

# THE BEST TECHNOLOGIES!



program for configuration and diagnostics  
of BT radio relay links

## SUMMIT MANAGEMENT SYSTEM

version 1.0  
user manual

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# 1 INTRODUCTION

This manual is designed to help with for the configuring, diagnosing and supervising of **BT** microwave links.

## 1.1 Basic description of the microwave link

The microwave link of the **BT** line allows for wireless Point to Point (PtP bridge) communication for data, voice and video transfer (it offers a reliable solution for triple play service operation). The link works in Full-Duplex mode allowing for concurrent transfer in both directions. The unit is of the FOD (Full Outdoor) type with direct assembly on a parabolic aerial. Aerials with a diameter of 35 cm, 65 cm, 90 cm or 120 cm are supplied with the link.

The user interface offers:

- 2 x interfaces for metallic Gigabit Ethernet with PoE+ (Eth1, Eth2) support
- 2 x SFP interfaces to connect Gbit optical system (SFP1, SFP2)
- Connector to connect with supply voltage of 20 to 57 VDC (PWR)
- N-connector to connect voltmeter (to measure RX signal strength)

The link allows full utilization of up to **3 independent** Ethernet channels. Channel number 1 (Eth1/SFP1) shares the service channel and is used for **access to the device management**.

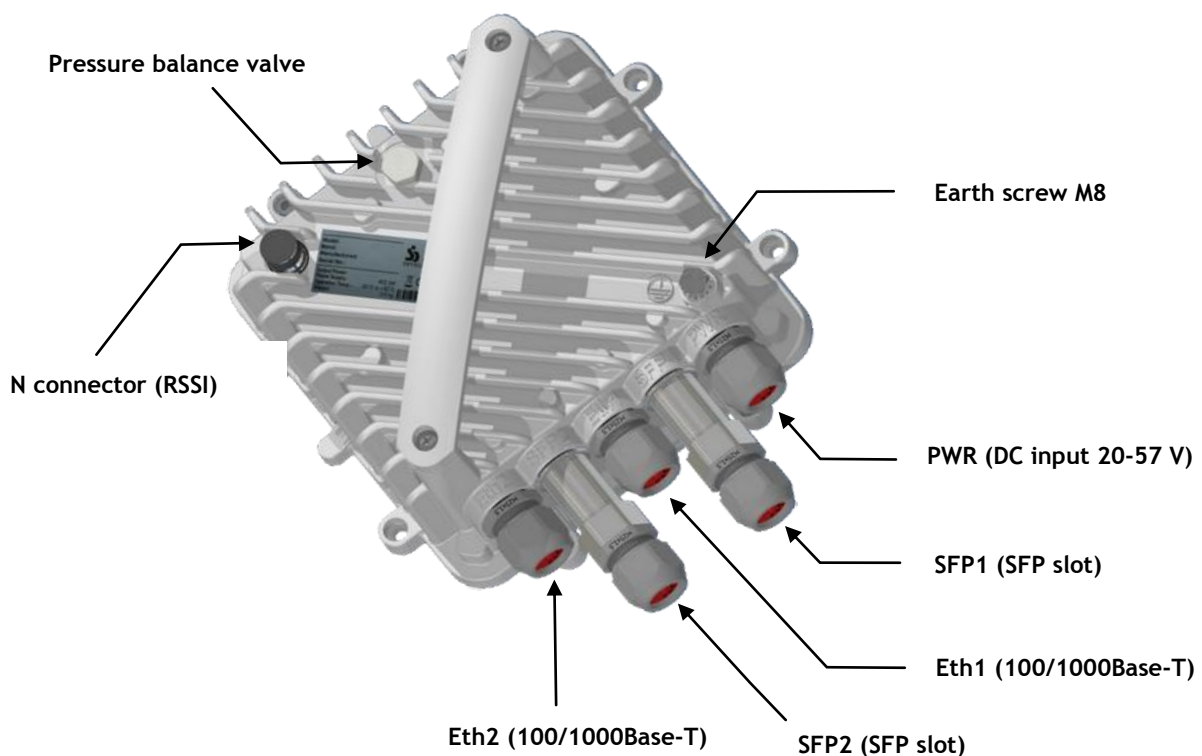


Fig. 1: Microwave BT device

The diagram illustrates the system architecture, showing the flow of data and power between various components. The central CPU is connected to the Microwave radio, Modem, Multiplexer / Demultiplexer, and Ethernet IP Packet Processor. The Ethernet IP Packet Processor is connected to three channels (channel 1, channel 2, channel 3) which lead to Eth1, SFP1, Eth2, and SFP2. A Power supply and Power MGMT block are also shown, connected to the CPU and the Ethernet IP Packet Processor. The Power MGMT block is connected to a PWR block (DC Power 20-57 V). The Ethernet IP Packet Processor is also connected to a Buffer 1, Buffer 2, and Buffer 3. The Microwave radio is connected to an antenna.

## 2 LINK LICENSING

### 2.1 Unblocking PIN

When the device is launched for the first time, a counter recording the number of days remaining before blocking (30 days as standard) is activated. Within this time, an unblocking PIN needs to be entered, otherwise the device stops transferring the data correctly (access to the device management is not restricted). The unblocking PIN is entered via the **Set pin** button in the middle of the SMS homepage. Each customer obtains the unblocking PIN from their direct seller automatically after the whole price is paid.

### 2.2 Prolonging PIN / key

In the case of hire purchase of the device, a prolonging PIN/key is generated for the customer after each instalment has been paid, which prolongs validity period of the device (until it is completely paid for). When the customer receives a short numeric prolonging PIN (up to 4 digits), it is entered in the same way as the unblocking PIN via the **Set pin** button. If the customer acquires a long alphanumeric prolonging key, it is entered via the **License key** at the top of the SMS homepage.

### 2.3 Increase speed key

To increase the current licence speed, the increase speed key is used. After the customer has purchased the licence for higher transmission speed, he/she receives the increase speed key which is entered via the **License key** button on the SMS homepage.

