NetUP.tv Transcoder server

NetUP: IPTV solutions
COMMON INFORMATION

NetUP Transcoder server

NetUP Transcoder server is a professional solution for real time stream encoding and transcoding.

Supported formats

Video:
• MPEG-2 up to 1920×1080@60i;
• H.264 up to 1920×1080@60i;

Audio:
• MPEG-1 Layer I, II, MP3, Dolby Digital AC3 5.1, Dolby Digital Stereo, DTS HD multi-channel, AAC.
Transcoding

The table below shows the list of available input video formats and the corresponding output video formats.

<table>
<thead>
<tr>
<th>Case</th>
<th>Video Resolution/fps</th>
<th>Audio Format</th>
<th>Video Format</th>
<th>Resolution/fps</th>
<th>Bitrates</th>
<th>Audio Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1920x1080/60i/50i</td>
<td>Any</td>
<td>MPEG2</td>
<td>1920x1080/60i/50i</td>
<td>10-19Mbps</td>
<td>Same as Input in pass through mode.</td>
</tr>
<tr>
<td></td>
<td>1440x1080/60i/50i</td>
<td>Any</td>
<td>MPEG2</td>
<td>320x240@30p</td>
<td>0.5-2Mbps</td>
<td>Same as Input in pass through mode.</td>
</tr>
<tr>
<td>2</td>
<td>1280x720@60p/50p</td>
<td>Any</td>
<td>MPEG2</td>
<td>1280x720@60p/50p</td>
<td>10-19Mbps</td>
<td>Same as Input in pass through mode.</td>
</tr>
<tr>
<td></td>
<td>MPEG4-AVC</td>
<td>Any</td>
<td>MPEG4-AVC</td>
<td>1280x240@30p</td>
<td>0.5-2Mbps</td>
<td>Same as Input in pass through mode.</td>
</tr>
<tr>
<td>3</td>
<td>1920x1080/60i/50i</td>
<td>Any</td>
<td>MPEG4-AVC</td>
<td>1920x1080/60i/50i</td>
<td>6-13Mbps</td>
<td>Same as Input in pass through mode.</td>
</tr>
<tr>
<td></td>
<td>1440x1080/60i/50i</td>
<td>Any</td>
<td>MPEG2</td>
<td>320x240@30p</td>
<td>0.5-2Mbps</td>
<td>Same as Input in pass through mode.</td>
</tr>
<tr>
<td>4</td>
<td>1280x720@60p/50p</td>
<td>Any</td>
<td>MPEG4-AVC</td>
<td>1280x720@60p/50p</td>
<td>6-13Mbps</td>
<td>Same as Input in pass through mode.</td>
</tr>
<tr>
<td></td>
<td>MPEG2/MPEG4-AVC</td>
<td>Any</td>
<td>MPEG4-AVC</td>
<td>320x240@30p</td>
<td>0.5-2Mbps</td>
<td>Same as Input in pass through mode.</td>
</tr>
<tr>
<td>5</td>
<td>720x480@60i</td>
<td>Any</td>
<td>MPEG2</td>
<td>320x240@30p</td>
<td>0.5-2Mbps</td>
<td>Same as Input in pass through mode.</td>
</tr>
<tr>
<td>6</td>
<td>720x576@50i</td>
<td>Any</td>
<td>MPEG2</td>
<td>720x576@50i</td>
<td>2-8Mbps</td>
<td>Same as Input in pass through mode.</td>
</tr>
<tr>
<td>7</td>
<td>720x480@60i</td>
<td>Any</td>
<td>MPEG4-AVC</td>
<td>320x240@15/30p</td>
<td>0.25-1Mbps</td>
<td>Same as Input in pass through mode.</td>
</tr>
<tr>
<td>8</td>
<td>720x576@50i</td>
<td>Any</td>
<td>MPEG4-AVC</td>
<td>720x576@50i</td>
<td>1-4Mbps</td>
<td>Same as Input in pass through mode.</td>
</tr>
</tbody>
</table>

Performance:

- 4 SD or 2 HD video streams transcoding H.264->MPEG-2, MPEG-2-> H.264 or H.264->H.264 per a transcoder card;

Encoding

The table below shows the list of available input video formats and the corresponding output video formats.

<table>
<thead>
<tr>
<th>Case</th>
<th>Video Resolution/fps</th>
<th>Audio Format</th>
<th>Video Format</th>
<th>Resolution/fps</th>
<th>Bitrates</th>
<th>Audio Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>720x480@60i</td>
<td>PCM</td>
<td>MPEG2</td>
<td>320x240@30p</td>
<td>0.5-2Mbps</td>
<td>MP2 AC3 AAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>32Kb-384Kb</td>
</tr>
</tbody>
</table>
Common information

Performance:
• 4 SD or 2 HD video streams encoding per a transcoder card.

