Integrated Networking Solutions

Eltex.EMS

PON Device Family Management
Operation Manual v2.0.41

OLT Configuration System

NOTES AND WARNINGS

Notes contain important information, tips or recommendations on device operation and setup.

Warnings are used to inform the user about harmful situations for the device and the user alike, which could cause malfunction or data loss.

HARDWARE AND SOFTWARE REQUIREMENTS

Eltex.EMS Server. Basic version — up to 10 station-side devices

CPU: Intel Core 2 Duo E7500 3GHz;
RAM: 4 GB;
HDD: 500 GB;
OS: Ubuntu 12.04.3 LTS x64.
NET: Ethernet 100/1000 Mbit/s;

Eltex.EMS Server. 10 to 200 station-side devices (up to 50k ONTs)

Platform: HP ProLiant DL160 Gen8(DL160R08);
CPU: Intel® Xeon® E5-2609(HP DL160 Gen8 Intel® Xeon® E5-2609 (2.40GHz/4-core/10MB/80W) Processor Kit)
RAM: 8GB (HP 8GB (1x8GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit);
HDD: 500 GB (HP 450GB 6G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive);
OS: Ubuntu Server 12.04.3 LTS x64.

Eltex.EMS Server. More than 200 station-side devices (and/or DHCP server up to 100k ONTs):

Platform: HP ProLiant DL160 Gen8 (DL160R08);
CPU: Intel® Xeon® E5-2640 (HP DL160 Gen8 Intel® Xeon® E5-2640 (2.50GHz/6-core/15MB/95W) Processor Kit);
RAM: 8GB (HP 8GB (1x8GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit);
HDD: 500 GB (HP 450GB 6G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive);
OS: Ubuntu Server 12.04.3 LTS x64.

Eltex.ACS Server. (up to 100k ONTs) + DHCP server up to 100k ONTs + Eltex.EMS:

Platform: HP ProLiant DL160 Gen8 (DL160R08);
CPU: Intel® Xeon® E5-2640 (HP DL160 Gen8 Intel® Xeon® E5-2640 (2.50GHz/6-core/15MB/95W) Processor Kit);
RAM: 8GB (HP 8GB (1x8GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit);
HDD: 500 GB (HP 450GB 6G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive);
OS: Ubuntu Server 12.04.3 LTS x64.

Operator station

CPU: Pentium E5700 3.0GHz;
RAM: 2 GB;
HDD: 80 GB;
OS: MS Windows XP/2000/Vista/7 или Linux;
NET: Ethernet 100/1000 Mbit/s;
Java JRE VM (SUN JRE 6.18 or later)
Browser with java plugin support (IE, Firefox, Chrome, Opera).
1366x768 or higher-resolution display

Virtualization

Virtualization technologies can be employed when you need to manage a small device network, e.g. up to 20 OLTs (20k ONTs max.). Thus, EMS system can be installed on the industrial hypervisor's virtual machine (VM). The only restriction applies to Eltex.EMS operation in a Syslog server (debug log collector) mode. In this case load onto network subsystem of the 'hypervisor — VM' bundle will increase significantly, that will result in possible failures of other network protocols. Employment of virtualization in networks with numerous OLTs and ONTs will require adaptation to server hardware capabilities and hypervisor settings.

CONTENTS

1 INTRODUCTION

Eltex.EMS intended use is to establish centralized management of the network elements, manufactured with Eltex company hardware. Data exchange with network equipment is carried out via Customized SNMP manager that performs the most frequent and large scale operations with subscriber ports and other equipment settings.

Eltex.EMS system employs 'client-server' architecture. Unified access server provides the interface that enables simultaneous and independent management of different network elements.

The management is described by the following devices:

Device type	**Section**
LTE-8ST	7
LTP-8X	8
MA4000-PX	9
PP4X control module	9.7
PLC8 GPON module	9.8

Management automation subsystem (Northbound Interface) enables the connection of the automated subscriber port management system. Particularly, it allows interfacing with the operator billing system via open standardized protocols. This interfacing enables automation of such routine operations as mass subscriber port disconnection when the service is unpaid and subsequent connection when the payment clears, and profile assigning.

2 SYSTEM STRUCTURE

Eltex.EMS system employs 'client-server' architecture. Multitask SNMP manager core can connect to multiple client applications simultaneously and send independent requests to the hardware.

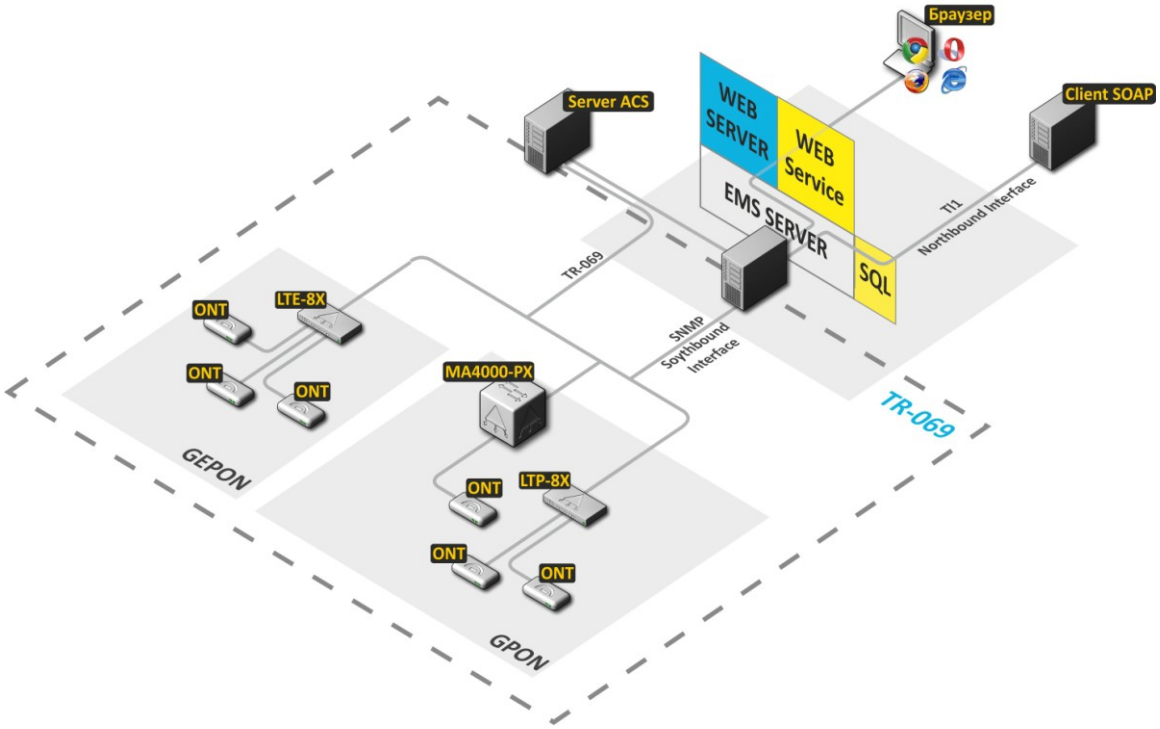


Fig. 1 — Structure of Eltex EMS management system for networks with information packet switching and routing

The structure of Eltex.EMS network element management system:

- **EMS server** — system core.
- **Web Server** provides web interface for manual control.
- **Web Service** — service that enables automated management of the subscriber ports (a part of Eltex.EMS).
- **SQL** — database, MySQL-based storage The database contains network topology and individual access settings to each device (snmp parameters). Also, this database stores user accounts, device messages, etc.
- **Server ACS** — automatic configuration server for subscriber devices (for detailed description see Eltex.ACS.GUI Operation Manual and Eltex.ACS Operation Manual). Integration of user interface for PON transport network management and subscriber device configuration are implemented.
- **Browser** (Web browser) — information request, processing, and output software, basic control (a part of operator station).
- **Client SOAP** — automated subscriber port management system (a part of operator's OSS or service activator).

3 INSTALLATION AND CONFIGURATION

Eltex.EMS system employs 'client-server' architecture. Access server can be represented by any computer that have sufficient performance to process multiple requests (server requirements depend on the quantity of network devices and the number of workstations for technical personnel). The system uses Linux Ubuntu operating system. Server operates on Java virtual machine.

MySQL database serves as a storage, thus no license purchase is required. Web access to system functions is provided via Apache Tomcat also without any license fees.

To create a workstation (in order to launch the graphic client application) you will need a PC without any special requirements. PC should come with pre-installed modern Windows OS (Windows 2000, XP, Vista, 7, 8) or Linux OS with graphics subsystem. Java JRE virtual machine (SUN JRE 6.18 or later) and a web browser with java plugin support are mandatory. IE, Firefox, Opera, Google Chrome.

For server installation manual, see **Eltex_EMS_server_install.doc**.

4 GRAPHICS APPLICATION APPEARANCE AND FEATURES

Graphics application interface has a tree-like structure. I.e. the root node can be represented by "Area", for example. For each area you can define districts as subnodes, which will contain location names. Then you can define devices for these locations.

If you need to perform the detailed device configuration, you can open HTTP or Telnet/SSH connection from the application interface (if you have corresponding user rights).

Fig. 2 shows user interface navigation panes.

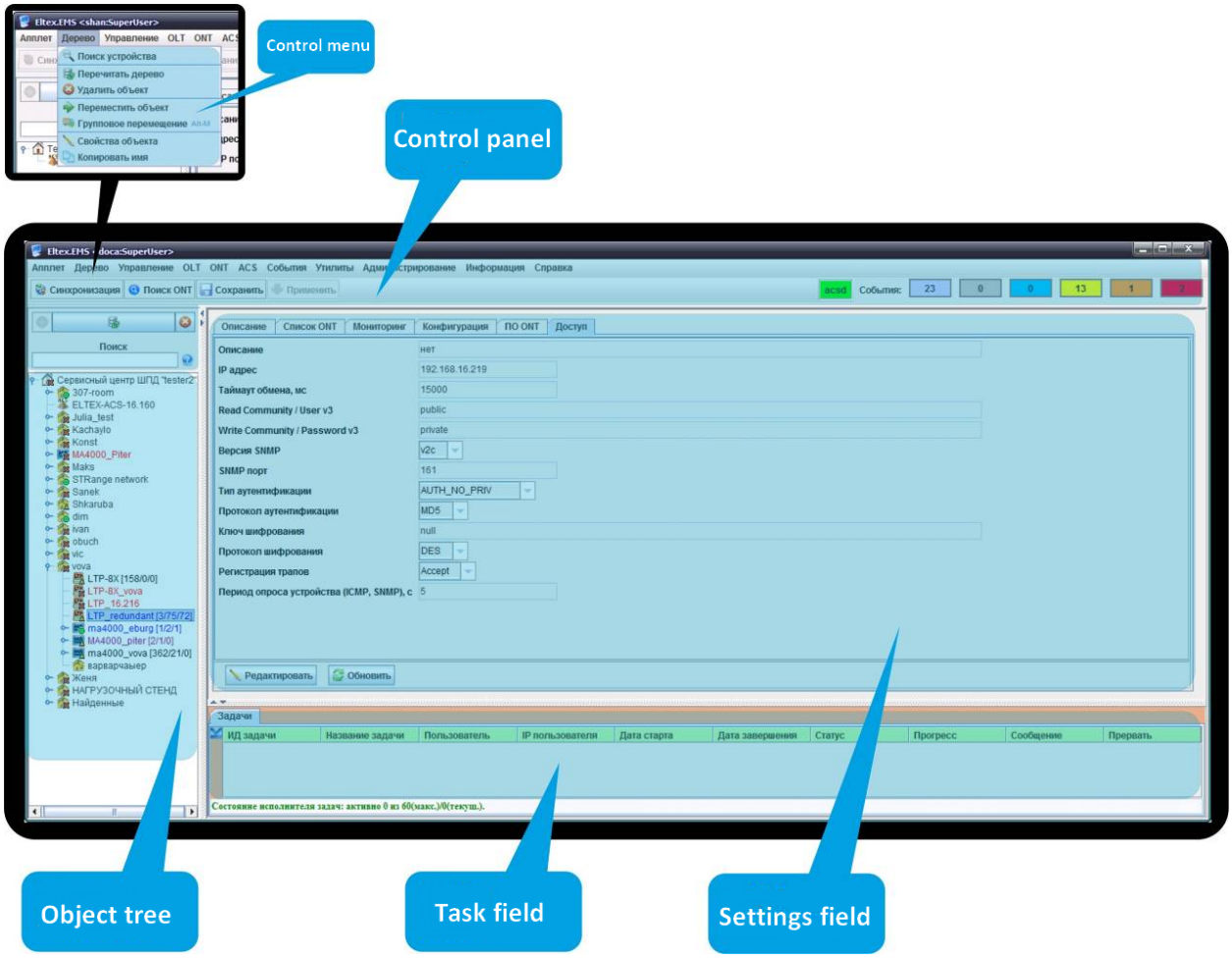


Fig. 2 — EMS.Eltex UI navigation panes

User interface window is divided into three general areas.

1. **Control panel** and **menu** allows you to administer the system, perform the most frequent operations and work with the object tree: service functions important for device operation, such as PON Synchronization, Add, Remove, Re-read, Apply and Save Configuration, etc.

2. **Object tree** that allows you to manage station-side network devices. Object tree contains the hierarchy of nodes and nested control objects.

Nodes are logically united structures that can be grouped by geographic organization (e.g. area, district, city, etc.) or by equipment type (e.g. PON, DSLAM, ETTH). Both grouping types can be combined.

3. **Settings field** that is based on the tree object selection. Allows you to view and edit device parameters. Settings field contains tabs that are used as selectors for groups of editable parameters. Some parameters are read-only, others are editable. If the user has sufficient rights for editing of current parameters, Edit button will become active. Otherwise, the button will be inactive, and the action is unavailable. Such system is used in menu items, toolbar and pop-up menu.

4. **Task field** shows the progress of asynchronous background tasks which are performed on the server that doesn't block GUI.

You can perform additional actions with objects from the pop-up menu that appears on right mouse click on the selected object.

Fig. 3 shows the example of the user interface with reduced functionality. Access to ACS server is denied for the user n14 ('Show' role). This object is greyed-out in the tree, and the user will not be able to access it.

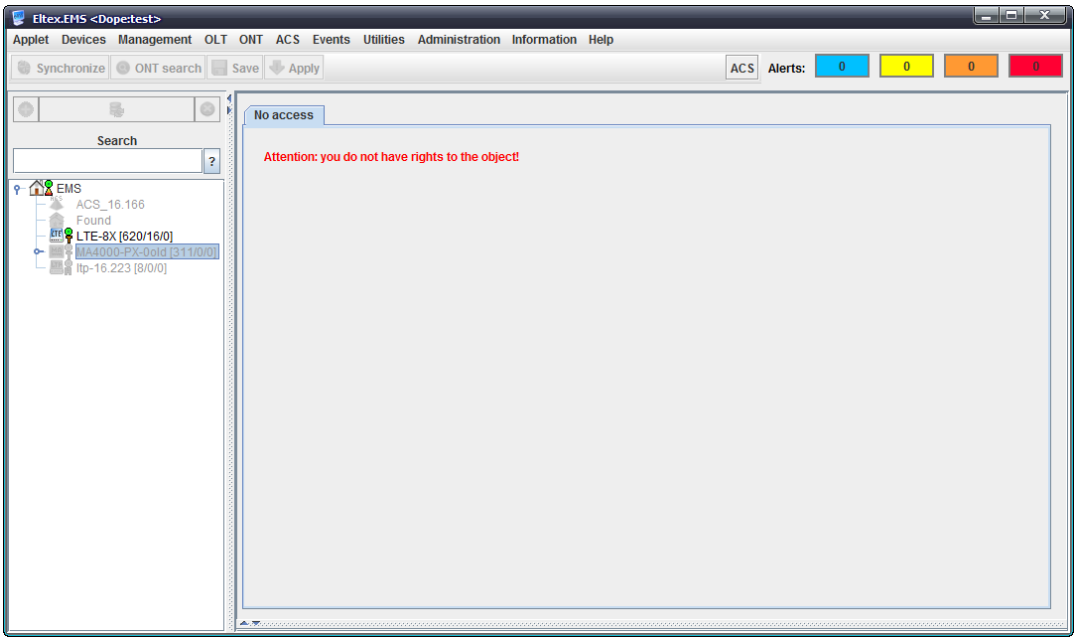


Fig. 3 — Example of user interface with reduced functionality

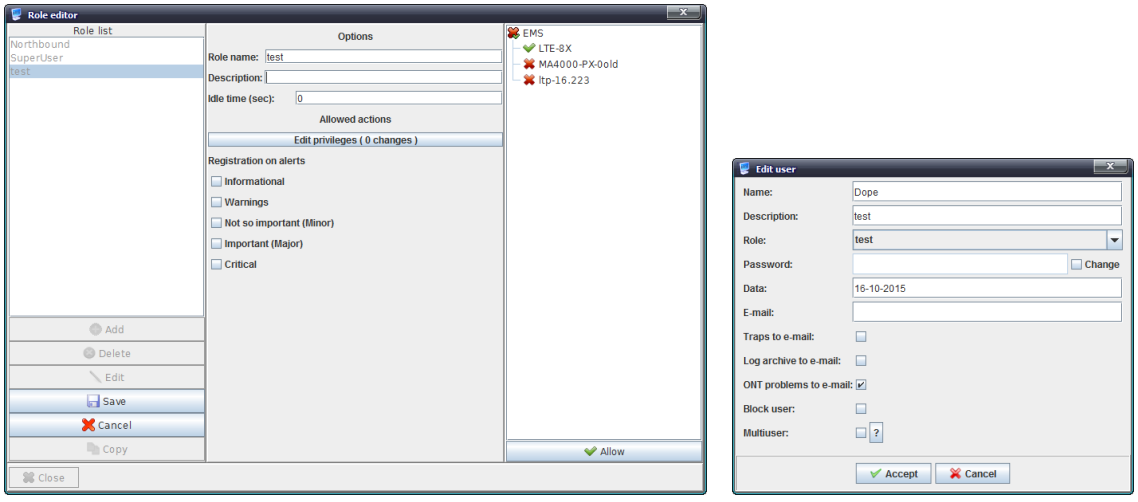


Fig. 3a — Example of reduced functionality role configuration and assigning it to a user

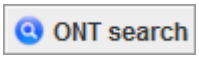
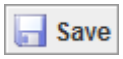
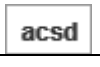
For detailed role and user configuration see Chapter **11 Administration. Rights and users. Configuring users and roles.**

5 CONTROLS

5.1.CONTROL PANEL

The control panel is located in the upper part of the interface. It allows you to manage the tree and device configuration, perform synchronization of PON device parameters, search for ONTs and launch external utilities. Table 1 lists description of the control panel basic controls.

Table 1. Controls

Designation	Button name	Description
Shortcuts		
	*Synchronize*	State synchronization of PON devices. Used for ONT list state update.
	*ONT search*	Show the ONT search dialog window in a device/node, for detailed description see chapter **6.3**. **ONT search in device/node**
	*Save*	Save changes into the non-volatile memory for the selected device.
	*Apply*	Apply changes made to configuration.
Editing object tree		
	*Add*	Add object into current tree node.
	*Remove*	Remove current object or node.
	*Re-read*	Update the tree (the tree is completely re-read from the database)
Events		
	*WARNING event*	The number describes the number of non-closed events of this type for a device. The total number of non-closed events of each type is shown for every nested device in a node. By clicking the icon, you can proceed to Monitoring/Active Events tab for the current device.
	*MINOR event*	
	*MAJOR event*	
	*ALARM event*	
ACS server		
	*Available*	ACS server status
	*Not set*	
	*Denied (not available)*	
	*Restart*	
Applet	**User application configuration**	
	*Authentication [locking]*	Block or unblock the applet with a password
	*Session data*	Show the window with the current user session information
	*Decor*	Applet theme configuration

	*View*	Configure the appearance of the elements
	*Pattern of utilities running*	Edit startup templates for ping, ssh, web, telnet utilities
	*Save applet settings*	Save current applet size and location on the screen
	*Exit*	Close the applet (terminate the current user session)
Devices	**Manage the object tree, duplicates the main and pop-up menus of the object tree**	
	*Search for a device*	Search for station-side device by the name or IP address. The search is performed through all the object tree.
	*Reload tree*	Load the whole list of the tree objects from EMS server
	*Add object*	Add object into current tree node. For detailed description, see chapter **6.1 Creating monitoring point**
	*Delete an object*	Remove current object from the tree.
	*Move object*	Move the current object to another node. For detailed description, see chapter **5.2.2 Transferring objects**
	*Group movement*	Move the group of objects in the tree structure. For detailed description, see chapter **5.2.2 Transferring objects**
	*Automatic search for devices in the network*	Search devices in the network by defined address range via SNMP protocol. For detailed description, see chapter 10 Automatic Device Discovery in Network
	*Object properties*	Edit address and name if the current object
	*Copy name*	Copy object name into the clipboard
	*Import from CSV file*	Allows you to import the data from the text file into the object tree
Management	**Basic device control features, duplicates the pop-up menu of the object tree**	
	*Synchronize alerts*	Request the current alarms from the device
	Apply configuration changes (COMMIT)	Apply changes made to configuration (for MA4000-PX)
	*Synchronize MA4000 slots*	Sync slots (for MA4000-PX)
	*Save configuration to non-volatile memory*	Save changes made to configuration into the non-volatile memory for the current device (for LTE-8ST, LTE-8X, and LTP-8X)
	*Reread configuration from non-volatile memory*	Load the configuration stored in the non-volatile memory for the current device (for LTE-

		8ST, LTE-8X, and LTP-8X)
	*Upload the configuration to the archive*	Upload the current device configuration file to EMS server
	*Download the configuration from the archive*	Load the configuration into the non-volatile memory of the selected device
	*Reboot the device*	Reboot the current device
OLT	**Basic OLT operation features, duplicates the pop-up menu of the object tree**	
	*Synchronize*	Synchronize the state of the current device
	*Migrate PON config*	Migrate to new format while saving PON configuration settings (for LTE-8ST)
	*Migrate ALL config*	Migrate to new format while saving all existing configuration settings (for LTE-8ST)
	*Update firmware for OLT chip in node*	Upgrade OLT chip software in the current node
	*Update firmware for all ONTs in device*	Upgrade the software for all ONTs in the device (for LTE-8X)
	*Reconfigure PON chips*	Reconfigure PON chips for the current device (for LTP-8X)
	*XML OLT PON-profile's editor*	Text editor for ONT profiles (template for OLT)
	*GUI for OLT PON-profile's editor*	Graphics editor for ONT profiles (template for OLT)
ONT	**Basic ONT operation features, duplicates the pop-up menu of the object tree**	
	*ONT Search*	Search for ONT in the current node or OLT For detailed description, see chapter **6.3 ONT SEARCH IN DEVICE/NODE**
	*Current statistics*	Statistics data on PON trees and quantity of ONTs at the moment for the selected object
	*Search for duplicated ONT by PON MAC*	Search for ONT objects in the tree with the same PON MAC
	*Search for duplicated ONT by Description*	Search for ONT objects in the tree with the same description
	*GPON metaprofile's editor*	Show the edit dialog of PON network unified profile
Events	**System utilities, duplicates the pop-up menu of the object tree**	
	*Events log*	View events of the system objects
	*Active alerts statistics*	View the active event statistics
Utilities	**System utilities, duplicates the pop-up menu of the object tree**	

	*Run PING from the user's PC to the device*	Perform echo test from the user PC to device
	*Run PING from the server to the device*	Perform echo test from the server to device
	*Connection to device via TELNET*	Launch Telnet client for connection to the current object
	*Connection to device via HTTP (WEB)*	Launch the browser for connection to the current object via HTTP
	*Connection to device via SSH*	Launch SSH client for connection to the current object
Administration		
	Rights and users	
	*Configuring user roles*	Edit the system users' roles. For detailed description, see chapter **11.2 Configuring roles**
	*Configuring the system users*	Edit system users' parameters. For detailed description, see chapter **11.3 Configure system users**
	GUI behaviour	
	*Settings the colour scheme*	Select the colour of the alarm messages. For detailed description, see chapter **12.1 Setting the color scheme**
	*Settings the sound scheme for alerts*	Select the audible signal of the alarm messages **12.2 Setting the sound scheme of alerts**
	EMS server configuration	
	*SNMP traps receiving and processing*	Edit settings for SNMP trap receiving
	*Scheduled tasks (monitors)*	View the monitor state and configure monitors
	*System modules settings*	View and edit module parameters
	*Administrator's workstation*	Go to Administrator Automated Workstation menu
	*EMS server restart*	Reboot the EMS server
	Device software	
	*Station software*	Download station-side software files and view active versions on the network
	*Subscriber's software*	Download subscriber-side software files and view active versions on the network
Information		
	*State of backup system*	View the state of the reservation system
	*Information about system components*	View the EMS system state
	*User actions log*	View user activity log
	*System notification of users*	Send messages to all users connected to the system at the moment
Help	**HELP INFORMATION**	
	*About*	Information about Eltex.EMS software and supported devices
	*License*	Information about used modules and effective license restrictions

	List of changes	Short changelog

PON device state synchronization can take a long time to complete. The interface will be locked at this time.

5.2. DEVICE TREE

The device tree is located in the left part of the interface. The tree shows the network structure and allows you to select the control device. Users with the following privileges will be able to modify the tree structure: Edit Tree Properties, Add Tree Object, Remove Tree Object

5.2.1. ADDING OBJECTS

You can add objects into the tree structure with  *(Add)* button, located in the object tree area. When adding object, you have to specify its unique name, type and IP address. For nodes (NODE) you have to specify the name only. After adding object, you have to fully configure SNMP parameters in order to access it. If the configuration is incorrect, the system will return 'SNMP Timeout' message each time the device is addressed. Please note that the 'SNMP Timeout' parameter defined in the device settings can be tripled, as the system makes 3 efforts to access the device by default.

When adding or editing device parameters, you have to specify the unique IP address. Duplication of object names is not allowed within the network.

5.2.2. TRANSFERRING OBJECTS

Transferring a single object

To transfer device from the current node to another node, use **Tree/Move Object** menu item in the toolbar or **Edit/Move to Node** menu, which is available by clicking the right mouse button on the object. To transfer the object, select the object from the tree, select **Move to Node** or **Move Object** and specify a new object location in the dialog window. You can transfer any objects and nodes (except for the root node).

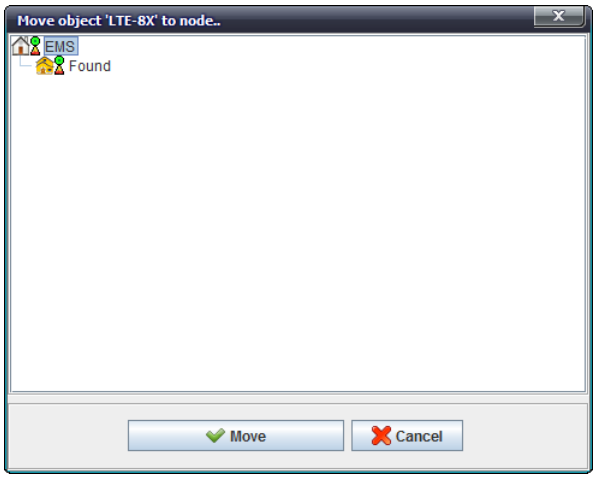


Fig. 4 — Tree object transfer menu

Group transfer

To transfer objects as a group in the tree, you can use **Tree/Move Group** menu item in the toolbar, see Fig. 2. In the menu, you can transfer multiple objects simultaneously and transfer objects located in the different source nodes into the one common target node.

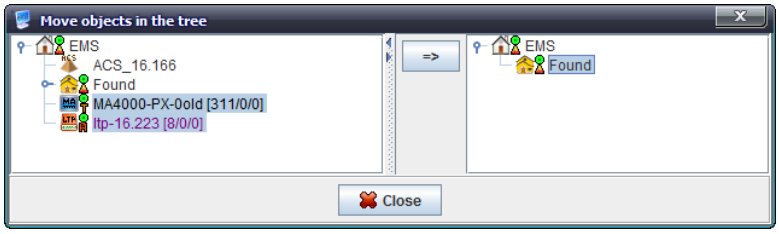


Fig. 4a — Tree object transfer menu

In the left pane of the edit window, named **Move Objects in a Tree**, select one or multiple objects/nodes to transfer. Target node is located in the right pane. Click **=>** button located between the panes to perform the transfer.

When transferring objects to another node, the rules applying to the target node are taken into account. Also, the following restrictions are implied: the node cannot be transferred into oneself or into its subnodes (OK/-> button will be disabled in the dialog window). You cannot transfer an object into the node, if the object with the same name already exists in this node.

5.2.3. REMOVING OBJECTS, REFRESHING TREE STRUCTURE

Reload button  allows you to refresh the tree structure information (re-read it from the database). This button should be used, when tree editing is performed simultaneously in the different interfaces. Also, Re-read function should be used, when the tree structure has been modified by the administrator.

Click *Delete*  button in the object tree area to remove the object from the tree, see Fig. 2.

If you remove the object, its data will be deleted permanently and cannot be restored (restoration from the database backup is possible, but it is an exceptional situation). Upon the node removal, its nested objects, subnodes and node objects will also be removed. The root node (RootNode) cannot be deleted.

5.2.4. PON DEVICE SYNCHRONIZATION IN THE OBJECT TREE

State synchronization process is essential for work with OLT object. When synchronization is performed, the system gets the OLT software version data, number and contents of subscriber setting profiles, contents and status of all ONTs, etc.

Synchronization can be performed in manual mode upon the start of work with OLT. Also, automatic recurrent synchronization service is enabled in the typical system supply package (see chapters 'Monitors', 'PON Synchronization Monitor'). Synchronization is a very important process — if it is not performed, the majority of OLT object control and monitoring functions will not be available to the user.

For PON devices, the device tree shows information on tree state synchronization. If data is synchronized, the last synchronization time and ONT quantity in configuration will be shown. ONT quantity is shown in the square brackets in the tree: [Configurations/Active/Alarms]. For example, string [10/8/1] means that OLT 10 ONT configurations, 8 active ONT devices are in operation, and 1 ONT is in error mode.

5.2.5. POP-UP MENU OF THE OBJECT TREE

You can access pop-up menu of the object tree by clicking the right mouse button on the object. This menu allows you to launch external applications (ping, telnet, ssh, web) and edit tree object name and type. Additionally, you can send the following commands to the device: **Synchronize alarms**, **Save configuration into the non-volatile memory**, **Reboot device**, **Reread configuration from the non-volatile memory**. For GPON devices, you can search for ONTs by PON Serial/MAC address, description or tree number and identifier in a tree (if the state is synchronized).

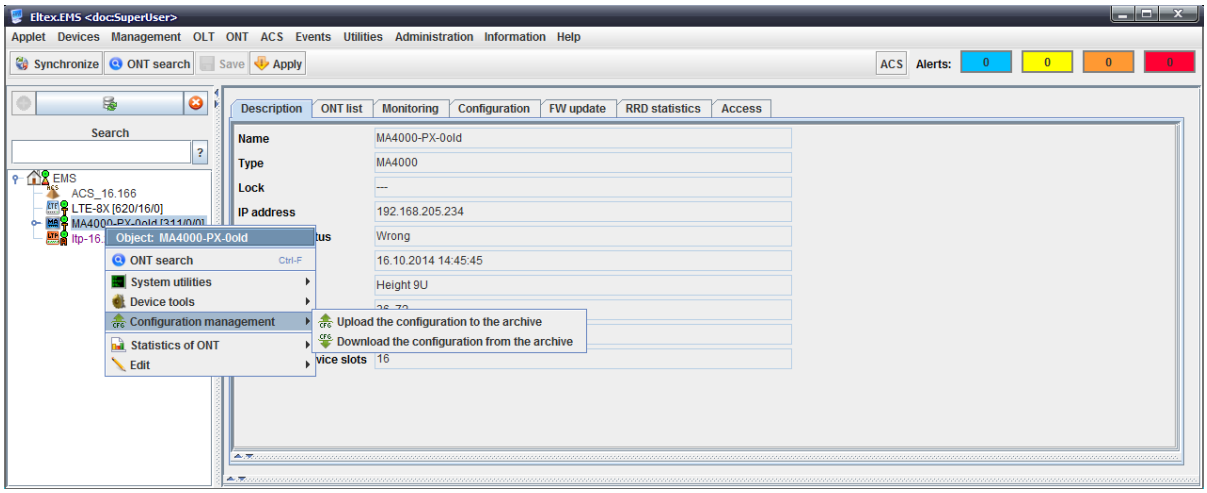


Fig. 5 — Pop-up menu of the object tree

5.3. OBJECT PROPERTY CONTROL FIELD (SETTINGS FIELD)

Settings field is located in the right part of the interface (see Fig. 2) and allows you to view and edit the device settings. It contains tabs that are used as selectors for groups of editable parameters and the basic buttons: *Edit, Refresh*. If the user has sufficient rights to change device settings (SNMPset in user role settings), *Edit* button will become enabled automatically.

Description of button actions:

- **Edit** — opens dialog window for editing current parameters
- **Reload** — this button updates the current panel values from the device, database or other sources.

In editing mode, the interface is fully blocked by the modal dialog window until the operation is completed. If the device settings are being edited on another workstation, the program will give you a warning, when editing mode is selected, and will block the operation execution.

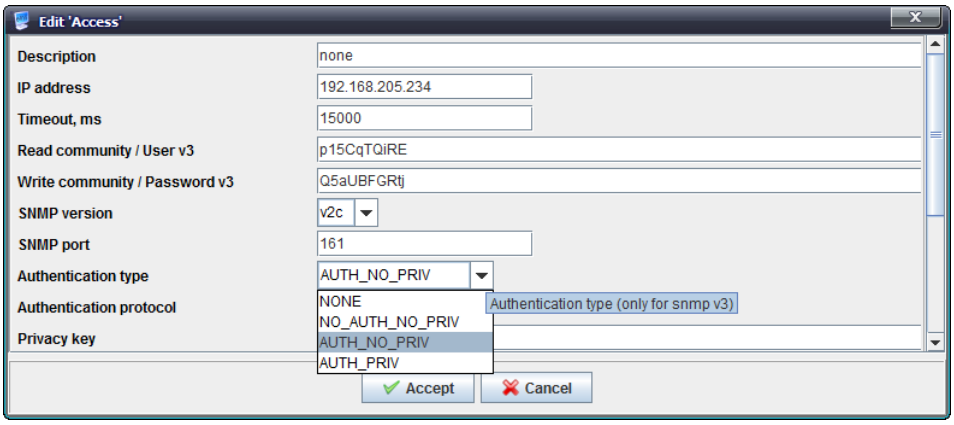


Fig. 6 — Edit window Authentication type selector is chosen

For data with indexed values (e.g. editing port settings), a selector that allows you to select the element index is located in the upper part of the field.

