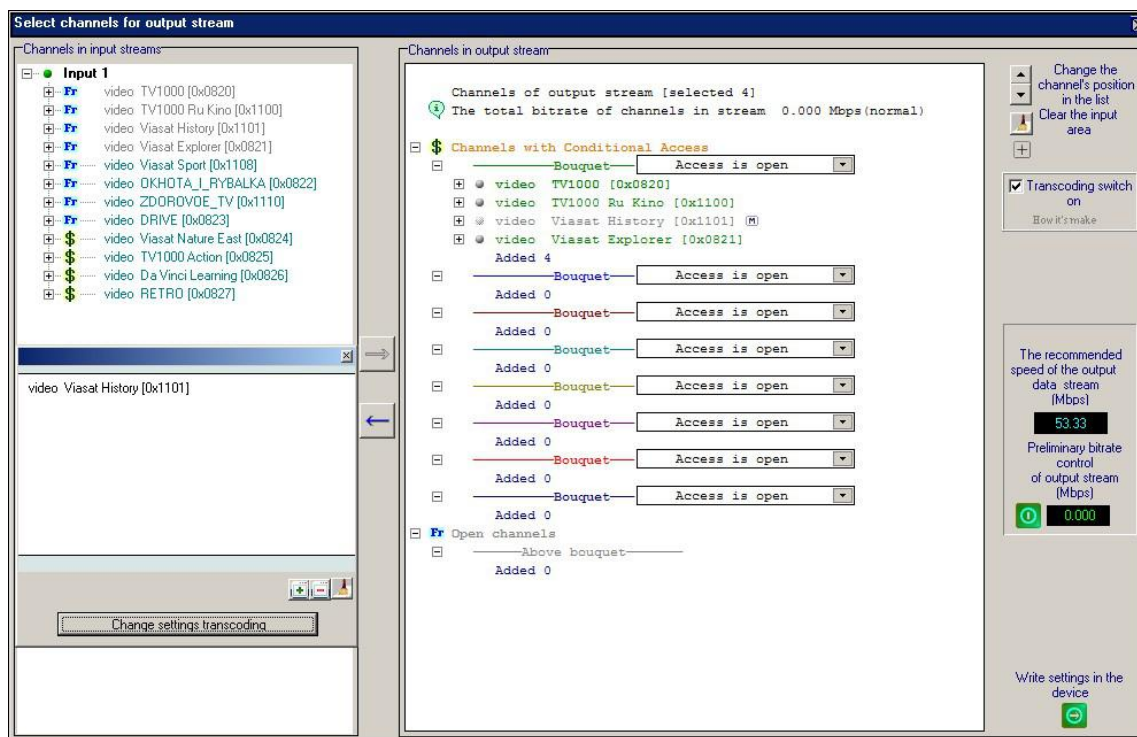
- The Multiplexer window is appears :



- Click "Start search"
- After the scan is complete the message appears :



After the scan is complete:



- Select the Input program for output stream formation and drag them by mouse to the right window
- In the right window highlight programs for transcoding.
- Enable the "Transcoding - put a tick in the right side.

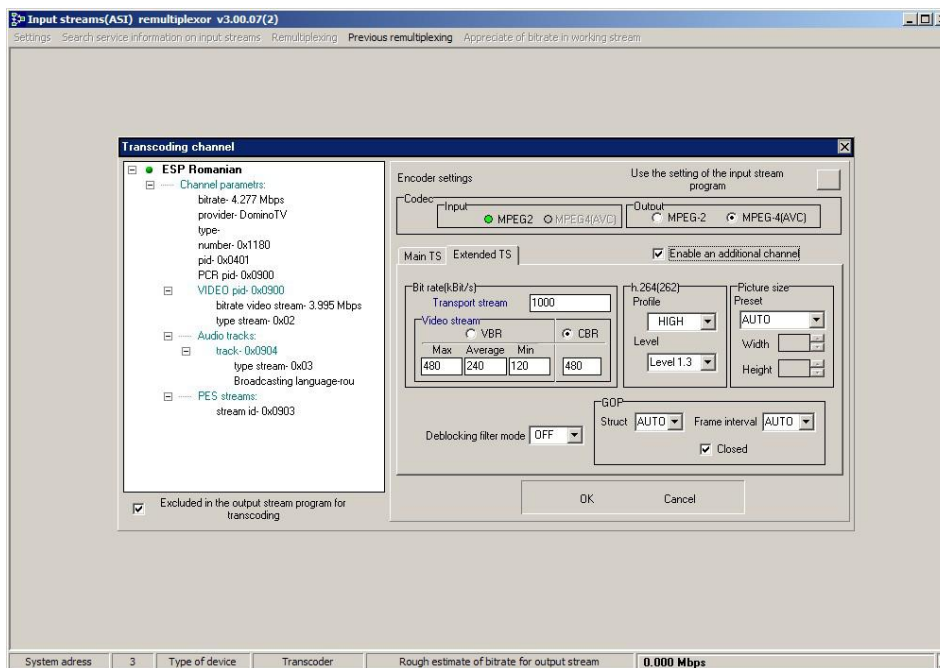
- Click “Transcoding Settings” -the Settings window is appear:

