BLANKOM®

Professional Headend Solutions

Device manual

8pole IP-/ ASI-TV Modulator

IP/ SFP/ ASI → DVB-C (8x QAM)/
IP/ SFP/ ASI → DVB-C, ITU-T J.83 Annex B, C (8x QAM)

A-QAMOS-IP/ -B-IP
Part N°: 5107.81
5116.81

...Setting Signals

Contents

1. Safety and operating instructions

When assembling, starting-up and adjusting the devices, it is necessary to consider the system specific references in the instruction manual.

The devices may only be installed and started up by authorized technical personnel.

When assembling the devices into the receiving points, the adherence of the EMC regulations is to be ensured.

The assembly and wiring have to be done without voltage.

With all work the defaults of the DIN EN 50083 have to be considered. It is especially important to follow DIN EN 60728-11[2].

If installed in mounting cabinets a adequate heat circulation must be guaranteed. The mounting in closed cabinets without air sufficient flow is **not allowed**.

The devices come under protection classification I. It is absolutely necessary, therefore, to insert the mains plug into a socket with protective contact.

WEEE-Reg.-Nr. DE 50389067

2. Device variants

A-QAMOS-IP	5107.81	IP/ SFP/ ASI → DVB-C (8x QAM)
A-QAMOS-B-IP	5116.81	IP/ SFP/ ASI → DVB-C, ITU-T J.83 Annex B, C (8x QAM)

3. Software options

CKB 200	5100.50	activation SNMP v3
CKB 205	5100.55	activation advanced NIT processing
CKB 210	5100.60	activation SFP port
CKB 211	5100.61	activation ASI port
CKB 214	5100.64	activation media player/ SD card

4. General

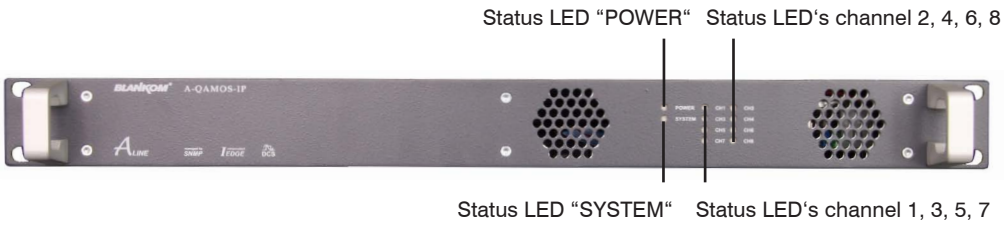
The 8 pole IP-/ ASI-TV Modulators A-QAMOS-IP and A-QAMOS-B-IP are devices of the head end system A-LINE, which is conceived as a complete system for big and middle sized networks.
The A-QAMOS-IP/ -B-IP converts transponders included in IP or ASI transport streams into QAM signals to transmit it in cable networks. In this case, up to 8 QAM channels from the available transport streams are generated, which are attached via a maximum of two inputs. In particular, the internal processing allows the output of DVB signals in full HD resolution. In addition, the A-QAMOS-B-IP enables the output of corresponding signals according ITU J.83 Annex B and C [6].

5. Functional description

The device receives a data stream via Gigabit Ethernet and can receive 8 transport streams from the included IP encapsulated transport streams. These transport streams are fed a high-performance FPGA. The transport stream processing or filtering, the QAM modulation and the freely adjustable up-converting in the cable network range (45 ... 862 MHz) take place in the FPGA.
The eightfold modulator is adjacent channel compatible. A highly-clocked digital to analogue converter (DAC) is responsible for the spectrally pure output of the cable signal. After amplification and sum level adjustment, the cable signal is coupled through a directional coupler to the output jacks.

6. Explanation of the operating elements

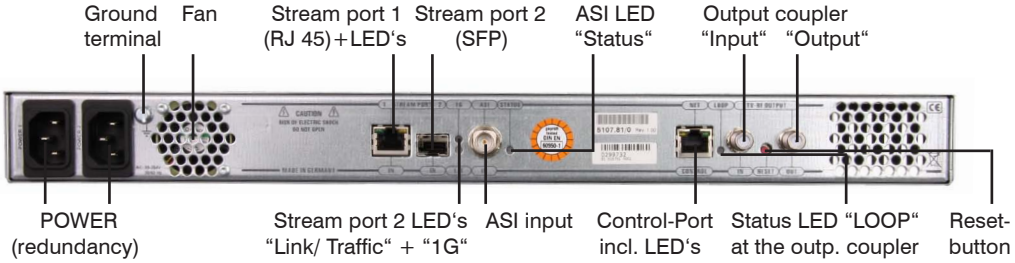
6.1 Front view



6.2 Meaning of the status LED‘s

Designation	Colour	Status	Meaning of display
POWER	green	permanently on	device is on
	amber	permanently on	device is in standby
		off	device is off, operating voltage is not applied
SYSTEM	green	permanently on	device is ready for work
		flashing	software update is running
	amber	permanently on	temperature is high, fan is already activated
		flashing	temperature is critical, the device will no longer work or is forced to shut down
		off	device is not ready for work
CH 1 ... CH 8	green	permanently on	channel operates without error
	amber	permanently on	error warnings, depending on signal: - input and/ or output without sync - input sync, but in bad quality (eg. mosaic effect in the TV picture)
		flashing	hardware is faulty
		off	channel is off

6.3 Rear view



6.4 Meaning of the LED‘s on rear

6.4.1 LED’s at the 10/ 100/ 1000 Mbit stream port 1

Designation, colour	Status	Meaning of display
GbE connect LED, green	permanently on	only illuminated when the cable connection is a GbE connection (does not light up at a 10/ 100 Mbit connection)
	off	no GbE connection
Connect/ data LED yellow	permanently on	cable connection is established
	flashing	data is received
	off	no cable connection

6.4.2 LED’s at the 10/ 100/ 1000 Mbit stream port 2

Designation	Colour	Status	Meaning of display
1G	green	permanently on	only illuminated when the cable connection is a GbE connection (does not light up at a 10/ 100 Mbit connection)
		off	no GbE connection
LINK/ TRAFFIC	amber	permanently on	cable connection is established
		flashing	data is received
		off	no cable connection or option is not enabled

6 4.3 Status LED at the ASI socket

Designation	Colour	Status	Meaning of display
STATUS	green	permanently on	ASI transport stream is present
		flashing	no ASI transport stream
		off	option is not enabled

6.4.4 Status-LED at the output coupler

Designation	Colour	Status	Meaning of display
LOOP	green	permanently on	loop active, i.e. nominal level range 62 ... 82 dBμV
		off	no loop, i.e. nominal level range 74 ... 94 dBμV

6.4.5 LED‘s at the 10/ 100 Mbit control port

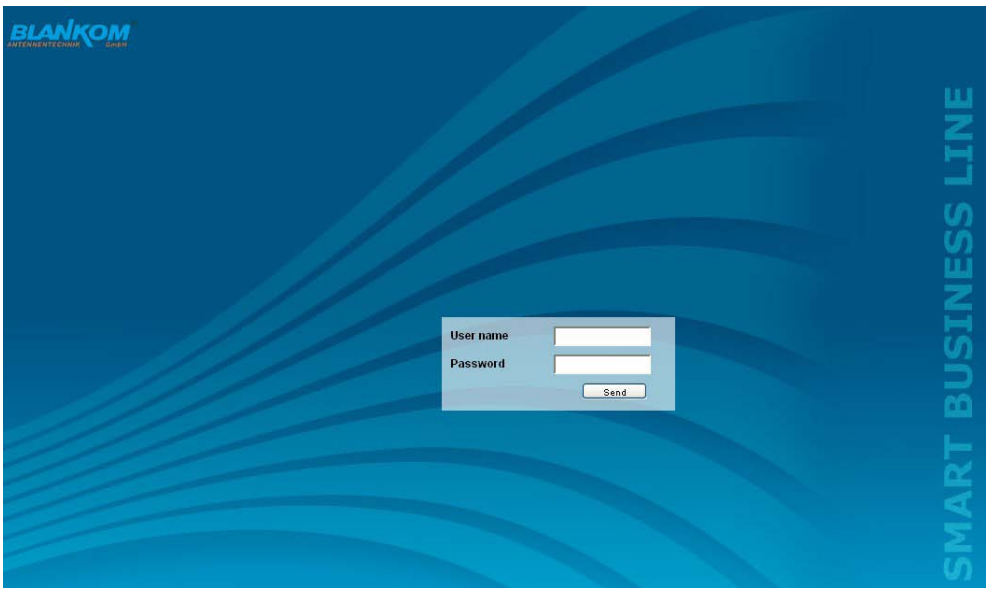
Designation, colour	Status	Meaning of display
Connect LED, yellow	permanently on	network cable is connected
	off	no cable connection
Data LED, green	flashing	data is exchanged
	off	no data exchange

7. Adjusting by web server

7.1 Network connection to the computer

System requirements:
- PC/ laptop with 10/ 100 Mbit Ethernet interface
- Internet browser (e.g. Windows Internet Explorer), which accept JAVA script.

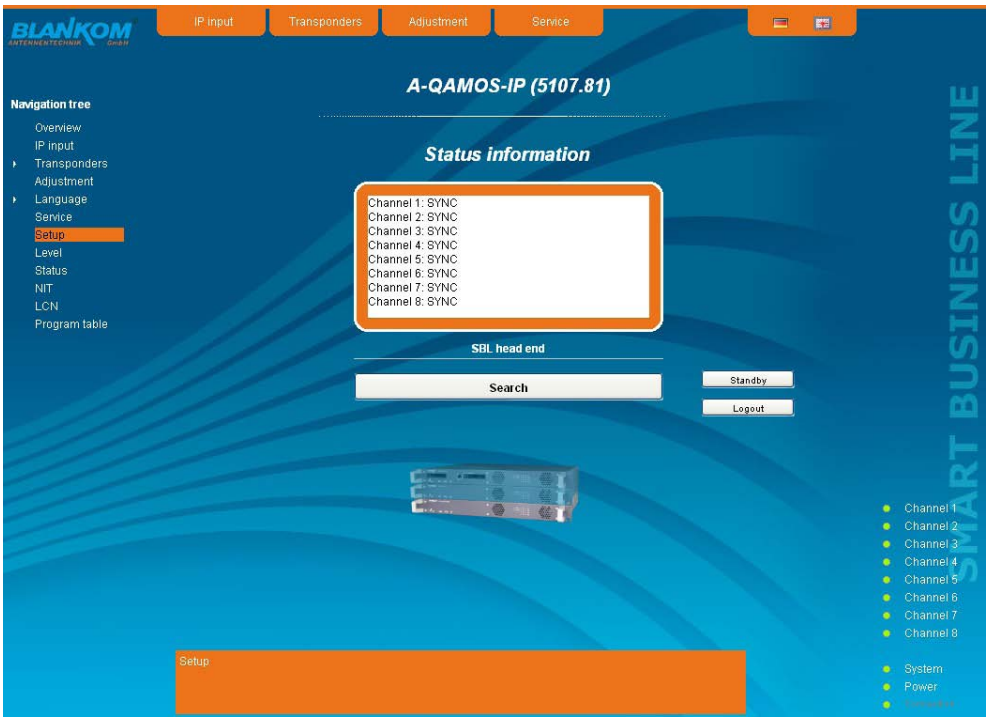
Setup the connection:
The A-QAMOS-IP/ -B-IP has to be connected to PC network using an Ethernet cable. The IP address of the device is 192.168.1.100 on delivery. If several devices should be controlled or adjusted via an Ethernet switch, each device must first be configured **individually** to its provided IP address within the network. To do so the address of the network port on the PC (temporary) must be adapted to the IP address of the device (subnet mask: 255.255.255.0, IP address: 192.168.1.XXX, where XXX is not the same as the corresponding value of the device IP address).
After the network configuration of the device(s) the IP address of the control PC is converted to the provided IP address and the devices can be accessed through the browser with their new IP addresses. The user must authenticate himself with his credentials (user name and password), if the password and user testing were activated on the setup page (see chapter 7.2.7):



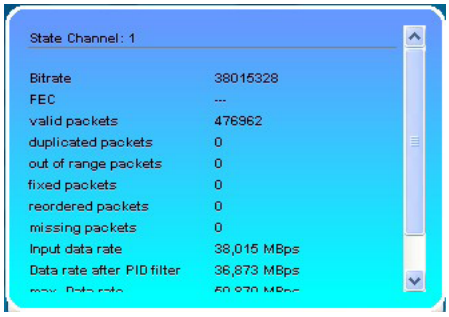
After successful registration or successful connection establishment without password (default setting) the start page of the device is the menu “Overview“ (see chapter 7.2.1).

