MPE-4000 MPEG-2/H.264 SD/HD Encoder

Datasheet and User Manual

SW Version: 2.15

HW Version: 1.43

Web NMS Version: 3.61
# Table of Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>TABLE OF CONTENT</td>
<td>2</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>3</td>
</tr>
<tr>
<td>PRODUCT OVERVIEW</td>
<td>3</td>
</tr>
<tr>
<td>KEY FEATURES</td>
<td>3</td>
</tr>
<tr>
<td>SPECIFICATIONS</td>
<td>4</td>
</tr>
<tr>
<td>BLOCK DIAGRAM</td>
<td>5</td>
</tr>
<tr>
<td>APPEARANCE AND DESCRIPTION</td>
<td>5</td>
</tr>
<tr>
<td>INSTALLATION GUIDE</td>
<td>7</td>
</tr>
<tr>
<td>POWER</td>
<td>7</td>
</tr>
<tr>
<td>ENVIRONMENTAL REQUIREMENT</td>
<td>7</td>
</tr>
<tr>
<td>GROUNDING REQUIREMENT</td>
<td>7</td>
</tr>
<tr>
<td>FRONT PANEL OPERATION</td>
<td>8</td>
</tr>
<tr>
<td>LCD MENU SETTINGS</td>
<td>8</td>
</tr>
<tr>
<td>INITIAL STATUS</td>
<td>10</td>
</tr>
<tr>
<td>GENERAL SETTINGS FOR THE MAIN MENU</td>
<td>11</td>
</tr>
<tr>
<td>WEB INTERFACE BASED NMS OPERATION</td>
<td>24</td>
</tr>
<tr>
<td>LOGIN</td>
<td>24</td>
</tr>
<tr>
<td>OPERATION</td>
<td>24</td>
</tr>
<tr>
<td>DATE-TIME SYSTEM SETTINGS</td>
<td>25</td>
</tr>
<tr>
<td>SYSTEM SETTINGS</td>
<td>25</td>
</tr>
<tr>
<td>OUTPUT SETTINGS:</td>
<td>28</td>
</tr>
<tr>
<td>ADVANCED: DOLBY META-DATA</td>
<td>30</td>
</tr>
<tr>
<td>SDI-CHANNEL SET:</td>
<td>31</td>
</tr>
<tr>
<td>PARAMETER -&gt; AUDIO SETTING</td>
<td>32</td>
</tr>
<tr>
<td>PARAMETER -&gt; VIDEO SETTING</td>
<td>33</td>
</tr>
<tr>
<td>OSD SETTINGS:</td>
<td>35</td>
</tr>
<tr>
<td>TROUBLESHOOTING</td>
<td>38</td>
</tr>
<tr>
<td>PACKING LIST</td>
<td>39</td>
</tr>
<tr>
<td>RECOMMENDATIONS:</td>
<td>39</td>
</tr>
<tr>
<td>General notes about Streams:</td>
<td>39</td>
</tr>
<tr>
<td>Multicast streams:</td>
<td>39</td>
</tr>
<tr>
<td>Registered port</td>
<td>41</td>
</tr>
<tr>
<td>Range for Ephemeral port</td>
<td>41</td>
</tr>
<tr>
<td>Packet structure</td>
<td>42</td>
</tr>
<tr>
<td>RTP:</td>
<td>42</td>
</tr>
<tr>
<td>Note: Regarding SAP (Session Announcement Protocol)</td>
<td>43</td>
</tr>
<tr>
<td>Contact</td>
<td>44</td>
</tr>
</tbody>
</table>
Introduction

Product Overview

MPE-4000 MPEG-2/H.264 SD/HD Encoder is a broadcasting audio & video encoding device with powerful functionality. It is equipped with multiple and therefore flexible Video input interfaces (SDI, CVBS, YPbPr and HDMI) and Audio input interfaces (AES, RCA and XLR) to be compatible with different signal sources.

Multiple audio and video encoding formats are available to meet your flexible and various requirements. 4 stereo (8 mono) or one DD 5.1 (AC3) audio signals can be embedded to the stream output. The encoded program will finally output in a DVB conform TS through ASI and IP port.

The MPE-4000 has an overlay insertion feature: QR code, LOGO and OSD-TEXT. It can generate 3 parallel overlay operations at the same time. You can insert an advertisement picture, own LOGO, special QR code and/or OSD content on top of the encoding process.

Key Features

- MPEG-2 HD/SD and MPEG-4 AVC/H.264 HD/SD video encoding
- 1080I, 720P, 480I, 576I video resolution and downscale transform
- Low latency
- MPEG1 Layer II, HE-AAC (v1 & v2), LC-AAC and DD AC3 audio encoding and adjustment
- Dolby Digital AC3 audio pass through (for SDI in)
- Additional 4 stereo or 8 mono audio encoding
- Video buffer, selectable Video sources (all video interfaces available in parallel Inputs)
- Support TT/CC (closed caption-US norm), EIA 608 and EIA 708 (for CVBS and SDI in)
- Dual parallel ASI output and IP over UDP and RTP
- LCD / Keypad control and Web based management by RJ45 Ethernet port
- AD-Insertion: QR code, LOGO, OSD-text
## Specifications

### Video

<table>
<thead>
<tr>
<th>Interface</th>
<th>1×SDI, 1×CVBS, 1×YPbPr and 1×HDMI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resolution</strong></td>
<td></td>
</tr>
<tr>
<td>1920×1080i@60</td>
<td>1920×1080, 1440×1080, 1280×1080i, 960×1080i</td>
</tr>
<tr>
<td>1920×1080i @59.94</td>
<td>1280×1080i, 960×1080i</td>
</tr>
<tr>
<td>1920×1080i @50</td>
<td>1280×1080, 960×1080, 640×720p</td>
</tr>
<tr>
<td>1280×720p@60</td>
<td>1280×720, 960×720p, 640×720p</td>
</tr>
<tr>
<td>1280×720p@59.94</td>
<td>1280×720, 960×720p, 640×720p</td>
</tr>
<tr>
<td>1280×720p@50</td>
<td>1280×720, 960×720p, 640×720p</td>
</tr>
<tr>
<td>720×576i@50</td>
<td>720×576, 704×576, 640×576, 544×576, 528×576, 480×576, 352×576</td>
</tr>
<tr>
<td>720×480i@59.94</td>
<td>720×480, 704×480, 640×480, 544×480, 528×480, 352×480</td>
</tr>
</tbody>
</table>

