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Product Outline

An (U)HD encoder & streamer for live broadcasting platforms and Video-over-IP applications. Up to 3840*2160@30fps HD resolution. Very stable operation on multicast distribution on local area networks. Suitable for Video-over-IP application through internet. 4 IP output streams at the same time with different resolutions, e.g. for LAN, Youtube, Facebook, Twitch simultaneously.

- H.264 encoder & IP streamer combined
- One HDMI input
- 4 IP streams output
- Stable and effective embedded HiLinux OS
- HD Resolution 2160p (4K), 1080p, 1080i, 720p and downscaling down to 176x144
- Low latency: <200ms ... 1000ms max., depending on configuration and load
- IP output: Unicast / Multicast- RTSP, RTMP, HTTP, UDP/RTP, FLV, ONVIF, HLS
- Distribution of Video camera, PC Monitor, dif. STB, DVD / Blu-ray player content over LAN, WAN or Internet
- Live stream broadcast, Digital signage, Video conferencing
- Video-over IP applications
- IPTV/OTT applications
- Local IPTV on LAN applications, Corporate IPTV, Hotel IPTV, Campus IPTV, Education IPTV
- VLC and FFmpeg mode selectable
- Logo insertion (as *.bmp file) and Text insertion feature on main stream & on secondary stream(s), for each channel
- Streams to YouTube, Vimeo, Twitter, Facebook, Twitch live broadcast platforms
- HLS encoding feature, Android and iOS mobile devices compatible

Statement:

Text and pictures herein are subject to changes w/o notifications.
The user manual will be updated in real time without special notice.
This user manual is provided only as a reference guide for technicians as examples.

Default Values

The factory default administrator account: admin
The factory-default user password: admin
The factory default IP address: 192.168.1.168  NM 255.255.255  GW 192.168.1.1

Set the administrator’s computer IP as: 192.168.1.* to avoid IP conflicting with the units own IP address 192.168.1.168.
192.168.1.1: use an IP setting “**” in the number range 2-254 and except the units default IP.
Remark: .0 is often the network router, .1 often the Gateway of the used router, .255 might be a network broadcasting address.
Please change these account settings according to your local policy and network. Do not forget to save and backup the configuration by Web-Interface and its related system-sub-menu.
The encoder can be always set back to factory default settings by using the RESET-switch in Web-IF or the button at the front.

Application Example

Of course, instead of the HDMI-Encoder a usage of the HD-SDI-encoder SDE-264/265 is possible in parallel too. The HDE-4K4 can be easily used with a PC/Laptop with 4K UHD outputs of a 2nd graphic card or a BlueRay Player output for i.e. Hotel – Guest Information displays in the lobby streaming to a BLANKOM UHD IPTV STB. Because it supports 1 Main-Stream encoding in max. 4K@30fps and
3 sub-streams downscaled into HD or less @30fps in parallel the same content can be deployed to several destinations (HLS, RTMP, RTSP (http), and multicasts).

**Specifications:**

**INPUT**
- One HDMI input
- Input Resolution 2160p, 1080p, 1080i, 720p and below
- Embedded audio from HDMI signal

**OUTPUT**
- Simultaneous 4 different streams output per channel (Main stream and 3 Substreams)
- Video data rate 0.1 Mbps ... 32 Mbps
- Output Resolution 2160p, 1080p, 1080i, 720p and below (max. 2160p@30fps or 1080p@30 fps on main stream)
- Main Stream output resolution support: 3840×2160, 1920×1080, 1280×720, 1024×576, 850×480, 720×576, 720×540, 720×480, 720×404, 704×576, 640×480, 640×360, 608×448, 544×480, 480×480, 480×384, 480×360, 480×320, 480×272, 480×270, 400×320, 400×224, 352×480, 352×228, 320×256, 320×240, 320×180, 240×180, 176×144.
- Latency: <200ms ... >1000ms max., depending on configuration and load