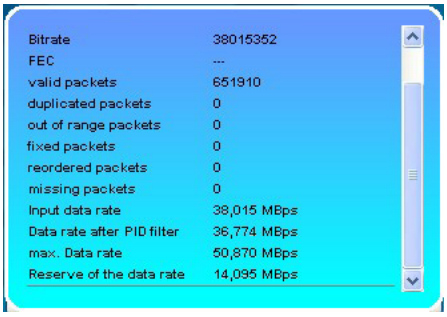
7.2 Setting of individual parameters

Using the web site, you can set certain parameters of the device or perform configurations on the device or the user interface. The various setting menus can be selected in the navigation tree on the left side. The setting is supported by an online help. Hovering the parameters by the mouse in the lower part of the site an orange colored text box appears with explanations for each parameter. By setting in the “Setup“ menu (see chapter 7.2.7) may be selected so that the help appears in the status bar of your browser. If appropriate setting changes in the browser options are necessary.

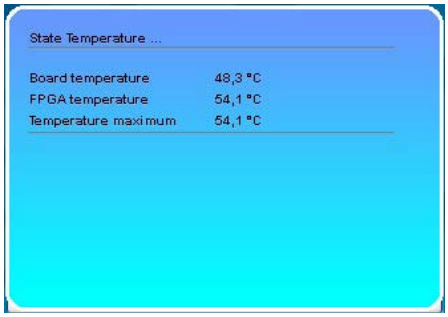


In addition, in the lower part of the navigation tree status information for the device is displayed. By changing the setup menu, the status information can also be moved to the right (see also chapter 7.2.7). All 8 channels are listed individually. A green LED symbol before the “channel ...“ means that both input and output are synchronized and that the channel operates without error. An orange colored symbol indicates that an error has occurred in that channel. An overview of the status of various parameters of the channel is obtained by clicking the corresponding channel. In the GUI, a status overview appears.





A transparent LED symbol means that the channel is not configured yet, or the RF output is turned off. Status information about the system is mirrored in the same way. In this case too an orange colored LED symbol displays an error state during which a green LED symbol displays error-free working condition. The detailed status information is available by clicking the name field.



The last displayed point indicates the connection status between the network interface and the device. Green means, that the connection is established. A transparent LED light indicates that there is no connection or the connection is failed.
Settings with the selection box or input fields are taken over by pressing the “send“ button and stored permanently, and the A-QAMOS-IP/ -B-IP is set on these values after a restart too. Settings with the check box are usually performed immediately but not stored in memory, so they would be lost on a possible restart of the device. To save these settings the “send“ button must be pressed.
In all menus, the language selection is possible between German and English top right.

7.2.1 Menu ”Overview”

This page provides a status overview of the 8 channels. If a channel is working without errors, “SYNC“ is displayed. If errors occur you will see an “Error“ display. If the RF power is switched off the display “Off“ appears behind the respective channel.

In addition, below the status window the head end display is visible. There all A-LINE-SBL and SBL devices are listed, which are in the same network and which have been associated with the head end in the “Setup“ menu (see 7.2.7). This is significant because functions over all devices such as the NIT processing between devices of the A-QAMOS and QAMOS product group can be extended to all components of the head end. The individual components of a head end are listed with their IP address, which is also provided with a link to this address, so you can switch easily to the next device. If no head end was configured, a “Search“ button appears, which forwards to the “Setup“ menu and scans the network for other A-LINE-SBL and SBL devices. Then all available devices are listed and can be selected and added to the head end.
By clicking the “Logout“ button the user logs out of the device and the login window appears. By pressing the “Standby“ button the device is switched to standby, which is indicated by an amber POWER LED on the device. The “Standby“ button will be replaced by a “ON“ button, and by pressing this the device will be switched back on.

7.2.2 Menu “IP Input”

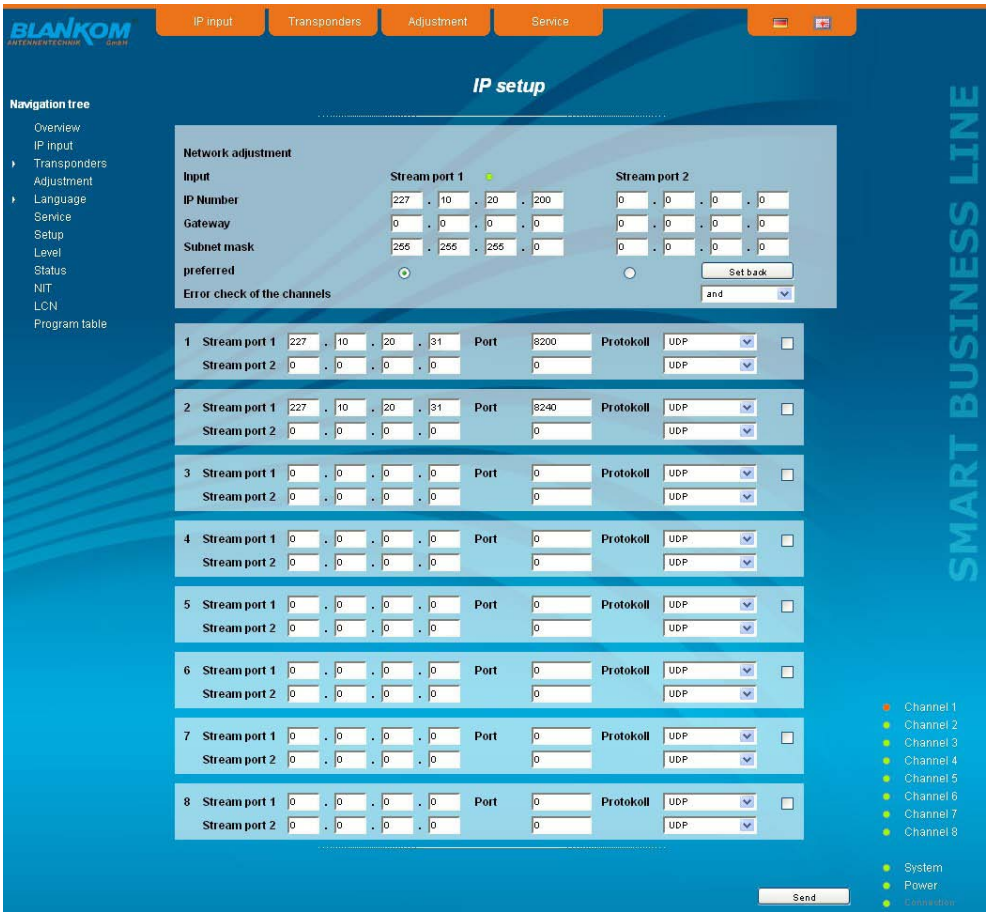
This menu contains the network configuration for the streaming port and for the 8 IP transport streams from which then the 8 desired transponders for transmitting can be selected.

On top the configuration options for the two stream ports are displayed. It should be noted that the stream port 2 is available only after enabling the associate software option (see section 7.2.7). The IP address, subnet mask and gateway can be configured for each port. The next step is to configure the setup parameters of the 8 IP input transport streams (IP input channels). Again, IP address, port and transport protocol (UDP or RTP) have to be entered for each IP channel. Everything is confirmed by pressing the “Send“ button.
If not all 8 ports are used, then the unused ports can be disabled by entering the IP address 0.0.0.0.
Identical settings within these 8 IP channels are not permitted and are automatically marked red.

Note:
Some switches, it can happen that a configuration change concerning on the multicast group will take effect after the end of the switch set query interval:
Some switches ignore an unsolicited IGMP join message. If the querier is set in the switch to a longer period of time, it may occur, that after a configuration change the stream is not applied immediately, because the switch ignores the directly emitted IGMP message. Upon expiration of the query interval, the switch then asks himself after memberships in multicast groups. Also to this request, the device responds and sends a corresponding response message - this is then accepted by the switch, which thus transmits the stream to the device.

7.2.2.1 SFP option

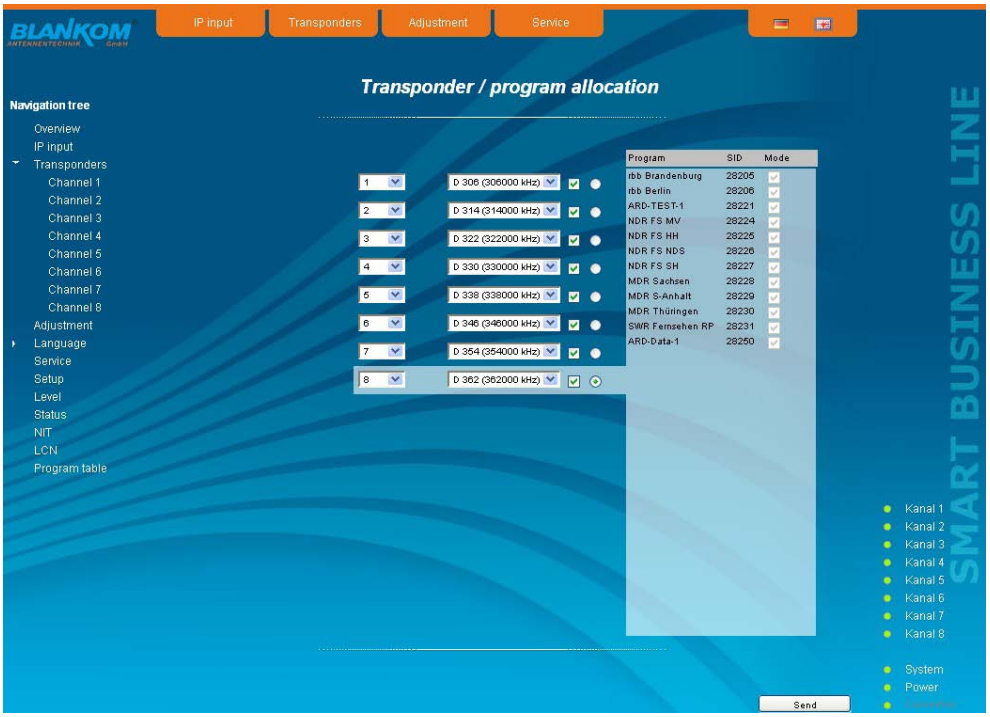
The SFP option allows the connection of different modules for the IP input. Depending on the SFP module thus various management and media types can be connected to the A-QAMOS-IP/ -B-IP. The IP input can be expanded to another IP data source. The SFP module figures as the stream port 2, so that either “Stream port 1“ or “Stream port 2“ can be used as an IP input.
Simultaneously there is the ability to define one of the two IP inputs as the preferred source and the respective other IP input as redundancy source. When an IP data source fails, the device then switches to the other data source. For this purpose, individual rules can be defined for when and how to switch. Inclusion in the monitoring is configured on a per-channel basis. This is a global option, deciding when to switch: either when an input channel is down or all monitored channels have failed. The switching occurs even when no signal should be present at the redundancy input.
Switching back to the preferred IP input is not automatically, but can only be done manually via the user interface.
Please note that actual monitoring on a particular channel starts for real one if actually receives data.



The form of the network settings also includes means for selecting the preferred IP input. The selection is made by pressing the appropriate option button. “Error check of the channels“ as described above configures the device for switchover if only one of the monitored channels fails (“or“) or only when all monitored channels have failed (“and“) .
At the right of the configuration of each of the 8 IP input transport streams, there is a check box. By marking this box, the respective transport stream is included in the monitoring.

7.2.3 Menu ”Transponders”

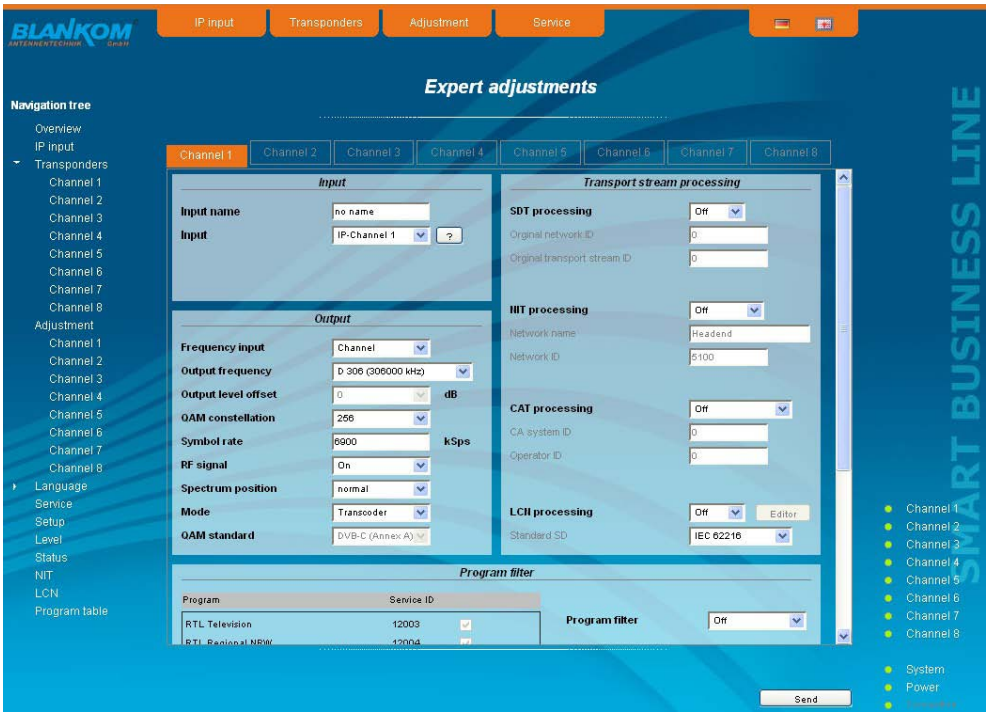
In this menu, the transponder selection, and so the program selection too, is done for all output channels. The user interface is divided into three tables. To the left there is the list of the selectable IP transponders. The selection is made from the available transponders, which are configured in menu “IP input“ (see chapter 7.2.2). In the middle there is the current transponder allocation of the 8 output channels. Outside right next to the output channel there are two selectors: with the first the RF signal of the respective channel is turned on or off, with the second you can select one of the 8 channels for setting. In the right table, the television and radio programs, that are transmitted on the selected channel, are listed with their name and service ID.