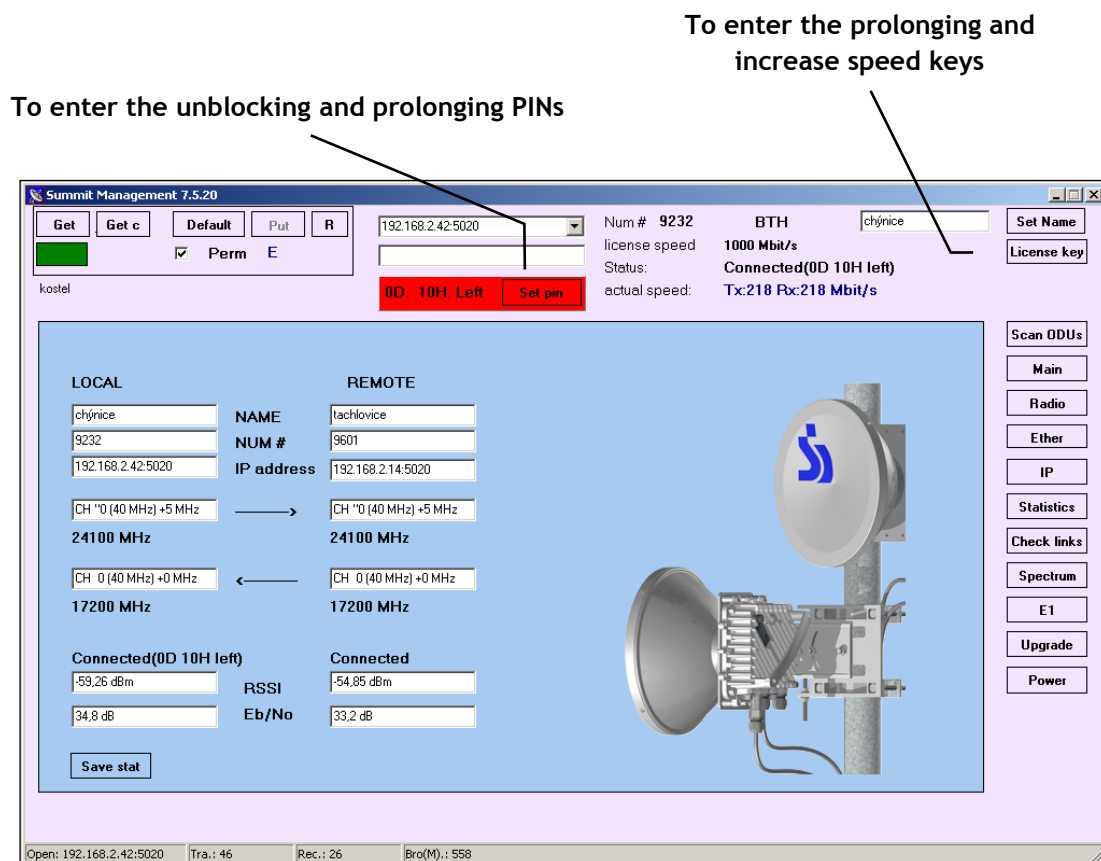


Fig. 3: Entering PINs and licence keys

## 3 PROGRAM ENVIRONMENT

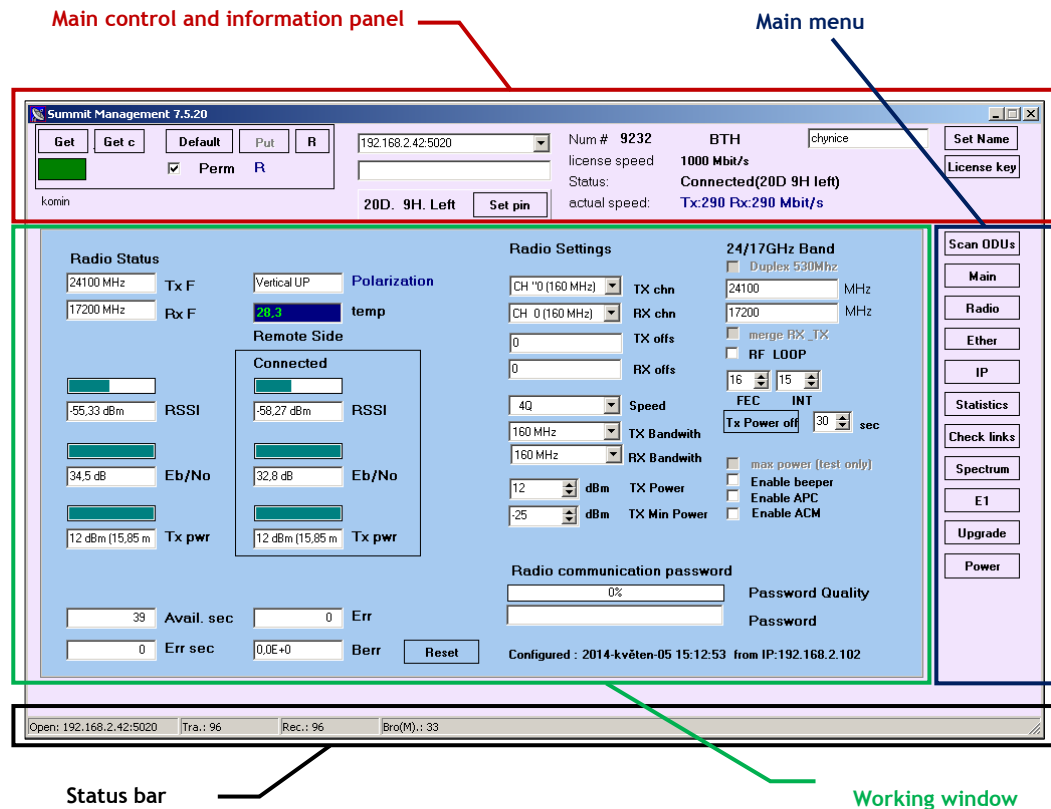


Fig. 4: SMS program environment

### 3.1 Main control and information panel

Progress bar of communication with the device

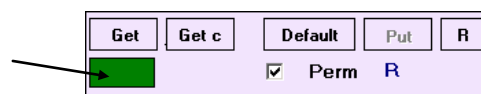


Fig. 5: Control elements

	Trying to connect (can be interrupted by clicking the progress bar)
	Successfully connected
	Connection failed
Get	Updating device parameters
Get c	Continuous updating of device parameters by the second. This can be interrupted by clicking the Get button or the coloured communication progress bar.
Default	Default setting of the device (does not affect the change of the IP address)

<b>Put</b>	Executing and saving the changes
<b>Perm</b>	Mode of saved changes. If <b>Perm</b> is enabled, changes are saved permanently in the device. If <b>Perm</b> is disabled, changes are saved temporarily for 5 minutes and then the original settings are restored.
<b>R</b>	Switching between the local <b>E</b> (Ethernet) and <b>R</b> (Remote) end of the connection. The end is indicated by a blue letter below the <b>Put</b> button. If the radios are not connected, the R button is not active (it is grey).
<b>Num #</b>	Serial number of the device
<b>Model</b>	Device model (to the right of <b>Num#</b> )
<b>Name</b>	Name of the device
<b>Set Name</b>	Save the device name (entry field to the left).
<b>License key</b>	Enter increase speed licence key or key to prolong device functionality (e.g. in the case of hire purchase). After the <b>License key</b> button is clicked, the field for entering the key opens. After the increase speed licence key is entered and confirmed by <b>Send</b> , radio speed in the <b>Speed</b> field on the <b>RADIO</b> page is enabled (the new speed only applies after it has been selected from the <b>Speed</b> drop-down menu and saved to the device).



Fig. 6: Window for entering licence key

<b>License speed</b>	Maximum permitted transmission speed in the device												
<b>Actual speed</b>	Current transmission speed												
<b>Status</b>	Information on communication status												
	<table> <tr> <td><b>Connected</b></td><td>Radio is connected</td></tr> <tr> <td><b>Not connected</b></td><td>Local end is in 'unconnected' status</td></tr> <tr> <td><b>Connected (Rem. n.c.)</b></td><td>Remote end is in 'unconnected' status</td></tr> <tr> <td><b>Connected (VPN mishmash)</b></td><td>Radio encoding is not set equally on both ends. It can also appear in the case of too many errors</td></tr> <tr> <td><b>Connected Loop</b></td><td>Radio Loopback. Radio receiver is tuned to new transmitter frequency (for radio functionality testing purposes)</td></tr> <tr> <td><b>No stat available</b></td><td>Information is not available</td></tr> </table>	<b>Connected</b>	Radio is connected	<b>Not connected</b>	Local end is in 'unconnected' status	<b>Connected (Rem. n.c.)</b>	Remote end is in 'unconnected' status	<b>Connected (VPN mishmash)</b>	Radio encoding is not set equally on both ends. It can also appear in the case of too many errors	<b>Connected Loop</b>	Radio Loopback. Radio receiver is tuned to new transmitter frequency (for radio functionality testing purposes)	<b>No stat available</b>	Information is not available
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<b>No stat available</b>	Information is not available												

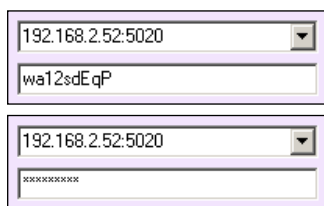
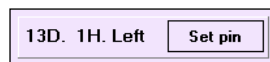
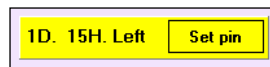


Fig. 7: IP address and password

The field for entering the IP address and password for communication with the device. Password for reading/recording is set on the IP page. Double click switches from password in ASCII characters to "\*\*\*\*\*" and back.

**Set pin****Entering the unblocking PIN.**

Counter for the device availability period (available for 13 more days and 1 hour).



Counter for the device availability period (availability is about to expire).



The device availability period has expired.

Fig. 8: Counter of availability period

### 3.2 Main menu

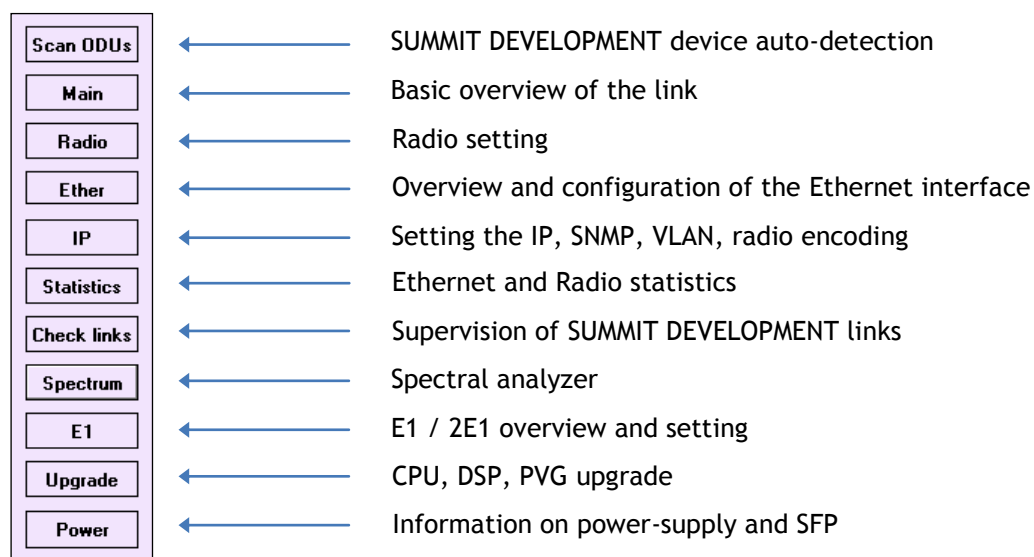


Fig. 9: Main menu

### 3.3 Status bar

To configure and supervise the links, up to 6 SMS instances can be executed. The first SMS activation is always MASTER. All the following activations are SLAVE. The MASTER instance replicates broadcasts to SLAVE instances. If the MASTER instance is closed, broadcasts to SLAVE instances will not be replicated any longer (until a new SMS instance is started).

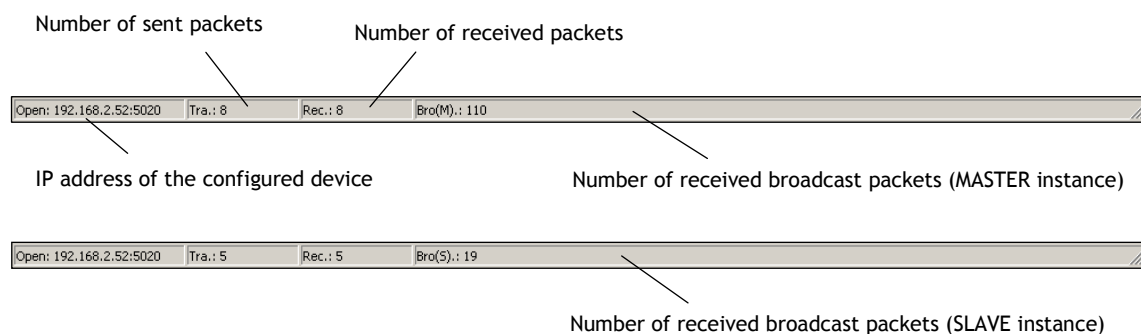


Fig. 10: Status bar with MASTER / SLAVE instance of the program

## 4 SCAN ODUs

### 4.1 Setting the IP address

To set the IP address, use port **Eth1** or **SFP1**.