**SYSTEM**
- HiLinux RTOS
- Unicast/Multicast HTTP, RTSP, RTMP, UDP/RTP, FLV, ONSIF, HLS
- Video encoder H.264 (MPEG-4, AVC) high profile Level 4.0 UHD4K max. 30fps
- Audio encoder AAC, AC3, MP3, MP1L2
- Data interface RJ45, 1000 Base-T Ethernet interface, Management by web browser
- Encoding Rate control CBR/VBR
- GOP Structure IBBP Adv
- Pre-treatment De-interlacing, Noise reduction, Sharpening, Y-C adjustments
- Sampling rate Auto (44100/48000)
- Audio Bit-rate 48K/64K/96K/128K/160K/192K
- Audio Sampling precision 24 bit
- Audio Data Rate 12 kbps ~ 320 kbps **40000... max. 640000** depending on used Codec
- User interface: WEB GUI
- 4 different Logo (as *.bmp file) and Text insertion feature on main stream & separately on all 3 secondary streams as well
- Firmware upgrade support

**GENERAL**
- DC 12V 1A power adapter
- Dimensions: 105 x 80 x 30mm
- Weight: 180g
- Power consumption: 6W

### Video Input

<table>
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<tr>
<td>1x HDMI</td>
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<tr>
<td><strong>Supports HDMI Resolution</strong></td>
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<td><strong>Firmware Update</strong></td>
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<tr>
<td><strong>Dimension</strong></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
</tr>
<tr>
<td><strong>Power adapter</strong></td>
</tr>
</tbody>
</table>
Appearance and description

LED’s are showing the operating status located at the top of the unit P= Operating ready (BLUE), E=Ethernet connected (GREEN), S=Signal Input ready (RED).
RST = RESET Button to factory defaults (press > 10 seconds)

Bottom: Serialnumber + Default values
Installation Guide

Accessories

- When you open the package of the device, it is recommended to check delivered items according to the packing list. Normally it should include the following items:
  - HDE 4K4 Encoder 1 pcs
  - User’s Manual (optional as download PDF) 1 pcs
  - Power Supply with 230VAC - 12VDC 1A with Euro plug 1 pcs

Installation Preparation

When users install device, please follow the below steps. The details of installation will be described at the rest part of this chapter. You can also refer rear panel chart during the installation. The main content of this chapter including:

- Checking the possible device missing or damage during the transportation
- Preparing relevant environment for installation
- Connecting signal cables (HDMI/SDI depending on source interface)
- Connecting communication port RJ45 GbE (WEB-IF + Streaming)
- Connecting Power supply
- The LED’s should flash and if the OS is loaded, LED’s are constantly ON
- RJ45 – port LED’s showing Ethernet connection ready
- Suggestion: CAT 6E Ethernet cable for GbEthernet for streaming purpose it should be shielded. Example: DST CAT6 = Double shielded twisted pair

Web Browser configuration

IMPORTANT NOTE:

Please connect your PC/Laptop and the Encoder(s) always to the Ethernet with a GbE auto-negotiation Switch (10/100/1000BaseT) in between.

Otherwise you might damage either your laptop or the encoder RJ45 ports(s) or at least get connection problems.

Asure that your switch doesn’t do Multicast-blocking on the ports you connect it – if you use UDP/RTP multicasts.
We recommend to use the latest Firefox browser on your PC/Laptop for this operation.

Login Interface

A login interface will pop up firstly when the software is running and give a user prompt to input user name and password (The default user name is admin and password is admin). You can change user and password as needed. Details please refer to below ... System Settings). The menu shows up as follows - This might look slightly different depending on your used browser:

![Login Interface Screenshot]

You will enter the STATUS page.

The Menu is located at the bottom of the webpage where you can change to the different submenus:

![Menu Screenshot]
In this status page the streams of all Main and secondary enabled streams will be shown and by simply copy and paste (to i.e. VLC-player) of the addresses an easy setup output can be controlled:

```
copy -> paste
```
Example with 4k-Laptop output on 2nd display port

If there is a problem with the input the unit will generate and output a test picture:

That might be the case if the input is disconnected or out of range (4K encoder supports only 30fps)
Network settings:

Default settings: DHCP=OFF because otherwise your router will give it an IP-address and it might change from time to time when restarting the power of the device. You probably need to check your router for its actual IP address ... so better to use a fixed IP.
DNS-address can be changed as well as the default streaming ports for HTTP and RTSP.

System settings:

Here you can change your password. If you once forgot your password, you can RESET the unit by a front - switch button (press > 10 seconds better 15) and all default factory settings will come back.
Or you can RESET the unit if you already are logged in:

Hint: If you change some settings in particular for the encodings, and press SETUP/Modification, a popup message will appear:

![Popup message](image)

**This doesn't mean you should restart the encoder** - but the receiver like VLC or IPTV Settopbox or the Apple device (HLS) or the Media-server (Wowza, Vimeo, Vimix,...) to resync it to the new values of the stream.