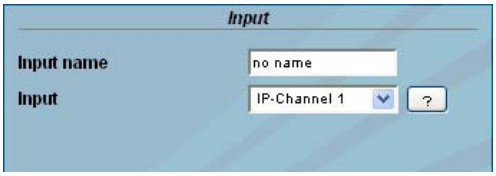
To make changes, first the desired channel is to be selected. This is done either by clicking the appropriate selector outside right next to the output channel in the middle of the channel list or by clicking on “Channel“ in the navigation tree on the left side, which is listed as a submenu of the menu “Transponders“.
If you want to change the input settings, the desired transponder is to be selected in the left table. At the same time the channel assignments associated with the service ID and filter check box is listed in the right table. After change of the input transponder the button “Load new program list“ appers in this list. This is to be pressed in order to perform the subsequent filter selection for the current program allocations. With this box you can select which channels of the transponder are transmitted and which are filtered out of the package. To transmit a program, it must be selected in that box.
If you want to change the output channel, so you click on the select box in this channel and selects the desired output channel. On double assignments within these 8 channels is called attention to this automatically.
Clicking the “Send“ button, the settings are taken and stored.

7.2.4 Menu ”Adjustment”

In this menu, the settings of the device are made. Each channel can be adjusted individually according to individual requirements. The channel may be either left in the navigation tree or above the set-up tables.

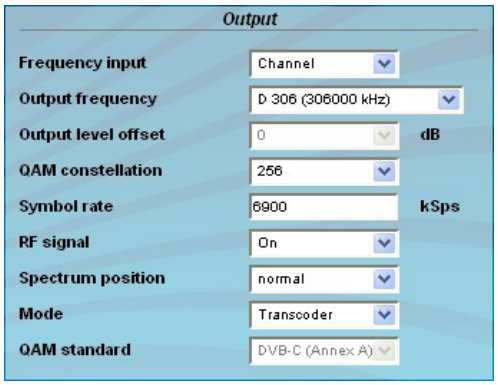


The following parameters are adjustable:



Input input parameters of the channel

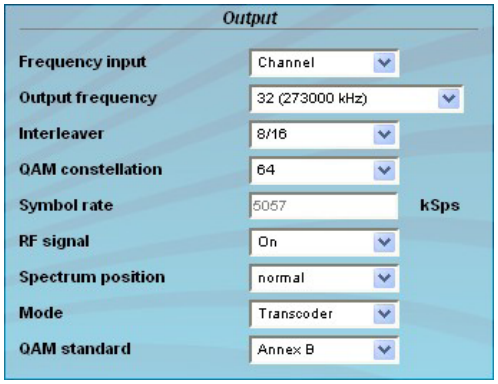
Input name e.g. name of the transponder, editable
Input sel.: IP input channels 1 ... 8, ASI TS
By pressing the "?" button, the channel list is updated.



Output (5107.81 only) output parameters of the channel

Frequency input selection: channel, frequency [1]
Output frequency selection from channel table/ input in kHz [1]
Output level offset display of the level offset [2]
QAM constellation selection: 16, 32, 64, 128, 256 QAM
Symbol rate input in kSps
RF signal selection: on, off
Spectrum position selection: normal, inverted
Mode selection: Transcoder, Test signal, Test level
QAM standard DVB-C/ ITU-T J.83 Annex A (fixed)

[1] If at the frequency input "channel" is selected the output frequency can be chosen in the pre-selected channel spacing (see chapter 7.2.7). If, however, "frequency" is selected, then the output frequency is selectable in kHz steps.
[2] Adjustment of the offset of each channel to the basic level, see chapter 7.2.8

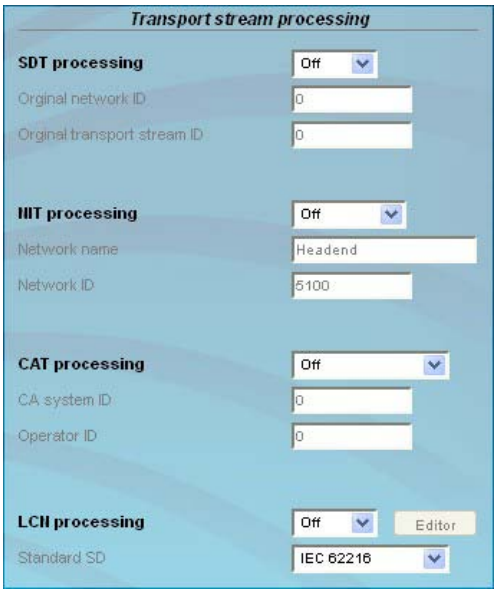


Output (5116.81 only) output parameters of the channel

Frequency input selection: channel, frequency [3]
Output frequency selection from channel table/ input in kHz [3]
Interleaver selection: 8/16, 16/8, 32/4, 64/2, 128/1 [4]
QAM constellation selection: 64, 256 QAM [5]
Symbol rate displays in kSps
RF signal selection: on, off
Spectrum position selection: normal, inverted
Mode selection: Transcoder, Test signal, Test level
QAM standard selection: DVB-C/ ITU-T J.83 Annex A, ITU-T J.83 Annex B, ITU-T J.83 Annex C

[3] If at the frequency input "channel" is selected the output frequency can be chosen in the pre-selected channel spacing (see chapter 7.2.7). If, however, "frequency" is selected, then the output frequency is selectable in kHz steps.
[4] This selection is only in case of Annex B possible. In case of Annex C only 12/17 is possible. No setting is in case of DVB-C/ Annex A.
[5] This selection is only in case of Annex B possible. In case of Annex C only 64 QAM are possible. Settings in case of DVB-C/ Annex A see output settings of 5107.81.

The output settings of the A-QAMOS-B-IP in case of the QAM standard DVB-C/ ITU-T J.83 Annex A are the same as for the A-QAMOS-IP. If Annex B or C is selected as the standard QAM, then automatically the output frequency raster is set to standard M. Instead of the output level offset display the interleaver setting appears. The output symbol rate is in both cases not selectable, it is set to the displayed fixed values corresponding to the selected QAM constellation.



Transport stream processing

SDT processing selection: on, off
Original network ID adjustment range: 0...65535
Original transport stream ID adjustment range: 0...65535

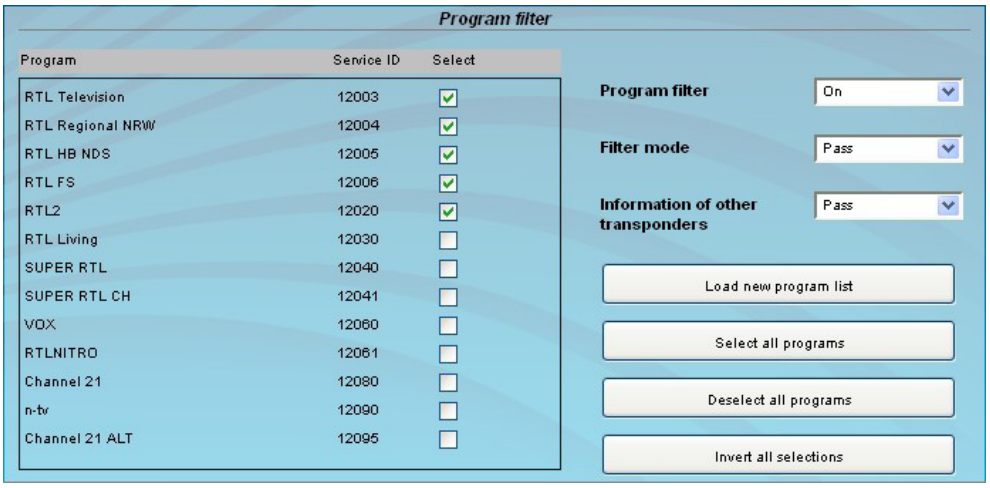
NIT processing selection: on, off
Network name name of the network (max. 30 characters)
Network ID adjustment range: 0...65535

CAT processing selection: on, on with CA filter, off
CA system ID adjustment range: 0...65535
Operator ID adjustment range: 0...65535

LCN processing selection: on, off
Standard SD selection: IEC 62216, NorDig (V1)

If the LCN processing was turned on, you can switch by pressing the "Editor" button to LCN editor to make the necessary adjustments (see chapter 7.2.11).

In the table “Program filter“, the program filter function of the channel can be executed. If the program filter is turned off, all programs of the received transponder can be transmitted.
At the left of the overview all programs with the associated service ID are listed. To the right is one check box to tag the program. In the right part of the overview there is the selector of the filter activation at the top. In the second box “Filter mode“, you choose whether the selected channels are blocked or allowed to pass. In the box “Information of other transponders“, it may be selected if additional information about SDT data from other transponders, which are transferred in the data stream under the “Other“, are filtered out or are transmitted. Possible EPG information from other transponders, which can also be transferred under the “Other“ in the data stream, are always transmitted with.
With the first of the 4 buttons right below the current program list can be loaded, the other 3 are used to simplify the selection of the program list.



7.2.5 Menu ”Language”

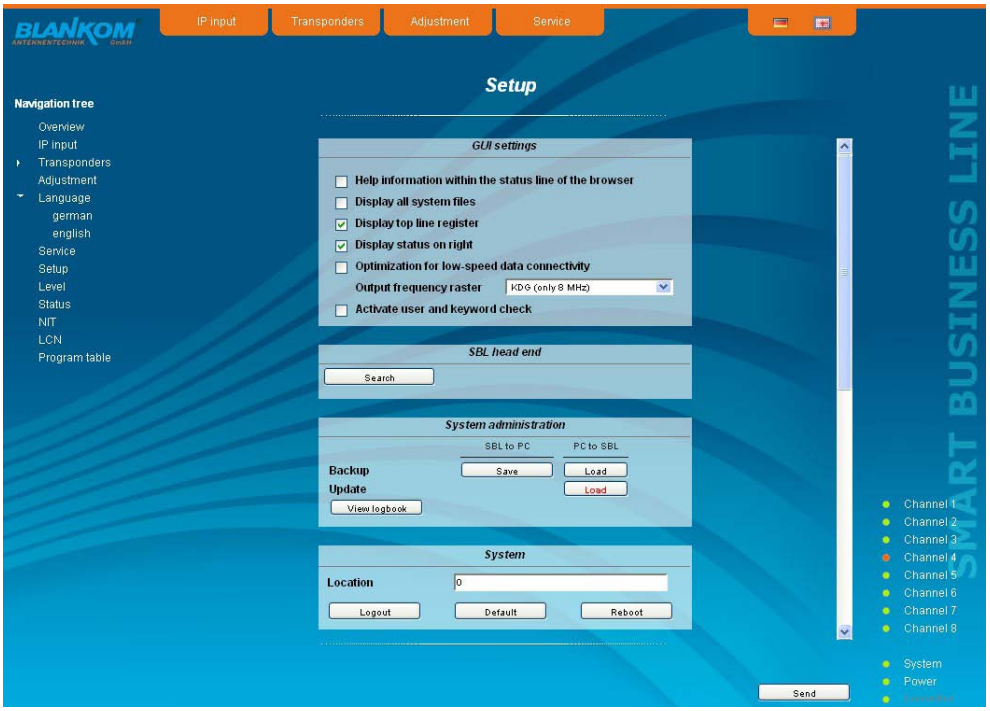
In this menu, the selection of the user interface language is executed. You can choose between German and English. The transition can be made either to the left in the navigation tree in the subtree of the point “Language“ or top right via the language selection box.

7.2.6 Menu ”Service”

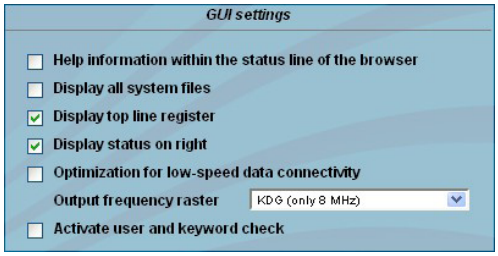
In this menu you will find all information about the service for the A-QAMOS-IP/ -B-IP in particular the BLANKOM service hotline and the service email address. In addition, the implemented operating instructions may be downloaded or viewed as PDF. If there is an internet connection the BLANKOM homepage can be started, offering the latest software release or descriptions. Finally, the currently installed software release is displayed.