The steps for this window is :

1. Choose output standard: MPEG2 or MPEG4,
2. Enable or disable the additional stream
3. Transcoder Settings.
4. Exclude selected program from the output stream.

It is possible to left the default parameters. They can be set up from DVB_Setting utility after the output stream will formed.

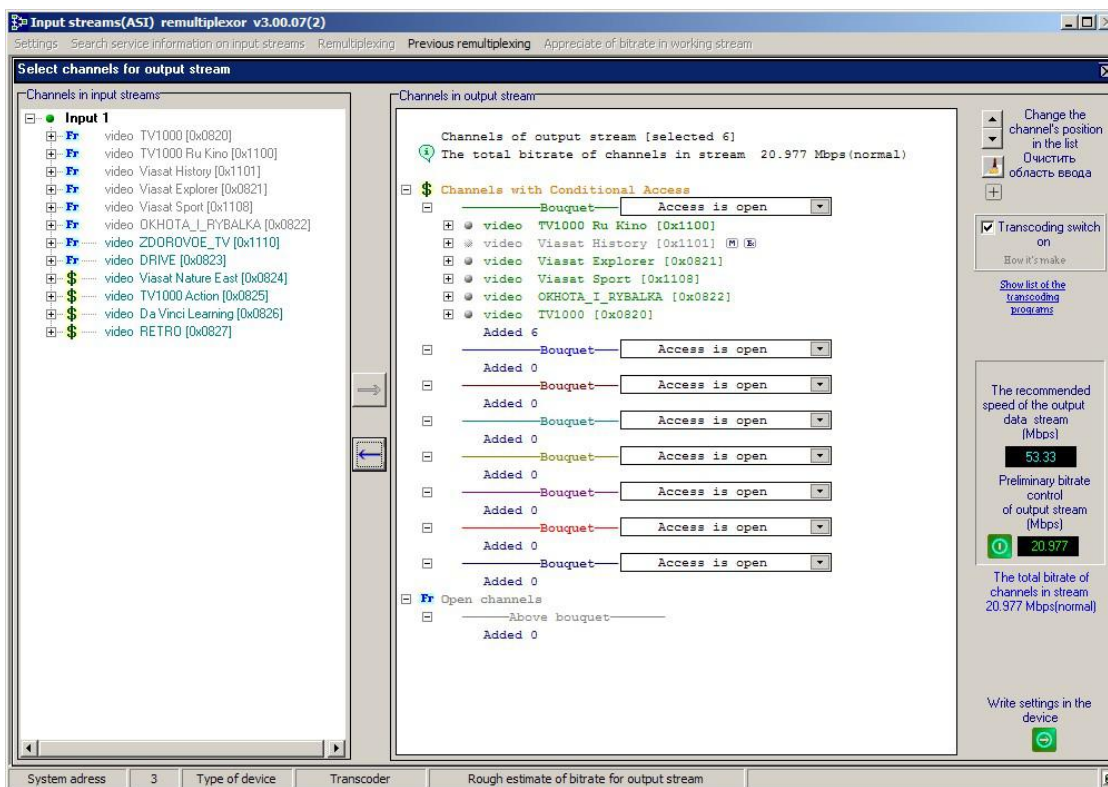
Once the options are selected - click "OK" to return to the previous window to check the output stream speed - It should not exceed the permissible value:

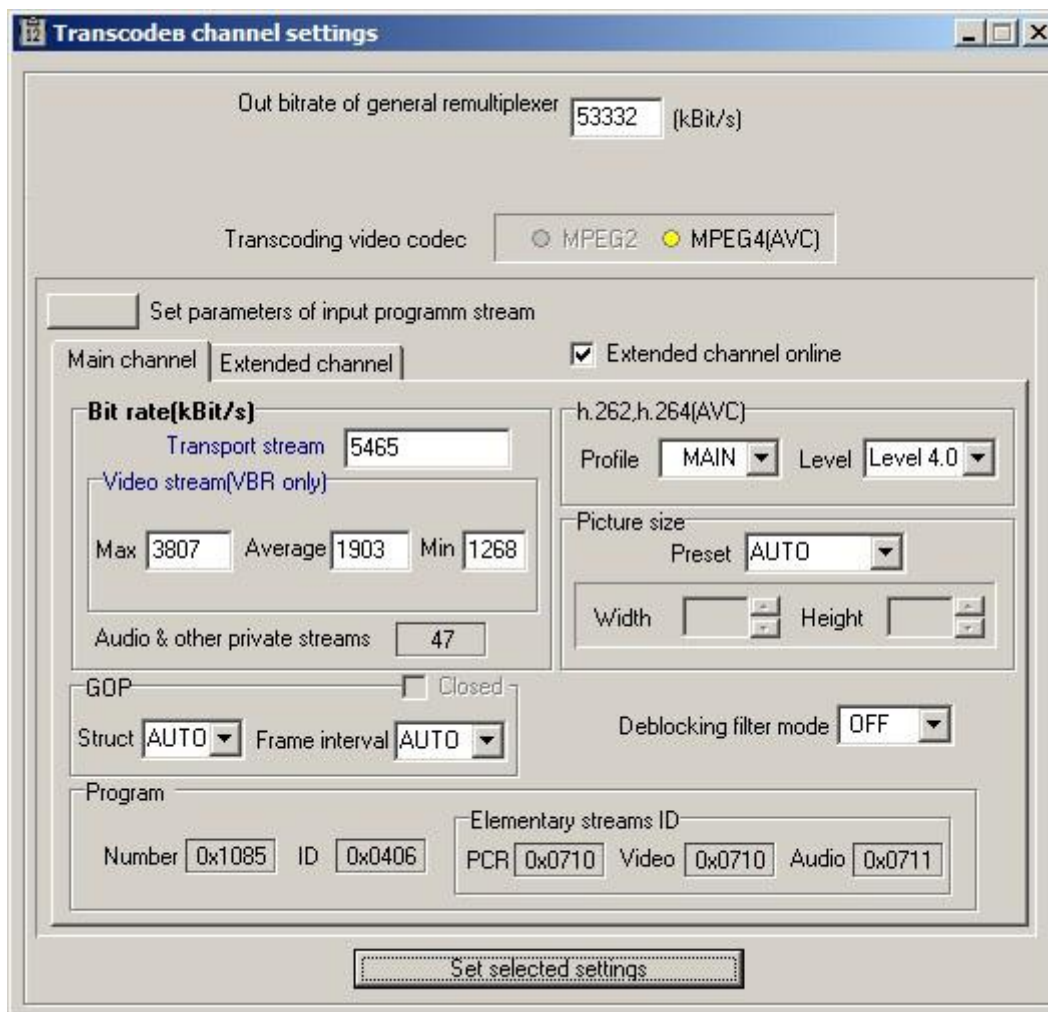


If the streams is valid, click "Save settings in the device". Wait until the end of recording – in the output stream will be present transcoding programs.- the device is ready to work.