**Software update:**

![Upgrade settings](image)

Self-explaining isn't it? The filename must be up.rar and must be selected from your PC/Laptop, then start the upload. A reboot will be necessary after this finished Upload -see above menu item.

**WARNING:** Flashing the wrong firmware will cause the device to not be able to start any more. So its highly recommended to ask us before. Also older chipset based units from 2016 and 2nd half of 2017 might not be compatible.
Scheduled restart interval adjustment:

This can be used to address the unit to operate only in particular time setups.

ADVANCED Settings = basic settings for all streams:

Automatically set some issues reg. FFMPEG or VLC-known issues. Usually FFMPEG should be OK.

Importand:

RTP-UDP

TS can be chosen for all of your Multicast output streams which you usually configure (Address + Port) in the Main + Substream menus. Some essential hints for RTP and Multicasts can be found at the end of this manual. Read it carefully before setup a RTP.

If problems happen with a moving camera picture or fast movements:
Please check the Deinterlacing mode and change accordingly to this ‘Bottom only’ usage
DVB-Transportstream related settings:

To be conform with IP-Input of multiplexers / Modulators, several improvements has been done in the past to be DVB-TS conform:

A TS password can be enabled for the http:// output stream like: shown in the status window: So the encoder asks the VLC user to insert usernam/password which are the same like your account to the WebIF:

VMIX-compatibility can be switched ON: If needed.

It might work eventually for other online Streaming services as well. Please check: https://www.vmix.com/ for more information.
TS – PID 8192dec zero stuffing feature can be adjusted according to your network topology. Hint: Ping your destination and see what value is best:

```
ping www.web.de
```

Ping wird ausgeführt für www.g-ha-web.de [82.165.229.138] mit 32 Bytes Daten:

Antwort von 82.165.229.138: Bytes=32 Zeit=23ms TTL=248

In closed network environments 64 is an almost valuable choice.

Now the picture quality defaults:

```
Slice split enable: [Enable]
Slice size: 1024
```


Loss resilience features including:

- **Network Abstraction Layer** (NAL) definition allowing the same video syntax to be used in many network environments. One very fundamental design concept of H.264 is to generate self-contained packets, to remove the header duplication as in MPEG-4's Header Extension Code (HEC). This was achieved by decoupling information relevant to more than one slice from the media stream. The combination of the higher-level parameters is called a parameter set. The H.264 specification includes two types of parameter sets: Sequence Parameter Set (SPS) and Picture Parameter Set (PPS). An active sequence parameter set remains unchanged throughout a coded video sequence, and an active picture parameter set remains unchanged within a coded picture. The sequence and picture parameter set structures contain information such as picture size, optional coding modes employed, and macroblock to slice group map.

- **Flexible macroblock ordering** (FMO), also known as slice groups, and arbitrary slice ordering (ASO), which are techniques for restructuring the ordering of the representation of the fundamental regions (macroblocks) in pictures. Typically considered an error/loss robustness feature, FMO and ASO can also be used for other purposes.

- Switching slices, called SP and SI slices, allowing an encoder to direct a decoder to jump into an ongoing video stream for such purposes as video streaming bit rate switching and “trick mode” operation. When a decoder jumps into the middle of a video stream using the SP/SI feature, it can get an exact match to the decoded pictures at that location in the video stream despite using different pictures, or no pictures at all, as references prior to the switch.

**The default values are Ok for normal usage.**
Y (Luminance) and C (Chroma) settings can be chosen to improve the picture quality. Quantization in an H.264 encoder is controlled by a quantization parameter, QP, that ranges from 0 to 51. QP is an index used to derive a scaling matrix. It is possible to calculate the equivalent quantizer step size (Qstep) for each value of QP. As QP increases, Qstep increases; in fact, Qstep doubles for every increase of 6 in QP.

MinQP and MaxQP are not in use if CBR encoding is chosen. For VBR the above values are OK.