Start the SMS and select **Scan ODUs** in the main menu. Within a few tens of seconds, the device will appear in the table. You can speed up the device display by clicking **Scan** (Note: UDP port 53416 is used to search the device). In the table, highlight the device for which you wish to set the IP address and click **Set IP**. The window for the IP address setting will pop up. Enter the new IP address in the **IP address** field. The address must be in the same network range as the IP address of the connected PC. Subsequently clicking on **Set new IP setting** will change the IP address. (Note: sub-network mask and the default gate shall not be filled in).

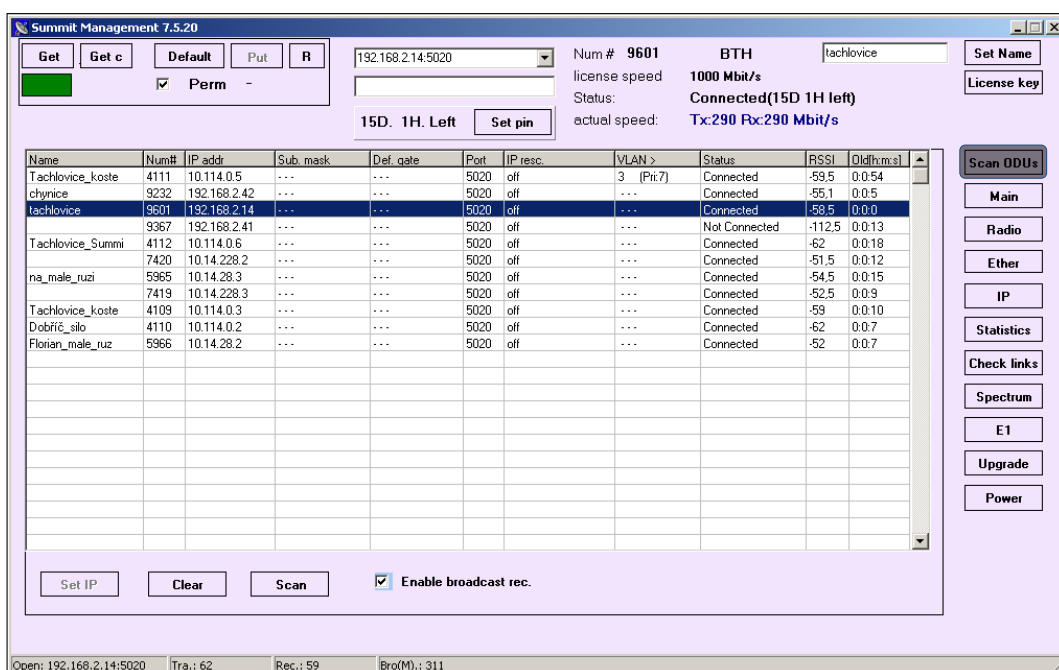


Fig. 11: Scan ODUs - search for a device within the network

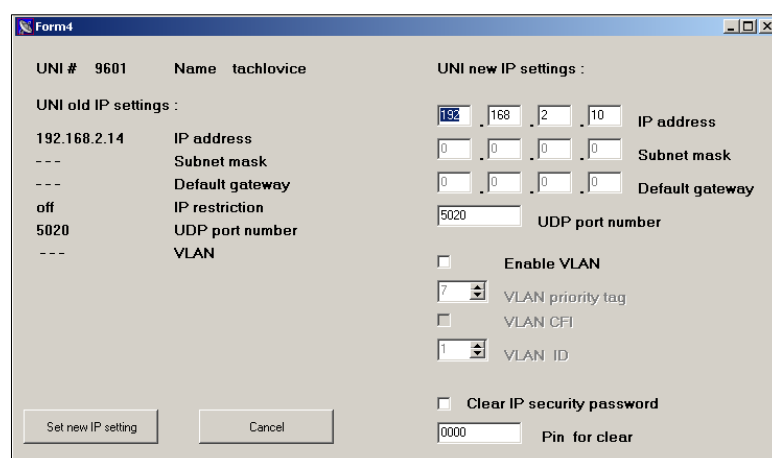


Fig. 12: Setting the IP address

UNI old IP setting	Current IP setting
UNI new IP setting	New IP setting
IP address	IP address of the device
Subnet mask	Sub-network mask (not to be filled in)
Default gateway	Default gate (not to be filled in)
IP restriction	Access to the device according to the IP range
UDP port number	UDP port number for communication with the device
Enable VLAN	Enables VLAN
Clear IP security password	Deletes the password for configuration and supervision
Pin for clear	PIN for deleting password

## 4.2 Information on the device

The radio device sends basic information on its setting and status every 30 seconds. The information is displayed and regularly updated in the **Scan ODU**s table (sending of broadcast packets can be turned off on the **IP - Broadcast sending off** page).

Name	Name of the device
Num#	Serial number of the device (odd = bottom XL, even = upper XH).
IP addr	IP address of the device
Sub. mask	Sub-network mask
Def gate	Default gate
Port	Number of the UDP port for communication with the device
IP resc.	Enables access to device management according to IP range
VLAN	Information on VLAN
Status	Device status
RSSI	Level of received signal
Old [h:m:s]	Time since the last received broadcast from the device
Clear	Restart the SMS (reloads the device in the table)
Set IP	Set the IP address and delete the access password to the device management
Scan	Searches the SUMMIT device in the local network (UDP broadcast)
Enable broadcast receive	Enable / Disable reception of packets broadcast from the device

## 4.3 Deleting the reading/recording password

On the **Scan ODU**s page, highlight the device for which you wish to delete the reading/recording password. Then click **Set IP**. The window for setting the IP address will pop up. Tick **Clear IP security password** in the window and enter the password delete PIN in the **Pin for clear** field. Confirm by clicking **Set new IP setting**.

**Warning:** If the **Disable IP SET** in **Scan ODU**s option is ticked when deleting the password on the **IP** page, the device will need to be restarted to complete the operation (by connecting and disconnecting the device from the power supply). The password delete PIN can be obtained from the direct seller after verification (contact the **sales department**).

## 5 MAIN

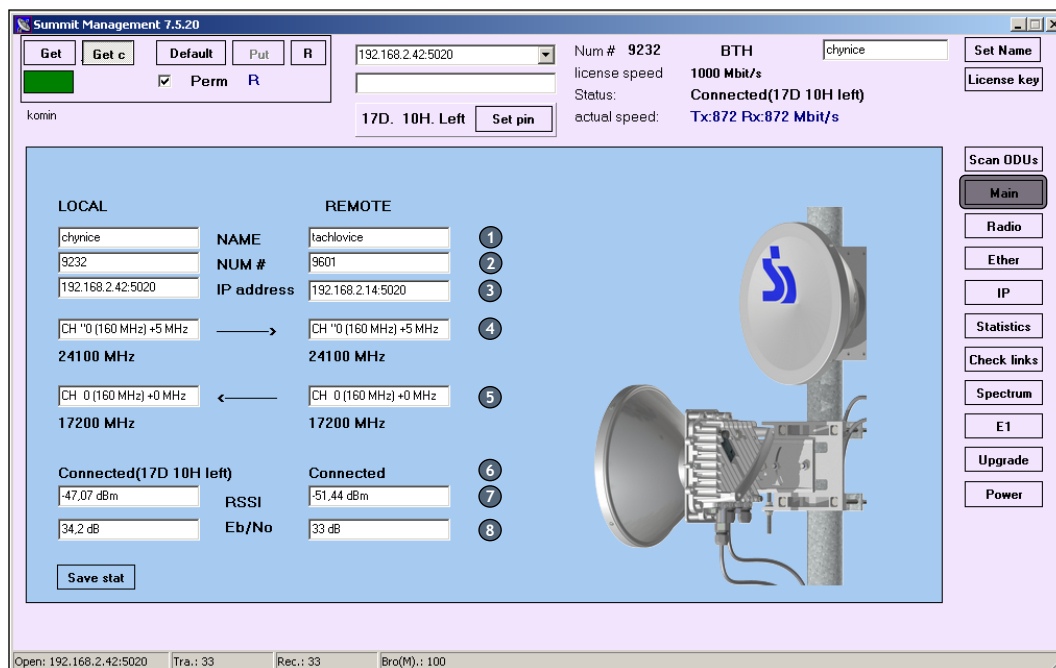


Fig. 13: MAIN - basic overview of the link

1	Name of the device
2	Serial number of the device
3	IP address of the device
4	Channel number + frequency [MHz].
5	Channel number + frequency [MHz].
6	Connection status
7	RSSI - Received signal strength indication
8	Eb/No - signal / noise ratio