- **Encoding**: MPEG-2 HD/SD; MPEG-4 AVC/H.264 HD/SD
- **Bitrate Range**: 0.52 – 60.00 Mbps
- **Rate Control**: CBR (Encoding)
- **GOP Structure**: Auto, IP, IPB, IPBB, IPBBB
- **Aspect Ratio**: 4:3, 14:9 (for SD video), 16:9 (for HD video)
- **Chroma**: 4:2:0, 4:2:2
- **Advanced Pretreatment**: De-interlacing, noise reduction, sharpening

### Audio

<table>
<thead>
<tr>
<th>Interface</th>
<th>4×XLR, 4×RCA, 1×AES, 1×HDMI, 1×SDI (maximum 4 stereo synchronous processing or one DD 5.1 CH processing)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Encoding</strong></td>
<td>MPEG-1 Layer II, HE-AAC (v1&amp;v2), LC-AAC, DD AC3 (2.0, 5.1 available); DD AC3 pass-through (for SDI in)</td>
</tr>
<tr>
<td><strong>Sampling rate</strong></td>
<td>48KHz</td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>24-bit</td>
</tr>
<tr>
<td><strong>Bit-rate</strong></td>
<td>32Kbps...384Kbps</td>
</tr>
</tbody>
</table>

### Low Latency options

- 150ms, 200ms, 350ms, 650ms depending on Resolution and S-Rates

### Stream output

- 2×ASI output ports, BNC interface
- IP over UDP and RTP, 100 Base-T Ethernet interface (UDP multicast/unicast)

### System function

- LCD/Keypad and web management
- Language: English
- Ethernet based software updates

### General

- **Dimensions**: 482mm × 405mm × 44.5mm (W × D × H)
- **Weight**: Approx. 4.0 Kg
- **Temperature**: 0...45°C (Operation), -20...8°C (Storage)
- **Power**: AC110V ±10%, 50/60Hz; AC 220V ±10%, 50/60Hz
- **Consumption**: 21W
Block Diagram

Remark: DVB TELETEXT or american CC will be passed as well

Appearance and Description

Front Panel Illustration

① LCD window ② LED-Status Indicators ③ Up and down, left and right navigation buttons ④ Enter button: for confirmation ⑤ Menu button: for back step ⑥ Lock button: press once to unlock setting access by Keypad
Rear Panel Illustration

① XLR input connectors (for stereo audio 1-2 input)
② XLR input connectors (for stereo audio 3-4 input) (For 5.1 surround input)
③ RCA input connectors (for stereo audio 1-4 input or 5.1 surround input)
④ AES input connector (for only one channel digital stereo)
⑤ YPbPr & CVBS video input connectors
⑥ HDMI input connector (Audio input embedded)
⑦ SDI input connector (Audio input embedded)
⑧ NMS connector for connecting Web management on PC
⑨ DATA Port for IP stream output
⑩ ASI output connectors
⑪ Power supply/Fuse

Audio Adapter Cable Illustration

- L/R: For Mono or Stereo input (Analog)
- L/R/LS/RS/C/Sub: For 5.1 surround input (Analog)
- AES: For single digital stereo audio input
Installation Guide

We assume, that the installation will be done by a skilled and well educated electrical technician taking care of environmental circumstances like Air-condition and grounding requirements. The device should always be mounted into a 19’’ Rack by the front screws and even better with some metal angles avoiding bending of the units housing.

Power

- When you connect the power source, make sure the source voltage fits to the PSU data.
- Make sure the connected cables are in good condition. Avoid shortage of signal cables.
- Make sure the power switch is OFF before you start to install the device

Environmental Requirement

<table>
<thead>
<tr>
<th>Item</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server operating room and floor</td>
<td>Electric Isolation, Dust Free Volume resistivity of ground anti-static material: (1 \times 10^7 \ldots 1 \times 10^{10} \Omega), Grounding current limiting resistance: (1 \Omega) (Floor bearing should be greater than 450kg/m²)</td>
</tr>
<tr>
<td>Environmental Temperature</td>
<td>5…40°C (sustainable), 0…45°C (short time), installing air-conditioning is recommended</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>20%…80% sustainable 10%…90% short time</td>
</tr>
<tr>
<td>Pressure</td>
<td>86…105kpa</td>
</tr>
<tr>
<td>Door &amp; Window</td>
<td>Installing rubber strip for sealing door-gaps and dual level glasses for window</td>
</tr>
<tr>
<td>Wall</td>
<td>It can be covered with wallpaper, or brightness less paint.</td>
</tr>
<tr>
<td>Fire Protection</td>
<td>Fire alarm system and extinguisher</td>
</tr>
<tr>
<td>Power</td>
<td>Requiring device power, air-conditioning power and lighting power are independent from each other. Device power requires AC 110V±10%, 50/60Hz or AC 220V±10%, 50/60Hz. Please carefully check before connecting.</td>
</tr>
</tbody>
</table>

Grounding Requirement

The grounding requirements can vary from region to region but usually has to be considered according to national norms and regulations. Opening the top case is strictly forbidden as long as the AC power source is connected or the device is in fully operation.
Front Panel Operation

MPE-4000’s front panel is your operation interface where you configure the device manually. The LCD is a 2-line x 40-character back-lit dot-matrix you interface with pushbuttons for **UP, DOWN, LEFT, RIGHT, ENTER, MENU, and LOCK button** for front panel control. You can decide whether to directly use the factory setting, or customize the input/output parameters and so on.

Keypad Function Description

**LEFT/RIGHT**: To choose and set the parameters

**UP/DOWN**: Modify activated parameters or page up/down when parameter is inactivated.

**MENU**: To cancel presently entered value, resume previous setting;

**ENTER**: Activate the parameters which need modification, and confirm the changes after modification

**LOCK**: Lock the screen / cancel the lock state. After pressing lock key, the system will question you to save or not. If not, the LCD will display the current configuration state

LCD Menu settings
Overview of the LCD menu tree:

- **Switch On**
  - Initializing
  - General Status
- **1 Alarm Status**
  - Error Type Check
- **2 System Setting**
  - 2.1 Network
    - 3.1 IP Address
    - 3.2 Subnet Mask
    - 3.3 Gateway
    - 3.4 MAC Address
  - 2.2 Reset Web
    - Yes/No
  - 2.3 Output set
    - 2.4.1 Mode
    - 2.4.2 Bit rate
    - 2.4.3 Dest IP
    - 2.4.4 Dest Port
    - 2.4.5 Source IP
    - 2.4.6 Source Port
    - 2.4.7 Dest MAC
    - 2.4.8 Source MAC
    - 2.4.9 Gateway
    - 2.4.10 Subnet Mask
    - 2.4.11 Flt Null Packet
  - 2.4 Insert SDT
    - Yes/No
  - 2.4 Insert TDT
    - Yes/No
  - 2.4 Insert TOT
    - Yes/No
- **3 Audio Setting**
  - 3.1 Audio Port
  - 3.2 Sample rate
  - 3.3 Audio Pair
  - 3.4 Pair 1
    - 3.4.1 PID
    - 3.4.2 Stream ID
    - 3.4.3 Encode Type
    - 3.4.4 Pass through
    - 3.4.5 Volume
    - 3.4.6 Bit rate
    - 3.4.7 ES Mode
    - 3.4.8 Audio delay
    - 3.4.9 AAC container
    - 3.4.10 AAC profile
    - 3.4.11 AAC Version
    - 3.4.12 AC3 Destype
  - 3.5 Pair 2
    - (Same content with 3.4.1-4.4.10)
  - 3.6 Pair 3
    - (Same content with 3.4.1-4.4.10)
  - 3.7 Pair 4
    - (Same content with 3.4.1-4.4.10)
4 Video Setting