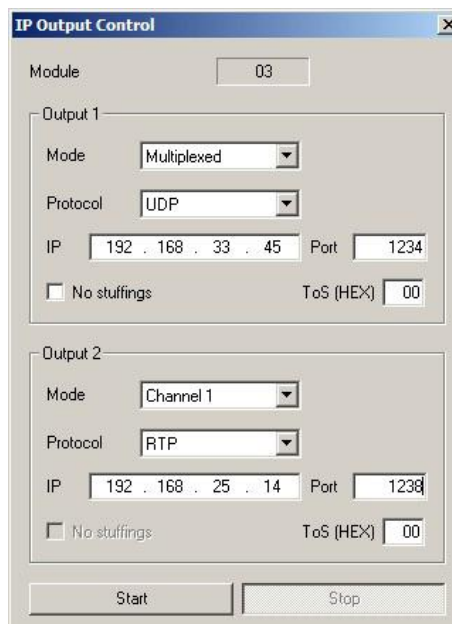
Notes:

- In the MPEG2 transcoding mode can be present only one stream with a resolution 720h576i. Transcoding with 2 output streams is possible in the MPEG4 node only.
- In case of incorrect settings — the system will issue a warning. If you ignore this warning and click "Yes" to save the settings - it will be written to the device at your own risk. If you click "No", the program will return you to the settings – the mistakes will be highlighted in red. To see the right parameters – put mouse on the red – the hint with the correct value of the parameter will appear.





- It is possible to change some settings with the DVB_Setting utility too:
- The encoder can transmit the each channel stream to separate IP address channel can broadcast stream on your IP address. It is also possible the multiplex mode – transmitting the IP stream with both of channels:



IP Outputs Recommendations:

1. Bitrate.

The maximum rate of traffic flow can not be more than 15 Mbit / s.

2. CBR mode

The difference in speed between the transport stream and the video stream is recommended to choose $TS-(TV + Ta)$, at least 400 kbit / s.

Where TS- traffic flow.

TV- video stream.

TA- audio stream.

3. VBR mode

The minimum bitrate (min) 0-0,75 the average bit rate (average)

Maximum bit rate (max) 1.2-2 medium (average) bit rates

Bitrate transport (transport stream) not less than 400 kbit / s bit rate greater than the maximum bitrate + audio.

It should be borne in mind that the recommended resolution mode for encoder

Mode HD:

1920x1080 50i

1440x1080 50i

960x1080 50i

720x1080 50i

1920x1080 60/59, 94i

1440x1080 60/59, 94i

960x1080 60/59, 94i

720x1080 60/59, 94i

Mode SD:

720x576 50i

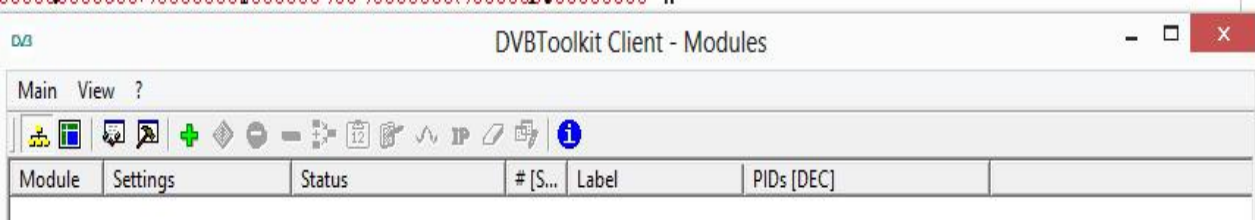
704x576 50i

720x480 60/59, 94i

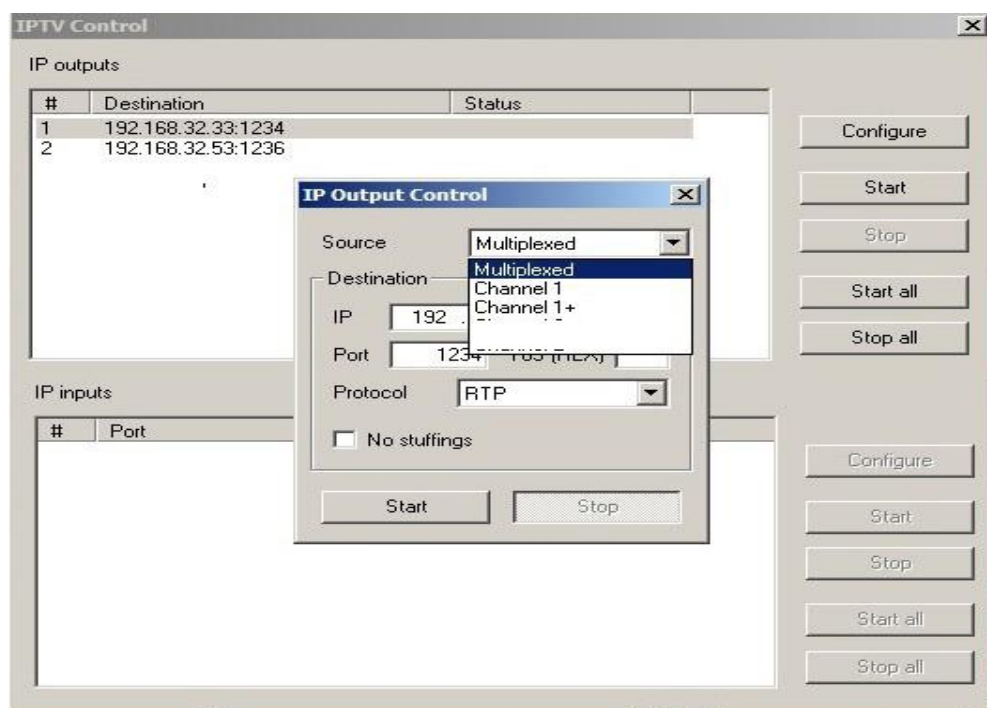
704x480 60/59, 94i

IP Outputs Settings

Click icon «IP» on the toolbar



IP output configuration window appears:



The encoder has the opportunity to work with two IP addresses sent in one IP stream. Each encoder channel may have its own IP address. There are several operation modes for each IP channel:

1. Output is disabled.
2. The output is commutated to channel 1.
3. The output is commutated to channel 1+.
4. The output delivers two multiplexed channels

The second channel works in the same mode. If two channels work in the "Multiplex mode", stuffing should be switched off (disabled), or one channel should be disconnected, while the second may work in the "multiplex" mode both with the enabled and disabled stuffing.

In the "channel1" and "channel2" modes stuffings are disabled.

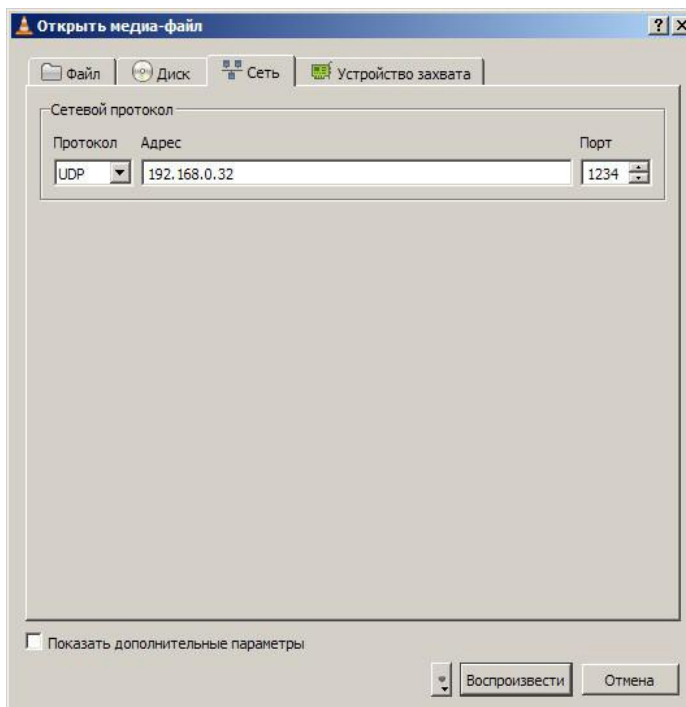
It is necessary to choose IP address and port that the stream will be broadcast to, as well as the protocol (RTP, UDP) for each of the channels.

After selecting the required parameters you should click "start" and close the window.