## 6 RADIO

Fig. 14: RADIO - page for radio settings and statistics

### 6.1 Radio settings

<b>TX chn</b>	Set the transmitter channel. Transmitter frequency in MHz is shown on the right
<b>RX chn</b>	Set the receiver channel. Receiver frequency in MHz is shown on the right
<b>TX ofs</b>	Set the broadcasting frequency offset (min. step +/-0.25 MHz; max. 1/2 of the set TX Bandwidth)
<b>RX ofs</b>	Set the receiving frequency offset (min. step +/-0.25 MHz; max. 1/2 of the set RX Bandwidth)
<b>Speed</b>	Set the radio speed / modulation
<b>TX Bandwidth</b>	Change the transmission bandwidth
<b>RX Bandwidth</b>	Change the receiving bandwidth
<b>Tx Power</b>	Set transmission performance (at APC in the sense of maximum TX power)
<b>Tx Min Power</b>	Makes sense only when APC is at minimum TX power
<b>Max Power</b>	Set maximum performance for testing (blocked).
<b>RF LOOP</b>	Radio loop. Receiver frequency tunes to its transmitter frequency (the function is automatically deactivated after 2 minutes and the receiver tunes to the original frequency).
<b>Tx Power off</b>	Switch the transmitter off with the option of setting a time interval (in seconds).
<b>FEC</b>	Forward error correction (user adjustable levels 0-16). FEC is off at level 0. FEC is strongest at level 16. For BTH device, FEC is only implemented for levels 0 (off) or 16 (on). When FEC is on, the receiver

	sensitivity increases by 4-5 dB and total transmission speed decreases by 9 %).
INT	Interleaving. Protection of radio transmission against disturbing pulse signals and error clusters. User adjustable interleaving levels 0-16
Enable beeper	Acoustic signal for link routing. Higher frequencies → stronger received signal (the function automatically deactivates after 15 minutes).
Enable APC	Enable Automatic Power Control. The range of power control is defined by TX power and TX min Power setting.
Enable ACM	Enable adaptive modulation. ACM automatically controls level of modulation according to current conditions on the radio channel.
Configured	Date of the last entered IP address configuration

## 6.2 Radio encoding

Radio encoding is implemented according to the algorithm A5/2. If the passwords on the two ends of the link are set differently, the link status **Connected VPN mishmash** will appear in the main control panel. It means that the link is properly radio-connected but does not transfer data correctly. Radio encoding does not decrease the total transmission speed.

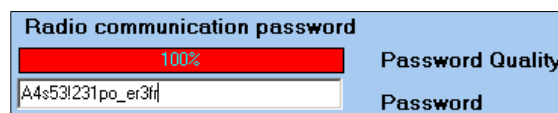


Fig. 15: Radio encoding

Password Quality	Evaluation of password quality (it is recommended to use a combination of upper and lower case letters and digits).
Password	Field for entering the password

## 6.3 Radio statistics

Tx F	Transmitting frequency [MHz]
Rx F	Receiving frequency [MHz]
temp	Temperature inside the device [°C]
Polarization	Device polarization (determined by the device position)

Vertical (DOWN)



Vertical (UP)



Horizontal (LEFT)



Horizontal (RIGHT)

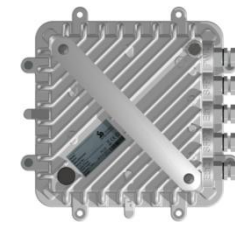


Fig. 16: Radio polarization

RSSI	Received signal strength indication [dBm]
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<b>Eb/No</b>	Signal / noise (including interference) ratio [dB]
<b>Tx power</b>	Transmission performance [dBm]
<b>Avail. sec</b>	Time of operation in seconds since the last reset
<b>Err sec</b>	Strongly erring seconds (error rate $10^{-3}$ and worse) since the last reset
<b>Err</b>	Total number of radio errors since the last reset
<b>Berr</b>	Error rate in the previous second [bit/s]
<b>Reset</b>	Reset counters

## 7 ETHER

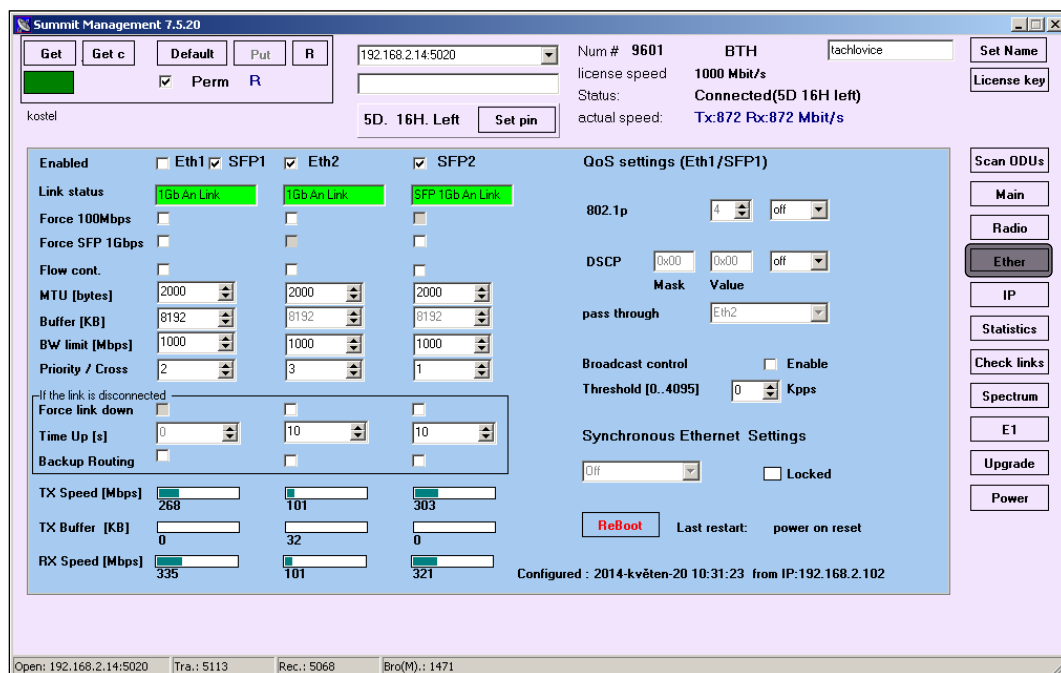


Fig. 17: Page for ETHERNET setting

### 7.1 Setting the ETH interface

<b>Enable</b>	Enable/disable Eth2 (channel no.2), SFP2 (channel no. 3) port. Eth1/SFP1 (channel no.1) ports are permanently enabled because they share the operation and management of the link. The switch at Eth1/SFP1 determines which port will be given priority if they are both connected to the switch at the same time.
<b>Force 100Mbps</b>	Set Eth port to the 100 Mbps and Full Duplex mode.
<b>Force SFP 1Gbps</b>	Set SFP port to 1 Gbps mode (if Auto-Negotiation does not work)
<b>Flow control</b>	Flow Control according to IEEE 802.3x. If input buffer is overloaded, frames are not discarded. For proper function, Flow Control shall also be supported by a network element connected to the device.
<b>MTU [bytes]</b>	Set maximum transmission of unit. MTU can be set to a value of up to 11 000 bytes. For the most commonly used Ethernet, an MTU setting of 1600 bytes is sufficient.
<b>Buffer</b>	Sett the buffer size (if not otherwise required by the application, it is recommended to keep the value of 8192KB). Fixed buffer size is set for transmission channels no. 2 and 3.
<b>BW limit [Mbps]</b>	Transmission speed restriction (limit for bandwidth). It can be set to a value of 1000 Mbps at most.
<b>Priority</b>	Set channel priority. If higher channel capacity is required in a higher-priority channel, it takes the required transmission speed capacity from a lower-priority channel, and after the requirement expires, the

capacity is returned (assuming that the priority channel is not restricted by the BW limit).

### Cross

Channel crossing. ETH2 operation can connect to port SFP2 at the other end and the other way round. Crossing is not possible with a link management port (ETH1/SFP1).