4.1 Video Port
4.2 Video Bit rate
4.3 Encode Type
4.4 Closed Caption
4.5 PID
4.6 Stream IP
4.7 Chroma Sample
4.8 Aspect Ratio
4.9 Rescaled
4.10 GOP Structure
4.11 GOP Size
4.12 Rate Ctrl Mode
4.13 IDR Frequency
4.14 Sync loss Image
4.15 Coding Mode
4.16 Profile
4.17 Level
4.18 PMT PID
4.19 PCR PID
4.20 TS Bitrate
4.21 Latency

5 Save Config

No / Yes

6 Save Config

6.1 Load Saved CFG
6.2 Load Default CFG

7 Version

Version Info

Initial Status

Switch on the device and after a few seconds’ initialization, it presents a booting pictures as below:

Encode Starting

Encode Starting

HD Encoder 12.34/20.00 Mbps
FMT: 720x576 50i VP: SDI AP: SDI

HD Encoder 12.34/20.00 Mbps
VEN-FMT: H.264 ACH-CNT: Frame-4

HD Encoder 12.34/20.00 Mbps
AEN-1: AC3 AEN-2: None

Read Only
- **HD Encoder**: to indicate the device name.
- **XX.XX/XX.XX Mbps**: to indicate the current encoding Bit Rate and total Output Bit Rate
- **FMT**: to indicate source signal resolution format
- **VP/AP**: to indicate the Video and Audio Signal source port.
- **VEN-FMT**: to indicate the video encode format.
- **ACH-CMT**: to indicate the audio Capture Mode.
- **AEN-1 to AEN-4**: to indicate the 4 channel audio encode format.

**General Settings for the Main Menu**

![Main Menu](image)

Press “**LOCK**” key on the front panel to enable the main menu. The LCD will show the following pages where you can configure the parameters for the device:

![SubMenus](image)

You can press UP/DOWN/LEFT/RIGHT buttons to specify menu item, and then press ENTER to enter the submenus as below:

**ALARM STATUS**

The alarm indicator will turn on if signal source loses or encoding errors occur. You can then enter this menu to check the error type.

**SYSTEM SETTING**

![System Setting](image)
Network setting

Enter “Network” to set the network. Submenus go as below:

- IP Address
  - 192.168.000.136
- Subnet Mask
  - 255.255.255.000
- Gateway
  - 192.168.000.001
- MAC Address
  - 00:11:22:33:55:11

This is the IP address used for connecting to Web management.

The MAC is read only on the front panel. It is can be modified in the Web management interface.

Reset web

With this interface, by pressing ENTER again, you can select to reset the web-if. The operation interface will turn up as following page:

- Reset web?
  - Yes
  - No

The current mode

The current option and total options

NOTE: Below explanations are applied in this entire manual.

1) When you enter this submenu, the LCD shows only one option which is the device’s current option which is marked with square bracket when you presses ENTER again to enter the operation interface.

2) “01/02” in the up-right corner indicates there are all together 2 options and the LCD is showing the 1st option currently.

Output setting

Enter “Output Set” to set the output parameters. Sub-menus works as below:

- Mode
  - 2.4.1
- Bitrate
  - 2.4.2
- Dest IP
  - 2.4.3
- Dest Port
  - 2.4.4

This is the IP address used for connecting to Web management.

The MAC is read only on the front panel. It is can be modified in the Web management interface.
• **IP Out Mode**

MPE-4000 HD encoder supports program stream to output over UDP through the DATA port.

<table>
<thead>
<tr>
<th>IP Out Mode</th>
<th>UDP</th>
<th>02/02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disabled</td>
<td>[UDP]</td>
<td></td>
</tr>
</tbody>
</table>

Disable: Program stream will not output from IP port, just output to the ASI Port(s).

• **Output Bit rate**

You can set the total output Bit rate (include video and audio Bit rate, PID Bit rate, etc.) under this menu.

Output Bit rate
50.00 Mbps

• You can enter the other IP settings accordingly to check or modify output IP parameters.

<table>
<thead>
<tr>
<th>Dest IP</th>
<th>224.002.002.002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dest Port</td>
<td>1234</td>
</tr>
<tr>
<td>Source IP</td>
<td>192.168.002.137</td>
</tr>
<tr>
<td>Source Port</td>
<td>2007</td>
</tr>
<tr>
<td>Dest MAC</td>
<td>01:00:5E:02:02:02</td>
</tr>
</tbody>
</table>

Fit Null Packet

You can decide whether to filter IP null packet (PID 8191dec) at this menu.

Filter IP Null Packet? NO [01/02]
[No] Yes

Insert SDT

At this interface, by pressing ENTER again, you can choose to insert SDT (Service Description Table) or not.

Insert SDT? Yes [01/02]
[Yes] No

Insert TDT (Time Date Table)

At this interface, by pressing ENTER again, you can choose to insert TDT or not.

Insert TDT? Yes [01/02]
[Yes] No

Insert TOT (Time Offset Table)

At this interface, by pressing ENTER again, you can choose to insert TOT or not.

Insert TOT? Yes [01/02]
[Yes] No

Insert VCT (American ATSC standard table part can be compared with DVB- SDT)
AUDISETTING

Enter “Audio setting” to configure the Audio parameters for the input program (HDMI/SDI/YPbPr/CVBS input program). Submenus go as below:

Audio Port

Press ENTER to enter menu Audio Port. It displays the current mode of audio Port. Press ENTER again to enter the setting interface, move the square bracket with LEFT/RIGHT keys to select the target mode and press ENTER to confirm. At last, press MENU to step back to the upper menus.

REMARKS:

If the audio source is from HDMI or SDI, the system will automatically identify and match the interface. It is not necessary to set this menu. If the audio source is from XLR, RCA or AES, it needs to match the interface manually.