**MAINSTREAM Settings:**

After chosen the Stream values in the SYSTEM Menu (i.e. UDP or RTP) you can start setting up your Main encoder settings. The Input is automatically detected (takes some seconds if re-connect it or Source has changed) and displayed in the STATUS page:
The Unicast http stream addresses are usually the device own IP-Address (default 192.168.1.168) followed by/0.ts for Main, 1...2...3.ts for the secondary streams. HLS= IP/0.m3u8 and so on... the TS URL is always enabled if all other stream settings are disabled in factory defaults.

Profiles:
- H.264 Level:
  - high profile
  - baseline profile

Bitrate control:
- vbr

Encoding:
The device is giving popup hints for settings of different ranges in different modes/protocols and codecs used.

If HLS is open, Bitrate (kbit) value should be an integer in 32-8000!

The unit will give a Warning if the encoding capacity exceeds 85% CPU/RAM power in the STATUS window. Very helpful is the STATUS window for your streams:
Checking stream values with a stream analyser:

Of course, the Input on HDMI will cause the encoder settings capabilities. Example: If the HDMI Input does not contain an AC3 Audio Signal, the AC3-mode can be set in the AUDIO Submenu but will not be processed...
d. If no Audio comes in (See above stream analyser screenshot), no Audio will be processed as well. If AAC, MP2/3 is detected, it cannot encode to AC3. So its recommended to check the source than process the Audio encoding settings.

You can also check the Audio codec with i.e. VLC:

![VLC Media Player](http://192.168.1.168/0.ts)

Hint: Output stream add DVB-PID 8191 zero packets:

<table>
<thead>
<tr>
<th>TS Empty Packet:</th>
<th>No Insert</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS password mode:</td>
<td>No Insert</td>
</tr>
<tr>
<td>User Compatible:</td>
<td>No Insert</td>
</tr>
<tr>
<td>TS OVER RSP:</td>
<td>Insert(1.2x)</td>
</tr>
<tr>
<td>Multicast type:</td>
<td>Insert(1.3x)</td>
</tr>
</tbody>
</table>

Insertion Value 1.3x will assure a proper overhead and a nearly stable CBR output even if the encoding has been set to VBR. The null-packets will be added to the output TS.

**VLC cannot gather automatically** via which of your IP addresses and maybe from different network interfaces (WIFI/GBE) it should receive the stream. This can be forced by setting your METRIC Values accordingly and/or configure appropriate routes.
Audio Encoding settings

After restarting the IP-Receiver (VLC):

Remark:
The RTSP is used by ONVIF, so the Audio Settings for ONVIF are always on according to G.711:
Audio encoding settings are a general issue and are working for all streams: Main – and sub-streams.

**Logo and Text-Insertion:**

Every Stream outputs can insert up to 4 different static text messages and 1 Logo which can be uploaded.

The Logo is limited to the file-mode BMP (Windows usual bitmap). The Logo can be designed as Transparent by keeping its background in the colour – 0xF1F1F1 (a slightly grey):

Please keep an eye on its max resolutions and size.
Adding text:

http://192.168.1.168/... - Vlc media player

Media Playback Audio Video Subtitle Tools View

Thai is Text-Insertion

Adding Logo-file (The name must be Logo1.bmp ...) and less than 500-1500kbyte (depending on encoder model) and need to be setup as 24bit sampled:

Upload:

Upload successfully!

Select where and how:

Set successfully, please restart your device!

Again, that does not mean Restarting the encoder – but the Receiver of the stream to resync.
Some useful hints to *modify an existing Picture as transparent Logo* by using IRFANVIEW (*a windows freeware*):

We are using one of our Logos: BMP, 24bit, background = Black (might be converted from transparent PNG to BMP before but can result in black background…

the size should be adjusted according to your needs, so please check that before…

Use Picture (Bild) – Menu: exchange the colour:

![IrfanView - Bildinformation](image)

Press replace colour:
Click in the black background of the original picture, the replace source will be black 000000

Click on choose new colour and replace it with F1F1F1 (RGB 241,241,241): 

Here logo4.bmp: Upload...
Enable it to your chosen stream (main ... sub1...3):

And voila:

Now you can chose your position for that logo beginning with left upper corner = x/y = 0/0 and the transparency level 0....128 (full)

So that’s all for the configuration actually. Do not expect a high professional encoder with realtime encoding capabilities because such units cost around 10K USD and more. Also this encoder is limited to one Audio mode only (no Dual Language AC3 support or multiple Stereo by embedded SDI signals (depending on Frontend used : HDMI/HD-SDI/VGA/CVBS, ...).
Regarding Latency:

Depends on used Chipset. Please do not expect a realtime encoding from this devices. The range is from 200ms up to 2 seconds (worst case).