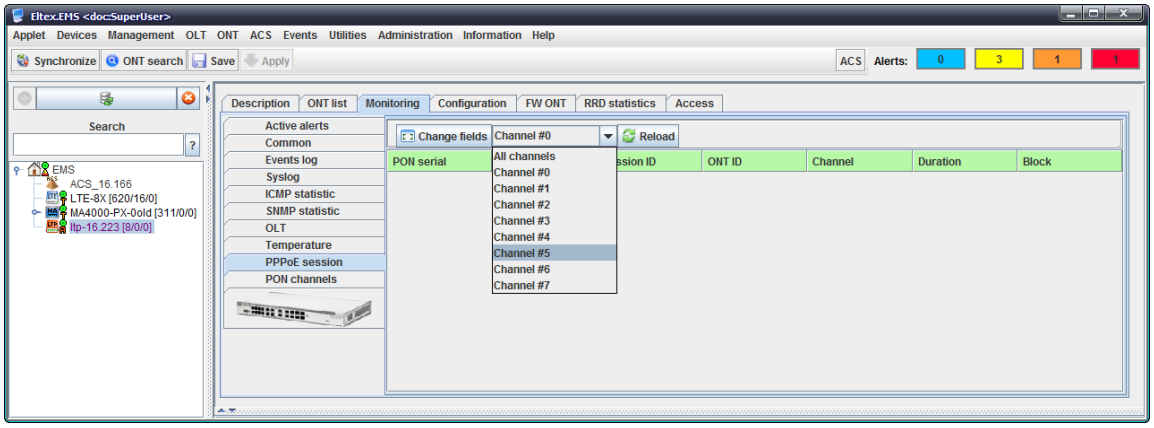


Fig. 7 — Channel selection in LTP-8X device

In addition to editing tabs, there are tabs for viewing port status, viewing tables, editing configurations and ONT lists, viewing ONT statuses.

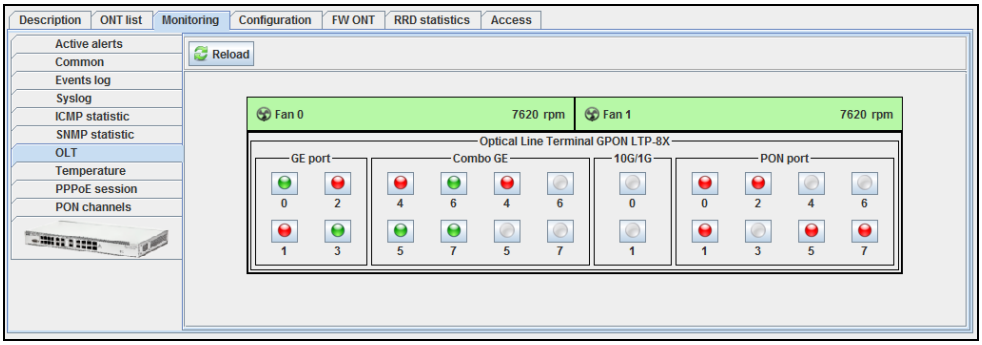


Fig. 8 — LTP-8X port state tab

Click *Reload* button to update the state of device ports and show the information in *Port Status* panel.

Help button located in the control field will help you with details for the settings. Tips are shown near the particular editing element to explain the meaning of a parameter or for the control panel in general.

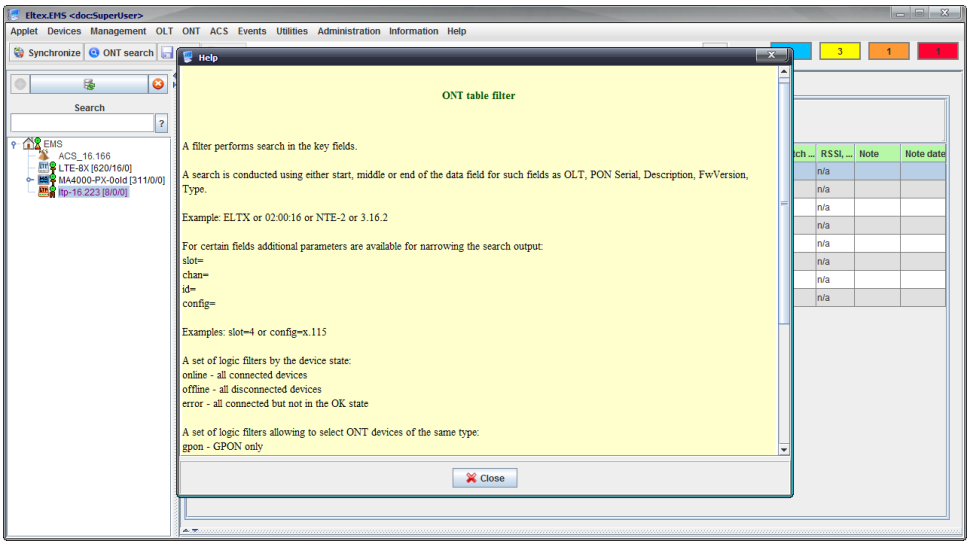


Fig. 9 — Help in ONT List tab for LTP-8X

6 DEVICE MANAGEMENT

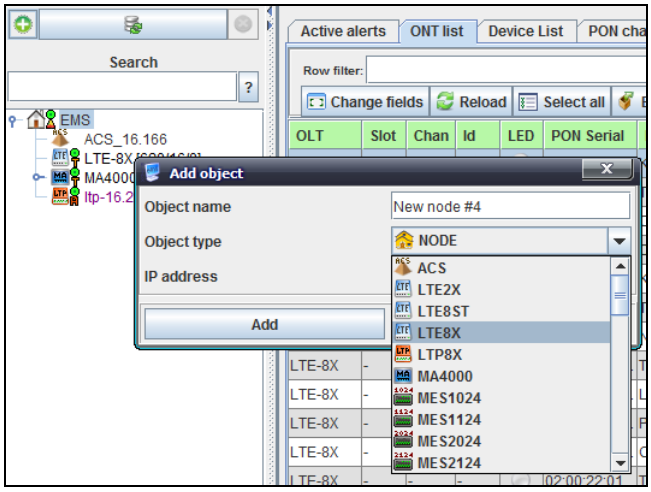
The system is able to manage several groups of devices, each group's management has its own peculiarities.

Device groups:

- PON (LTE-8ST, LTE-8X, LTE-2X, LTP-8X, MA4000-PX);
- DSLAM (MXA-24, MXA-32, MXA-64);
- ETTH (MES1024, MES1124, MES2024, MES2124, MES3108, MES3108(F), MES3116, MES3116(F), MES3124, MES3124F, MES5148, MES5248);
- VoIP (TAU-32M.IP, TAU-36.IP, TAU-72.IP, SMG-1016, SMG-1016M, SMG-1016M-R, SBC, MSR);
- MSAN MC1000-PX;
- ToPGATE;
- MXL2E;
- UEP (UEP2-3, UEP2-5, UEP3-3)
- Wi-Fi access points (WEP-12ac, WOP-12ac).

6.1. CREATING MONITORING POINT

The object of monitoring is defined with Add button on the main menu panel. To create an object in the desired node, select the node and click *Add* button.



Type the object name in the appeared menu, select its type and define device IP address.

Click *OK* button and the device will appear in the object tree.

6.2. AUTOMATIC DEVICE DISCOVERY IN NETWORK

Eltex.EMS allows you to search for supported devices in the enterprise network automatically by the defined IP address range. You can configure parameters of automatic search directly in the application interface with **Search Settings** button. The search is performed by querying the devices in

the defined IP range via SNMP protocol using the defined parameters. For device discovery, SNMP agent should be enabled on the target device with parameters defined in search settings.

To show automatic search form, select **Devices/ Automatic search for devices in the Network** in the menu bar or go to the root node and select **System Utilities/ Automatic search for devices in the Network** from the pop-up menu.

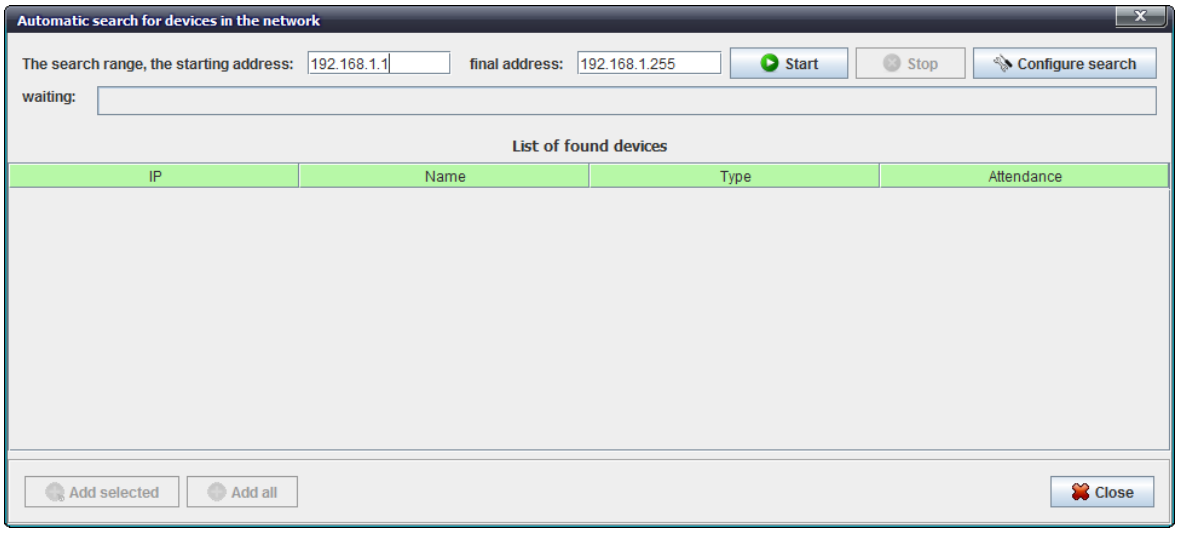


Fig. 10 — Device discovery by defined range: dialog window

- *Search range, starting address* — starting address of the IP address range for device discovery
- *Final address* — ending address of the IP address range for device discovery
- *Start* — start the network scan
- *Stop* — force-stop the network scan
- *Configure search*— edit SNMP access for search purposes
- *Waiting*— scanning activity indicator

Click *Configure search* button to show the window, where you can edit SNMP access parameters for the device discovery.

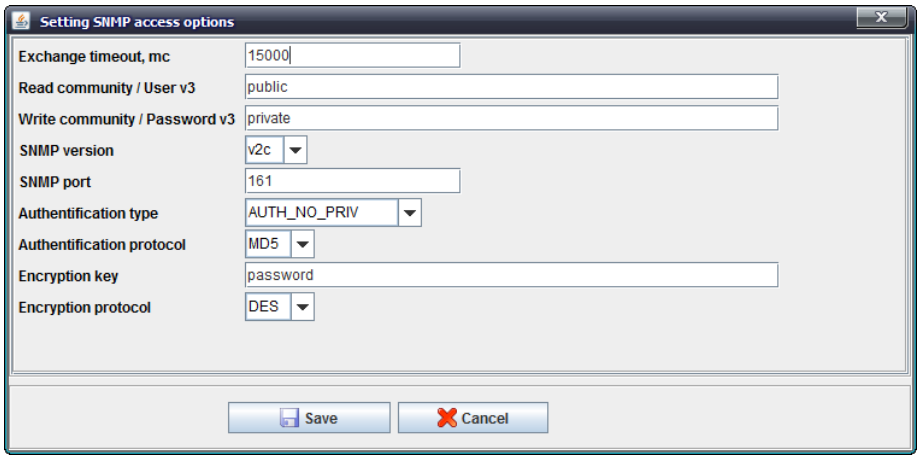


Fig. 11 — Example of SNMP access parameters configuration

Progress indicator is shown during the network scan. Scanning is performed in multiple simultaneous threads. Also, timeout is defined for each device with *Timeout* parameter in the configuration file. You can stop the process by clicking *Stop* button.

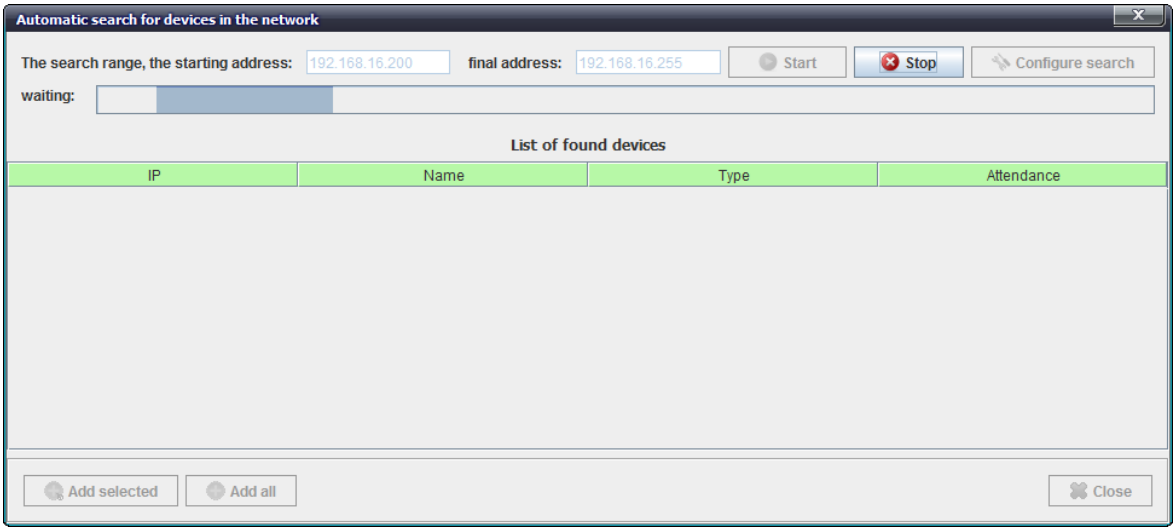


Fig. 12 — Device discovery by defined range: process

The application generates the table with found devices during the scan. If found device already exists in the object tree, application will display the corresponding warning with the node for this object and the object name. Object match is performed by IP address.

After network scan has been completed, *Add All* (add all found devices) and *Add Selected* (add only selected devices) buttons will become available.

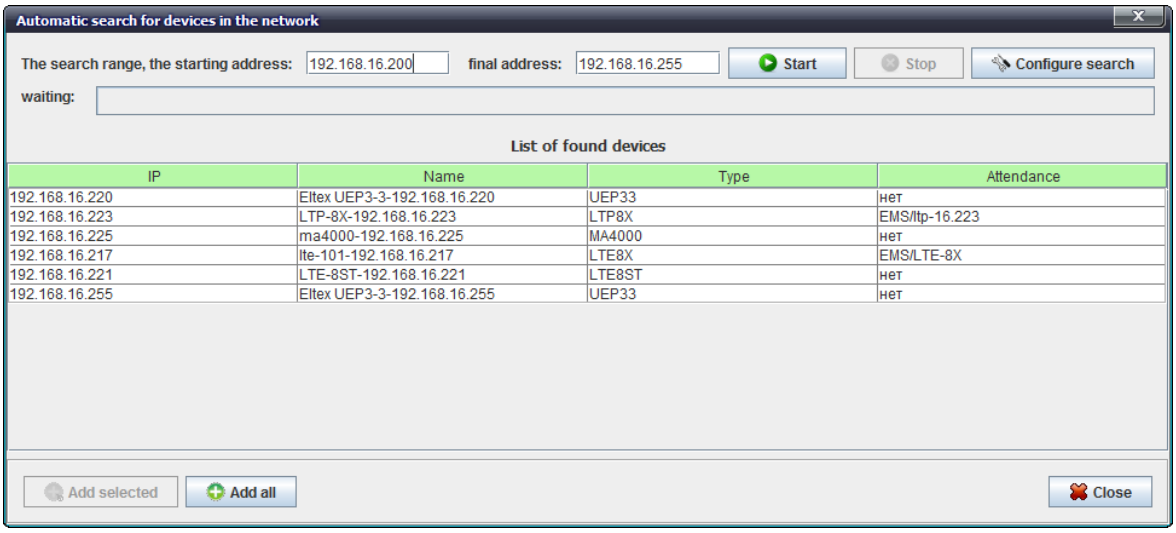


Fig. 13 — Device discovery by defined range: results

Click *Add* button to add the selected objects into *Found* node, that will be created automatically in the current node of the object tree. If *Found* node already exists, objects will be added to existing objects in that node (if they are not duplicated by IP address). When adding objects, the application will automatically discard all devices with duplicate IP addresses, even if they were selected in the table. If all object are to be discarded, the application will show a dialog window with a warning. If objects with the same names exist in *Found* node, the application will add '_x' suffix to their names to avoid the name duplication.

To transfer device from the *Found* node to another node, use **Edit/Move to Node** menu item, which is available by clicking the right mouse button. To transfer the object, select the object from the tree, select **Move to Node** and specify a new object location in the dialog window. You can transfer any objects and nodes (except for the root node). Device search and transfer to nodes is possible only for users with rights sufficient for adding objects. When transferring objects to another node, the rules applying to the target node are taken into account. Also, the following restrictions are implied: the node

cannot be transferred into oneself or into its subnodes (*Move* button will be disabled in the dialog window). You cannot transfer an object into the node, if the object with the same name already exists in this node.

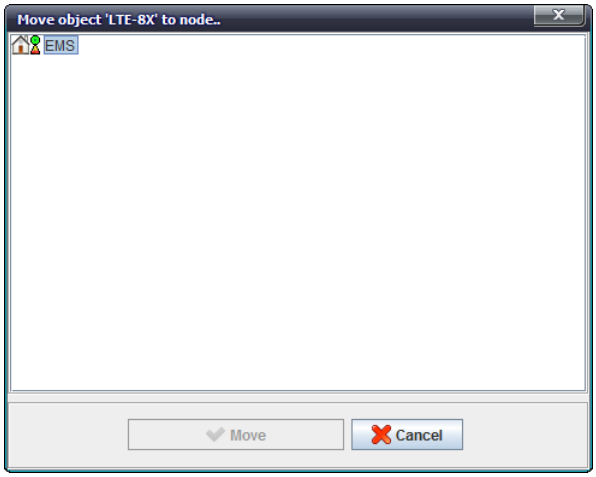
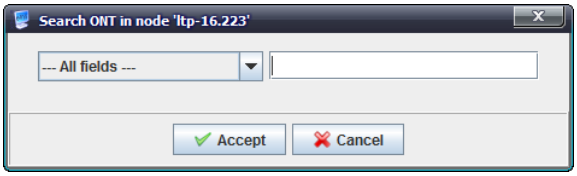


Fig. 14 — Selection of the node for object transfer

6.3. ONT SEARCH IN DEVICE/NODE

The search is performed only for the nodes that contain PON devices.
The search can be performed in PON devices, synchronized with EMS server.



You can search by the following parameters:

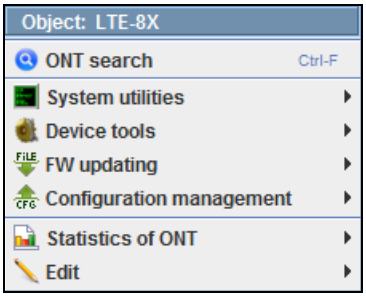
- *PON MAC/ Serial* — search for ONT by specified PON MAC/ Serial address
- *Description*— search for ONT by specified subscriber description or ID
- *On tree and ID (through gap)* — search for ONT by specified tree number or ID, values should be space-separated

Enter the desired value into the field on the right.

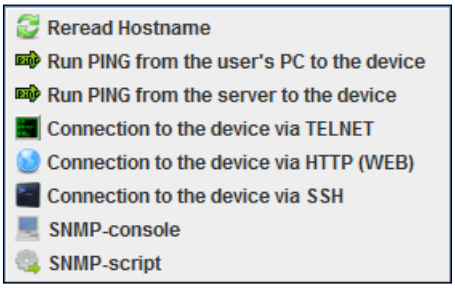
6.4.OPERATIONS WITH THE TREE OBJECT

Basic operations with the current tree object are listed in the pop-up menu of the tree. You can access the menu by clicking the right mouse button. Contents of this menu depend on the currently selected object and defined user rights. If you doesn't have the necessary rights to perform an operation, the corresponding menu items become blocked (greyed-out).

Click the right mouse button on the row for the tree object to show the drop-down menu that contains the following items:



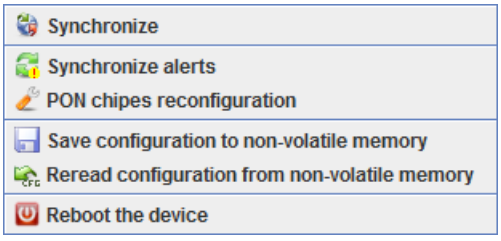
– ***System utilities*** — contains the bundle of utilities:



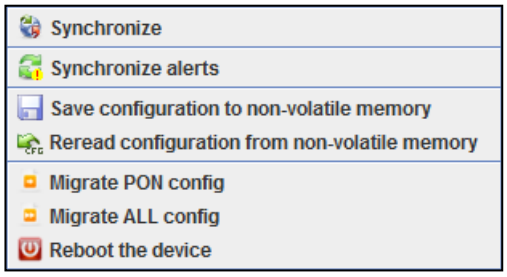
  – *Re-read hostname* — re-read device system name;
  – *Send PING from user PC to device* — echo test from the user PC to device;
  – *Send PING from server to device* — echo test from the server to device;
  – *Conne ct to device via Telnet protocol;*
  – *Connect to device via HTTP (WEB) protocol;*
  – *Connect to device via SSH protocol;*
  – *SNMP console* — show SNMP console;
  – *SNMP* template — allows you to quickly configure any parameters of the device with the text (xml) file via SNMP protocol.

– ***Device tools***— contains the set of control commands:

  – *Synchronize* — performs the state synchronization of PON device. Used for ONT list configuration status update;

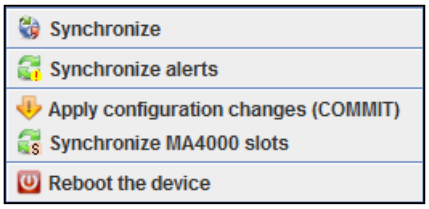


  – *Synchronize alerts* — get list of active alarms from the device;
  – *PON chips reconfiguration*— execute PON chip reconfiguration command;
  – *Save configuration to non-volatile memory* — store performed changes to the internal device memory;
  – *Reread configuration from non-volatile memory* — load configuration stored in the internal device memory;
  – *Migrate PON config (only for LTE)* — migrate to new format while saving PON configuration settings only;



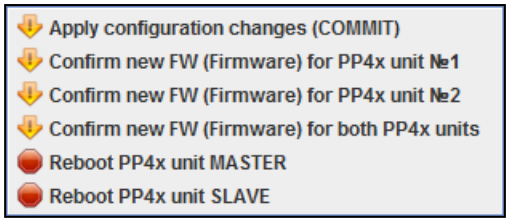
- *Migrate ALL config (only for LTE)* — migrate to new format while saving all existing configuration settings;
- *Reboot the device* — execute the reboot command.

MA4000-PX device management:



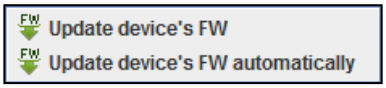
- *Apply configuration changes (COMMIT)* — apply changes made to configuration;
- *Synchronize MA4000 slots* — performs the state synchronization of MA4000-PX slots;

PP4X device management:



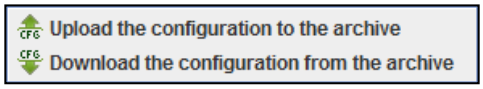
- *Apply configuration changes (COMMIT)* — apply changes made to configuration;
- *Confirm new FW (firmware) for PP4X unit № 1;*
- *Confirm new FW (firmware) for PP4X unit № 2;*
- *Confirm new FW (firmware) for both PP4X units;*
- *Reboot PP4X unit MASTER* — reboot the master control module of the device;
- *Reboot PP4X unit SLAVE* — reboot the slave control module of the device.

- ***FW updating***— contains the set of commands to upgrade the firmware:



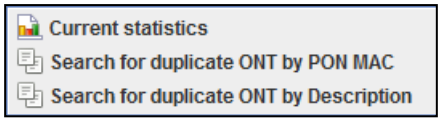
  - *Update device's FW;*
  - *Update device's FW automatically* — upgrade device firmware, save and reboot automatically.

- ***Configuration management*** — contains the set of commands to manage the configuration of the managed station-side devices:
  - *Upload the configuration to the archive* — upload (save) the configuration as a file on disk;



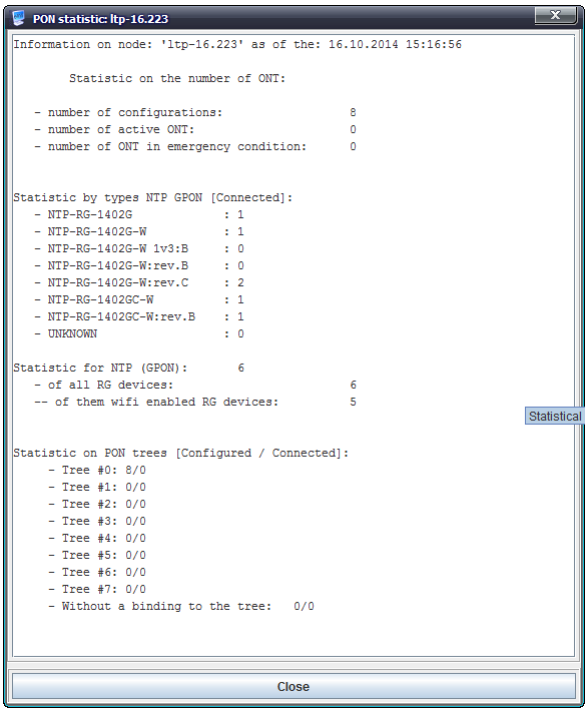
  - *Download the configuration from the archive* — load the configuration from the archive into the internal device memory.

- ***Statistics of ONT –*** show the statistics (current state and dynamics) for subscriber terminals connected to the PON channel/device/node (quantity, type)



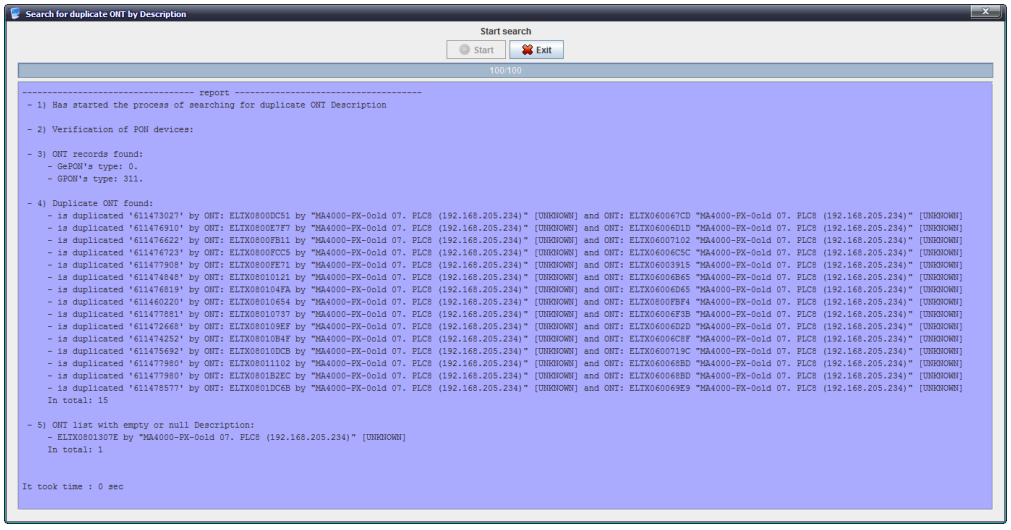
  - *Current statistics* — shows the statistics for PON

channels and quantity of ONTs at the moment;

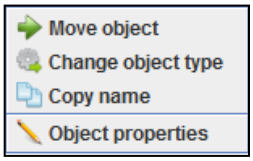


– *Search for duplicated ONT by PON MAC* — search for ONTs in the object tree with the same PON MAC. The search results page contains the list of duplicated ONT numbers and corresponding devices;

– *Search for duplicated ONT by Description* — search for ONTs in the object tree with the same description. The search results page contains the list of duplicated ONT numbers and corresponding devices.



– ***Edit*** — section that allows you to modify object properties, contains the following commands:



  – *Move object* — move objects (and nodes) between the tree nodes;
  – *Change object type* — edit current object type;
  – *Copy name* — allows you to copy object name into the clipboard;
  – *Object properties* — modify object name or IP address.

6.5. DEVICE STATUS INDICATION

The system supports device connection availability indication in the object tree that is represented by the status icon located next to the device icon. Table 2 shows the correspondence between the different status icons and general device states.

Each device icon can contain up to two status icons. Icon located in the upper right corner describes object availability status. The status is comprised of SNMP polling and ICMP PING polling. If the device is not available on both protocols, the system marks this object as 'lost' and sets the 'red' alarm level. If the device is not available on one of the protocols, it sets the 'yellow' alarm level. If the device is available on both protocols, the status becomes 'green'. If device polling if disabled, white icon will be shown in the tree. If the device is out of service, grey icon will be shown.

Icon located in the lower right corner is used for warning indication. It indicates active device alarms, system time mismatch, wrong trap settings, and other important situations, that should be investigated by the service personnel.

Table 2. Device connection status indication

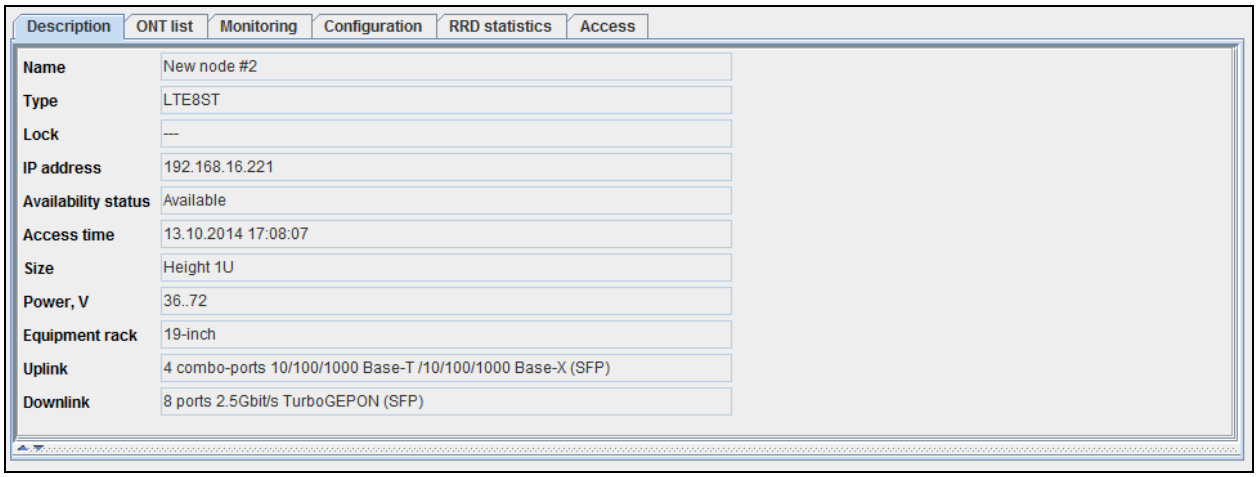
Designation	Appearance in the object tree	Description
High level icons — for objects and nodes		
	ma4000	both ping responses are received
	ma4000	one of the ping responses is not received
	ma4000	both ping responses are not received
	ma4000	device is out of service
	ma4000	waiting for the first response to ping
empty field	ma4000	polling period is not defined or Availability Poll is disabled (system modules)
Low level icons — only for nodes		
		objects with alarms present for this node
empty field		no objects with alarms present for this node
Low level icons — only for objects, not for nodes		

T	LTP-8X_3.20 [10/2/2]	traps
I	LTP-8X [9/2/0]	overheat
A	LTE-8ST [3/0/0]	alarms present
n	MA4000 [7/7/1]	device name doesn't match the node name
⊘	LTE-8ST [3/2/2]	ONT error
empty field	ma4000 [7/7/1	no alarms (not received yet)

6.6. GENERAL CONFIGURATION FOR DEVICE OPERATION IN ELTEX.EMS SYSTEM

6.6.1. DESCRIPTION MENU

This tab shows the device name, connection IP address, general physical parameters, availability status, and appearance of this type of devices.



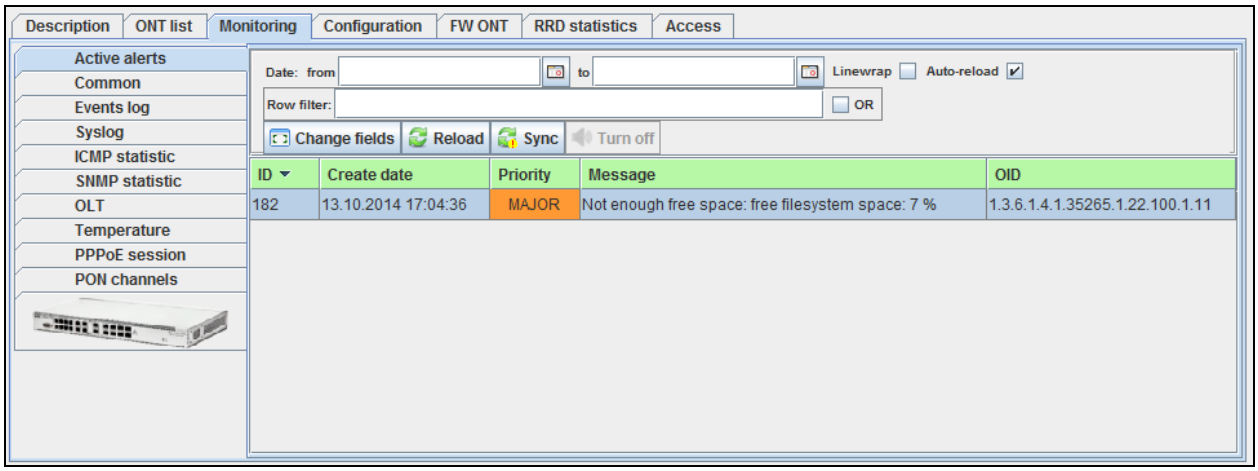
- *Name* — device name;
- *Type* — device model;
- *Lock*— device block status;
- *IP address* — device IP address;
- *Availability status* — device availability state;
- *Access time* — date and time of the last device access (SNMP);
- *Size* — device dimensions;
- *Power, V* — device power supply voltage;
- *Equipment rack* — device mounting hardware;
- *Uplink, Downlink* — quantity and type of device ports;

- *Number of service slots* — quantity of device slots (for MA4000).

6.6.2. MONITORING MENU, ACTIVE ALERTS TAB

This menu contains the list of current alarms and abnormal situations. Alerts in this list are created by alarm traps received from devices or internal recurrent services activity (e.g. availability control, temperature control, etc.). The copy of each event is saved to event log for the particular device upon its occurrence. If automatic normalization is activated (e.g. upon trap arrival or restoration of exchange channel), the event will be erased from the active events list, but will remain in the log. The log

stores alarm and normalization messages.



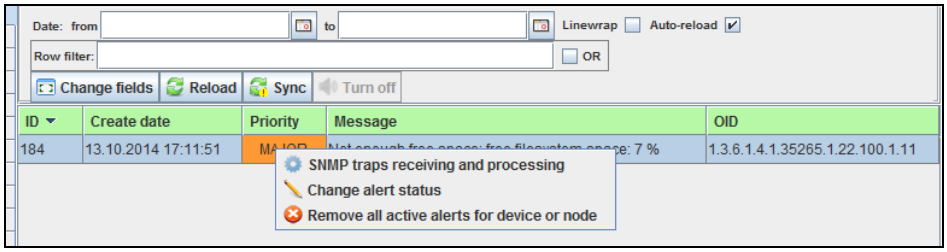
Click *Reload* button to refresh the information in the tab.