Sample Rate

The audio sample rate is 48 KHz without other options.

Audio Pair

MPE-4000 supports 4 stereo (8 mono) or one DD 5.1 (AC3) audios embedded to mix with the video stream output.

Drop: Audio data has been captured.
Pair-1: A single (channel 1) audio stream is captured.
Pair-2: 2 audio (channel 1&2) streams are captured.
Pair-3: 3 audio (channel 1 to 3) streams are captured.
Pair-4: 4 audio (channel 1 to 4) streams are captured.
5.1CH: Surround (5.1) for Dobby/AC3 5.1 channel.

**Pair 1-4**

As the MPE-4000 is with 4 audio encode channel, “3.4”-“3.7”. You can enter “3.4”/“3.5”/“3.5”/“3.7” to set the corresponding audio parameters. Submenus (taking “3.4” as an example) are as below:

- **PID**
  You can set the PID for first channel under this menu.
  
  | PID | 0512 |
  |

- **Stream ID**
  You can set the audio stream ID under this menu.

  | Stream ID | 192 |
  |

- **Encode Type**
  Select audio encode format among items listed in the interface.

  | Encode Type | MPEG-L2 | [02/04] |
  | None | [MPEG-L2] | AC3 | AAC |

**REMARKS:**

If “None” is chosen the audio format, the system will not choose any audio to process and there will be no audio in the output data stream.

- **Pass Through**

  MPE-4000 supports AC3 audio to pass-through from SDI input.
You can decide to switch “on” AC3 Pass through function or “off” under this menu.

### Volume

You can set the Audio Volume Level under this menu.

### Audio Bit rate

Select audio bit rate among 32Kbps – 384Kbps.

MPE-4000 support MPEG1-L2, AC3, AAC (LC/HE-AAC) audio encoding. Different audio encode types have different Audio Bit rates usually to consider.

- **64Kbps, 96-384Kbps** for MPEG1-L2
- **32-384Kbps** for AAC
- **128Kbps, 192Kbps, 156Kbps, 384Kbps** for AC3

### ES Mode

Select Stereo mode among stereo, Dual Mono, L-Mono, and R-Mono.

### Audio Delay

You can set the audio delay under this menu.

### AAC Container

You can choose the AAC container mode under this menu.
- **AAC Profile**
  Select AAC profile among LC, HE and HEV2.

<table>
<thead>
<tr>
<th>AAC Profile</th>
<th>LC</th>
<th>[01/03]</th>
<th>HE</th>
<th>HEV2</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **AAC Version**
  You can set the AAC encoder version in this menu.

<table>
<thead>
<tr>
<th>AAC Version</th>
<th>MPEG-2</th>
<th>[01/02]</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPEG-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MPEG-4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **AC3 Destype**
  You can set the AC3 Descriptor type in this menu.

<table>
<thead>
<tr>
<th>AC3 Destype</th>
<th>DVB</th>
<th>[01/02]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DVB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATSC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**VIDEO SETTING**

- 4.1 Video Port
- 4.2 Video BitRate
- 4.3 Encode Type
- 4.4 Closed Caption
- 4.5 PID
- 4.6 Stream ID
- 4.7 Chroma Sampling
- 4.8 Aspect Ratio
- 4.9 Rescaled
- 4.10 GOP Structure
- 4.11 GOP Size
- 4.12 Rate Ctrl Mode
- 4.13 IDR Frequency
- 4.14 SyncLoss Image
- 4.15 Coding Mode
- 4.16 Profile
- 4.17 Level
- 4.18 PMT PID
- 4.19 PCR PID
- 4.20 TS Bitrate
- 4.21 Latency
- 4.22 PCR Interval
- 4.23 Video Buffer
- 4.24 Source Error
- 4.25 Adj WinFmt
- 4.26 Adj LineNum
• **Video Port**

Press ENTER to enter menu *Video Port*. It shows the current mode of the video input. Press ENTER again to enter the setting interface, move the square bracket with LEFT/RIGHT keys to select the target mode and press ENTER to confirm. At last, press MENU to step back to the upper menus.

There are 4 types of interface for video input. Select one type and the system will detect the single and process. Make sure the single cables are properly connected.

• **Video Bit Rate**

MPE-4000 can encode video at range of 0.52 Mbps to 60.00 Mbps.

• **Encode Type**

MPE-4000 supports two Encode Types: **H.264** (MPEG4 AVC/H.264) and **MPEG2**. You can choose to one mode as the video compression type at this menu.

• **Closed Caption (CC) American Teletext**

(Note: MPE-4000 supports CC from CVBS and SDI input only)

**None**: not to insert the CC into the output stream

**All**: The device will automatically identify the Closed Caption Standard among 608B 608FLD1 608FLD2 and 708B.

• **PID**

Enter this menu to edit Video PID.

• **Stream ID**

Enter this menu to set Video Stream ID.
- **Chroma Sample**
  Select one Chroma Sample mode from the 2 options listed. They are applicable for both MPEG2 and H.264 encoding mode.

  ![Chroma Sampling](image)
  

- **Aspect Ratio**
  Select aspect ratio mode from option listed. SD Video can choose from 4x3 and 14:9. HD Video only can choose 16:9.

  ![Aspect Ratio](image)

- **Rescale**
  Enter this menu to set the output Resolution. MPE-4000 support 1080I, 720P, 480I, 576I video input resolution and downscale transform.
  Disable: To out the same resolution as source resolution.

  ![Rescale Resolution](image)

- **GOP Structure**
  Select GOP structure mode from the options listed.

  ![GOP Structure](image)

- **GOP Size**
  You can set the GOP Size by this menu item.

  ![GOP Size](image)
• **Rate Control Mode**

MPE-4000 supports CBR (Constant Bit Rate) encoding control mode.

<table>
<thead>
<tr>
<th>Rate Control Mode</th>
<th>CBR [01/01]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[CBR]</td>
</tr>
</tbody>
</table>

• **IDR Frequency**

Specify the IDR frequency relative to I-Frames.

<table>
<thead>
<tr>
<th>IDR Frequency</th>
<th>NO IDRs [01/04]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[NO IDRs] Every I Second I Third I</td>
</tr>
</tbody>
</table>

• **Sync Loss Image**

You can choose the image type to encode during loss of video source sync.

<table>
<thead>
<tr>
<th>Sync Loss Image</th>
<th>Color [01/02]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[Color] Black</td>
</tr>
</tbody>
</table>

• **Coding Mode**

Choose the coding mode from the options listed.

<table>
<thead>
<tr>
<th>Code Mode</th>
<th>Auto Frame Field MBAFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Auto]</td>
<td></td>
</tr>
</tbody>
</table>

• **Profile**

Select the encoding Profile from the options listed.