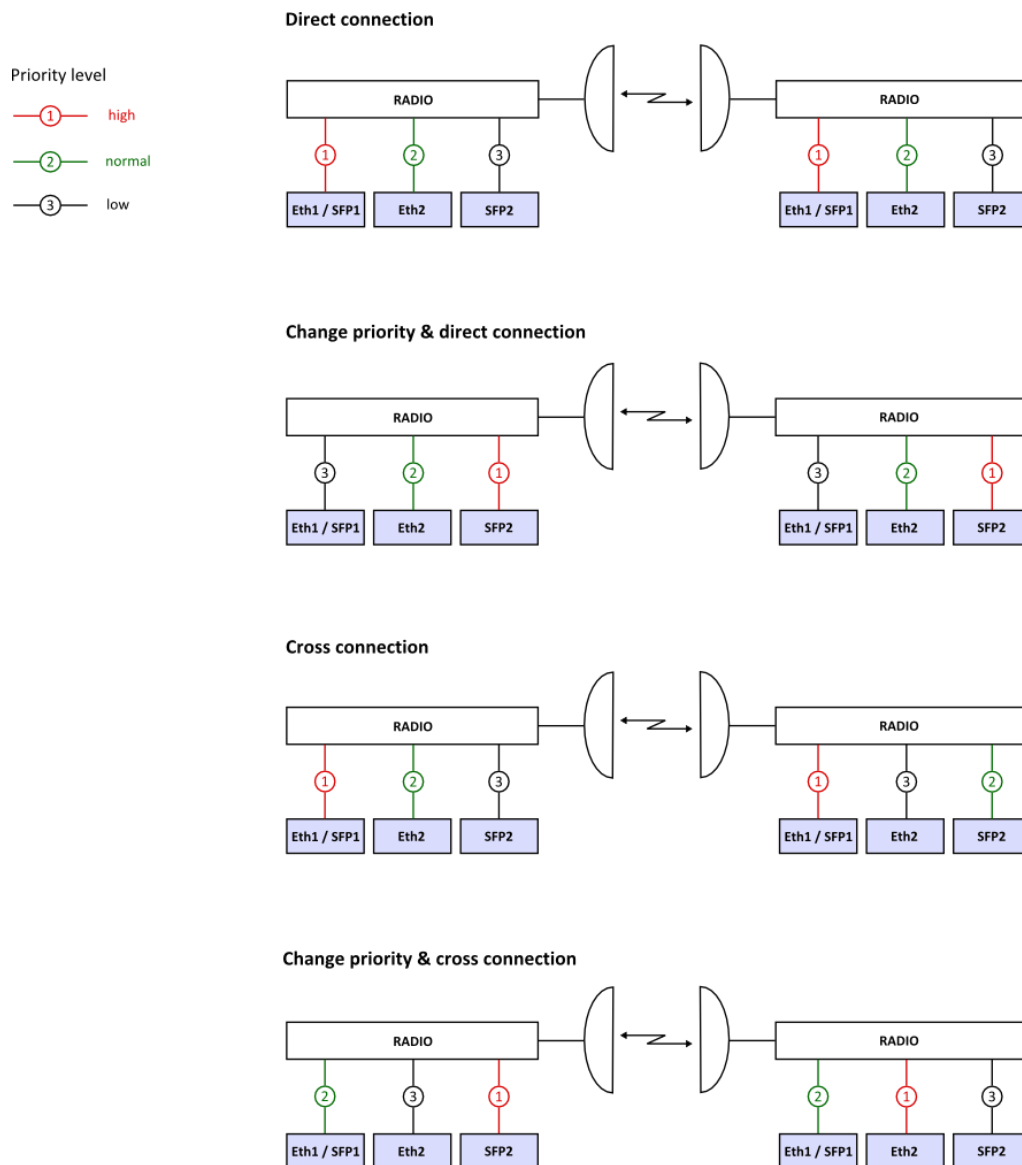


Fig. 18: Possible settings for channel priority and crossing (Priority/Cross)

<b>TX speed [Mbps]</b>	Transmission speed (to radio transmitter)
<b>TX buffer [KB]</b>	Transmitter buffer
<b>RX speed [KB]</b>	Transmission speed (from radio receiver)
<b>802.1p priority enable</b>	Enable packet prioritization according to IEEE 802.1p. Prioritizes traffic on Eth1/SFP1 via a 3 bit value in ETH framework and mathematical relation. If <b>802.1p</b> is enabled, Flow Control will be automatically switched off.

**Diff Serv**

Differentiated Services. Mask and value entering creates a **DSCP code** (Differentiated Services Code Point) by which the required level of service at Eth1/SFP1 is differentiated. If **Diff Serv** is enabled, Flow Control will automatically switch off.

**Mask**

8 bit mask (the mask may be entered in hexadecimal or decimal form)

**Value**

Value for DSCP (the value may be entered in hexadecimal or decimal form)

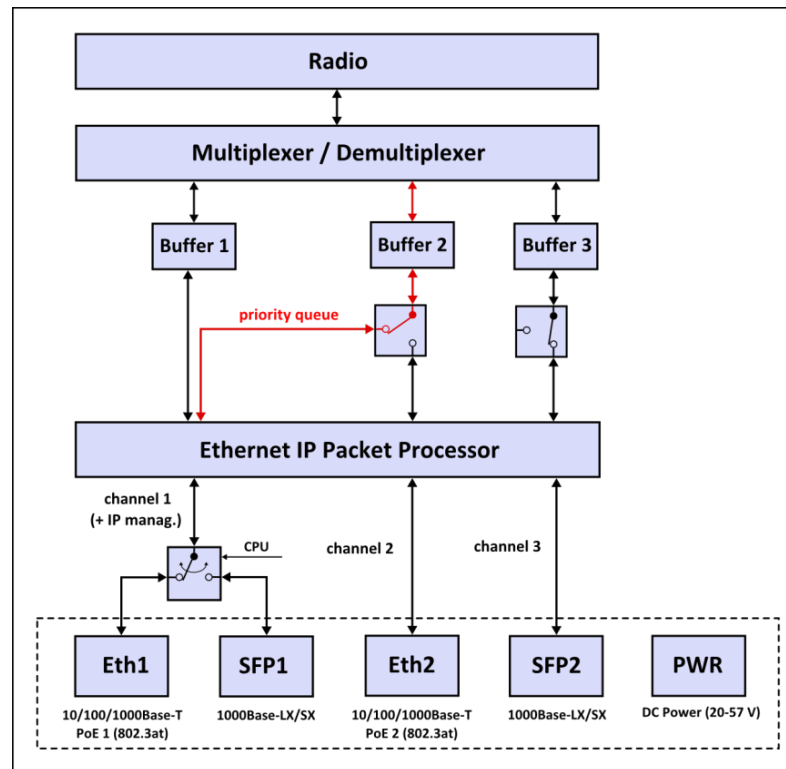


Fig. 19: 802.1p/Diff Serv - Prioritization of ETH1/SFP1 operation through channel 2

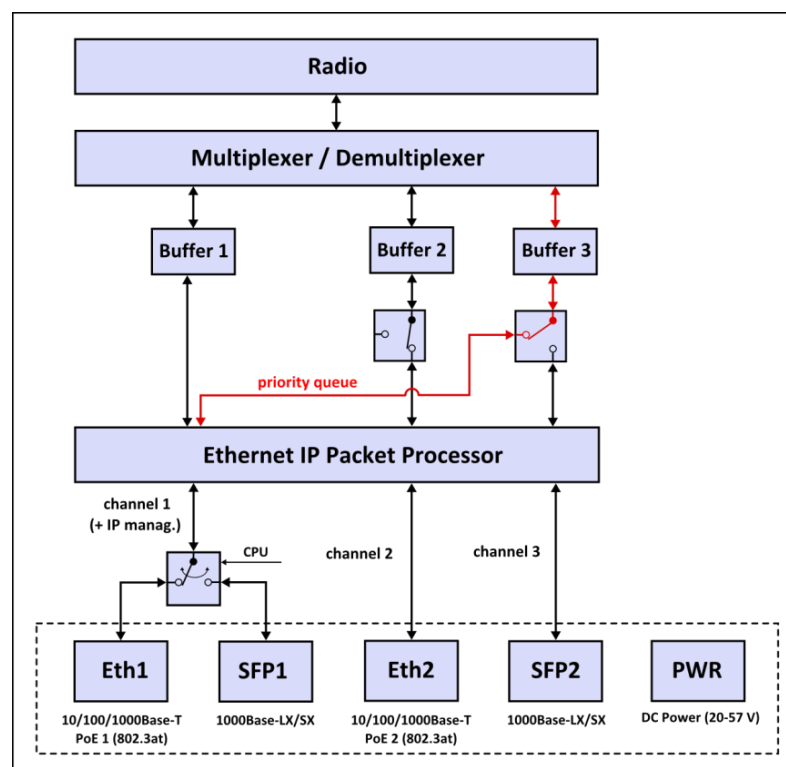


Fig. 20: 802.1p/Diff Serv - Prioritization of ETH1/SFP1 operation through channel 3

<b>Broadcast control</b>	Control/restriction of broadcast operation.
<b>Threshold [0 - 4095]</b>	Set the threshold for broadcast packets [kilo packet per second]
<b>Synchronous Ethernet</b>	Synchronous Ethernet (so far not enabled).
<b>ReBoot</b>	Restart the device (approx. 30 seconds). The restart does not change radio and Ethernet settings.
<b>Last restart</b>	Displays the reason for last restart of the device.
	<b>User requested</b> Requested by user (by <b>ReBoot</b> ) <b>Power on reset</b> Restart by power supply disconnection/connection <b>Warm external reset</b> Restart requested by the device (may indicate a fault)
<b>Configured</b>	Date of the last entry in the device
<b>Backup routing</b>	Optional link backup. If the radio is unlinked, this operation redirects to the port with connected backup. In the SMS next to <b>Backup routing</b> , tick the port which shall be backed-up and the port to which the backup device is connected.
<b>Force link down</b>	If radio is unlinked, <b>LINK DOWN</b> will be forced at the port.
<b>Time Up</b>	Time lag from the moment when the radio is re-connected. After the time lag, traffic will be switched to the original route and the link to the relevant port will be activated.