Here is an example page used with an encoder and a media server by RTMP:

The Latency is of course depending from the encoder settings profile and the related values like:

- **Bitrate, Profile**

- **Stream capacity:**

- **Improvement settings:**
Downscaling settings (Same as Input ... down to 176x144 size)
- And finally the OSD Insertion actions (if you enable this).
  All these values have an impact on processing load and therefore the latency.

Finally some useful Hints about the network streamings. IGMP is one of the important mechanism for IPTV securing over loadings of i.e. STB’s by pushing too many streams to it. We recommend to make yourself familiar with the h.264 AVC (and HEVC depending on Encoder unit) encoding methods as well as streaming itself.

Example for streaming to VIMEO Live by RTMP:

VIMEO gives the user an RTMP –address with a live token at the end. No username/password is necessary because they handover individual stream-keys which simply needs to be inserted as

```
rtmp://rtmp.cloud.vimeo.com/live?token=*************/streamkey
```

Than you can control it by checking the vimeo live portal of your stream:
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:
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 (224.5.0.0-224.251.255.255 (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](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](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](http://www.iana.org/assignments/service-names-port-numbers/service-names-port-numbers.xml) Generally one of the unassigned User 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 user or registered ports, and ports with numbers 49152-65535 are called dynamic and/or private ports.[2] Both system and user 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** – user 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. 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. Windows Server 2008 with Exchange Server 2007 installed has a default port range of 1025–60000. 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 Octet</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Octet Bit</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>Source port</td>
<td>Destination port</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>32</td>
<td>Length</td>
<td>Checksum</td>
<td></td>
</tr>
</tbody>
</table>

The UDP header consists of 4 fields, each of which is 2 bytes (16 bits).[1] 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.\[6\] 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.
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.

Changelog: Added zero packets, Logo insertion with transparent value... Nov. 2018 RRI

Important notes: / Zur Beachtung

- Auf das Netzgerät dürfen keine mit Flüssigkeit gefüllten Gegenstände gestellt werden.
- No liquid-filled items may be placed on top of the power supply unit.
- Das Netzgerät darf nicht Tropf- oder Spritzwasser ausgesetzt sein.
- The power supply unit must not be exposed to dripping or splashing water.
- Der Netzstecker muss ohne Schwierigkeiten zugänglich und benutzbar sein.
- The mains plug must be easily accessible and operable.
- Das Gerät kann nur durch Ziehen des Netzsteckers vom Netz getrennt werden.
- The only reliable method of disconnecting the unit from the mains is to unplug it.
- Bei größerem Durchmesser des Kabel-Innenleiters als 1,2 mm bzw. Grat können die Gerätebuchsen zerstört werden.
- If the inner cable conductor diameter is greater than 1.2 mm or in case of burr, the device sockets may be destroyed.

Bitte installieren Sie die Anschlüsse gemäß dem Aufdruck

Please install according to the sticker on the Multiswitch

Hinweis: Elektrische Installationen sollten nur durch geschultes Fachpersonal vorgenommen werden!

Note: Electrical installations should only be done by well-educated and skilled technicians!
Warning! Ultimate disposal of this product should be handled according to all national laws and regulations.

製品の廃棄
この製品を廃棄処分する場合、国の関係する全ての法律・条例に従い処理する必要があります。

警告
本产品的废弃处理应根据所有国家的法律和规章进行。

警告
本產品的廢棄處理應根據所有國家的法律和規章進行。

Warnung
Die Entsorgung dieses Produkts sollte gemäß allen Bestimmungen und Gesetzen des Landes erfolgen.

¡Advertencia!
Al deshacerse por completo de este producto debe seguir todas las leyes y reglamentos nacionales.

Attention
La mise au rebut ou le recyclage de ce produit sont généralement soumis à des lois et/ou directives de respect de l'environnement. Renseignez-vous auprès de l'organisme compétent.

경고
이 제품은 해당 국가의 관련 법규 및 규정에 따라 폐기되어야 합니다.