<table>
<thead>
<tr>
<th>Profile</th>
<th>Baseline [01/03]</th>
</tr>
</thead>
<tbody>
<tr>
<td>[B/S]</td>
<td>Up to high Up to main</td>
</tr>
</tbody>
</table>
• **Level**

You can choose the level which is used for encoding.

<table>
<thead>
<tr>
<th>Level</th>
<th>[Auto]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto</td>
<td>Level 1.0</td>
</tr>
</tbody>
</table>

• **PCR/PMT PID**

Enter each single menu to edit the PIDs.  
**REMARKS:** These values are based on decimal system (not HEX).

<table>
<thead>
<tr>
<th>PCR PID</th>
<th>PMT PID</th>
</tr>
</thead>
<tbody>
<tr>
<td>0256</td>
<td>0257</td>
</tr>
</tbody>
</table>

• **TS Bitrate**

You can check and modify the TS bitrate which is used for encoding.

| TS bitrate | 35 |

• **Video Buffer**

You can select to turn on/off the video buffer.

<table>
<thead>
<tr>
<th>Video buffer</th>
<th>On</th>
<th>[01/02]</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>Off</td>
<td></td>
</tr>
</tbody>
</table>

• **Source error**

You can check the source error which is used for encoding.

<table>
<thead>
<tr>
<th>Source error</th>
<th>Detect</th>
<th>Ignore</th>
<th>Resyne</th>
</tr>
</thead>
</table>

• **Adj Winformat and Linenumber**

You can check the Window format which is used for encoding.

Because of new SW-Versions enabling additional functions the menu structure can vary.
SAVE CONFIGURATION

You can enter Saving Configuration for saving settings. Choose yes and press ENTER to confirm.

LOAD CONFIGURATION

With this menu, you can select a loading source and press ENTER to confirm. You can restore the device into the last saved configuration by choosing “6.1” and restore the device into factory configuration by choosing “6.2” the display will show this menu as below:

VERSION

You can check the software version and hardware version of this equipment under this submenu.
WEB Interface based NMS Operation

You can not only use front panel to set configuration, but also control and set the configuration with a PC (Personal Computer) or Laptop by connecting the device to the RJ45 WEB-IF NMS Port (Network Management Setup). You should ensure that the computer’s IP address is different from the MPE-4000's IP address (default = 192.168.0.136) otherwise, it would cause IP conflict.

Login

The default IP address of this device is 192.168.0.136. You can modify the IP Address through the front panel – menu 4.1. or by WEB-IF. Connect the PC and the device with a network cable, and use ping command to confirm they are on the same network segment.

Use your web browser (recommended Mozilla newest version) to connect the device with a PC by inputting the device’s IP address in the browser’s address bar and press Enter. It will display the Login interface as Figure-1. Input the Username and Password (Both the default Username and Password are “admin”. ) and then click “LOGIN” to start the device setting.

![Login Interface](image)

Figure-1

Operation

- **System Information**

After login, it shows the SYSTEM INFORMATION as Figure-2 where you can view the current system information:

![System Information](image)
Date-Time system settings

“Help” Function

In “Encode Setting” Interface, whenever the mouse cursor is suspended on one item, a question mark appears by the cursor and the corresponding item comes to a hyperlink state. Click the hyperlink item to trigger a text window to give instructions on properly setting the corresponding item.

System settings

First of all we should take care about some basic settings like network IP addresses and Time/Date settings:
SAVE and Load Menu

The description is self-explaining...

If new Firmware is released, you can upload it here.
So better to BACKUP before Upgrade!

A popup will appear to save the file ‘config.bin’. This would be the upload file after a factory reset.

Change password here. If you’ll lose it, you must reset the machine by Front-Panel Keypad:

Another important value to consider: Time and Date Information setup:
You should connect the unit to a local NTP server (5 max.) for syncing of actual correct time and date and offset:

To be able to insert TDT/TOT Information in the output TS this time & date & GMT offset information are necessary.

Because we want to output the encoded TS as ASI and IP-Stream, we need to setup the **OUTPUT SETTINGS:**

Click “Output Setting” on the top column and it displays interface as Figure-7. You can set the output parameters by inputting a value or selecting a mode in the pull-down list.
Config-Section:
In this part, all settings for the output stream from the DATA – RJ45 network interface can be adjusted. Of course a streamer need an IP Address (Source), GW and NM settings. RTP or UDP can be chosen. The MAC should be unique but can be adjusted somehow. If the IP Stream output should be a VBR, the Zero-packets (PID 8191dec) can be skipped. This doesn’t work on ASI output because ASI is always a CBR incl. Zero packets filling up to the Bitrate you can setup to your needs. The ASI port can be used as Burst or Byte mode. An Insertion of the SDT is for TS related multiplexers and even for IPTV streams nearly mandatory.

TDT/TOT must be generated if the ASI / IP Stream output demands this for the further multiplexer devices. Reason: While an SDI or HDMI or even CVBS analogue Video signal must not carry time and date information, it is almost a must-have to insert this information in a Transportstream (TS). See also: https://www.dvb.org/resources/public/standards/a38_dvb-si_specification.pdf

While VCT is a part of the ATSC norm, as well as CC Closed caption information (Subtitles as Overlays similar to DVB-Teletext) you can insert a VCT-PID containing relevant information or skip this part. Some explanations from Internet:
http://www.tvwithoutborders.com/tutorials/dtv_intro/atsc_psip/vct/

The first thing that service information has to describe is the organization of the transport stream. This is defined as part of the MPEG standard, and so these tables are common across all types of digital TV system, be it DVB or ATSC. The most important table is the Program Association Table (PAT). This is the entry point into the service information, and so it must be broadcast on a well-known PID within the transport stream – PID 0.

Programs in MPEG are the same as services in a digital TV context. The Program Association Table lists how many services there are in the transport stream, and provides pointers to more detailed descriptions of those services. Each service has an associated Program Map Table(PMT) that describes the elementary streams that make up the service. For every elementary stream in the service, the PMT for that service contains information about the type of that stream (audio, video or data, and what type of audio, video or data) and the PID of that elementary stream. Since there are several instances of the PMT in a transport stream, these are broadcast on different PIDs. The PID for each PMT is carried in the PAT entry for that service. Now that the receiver knows how the network is organized at the stream level, some extra logical information is needed to make this more useful to the receiver.
The PMT provides a list of how each service is organized in the transport stream, but it doesn’t actually give much information about how services are organized from the perspective of the viewer. The viewer cares specifically about TV channels, and shouldn’t even know about transport streams and elementary streams or any other part of the broadcasting system. To do this, ATSC uses another table called the Virtual Channel Table, or VCT. Cable, satellite and terrestrial networks all have slightly different versions of this table. ...