7.2.7 Menu ”Setup”

In this menu, various administrative and system settings are made.



Specifically, the following can be configured:



GUI settings

Help information within the status line of the browser
By default, the online help is displayed in an orange text box at the bottom of the page. If you click this option, the help texts are displayed in the status bar of your browser. Depending on your browser sometimes such use has to be allowed in the browser settings.

Display all system files
The default is, that the system files can be subjected to upload or download as a package under “Backup“ in the submenu “System administration“. If you click this box, the system files are listed individually and can be individually subjected to an up- or download.

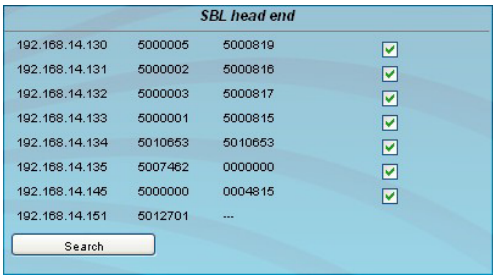
Display top line register
By default, the registers are shown in the upper part of the user interface, to move more quickly to the most frequently used menus. By removing the box marking the registers are hidden.

Display status on right
By clicking the box, the status of the channels or the system is shifted to the right of the user interface.

Optimization for low-speed data connectivity
By clicking the box the data volume of the browser pages is greatly reduced. So it is possible to adjust the device, if there is only a low-speed connectivity (GSM). The available reduction is achieved by reducing image size.

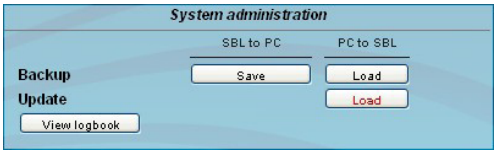
Output frequency raster
With this selection box you can set the output channel spacing, which is pre-set for adjustment of the QAM channels.To choose there are the standard B/G raster, the standard G raster (continuous 8 MHz) and the channel spacing of the cable company Kabel-Deutschland-Gesellschaft (KDG). In addition, for the A-QAMOS-B-IP the standard M raster is available.

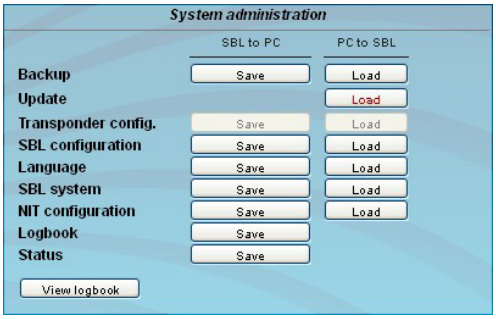
Activate user and keyword check
This selection is only available if you are logged in as administrator. If the box is disabled, the log-in is skipped after each GUI reboot. Otherwise, user login and password are required (see chapter 7.1).



SBL head end

All A-LINE-SBL and SBL devices, which are located in the same network, are listed. By pressing the “Search“ button the list is updated. All marked devices belong to the head end and are displayed on the “Overview“ page





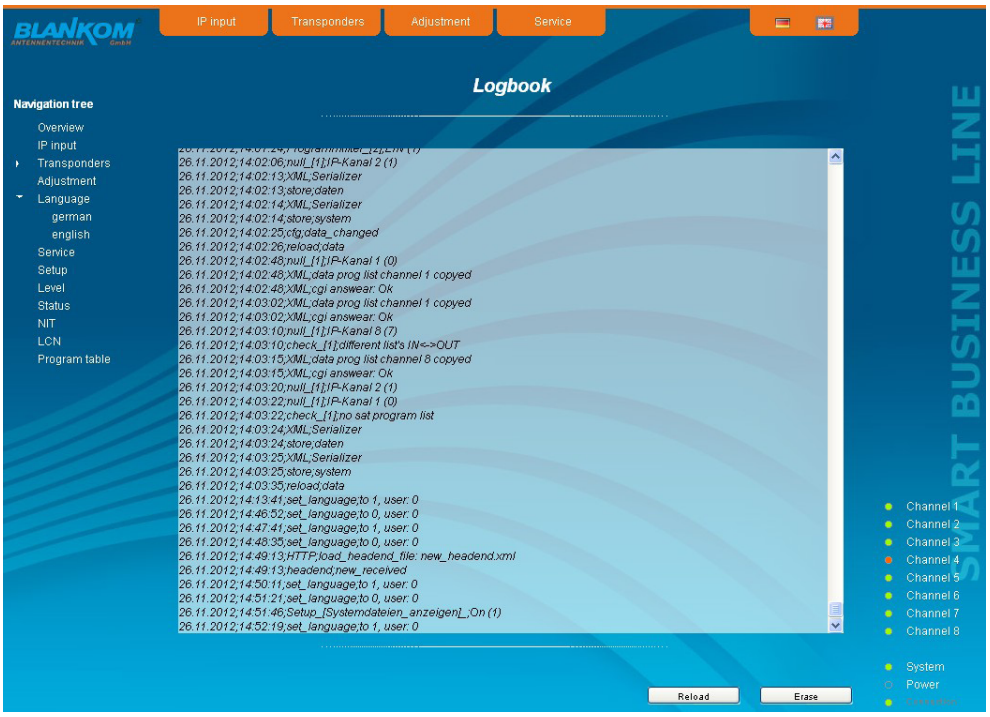
System administration

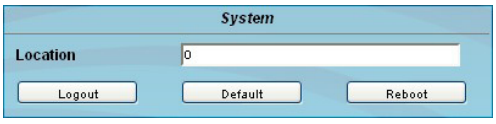
The default is displaying of the shortened list of files (top).

Backup
Here the system files can be loaded or saved as a package (except Logbook and Status). Thus, it is possible, for example to copy the system files from an A-QAMOS-IP/ -B-IP to another. If under "GUI setup" "Display all system files" is selected, the system files can also be loaded or saved separately (see figure below).

Update
By clicking the "Load" button, the internal software components can always be brought up to date.

Pressing the button "View logbook" leads to an overview, in which all the processes have been documented since the start of the GUI. Each operation is listed by date, time and description. If operations have been executed, the logged on user, who initiated the action, is saved too. By pressing the "Erase" button all entries are deleted, when you are logged in as administrator.





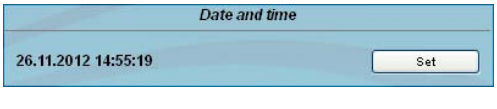
System

Location — In this field a name for the A-QAMOS-IP/ -B-IP is be made to identify the device easily. This name appears on the top right of the web site under the language selection box and is provided via SNMP with the question of the field: Iso(1)org(3). dod(6).internet(1).mgmt(2).mib.2(1).system(1). sysLocation(6).

Logout — restart the user interface

Default — delete the settings and reset to default values (including IP address), available only if you have logged in as administrator

Reboot — restart of the A-QAMOS-IP/ -B-IP

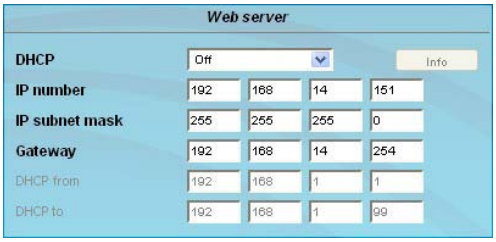


Date and time

Clicking the "Set" button, the date and time will be set to that of the PC.

Enabling of

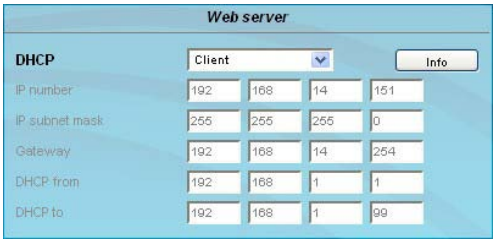
In this field, possible software options for the A-QAMOS-IP/ -B-IP can be enabled. The registration code must be entered in the input field and by pressing the "Send" button the option will be activated. Activated options are displayed in black, inactive are grayed out.



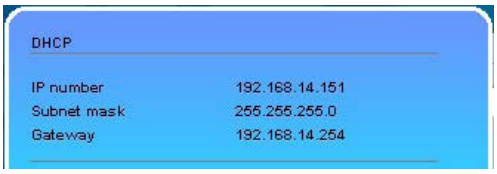
Web server

This setting appears only when you are logged in as administrator, and thus you have the authority to make administrative changes.
The A-QAMOS-IP/ -B-IP supports the DHCP functionality. DHCP-Client is factory default. Note, that after each factory reset the A-QAMOS-IP/ -B-IP is set to "DHCP-Client".

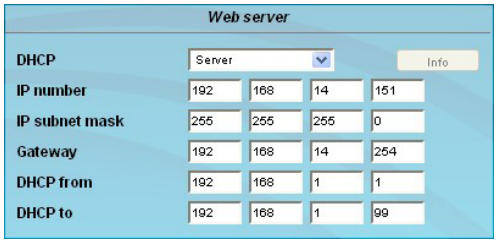
If the **DHCP functionality** is set to **"Off",** in the appropriate fields the IP number, subnet mask and gateway can be manually entered and then the settings of the A-QAMOS-IP/ -B-IP are adapted to the network.



If the device is set to **"DHCP-Client"**, it automatically obtains an IP address from the DHCP server on the network. The manual network settings are grayed out and are therefore disabled.



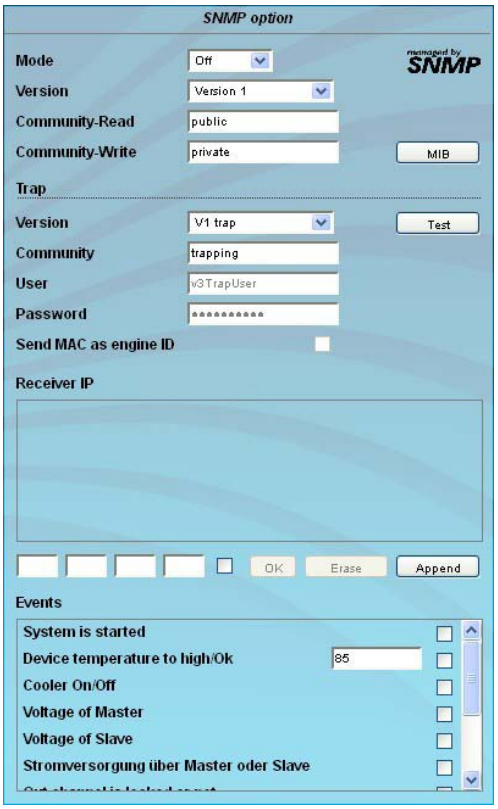
By pressing the "Info" button the automatically assigned network configuration of the device is displayed.



Please note if the device is set to **"DHCP-Server"**, that the IP address 192.168.1.100 should not be set. If you select this address, you will get an error message. In addition to the IP settings you can configure the DHCP range from which the IP addresses of the connected clients are assigned. The address range must match the address range according to IP address and subnet mask of the server and should not be too small. The default is the area 192.168.1.1 to 192.168.1.99. Additionally with the DHCP server will also set up a local DNS (Domain Name Server). To use it in full extent a connected PC/ laptop must be configured as a DHCP client. Please note, that the client unit not only get its IP address from the DHCP server, but also its DNS server.

If the device is configured as a DHCP server or client and the client has received an IP address successfully, so the device can be accessed via a web browser using its name. This name is composed of the prefix "sbl" and the device number that is printed on the back of the device and on the packaging. For example, the device with the number 0123456 can be called under "sbl0123456". Should there be problems with it among the local network conditions, the domain can be added. In the case that the above device is configured as a server, the call using the domain is then "sbl0123456.sbl". If another DHCP server is used, ask your administrator for the domain name.

An example of the simplification of the configuration or operation of the head end via DHCP, is, that an A-LINE-SBL device is as a server, the remaining devices and the connected PC/ laptop are configured as a client. By calling the browser "dhcp.sbl" the GUI of the server device is loaded. If not already done so, now the head end can be read. So all connected components are found and listed. The head end can now be stored in the "Setup" menu under the item "System administration". The head end overview can be changed quickly to the user interface of any other device by selecting the respective devices links.