Waarschuwing
De uiteindelijke verwijdering van dit product dient te geschieden in overeenstemming met alle nationale wetten en reglementen.
Safety instructions

Read the safety instructions carefully before assembling or commissioning the device and ensure that you comply with them.

1. Installation
   - **Danger:** The device may only be installed and started up by competent people (see EN 60065).
   - **Danger:** The device and the peripheral distribution devices must be earthed properly (potential equalization) in accordance with EN 60728-11 before Commissioning and remain earthed even when the device is dismantled.
   - **Danger:** The device may not be installed on a flammable base (risk of fire).
   - **Danger:** Only connect the device to a socket that is installed correctly and connected to devices that has an earth conductor (Depending on Model and Usage).
   - **Danger:** Plan the assembly or installation location to ensure that children cannot play with the device and its connections. There is a risk of electric shock (Danger of death).
   - **Danger:** Select an assembly or installation location in which fluids or objects cannot get into the device under any circumstances (e.g. condensation, water for watering plants, etc.).
   - **Danger:** Ventilation slots and refrigeration units are important function elements on the devices. If devices have refrigeration units or ventilation slots, you must ensure that they are never covered or built over. Also ensure that there is sufficient air circulation around the device. This prevents possible damage to the device and the risk of fire due to overheating. Ensure a minimum of clearance of 20cm between the device and other objects.
   - **Danger:** The assembly or installation location must allow all connected cables to be laid safely. Cables and power supply cables must not be damaged or crushed by any objects. Furthermore, ensure that cables are not laid in the immediate vicinity of sources of heat (e.g. radiators, other electrical devices, fireplaces, etc.) (Risk of fire), (risk of electric shock danger of death)
   - **Danger:** In order to prevent damage to the device, as well as possible subsequent damage (risk of fire), devices intended for installation on the wall are only permitted to be installed on a level surface and not above head height.
   - **Warning:** (Only for optical transmitters and their peripheral distribution devices) Never look directly or indirectly into the laser beam. Only connect the device to the power supply once all optical lines are connected securely.
   - **Warning:** The safety regulations in the relevant current standards EN 60728-11 and EN 60065 must be complied with.
   - **Warning:** Comply with all applicable national safety regulations and standards.
   - **Warning:** The device's mains plug must be easily accessible at all times.
   - **Warning:** Follow all instructions in the device-specific operating manual

2. Operation
   - **Danger:** The device is only permitted to be operated in dry rooms in a non-tropical climate. In damp rooms or outdoors, there is the risk of short circuits (risk of fire) or electric shock (danger of death).
   - **Danger:** Do not insert any objects through the ventilation slot. Risk of electric shock (danger of death).
   - **Danger:** Do not put any containers filled with liquid (e.g. vases) on the device. There is a risk of electric shock (danger of death) or (risk of fire).
   - **Danger:** No open sources of fire such as burning candles are permitted to be placed on the device (risk of fire).
   - **Danger:** Ensure that there is a clearance of at least 20cm around the device. The device ventilation is not permitted to be impaired by covering the
- Ventilation openings with objects such as newspapers, tablecloths, curtains, etc. (risk of fire).
- **Warning:** Follow all instructions in the device-specific operating manual.

### 3. Maintenance
- **Danger:** Maintenance tasks must always be carried out by competent people (see EN 60065).
- **Danger:** Do not carry out servicing work during thunderstorms. There is a risk of electric shock (danger of death).
- **Warning:** (Only for devices with batteries): Risk of explosion if the battery is replaced improperly. Only replace with the same type!
- **Warning:** Batteries must not be subjected to excessive heat such as sunlight, fire or similar (risk of explosion).
- **Warning:** Only use the manufacturer's accessories or accessories with identical technical properties.
- **Warning:** (For optical transmitters and their peripheral distribution devices) unplug the mains plug before dismantling the device.

### 4. Repairs
- **Danger:** The device may only be opened by competent people (see EN 60065). Before opening the device, unplug the mains plug or disconnect the power supply; otherwise there is a danger of death! The device is only permitted to be connected to the power and operated when the mains adaptor cover is installed. This also applies when you clean the device or work on the connections.
- **Danger:** Repairs on the device may only be carried out by a specialist (see EN 60065) observing the applicable VDE (German Association for Electrical, Electronic & Information Technologies) guidelines.
- **Danger:** Only use components of the same type and with identical technical properties for the repair. Otherwise, there is a risk of electric shock (danger of death) and risk of fire.
- **Warning:** (For optical transmitters and their peripheral distribution devices) unplug the mains plug before dismantling the device.