ADVANCED: Dolby Meta-Data:

Because Dolby Labs are a margin optimizing oriented company, you should be sure to own the license for that. So we are asking for the confirmation of this notable issue.
After confirmation of the License nag-screen, all of these parameters can be set according to your needs and independently for all 4 Audio-channel pairs.

**SDI-Channel SET:**

In this menu – if the SDI-Input carries multiple AUDIO pairs already, you can select these and re-organize them.
Groups and primary / secondary channels can be changed for the encoding output.

**Parameter -> Audio Setting**

Select “Audio Setting” on the top column and it shows the AUDIO interface. You can configure the Audio parameters:

**Capture Mode:**

MPE-4000 supports 4 stereo (8 mono) or one DD 5.1 (AC3) audios embedded to mix with the video to form a stream output.

Drop: Audio data is captured.

Frame-1: A single (channel 1) audio stream is captured.
Frame-2: 2 audio (channel 1&2) streams are captured.
Frame-3: 3 audio (channel 1 to 3) streams are captured.
Frame-4: 4 audio (channel 1 to 4) streams are captured.
5.1CH: Surround (5.1) for Dobby/AC3 5.1 channel.

**Parameter -> Video Setting**

Select “Video Setting” on the top column and it shows its interface. Configuring the Video parameters:

- **Video Format:** 1920x1080 50p is related to the detected INPUT Resolution! No adjustment possible.
- **GOP Structure:** Specifies the GOP structure of the encoded video.
  - For H.264 650ms latency the max number of B frames is 2 for 29.97/25Hz, and 3 for 60/50Hz.
  - For MPEG-2 650ms latency the max number of B frames is 1 for 29.97/25/24Hz, and 2 for 60/50Hz.
  - **WARNING:** There are no B frames for 150ms latency.
- **IDR-Frequency:** Specifies the IDR frequency relative to I-Frames.
- **Profile:** The maximum profile to be used for encoding. Coding tools for profiles higher than specified will be disabled. The encoder will signal the lowest profile in the bitstream that allows for the currently enabled coding tools.
- **PMT PID:** Set TS PMT PID Number for the DVB / ATSC related Program map table -> See DVB/ATSC specs. Avoid reserved PID’s like 11dec = NIT, 18dec = EIT, ... **WARNING:** Please do not set this value identical as other PID’s!
- **PID Range:** 19 ... 8190 (8191 = zero packets)
- **Latency:** 150ms, 200ms, 350ms, 650ms optional.
- **Source Error:** Detect or ignore the source error. NOTE: Only SDI source input is supported yet.
  - **WARNING:** For safety sake, in general, please use the Detect options.
Video Port:
Select video input interface. Input availability Matrix:

<table>
<thead>
<tr>
<th>FMT</th>
<th>SDI</th>
<th>HDMI</th>
<th>YPbPr</th>
<th>CVBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>480I</td>
<td>√</td>
<td>-</td>
<td>-</td>
<td>√</td>
</tr>
<tr>
<td>576I</td>
<td>√</td>
<td>-</td>
<td>-</td>
<td>√</td>
</tr>
<tr>
<td>720P</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>-</td>
</tr>
<tr>
<td>1080I</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>-</td>
</tr>
</tbody>
</table>

VIDEO PID: **WARNING**: Please do not set this value identical like other PIDs!

PID Range: 19...8190

Aspect Ratio: Select the aspect ratio for video encoding.

SD: 4x3 16x9 14x9  HD : 16x9  Note: Only h.264 encoding supports 14x9

GOP Size: The size of each GOP in frames. The value of 0 for GOP size indicates AUTO, which is the following:
- 150ms/250ms/350ms MPEG-2 and h.264:
  - The default GOP size is infinite. This means that there will be I-fields only at scene changes and all other fields will be P-fields using Continuous Decoder Refresh (CDR) method.
  - 650ms MPEG-2: The default GOP size is 132 frames
  - 650ms H.264: The default GOP size is 300 frames

SyncLoss-Image: The image type to encode during loss of video source synchronisation. Color bar or Black screen

<table>
<thead>
<tr>
<th>Level</th>
<th>Automatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCR PID</td>
<td>Automatic</td>
</tr>
<tr>
<td>PCR Interval</td>
<td>422 High</td>
</tr>
<tr>
<td>Adj Win Format</td>
<td>422 Man</td>
</tr>
<tr>
<td>Adj Win Format</td>
<td>High 1440</td>
</tr>
</tbody>
</table>

PCR-PID: The value for the TS output PCR-PID. Here please beware of the PID regions like above.

PCR-Interval: Set PCR interval in milliseconds. **WARNING**: Range: 1...40, default 35

Adj Win Format: Active adjust the window format:

| Adj Win Format | Disable |
| Adj Win Format | Adjust Bottom Field |
| Adj Win Format | Adjust Top Field |

Stream ID: Set video stream ID. ID Range:-1...225 , default:224

**WARNING**: Generally, please use default value.

Rescaled: Horizontal rescale the input video to this resolution.

For 1920 pixel wide inputs, valid values are: 1440 (3/4), 960
For 1280 pixel wide inputs, valid values are: 960 (3/4), 640
For 720 pixel wide inputs, valid values are: 704 (drop), 640 (square pixels), 544 (3/4), 528 (3/4 of 704), 480, 352

| Close GOP | NO |
| Coding Mode | NO |
| TS Extres [Mbps] | YES |

Close GOP structure yes/no.
**Coding Mode:** The coding mode to use.

**WARNING:** For MPEG2 encoding only AUTO is supported (field coding for interlaced/frame coding for progressive).

For H.264 150ms latency only AUTO is supported (field coding for interlaced/frame coding for progressive).

For H.264 650ms latency, FIELD mode is supported for interlaced content if B pictures are disabled. Otherwise AUTO will select MBAFF for interlaced or FRAME for progressive.

**TS Bitrate:** Output bit rate of the transport mux

**WARNING:** This parameter is read only, and is related to the Bitrate (Mbps) parameter which has been configured in the output page.

**VEN Bitrate (Mbps):** Video bit rate in bits per seconds (BPS). MPEG2: Range 0,52Mbps ... 60Mbps

h.264: Range 0,256Mbps ... 60Mbps

**WARNING:** Encoding Bitrate (video and audio) can’t be larger than the TS Bitrate!

**Video Buffer:** When source input signal is unstable, enabling this parameter can protect the encoder to avoid crashing.