Click 

button to get the list of current alarms for the device.

Click *Turn off* button to disable active alarm for the device.

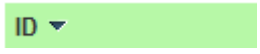
Click the right mouse button on the selected row to show the menu, which allows you to edit and manage the active event.



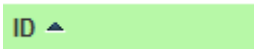
- *SNMP traps receiving and processing* — configure the processing of this trap by the system;
- *Change alert status* — change event status (new/processing/closed);
- *Remove all active alerts for device or node* — delete all active events for the device/node.

6.6.2.1. ARRANGING EVENTS

To sort events in the table by the desired parameter, left-click the corresponding column header. The order of arrangement is indicated by the arrow located next to the header:



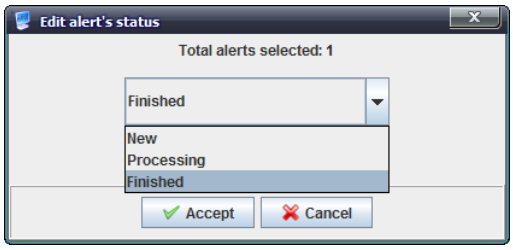
- arrange from the largest value to the lowest (new ones are on top of the list);



- arrange from the lowest value to the highest (new ones are on bottom of the list).

Fields located in the upper part of the tab allow you to filter events by date or content.

6.6.2.2. CHANGING EVENT STATUS



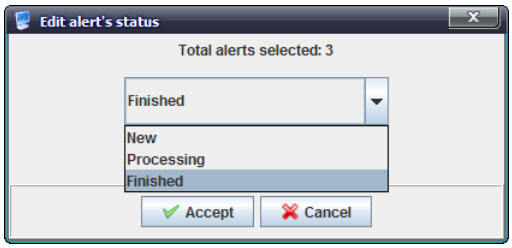
You can manually process each event received by the system. Use *Edit Status* menu to modify the status.

If the event is not critical or important, you can change its status from *New* to *Closed*.

If the event is important, you should send it to processing (set *Processing* status).

When event is closed (*Closed* status is assigned*)*, it will be deleted from the active events list, but its record in the event log will remain. Event log records will not be affected by operations with active events.

6.6.2.3. GROUP STATUS CHANGING

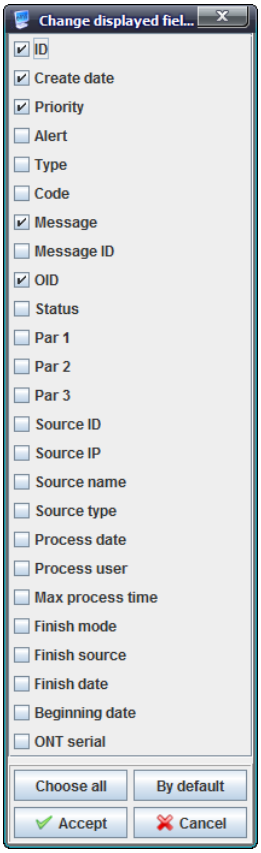


To change status of multiple events simultaneously, select desired rows in the event table with mouse cursor or directional keys while holding <Shift> (joint selection) or <Ctrl> (disjoint selection) keys, and click the right mouse button on any of the selected rows — group status edit menu will open.

6.6.2.4. EVENT TABLE CONFIGURATION

Click *Change Fields* button to configure the set of fields for the event table.

List of displayed fields:



- *ID* — record identifier;
- *Creation date* — record creation date;
- *Priority* — priority of the occurred event;
- *Alert* — alarm marker;
- *Type* — type of the event (snmp trap, monitor, etc.);
- *Code* — internal event code;
- *Message* — text message;
- *Message ID* — message identifier;
- *OID* — SNMP OID of the received message;
- *Status* — current message status;
- *Par 1* — parameter 1, that contains alarm index;
- *Par 2* — parameter 2, that contains additional alarm index;
- *Par 3* — parameter is not used;
- *Source ID* — message source ID;
- *Source IP* — message source IP address;
- *Source name* — name of the source in the object tree;
- *Source type*;
- *Process date* — event processing start date (when status 'New' changed to 'Processing');
- *Process user* — operator name (login), who started the processing;
- *Max process time* — event processing start time;
- *Finish mode* — type of message closure: MANUAL — manual, AUTO — automatic normalization;
- *Finish source* — in case of automatic normalization this field contains identifier of

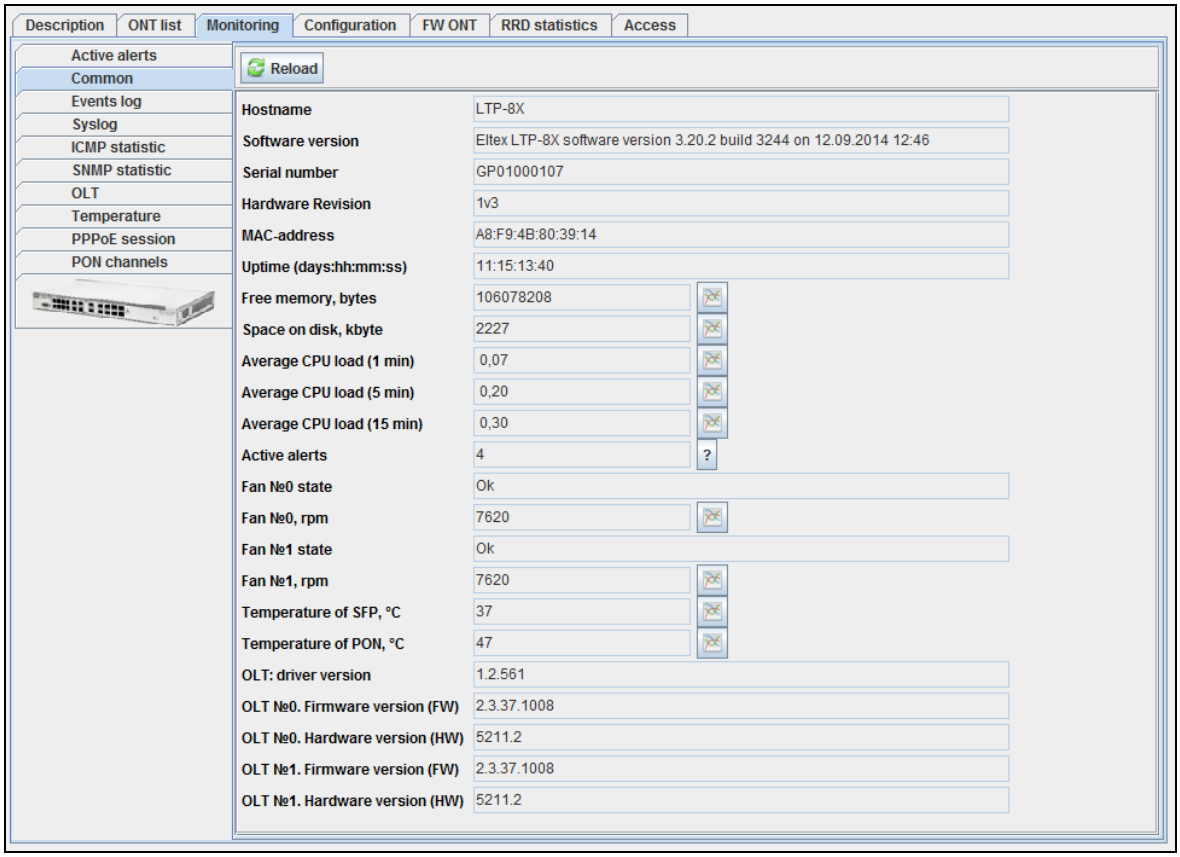
normalizing message;
- *Finish date* — date, when status changed to *'Closed';*
- *Beginning date;*
- *ONT serial* — ONT serial number (filled in for messages, where ONT number is present).

Click *Choose All* button to select all list fields, that you want to add.

To save changes in the set of displayed fields, click *Accept* button, or click *Cancel* to discard changes.

6.6.3. MONITORING MENU, COMMON TAB

The tab shows general data, received from the device. The information is read-only.



This menu contains general data for the device:
- *Hostname* — device hostname;
- *Software version* — device firmware version;
- *Serial number* — device serial number;
- *Uptime* — device operation time since the last reboot;
- *Free memory, bytes* — free device memory in bytes;
- *Free on disk* — free space on disk in percentage;
- *Average CPU Load (1 min/5 min/15 min)* — CPU load in percentage for the last minute/5 minutes/15 minutes;
- *Active alerts*— number of active alarms for the device;

For LTP:

- *Hardware Revision* — board version number;
- *MAC-address* — device MAC address;
- *Fan №0/№1 state*— fan operation status;
- *Fan #0/#1, rpm* — fan rotation speed in rpm;

- *Temperature of SFP, Temperature of PON, ˚C* — thermal sensor readings in Celsius;
- *OLT: driver version (LTP)* — OLT optical chip driver version;
- *OLT№0, №1. Firmware version (FW) (LTP)* — OLT optical chip firmware version;
- *OLT№0, №1. Hardware version (HW) (LTP)* — OLT optical chip hardware version;

For LTE:

- *Fan № state*— fan operation status;
- *Temperature, ˚C* — thermal sensor readings in Celsius;
- *Number of active ONT* — quantity of active ONTs connected to the device;

For MA400-PX

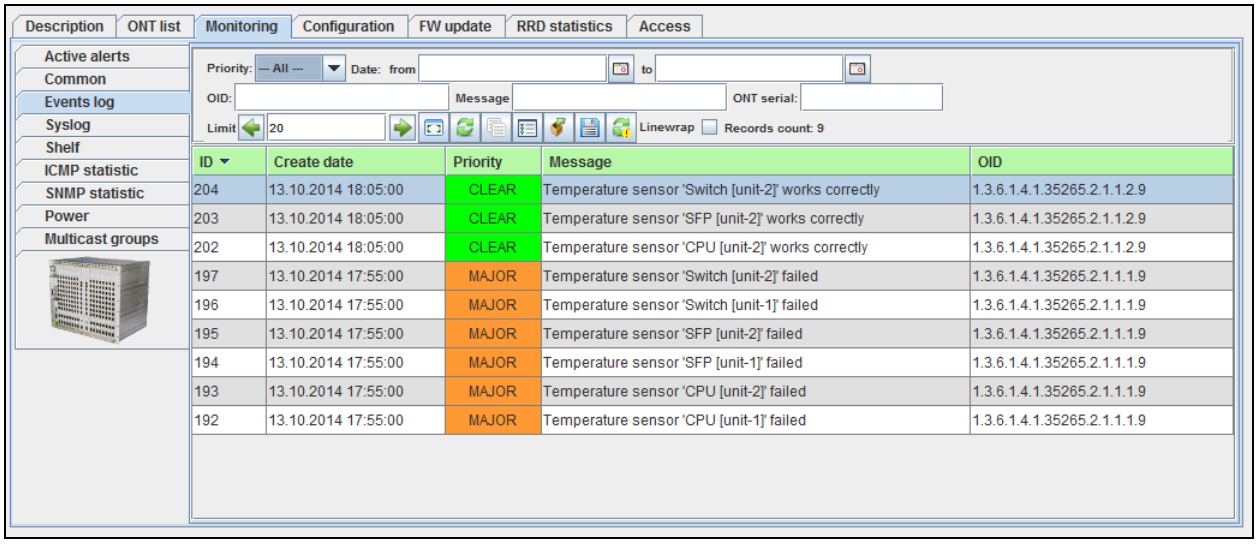
- *Fan №X, rpm* — fan rotation speed in rpm;
- *Relative speed, %* — fan rotation speed in percentage from max;
- *Fan №X state* — administrative status of fan operation;
- *Unit1/Unit2 firmware version* — version of firmware for control modules;
- *Unit1/Unit2 uptime (days:hh:mm:ss)* — control module operation time since the last reboot;
- *Unit1/Unit2 role* — control unit role (master/slave);
- *Unit1/Unit2 slot* — control module position in a rack (left/right);
- *Unit1/Unit2 Serial number* — serial numbers of control modules.

Click  button to proceed to *RRD Statistics* tab, to add new parameter monitoring task or to view the statistics for the previously assigned task (for detailed information, see Chapter **6.6.10 RRD Statistics menu**).

Click *Reload* button to refresh the information in the tab.

6.6.4. MONITORING MENU, EVENTS LOG TAB

This menu contains the list of events received from the device.

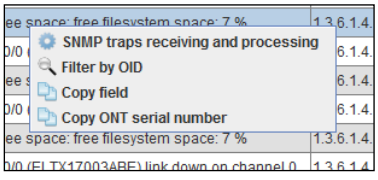


Click  *(Re-read database)* button to refresh the information in the tab (with filtering).

Click  button to synchronize current alarms for the device.

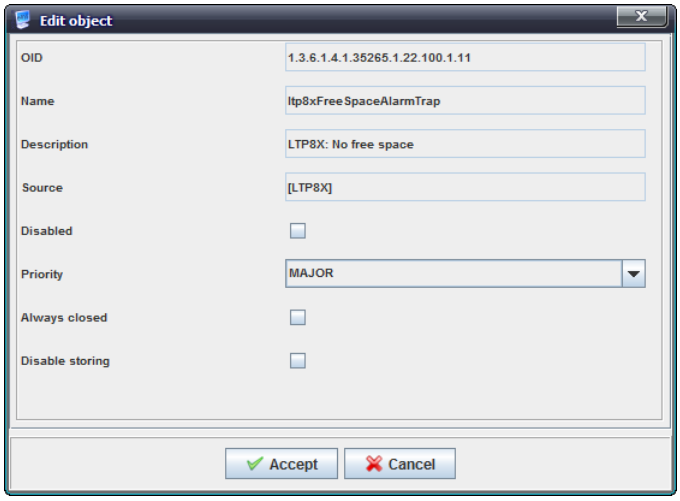
Click  button to save the current event table to a local PC.

To select all records in the table, click  button (*Select All*).



Click the right mouse button on the selected row to show the menu, which allows you to edit and manage the active event.

- *SNMP traps receiving and processing* — configure the processing of this trap by the system;



  - *OID* — trap identifier (cannot be changed);
  - *Name* — trap name (cannot be changed);
  - *Description* — trap description (cannot be changed);
  - *Source* — device name (type) (cannot be changed);
  - *Disabled* — this checkbox disables trap processing (processors will ignore this trap, no changes will be made to database);
  - *Priority* — set trap priority;
  - *Always closed* — when checked, trap will be recorded into the database in *Closed* state and will not be listed as a new trap in subsystems;
  - *Disable storing* — when checked, the trap will not be stored in the database, but it will be processed by appropriate handlers, if they are used.

- *Filter by OID* — filter events by OID identifier;

- *Copy field* — copy the text from this field into the clipboard;

- *Copy ONT serial number* — copy ONT serial number, mentioned in this event, into the clipboard.

For event sorting order and individual and group status changing, see chapters **6.6.2.1, 6.6.2.2, 6.6.2.3** respectively.

6.6.4.1. EVENT FILTERING

You can filter events in the table by one or multiple parameters.

Filter list for active events:

- *Priority* — priority of the occurred event;
- *Date*: *from/to* — record creation date range in *DD.MM.YYYY* or *DD.MM.YYYY HH.MM* format;
- *OID* — SNMP OID of the received message (permitted formats: 1.3.6.*, *.1.6.3.1, *.3.6*, 1.3.6.1.4.1.8072.4);
- *Message* — message text (permitted formats: text, %text, %part of the text%);
- *ONT serial* — serial number or PON MAC ONT (whole or partial).

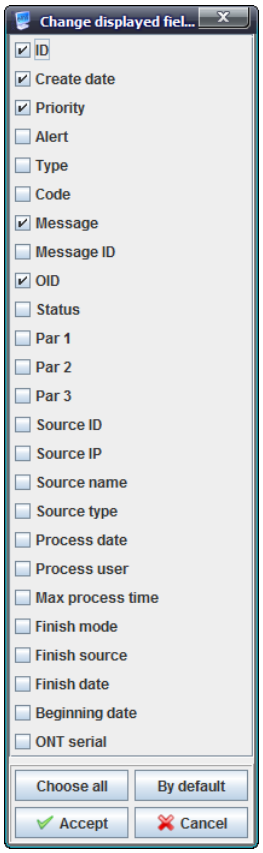
Use  *(Reset Filters)* button to return all filters into their default state.

Use  *(Modify Fields)* button to configure displayed fields of the log records.

6.6.4.2. EVENT TABLE CONFIGURATION

Click  (*Modify Fields*) button to configure the set of fields for the event table.

List of displayed fields:



- *ID* — record identifier;
- *Create date* — record creation date;
- *Priority* — priority of the occurred event;
- *Alert* — alarm marker;
- *Type* — type of the event (snmp trap, monitor, etc.);
- *Code* — internal event code;
- *Message* — text message;
- *Message ID* — message identifier;
- *OID* — SNMP OID of the received message;
- *Status* — current message status;
- *Par 1* — parameter 1, that contains alarm index;
- *Par 2* — parameter 2, that contains additional alarm index;
- *Par 3* — parameter is not used;
- *Source ID* — message source ID;
- *Source IP* — message source IP address;
- *Source name* — name of the source in the object tree;
- *Source type*;
- *Process date* — event processing start date (when status 'New' changed to 'Processing');
- *Process user* — operator name (login), who started the processing;
- *Max process time* — event processing start time;
- *Finish mode* — type of message closure: MANUAL — manual, AUTO — automatic normalization;
- *Finish source*— in case of automatic normalization this field contains identifier of normalizing message;
- *Finish date* — date, when status changed to 'Closed';
- *Beginning date;*
- *ONT serial* — ONT serial number.

Click *Choose All* button to select all list fields that you want to add.

To save changes in the set of displayed fields, click *Accept* button, or click *Cancel* to discard changes.

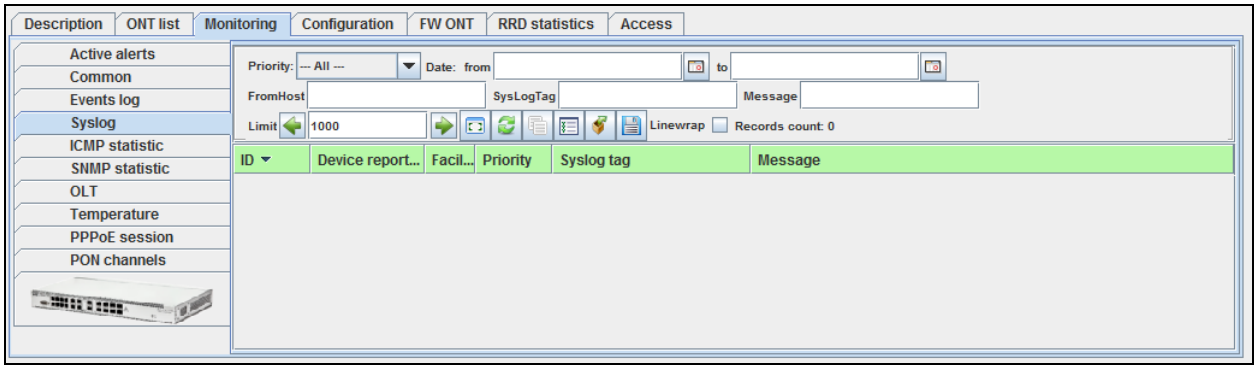
6.6.4.3. EXPORT OF RECORDS

For detailed export process description, see chapter **10 Export of Records.**

6.6.5. MONITORING MENU, SYSLOG TAB

The tab shows device system log records. The information is read-only.

SYSLOG is a protocol, designed for transmission of messages on current system events. EMS system acts as a SYSLOG server and receives messages from devices.



Click  *(Re-read database)* button to refresh the information in the tab (with filtering).

Click  button to save the current event table to a local PC.

To select all records in the table, click  button (*Select All*).

You can filter events in the log by one or multiple parameters.

Filter list for log records:

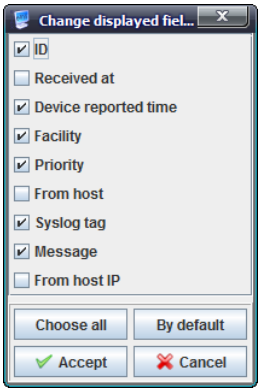
- *Priority* — priority of the occurred event:
  - *LOG_EMERG* — emergency message;
  - *LOG_ALERT* — alert message;
  - *LOG_CRIT* — critical alarm message;
  - *LOG_ERR* — error message;
  - *LOG_WARNING* — warning message;
  - *LOG_NOTICE* — notification;
  - *LOG_INFO* — informational message;
  - *LOG_DEBUG* — debug message;
- *Date*: from/to — record receiving date range in *DD.MM.YYYY* or *DD.MM.YYYY HH.MM* format;
- *FromHost* — message source address (used for devices with module architecture);
- *SysLogTag* — type of process that has sent the message;
- *Message* — message.

Limit field allows you to configure the quantity of messages displayed on the page. Use arrow

buttons located to the left and right from the field to navigate through pages.

Use  *(Reset Filters)* button to return all filters into their default state.

Use *Modify Fields* button to configure displayed fields of the log records:

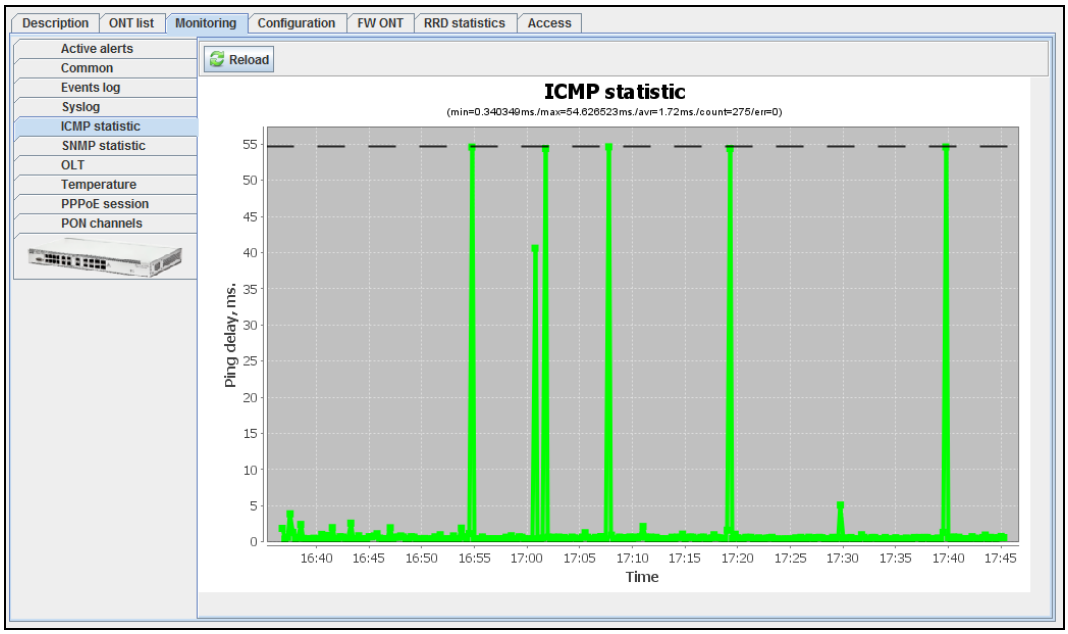


- *ID* — record identifier, always displayed;
- *Received at* — date and time of message receiving notification;
- *Device reported Time* — record receiving date in *DD.MM.YYYY* or *DD.MM.YYYY HH:MM;*
- *Facility* — weighted value of the record;
- *Priority* — priority of the occurred event;
- *From host* — hostname of the message source;
- *Syslog tag* — type of process that has sent the message;
- *Message* — message text;
- *From host IP* — IP address of the message source.

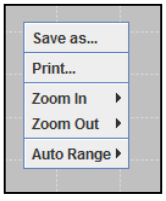
To save changes in the set of displayed fields, click *Accept* button, or click *Cancel* to discard changes.

6.6.6. MONITORING MENU, ICMP STATISTICS TAB

This tab shows echo test duration statistics for the last two hours.



Click the right mouse button on the chart field to show the control menu.

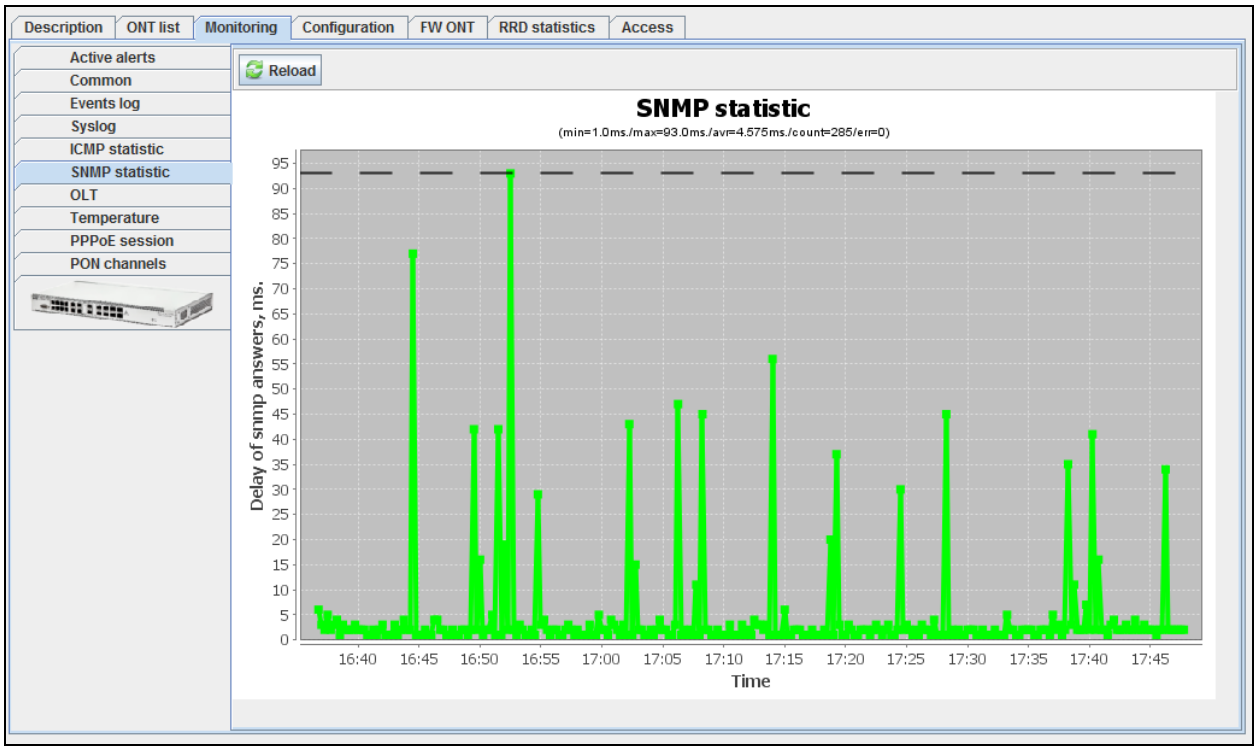


- *Save as* — save the current image to a local PC;
- *Print* — print the current image;
- *Zoom in/out* — configure the scale of chart axis;
- *Auto Range* — configure the scale of chart axis automatically.

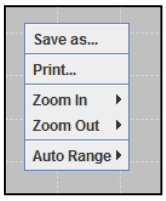
Click *Reload* button to refresh the information in the tab.

6.6.7. MONITORING MENU, SNMP STATISTICS TAB

This tab shows SNMP response delay statistics for the last two hours.



Click the right mouse button on the chart field to show the control menu.



- *Save as* — save the current image to a local PC;
- *Print* — print the current image;
- *Zoom in/out* — configure the scale of chart axis;
- *Auto Range* — configure the scale of chart axis automatically.

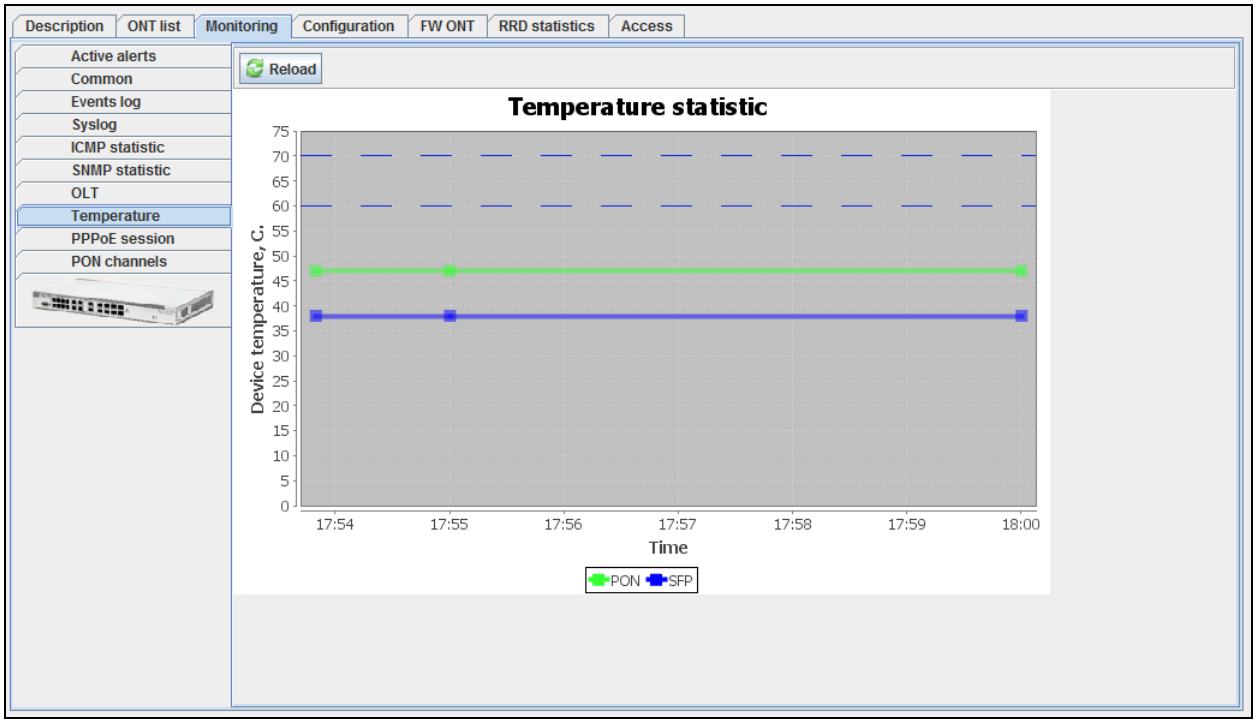
Click *Reload* button to refresh the information in the tab.

6.6.8. MONITORING MENU, TEMPERATURE TAB

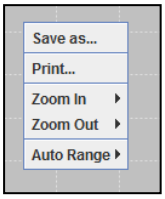
This tab contains statistic chart of readings from temperature sensors installed inside the modules.

Temperature statistics is gathered from OLT devices, if the following conditions are met:

- device is available via SNMP protocol;
- device is not 'out of service' on the Access tab;
- automatic temperature data collection service is running: Temperature Control monitor.



Click the right mouse button on the chart field to show the control menu.



- *Save as* — save the current image to a local PC;
- *Print* — print the current image;
- *Zoom in/out* — configure the scale of chart axis;

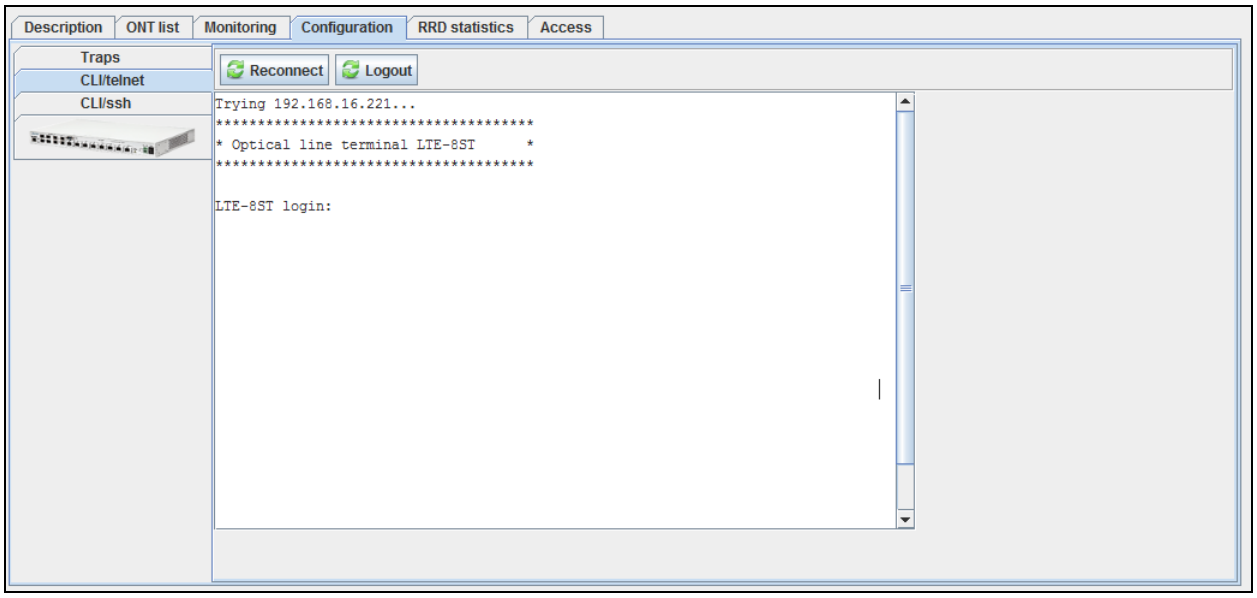
You can change the scale with the mouse wheel: scroll down to zoom in, scroll up to zoom out.

- *Auto Range* — configure the scale of chart axis automatically.

Click *Reload* button to refresh the information in the tab.

6.6.9. CONFIGURATION MENU, CLI/TELNET, CLI/SSH TABS

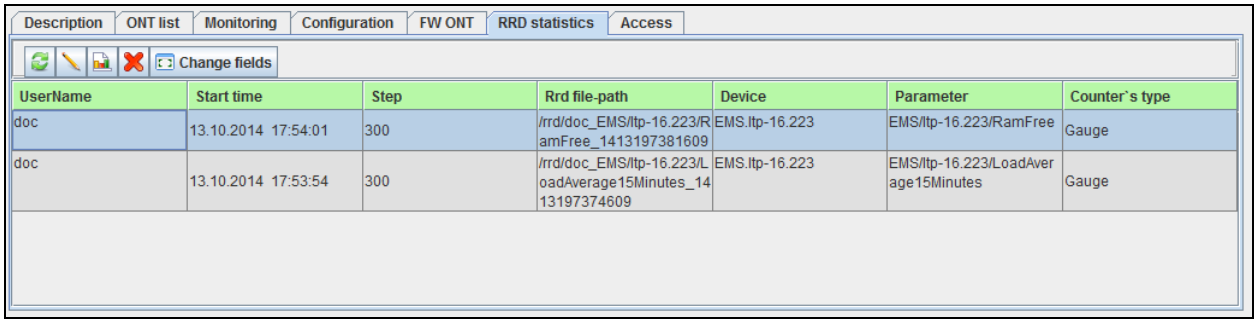
In CLI/telnet tab the system emulates the terminal program for connection via Telnet protocol, in CLI/ssh menu — for connection via SSH protocol.