If you have any queries regarding repairs, please contact our company service: E-mail: info@blankom.de, contact: www.blankom.de

### 5. Sale
- **Caution:** If the device is sold, these safety instructions and the operating manual for the relevant device must be handed over to the purchaser.

### 6. Disposal
- **Caution:** Dispose of the device in accordance with the applicable environmental regulations.
- **Caution:** Dispose of batteries (if present) in accordance with the applicable environmental regulations.
- Cartons and all pcs. of the packaging can be sent back to us for recycling for sustainable environment protection.
Sicherheitshinweise

Sicherheitshinweise bitte vor Montage bzw. Inbetriebnahme des Gerätes sorgfältig lesen und befolgen.

1. Installation

**Gefahr:** Das Gerät darf ausschließlich von sachverständigen Personen (siehe EN 60065), installiert und in Betrieb genommen werden.

**Gefahr:** Das Gerät und/oder die Verteilperipherie muß vor Inbetriebnahme gemäß EN 60728-11 vorschriftsmäßig geerdet sein (Potentialausgleich) und bleiben, auch wenn das Gerät ausgebaut wird.

**Gefahr:** Das Gerät darf nicht auf brennbarem Untergrund montiert werden (Brandgefahr).

**Gefahr:** Schließen Sie das Gerät nur an eine vorschriftsmäßig installierte Steckdose mit Schutzleiter an.

**Gefahr:** Planen Sie den Montage - bzw. Aufstellungsort so, daß Kinder nicht am Gerät und dessen Anschlüssen spielen können.

Es droht Gefahr durch elektrischen Schlag (Lebensgefahr).

**Gefahr:** Wählen Sie einen Montage - bzw. Aufstellungsort, an dem unter keinen Umständen Flüssigkeiten oder Gegenstände in das Gerät gelangen können (z.B. Kondenswasser, Gießwasser etc.).

**Gefahr:** Lüftungsschlitze und Kühlkörper sind wichtige Funktionselemente an den Geräten. Bei Geräten, die Kühlkörper oder Lüftungsschlitze haben, muß daher unbedingt darauf geachtet werden, daß diese keinesfalls abgedeckt oder zugebaut werden. Sorgen Sie außerdem für eine großzügig bemessene Luftzirkulation um das Gerät. Damit verhindern Sie mögliche Schäden am Gerät sowie Brandgefahr durch Überhitzung. Gewährleisten Sie einen Mindestabstand von 20cm um das Gerät zu anderen Gegenständen.

**Gefahr:** Der Montage - bzw. Aufstellort muß eine sichere Verlegung aller angeschlossenen Kabel zulassen. Stromversorgungskabel sowie Zuführungskabel dürfen nicht durch irgendwelche Gegenstände beschädigt oder gequetscht werden. Es ist darüber hinaus unbedingt darauf zu achten, daß Kabel nicht in die direkte Nähe von Wärmequellen verlegt werden (z.B. Heizkörper, andere Elektrogeräte, Kamin etc.) (Brandgefahr), (Gefahr durch elektrischen Schlag).

**Gefahr:** Um sowohl Beschädigungen am Gerät als auch mögliche Folgeschäden (Brandgefahr) zu vermeiden, dürfen für Wandmontage vorgesehene Geräte nur auf einer ebener Grundfläche montiert werden und nicht über Kopf.

**Warnung:** (Nur für optische Sender sowie deren Verteilperipherie) Blicken Sie auf keinen Fall direkt oder indirekt in den Laserstrahl. Schließen Sie das Gerät erst an die Stromversorgung an, wenn alle elektrischen und optischen Leitungen sicher verbunden sind.

**Warnung:** Die Sicherheitsbestimmungen der jeweils aktuellen Normen EN 60728-11 und EN 60065 sind zwingend einzuhalten.