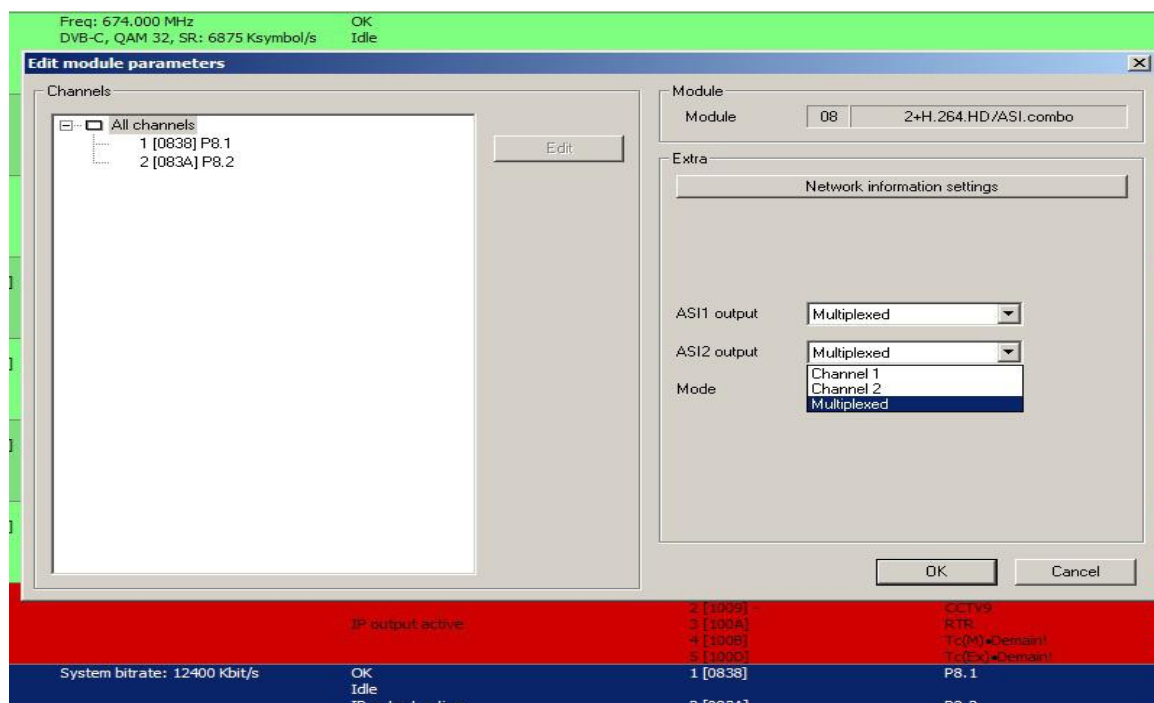
It is possible to check (monitor) work of IP inputs using VLC player.



Select Media / Network and enter the necessary parameters. An example is given on Figure below.



ASI Outputs Settings



The output stream can may contain or separate channel – Channel 1 or Channel 2, or multiplex mode – transmitting the stream with both of channels:

Warranty

Warranty period – 24 months from the selling date

The manufacturer does not take any responsibility for defects occurred at the customer's fault or trading company's during careless transportation, improper storage, technical service or usage, mechanical damages, violating the operation rules.

The software is delivered "as is" unless mentioned otherwise. The manufacturer does not bear responsibility for any consequences of using the software. The software can be used without any limitations. Additional information on the software interfaces can be sent upon request.

The manufacturer reserves a right to bring any changes to the product, software or description without notice. Please ask manufacturer for latest information and updates.

Dear customers!

We make improvements and/or changes in our products and we reserve the right to make changes without notice. Though every effort has been made to ensure that this document is current and accurate, more information may have become available subsequent to the production of this guide.

Our products are under continual improvement, so we would like to draw your attention to the fact that the old-model devices may not be supported by the most recent version of our software. It is caused by using in our equipment advanced technical solutions and new electronic components.

We are pleased to receive at info@dv-lab.com comments and remarks regarding our products and software. At the same address we are ready to provide further information about the products application and updated software.

RJ45 connector cable to the HUB connection:

RJ45		RJ45	
1	white / orange	white / orange	1
2	orange	orange	2
3	white / green	white / green	3
4	blue	blue	4
5	white / blue	white / blue	5
6	green	green	6
7	white / brown	white / brown	7
8	brown	brown	8