SNMP option

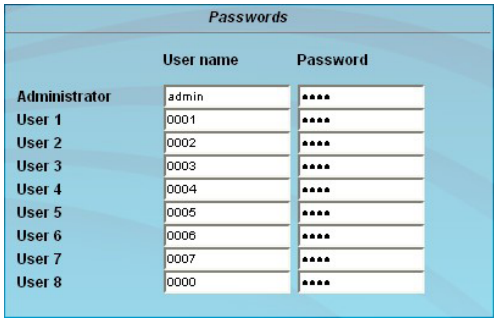
In the first section, the SNMP functionality, including the sending of traps is enabled or disabled with the "Mode" selection field. With the selector "Version" you can select the SNMP version (version 1, 2 or 3). In the two boxes below it, the communities for versions 1 and 2 are given separately for reading and writing via SNMP. With version 3, these two fields are disabled because all registered users of the device (see menu "Passwords") have the automatic read access to SNMP. The write access can be enabled or disabled for each user by clicking the SNMP check box in the "Passwords" menu.
By clicking the "MIB" button the MIB of the device is generated and offered for download.

In the second section the trap settings are done. First, the trap version is selected:
V1 trap - normal traps according SNMPv1 with specified community
V2 trap - normal traps according SNMPv2 with specified community
V2 inform - sends information traps according SNMPv2 and waits for an acknowledgment
V3 trap - normal traps according SNMPv3
V3 inform - sends information traps according SNMPv3 and waits for an acknowledgment

The community can be configured for traps of SNMP versions v1 and v2. User/ password and the using of the network MAC address as the engine ID can be configured for traps of SNMP version v3. These settings must correspond with the configuration of the trap receiver, so traps are successfully transferred. For this purpose a test trap can be sent by clicking the button "Test" to test the transmission of traps. If a test trap triggered, all pre-preserved traps are discarded.

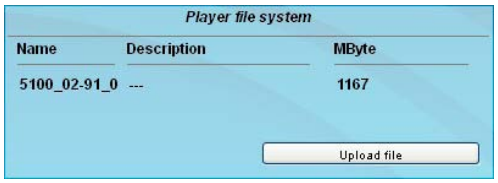
There up to 256 IP addresses to receive the traps can be created or enabled. These are listed under "Receiver IP". Below, the events can be configured, whether and partly with what thresholds they should trigger traps. There are three ways to configure a trap:
- without parameters, e.g. fan on/ off
- with a freely selectable parameter for a medium priority
- with a selectable parameter from a list for a medium priority

References and notes:
All users using SNMPv3 must use passwords with at least 8 characters. For SNMPv3 the A-LINE-SBL supports only the authentication password, not the privacy password. The A-LINE-SBL only supports the MD5 algorithm for authentication password in SNMPv3.
Information traps are specific traps that are possible up to SNMPv2. If there is no acknowledgment of the receiver, the transmitter attempts to transmit it later, until the confirmation is received.
An A-LINE-SBL device holds up to 256 information traps that could not be sent successfully. If there are more unconfirmed traps, the older traps are discarded and noted in the logbook as having failed. A successful sent trap is also registered as such in the logbook. In case of power failure or reboot of the device the non-confirmed traps are lost.
Details may be found in the help text for each event. The critical priorities are each covered with fixed values that can not be changed.
If the web site of A-QAMOS-IP/ -B-IP is open, no changes are possible via SNMP.



Passwords

The setting appears only when you are logged in as administrator, having the authority to make administrative changes. In addition the box "User and keyword check" in the submenu "GUI settings" has to be clicked. The user ID and password for the administrator can be set in the first line. The fixing of up to 8 user identification and passwords is possible. The limitations of user rights exist only in the fact that they are not authorized to change web server settings, user rights and password changes and default settings.
The default **password** for the **admin** is: 1111
and for the **user**s: 0000
To the right of each user appears an SNMP check box. By clicking the box, the writing rights for individual users can be awarded for the SNMP version 3 (see also section "SNMP option").



Player file system [1]

displays the stored files in media player with file name, description and file size

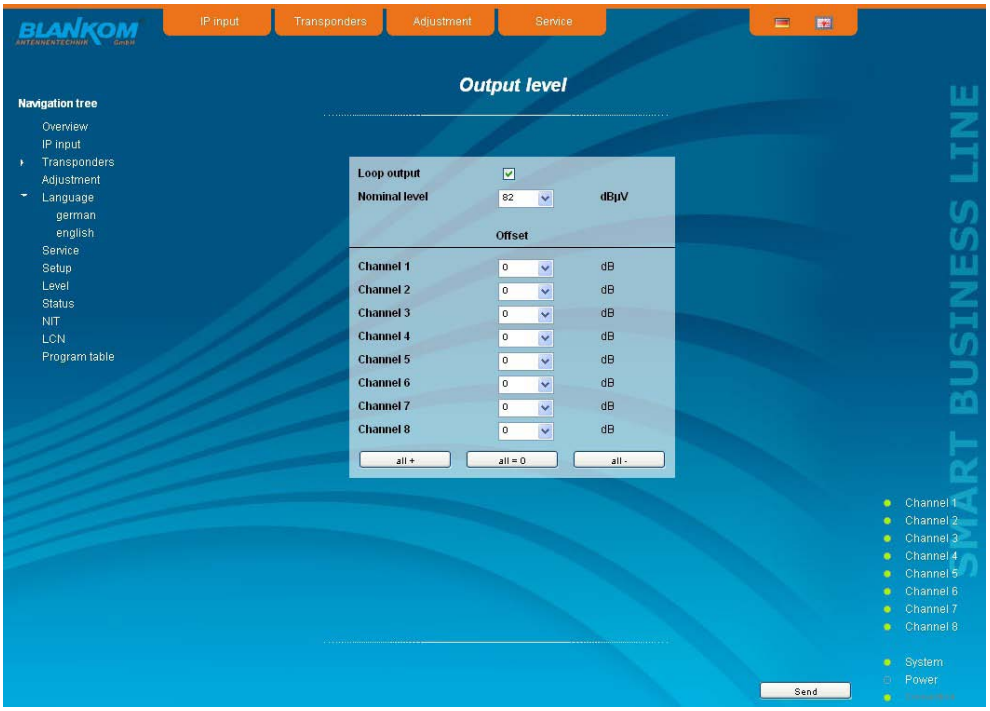
[1] only available with enabled media player option

The media player offers the opportunity to install a file from a PC/ laptop to the A-LINE-SBL device via network. The file must be available in a transport stream format that corresponds to the DVB standard. The data rate of the whole data stream must be constant and shall not exceed 40 Mbps. The content of the data stream can be single or multiple transport streams (SPTS or MPTS). To create a transport stream file the free software ffmpeg is recommended (www.ffmpeg.org).
To upload the file you select the menu item “Setup“. In the section “Player file system“ the uploaded file is already displayed with their name, description and file size in kilobytes. To upload or change the transport stream file, click the button “Upload File“. In the following dialog you select a file and can optionally specify a text description for this file. **Note, that neither in the file name nor in the text description are umlauts or special characters.** By clicking the “Upload“ button, the previously selected file is transferred to the A-LINE-SBL device. A previously existing file is automatically deleted. For the time of file uploads the GUI is locked. A dialog shows the progress in percent. If necessary, the file upload may be aborted by pressing the “Cancel“ button.
Subsequently, the file can be used as input to any output channel. Do this, select as the input the entry “player“ in the channel settings, item “Input“, and confirm your settings by clicking the “Send“ button (see chapter 7.2.4).

To produce a transport stream file in the appropriate format, the company BLANKOM provides a corresponding conversion tool. This may generate a corresponding file in the transport stream format, which the A-QAMOS-IP/ -B-IP can handle. A detailed description of the conversion tool can be found in chapter 9.

7.2.8 Menu "Level"

With the top box, the loop through output (loop) is enabled or disabled. If enabled, the underlying selection of the nominal level for all 8 channels may be set in the range from 62 ... 82 dBµV. If the loop is disabled, the output level of the 8 channels may be set in the range of 74 ... 94 dBµV. Below each channel can be set individually with an offset of +3 ... -6 dB in 0.5 dB steps. The three lower buttons are used to simplify the offset level setting if you want to perform same adjusting for all 8 channels. With the left button the offset for all 8 channels is increased by 0.5 dB, decreased with the right button by 0.5 dB. The offset is set for all 8 channels to 0 dB with the middle button.



7.2.9 Menu "Status"

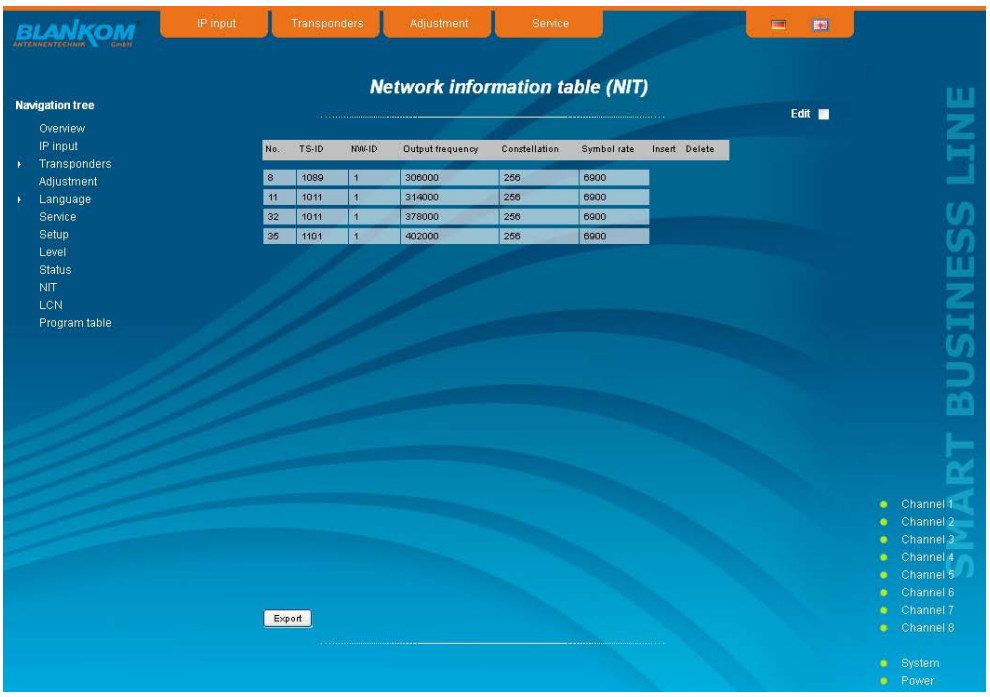
It presents an overview of the status of the various components per channel, it is updated every 5 seconds. It lists only the current values, the naming of the parameter appears in the help box in the lower part of the user interface or in the status bar of the browser (as adopted configuration), if you hover the mouse cursor above the parameter.

7.2.10 Menu ”NIT”

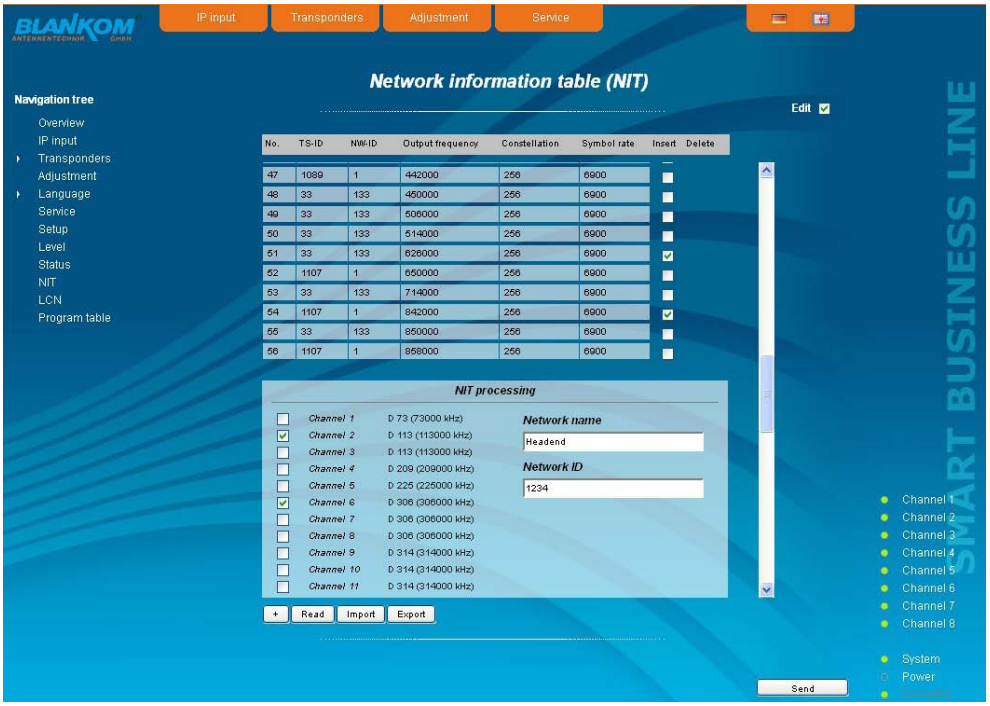
The NIT processing for all to a head end associated devices of the A-QAMOS and QAMOS product group can be done in 2 ways: as an automatic or manual NIT processing. The simplest and by installation and support expense safest way is the automatic NIT processing. The precondition is that all to the head end associated above mentioned devices have a different IP address and an Ethernet switch must be connected to each other so that the data exchange can take place automatically. The NIT settings must be made here only in one of the above mentioned devices of the head end and after confirmation they are automatically included of all other devces. The Ethernet connection among each other is not necessary for the manual NIT processing, but the settings must be made or maintained separately **in each device** of the head end, which means a much higher expense.
To start the NIT processing it is first necessary to put together the head end in the user interface. At first in the menu “Setup“ (see chapter 7.2.7) at the point “SBL head end“ the “Search“ button is to press. Alternatively, you can press the “Read“ button in the menu “Overview“ (see Section 7.2.1) under the item “SBL head end“ overview in the case of factory setting. First all devices of the A-QAMOS and QAMOS product group are listed that are within the network. If there is no network connection between the mentioned devices (the case of manual NIT processing), here only this one device appears on which the settings are being implemented. The next step, all mentioned devices are selected, which should belong to the head end (in the case of the manual NIT processing the device itself) and the selection has to be confirmed with the “send“ button. In the case of an automatic NIT distribution now the data of all selected devices are exchanged. Further adjustments must be performed only in one device and be adopted by all the other automatically.
In the case of a manual NIT processing this step must be implemented **in each device** of the head end. The data of the other devices must be taken manually in each device, as explained in subsequent chapters.