**NOTE:** Only the SDI source input is supported. **WARNING:** If enabled video buffer, the time of system latency will increase about 200ms, and audio will out of synch about 1...10 frames with the video!

**Adj Line number:** Active window start line offset

**OSD settings:**

In this Menu you can add multiple logos, text and QR codes. --- Menu is nearly self-explaining:
Right click: Settings of the logo can be modified.
Caption—Caption insert configuration

Select the text color and background color

Put your caption anywhere

Click each one of the inserted OSD, then name it and select one “affairs Idx” to save it

QRcode—QR code insert configuration

Upload

Create
Advanced -> OSD affairs settings
Click “OSD affairs settings” on the top column will show the setup where you can configure the OSD affairs as per configuration.

Troubleshooting
The manufacturers ISO9001 quality assurance system has been approved by CQC organization. For guarantee the products’ quality, reliability and stability. All products have been passed the testing and inspection before shipping out from factory. The testing and inspection scheme already covers all the Optical, Electronic and Mechanical criteria which have been published by the Manufacturer. To prevent potential hazard, please strictly follow the operational conditions.

Prevention Measure
- Installing the device at the place in which environment temperature between 0 to 45 °C
- Making sure good ventilation for the heat-sink on the rear panel and other heat-sink bores if necessary
- Checking whether the input AC voltage is within the power supply working range and the connection is correct before switching on device
- Checking all signal cables have been properly connected
- Frequently switching on/off of the device is prohibited; the interval between every switching on/off must be higher than 10 seconds.

Conditions need to unplug power cord
- Power cord or socket damaged.
- Any liquid flowed into device.
- Any stuff causes circuit short
- Device in damp environment
- Device was suffered from physical damage
- Longtime idle.
- After switching on and restoring to factory setting, device still cannot work properly.
- Maintenance needed
Packing List

- MPE-4000 MPEG2/H.264 HD Encoder: 1 pcs
- You Manual: 1 pcs
- HDMI Cable: 1 pcs
- SDI Cable: 1 pcs
- YPbPr Cable: 1 pcs
- CVBS Cable: 1 pcs
- XLR adapter Cables: 2 Sets
- RCA adapter Cables: 1 Set
- Power Cord: 1 pcs

Recommendations:

As a Multicast capable Switch we recommend is the HP (ARUVA) 2530 24G or 48G. (For Floor switches we have an own branded one and support IGMP as well) IGMP should be set to ON in the port configs. The latest HP Firmware might not be the best choice. Better to test IGMP functions before installation into a HOT running System and eventually do a downgrade of the Firmware. This one works:

![HP 2530-24G Switch](image)

General notes about Streams:

Multicast streams:

Multicast Address Ranges:

We recommend, that the addressing of your Multicast streams should be in conjunction with this listings to avoid conflicts with other network equipment or protocols.

https://www.iana.org/assignments/multicast-addresses/multicast-addresses.xhtml

One small part from this:

IPv4 Multicast Address Space Registry

Last Updated
2018-01-05

Expert(s)
Stig Venaas
Note

Host Extensions for IP Multicasting [RFC1112] specifies the extensions required of a host implementation of the Internet Protocol (IP) to support multicasting. The multicast addresses are in the range 224.0.0.0 through 239.255.255.255. Address assignments are listed below.

The range of addresses between 224.0.0.0 and 224.0.0.255, inclusive, is reserved for the use of routing protocols and other low-level topology discovery or maintenance protocols, such as gateway discovery and group membership reporting. Multicast routers should not forward any multicast datagram with destination addresses in this range, regardless of its TTL.

Available Formats

Registries included below

- Local Network Control Block (224.0.0.0 - 224.0.0.255 (224.0/24))
- Internetwork Control Block (224.0.1.0 - 224.0.1.255 (224.0/24))
- AD-HOC Block I (224.0.2.0 - 224.0.255.255)
- RESERVED (224.1.0.0-224.1.255.255 (224.1/16))
- SDP/SAP Block (224.2.0.0-224.2.255.255 (224.2/16))
- AD-HOC Block II (224.3.0.0-224.4.255.255 (224.3/16, 224.4/16))
- RESERVED (224.5.0.0-224.5.255.255 (251/16s))
- DIS Transient Groups 224.252.0.0 - 224.255.255.255 (224.252/14))
- RESERVED (225.0.0.0-231.255.255.255 (7/8s))
- Source-Specific Multicast Block (232.0.0.0 -232.255.255.255 (232/8))
- GLOP Block
- AD-HOC Block III (233.252.0.0-233.255.255.255 (233.252/14))
- Unicast-Prefix-based IPv4 Multicast Addresses
- Scoped Multicast Ranges
- Relative Addresses used with Scoped Multicast Addresses

Multicast (as opposed to unicast) is used to send UDP packets from 1 source to multiple destination servers. This is useful for example for streaming from a satellite/DVB-T receiver to multiple receiving PCs for playback. Multicast can also be used on the output of an encoder to feed multiple streaming servers. Multicast only works with UDP and is not possible with TCP due to the 2 way nature of TCP, most commonly multicast is used with RTP and MPEG2-TS.

A multicast IP address must be chosen according to IANA information, we recommend using an address in the range 239.0.0.0 to 239.255.255.255 as this is reserved for private use. Using multicast addresses in the 224.0.0.0 range may clash with existing services and cause your stream to fail. For more details see http://www.iana.org/assignments/multicast-addresses/multicast-addresses.xml

Choosing a UDP port number for multicast streams is also important. Even if you use a different multicast IP for each of your streams, we strongly recommend using different UDP port numbers as well. This is because a server and all software running on the server receives
ALL multicast traffic on an open port and extra processing is required to filter out the required traffic. If the each stream arrives on a different port, the server can safely ignore any traffic on ports that are not open. Port numbers MUST be chosen so that don't clash with any existing services or ephemeral ranges. The ephemeral range for Windows Vista, 7, 2008 is 49152 to 65535, for older Windows it is 1025 to 5000 and for Linux it is 32768 to 61000. For more information on Windows see http://support.microsoft.com/kb/929851 Care should also be taken to avoid system ports 0 to 1024. See http://www.iana.org/assignments/service-names-port-numbers/service-names-port-numbers.xml Generally one of the unassigned You Ports (1024-49151) should be used, you can run the netstat -abn (as admin under windows) command to see which ports are currently in use.

Registered port

A registered port is a network port (a sub-address defined within the Internet Protocol, in the range 1024–49151) assigned by the Internet Assigned Numbers Authority (IANA) (or by Internet Corporation for Assigned Names and Numbers (ICANN) before March 21, 2001, [1] or by USC/ISI before 1998) for use with a certain protocol or application.