6.6.10. RRD STATISTICS MENU

This menu allows you to configure the collection of network interface load statistics. The data is output in graphics/tabular format.

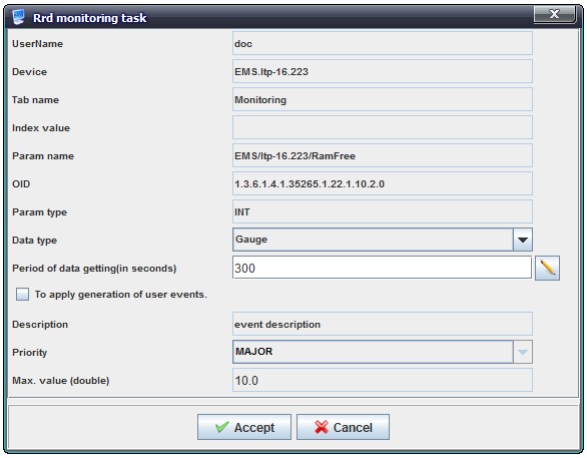
Round-robin Database (RRD) is a database, where the amount of stored data remains constant over time. As the number of records remains constant, they are used in cycles when data saving is performed. As a rule, such databases are used for storing information that is rewritten in regular periods of time.

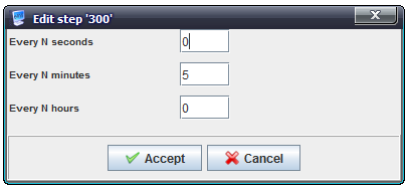


UserName	Start time	Step	Rrd file-path	Device	Parameter	Counter`s type
doc	13.10.2014 17:54:01	300	/rrd/doc_EMS/ltp-16.223/RamFree_1413197381609	EMS.ltp-16.223	EMS/ltp-16.223/RamFree	Gauge
doc	13.10.2014 17:53:54	300	/rrd/doc_EMS/ltp-16.223/LoadAverage15Minutes_1413197374609	EMS.ltp-16.223	EMS/ltp-16.223/LoadAverage15Minutes	Gauge

For adding monitoring tasks, use *Monitoring* section, *Common* tab. Settings available for monitoring are marked with  button located to the right of the entry field. Click this button to open Add Task dialog window or go to the record with existing task.

Task editing is performed by clicking  .

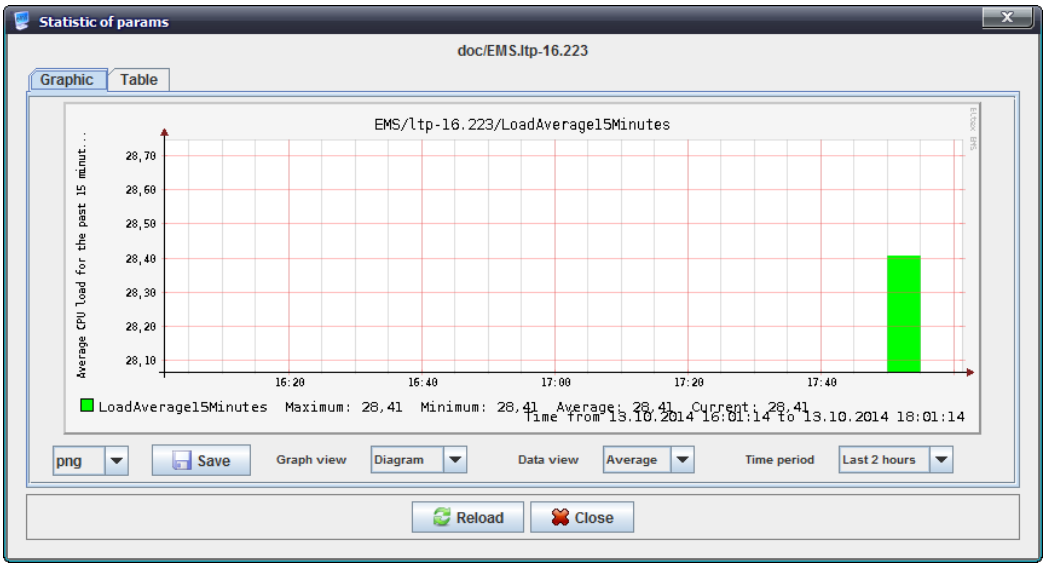




You can edit the following settings:

- *Data type* — select the type of saved data: absolute or increment (difference between values);
- *Period of data getting (in seconds)* — set the polling period in seconds. If polling values are great, you can use the additional editing menu that is available by clicking the button to the right of the entry field. There you can set the polling period in hours, minutes and seconds. For example, every 1h 30min (0 sec), every 2h (0min, 0 sec), every 2min 30sec. At that, the value entered into the field will be automatically converted to seconds;
- *To apply generation of user events* — when checked, the following settings will become available:
  - *Event description* — arbitrary text description;
  - *Priority* — select the event priority from the drop-down list;
  - *Max. value (double)* — maximum value of the monitored parameter; if exceeded, user event will be generated with the defined priority.

Data gathered by the task are shown by clicking  .



The chart explicitly shows time dependence of the measured parameter. You can adjust the chart type (diagram or line chart), data type (average or maximum), and displayed time period (from the

last two hours to a week) with the corresponding drop-down lists below the chart.

The table lists measured parameter values for each point of time according to the polling period.

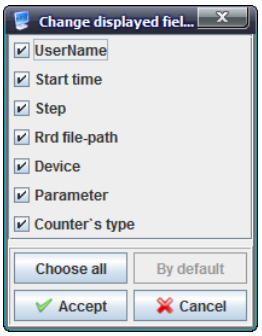
You can save the resulting chart into a file — just select its extension and click *Save* button.

Available extensions:
- Bmp;
- Gif;
- Jpeg;
- Jpg;
- Png;
- Wbmp.

Click *Reload* button to refresh the information.

6.6.10.1. EVENT TABLE CONFIGURATION

Click *Change Fields* button to configure the set of fields for the event table.

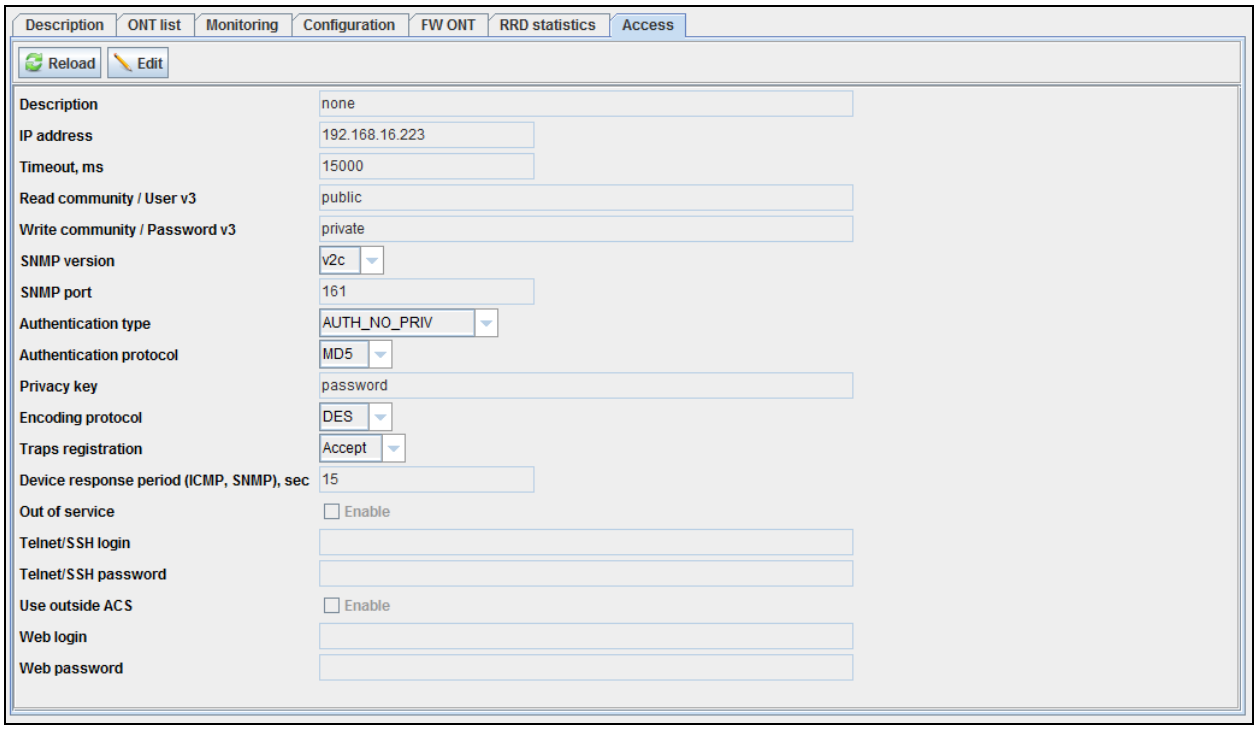


List of displayed fields:
- *User Name*— record identifier;
- *Start time* — record creation date;
- *Step*— priority of the occurred event;
- *Rrd file-path* — path to statistics output file;
- *Device* — name of the device, that statistics is gathered for;
- *Parameter* — monitored parameter;
- *Counter's type* — absolute or increment.

6.6.11. ACCESS MENU

This tab contains general parameters for data exchange between the device and EMS. Click *Edit* button to make them available for editing. All parameters in this tab are available for editing.

The following parameters are essential for gaining access to the device: *Read Community, Write Community*. These settings should be confirmed by the network administrator or checked against the SNMP agent configuration file.



- *Description* — arbitrary description;
- *IP address* — device IP address;
- *Timeout, ms* — timeout of data exchange with the device;

We do not recommend setting the timeout value lower than 5000ms.

- *Read Community/User v3* — password for read access, for SNMP v3 — user login;
- *Write Community/Password v3* — password for write access, for SNMP v3 — user password;
- *SNMP version* — SNMP protocol version (supported versions: v2c, v3);
- *SNMP port* — device IP port number for data exchange via SNMP;
- *Authentication type* — authentication type, specified for SNMP v3;
- *Authentication protocol* — authentication protocol, specified for SNMP v3:
  - *MD5* — authorization with MD5 hash;
  - *SHA* — authorization with SHA hash;
- *Privacy key* — specified for SNMP v3, if AUTH_PRIV authentication type is set;
- *Encoding protocol* — encryption protocol for SNMP v3:
  - *DES* — symmetric encryption algorithm with 56-bit key;
  - *AES* — symmetric block encryption algorithm with 128/192/256-bit key;
- *Traps registration* — trap registration mode:
  - *Accept* — system will generate traps received from devices;
  - *Block* — system will not generate or show traps;
- *Device response period (ICMP, SNMP), sec* — period of periodic polling via ICMP and SNMP protocols;

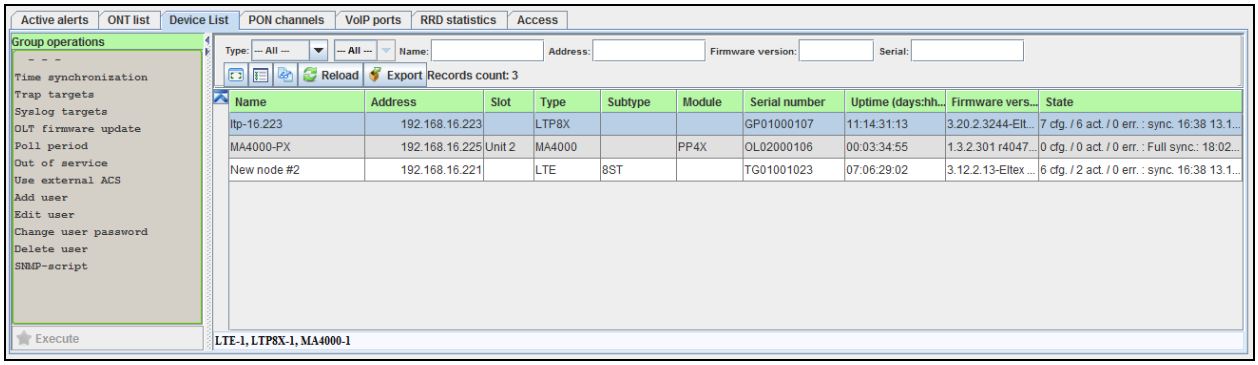
- *Out of service* — when checked, automatic services (monitors) will not be able to perform operations with the object (availability polling, configuration upload, etc.);
- *Telnet/SSH Login* — set the access login for *Telnet/SSH* protocols;
- *Telnet/SSH Password* — set the access password for *Telnet/SSH* protocols;
- *Use outside ACS* — when checked, the device will be able to use the external ACS server;
- *Web login;*
- *Web password.*

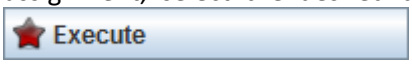
To discard or save changes made to parameters, click the corresponding buttons — *Cancel* or *Save.*

Click *Reload* button to refresh the information in the tab.

6.7. GROUP OPERATIONS FOR DEVICES IN A NODE

For devices located in a single node, you can group edit some of their parameters. To perform these operations, go to *Device List* tab for the desired node.



In the right part of the screen there is a table with devices added to this node and their status information. In the left part of the screen there is a list of available group operations. To perform the assignment, select the desired devices from the table, select an operation from the list and click 

button. Dialog window, that allows the assignment of group operation parameters, will be opened; choose the desired values and click *Apply* button.

List of group operations

- *Time synchronization* — perform immediate device synchronization using data from the management system. Also, you can configure time server;

- *Trap targets*— configure IP address for sending messages via SNMP protocol (trap, inform);

- *Syslog targets* — configure IP address for sending messages via Syslog protocol;

- *OLT Firmware Upgrade* — create packet task to perform the firmware upgrade on the similar selected devices;

- *Poll period* — group configuration of the 'Device polling period (ICMP, SNMP)' parameter in the device access settings;

- *Out of service* — group configuration of the '*Out of service*' parameter in the device access

settings;

– *Use external ACS* — group configuration of '*Use external ACS*' checkbox in the device access settings;

– *Add user* — group user addition into the selected OLT devices;

– *Edit user* — group user editing in the selected OLT devices;

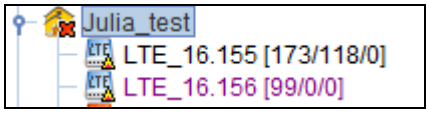
– *Change user password* — group user password modification in the selected OLT devices;

– *Delete user* — group user deletion from the selected OLT devices;

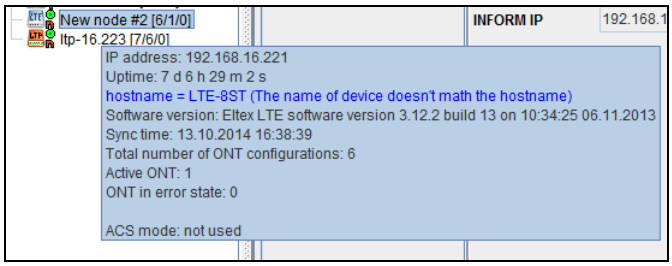
– *SNMP-script* — apply SNMP-script to the selected devices.

7 PON DEVICE MANAGEMENT: LTE-8ST, LTE-8X, LTE-2X

LTE series devices are the station-side devices designed for organization of PON networks based on Turbo GEPON technology.



Hover the cursor over the tree object to see the tooltip with the information on that object:



- IP address;
- Uptime;
- Number of active events;
- SNMP trap settings;
- Hostname;

Records representing errors, that prevent the obtaining of the 'green' synchronization status for that object, are marked in blue.

- Software version;
- last synchronization date and time;
- total number of ONT configurations on the device;
- number of active ONTs on the device;
- number of ONTs in the error state in the device;
- ACS mode.

7.1. MAIN OBJECT EDITING AND MONITORING WINDOW

Table 3 lists description of the basic control tabs:

Table 3 — LTE control and monitoring menu

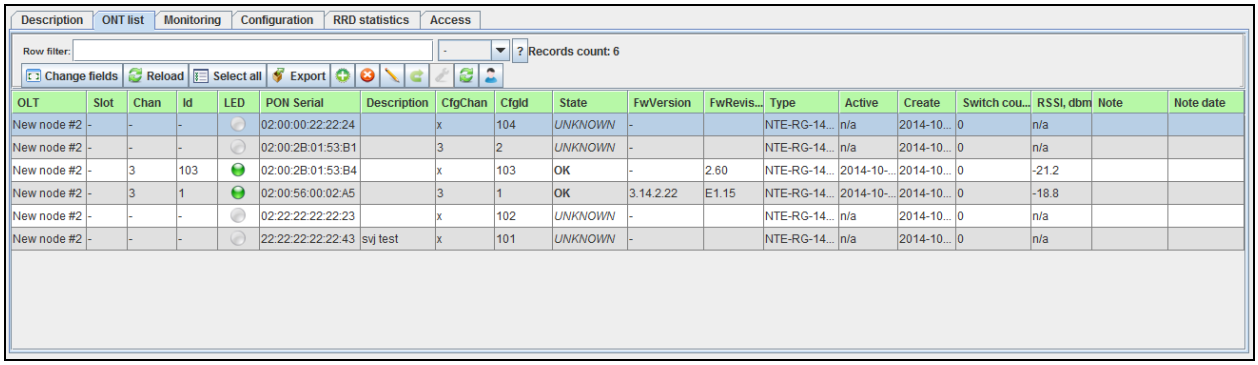
Menu	Description	Section
Description	Information on the physical properties of the object	6.6.1
ONT list	View and edit ONT configurations	7.2
Monitoring	Monitoring of the object parameters	7.3
Active alerts	Monitoring of active events, received from the device	6.6.2
Common	General device data (firmware version, uptime, CPU load, etc.)	6.6.3
Events log	Monitoring of events, received from the device	6.6.4
Syslog	Network log configuration for the system	6.6.5
ICMP statistics	Echo test duration statistics to the device	6.6.6
SNMP statistics	SNMP response delay statistics	6.6.7
Temperature	Statistic chart of PP4X module temperature variations	6.6.8
OLT	Online monitoring of device port status	7.3.1
PPPoE session	Information on PPPoE session parameters, running on the device	7.3.2
PON channels	Device SFP modules management and monitoring	7.3.3
Configuration	Configuration management	7.4
Traps	Trap settings configuration	7.4.1

CLI/telnet	Terminal program emulator for connections via Telnet protocol	6.6.9
CLI/ssh	Terminal program emulator for connections via SSH protocol	6.6.9
RRD statistics	Collection of the network interface load statistics	6.6.10
Access	Information on the object hardware parameters, that are stored in the database, device SNMP access settings	6.6.11

7.2.ONT LIST

This section lists information on all ONTs, registered on the device and physically connected to ONT PON channels. In summary, this table shows several types of ONT states:

- ONT is present in OLT configuration, but there is no physical connection;
- ONT is present in OLT configuration, there is a physical connection, but some parameters are not defined, 'Alarm' logical state;
- ONT is present in OLT configuration, there is a physical connection, all parameters are defined correctly, 'In operation' logical state;
- ONT is not present in OLT configuration, but there is a physical connection, 'Alarm' logical state;
- ONT is present in OLT configuration, all parameters are defined correctly, operation is blocked by the operator, 'Blocking' logical state.



OLT	Slot	Chan	Id	LED	PON Serial	Description	CfgChan	CfgId	State	FwVersion	FwRevis...	Type	Active	Create	Switch cou...	RSSI, dbm	Note	Note date
New node #2	-	-	-		02:00:00:22:22:24		x	104	UNKNOWN	-		NTE-RG-14...	n/a	2014-10...	0	n/a		
New node #2	-	-	-		02:00:2B:01:53:B1		3	2	UNKNOWN	-		NTE-RG-14...	n/a	2014-10...	0	n/a		
New node #2	-	3	103		02:00:2B:01:53:B4		x	103	OK	-	2.60	NTE-RG-14...	2014-10-...	2014-10...	0	-21.2		
New node #2	-	3	1		02:00:56:00:02:A5		3	1	OK	3.14.2.22	E1.15	NTE-RG-14...	2014-10-...	2014-10...	0	-18.8		
New node #2	-	-	-		02:22:22:22:22:23		x	102	UNKNOWN	-		NTE-RG-14...	n/a	2014-10...	0	n/a		
New node #2	-	-	-		22:22:22:22:22:43	svj test	x	101	UNKNOWN	-		NTE-RG-14...	n/a	2014-10...	0	n/a		

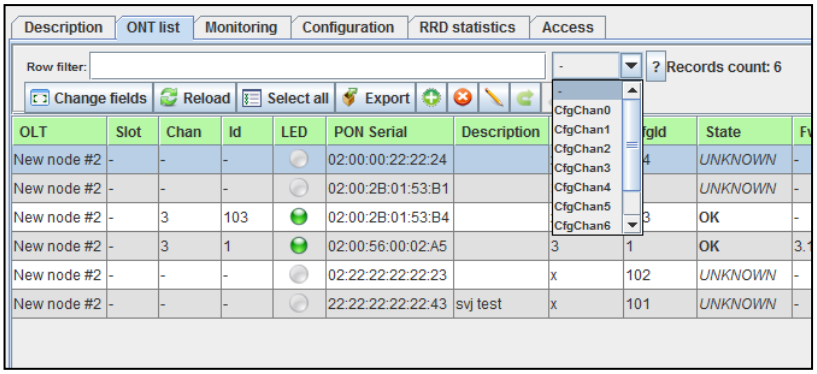
Click 

(*Reload*) button to refresh the information in the tab.

To refresh the information only for particular ONTs, select the desired records in the table and click  button — microsynchronization will be performed.

7.2.1. RECORD FILTERING

Filtering by channel number



To apply filter to the particular PON tree, select the PON channel number (chan0..7), where the ONT configuration is set up, from the drop-down menu next to the filter entry field. By default, the search is performed through all the trees.

Types of filters

Key field occurrence filter.

Search for the occurrence in the beginning, the midpoint and the end of the data of *OLT*, *PON Serial*, *Description*, *FwVersion,* and *Type* fields.

Examples: ELTX or 02:00:16 or NTE-2 or 3.16.2

Some fields are provided with adjustments that allow you to narrow the search:

- *chan=*
- *id=*
- config=

Examples: config=x.115

Logical filters for the device network status:

- *online* — all connected;
- *offline* — all disconnected;
- *error* — all connected, but not in OK state.

Note. The filter input is not case-sensitive.

Joining filters

You can use multiple filters simultaneously by space-separating them.

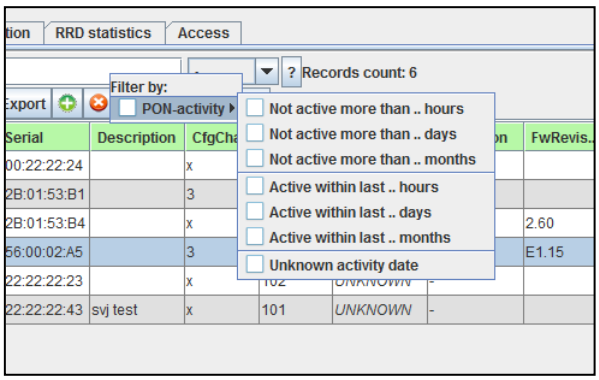
Example:

NTE-RG-1402F online — all connected NTE-RG-1402F.

Special filters

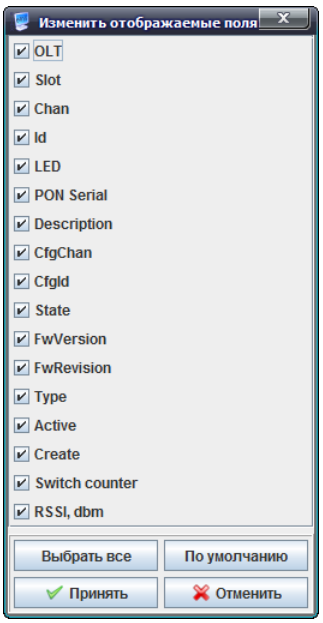
Click the right mouse button on the **search** field to show the special filters.

In fact, special filters work in the same way, and they just help you to enter key words and values correctly.



7.2.2. ONT LIST APPEARANCE CONFIGURATION

Click *Change Fields* button to configure the set of the table fields.



List of displayed fields:

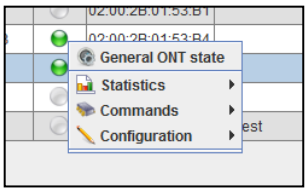
- *OLT* — device name;
- *Slot* — MA4000-PX rack slot number, where the module is installed (for MA4000);
- *Chan* — channel number;
- *ID* — ONT identifier;
- *LED* — ONT activity indicator:
  - *Green* — OK state — normal operation;
  - *Red* — UNACTIVATED state — missing or bad configuration;
  - *Grey* — device is configured, but not connected;
  - *Purple* — device is blocked by the operator;
- *PON serial* — ONT serial number in 02:00:xx:xx:xx:xx format;
- *Description* — text description;
- *Cfgid* — identifier of the subscriber-side device in the tree in CPE configuration of the station-side device (for ONTs tethered to the tree, in the range from 1 to 99; for ONTs not tethered to the tree — (CfgChan =x) in the range from 100 to 4294967295;
- *CfgChan* — number of the tree, that has subscriber-side device tethered to it in CPE configuration of the station-side device (from 0 to 7); for ONTs not tethered to the tree — CfgChan =x;
- *State* — ONT state;
- *FwVersion* — ONT firmware version;
- *FwRevision* — ONT PON chip version;
- *Type* — ONT model;
- *Active* — operation status (activity);
- *Create* — date of ONT creation on the server;
- *Switch counter* — ONT state transition counter (increases in reconfiguration, for example);
- *RSSI, dbm* — power level of the received signal in dbm.

Click Choose All button to select all list fields that you want to add.

Click *Remove Old* button to remove records that are more than one month old.

To save changes in the set of displayed fields, click *Accept* button, or click *Cancel* to discard changes.

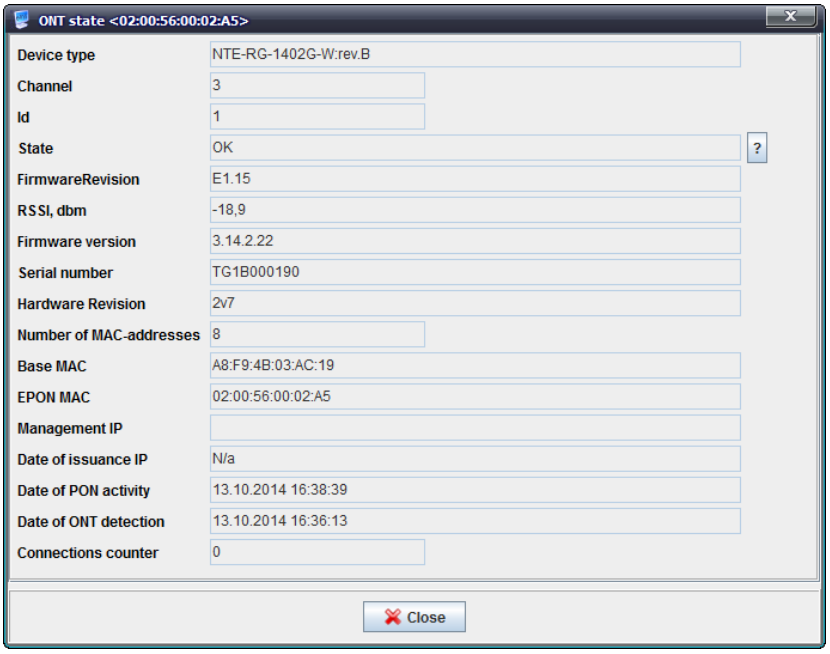
7.2.3. CONFIGURING CONNECTED ONTS



Click the right mouse button on the active ONT row to show the device control menu:

General ONT state:

Click the middle mouse button (scroll wheel) on the selected active ONT record to show ONT state window.



- *Device type* — device model;
- *Channel* — PON channel number, where the device is listed in configuration
  - Disabled — device is not tethered to PON tree;
- *ID* — identifier of the device in the tree; for ONTs not tethered to the PON tree, identifier is assigned in the range from 100 to 9999, for tethered ONTs — in the range from 1 to 99;
- *State* — ONT status:

Description of ONT States

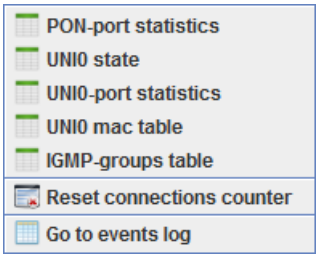
ONT State	Description
ALLOCATED	resource allocated
AUTH_FAILED	authorization failed
AUTH_IN_PROGRESS	authorization in progress
AUTH_OK	authentication successfully completed
BLOCKED	blocked
CFG_FAILED	configuration failed to apply
CFG_IN_PROGRESS	configuration application in progress
DISCOVERED	resource not found
FREE	free state (not used)
OK	normal operation state
REPORT_TIMEOUT	exchange timeout
RESET_IN_PROGRESS	reset in progress
RESET_OK	reset successfully completed
UNAVAILABLE	not used

- *Firmware Revision* — device firmware revision;

- *RSSI, dbm* — power level of the received signal in dbm;
- *Firmware Version* — device firmware version Negative values indicate that the version information is not available;
- *Serial number* — device serial number;
- *Hardware Revision* — version of the device board;
- *Number of MAC-addresses* — available MAC address quantity;
- *Basy MAC* — basic MAC address of the device;
- *EPON MAC* — PON MAC address of the device;
- *Management IP* — device IP address in the master network;
- *Date of issuance IP* — lease date of IP address in the master network;
- *Date of PON activity* — last known PON activity date (automatic monitor is running);
- *Date of ONT detection* — last known ONT discovery date (automatic monitor is running);
- *Connections counter.*

Operation statistics:

- *PON port statistics* — optical port traffic counters:
  - *ReceiveBroadcastFrames* — quantity of broadcast frames received;
  - *ReceiveBytes* — quantity of bytes received;
  - *ReceiveCRCErrors* — quantity of frames with CRC errors received;
  - *ReceiveDroppedBytes* — quantity of bytes received and dropped afterwards;



  - *ReceiveDroppedFrames* — quantity of frames received and dropped afterwards;
  - *ReceiveFCSErrors* — quantity of frame check sequence (FCS) errors received;
  - ReceiveFrames — general quantity of frames received;
  - *ReceiveLine CodeErrors* — quantity of linear code errors received;
  - *RecieveMulticastFrames* — quantity of multicast frames received;
  - *RecieveUndersizeFrames* — quantity of undersized frames received;
  - *RecieveUnicastFrames* — quantity of unicast frames received;
  - *TransmitBroadcastFrame*s — quantity of broadcast frames sent;
  - *TransmitBytes* — quantity of bytes sent;
  - *TransmitDroppedBytes* — quantity of bytes sent and dropped afterwards;
  - *TransmitDroppedFrames* — quantity of frames sent and dropped afterwards;
  - *TransmitFrames* — quantity of frames sent;
  - *TransmitMulticastFrames* — quantity of multicast frames sent;
  - *TransmitUnicastFrames* — quantity of unicast frames sent.

- *UNI0 port statistics* — ETH0 traffic counters:
  - *ReceiveAlignmentErrors* — quantity of synchronization errors received;
  - *ReceiveBroadcastFrames* — quantity of broadcast frames received;
  - *ReceiveBytes* — quantity of bytes received;
  - *ReceiveCRCErrors* — quantity of CRC errors received;
  - *ReceiveFrames* — quantity of frames received;
  - *ReceiveLengthErrors* — quantity of runt packets received;
  - *RecieveMulticastFrames* — quantity of multicast frames received;
  - *RecieveOversizeFrames* — quantity of oversized frames received;
  - *RecieveUndersizeFrames* — quantity of undersized frames received;
  - *RecieveUnicastFrames* — quantity of unicast frames received;

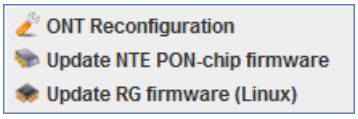
- *TransmitBroadcastFrames* — quantity of broadcast frames sent;
- *TransmitBytes* — quantity of bytes sent;
- *TransmitDroppedBytes* — quantity of bytes sent and dropped afterwards;
- *TransmitDroppedFrames* — quantity of frames sent and dropped afterwards;
- *TransmitFrames* — quantity of frames sent;
- *TransmitMulticastFrames* — quantity of multicast frames sent;
- *TransmitUnicastFrames* — quantity of unicast frames sent.

- *UNI0 port state* — device ETH0 physical port state:
  - *Link* — connection state;
  - *Speed* — connection speed;
  - *Enabled* — status (enabled/disabled);
  - *Duplex* — duplex mode;
  - *FlowControl* — flow control status;
  - *Autonegotiate* — status of autonegotiation (mode, that supports auto crossover feature; it performs automatic TP port switching between MDI and MDI-X destinations to enable the correct connection regardless of port destination for device connection);

- *MAC address table for UNI0* — table of active MAC addresses on ETH0 interface;
- *IGMP table* — table of active multicast groups on the device;
- *Switch counter reset* — reset switch counter, 'Switch counter' table field is stored in the database;
- *Go to event log* — proceed to event monitoring for that ONT.

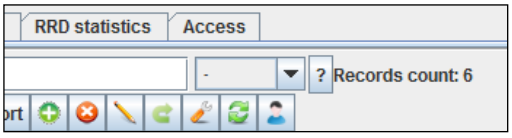
Commands:

- *ONT reconfiguration* — perform reconfiguration command for the current ONT (available by clicking  button in the edit field);
- *Upgrade PON chip firmware in NTE* — perform *Upgrade PON firmware* command on the current ONT;
  - *Upgrade NTE-RG software (Linux)* — perform manual software update on the router unit of the current ONT.



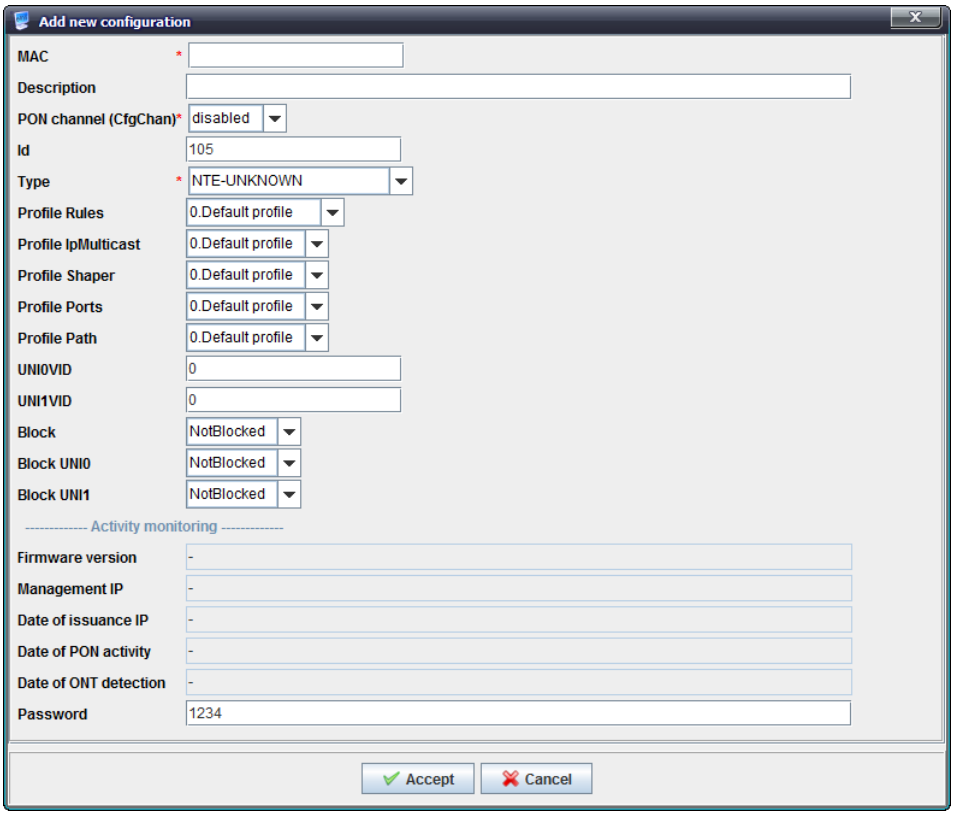
Operations with configuration:

- *Add* — create configuration for the current ONT;
- *Delete* — delete configuration for the current ONT;
- *Edit* — edit current configuration;
- *Replace ONT* — change the serial number for the current ONT.