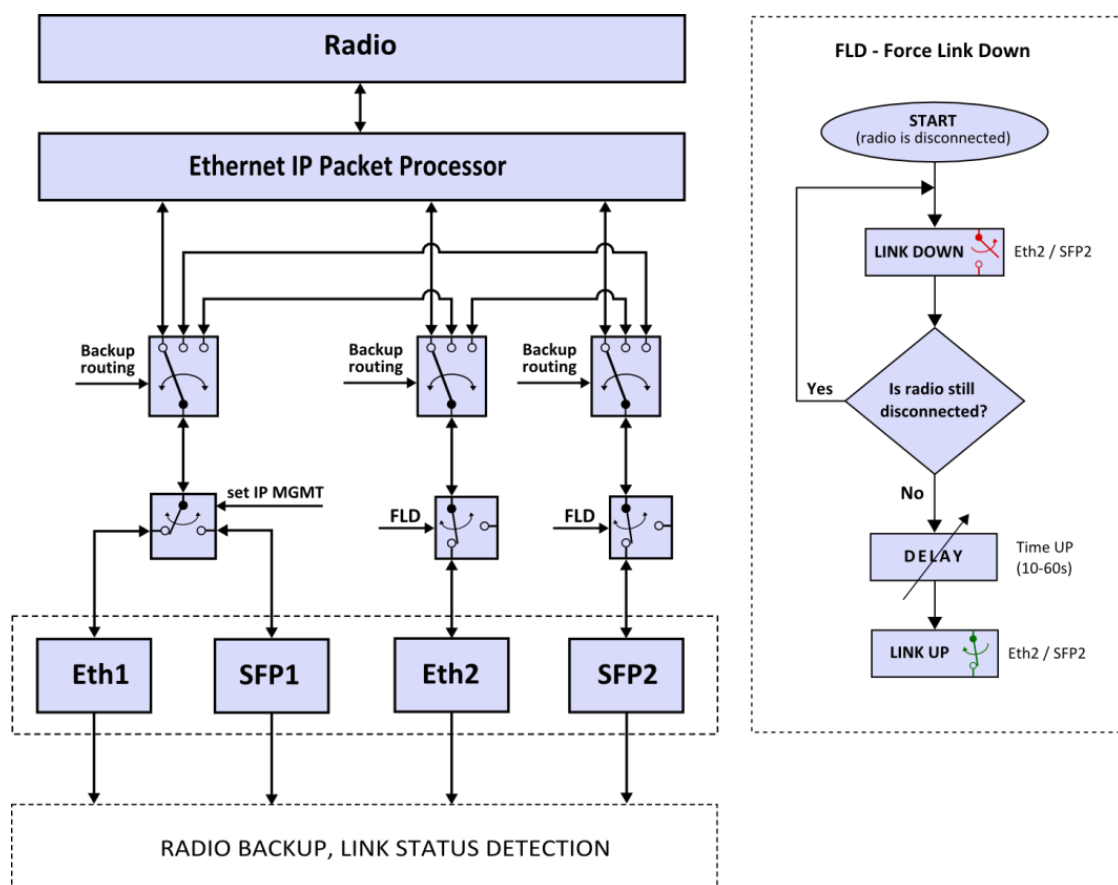


Fig. 21: Backup routing - link backup

## 8 IP

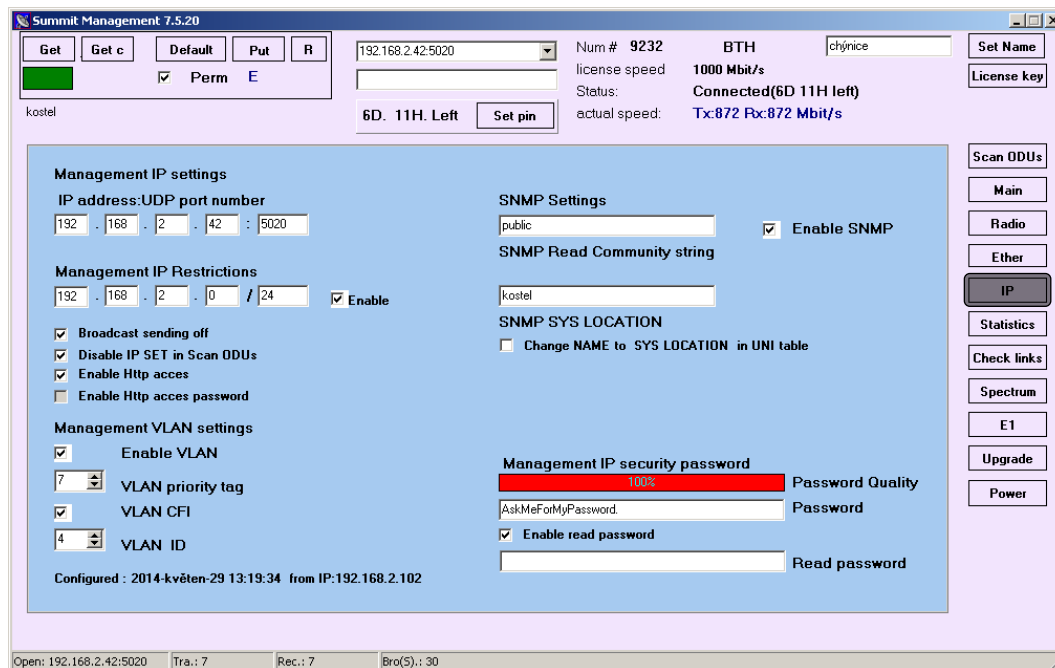


Fig. 22: Setting SNMP, VLAN and management password

**IP address: UDP port number** Set 32 bit IP address and UDP port for communication with the device (Scan ODU's page is designed for initial IP address setting).

**Management IP Restrictions** Restricted access to the device by the network IP address.

Example:

**192.168.18.0 / 24** IP address / 24 bit mask (255.255.255.0)

Access is only permitted for stations with **192.168.18.xxx** IP address.

**Broadcast sending off** Switch off broadcast sending from the device to the network. If the function is enabled and the device is switched off and on again, the sending of five broadcast packets is always permitted to allow the device auto-detection in **Scan ODU's**. **Note:** If the device is set in VLAN, 3 broadcasts in 30 second intervals are sent to VLAN and 2 to LAN.

**Disable IP SET in Scan ODU's** Disable the option to set the IP address through **Scan ODU's**. If the password is forgotten, it can be deleted by the method described in 4.3. **Warning!** If the **Disable IP SET in Scan ODU's** is enabled when the password is being deleted, the device needs to be restarted (by connecting and disconnecting the device from the power supply) for security reasons.

**Enable http access** Access to the device through HTTP.

**Enable http access password** Access to the device through HTTP (protected by password).

## 8.1 Setting MGMT in VLAN

Enable VLAN	Enable device management for VLAN
VLAN priority tag	Set priority according to the <b>802.1p</b> protocol (if utilized)
VLAN CFI	Set CFI indicator. If CFI is <b>enabled</b> , access to device management is only possible from VLAN set in the <b>VLAN ID</b> field. If CFI is <b>disabled</b> , access to management is also possible from the native VLAN ID 1.
VLAN ID	VLAN identification number

## 8.2 Setting SNMP protocol

The device may be monitored by means of the SNMPv1 protocol. Click **Enable SNMP** in the SMS and fill in the field for authentication marked as **SNMP read Community string**.

From [www.summitd.cz/download/](http://www.summitd.cz/download/), you can download a **.mib** file or **.XML** template for the SUMMIT device to CACTI.

Enable SNMP	Enable SNMP protocol
SNMP Read Community string	Authentication password
SNMP SYS Location	Physical location of the device
Change NAME to SYS LOCATION in Scan ODUs	Switch name display in <b>Scan ODUs</b> (between the “device name” and the name entered in <b>SYS LOCATION</b> ).

## 8.3 Link management password

Communication with the device can be encoded to prevent misuse by an unauthorised person. The communication password can be set separately for reading and recording. After the password is saved to the device, it is displayed in the main control panel (under the field for the IP address). In the password field, double clicking on the mouse right button can switch between the password in ASCII characters or the characters “\*\*\*\*\*”.

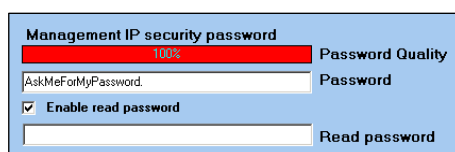


Fig. 23: Setting the link management password

Password Quality	Password quality (it is recommended to use a combination of upper and lower case letters and digits)
Password	Password for communication with the device (for reading and recording)
Enable read password	Enable a password solely for reading
Read password	Set the reading password

## 9 STATISTICS

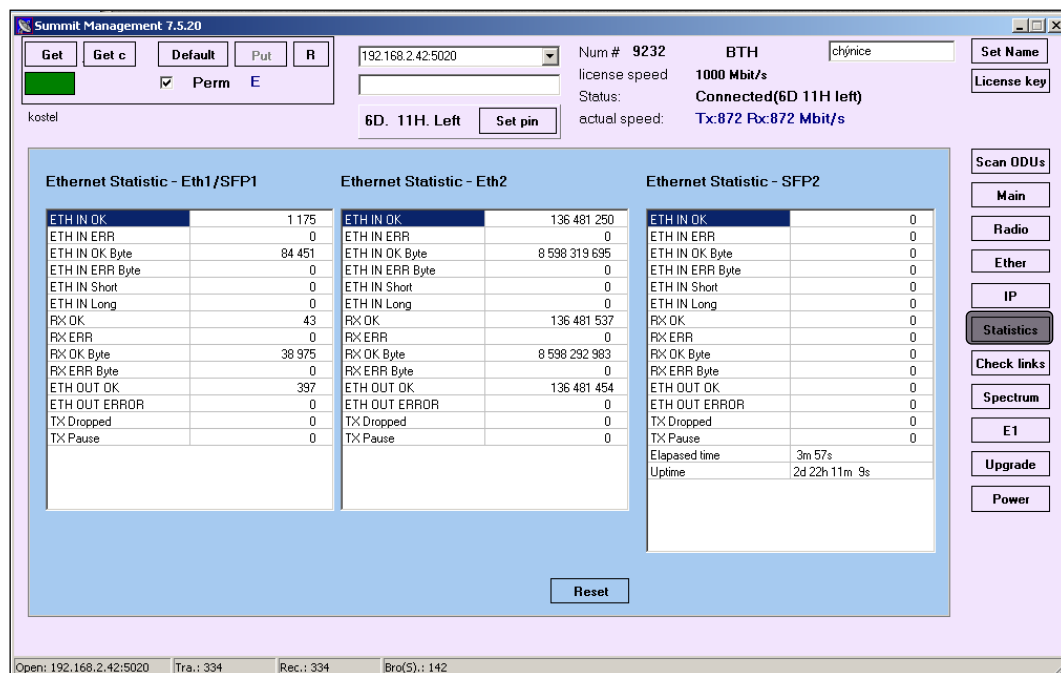


Fig. 24: Detailed Ethernet and Radio statistics

ETH IN OK	Number of correctly received packets from ETH
ETH IN ERR	Number of incorrectly received packets from ETH
ETH IN OK Byte	Number of correctly received bytes
ETH IN ERR Byte	Number of incorrectly received bytes
ETH IN Short	Number of received packets smaller than 53 bytes (packets smaller than 53 bytes are discarded)
ETH IN Long	Number of received packets larger than MTU (packets larger than the set MTU are discarded)
RX OK	Number of correctly received packets on radio
RX ERR	Number of incorrectly received packets on radio
RX OK byte	Number of correctly received bytes on radio
RX ERR byte	Number of incorrectly received bytes on radio
ETH OUT OK	Number of packets correctly sent to ETH
ETH OUT ERR	Number of packets incorrectly sent to ETH
TX Dropped	Number of discarded packets. Packets are discarded due to an overflowing input transmission buffer. The problem can be removed by shaping or by Flow Control (increases the link latency).
TX Pause	Number of sent Pause packets
Elapsed Time	Time since the last counters reset
Uptime	Time of the device operation
RESET	Reset all counters