7.2.10.1 Automatic NIT processing

As explained above, all devices of the A-QAMOS and QAMOS product group of the head end must be connected over an Ethernet switch for automatic NIT processing. The creation or editing of the NIT settings must only be done on one device of the head end and is then applied from all other devices automatically.
It presents the last created NIT table of the whole head end with continuous listing of the following parameters: transport stream ID, original network ID, output frequency in kHz, QAM constallation, symbol rate in kSps, insert and delete fields. A characteristic of the automatic NIT processing is that all channels of the devices are listed in frequency-ascending blue colored table cells. If the first time an NIT is created, a list appears with no table entries. The loading or update of the NIT is then in edit mode. By clicking the “Export“ button, the NIT of the head end is saved as a .xml-file on the PC. In the editing mode this settings can be changed.

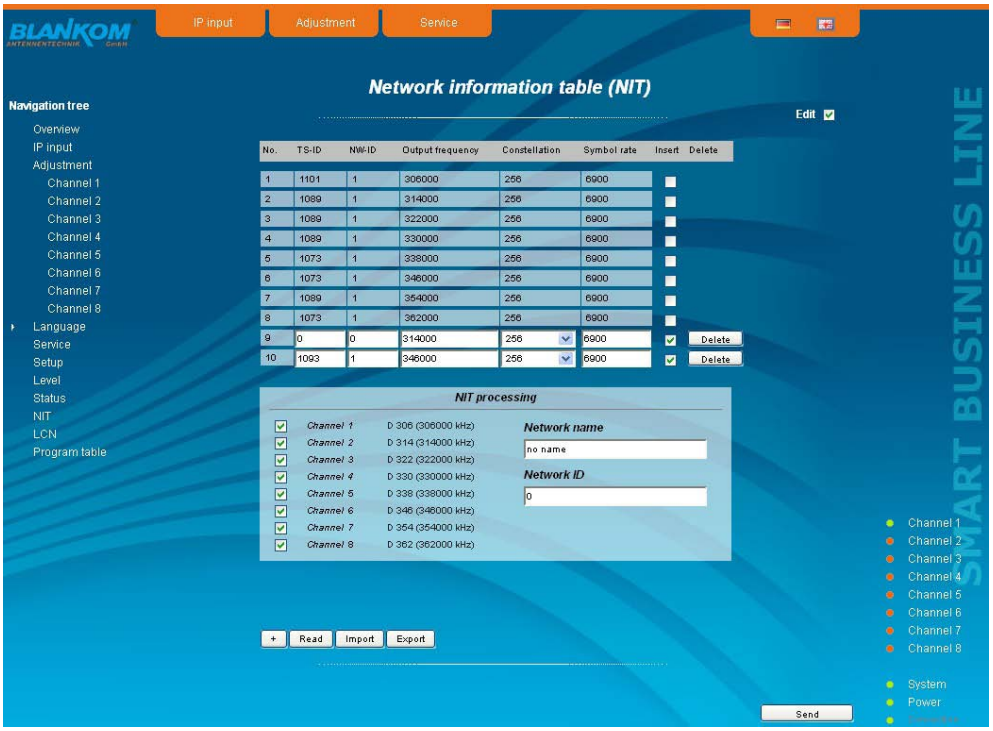


By clicking the box “Edit“ in the top right of the user interface you can switch to edit mode and edit the NIT entries. With the “+“ button, an entry will be added. The settings of the last table entry are accepted and must be adjusted accordingly. With the “Delete“ button the table entry is removed. Also in this mode, you can save the NIT of the device with the “Export“ button as .xml-file on the PC. By clicking the “Import“ button, another NIT can be added, which was previously stored as a .xml file on the PC. In this way its easy possible to create a NIT of a system with multiple devices of the A-QAMOS and QAMOS product group. In the NIT processing all the selected table entries are included.
In the lower part of the GUI it appears additionally an overview of the settings for the NIT processing of all the channels of the head end. Here the NIT transmission per channel can be switched on or off easily and the network name and network ID can be changed. The settings are identical to the section “Transport stream processing” in the menu “Adjustment“ (see chapter 7.2.4).
If all settings have been made, with pressing the “send“ button this NIT is automatically stored in all other devices of the A-QAMOS and QAMOS product group of the head end.



7.2.10.2 Manual NIT processing

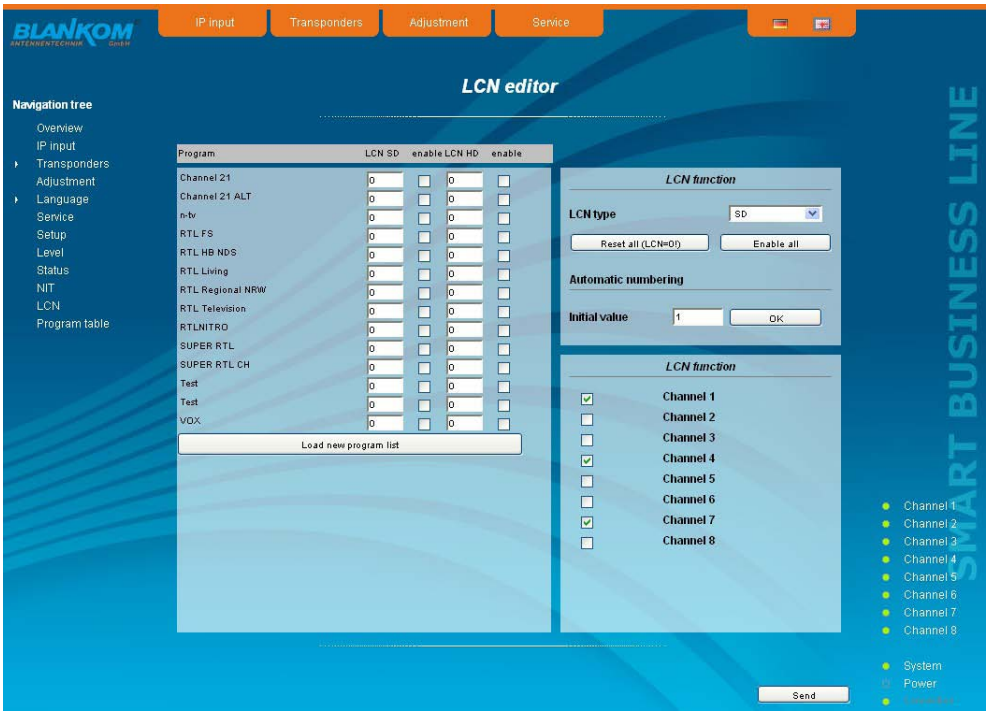
After the preparation or initializing of the NIT, described in 7.2.10, first it must be called the edit mode of the NIT **in each device of the A-QAMOS and QAMOS product group** of the head end, readed the NIT of the device and stored on the PC by clicking the “Export“ button. Then you append the NIT of the other mentioned devices, which belong to the head end, by repeatedly pressing the “Import“ button in edit mode. As opposed to the automatic NIT processing here appear the added tables in white color. After the appropriate selection of channels of the NIT and any change in the network name or network ID the NIT of this device is stored and transferred by pressing the “Send“ button. To facilitate the setting of all other mentioned devices the head end, this head end NIT can be stored in the PC by clicking the “Export“ button. Now all the other devices of the A-QAMOS and QAMOS product group of the head end have called successively, these stored NIT loaded by pressing the “Import“ button and then adopted and saved by pressing the “Send“ button.



For changes of the NIT is to be noted that these changes must be made in the NIT **of each device**. It is therefore recommended to prefer the automatic NIT processing of the manual NIT processing.

7.2.11 Menu ”LCN”

The allocation of a logical channel number (LCN) is a service that allocates a serial number to each TV program in all the channels, which are enabled for this service. If the set-top box supports this service at the subscriber, the TV programs are offered in the order established by program numbers.
To use this service, the LCN processing of all appropriate channels must be turned on. Then you can set the program order. It should be noted that the numbering is done separately for HD and SD programs. When you first load the LCN editor there in the left table cell, all the transferred services of the channels are listed that were marked in the lower right table for LCN processing. TV channels are already pre-selected, separated for HD and SD programs, all services are still provided with the number 0. You can now assign the LCN for the selected program automatically by pressing the “OK“ button in the right box “automatic numbering“, starting with the number registered there. The numbers can also be selected manually: individually by clicking the corresponding box in the left table, or all programs of a type by pressing the “Enable all“ button. The numbering itself is performed again by pressing the “OK“ button. In order to reverse the numbering for HD or SD programs, one selects the corresponding LCN type in the right table field and press the “Reset all (LCN = 0)“ button.



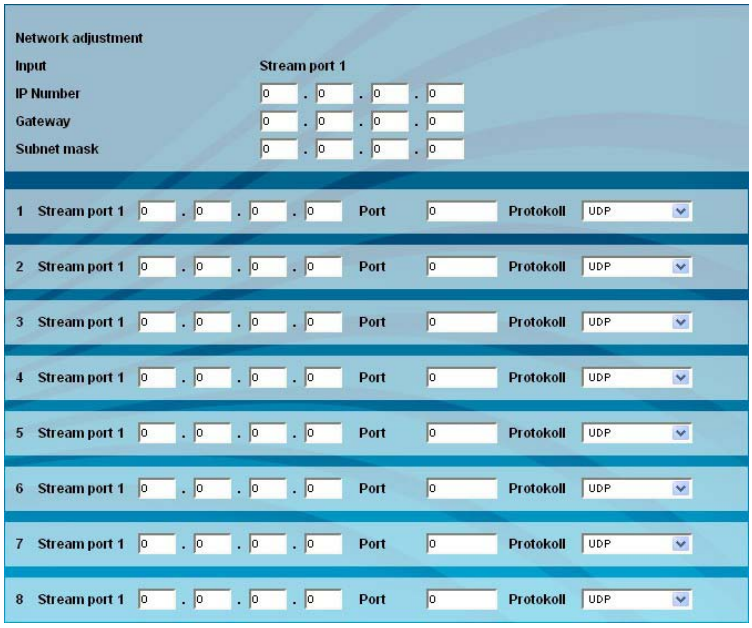
7.2.12 Menu ”Program table”

The program table gives an overview of the channel allocation of the A-QAMOS-IP/ -B-IP. The overview begins with the output frequency and output channel identifier for each transmission channel. Under them all TV and radio programs are listed, which are transmitted in this channel. By clicking the “Save“ button, the program table can be saved as a text file on the connected PC.