Also, you can add, delete and edit configuration and replace ONT serial number by clicking the corresponding buttons in the edit field.

ONT configuration contains the following parameters:



- *MAC* — device MAC address;
- *Description* — arbitrary text description for the object;
- *PON channel (CfgChan)* — number of PON tree the device is tethered to:
  - *Disabled* — device is not tethered to PON tree;
- *ID* — identifier of the device in the tree; for ONTs not tethered to the PON tree, identifier is assigned in the range from 100 to 9999, for tethered ONTs — in the range from 1 to 99;
- *Type* — subscriber-side device model Select values from a drop-down list;
- *Profile Rules* — select rule configuration profile;
- *Profile IpMulticast* — select IGMP configuration profile;
- *Profile Shaper* — select bandwidth shaper profile;
- *Profile Ports*— select profile for configuring the physical parameters of ports;
- *Profile Path* — select channel routing profile;
- *UNI0VID* — VLAN identifier for UNI0 interface;
- *UNI1VID* — VLAN identifier for UNI1 interface;
- *Block* — device operation blocking:
  - *Blocked* — device is blocked;
  - *NotBlocked* — device is operational;
- *Block UNI0, UNI1* — device port operation blocking;

Activity monitoring:

- *Firmware Version* — device firmware version Negative values indicate that the version information is not available;
- *Management IP* — device IP address in the master network;
- *Date of issuance IP* — lease date of IP address in the master network;
- *Date of PON activity* — last known PON activity date (automatic monitor is running);
- *Date of ONT detection* — last known ONT discovery date (automatic monitor is running);
- *Password.*

Edit ACS parameters — open window to edit CPE private parameters on ACS server.

For detailed parameter description, see **Eltex.ACS.GUI Operation Manual**.

Go to ACS — go to ACS object with highlighted CPE in the general list.

ACS server deals with CPE router unit configuration.

For detailed description on operations with ACS object, see **Eltex.ACS.GUI Operation Manual.**

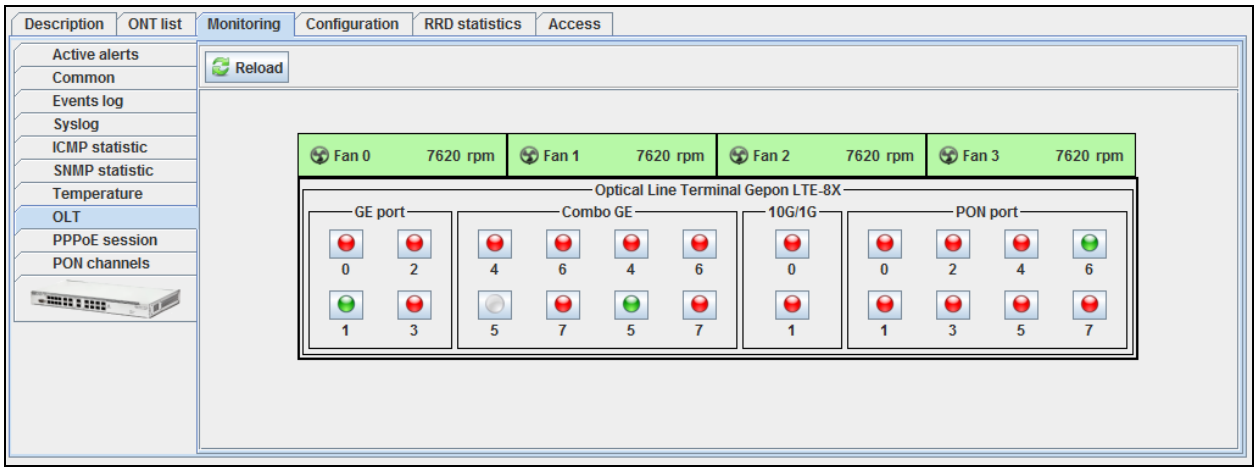
Click *Apply* button to save changes made to configuration, or click *Cancel* to discard them.

7.3. MONITORING

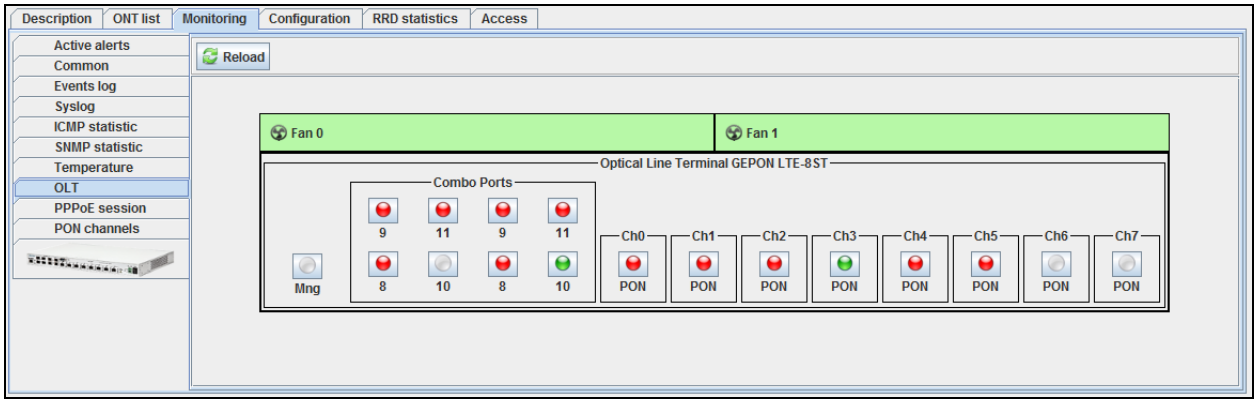
7.3.1. OLT

In this tab you can perform online monitoring of the device port state.

For LTE-8X:



For LTE-8ST:



Areas of monitoring

- *Fan, rpm* — fan state and rotation speed data in revolutions per minute (rpm)
- *Optical Line Terminal* — state of the device ports

Fan state indication:

- operating

- shut down by administrator or in alarm state

Ports indication:

– current interface state, *UP — in operation*

– current interface state, *DOWN* — port is not active/not connected

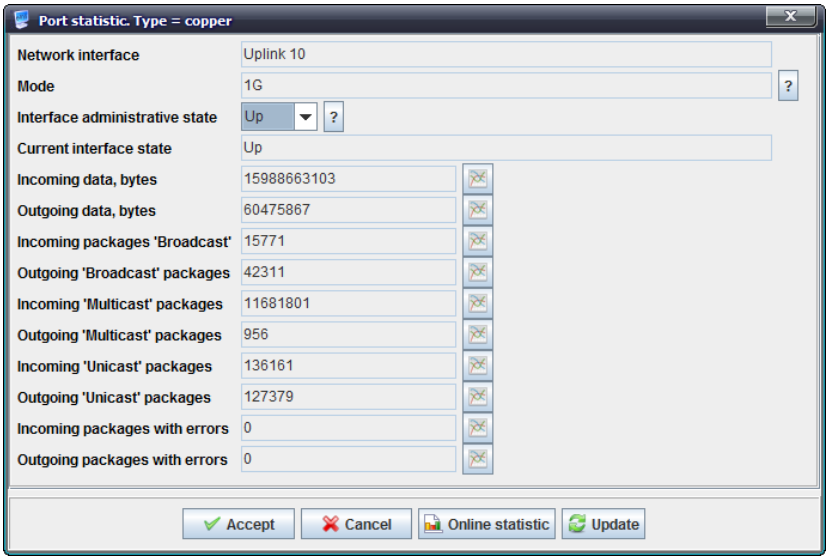
– current interface state is unknown — port is not active/not connected or was shut down by the network administrator

Port status buttons are the active elements. Click them to edit the selected port on *Uplink statistics* tab.

Click *Reload* button to refresh the information in the tab.

7.3.1.1. UPLINK PORTS STATISTICS

The statistics for the current device port will be shown in the pop-up window.



- *Network interface* — name of the interface;
- *Mode* — interface operation speed in bit/s;
- *Interface administrative state* — port control administrative status:
  - *Up* — port is physically enabled for operation;
  - *Down* — port is physically disabled for operation;

Before changing administrative state of the UPLINK port, make sure that this port is not used for device management, as it may lead to LOSS OF CONNECTION to the device.

- *Current interface state* — port operation status (Up — enabled for operation, Down — disabled for operation);
- *Incoming data, bytes* — amount of data received to the interface, in bytes;
- *Outgoing data, bytes* — amount of data sent via the interface, in bytes;
- *Incoming 'Broadcast' packages* — amount of broadcast packets received to the interface;

- *Outgoing 'Broadcast' packages* — amount of broadcast packets sent from the interface;
- *Incoming 'Multicast' packages* — amount of multicast packets received to the interface;
- *Outgoing 'Multicast' packages* — amount of multicast packets sent from the interface.
- *Incoming 'Unicast' packages* — amount of unicast packets received to the interface;
- *Outgoing 'Unicast' packages* — amount of unicast packets sent via the interface;
- *Incoming packages with errors* — amount of received packets with errors;
- *Outgoing packages with errors* — amount of sent packets with errors.

Click *Accept* button to save entered parameters, or click *Cancel* to discard them.

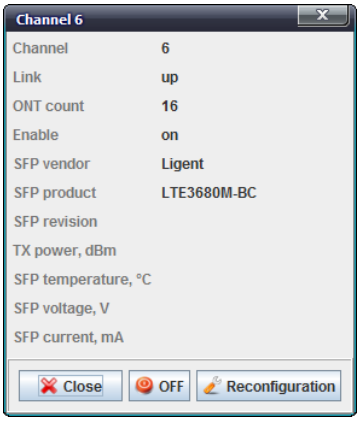
Click  button to proceed to *RRD Statistics* tab, to add new parameter monitoring task or to view the statistics for the previously assigned task (for detailed information, see chapter **6.6.10 RRD Statistics menu**).

Click *Reload* button to refresh the information in the tab.

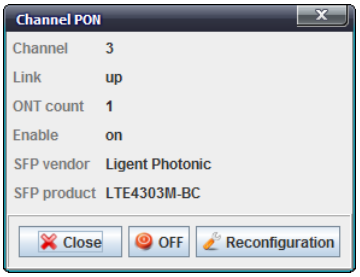
7.3.1.2. PON PORTS STATISTICS

The monitoring of device SFP modules is performed in the pop-up window.

For LTE-8X:



For LTE-8ST:



- *Channel* — PON channel number;
- *State* — operation state of SFP module;
- *ONT quantity* — quantity of connected ONTs;
- *Enable* — PON channel activity (on/off);
- *SFP vendor;*
- *SFP product;*
- *SFP revision;*
- *Laser power output, dBm;*
- *SFP temperature, °C;*
- *SFP voltage, V;*
- *SFP bias current, mA.*

Click 

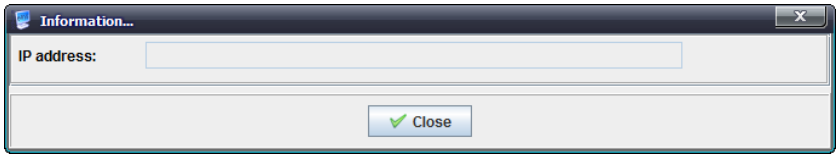
button to enable or disable the channel for the operation.

Click *Reconfiguration* button to reconfigure the selected PON channel.

Reconfiguration will lead to the loss of connection with all subscribers on the reconfigured PON channel.

7.3.1.3. MNG PORT STATISTICS FOR LTE-8ST

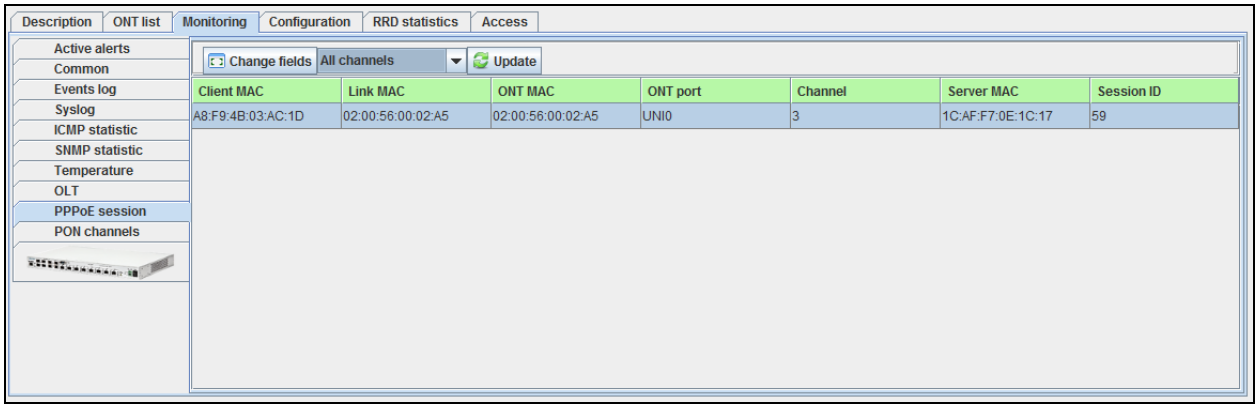
The monitoring of the control port address is performed in the pop-up window.



7.3.2. PPPOE SESSIONS

This section contains data on current active PPPoE sessions. The information is read-only.

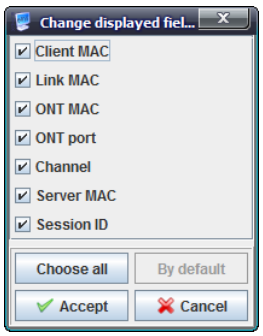
Click *Update* button to refresh the information in the tab.



Use drop-down menu to specify PON tree, which PPPoE sessions you want to view, or to show the statistics for all device trees.

The table lists the following information:

- *Client MAC* — device address of the user that established the session;
- *Link MAC* — for each UNI port, there are four virtual links with individual MAC addresses;
- *ONT MAC*— address of the subscriber-side device, that has established PPPoE session;
- *ONT port* — UNI port of the subscriber-side device;
- *Channel*— PON channel, which includes the subscriber-side device, that has established PPPoE session;
- *Server MAC* — MAC address of the upstream server processing PPPoE connections;
- *Session ID* — assigned PPPoE session number.



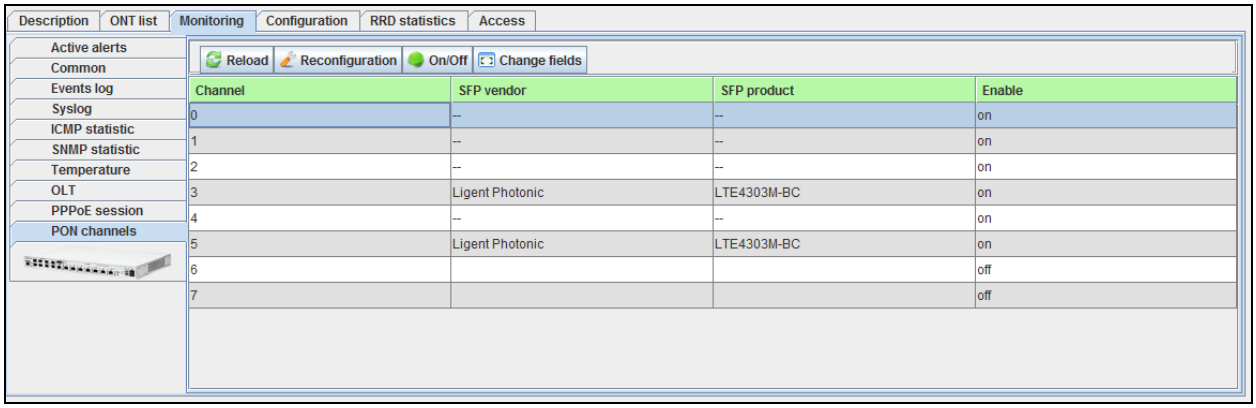
Click *Change Fields* button to configure the set of fields for the event table.

Click Choose All button to select all list fields that you want to add.

To save changes in the set of displayed fields, click *Accept* button, or click *Cancel* to discard changes.

7.3.3. PON CHANNELS

Use this tab to control and monitor SFP modules of the device.



Click 

button to enable or disable the channel for the operation. Its status in *Enabled* column will change.

Click *Reconfiguration* button to reconfigure the selected PON channel.

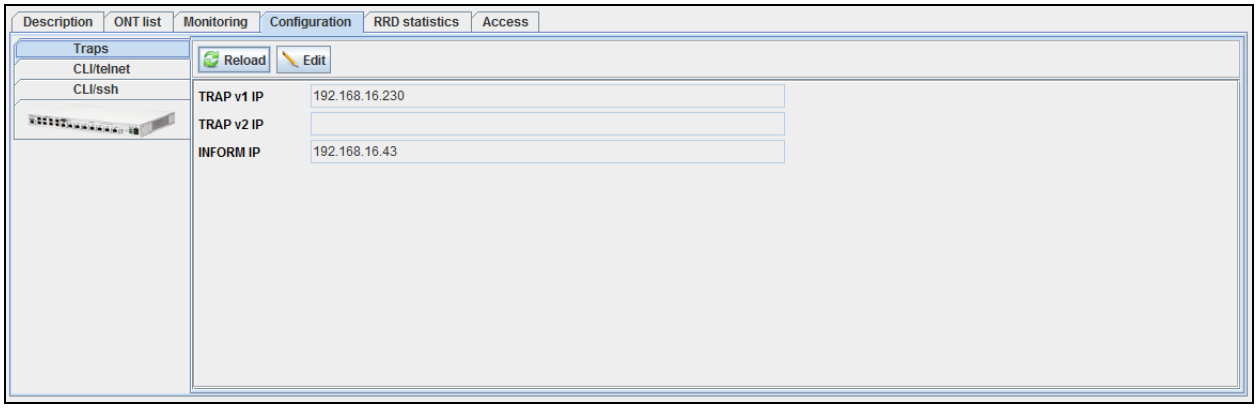
Reconfiguration will lead to the loss of connection with all subscribers on the reconfigured PON channel.

Click *Reload* button to refresh the information in the tab.

7.4. CONFIGURATION

7.4.1. TRAPS

This tab shows information on SNMP server IP address configuration for sending SNMP traps.



- *Traps v1 IP* — IP address for sending SNMPv1 traps
- *Traps v2 IP* — IP address for sending SNMPv2 traps
- *INFORM IP* — IP address for sending Inform traps

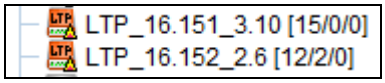
Click *Edit* button to enable the editing of fields.
Click *Save* button to save entered parameters, or click *Cancel* to discard them.

Click *Reload* button to refresh the information in the tab.

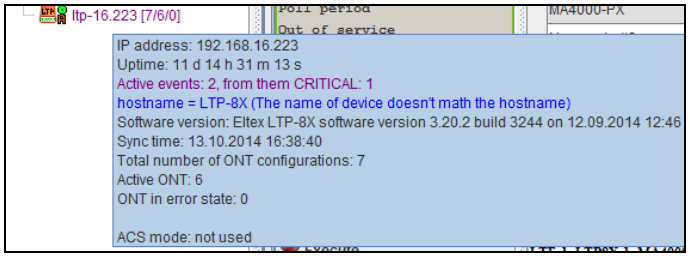
If you change trap address, SNMP agent on OLT device will be rebooted; the reboot may take a long time to complete (up to 30–40 seconds); connection between OLT and EMS will not be available at that time.

8 PON LTP-8X DEVICE MANAGEMENT

LTP series devices are the station-side devices designed for organization of PON networks based on GPON technology.



Hover the cursor over the tree object to see the tooltip with the information on that object:



- IP address;
- Uptime;
- Number of active events;
- SNMP trap settings;
- Hostname;

Records representing ERRORS, that prevent the obtaining of the 'green' synchronization status for that object, are marked in blue.

- Software version;
- last synchronization date and time;
- general number of ONT configurations on the device;
- number of active ONTs on the device;
- number of ONTs in the error state in the device;
- ACS mode.

8.1. MAIN OBJECT EDITING AND MONITORING WINDOW

Table 4 lists description of the basic control tabs:

Table 4 — LTP control and monitoring menu

Menu	Description	Section
Description	Information on the physical properties of the object	6.6.1
ONT list	View and edit ONT configurations	8.2
Monitoring	Monitoring of parameters	8.3
Active alerts	Monitoring of active events, received from the device	6.6.2
Common	General device data (firmware version, uptime, CPU load, etc.)	6.6.3
Events log	Monitoring of events, received from the device	6.6.4
Syslog	Network log configuration for the system	6.6.5
ICMP Statistics	Echo test duration statistics to the device	6.6.6
SNMP statistics	SNMP response delay statistics	6.6.7
Temperature	Statistic chart of PP4X module temperature variations	6.6.8
OLT	Online monitoring of device port status	8.3.1
PPPoE sessions	Information on PPPoE session parameters, running on the device	8.3.2
PON channels	Device SFP modules management and monitoring	8.3.3
Configuration	Configuration management	8.4
Traps	Trap settings configuration	8.4.1
VLAN	VLAN settings	8.4.2

Sync Time	device time synchronization	8.4.3
NTP	NTP server configuration	8.4.4
IGMP	IGMP snooping feature management	8.4.5
Syslog	network system log configuration	8.4.6
Users	View and edit user rights for configuration	8.4.7
Profiles	View and edit profiles on device	8.4.8
Log	Configure the output for debug messages	8.4.9
ONT Discovery	Configure automatic discovery of new ONTs in PON channels	8.4.10
Terminal VLANs	VLAN identification configuration	8.4.11
CLI/telnet	Terminal program emulator for connections via Telnet protocol	6.6.9
CLI/ssh	Terminal program emulator for connections via SSH protocol	6.6.9
FW ONT	ONT firmware update configuration	8.5
ONT firmware files	Active firmware files for subscriber-side devices	8.5.1
ACS scheduler	Settings for firmware update via ACS server	8.5.2
ACS schedulеe time	Schedule for firmware update via ACS server	8.5.3
External firmware server	Configure external HTTP server address with the software for subscriber-side devices	8.5.4
RRD statistics	Collection of the network interface load statistics	6.6.10
Access	Information on the object hardware parameters, that are stored in the database, device SNMP access settings	6.6.11

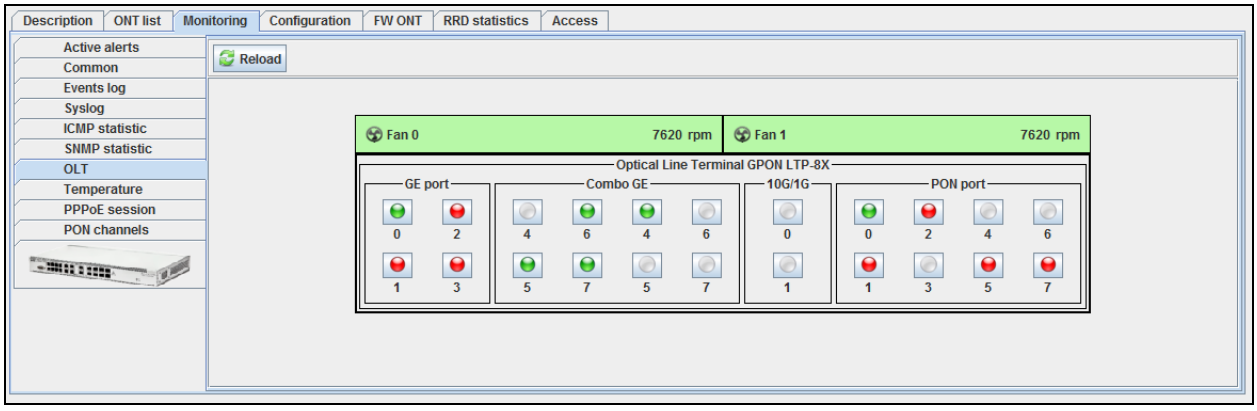
8.2. ONT LIST

For detailed tab description, see chapter **7.2 ONT list.**

8.3. MONITORING

8.3.1. OLT

In this tab you can perform online monitoring of the device Uplink port state.



Areas of monitoring

- *Fan, rpm* — fan state and rotation speed data in revolutions per minute (rpm);
- *Optical Line Terminal* — state of the device ports.

Fan state indication:

- operating;

- shut down by administrator or in alarm state.

Ports indication:

 – current interface state*, UP — in operation;*

 – current interface state, *DOWN* — port is not active/not connected;

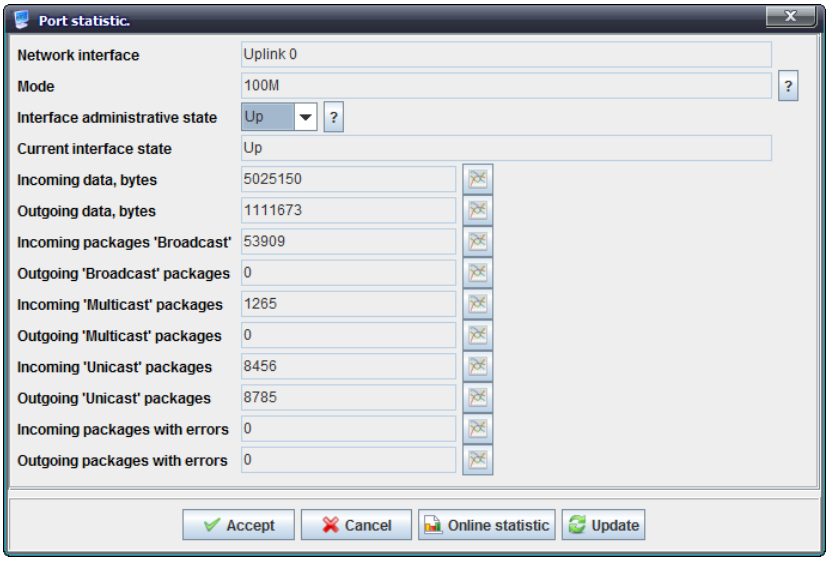
 – current interface state is unknown — port is not active/not connected or was shut down by the network administrator.

Port status buttons are the active elements. Click them to edit the selected port on *Uplink statistics* tab.

Click *Reload* button to refresh the information in the tab.

8.3.1.1. UPLINK PORTS STATISTICS

The statistics for the current device port will be shown in the pop-up window.



- *Network interface* — name of the interface;
- *Mode* — interface operation speed in bit/s;
- *Interface administrative state* — port control administrative status:
  - *Up* — port is physically enabled for operation;
  - *Down* — port is physically disabled for operation;

Before changing administrative state of the UPLINK port, make sure that this port is not used for device management, as it may lead to LOSS OF CONNECTION to the device.

- *Current interface state* — port operation status (Up — enabled for operation, Down — disabled for operation);
- *Incoming data, bytes* — amount of data received to the interface, in bytes;
- *Outgoing data, bytes* — amount of data sent via the interface, in bytes;
- *Incoming 'Broadcast' packages* — amount of broadcast packets received to the interface;
- *Outgoing 'Broadcast' packages* — amount of broadcast packets sent from the interface;
- *Incoming 'Multicast' packages* — amount of multicast packets received to the interface;
- *Outgoing 'Multicast' packages* — amount of multicast packets sent from the interface.
- *Incoming 'Unicast' packages* — amount of unicast packets received to the interface;
- *Outgoing 'Unicast' packages* — amount of unicast packets sent via the interface;
- *Incoming packages with errors* — amount of received packets with errors;

– *Outgoing packages with errors* — amount of sent packets with errors.

Administrative interface state field is available for editing.

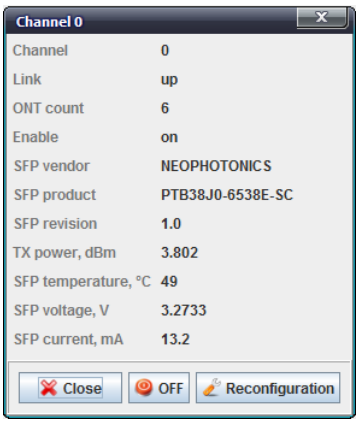
Click *Accept* button to save entered parameters, or click *Cancel* to discard them.

Click  button to proceed to *RRD Statistics* tab, to add new parameter monitoring task or to view the statistics for the previously assigned task (for detailed information, see chapter **6.6.10 RRD Statistics menu**).

Click *Reload* button to refresh the information in the tab.

8.3.1.2. PON PORTS STATISTICS

The monitoring of device SFP modules is performed in the pop-up window.



– *Channel* — PON channel number;
– *Link*— operation state of SFP module;
– *ONT count* — quantity of connected ONTs;
– *Enable* — PON channel activity (on/off);
– *SFP vendor;*
– *SFP product;*
– *SFP revision;*
– *TX power, dBm;*
– *SFP temperature, °C;*
– *SFP voltage, V;*
– *SFP current, mA.*

Click 

button to enable or disable the channel for the operation.

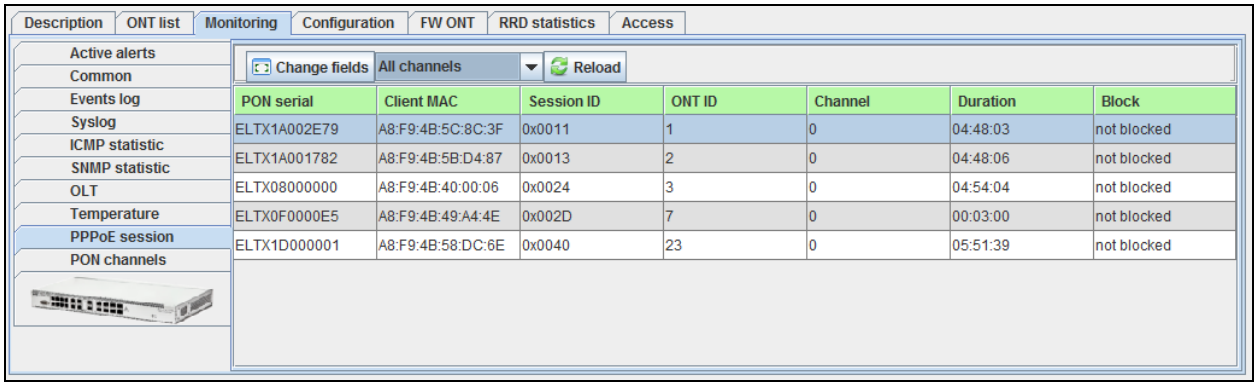
Click *Reconfiguration* button to reconfigure the selected PON channel.

Reconfiguration will lead to the loss of connection with all subscribers on the reconfigured PON channel.

8.3.2. PPPOE SESSIONS

This section contains data on current active PPPoE sessions. The information is read-only.

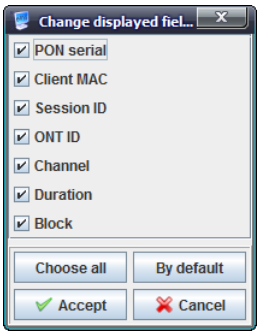
Click *Reload* button to refresh the information in the tab.



Use drop-down menu to specify PON tree, which PPPoE sessions you want to view, or to show the statistics for all device trees.

The table lists the following information:

- *PON serial* — PON serial number;
- *Client MAC* — device address of the user that established the session;
- *Session ID* — assigned PPPoE session number;
- *ONT ID* — identifier of the subscriber-side device, that has established PPPoE session;
- *Channel* — PON channel, which includes the subscriber-side device, that has established PPPoE session;
- *Duration* — PPPoE session duration;
- *Block* — subscriber-side device block status.



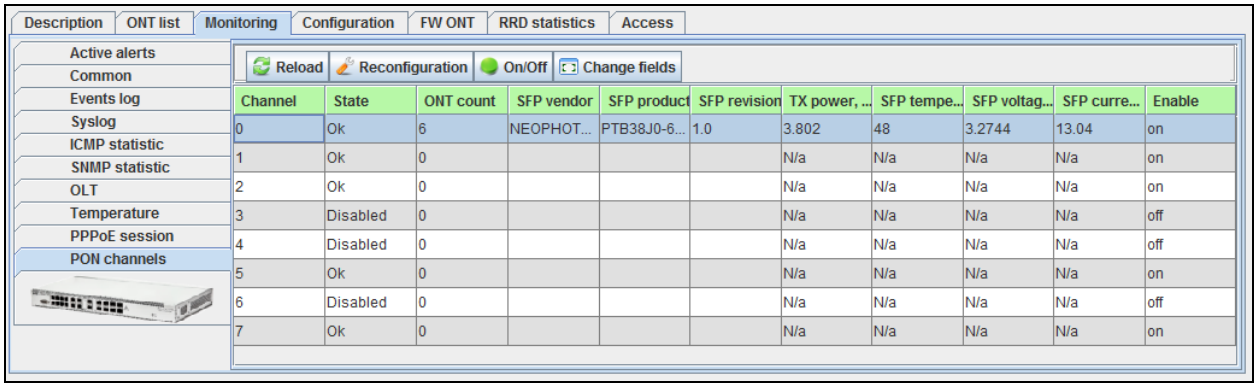
Click *Change Fields* button to configure the set of fields for the event table.

Click *Choose All* button to select all list fields, that you want to add.

To save changes in the set of displayed fields, click *Accept* button, or click *Cancel* to discard changes.

8.3.3. PON CHANNELS

Use this tab to control and monitor SFP modules of the device.



Channel	State	ONT count	SFP vendor	SFP product	SFP revision	TX power, ...	SFP tempe...	SFP voltag...	SFP curre...	Enable
0	Ok	6	NEOPHOT...	PTB38J0-6...	1.0	3.802	48	3.2744	13.04	on
1	Ok	0				N/a	N/a	N/a	N/a	on
2	Ok	0				N/a	N/a	N/a	N/a	on
3	Disabled	0				N/a	N/a	N/a	N/a	off
4	Disabled	0				N/a	N/a	N/a	N/a	off
5	Ok	0				N/a	N/a	N/a	N/a	on
6	Disabled	0				N/a	N/a	N/a	N/a	off
7	Ok	0				N/a	N/a	N/a	N/a	on

Click 

button to enable or disable the channel for the operation. Its status in *Enabled* column will change.

Click *Reconfiguration* button to reconfigure the selected PON channel[1].