## 10 CHECK LINKS

The **Check Links** page allows for fast supervision and control of a larger number of SUMMIT DEVELOPMENT links. A link is displayed in the table as two lines with a light grey and dark gray background. For the selected link (double line) the background colour changes to blue. Data highlighted in the table in yellow indicates a warning (decreased link quality). Red highlighting indicates the critical status of the link.

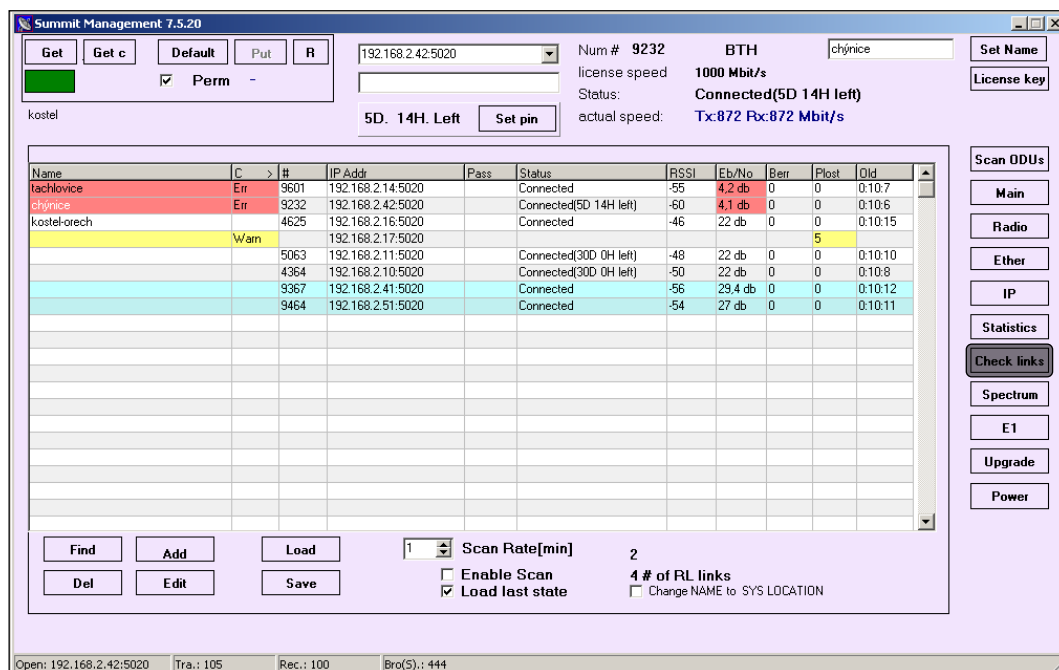


Fig. 25: Supervision of SUMMIT DEVELOPMENT links

- Add** Add a link for supervision. Enter the IP address of both ends and possibly also the password
- 
- Load** Download the links from a text file. The IP address and password for each end is entered to a text file (one line = one link). Empty lines are ignored; comments are introduced by a semicolon.

### Structure:

IP ADDRESS 1 "PASSWORD 1" IP ADDRESS 2 "PASSWORD 2"

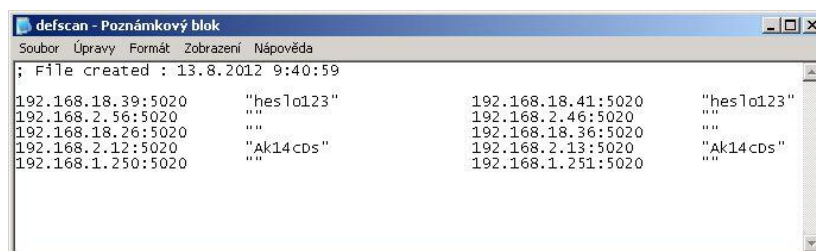


Fig. 26: Text file for definition and editing of links for supervision

- Save** Save all links in the table to a text file of .txt format

<b>Edit</b>	Edit the address and password of the selected link
<b>Del</b>	Delete the selected link from the table
<b>Find</b>	Find a link by entered IP address and port
<b>Enable Scan</b>	Enable scanning of links in the table
<b>Scan Rate [min]</b>	Rate of scanning the whole list in minutes. The value determines how often the link list in the table shall be scanned (maximum speed for scanning one link is one second)
<b>Load last state</b>	Allows downloading of the last list of links to the table when restarting the SMS
<b># of RL Links</b>	Number of links in the table. Order number and IP address of the currently scanned link is displayed above this number
<b>Change NAME to SYS LOC.</b>	Switches the displayed name of the device (Unit name / SyS Location Name)
<b>Name</b>	Name of the device
<b>C</b>	The device status (Condition)  <div> <div><b>warn</b></div> <div>-</div> <div>warning (yellow highlight)</div> </div> <div> <div><b>err</b></div> <div>-</div> <div>critical link (red highlight)</div> </div>
<b>#</b>	Serial number of the device
<b>IP Addr</b>	The device IP address (if "e" character precedes the IP address, it means the device model with E1 interface)
<b>Pass</b>	Device protected by a password (if * is displayed, the unit is protected by a password)
<b>Status</b>	The device status
<b>Eb/No</b>	Signal quality
<b>Berr</b>	Error rate of the link
<b>Plost</b>	Number of lost packets
<b>Old</b>	Time since the last received broadcast from the device

Links can be sorted by any of the column parameters. After the name of a column is clicked, the ">" or "<" character appears. The ">" character sorts the values in the column from the highest down to the lowest. The "<" character sorts orders the values in the column from the lowest to the highest.

## 11 SPECTRAL ANALYZER

The spectral analyzer (SA) incorporated in the device is used to search for a free channel. The SA is created from part of the radio receiver, which is why the communication link is disconnected during recording and no data is transferred. After the recording is completed, the link function automatically recovers in 15-20 seconds. The spectrum can be measured from the local as well as the opposite end.

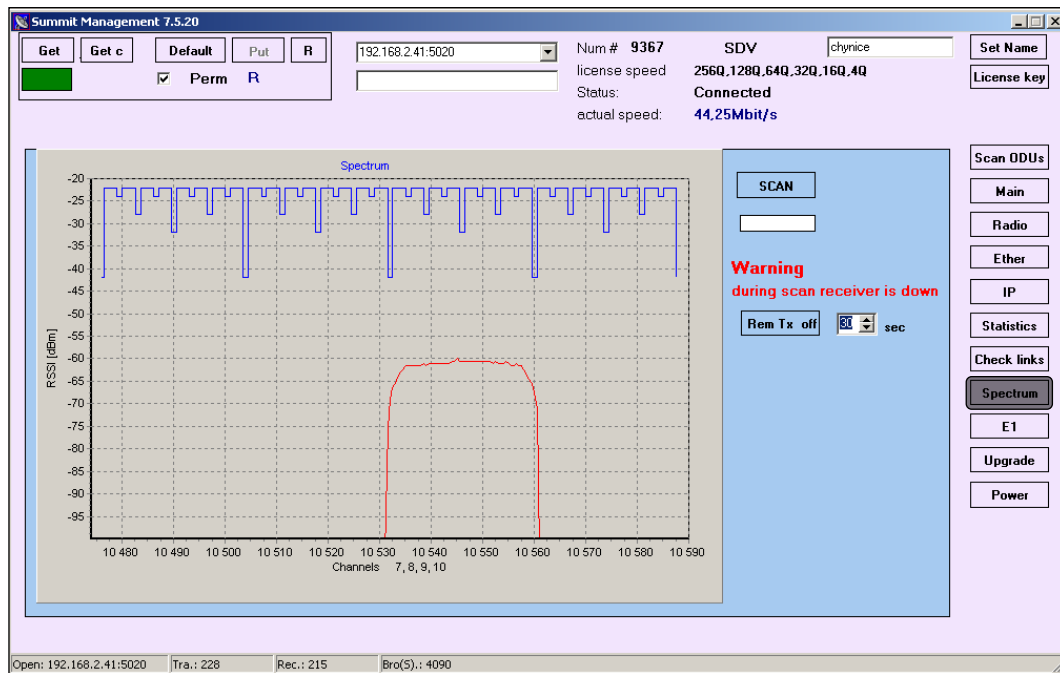


Fig. 27: Spectral analyzer

SCAN	Start scanning of the frequency spectrum
Rem TX off	Turn the opposite transmitter off (with time interval)
Red curve	Measured spectrum
Blue curve	Mask of channel distribution

## 12 E1

The E1 standard is for the transmission of 32 channels at a speed of 64 Kbit/s per channel (transmission speed of all E1 channels is 2.048 Mbit/s). The **E1/2E1** standard is only supported by the device models **UNIC**, **QAM**, **NARROW** and **ALTER**.