Setup and management

Please read the **LCD-panel** chapter for the front panel functions. Please read the **web-interface** chapter for the server settings and transcoding setup.

<table>
<thead>
<tr>
<th>No.</th>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>720x576@50i</td>
<td>PCM MPEG2</td>
</tr>
<tr>
<td></td>
<td>720x576@50i</td>
<td>2-8Mbps</td>
</tr>
<tr>
<td></td>
<td>32Kb – 384Kb</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>720x480@60i</td>
<td>PCM MPEG4-AVC</td>
</tr>
<tr>
<td></td>
<td>320x240@15p/30p</td>
<td>0.25-1Mbps</td>
</tr>
<tr>
<td></td>
<td>16Kb – 256Kb</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>720x576@50i</td>
<td>PCM MPEG4-AVC</td>
</tr>
<tr>
<td></td>
<td>720x576@50i</td>
<td>1-4Mbps</td>
</tr>
<tr>
<td></td>
<td>16Kb – 256Kb</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1920x1080@60i/50i</td>
<td>PCM MPEG2</td>
</tr>
<tr>
<td></td>
<td>320x240@30p/25p</td>
<td>0.5-2Mbps</td>
</tr>
<tr>
<td></td>
<td>32Kb – 384Kb</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1280x720@60p/50p</td>
<td>PCM MPEG2</td>
</tr>
<tr>
<td></td>
<td>320x240@30p/25p</td>
<td>0.5-2Mbps</td>
</tr>
<tr>
<td></td>
<td>32Kb – 384Kb</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1920x1080@60i/50i</td>
<td>PCM MPEG4-AVC</td>
</tr>
<tr>
<td></td>
<td>1920x1080@60i/50i</td>
<td>4-10Mbps</td>
</tr>
<tr>
<td></td>
<td>1280@30p/25p</td>
<td>0.25-1Mbps</td>
</tr>
<tr>
<td></td>
<td>16Kb – 256Kb</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1280x720@60p/50p</td>
<td>PCM MPEG4-AVC</td>
</tr>
<tr>
<td></td>
<td>1280x720@60p/50p</td>
<td>4-10Mbps</td>
</tr>
<tr>
<td></td>
<td>1280x720@30p/25p</td>
<td>0.25-1Mbps</td>
</tr>
</tbody>
</table>

Each transcoder card has 2 HDMI and 2 SDI inputs.
LCD PANEL

To set up the NetUP’s server equipped with LCD panel, do the following:
1. Plug the network and power cables into the device.
2. Switch power on. You shall see Starting... on the LCD panel.
3. Use the LCD manager for the initial setup of the system.

LCD manager provides a convenient way to monitor the CPU and LAN interface load on the device front panel, as well as to assign IP addresses to network adapters.

Statistics screen

The software contains two statistics screens. The first and principal is the screen that lists the amount of traffic through the network adapters. Lower line of the screen presents the total rate of incoming and outgoing traffic separated by “/”.

Pressing Up switches to the CPU load screen. First number is the total CPU load. Three subsequent numbers give, correspondingly, the portions of CPU load related to user tasks (u), system tasks (s), and awaiting data from the peripherals (w). Pressing Down switches back to the traffic statistics screen.

Network interfaces setup

The LCD panel contains interface for setting up network parameters, i.e. IP address and subnet mask. To do that, press Fn, then Enter on any statistics screen. The network configuration screen will appear. By pressing Up and Down select the network interface to be set up.

After selecting the interface you want to set up, press Enter. Then you will be prompted to change current IP address for the selected interface.

Pressing Fn, then Up or Down selects the byte to change (at that, “>” points to the currently selected byte). Pressing Up and Down, correspondingly, increases and decreases the selected byte value by 1.
When you are done with the IP address, press Enter. Then you will be prompted to enter the subnet mask. It is entered by pressing Up or Down, which increases or decreases the number of bits in the mask determining the subnet address.

After entering the subnet mask, press Enter. Then you will be prompted to keep the changes just made or cancel them. Buttons Up and Down switch between Yes and No, with currently selected option emphasized with brackets. Select Yes to save the settings just made, or press Enter to proceed back to the network interface selection screen.

When the settings are done, set up your DNS server (via its config file) to associate the IP address just entered with mw.netup domain name.
WEB INTERFACE

Introduction

Web interface is intended for setting up various server parameters of NetUP.tv servers and STB clients. It is accessible by the address \texttt{http://<Server IP address or domain name>}/.