Ports with numbers 0–1023 are called system or well-known ports; ports with numbers 1024-49151 are called you or registered ports, and ports with numbers 49152-65535 are called dynamic and/or private ports.[2] Both system and you ports are used by transport protocols (TCP, UDP, DCCP, SCTP) to indicate an application or service.

- Ports 0–1023 – system or well-known ports
- Ports 1024–49151 – you or registered ports
- Ports >49151 – dynamic / private ports


Range for Ephemeral port

The Internet Assigned Numbers Authority (IANA) suggests the range 49152 to 65535 (2^{15}+2^{14} to 2^{16}−1) for dynamic or private ports.[1]

Many Linux kernels use the port range 32768 to 61000.[note 2] FreeBSD has used the IANA port range since release 4.6. Previous versions, including the Berkeley Software Distribution (BSD), use ports 1024 to 5000 as ephemeral ports.[2][3]

Microsoft Windows operating systems through XP use the range 1025–5000 as ephemeral ports by default.[4] Windows Vista, Windows 7, and Server 2008 use the IANA range by default.[5] Windows Server 2003 uses the range 1025–5000 by default, until Microsoft security update MS08-037 from 2008 is installed, after which it uses the IANA range by default.[6] Windows Server 2008 with Exchange Server 2007 installed has a default port range of 1025–60000.[7] In addition to the default range, all versions of Windows since Windows 2000 have the option of specifying a custom range anywhere within 1025–65535.[8][9]
Packet structure

<table>
<thead>
<tr>
<th>Offsets</th>
<th>Octet</th>
<th>Bit</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Octet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td>Source port</td>
<td>Destination port</td>
</tr>
<tr>
<td>4</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td>Length</td>
<td>Checksum</td>
</tr>
</tbody>
</table>

The UDP header consists of 4 fields, each of which is 2 bytes (16 bits). The use of the fields "Checksum" and "Source port" is optional in IPv4 (pink background in table). In IPv6 only the source port is optional (see below).

Source port number

This field identifies the sender's port when meaningful and should be assumed to be the port to reply to if needed. If not used, then it should be zero. If the source host is the client, the port number is likely to be an ephemeral port number. If the source host is the server, the port number is likely to be a well-known port number.[4]

Destination port number

This field identifies the receiver's port and is required. Similar to source port number, if the client is the destination host then the port number will likely be an ephemeral port number and if the destination host is the server then the port number will likely be a well-known port number.[4]

Length

A field that specifies the length in bytes of the UDP header and UDP data. The minimum length is 8 bytes because that is the length of the header. The field size sets a theoretical limit of 65,535 bytes (8 byte header + 65,527 bytes of data) for a UDP datagram. However the actual limit for the data length, which is imposed by the underlying IPv4 protocol, is 65,507 bytes (65,535 – 8 byte UDP header – 20 byte IP header) [4].

In IPv6 jumbograms it is possible to have UDP packets of size greater than 65,535 bytes.[5] RFC 2675 specifies that the length field is set to zero if the length of the UDP header plus UDP data is greater than 65,535.

Checksum

The checksum field may be used for error-checking of the header and data. This field is optional in IPv4, and mandatory in IPv6.[4] The field carries all-zeros if unused.[7]

RTP:

a part from: https://tools.ietf.org/html/rfc3550

Chapter 11:

RTP relies on the underlying protocol(s) to provide demultiplexing of RTP data and RTCP control streams. For UDP and similar protocols,

RTP SHOULD use an even destination port number and the corresponding RTCP stream SHOULD use the next higher (odd) destination port number.

For applications that take a single port number as a parameter and derive the RTP and RTCP port pair from that number, if an odd number is supplied then the application SHOULD replace that number with the next lower (even) number to use as the base of the port pair. For
applications in which the RTP and RTCP destination port numbers are specified via explicit, separate parameters (using a signaling protocol or other means), the application MAY disregard the restrictions that the port numbers be even/odd and consecutive although the use of an even/odd port pair is still encouraged. The RTP and RTCP port numbers MUST NOT be the same since RTP relies on the port numbers to demultiplex the RTP data and RTCP control streams.

In a unicast session, both participants need to identify a port pair for receiving RTP and RTCP packets. Both participants MAY use the same port pair. A participant MUST NOT assume that the source port of the incoming RTP or RTCP packet can be used as the destination port for outgoing RTP or RTCP packets. When RTP data packets are being sent in both directions, each participant’s RTCP SR packets MUST be sent to the port that the other participant has specified for reception of RTCP. The RTCP SR packets combine sender information for the outgoing data plus reception report information for the incoming data. If a side is not actively sending data (see Section 6.4), an RTCP RR packet is sent instead.

<table>
<thead>
<tr>
<th>Family:</th>
<th>Netzwerkprotokoll</th>
</tr>
</thead>
<tbody>
<tr>
<td>Einsatzgebiet:</td>
<td>Transport von Medien-Streams</td>
</tr>
<tr>
<td>Port:</td>
<td>beliebiger freier, gerader Port größer 1024</td>
</tr>
<tr>
<td>RTP im TCP/IP-Protokollstapel:</td>
<td></td>
</tr>
<tr>
<td>Anwendung:</td>
<td>RTP</td>
</tr>
<tr>
<td>Transport:</td>
<td>UDP</td>
</tr>
<tr>
<td>Internet:</td>
<td>IP (IPv4, IPv6)</td>
</tr>
<tr>
<td>Netzzugang:</td>
<td>Ethernet</td>
</tr>
</tbody>
</table>

Note: Regarding SAP (Session Announcement Protocol)
IPv4 global scope sessions use multicast addresses in the range 224.2.128.0 - 224.2.255.255 with SAP Announcements being sent to 224.2.127.254 Port 9875 (note that 224.2.127.255 is used by the obsolete SAPv0 and MUST NOT be used).
IPv4 administrative scope sessions using administratively scoped IP multicast. The multicast address to be used for SAP announcements is the highest multicast address in the relevant administrative scope zone. For example, if the scope range is 239.16.32.0 - 239.16.33.255, then 239.16.33.255 is used for SAP Announcements.
We assume, that this professional unit is used by professional technicians knowing all relevant norms, regulations, abbreviations (i.e. DVB, ATSC, ...) and specifications.

Contact:
First Aid, Ralf Riedel: ralf.riedel@blankom.de
IRENIS GmbH
Owiesenkehre 1
D-22177 Hamburg - Germany

Managing Director: Dipl.Ing. Riccardo Rossini
Commercial Register: HRB 130657 / District Court Hamburg

Web: www.blankom.de  E-Mail: info@blankom.de
Irenis-Direct Phone: +49 40 459747  Technical Hotline: +49 40 22864848