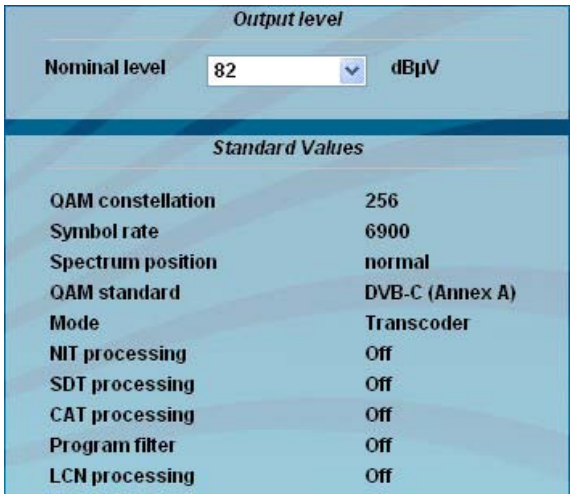
8. Factory settings

A short pressing of the reset button on the rear of the device causes a reboot, i.e. it will restart the device and all stored values are adjusted. If the device is to be reset to factory settings, the reset button must be pressed so long to keep up until the “POWER“ and “SYSTEM“ LED will illuminate green permanently. This process takes about 15 seconds. In this case the device is set to the following:

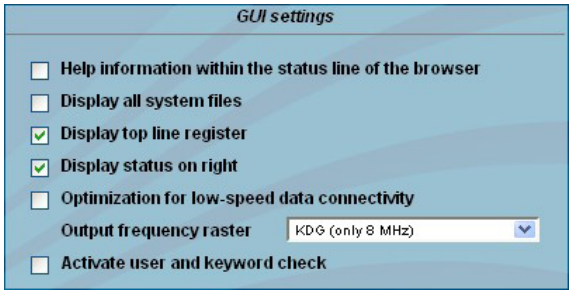
Input parameters



Output parameters



Setup settings



Network settings

9. Conversion tool to produce a compliant TS file for A-QAMOS-IP/-B-IP

With the media player option of A-QAMOS-IP/ -B-IP it offers the opportunity to install a TS file from a PC connected via network with the A-LINE-SBL device. The file must be present in a transport stream format conforming to the DVB standard.
To create a file in a compliant transport stream format, the BLANKOM provides a conversion tool. This can generate from a large number of video file formats a corresponding file in the transport stream format, which process the A-QAMOS-IP/ -B-IP and can provide as an additional channel to the customer.

9.1 Functional scope

“VideoKonverter.jar“ intended for conversion of video files into the required transport stream format of the player. Thereby it is ensured that the resulting file has a constant bit rate, audio and video bit rate are set correctly and the meta data of the transport stream can be configured as desired. The user can choose between 3 resolutions SD, HD 720 and HD 1080.
“tsmux.exe“ is an application that optimizes the generated transport stream for the player: the player is able to process transport streams, in which the null packets are compressed. This compression can be activated by means of “tsmux.exe“.
The generation of the transport stream takes place by means “FFmpeg“. However, it is based on a buffer model that is different from the player. Therefore, „tsmux.exe“ offers the possibility to arrange the packets in the transport stream so that caused by the wrong buffer model continue count error can be suppressed.

9.2 Installation requirements

The conversion tool “VideoKonverter.jar“ is a Java program, which offers the advantage, that it is platform independent. For the preparation and installation of the program the following conditions are necessary:

1. Check the installed version of Java on your PC
   For this check it necessary to establish an internet connection to the PC. To test it, the following link is called in the used browser:
   http://www.java.com/de/download/testjava.jsp
   If necessary, the Java software must be brought up to date by means of update offered there.
   Alternatively, the Java version to be tested without an internet connection using command prompt as follows:
   Open the command prompt by typing
   java-version
   followed by <Enter>.
   Result is either an error message if Java is not installed or the version information of the existing Java installation.

2. Installing the necessary software “FFmpeg“ to run the program
   The software “ffmpeg“, necessary for the execution of the conversion tool, is available at the following link:
   www.ffmpeg.org
   By clicking the “Download“ button on this page you take to the corresponding versions, which are available for the individual operating systems. We recommend going to use only the 32-bit versions.
   The current download link addresses are for

Linux:	http://ffmpeg.gusari.org/static/
Windows:	http://ffmpeg.zeranoe.com/builds/
MacOS:	http://www.evermeet.cx/ffmpeg/

   An installation of FFmpeg in the sense of a self-running process is not required. The downloaded, compressed files must be extracted into a target path freely chosen. This path should be reminded, because it is used later in the “VideoKonverter“ software as an auxiliary path.

3. To preview the selected video the player installed as the default program is used. In Windows, this is for example the media player. By BLANKOM falls the recommendation of a video player on the VLC player, because this player knows how to deal with non-standard video formats. If even one other video player is used, it can be used.
   If you want to use the VLC player, the download is available at the following link:
   http://www.videolan.org/vlc/#download
   The installation of the VLC player runs on a self-running routine, which starts by calling the vlc.exe. This makes the program binds into the operating environment and can be easily “found“ by the video converter tool.

When you install the software (Java, VLC player) it should take some time and read the message window to not allow third-party programs or other promotional activities.

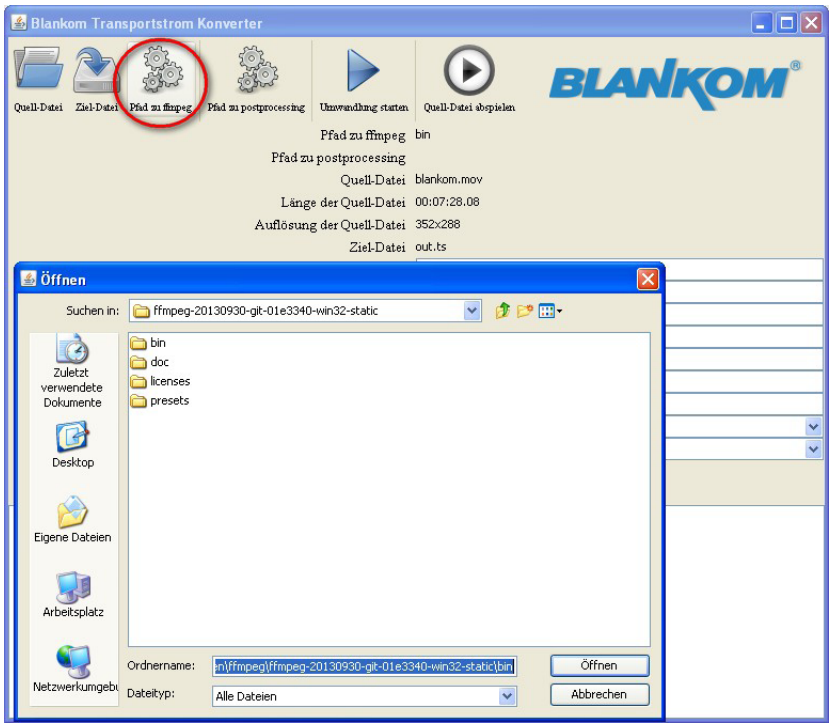
For the following software releases, the functionality of the video converter tool has been tested successfully:

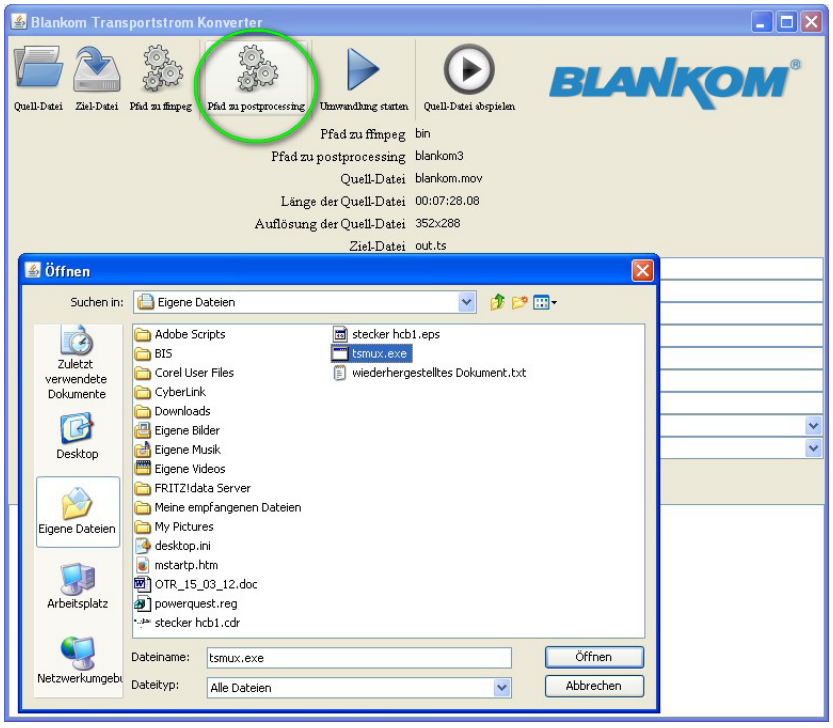
Operating systems:	- Windows XP and 7
Java:	- from version 6
FFmpeg:	- for Windows XP/ 7- 32bit from version 01e3340

9.3 Installation and integration of the conversion tool on a Windows (XP) system

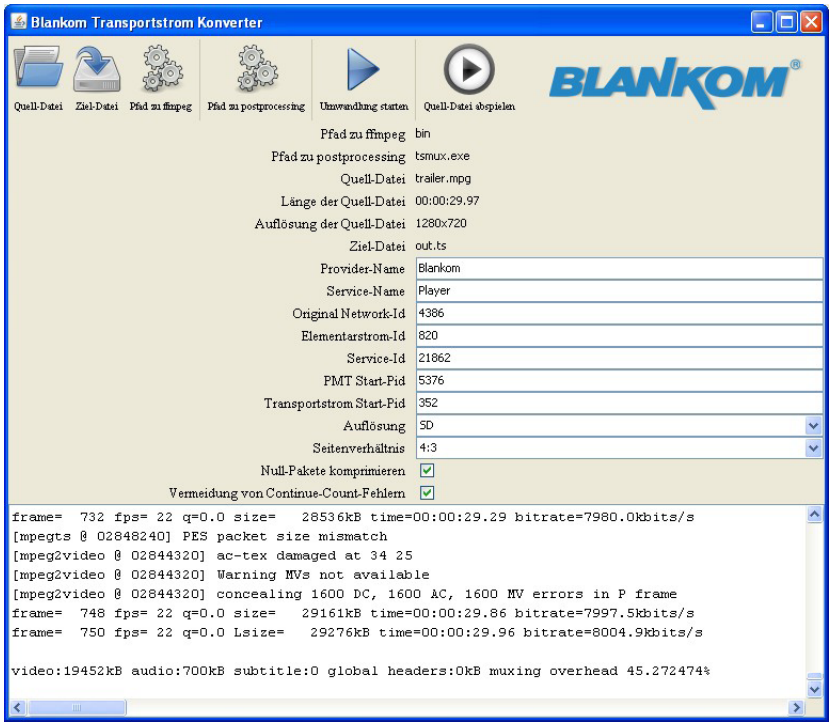
First, the inclusion of the auxiliary path and the first conversion is illustrated.
After the files are unpacked from FFmpeg to the selected folder, you can also link this path in the converter. You simply select the button “path to ffmpeg“ (pictured in red) and click their way there through their own folder structure to the path where the file was unzipped. There, select the “bin“ folder and confirm by clicking the button “Öffnen“ or “Open“.

In order to perform post processing, you have to link the path to “tsmux.exe“ in the converter. Then, click the button “path to post-processing“ (pictured in green) and click it there by their own folder structure to the path where the file is located. There, choose the file “tsmux.exe“ and confirmed with the click on the button “Öffnen“ or “Open“.





After the successful completion of the installation of the playback tool, you can select video converter already in a file.
In the following, a video file is selected and clicked “Quell-Datei abspielen“. This will open the video player and returns the selected file.
Using the button “Ziel-Datei“ the path and name for the file is to be created are defined. The file extension will be denominated in any case *. ts and can not be changed. For a distinction between the individual films a unique name should be used, e.g. Infofilm.WBG.SD.4:3.PID65535.ts
If an error was made when entering - as a numerical figure is outside the permitted range - or were required fields not filled in, the start of transformation is blocked. Incorrectly filled fields are highlighted in red. The boundaries of the allowed values are displayed as a tooltip when the mouse pointer rests over the input field a long period of time.
After that the setting of the desired output parameters for the conversion follows. A detailed overview of the range and standard information found in the glossary of the program (see chapter 9.5). It should be stated only briefly that it is possible to create from SD also HD content, however considering that image information is added. The quality is therefore not to be compared with original HD content.
It should be noted that without configuring the path for post-processing is not possible to optimize the transport stream file, i.e. the two checkboxes “Null-Pakete komprimieren“ and “Vermeidung von Continue-Count-Fehlern“ remain inactive.