Left pane of the web interface remains visible on every page and contains links to the following pages organized into groups:

\textit{The composition and the very presence of particular interface pages and entire groups may depend on the hardware configuration of the server and on the access privileges of the administrator currently logged in.}

1. **IPTV** group (present only on streamers):
   * **Multicast to unicast** (page 9) to control the retranslation of selected multicast streams via unicast;
   * **SNMP agents** (page 9) for setting up SNMP;

2. **System administration** group:
   * **Files** (page 10) for downloading the united control center, documentation, and miscellaneous STB-related files;
   * **Power Management** (page 10) for reboot and shutdown;
   * **Update** (page 11) for NetUP.tv firmware upgrade;
   * **Status** (page 11) shows the system status;

3. **System configuration** group:
   * **Network** (page 12) for network interfaces settings;
   * **Routing** (page 13) with routing table;
   * **Security** (page 14) for password management;
   * **Services** (page 14) for manual start and stop of services;

4. **System status** group:
   * **About** (page 16) showing version information;
   * **Connections** (page 16) showing connections between system components;
   * **Storage** (page 16) displaying disk space usage;

Starting web interface

To enter the web interface, type \texttt{http://<server IP address or domain name>} in your browser’s address field. An entrance page will appear. Logging in requires the password which is provided in the equipment certificate.
It is strongly recommended to change the password immediately after logging in for the first time. This can be done via the Security page (see Security on page 14).

**IPTV**

**Multicast to unicast**

On this page any multicast channel may be retranslated as unicast.

Once configured, the retranslated channel gets accessible by the URL `http://<server address>:8180/stream?ip=<channel IP>&port=1234`. Meanwhile, the complete list of retranslated channels and their addresses is available at `http://<server address>:8180/channels` as an XML file of the following format:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<channelLists>
  <timestamp>1327324533</timestamp>
  <channelList>
    <name>All channels</name>
    <channel>
      <name>Channel 1 (228.110.1.1)</name>
      <address>http://10.1.0.121:8180/stream?ip=228.110.1.1&amp;port=1234</address>
      <id>7c1342b67c4ed50f361aa045acf0e4f9</id><type>tv</type>
      <quality>SD</quality><encrypted>no</encrypted>
    </channel>
  </channelList>
</channelLists>
```

**SNMP agents**

This page contains the list of communities entitled to make SNMP requests. For each community the corresponding view and IP address are provided. Communities may also be added or removed. A MIB file describing the available information can be downloaded on this page.

The NetUP’s MIB file contains a template for the variables which are listed below, with explanation.

For each CPU in the system:
• netupCpuIndex is the CPU number;
• netupCpuLoad is the CPU load level;
• netupCpuTemp is the CPU temperature.

For each data storage in the system:
• netupStorageIndex is the storage number;
• netupStorageDevice is the path to the storage (for example, "/dev/sda1");
• netupStorageMountPoint is the mounting point of the storage (for example, "/mnt/hdd");
• netupStorageFileSystem is the file system of the storage;
• netupStorageBlockSize is the block size on the storage;
• netupStorageFragmentSize is the fragment size on the storage;
• netupStorageSize is the storage size;
• netupStorageFree is the free space on the storage.

For the system as a whole:
• netupMemPhysTotal is the total memory size;
• netupMemPhysFree is the free memory size;
• netupMemPhysBuffers is the buffer size;
• netupMemPhysCached is the cache memory size;
• netupMemSwapTotal is the maximum size of the swap file;
• netupMemSwapFree is the free space within the swap file;
• netupStbClients is the number of connected STB clients;
• netupPcClients is the number of connected PC clients;
• netupTotalClients is the total number of connected clients.

To request all available parameters, download the MIB file, pass it to the SNMP daemon, and run the following command:

```
snmpwalk -v2c -c netuptest 10.1.0.77 NETUP-MIB::netup
```

System administration

Files

This page contains the download links for various auxiliary files, including documentation in a single PDF file.

Power Management

This page contains Reboot and Shutdown buttons. Whenever the server needs to be reloaded or shut down, this should be done exclusively by means of these controls; abnormal termination may lead to system failure.
Update

This page lists the uploaded firmware files together with their uploading dates, build numbers, and possible actions.

<table>
<thead>
<tr>
<th>Firmware</th>
<th>Version</th>
<th>Revision</th>
<th>Created</th>
</tr>
</thead>
<tbody>
<tr>
<td>firmware_1.9.86</td>
<td>1.9.96-dreams-standalone</td>
<td>2099M</td>
<td>2012/12/01 09:29:14</td>
</tr>
<tr>
<td>firmware_1.8.86</td>
<td>1.8.86-standalone</td>
<td>2000M</td>
<td>2012/12/01 12:33:12</td>
</tr>
</tbody>
</table>

Figure 9. Update page.

This page allows to update the NetUP.tv firmware. To do that, upload the new firmware file to the server via FTP (login: update; password is similar to the server administrator password, see Security on page 14), refresh the page to reveal it in the list, and press Install.

Firmware files of incompatible versions may be falsely interpreted as corrupted. In particular, this is the case for the firmware files of version 1.6 once the system has been upgraded to version 1.7.

Status

This page shows:

- Time zone
- Internet (internet connection status)
- Server password
- Connections between systems (status of connection between system components)
Web interface

System configuration

Network

The Add VLAN button opens a popup window of virtual adapters’ settings (see VLAN window on page 13).

The Change Core IP button is only present on the servers other than IPTV Core. It lets you enter the IPTV Core IP address. After that the server will connect to the IPTV Core and will appear in the IPTV Core’s web-interface on Connections page.

Network adapters management

Network page gives the full list of installed network adapters together with their state.

Network connectors on the front panel of NetUP streamer are marked as follows:

<table>
<thead>
<tr>
<th>On the panel</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the web interface</td>
<td>eth0</td>
<td>eth1</td>
<td>eth2</td>
<td>eth3</td>
</tr>
</tbody>
</table>

Figure 11. Network adapters arrangement on the front panel of NetUP streamer.

For each adapter the following information is presented:

- Adapter name;
- Inet address (IP address) of the adapter;
- MAC address of the adapter;
• Adapter state (UP or DOWN);
• Aliases (alternative IP addresses) of the adapter;
• DHCP server IP range and state (UP or DOWN);

Following actions can be done with an adapter:
• Add alias button adds an alias IP address;
• Statistics button displays load statistics for the given adapter in graphic form;
• Inet address link provides the way of changing the IP address, or removing it altogether (unless it is unique);
• DHCP server link changes the IP address range served by this DHCP.
• DHCP server status indicator (UP / DOWN) is also a switch that toggles this DHCP on and off.

The address assigned for the eth0 interface is used for the component’s interaction (see Connections on page 16) and thus is absolutely crucial for the system’s operation. It can never be deleted.

VLAN window

To create new virtual LAN interface based on the selected physical interface, enter VLAN ID and press Add. A new VLAN with a name composed of the physical LAN’s name and the ID will be created.

To remove a VLAN, press Delete VLAN in the corresponding row.

Routing

This page features user routing rules and the system routing table.
Press **Add rule** to add a user routing rule. Left-click **Default Gateway** to edit it. Left-click a user rule to edit or delete it. When you left-click a user rule, a **Change routing rule** window will appear. There you can set an **IP address/mask**, set a **Gateway** or choose a **Network interface**.

- click **Save** to save the changes
- click **Cancel** to cancel the changes
- click **Delete** to delete the user routing rule

The system routing table is needed for correct system operation and can’t be edited. **Show/Hide** shows/hides the system routing table.

**Security**

This page contains interface for changing the access passwords, namely the server admin password and the cluster admin password. To do so, type the new password twice in the **New Password** and **Repeat Password** fields of the corresponding form and press **Update**.

*Server admin password is used for SSH and FTP access (see **Update** on page 11 and **Creating VoD or nVoD content** on page 46). Cluster admin password is used by the web interface and by the control center (see **Installing the UCC** on page 41).*

**Services**

This page lists existing system components (**Middleware**, **Billing**, etc).

It also provides an interface for the following services:

1. **Multicast Router** acting as an IGMP querier;
2. **Virtual Tunnel** – a tunneling connection to the server.

![Figure 17. Tunneling & IGMP page.](image)

- **Status** column displays current status of services (*Started* / *Stopped*).

You can change the status of a component to the opposite by left-clicking the component name (if it’s status is “started”, it will change to “stopped” and vice versa).

A virtual tunnel is a technology that may be used by the NetUP technical support team to remotely control your server. To set up a virtual tunnel, you have to send the `etc/vtund.conf` file to NetUP.

**Date and time**

Date and time page contains the time zone setting interface.