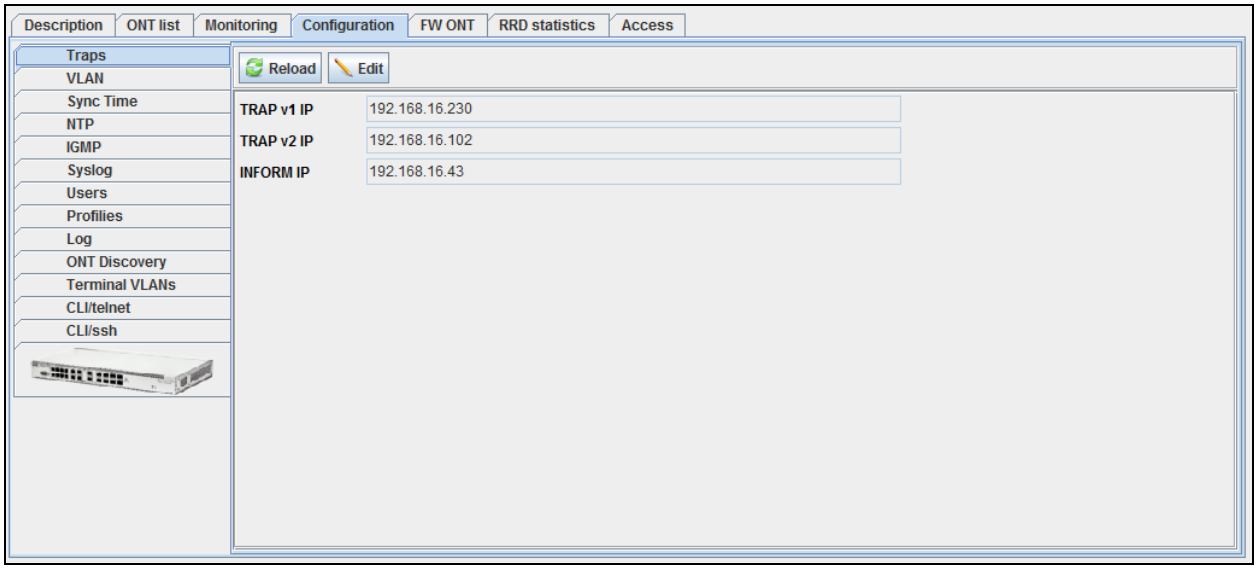
Reconfiguration will lead to the loss of connection with all subscribers on the reconfigured PON channel.

Click *Reload* button to refresh the information in the tab.

8.4. CONFIGURATION

8.4.1. TRAPS

This tab shows information on configuration of SNMP traps.



- *Traps v1 iP* — IP address for sending SNMPv1 traps;
- *Traps v2 IP* — IP address for sending SNMPv2 traps;
- *INFORM IP* — IP address for sending Inform traps.

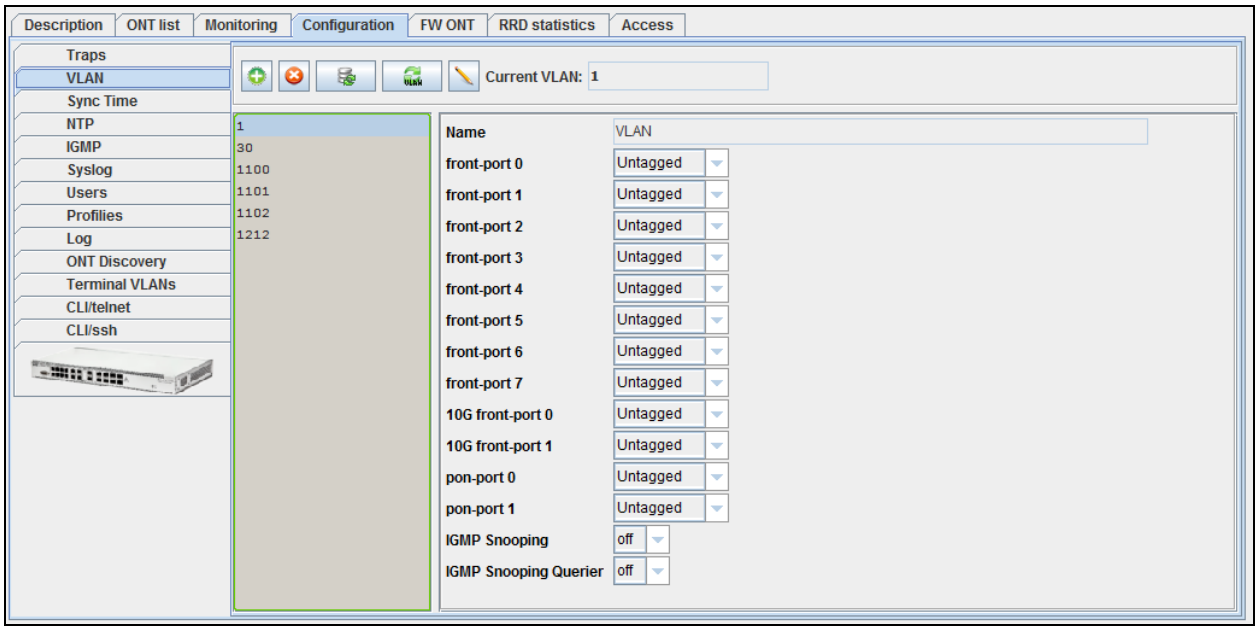
Click *Edit* button to enable the editing of fields.

[1] The current firmware version doesn't support this function.

Click *Save* button to save entered parameters, or click *Cancel* to discard them.

Click *Reload* button to refresh the information in the tab.

8.4.2. VLAN



To add a new VID, click  button, specify VLAN group name and tagging rules for each port of the device:

- *Tagged* — all packets sent through ports will be tagged;
- *Untagged* — all packets sent through ports will not be tagged;
- *Not member* — this port is not a part of the group.

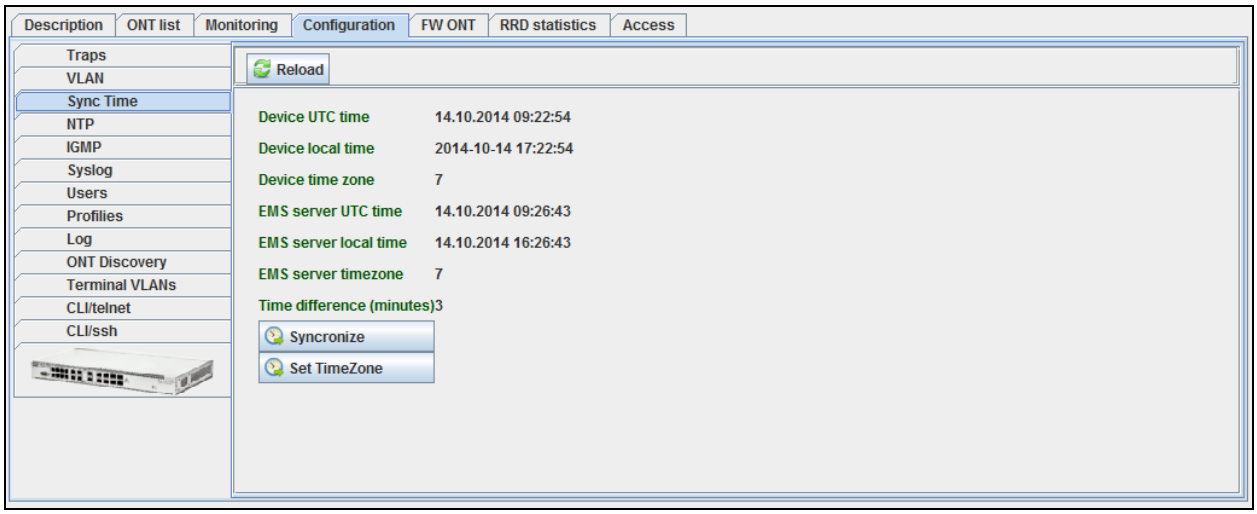
For LTP-8X boards v1.x, pon-port 0, pon-port 1 are available for configuration.
For LTP-8X boards v2.x, pon-port 0..7 are available for configuration.

To edit record parameters, select the desired VID from the list and click  button, or click  button to delete them.

Click *Accept* button to save entered parameters, or click *Cancel* to discard them.

Click  *(Re-read VLAN list)* button to update the list of configured VLANs, or click  *(Refresh VLAN parameters)* button to refresh parameters for the current VLAN.

8.4.3. SYNC TIME



System time data

- *Device UTC time* — device time in UTC format;
- *Device local time* — device local time with UTC time offset;
- *Device time zone* — timezone in reference to UTC;
- *EMS server UTC time* — server time in UTC format;
- *EMS server local time* — server local time with UTC time offset;
- *EMS server time zone* — timezone in reference to UTC;
- *Time difference (minutes)* — difference in time on the device and EMS server;
- *Synchronize* — click to synchronize the system time on the device with EMS server;

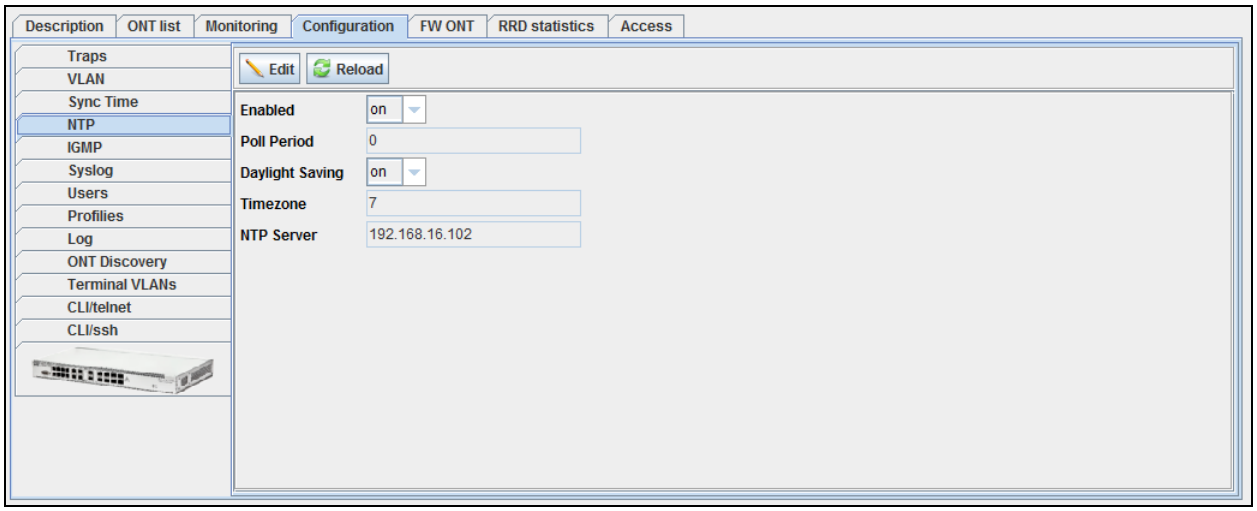
If NTP service is enabled on the device, manual synchronization will not be performed

- *Set TimeZone* — set timezone in reference to UTC.

Click *Reload* button to refresh the information in the tab.

8.4.4. NTP[1]

Use this tab to configure NTP server that performs device time synchronization.



- *Enabled* — enable/disable NTP;

[1] Only for LTP 3.x

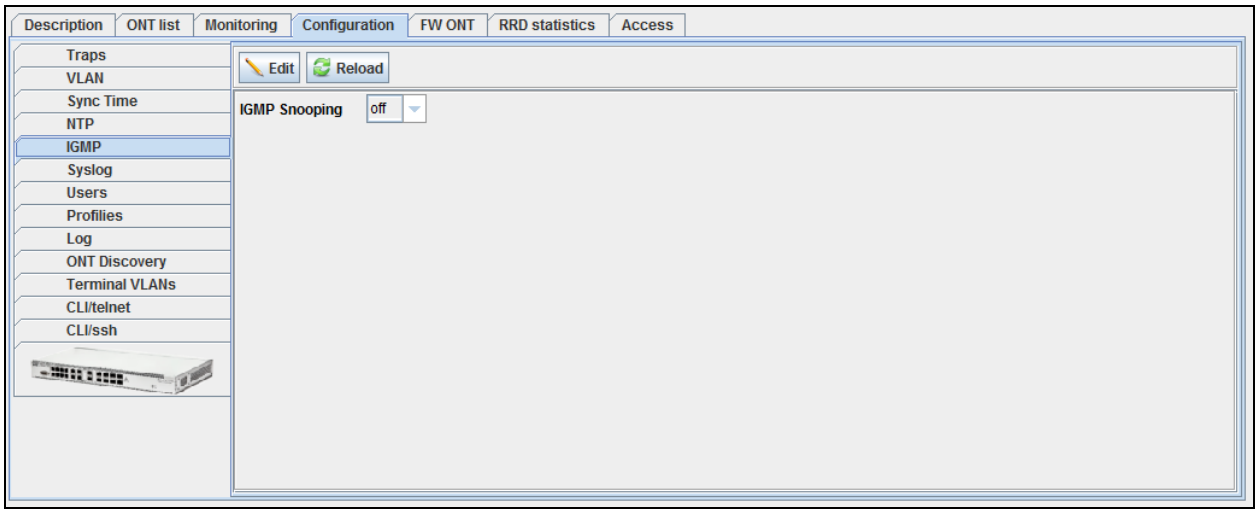
- *Poll Period* — time interval between NTP server polling attempts in minutes;
- *Daylight* – indicate whether it should be switched to daylight-saving time;
- *Timezone* — set timezone in reference to UTC.
- *NTP Server* — address of time server, that will be used for device time and date synchronization.

Click *Save* button to save changes, or click *Cancel* button to exit from the edit mode without saving.

Click *Reload* button to refresh the information in the tab.

8.4.5. IGMP

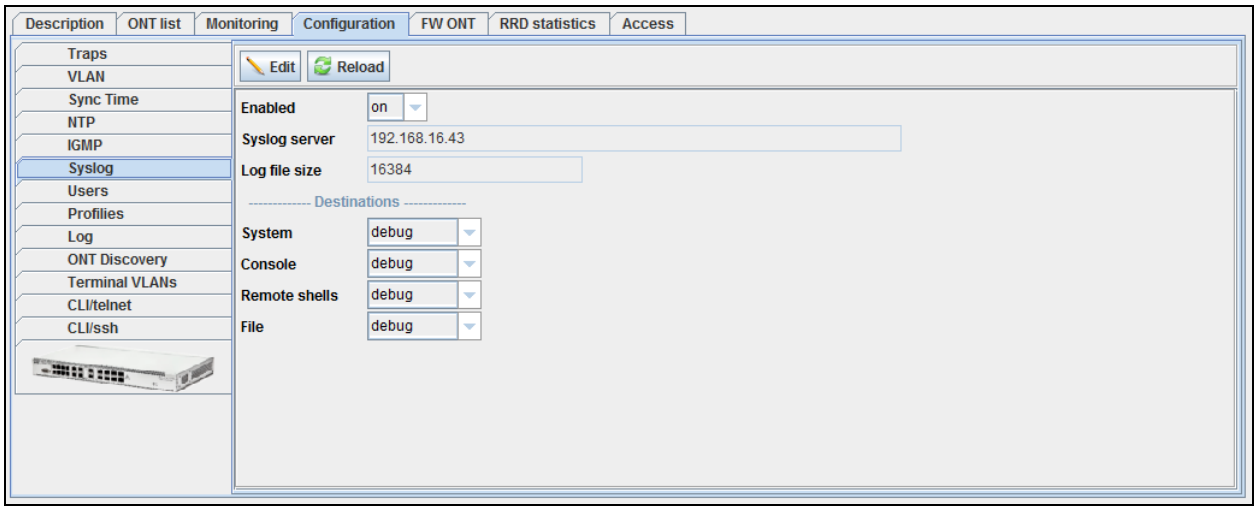
Use this tab to manage IGMP-snooping feature — enable or disable listening to requests of multicast groups.



Click *Reload* button to refresh the information in the tab.

8.4.6. SYSLOG[1]

Use this tab to configure the logging level and the address used for sending SYSLOG messages to the external SYSLOG server.



- *Enabled* — enables syslog message transmission to all recipients;
- *Syslog server* — define the IP address of the remote host for log file saving;

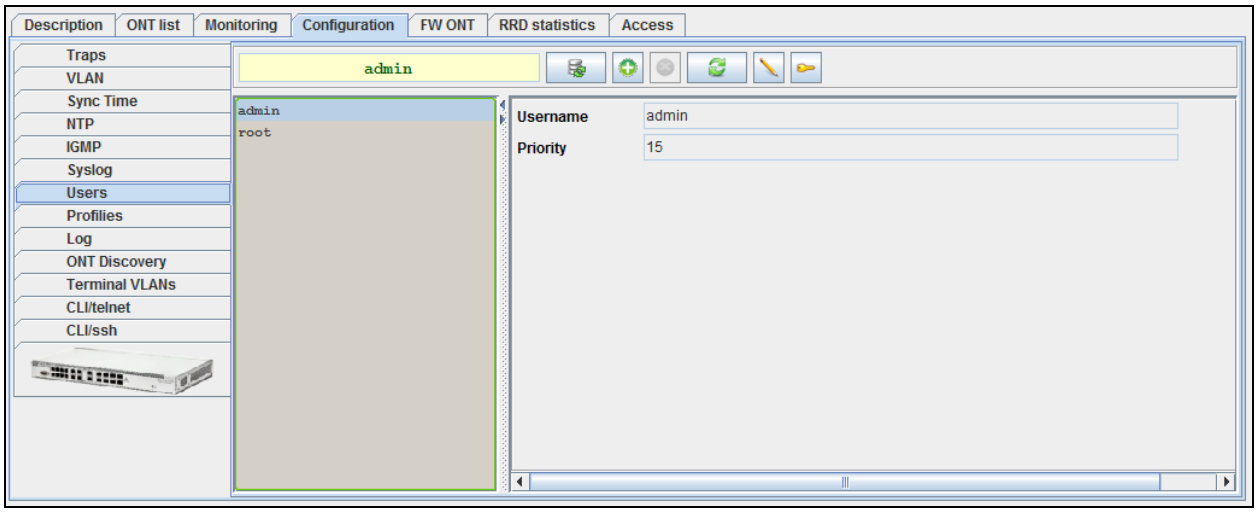
[1] Only for LTP 3.x.x

- *Log file size* — maximum size limit for a log file;
- *Destinations* — configure the message level to perform output to different locations:
  - *System* — system log output;
  - *Console* — system console output;
  - *Remote shells* — Telnet or CLI session output;
  - *File* — output to file.

Click *Reload* button to refresh the information in the tab.

8.4.7. USERS[1]

Use this tab to view and edit user rights for configuration.



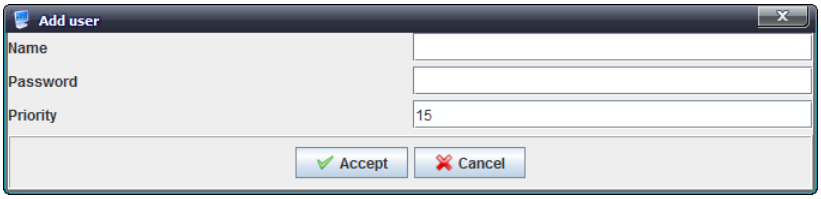
Users admin and root are always present on the device and cannot be deleted.

User rights[1]:

- *View config* — configuration viewing rights;
- *Edit config* — configuration editing rights;
- *View OLT* — OLT configuration viewing rights;
- *Edit OLT* — OLT configuration rights;
- *View ONT* — ONT configuration viewing rights;
- *Edit ONT* — ONT configuration rights;
- *View PON* — PON parameter viewing rights;
- *SNMP read-only access* — rights for configuration viewing via SNMP;
- *SNMP read-write access* — rights for configuration editing via SNMP;
- *Switch access* — integrated switch configuration rights;
- *View System* — system configuration viewing rights;
- *Edit System* — system configuration editing rights.

Adding user

To add user, click button and fill in the following fields:



- *Name* — user name;

[1] Only for LTP 3.20.1

– *Password* — user authorization password (at least 8 characters, only Latin);
– *Priority.*

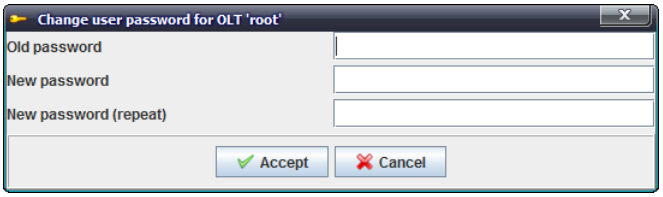
Editing user rights

To edit user rights, select the desired record, click  button and set up access rights:

Change user password

To change the password, select the desired record, click  and fill in the following fields:

– *Current password* — current user password;
– *New password* — modified user password;
– *New password (repeat)* — modified password verification.



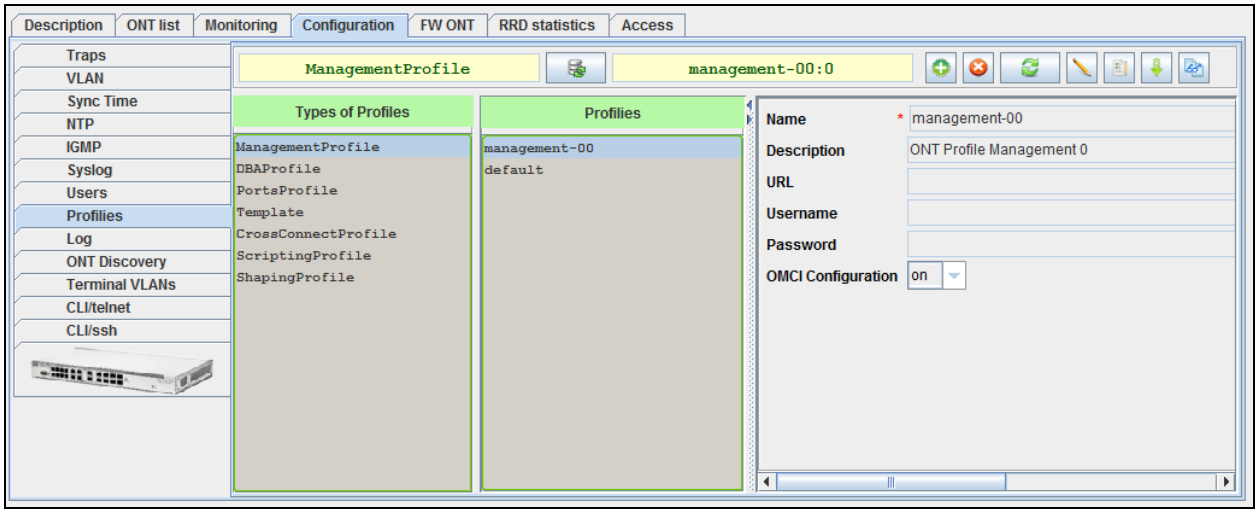
Click *Apply* button to save changes, or click *Cancel* button to exit from the edit mode without saving.

Click  (*Update user parameters)* button to update parameters of a specific user.

Click  *(Reload user list)* button to refresh the list of users.

8.4.8. PROFILES[1]

Use this tab to view and edit ONT profiles on the device.

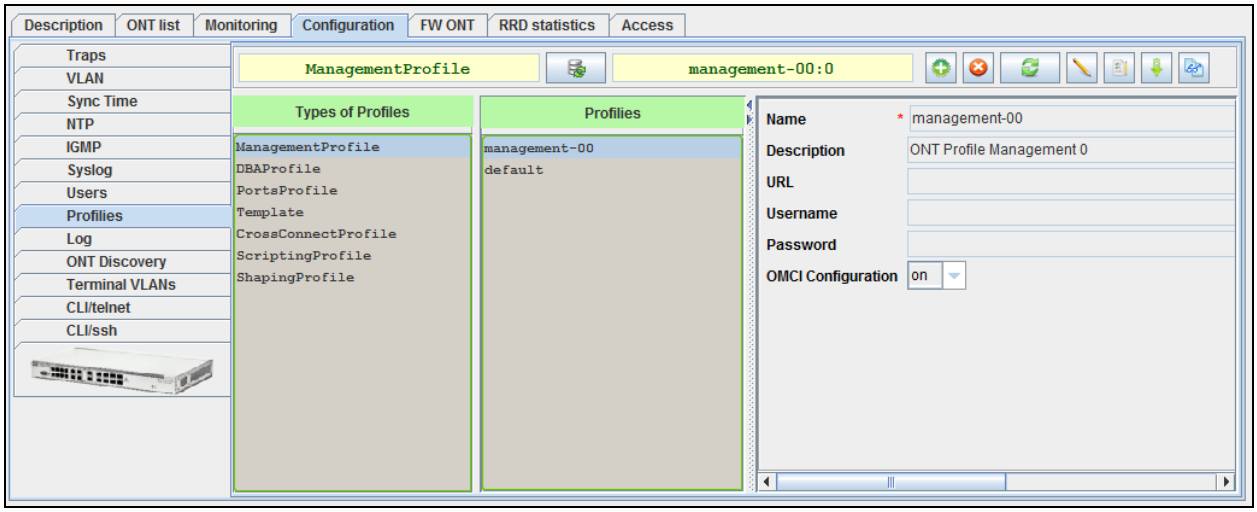


ONT configuration involves the assigning profiles to the configuration and setting up individual ONT parameters. Configuration profiles allow general parameters to be set for all ONTs or for the specific range.

[1] Only for LTP 3.x

8.4.8.1. CONFIGURATION OF MANAGEMENT PROFILE

The **management** profile enables specific configuration of TR-069 management protocol, namely configuration of TR client in ONT.



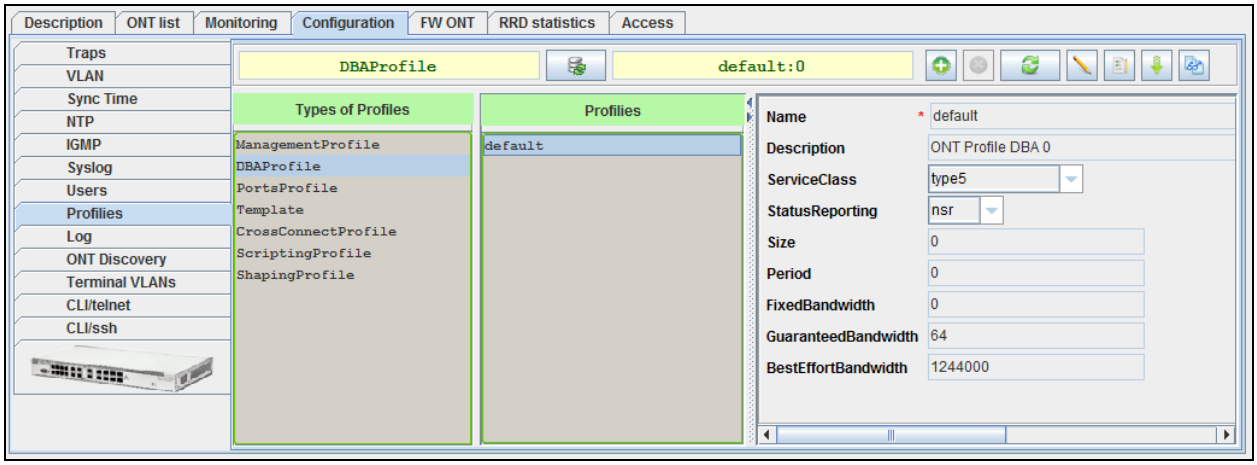
The **omci-configuration** parameter defines the TR client configuration which can be done: either automatically with DHCP (all other parameters of the profile are not used in this case) or with OMCI using the profile settings.

The **url** parameter corresponds to the address of the auto configuration server (ACS).

ACS access parameters are defined by the **username** and **password** parameters.

8.4.8.2. CONFIGURATION OF DBA PROFILE

This profile configures dynamic bandwidth allocation (DBA). These parameters allow specification of any T-CONT type described in G.984.3.



The **service-class** parameter defines the basic DBA algorithm.

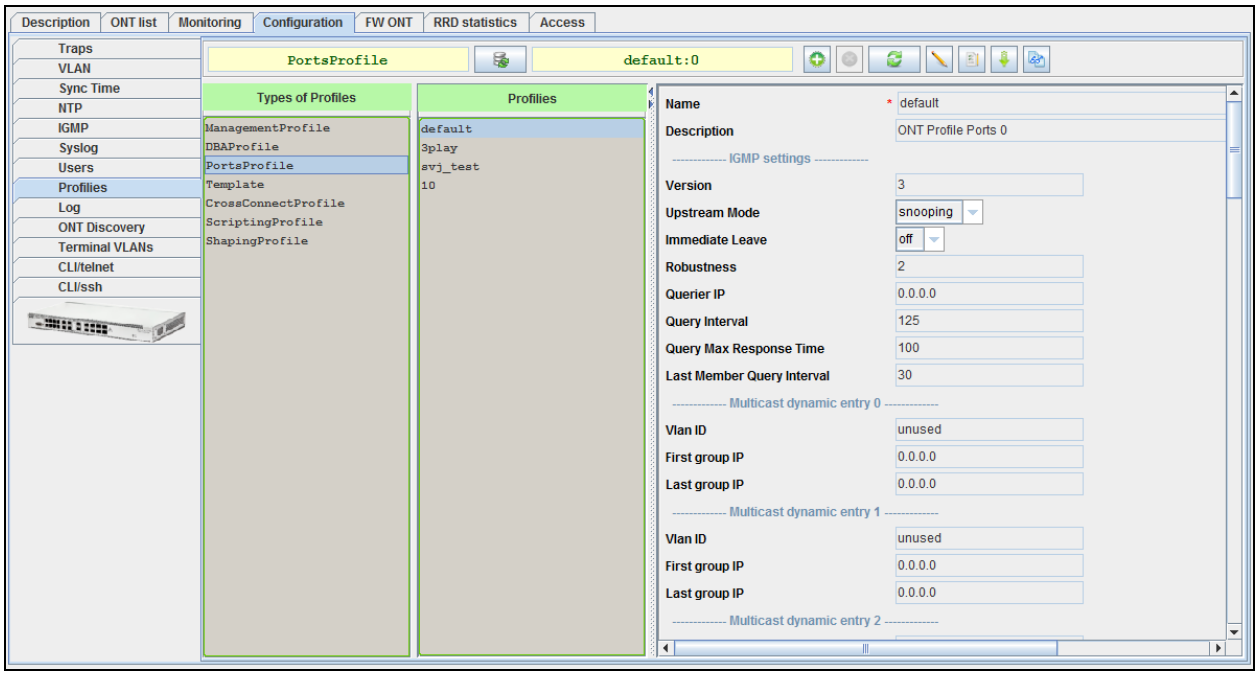
The **status-reporting** parameter defines a type of ONT queues status report.

The **fixed-bandwidth**, **guaranteed-bandwidth**, and **besteffort-bandwidth** parameters define the fixed, guaranteed, and best-effort bandwidth correspondingly.

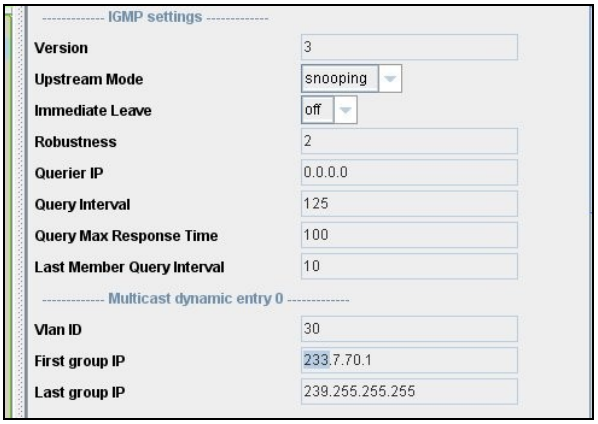
8.4.8.3. CONFIGURATION OF PORTS PROFILE

The *ports* profile allows you to group ports in ONT. The profile also contains IGMP and multicast setting as they are separately adjusted for each port.

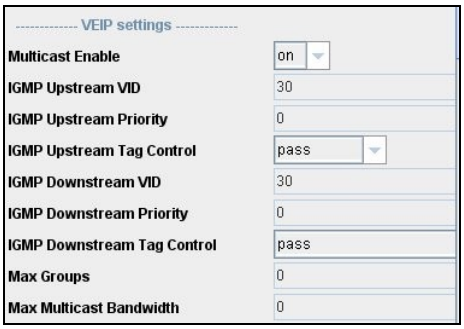
You can adjust up to 4 Ethernet ports and a VEIP virtual port which will serve as a link between OMCI and RG domains in ONT.



To configure IGMP and multicast specify VLAN ID number, which will be used for multicast traffic transmission, and MC address range.



Also, you have to configure VLAN operations rules for downstream multicast+IGMP and upstream IGMP

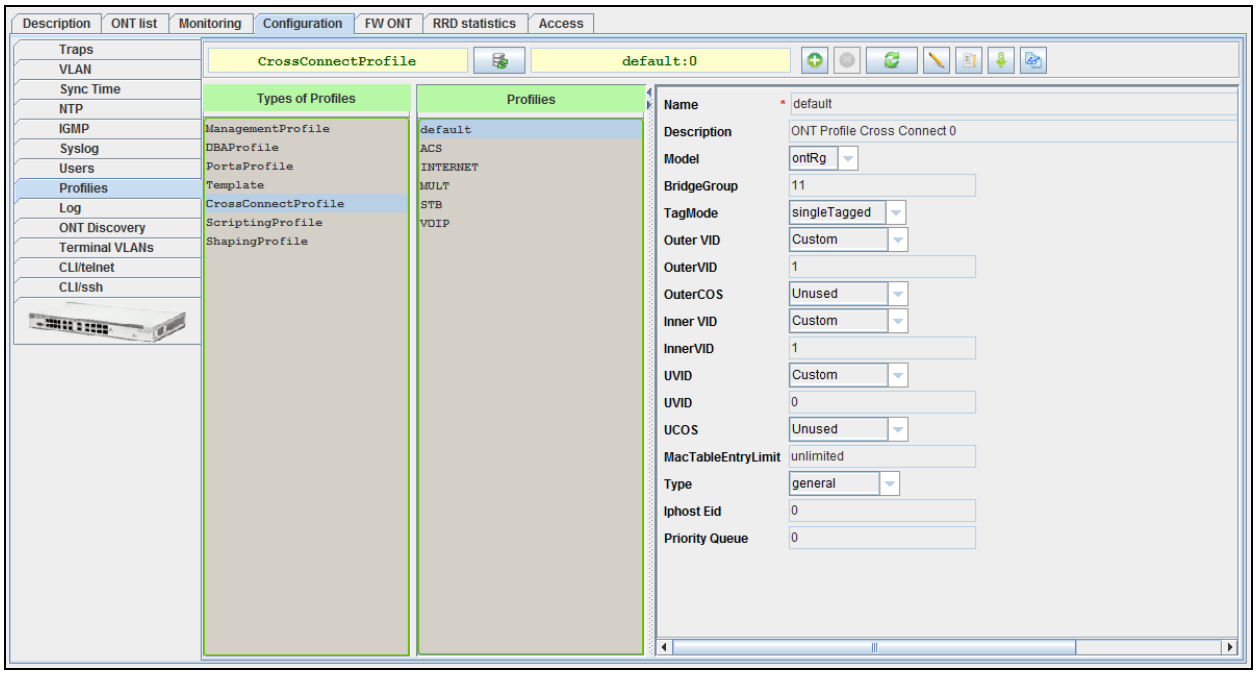


Ethernet ports are configured using **bridge-group** parameter. Value 0 means that the port is associated with an RG domain (router). Other values mean port association with an OMCI domain, i.e. the port with OLT can be directly used to establish a data communication channel.