9.4 Error prevention

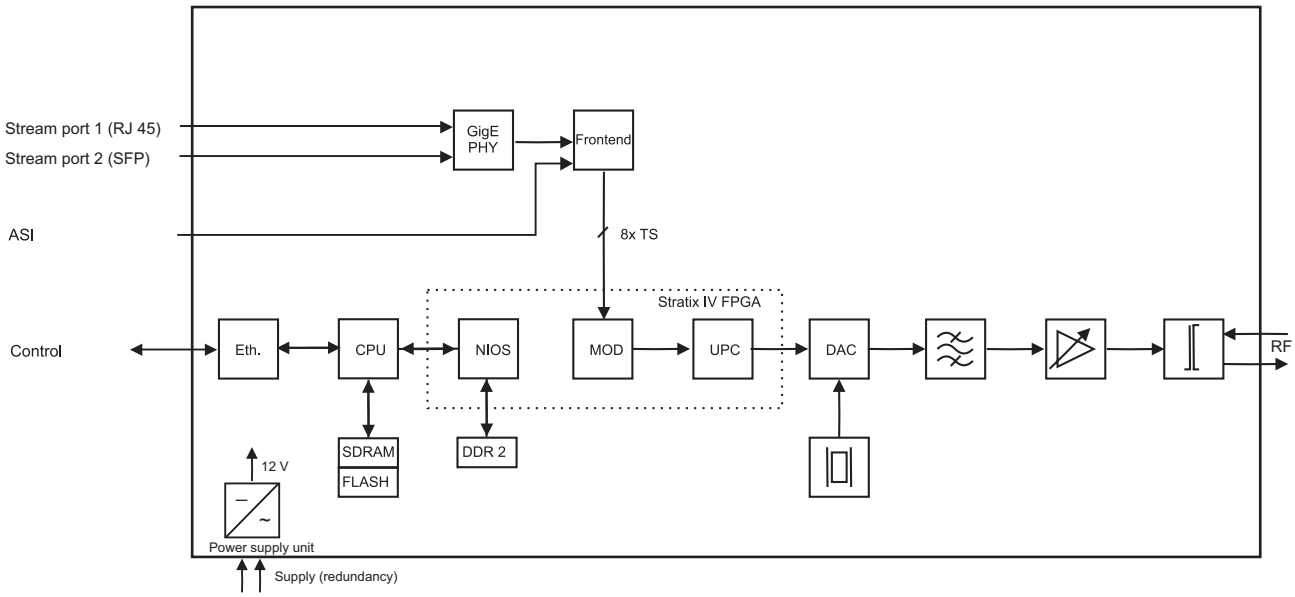
1. If you want to create HD video from SD material so it is to be reckoned with qualitative degradation because there data be added that were not in the original.
2. Provider name, service name, and original network ID are system dependent and are used to allocate the net sites of the operator and adjust its network.
3. To avoid serious disturbances in the network, the elementary stream ID should be unique throughout the network.

9.5 Glossary - parameter declaration [min. … max. range]

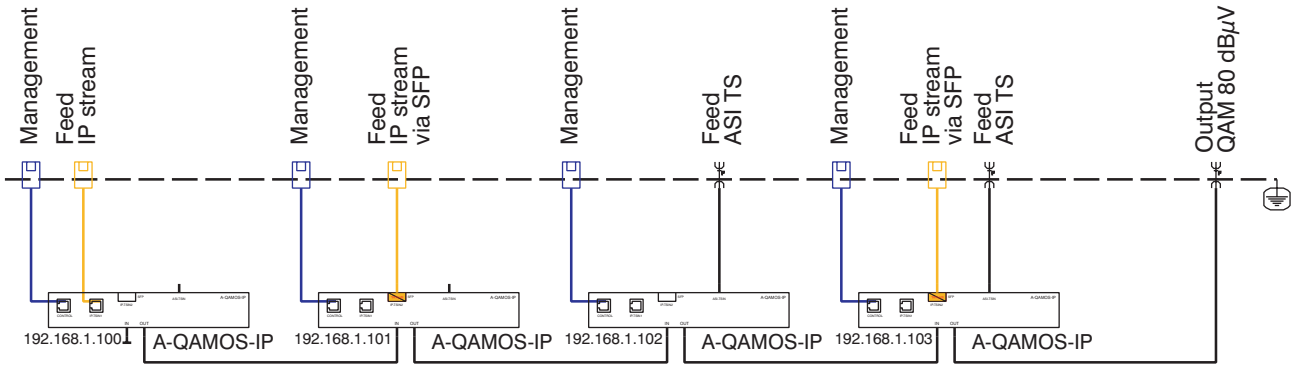
Provider-Name	[freely selectable]	(provider name)
Service-Name	[freely selectable]	(service name)
Original Network-Id	[0 … 65.536]	(original network ID)
Elementarstrom-Id	[256 … 8.191]	(elementary stream ID)
Service-Id	[0 … 65.536]	(service ID)
PMT Start-Pid	[4.096 … 8.191]	(PMT start PID)
Transportstrom Start-Pid	[0 … 65.536]	(transport stream start PID)
Auflösung	SD, HD 720, HD 1080	(resolution)
Seitenverhältnis	4:3, 16:9, 24:10	(aspect ratio)
Null-Pakete komprimieren [1]	yes, no	(compress null packets)
Vermeidung von Continue-Count-Fehlern [2]	yes, no	(avoid continue count errors)

[1] This switch enables the compression of null packets in the transport stream. Thus, a significant reduction in file size is achieved especially for files that have a big difference between video and transport stream bit rate. However, the resulting files are not compatible with conventional software programs. These compressed files are used only by the A-QAMOS-IP/ -B-IP or compatible devices of BLANKOM company..
[2] This switch activates a function which suppresses the conversion resulting from the continue count errors due to the different buffer models. It is strongly recommended to enable this option in order to achieve optimal results.

10. Block diagram



11. Application example



12. Technical data

IP input (stream port)

Network connection (LAN/ WAN)	Ethernet,10/ 100/ 1000 Base-T
Connector	1x RJ 45, 1x SFP
Protocols	ARP, PING, IPv4,
Streaming protocols	UDP, RTP, RTP-FEC
Streaming mode	CBR/ VBR

ASI input

Level range	200 … 880 mV_{pp}
Data rate	270 Mbps
Connector	BNC socket
Impedance	75 Ω
ASI polarity	regular/ inverted

ASI signal processing

Data rate	0.625…75 Mbps
ASI transfer format	continuous, burst
TS transfer format	188, 204 Byte
Signal processing	EN 50083-9 [1]

QAM modulator

Input data rate	max. 75 Mbps acc. adjustment symbol rate & QAM constell.
Symbol rate	1.0 ... 7.2 MSps

5107.81:

QAM modulation	DVB-C
QAM constellation	16; 32; 64; 128; 256
Roll off	15%
Interleaving	Conv. I=12
Forward error correction/ FEC	Reed Solomon (204, 188.8)
Signal processing	EN 300 429 [2]

5116.81:

QAM modulation	ITU-T J.83 Annex B, C, DVB-C		
	Annex B	**Annex C**	**DVB-C**
QAM constell.	64; 256	64	16; 32; 64; 128; 256
Roll off	12 %, 18 %	13 %	15%
Interleaving	Conv. I/J= 128/1, 64/2, 32/4, 16/8, 8/16	Conv. I/M= 12/17	Conv. I/M= 12/17
Forward error corr. (FEC)	Reed Solomon (128,122) + Trellis	Reed Solomon (204, 188.8)	Reed Solomon (204, 188.8)
Signal processing	EN 300 429 [2] ITU-T J.83 Annex B, C [6]		

PSI-/ SI processing	disconnectable
Zero stuffing	continously

Test signals:

QAM test signal	according adjustment symbol rate & QAM constellation
Measurement signal	unmod. carrier (signal level)

RF output

Output frequency range	45 ... 862 MHz
Tuning step	1 kHz
Max. output level	97 dBµV (per channel)
Total level settings	
without loop	74 ... 94 dBµV (1 dB steps)
with loop	62 ... 82 dBµV (1 dB steps)
Individual level settings (offset)	+3 ... -6 dB (0.5 dB steps)
Channel allocation	adjacent channel ability
Connector	F socket
Impedance	75 Ω
Return loss	≥ 18 dB 45 MHz - 1.5 dB/ octave

Signal quality

MER	≥ 45 dB
Shoulder attenuation	≥ 53 dB
Spurious 45...862 MHz	≥ 60 dB
max. frequency stability	30 kHz
Output level stability	± 0.5 dB

Operating parameters

Operating voltage	2x 90 ... 240 V~ 50/ 60 Hz including redundancy function
Power consumption	27 W

Environmental conditions

Temperature range	-10 ... +55 °C
Temperature range for data keeping	5 ... 45 °C
Relative humidity	≤ 80 % ((non condensing)
Method of mounting	horizontal
Location of mounting	splash-proof and drip-proof

Miscellaneous

Dimensions (l x w x h)	448 x 44 x 350 mm
Weight	5.300 g

Delivery content

2x power cord
1x RJ45 connection cable
1x terminating resistor
1x mounting kit

13. Glossary

ARP	**A**ddress **R**esolution **P**rotocol
ASI	**A**synchronous **S**erial **I**nterface
BW	**B**and**w**idth
DVB	**D**igital **V**ideo **B**roadcasting (-C Cable, -S Satellite, -S2 Satellite 2, -T Terrestrial)
EIT	**E**vent **I**nformation **T**able
ETSI	**E**uropean **T**elecommunications Standards Institute
FAT	**F**ile **A**llocation **T**able
FPGA	**F**ield **P**rogrammable **G**ate **A**rray
GbE	**G**iga**b**it-**E**thernet
GUI	**G**raphical **U**ser **I**nterface
HTTP	**H**ypertext **T**ransfer **P**rotocol
ID	**Id**entifier
IF	**I**ntermediate **F**requency
IGMP	**I**nternet **G**roup **M**anagement **P**rotocol
IIC	**I**nter-**I**ntegrated **C**ircuit (I^2C bus, data bus within device)
IP	**I**nternet **P**rotocol
LAN	**L**ocal **A**rea **N**etwork
LDPC	**L**ow **D**ensity **P**arity **C**heck Code
LED	**L**ight **E**mitting **D**iode

MAC	**M**edia **A**ccess **C**ontrol
MER	**M**odulation **E**rror **R**atio
MIB	**M**anagement **I**nformation **B**ase
MPTS	**M**ulti **P**rogram **T**ransport **S**tream
NIM	**N**etwork **I**nterface **M**odule
Nios	Product name of a processor
NIT	**N**etwork **I**nformation **T**able
PCR	**P**rogram **C**lock **R**eference
PSI	**P**rogram **S**ervice **I**nformation
QAM	**Q**uadrature **A**mplitude **M**odulation
RF	**R**adio **F**requency
SDT	**S**ervice **D**escription **T**able
SFP	**S**mall **F**orm-factor **P**luggable
SI	**S**ervice **I**nformation
SNMP	**S**ingle **N**etwork **M**anagement **P**rotocol
SPTS	**S**ingle **P**rogram **T**ransport **S**tream
TS	**T**ransport **S**tream
WAN	**W**ide **A**rea **N**etwork

14. Bibliography

[1] EN 50083-9: Cabled distribution systems for television, sound and interactive multimedia signals, part 9: Interfaces for CATV/ SMATV head ends and similar professional equipment for DVB/ MPEG-2 transport streams

[2] EN 300 429: Digital Video Broadcasting (DVB): Framing structure, channel coding and modulation for cable systems

[3] EN 60728-11: Cable networks for television signals, sound signals and interactive services Part 11: Safety (IEC 60728-11:2005); German version EN 60728-11:2005

[4] EN 50083-2 : Cabled distribution systems for television and sound signals. Electromagnetic compatibility for equipment; EN 50083-2:2001

[5] RFC 1157 Request for Comments (RFC): RFC Database URL: Http://www.rfc-editor.org/rfc.html

[6] ITU-T J.83 Digital multi-programme systems for television, sound and data services for cable distribution, Amendment to Annex B and C (2006)

15. Notes on the device software

Device Software of the A-QAMOS-IP and A-QAMOS-B-IP

These both device software based on top of Linux 3.6.8 are free software: you can redistribute them and/ or modify them under the terms of the GNU General Public License as published by the Free Software Foundation, either version 2 of the License, or (at your option) any later version.

You should have received a copy of the GNU General Public License along with Foobar. If not, see <http://www.gnu.org/licenses/>.

The source code is available upon request.
Please address requests to:

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Hermann-Petersilge-Straße 1

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Germany

16. Document history

Version	Date	Modification	Author
1.00	19.11.2012	basic document	Häußer
1.01	06.06.2013	insertion of A-QAMOS-B-IP	Häußer
1.02	25.10.2013	insert player option & conversion tool (chapter 8)	Häußer
1.03	11.12.2013	revision conversion tool	Häußer

Options available upon request. Subjects to changes due to technical progress.

CE Declaration of Conformity

Manufacturer: BLANKOM Antennentechnik GmbH
Hermann – Petersilge – Straße 1
07422 Bad Blankenburg
Germany

Product Name: 8pole IP-/ ASI-TV Transmodulator

Type Name: A-QAMOS-IP, A-QAMOS-B-IP

Type N°: 5107.81, 5116.81

BLANKOM Antennentechnik GmbH confirms that the mentioned products meet the guideline(s) of the Council for the approximation of legislation of the member states.

Electromagnetic compatibility (2004/ 108/ EC)
The following standards are met: DIN EN 50083-2: 2007-04 (EN 50083-2:2006-06)

Low voltage guideline (2006/ 95/ EC)
The following standards are met: DIN EN 60950-1: 2006-04 (EN 60950-1:2006-11)
Information technology equipment -Safety-

Restriction of hazardous substances (2011/ 65/ EC)
The following standards are met: DIN EN 50581: 2013-02 (EN 50581:2012)

Bad Blankenburg, Germany, 2013-06-06

Dr. Piero Kirchner
(Managing Director)