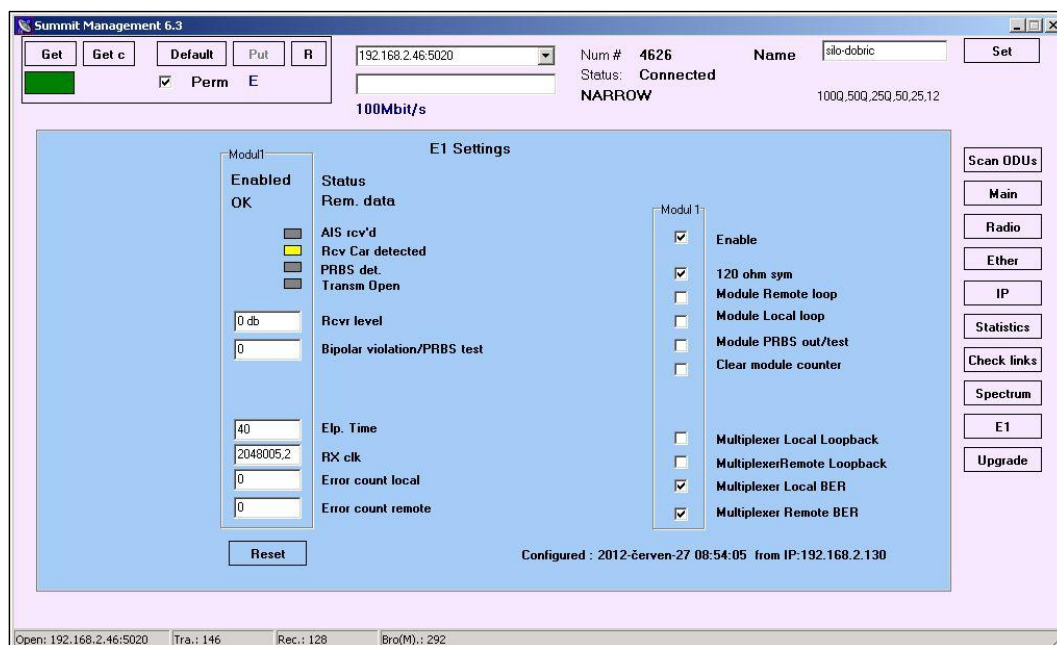


Fig. 28: E1 interface setting and diagnostics

### 12.1 E1 setting and status

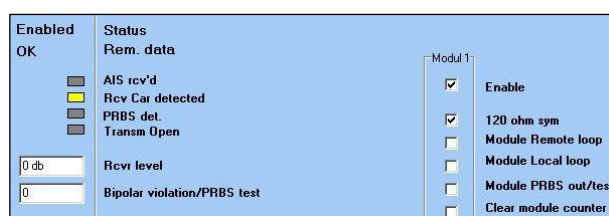


Fig. 29: E1 setting and diagnostics

<b>Enable</b>	Enable E1 module (shall be marked at both ends of the link). The E1 module uses part of the capacity, even if it is enabled but not used!
<b>120 ohm sym</b>	When enabled, it is set to connect a 120 ohm balanced cable. When disabled, it is set for a 75 ohm unbalanced cable.
<b>AIS rcv'd</b>	Detect alarm signal from the connected device (e.g. telephone exchange)
<b>Rcv Car detected</b>	Detect input signal
<b>PRBS det.</b>	Detect pseudo-random binary sequence (testing sequences)
<b>Transm Open</b>	Detect disconnected or impedance-unmatched output on E1 module
<b>Rcvr level</b>	Detect input signal [dB]
<b>Bipolar violation/PRBS test</b>	1. If the PRBS det. indicator is off, errors of incorrectly encoded signal to HDB3 link code (deviations from HDB3 code) are detected.

2. If the PRBS det. indicator is on, the error rate of the testing binary signal is detected.

## 12.2 E1 diagnostics

Potential connection problems can be solved by testers incorporated in the device and by diagnostic methods adjustable in the SMS.

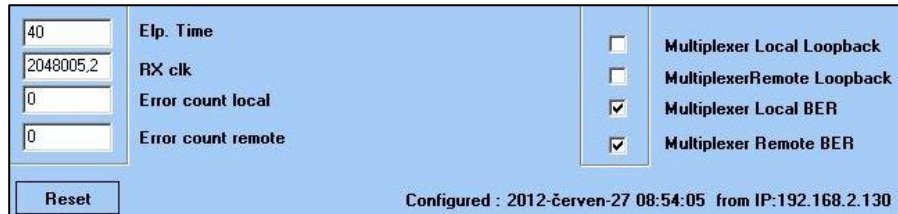


Fig. 30: E1 diagnostics

<b>Module Remote loop</b>	Module loop towards radio (data received at the interface turns and returns to the remote end of the radio link).
<b>Module Local loop</b>	Module loop towards interface (data received at the interface turns and is sent back from the interface)
<b>Module PRBS out/test</b>	Generates testing PRBS sequences
<b>Clear module counter</b>	Clear <b>Bipolar violation/PRBS test</b> counter
<b>Multiplexer Local Loopback</b>	Multiplexer loop towards interface
<b>Multiplexer Rem. Loopback</b>	Multiplexer loop towards radio
<b>Multiplexer Local BER</b>	Incorporated tester measuring error rate (with loopback on local side)
<b>Multiplexer Remote BER</b>	Incorporated tester measuring error rate (with loopback on remote side)
<b>Elp. Time</b>	Elapsed time
<b>RX clk</b>	Frequency [Hz]
<b>Error count local</b>	Error rate counter (to local side)
<b>Error count remote</b>	Error rate counter (to remote side)
<b>Reset</b>	Reset counters

## 13 UPGRADE

Page for DSP and CPU updating (or potentially PVG for the SDV link series). Firmware is upgraded by downloading the upgrade files (available at [www.summitd.cz/download](http://www.summitd.cz/download)) to the directory from which the SMS is executed. The SMS is started. Then select **Upgrade** and left click **Upgrade CPU**, **Upgrade DSP** (or **PVG**). It is recommended to upgrade the remote end first and then the local end. In the case of the SDV link series, the set bandwidth needs to be checked after PVG upgrade!

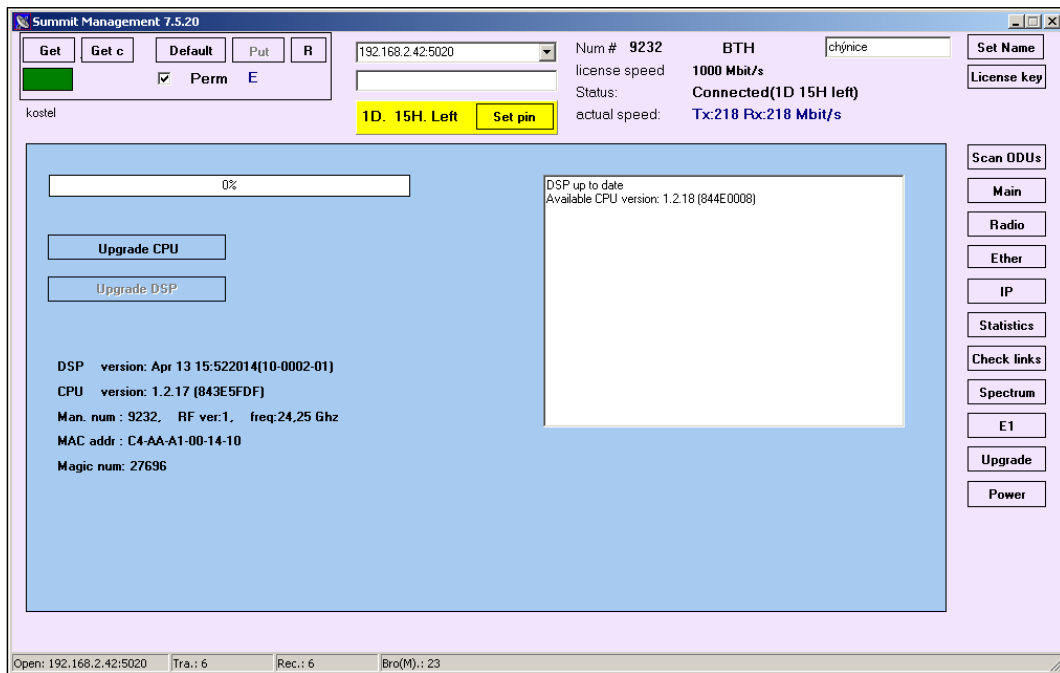


Fig. 31: Firmware upgrade

When downloading the firmware, it is necessary to ensure a continuous power supply to the device! Otherwise the manufacturer does not accept liability for potential damage.

<b>Upgrade CPU</b>	Start to download the CPU program (after the program is completely downloaded, the device restart takes approx. 30-40 s)
<b>Upgrade DSP</b>	Start to download the DSP program (after the program is completely downloaded, the device restart takes approx. 30-40 s)
<b>Upgrade PVG</b>	Start to download the PVG program