In the **NTP servers** section one may add or remove the NTP servers to synchronize with. New items get added to the end of the list.

The **Status** column lists the current status of the servers:

- **Failed** if the last sync attempt has failed;
- **Sync** if the sync has been performed successfully;
- **Reserved** if this time server has not been used yet.

Synchronization occurs once per hour. The servers are tried in presented order till the first success.

This page is present only on IPTV Core servers.

![Figure 18. Date and time page.](image)

**License**

This page contains interface for uploading the `security.tgz` file (so-called license archive), which is required for working with STBs and the admin interface. This file has to be downloaded from the client’s personal cabinet on [www.netup.tv](http://www.netup.tv) after installation of the system (unless preinstalled as factory default) and afterwards downloaded anew upon each update of the system’s components.

**Correct time zone must be set up prior to the license uploading** (see **License** on page 15), otherwise the system may work incorrectly.
The license archive must be uploaded after setting the time zone (see Date and time on page 15) and prior to the downloading of the united control center (see Files on page 10).

Once the license archive is uploaded, this page displays detailed license information, including the date of validity, list of optional components, and the limitations thereof.

System status

About

This page displays the version number of NetUP.tv and build numbers of individual systems.

Connections

This page displays the addresses and status information for all systems of NetUP.tv (including individual STBs). For each one, it also lists the other systems with which this one interacts.

Connections

<table>
<thead>
<tr>
<th>Connections</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NetUP IPTV Gate</td>
<td>Connected</td>
<td>10.1.0.77</td>
</tr>
<tr>
<td>NetUP IPTV Middleware</td>
<td>Connected</td>
<td>10.1.0.77</td>
</tr>
<tr>
<td>NetUP IPTV VideoGateway</td>
<td>Connected</td>
<td>10.1.0.77</td>
</tr>
<tr>
<td>NetUP IPTV Encrypted Video Server (license: 888)</td>
<td>Connected</td>
<td>10.1.0.77</td>
</tr>
<tr>
<td>NetUP IPTV Encrypted IP Server (license: 447)</td>
<td>Not connected</td>
<td>N/A</td>
</tr>
<tr>
<td>NetUP IPTV Encrypted IP Server (license: 447)</td>
<td>Connected</td>
<td>10.1.0.77</td>
</tr>
</tbody>
</table>

Figure 19. Connections page.

For this host’s system, the addresses of other connected systems are links to the interface by which they may be changed, either manually or by automatic address discovery.

Storage

This page summarizes the disk space usage info.

Storage

<table>
<thead>
<tr>
<th>Storage</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 20. Storage page.
Web-interface for transcoding setup

Open a web browser, go to its address field and type in http://<server IP address or domain name>/transcoder. This will get you to the login page. You will require the user name and password to log in.

*We strongly recommend that you change the password immediately after logging in the first time. You can do that via the Security page (see Security on page 14).*

After logging in you will see the following page:

This page shows all the transcoder cores available on the server and the names of the presets for these cores. Each preset stores the information about the incoming stream source and the encoding settings. The cores are organized into groups - two transcoder cores per CPU and two CPUs per a transcoder card.

*One CPU is capable of simultaneously encoding two streams in SD, or one stream in HD quality. Do not try to use the second core of a CPU, if you just set up encoding of an HD stream on the first core. In that case both cores are actually being used.*

Right-click **Total transcoding status** to see the detailed information about what is being encoded/transcoded on each of the transcoder cores available on the server.

Right-click one of the cores (preset name) to look at or edit the settings. That will open the following page:
There is a **Reset settings** button at the upper-right corner of the page. Use it to reset to default settings. The page contains the following elements:

- **Channel name** - enter the name of the preset here. It makes sense for a preset name to match the name of the channel that is being encoded/transcoded. That makes it easier to find the settings for a particular channel.
- **Incoming stream** - choose the incoming stream source. You have the following options:
  - **URL** - an address of the stream source (may be a udp multicast or a http unicast)
  - **HDMI port** - one of the transcoder card’s HDMI ports
  - **HD SDI port** - one of the transcoder card’s HD SDI ports
- **Outgoing stream** - enter the outgoing stream address here. The address may be a udp multicast or an http unicast. In case of http unicast, use your transcoder server’s IP address. In this field you may enter multiple addresses, divided by “;”
- **Transcoding options** - adjust the settings of audio and video codecs, being used for encoding/transcoding the incoming stream
- **Save button** - save current settings
- **Start/Stop button** - start/stop encoding/transcoding

If both the incoming and outgoing streams are SD quality streams, then only one core will be used for encoding/transcoding the incoming stream. But you have to make sure that the second core of the CPU is not busy encoding an HD quality stream.

If the incoming stream is an HD quality stream, you have to make sure that the second core of this CPU is idle before you start encoding/transcoding.