8.4.8.4. CONFIGURATION OF CROSS-CONNECT PROFILE

Cross-connect profile allows to define VLAN parameters — traffic stream transformation for each of services.

Cross-connect profile configuration for RG services (Internet/VoIP/VoD, etc).



The **model** parameter defines the type of service: routed (pass through ONT router) or bridged (bridge connection)

The **type** parameter allows to configure OMCI interfaces for TR/multicast traffic transmission to ONT.

VLAN configuration is defined by **tag-mode, outer- vid, outer-cos, inner-vid, u-vid, u-cos** parameters.

The **outer-vid, outer-cos** parameters define the external tag and priority for traffic received from/sent to the network.

The **u-vid** and **u-cos** parameters allow a tag to be specified which will be used on the ONT side.

The **mac-table-entry-limit** parameter allows restriction of records number in the MAC table of OLT for this service.

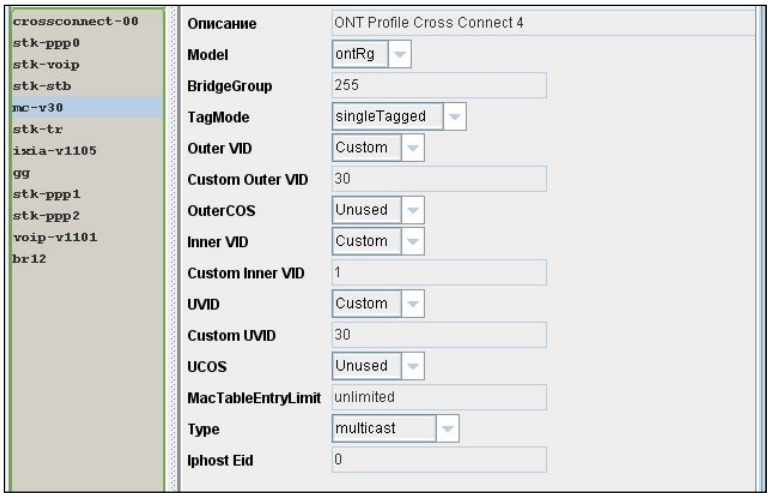
The **priority-queue** parameter allows allocation of all services of one T-CONT into queues with priorities (if ONT supports this method).

The **type** parameter defines the type of service provided on the ONT side:

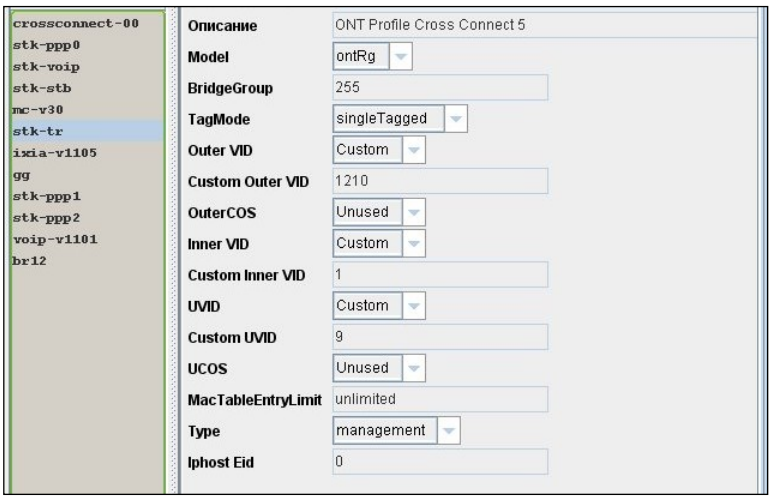
- *General* — transparent traffic transmission between ONT (OMCI) and RG parts of ONT (according to TR-142)
- *Multicast* — transmission of upstream IGMP messages
- *Management* — IPHOST interface configuration on ONT (IP interface for tr-069 client)
- *Voice* — configuration of IPHOST interface on ONT (IP interface for VoIP client)

The following screenshots show configured *cross-connect* profiles for several particular tasks.

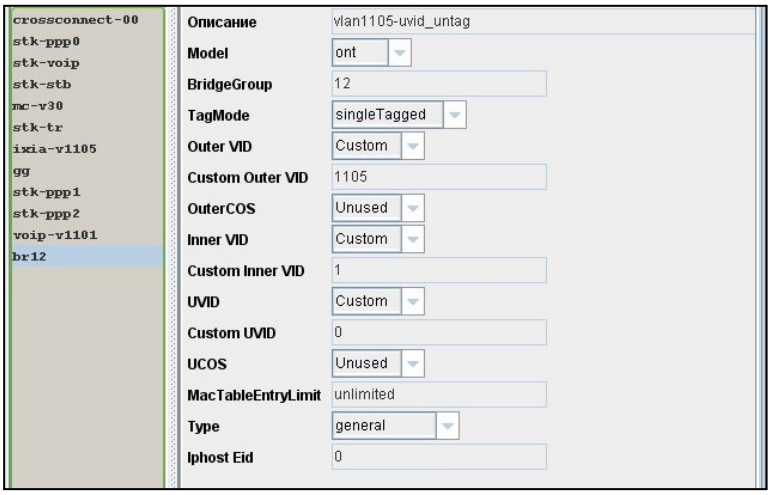
The cross-connect profile configuration for upstream IGMP traffic transmission (additional configuration for Downstream MC and IGMP is not required — traffic goes via MC GEM.)



The cross-connect profile configuration for ONT control traffic transmission (TR-069)



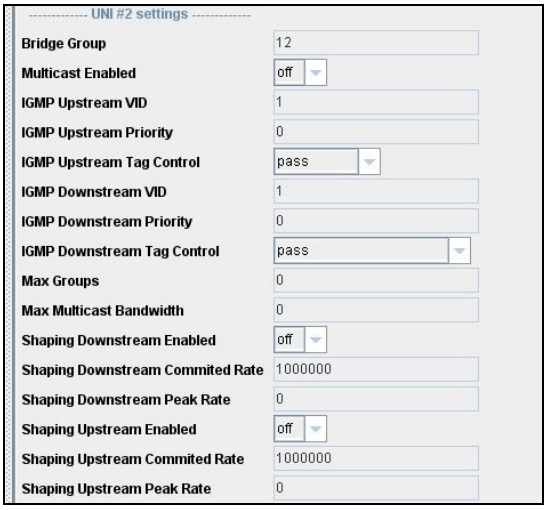
The cross-connect profile configuration for traffic transmission via ONT, configured in ONT mode (LAN ports configuration via OMCI, without TR-142 RG domain).



The **Model** parameter defines the type of bridged service (bridge connection).

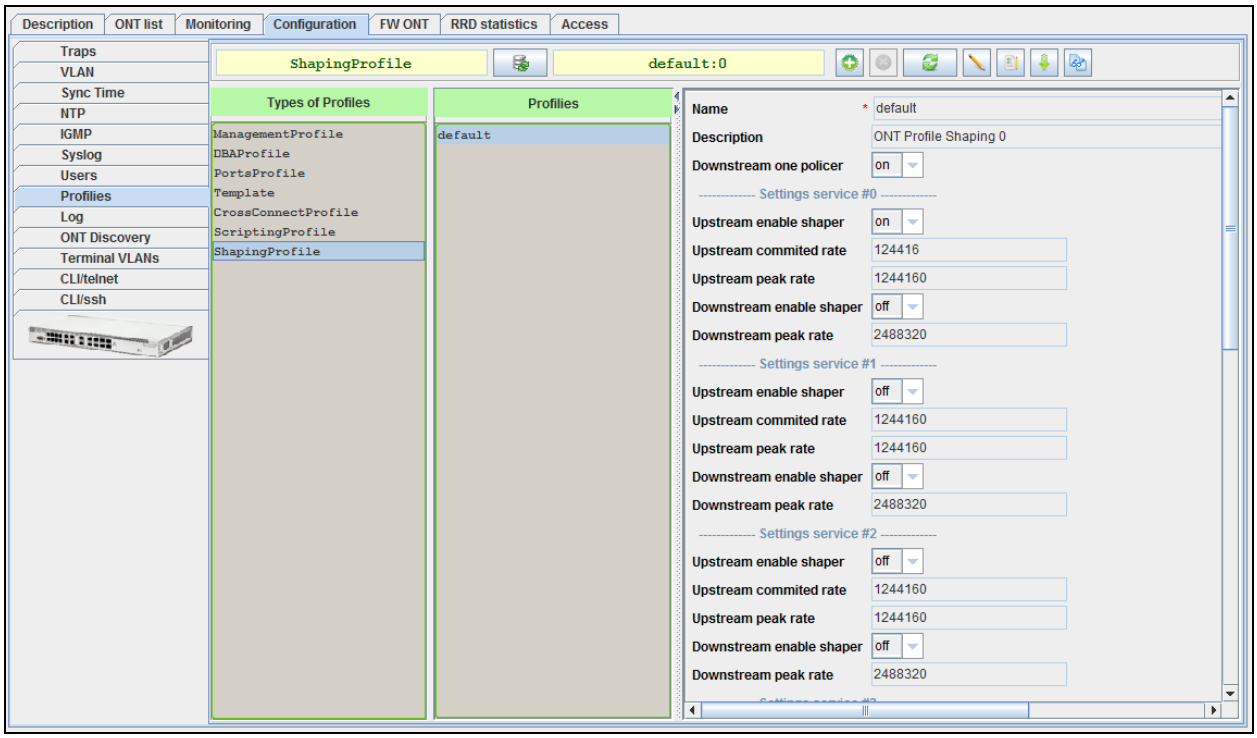
The **bridge group** parameter defines the unique OMCI block identifier (MAC bridge service profile).

For correct operation in this mode, in **ports** profile should be defined the same **bridge group.**



8.4.8.5. CONFIGURATION OF SHAPER PROFILE

This profile allows restriction of upstream and downstream services.

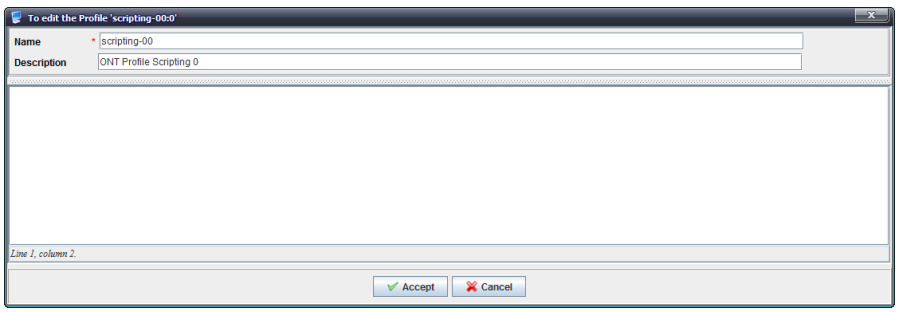


Downstream restriction in OLT uses the *policing* algorithm. You can use individual policies for each service or one policy for all services simultaneously. This is specified in the **one-policer** parameter. When one policy for all services is used, only **policer 0** should be specified; otherwise per-service policies should be configured.

Upstream restriction in ONT uses the *shaping* algorithm. You can specify either a global shaper or individual shapers for each type of traffic: *unicast, multicast* and *broadcast* (if they are supported by ONT).

8.4.8.6. CONFIGURATION OF SCRIPTING PROFILE

Use this profile to create ONT and OMCI configuration scenarios with low-level command language.



Profile configuration is performed with support from manufacturer's service centre.

8.4.8.7. SETUP OF CONFIGURATION TEMPLATES

To facilitate the setup process of complex configurations, which include multiple services, you can employ configuration templates.

You can create several templates that will perform the configuration of basic sets of services.

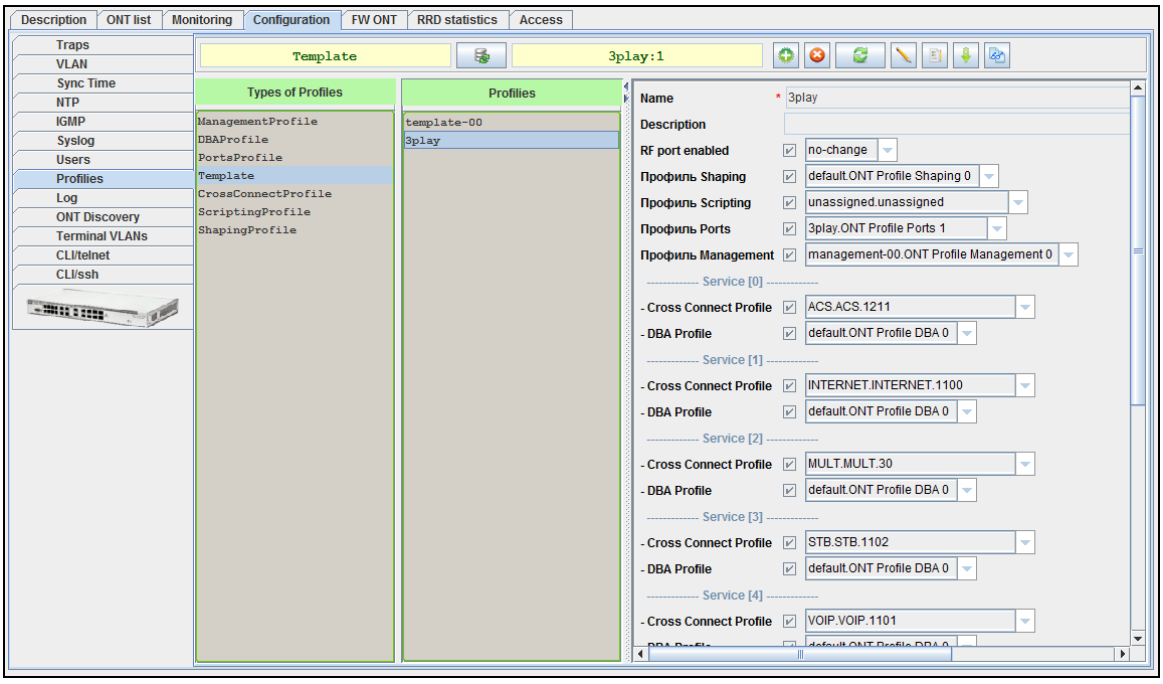
All template settings will have the priority over settings defined in ONT parameters.

Templates include set of profiles, grouped by services, and non-profile settings for ONT configuration.

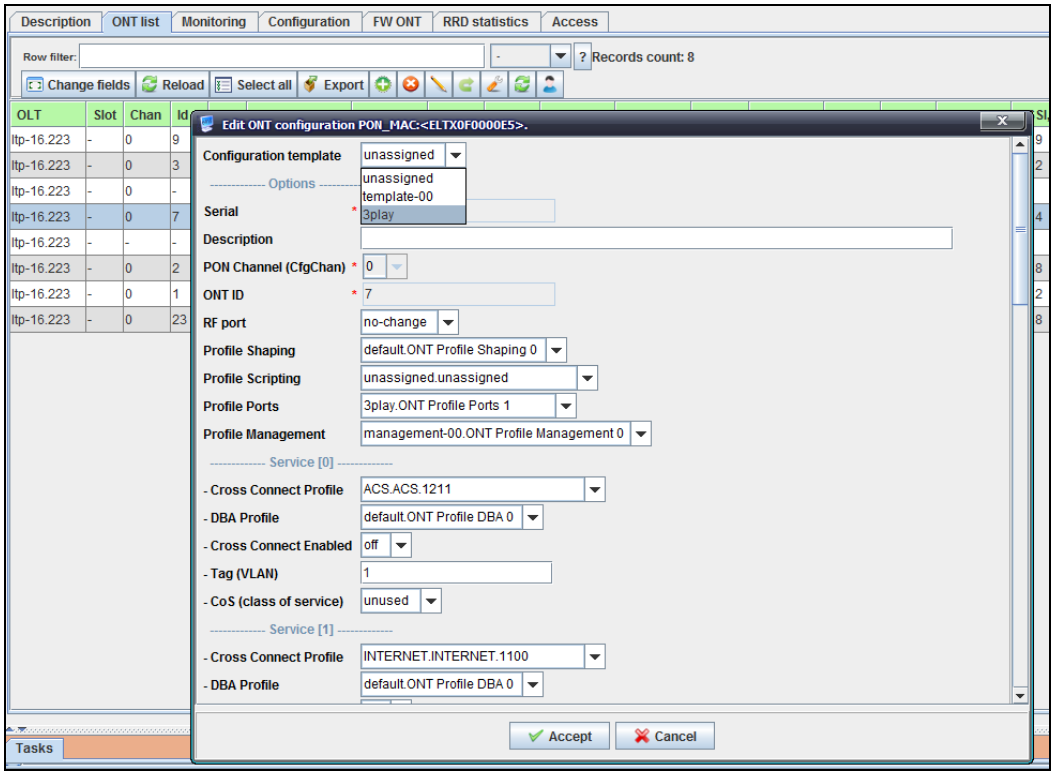
Several templates may be configured on ONT:

- *3play* – internet+voip+stb
- *Voip* – voip
- *3play+security* – internet+voip+stb+OC etc.

For configuration of templates will be used the same set of cross connect, port and other profiles.

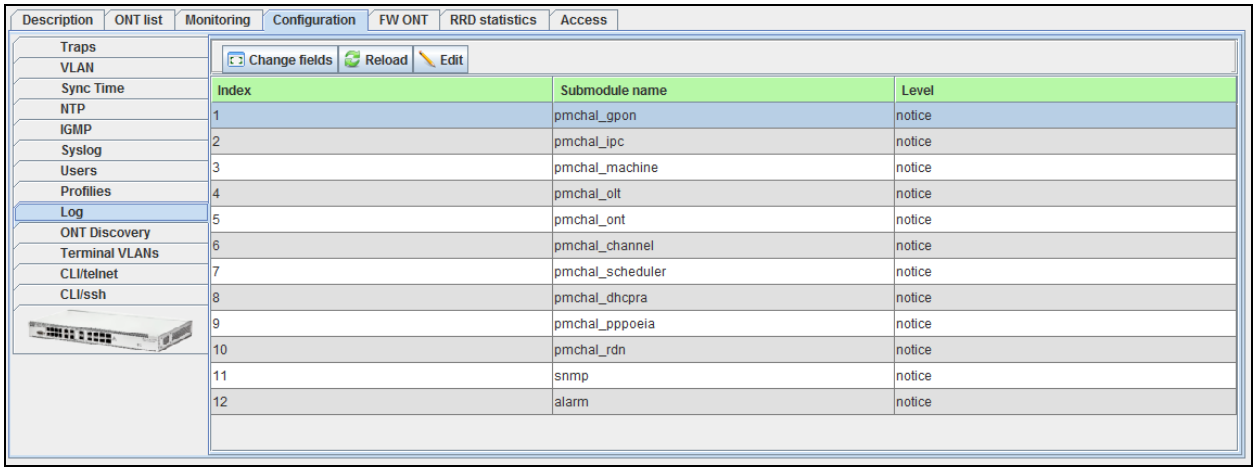


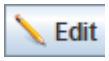
When configuring (adding) ONT, all you need to do is select the specific configuration template, and the set of profiles for defined set of services will be assigned automatically.



8.4.9. LOG[1]

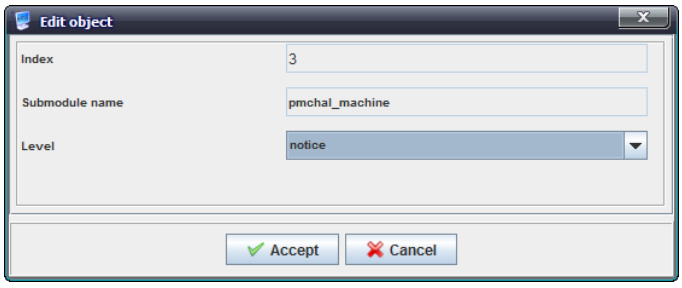
Use this tab to configure the logging level for debug messages and OLT system modules.



To enable editing, select the desired record and click 

button:

- *Index* — number of the record;
- *Module name* — name of the module;
- *Level* — level of debug messages.

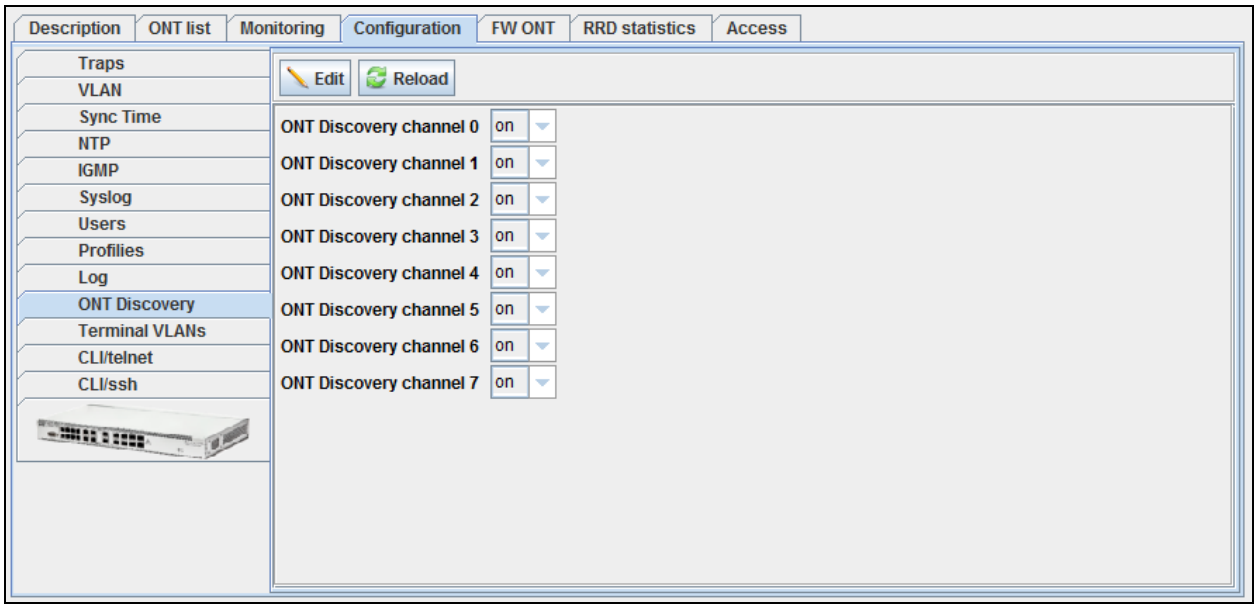


Click *Reload* button to refresh the information in the tab.

[1] Only for LTP 3.x

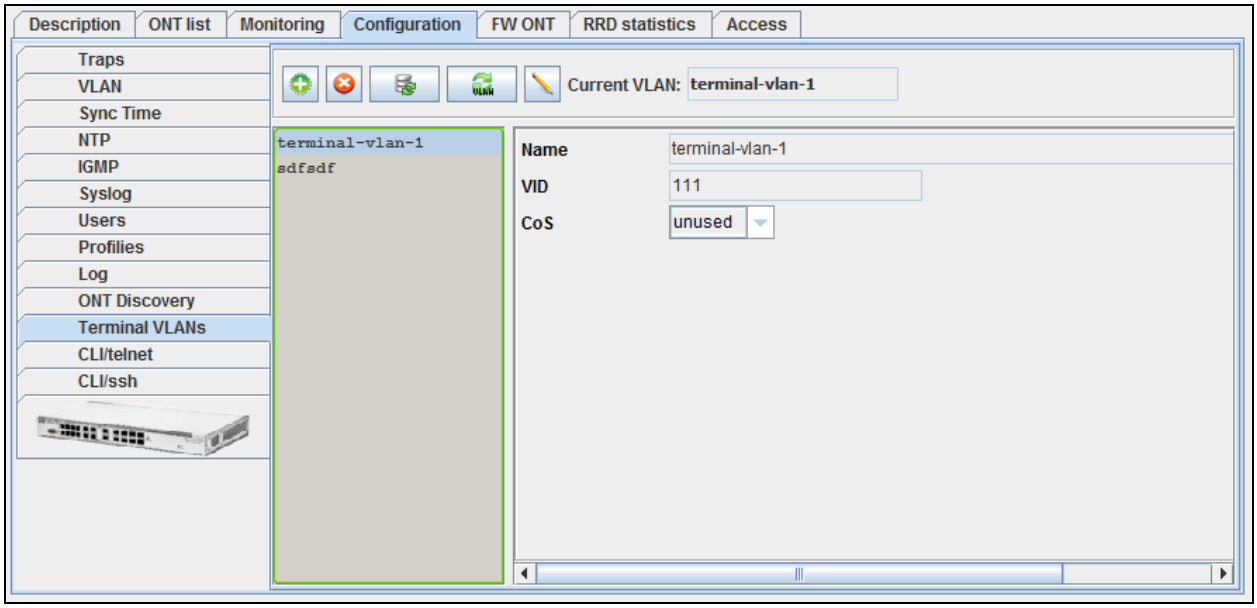
8.4.10. ONT DISCOVERY

Use this tab to configure automatic discovery of new subscriber-side devices for each PON channel. When enabled (parameter is set to 'on'), new subscriber-side terminals will be automatically shown in the device monitoring section, otherwise they will not be shown.



8.4.11. TERMINAL VLANS[1]

Use this tab to work with VLAN. You can add/remove VLANs, or change the name, VID and CoS priority for existing VLAN. When adding new VLAN, you can use its assigned name instead of VID for further work in Eltex.EMS system.

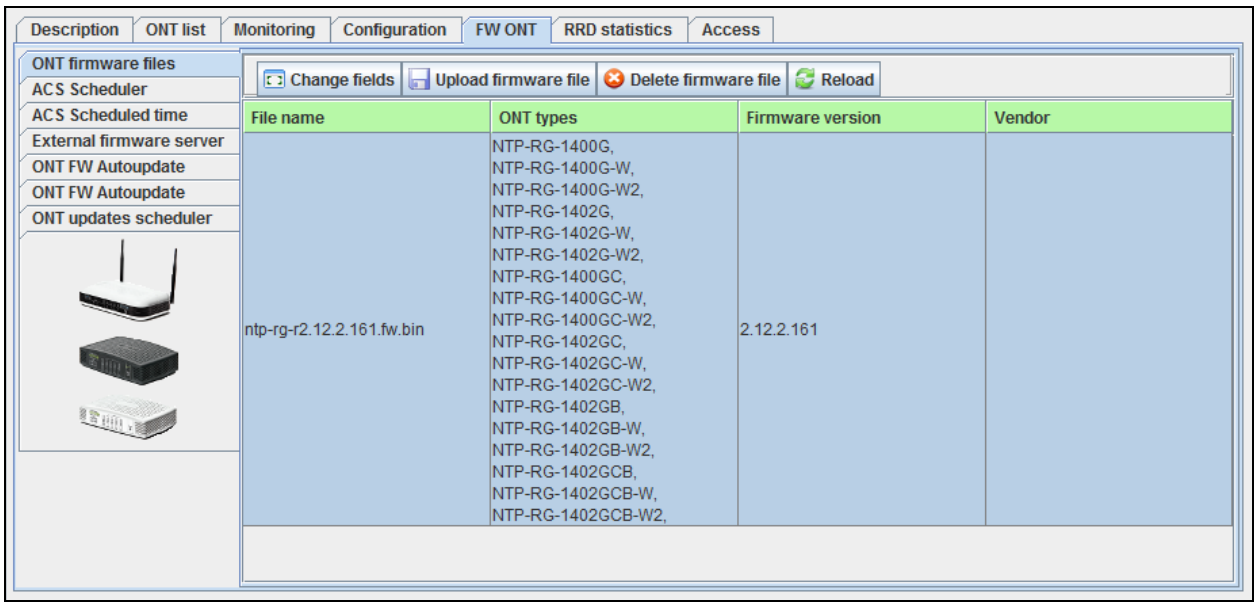


[1] Only for LTP 3.x

8.5.ONT FIRMWARE

8.5.1. ONT FIRMWARE FILES

Use this tab to assign active firmware files for subscriber-side devices.



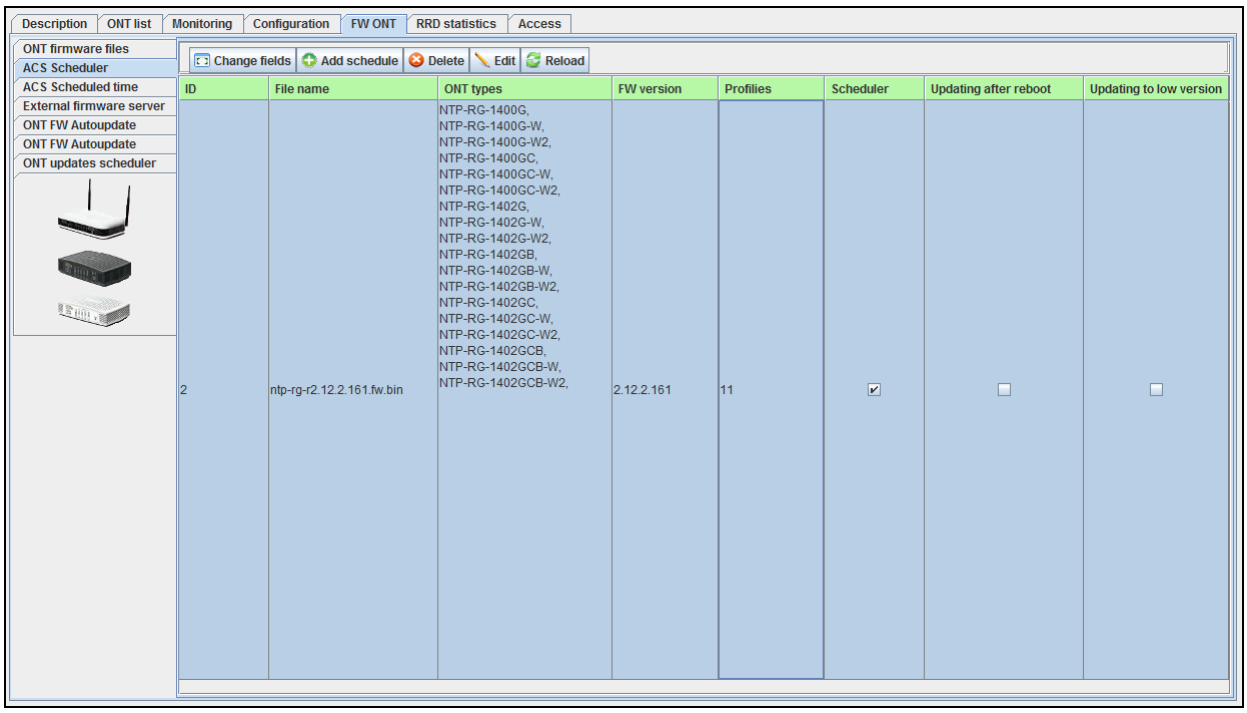
To download the firmware, click *Download firmware file* button, and select the desired firmware file in the opened window. Click Accept, and the system will begin the download of the firmware file.

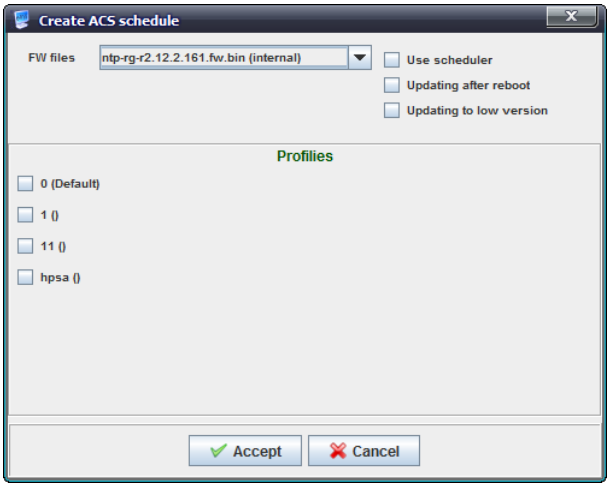
To delete the firmware file, select it in Firmware Files menu and click *Delete file* button.

Click *Reload* button to refresh the information in the tab.

8.5.2. ACS SCHEDULER[1] (FOR GPON 2X VERSION)

Use this menu to configure firmware update parameters for subscriber-side devices using ACS server.





Click *Add schedule* button to proceed to adding rules screen. To edit the rule, select the desired row from the rights list and click *Edit* button, or click *Delete* button to remove it.

Adding/Editing shedules:

- *FW files* — select the firmware from the drop-down list;
- *Use scheduler* — when checked, use the scheduler, otherwise the scheduler will not be used;
- *Updating after reboot* — when checked, perform firmware update after ONT is rebooted, otherwise device will be updated when ONT gets access to ACS;
- *Updating to low version* — when checked, you can flash previous versions of ONT firmware;
- *Profiles* — when checked, the profile will be included into the used profile list.

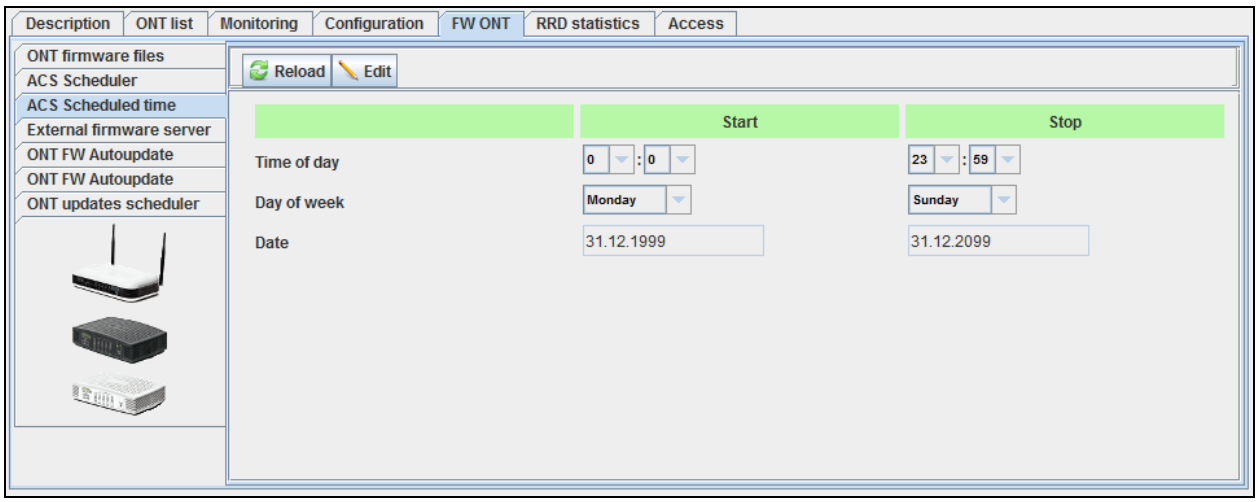
Click *Apply* button to confirm changes, or click Cancel button to exit from the edit mode without saving.

Click *Reload* button to refresh the information in the tab.

[1] The tab is active when internal ACS is enabled on LTP, otherwise it will not be shown.

8.5.3. ACS SCHEDULED TIME[1] (FOR GPON 2X VERSION)

Use this menu to configure firmware update schedule for subscriber-side devices using ACS server.