**Warnung:** Befolgen Sie auch alle anwendbaren nationalen Sicherheitsvorschriften und Normen.

**Warnung:** Der Netzstecker des Gerätes muß jederzeit leicht erreichbar sein.

**Warnung:** Befolgen Sie alle Instruktionen in den gerätespezifischen Bedienungsanleitungen

2. Betrieb

**Gefahr:** Das Gerät darf nur in trockenen Räumen bei nicht tropischem Klima betrieben werden. In feuchten Räumen oder im Freien besteht die Gefahr von Kurzschluß (Brandgefahr) oder elektrischen Schlag (Lebensgefahr).

**Gefahr:** Stecken Sie keine Gegenstände durch die Lüftungsschlitze. Gefahr durch elektrischen Schlag (Lebensgefahr).
**Gefahr:** Stellen Sie keine mit Flüssigkeit gefüllten Gefäße (wie z. B. Vasen) auf das Gerät. Es droht Gefahr durch elektrischen Schlag (Lebensgefahr) oder (Brandgefahr).

**Gefahr:** Es dürfen keine offenen Brandquellen, wie z. B. brennende Kerzen, auf das Gerät gestellt werden (Brandgefahr).

**Gefahr:** Sorgen Sie für einen Freiraum von mindestens 20cm um das Gerät. Die Belüftung des Gerätes darf nicht durch Abdecken der Belüftungsöffnungen mit Gegenständen wie z. B. Zeitungen, Tischdecken, Gardinen usw. behindert werden (Brandgefahr).

**Warnung:** Befolgen Sie alle Instruktionen in der gerätespezifischen Bedienungsanleitung.

4. Wartung

**Gefahr:** Wartungsarbeiten sind stets von sachverständigen Personen (siehe EN 60065) vorzunehmen.

**Gefahr:** Keine Servicearbeiten bei Gewitter. Es droht Gefahr eines elektrischen Schlags (Lebensgefahr).

**Warnung:** (nur für Geräte mit Batterie): Explosionsgefahr bei unsachgemäßem Auswechseln der Batterie. Ersatz nur durch den gleichen Typ!

**Warnung:** Batterien dürfen nicht übermäßiger Wärme wie Sonnenschein, Feuer oder dergleichen ausgesetzt werden (Explosionsgefahr).

**Warnung:** Verwenden Sie nur das Zubehör des Herstellers oder Zubehör mit identischen technischen Eigenschaften.

**Warnung:** (Bei optischen Sendern sowie deren Verteilperipherie) ziehen Sie den Netzstecker bevor das Gerät ausgebaut wird.

5. Reparatur

**Gefahr:** Das Gerät darf nur durch sachverständige Personen (siehe EN 60065) geöffnet werden. Vor Öffnen des Gerätes Netzstecker ziehen bzw. Stromzuführung entfernen, andernfalls besteht Lebensgefahr! Das Gerät darf nur mit montierter Netzteilabdeckung an Spannung angeschlossen und betrieben werden. Dies gilt auch, wenn Sie das Gerät reinigen oder an den Anschlüssen arbeiten.

**Gefahr:** Reparaturen am Gerät sind ausschließlich vom Fachmann (siehe EN 60065) unter Beachtung der geltenden VDE-Richtlinien durchzuführen.

**Gefahr:** Verwenden Sie nur Bauteile des gleichen Typs und mit identischen technischen Eigenschaften für die Reparatur, andernfalls droht Gefahr eines elektrischen Schlags (Lebensgefahr) und Brandgefahr.

**Warnung:** (Bei optischen Sendern sowie deren Verteilperipherie) ziehen Sie den Netzstecker bevor das Gerät ausgebaut wird.

Bei Fragen zur Reparatur wenden Sie sich an den IRENIS-Service:
E-Mail: info@blankom.de, Kontakt: www.blankom.de

6. Verkauf

**Vorsicht:** Im Falle eines Verkaufs müssen diese Sicherheitshinweise und die Bedienungsanleitung des entsprechenden Geräts dem Käufer ausgehändigt werden.

7. Entsorgung

**Vorsicht:** Entsorgen Sie das Gerät entsprechend den geltenden umweltrechtlichen Bestimmungen. Elektrische und elektronische Geräte dürfen nicht in den Hausmüll!

**Vorsicht:** Entsorgen Sie Batterien (falls vorhanden), entsprechend den geltenden umweltrechtlichen Bestimmungen.
Verpackungen können an uns zurückgeschickt werden. Wir kümmern uns um Recycling und/oder fachgerechte Entsorgung.

Contact:

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