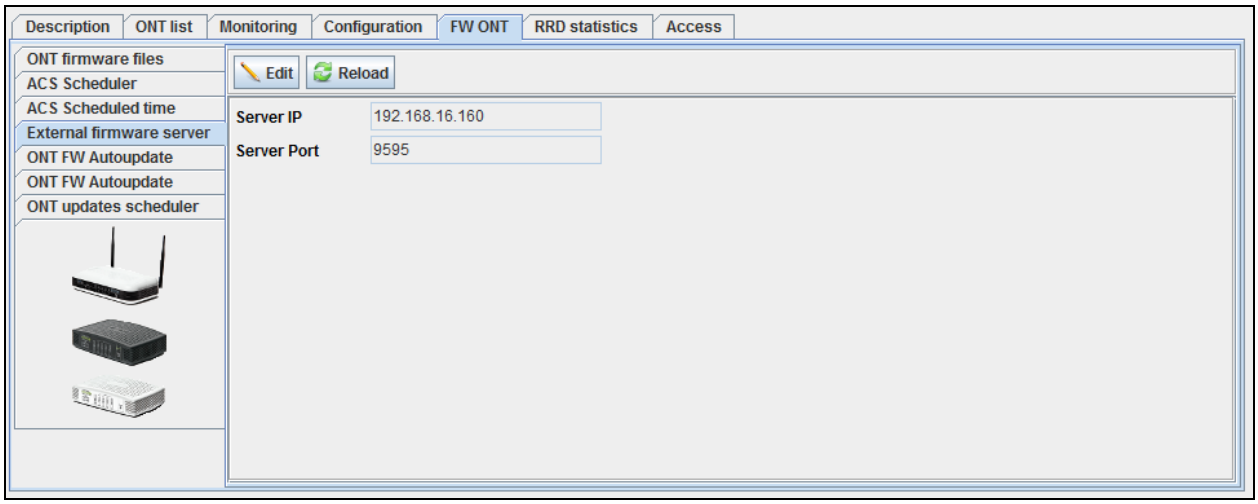
- *Time of day* — set scheduler operation start/end time;
- *Day of week* — set scheduler operation start/end day of the week in DD.MM.YYYY format;
- *Date* — set scheduler operation start/end date in DD.MM.YYYY format.

To ensure the proper scheduler operation, adjust the system time correctly. If NTP service is enabled for the device, manual time synchronization will not be available.

Click *Reload* button to refresh the information in the tab.

8.5.4. EXTERNAL FIRMWARE SERVER (FOR GPON 2X VERSION)

Use this menu to configure external HTTP server address with the software for subscriber-side devices.



- *Server IP* — server IP address;
- *Server Port* — server port.

Click *Reload* button to refresh the information in the tab.

[1] The tab is active when internal ACS is enabled on LTP, otherwise it will not be shown.

9 MA4000-PX DEVICE MANAGEMENT

9.1. LIST OF OBJECTS IN DEVICE

MA4000-PX multiservice access and aggregation point allows to construct access networks based on GPON technology and aggregation networks based on ETTH (FTTB) technology. This system allows to build scalable and robust 'last mile' networks, that comply with strict security requirements of rural or urban areas. Access points allow to manage subscriber-side devices, switch traffic and establish connection with the transport network.

Given that MA4000-PX has a module construction, MA4000 object in the device tree will be divided into several subobjects:

- PP4X control module
- GPON PLC8 module

For PON modules, the device tree shows information on tree state synchronization. If data is synchronized, the last synchronization time and ONT quantity in configuration will be shown in the separate tab. ONT quantity in the device or slot is shown in the square brackets in the **[CFG/ACTIVE/ALARM**] format.

For example, string [10/8/1] means, that the selected tree has 10 ONT configurations, 8 active devices are in operation, and 1 device is in error mode.

9.2. MAIN OBJECT EDITING AND MONITORING WINDOW

Table 5 lists description of the basic control tabs:

Table 5 — MA4000-PX general control and monitoring menu overview

Menu	Description	Section
Description	Information on the physical properties of the object	6.6.1
ONT list	View and edit ONT configurations	9.3
Monitoring	Graphical information on states of the device modules, monitoring of power supply parameters	9.4
Active alerts	Monitoring of active events, received from the device	6.6.2
Common	General device data (firmware version, uptime, CPU load, etc.)	6.6.3
Event log	Monitoring of events, received from the device	6.6.4
Syslog	Network log configuration for the system	6.6.5
Shelf	Rack configuration monitoring and control	9.4.1
ICMP Statistics	Echo test duration statistics to the device	6.6.6
SNMP statistics	SNMP response delay statistics	6.6.7
Power	Monitoring of the power supply parameters	9.4.2
Multicast Groups	Monitoring of multicast groups parameters	9.4.3
Configuration	Management of slot configuration, default firmware, control modules' firmware, firmware update, SNMP traps and syslog configuration	9.5
Profiles	View and edit profiles on device	9.5.1
Slot configuration	View and edit general parameters for service modules	9.5.3
IGMP Snooping	IGMP settings management	9.5.4
IGMP Proxy Report range	proxy configuration	9.5.5
Traps filtration	View and filtering traps	9.5.6
SNMP Traps	Information on SNMP trap configuration	9.5.7
Syslog configuration	network system log configuration	9.5.8
Users	View and edit user rights	9.5.9

Network Time Protocol	NTP service configuration	9.5.10
Time synchronization	Synchronize time on device with EMS server	9.5.10
Stack configuration	Device stack configuration	9.5.11
CLI/telnet	Terminal program emulator for connections via Telnet protocol	6.6.9
CLI/ssh	Terminal program emulator for connections via SSH protocol	6.6.9
Firmware Update	Subscriber-side device firmware management	9.6
Shelf's firmware	Active images for each of the control modules	9.6.1
FW ONT	Active images for subscriber-side devices	9.6.2
ONT AutoUpdate Flags	Configuration of ONT firmware update via OMCI	9.6.3
ONT updates scheduler	Firmware update schedule	9.6.4
ACS scheduler	Settings for firmware update via ACS server	9.6.5
ACS schedule	Schedule for firmware update via ACS server	9.6.6
RRD statistics	Collection of the network interface load statistics	6.6.10
Access	Information on the object hardware parameters, that are stored in the database, device SNMP access settings	6.6.11

9.3.ONT LIST

For detailed tab description, see chapter **8 PON LTP-8X device management** paragraph **8.2 ONT list.**

9.4.MONITORING

9.4.1. SHELF

Areas of monitoring

- *Fan0/1/2* — fan state and rotation speed data in revolutions per minute (rpm);
- *Feeder1/2* — state of modules and power supply parameters:
  - *Current* — power supply current, Amp;
  - *Voltage* — power supply voltage, V.

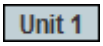
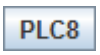
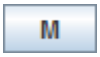
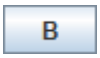
Fan and power modules' state indication:

- operating

 - shut down by administrator or in alarm state

Rack graphics representation

Table — rack element

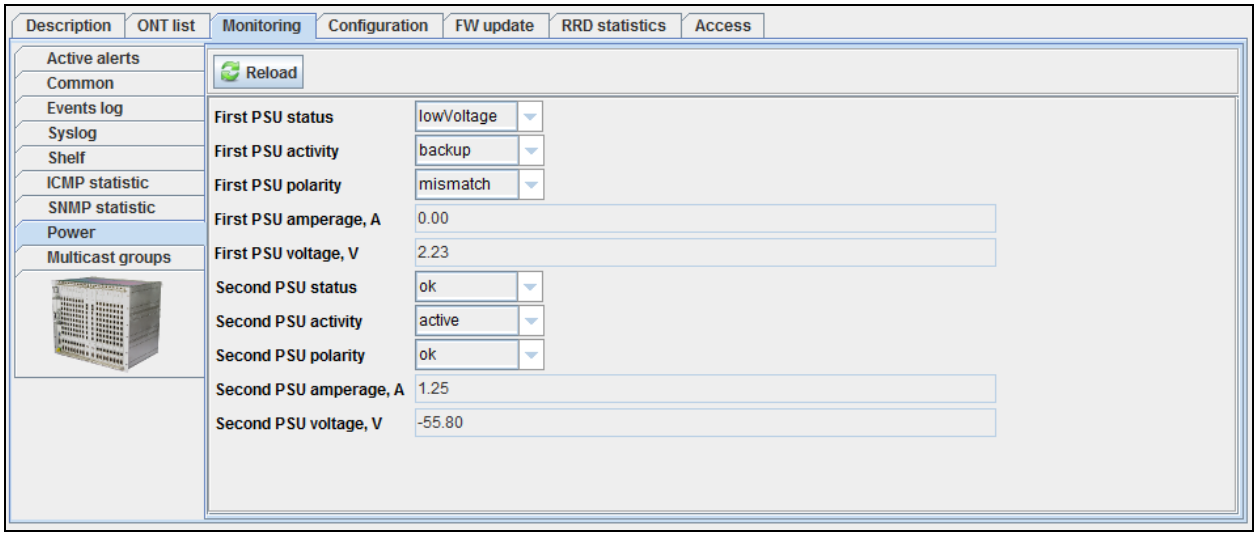
Designation	Description	Note
Slot numbering		
	Sequence number of PON module slot	
	Sequence number of control module slot	
Slot assignment		
	Control module slot	Editing of the slot is denied
	GPON module slot	Click the icon to show object edit window — select the type of module being installed and its firmware version
	Not assigned slot	
Information on slots for control modules		
	Module in MASTER mode	Click the icon to show the information on the installed module
	Module in BACKUP mode	
Information on slots for PON modules		
	Slot is empty, the type of the module being installed is not defined	
	Slot is empty, the type of the module being installed is defined	
	Slot is occupied	Click the icon to show the information on the installed module
Presence of the module in a rack		
	PLC8 slot is occupied	
	Control module slot is occupied	
	Slot is empty, the type of the module being installed is assigned	
	Slot is empty, the type of the module being installed is not assigned	
Uplink interface status of control modules		
	Connection is available	For control modules, click the icon to show the interface

	No connection	information.
Interface status of PON modules		
	Operation and administrative port status — DOWN — port is disabled	For PON modules, click the icon to show PON channel information.
	Port is enabled, SFP module is not installed	
	Operation and administrative port status — UP — in operation, no active ONTs	
	Operation and administrative port status — UP — in operation, active ONTs available	

Click *Reload* button to refresh the information in the tab.

9.4.2. POWER

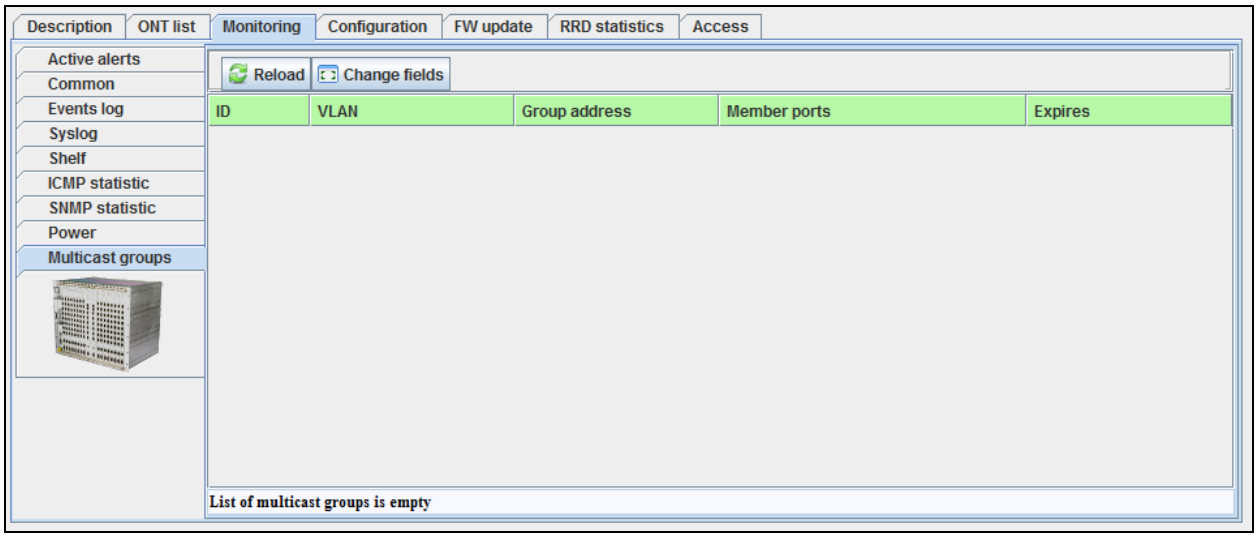
Use this tab to monitor the power supply parameters: operation status, activity, polarity, and the current and voltage data for each of the two power supplies of the device.



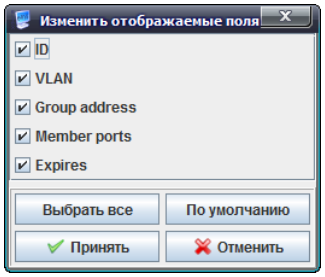
Click *Reload* button to refresh the information in the tab.

9.4.3. MULTICAST GROUPS

Use this tab to monitor parameters of multicast groups on the device.



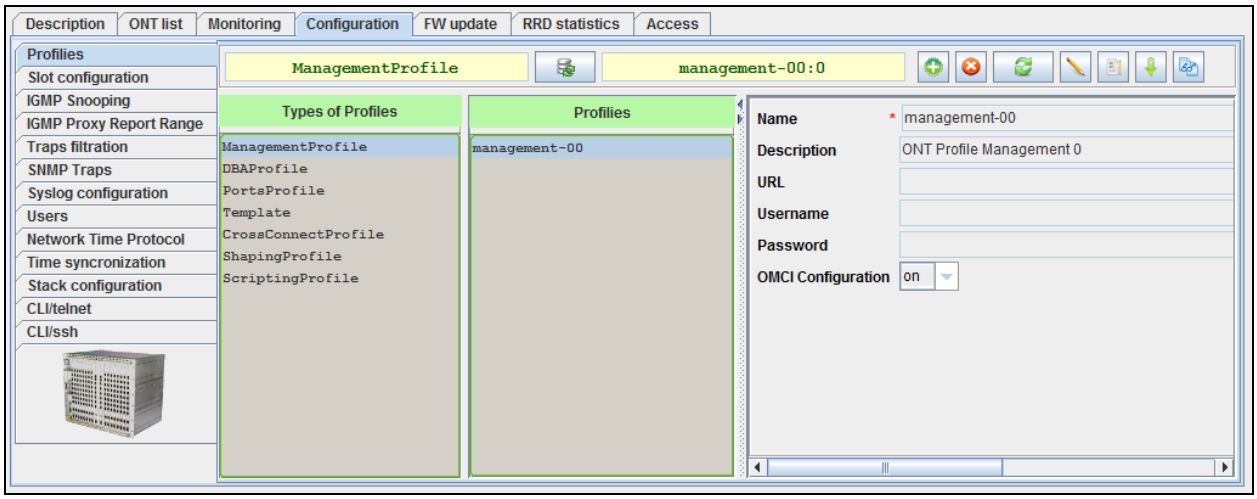
- *ID* — number of the record;
- *VLAN* — VLAN number;
- *Group Address* — group IP address;
- *Member Ports* — group ports;
- *Expires* — amount of time until the group is disbanded on the internal switch.



9.5.CONFIGURATION

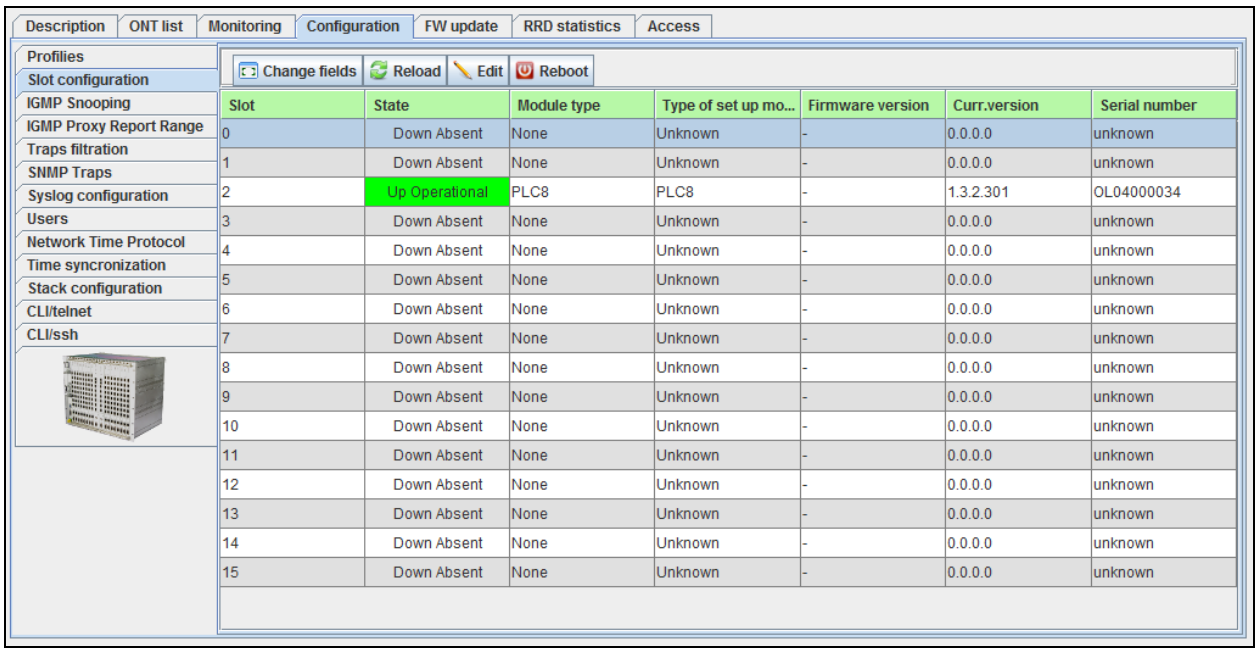
9.5.1. PROFILES

Use this tab to view and edit profiles on the device. For detailed information, see chapter **8 PON LTP-8X device management**, section **8.4.8 Profiles.**



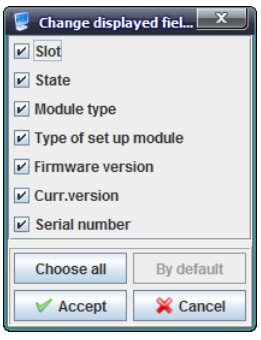
9.5.2. SLOT CONFIGURATION

Use this tab to view and edit general parameters of the service modules, installed in MA4000-PX.



Slot	State	Module type	Type of set up mo...	Firmware version	Curr.version	Serial number
0	Down Absent	None	Unknown	-	0.0.0.0	unknown
1	Down Absent	None	Unknown	-	0.0.0.0	unknown
2	Up Operational	PLC8	PLC8	-	1.3.2.301	OL04000034
3	Down Absent	None	Unknown	-	0.0.0.0	unknown
4	Down Absent	None	Unknown	-	0.0.0.0	unknown
5	Down Absent	None	Unknown	-	0.0.0.0	unknown
6	Down Absent	None	Unknown	-	0.0.0.0	unknown
7	Down Absent	None	Unknown	-	0.0.0.0	unknown
8	Down Absent	None	Unknown	-	0.0.0.0	unknown
9	Down Absent	None	Unknown	-	0.0.0.0	unknown
10	Down Absent	None	Unknown	-	0.0.0.0	unknown
11	Down Absent	None	Unknown	-	0.0.0.0	unknown
12	Down Absent	None	Unknown	-	0.0.0.0	unknown
13	Down Absent	None	Unknown	-	0.0.0.0	unknown
14	Down Absent	None	Unknown	-	0.0.0.0	unknown
15	Down Absent	None	Unknown	-	0.0.0.0	unknown

- *Slot* — slot number in the MA4000-PX rack;
- *State* — module activity status;
- *Module type* — type of the module being installed (none/PLC8/unknown);
- *Module type inst.* — type of installed module (none/PLC8/unknown);
- *Firmware version* — expected module firmware version;
- *Current version* — installed module firmware version;
- *Device serial number* — factory serial number of the device.

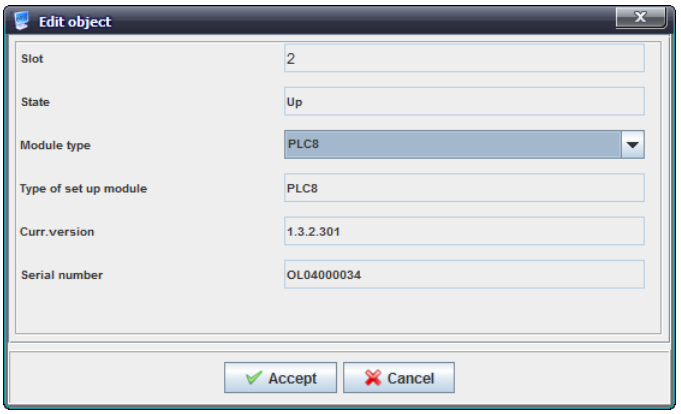


Slot configuration peculiarities:

If you change the slot type or assign slot to empty position, there will be two possible editing options.

If the current version of firmware differs from the default version:

Step 1



- Go to edit mode.
- Assign the module type in the corresponding column (during this operation, in 'Firmware version' selector will be shown available versions for the *previous* module type).
- Click *Accept* button to save changes.

Step 2

- Go to edit mode again.
- Assign the firmware version that differs from the default one.
- If reboot is needed, select *On* value in *Reboot* field.
- Click *Accept* button to save changes.

If the firmware version matches the default version:

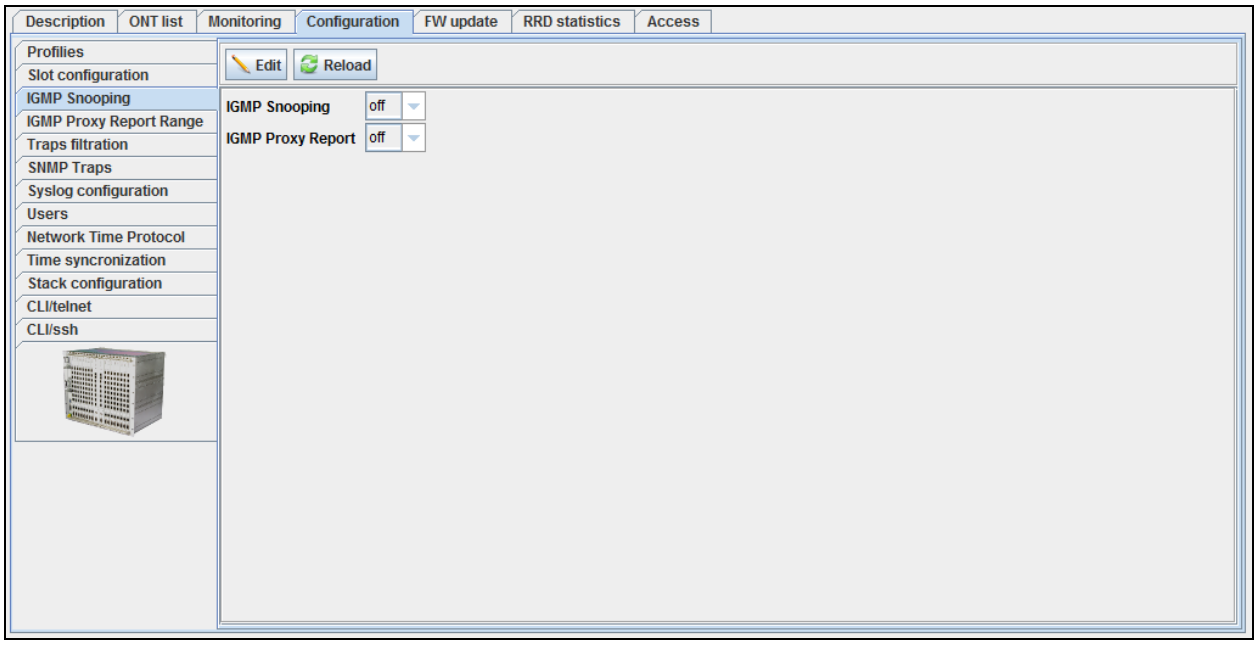
- Go to edit mode.
- Specify the required module type in the *Module type* field.
- Select *default* value in the *Firmware version* field.
- If reboot is needed, select *On* value in *Reboot* field.
- Click *Accept* button to save changes.

Click *Apply* button to save changes, or click Cancel button to exit from the edit mode without saving.

Click *Reload* button to refresh the information in the tab.

9.5.3. IGMP SNOOPING[1]

Use this tab to manage IGMP settings.



To manage IGMP settings, click *Edit* button and select the desired values from the drop-down list:

- *IGMP Snooping* — enable/disable IGMP snooping feature, that allow to manage downlink multicast streams;
- *IGMP Proxy Report* — enable/disable IGMP Proxy Report.

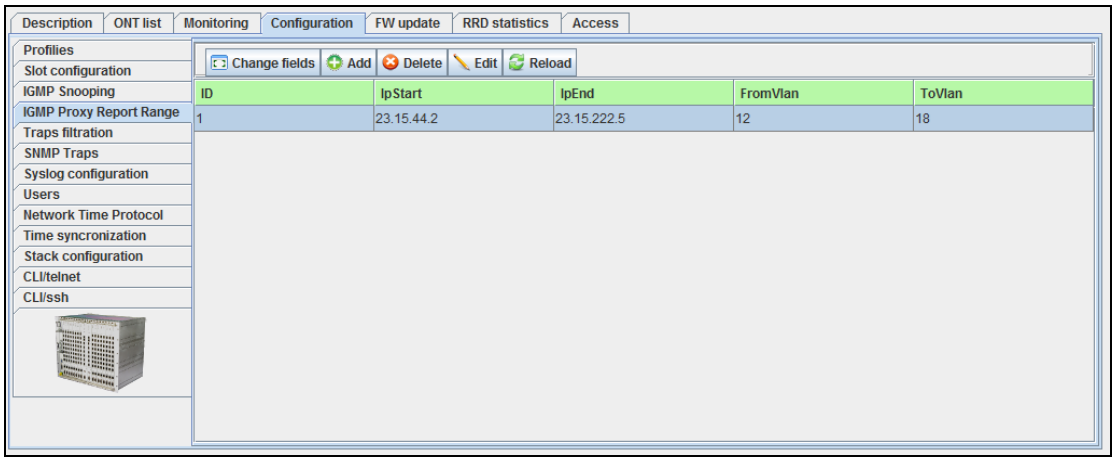
Click *Apply* button to save changes, or click *Cancel* button to exit from the edit mode without saving.

Click *Reload* button to refresh the information in the tab.

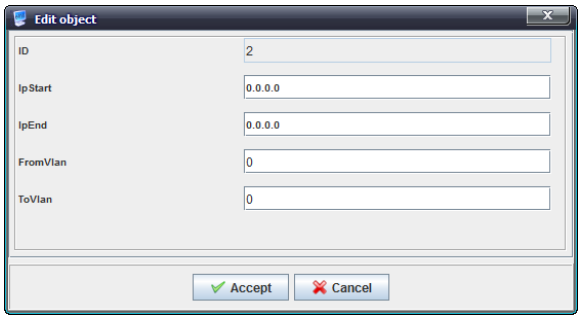
[1] For versions 1.3. x. x

9.5.4. IGMP PROXY REPORT RANGE[1]

Use this tab to configure proxy.



- *ID* — sequence number of the record;
- *IpStart* — starting address of the IP address range;
- *IpEnd* — ending address of the IP address range;
- *FromVlan* — starting address of the VLAN range;
- *ToVlan* — ending address of the VLAN range.

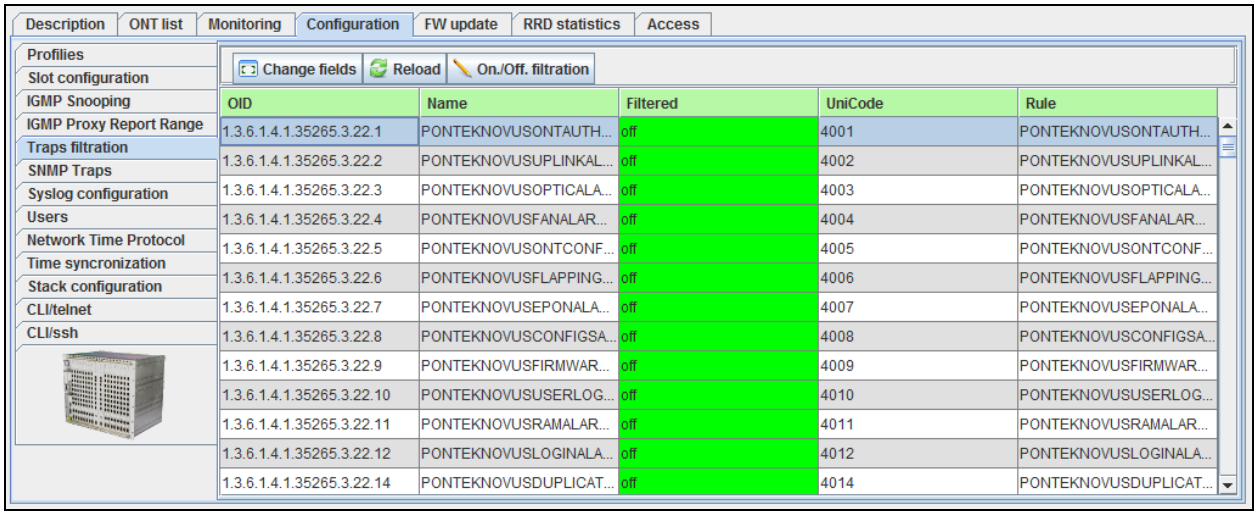


Click *Apply* button to save changes, or click Cancel button to exit from the edit mode without saving.

Click *Reload* button to refresh the information in the tab.

9.5.5. TRAPS FILTERING[1]

Use this tab to view and filter traps received from the device.

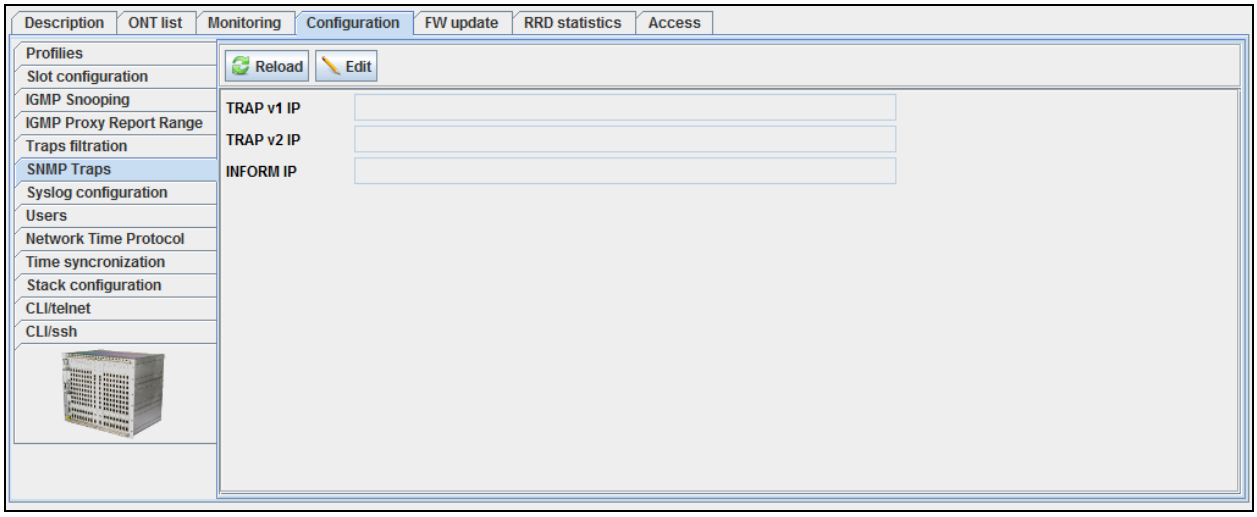


Click *Reload* button to refresh the information in the tab.

[1] For versions 1.3.x.x

9.5.6. SNMP TRAPS

This tab shows information on configuration of SNMP traps.



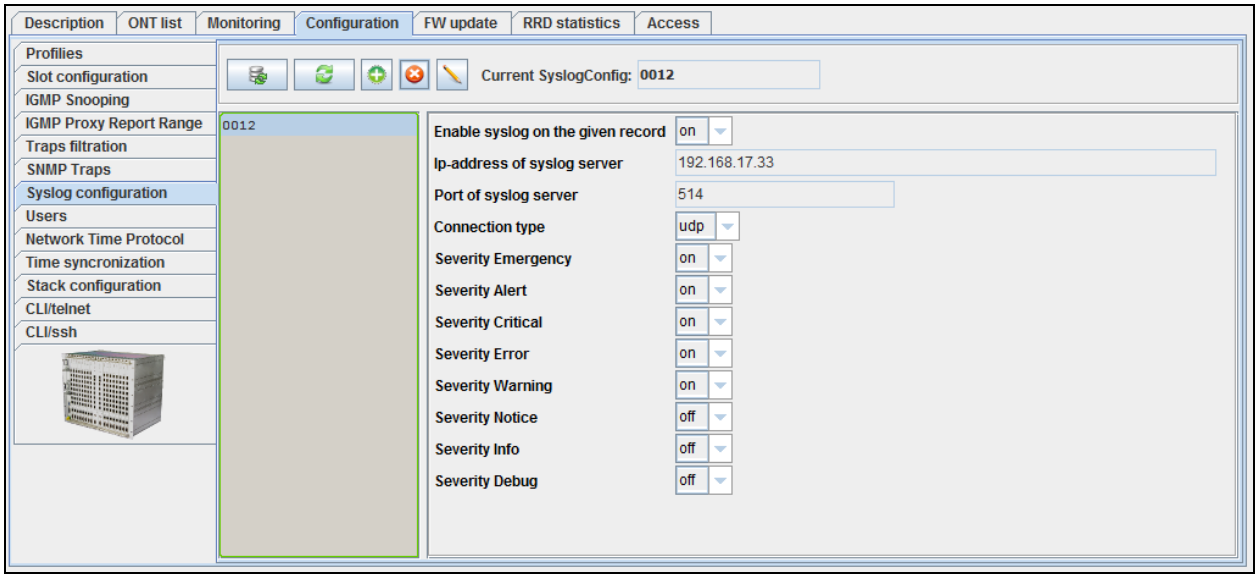
- *Traps v1 IP* — define the address for sending SNMPv1 traps;
- *Traps v2 IP* — define the address for sending SNMPv2 traps;
- *INFORM IP* — define the address for sending SNMP information traps.

Click *Apply* button to save changes, or click Cancel button to exit from the edit mode without saving.

Click *Reload* button to refresh the information in the tab.

9.5.7. SYSLOG CONFIGURATION

Use this tab to configure network system log. You can create up to 64 different configurations.



- *Enable syslog on the given record* — enable syslog message transmission to all recipients;
- *IP address of syslog server*— define the IP address of the remote host for log file saving;
- *Port of syslog server*— port number for the connection to the remote point in the range from 1 to 65535;
- *Connection type* — type of packets being transmitted, *tcp* or *udp;*

Message types by severity level:

- *Severity Emergency* — system is down, Level 0;
- *Severity Alert* — immediate action required, Level 1;
- *Severity Critical* — critical state, Level 2;
- *Severity Error* — error, Level 3;
- *Severity Warning* — warning, Level 4;
- *Severity Notice* — important notice, Level 5;
- *Severity Info* — informational message, Level 6;
- *Severity Debug* — debug print, Level 7;

Configure the receiving of these message types:

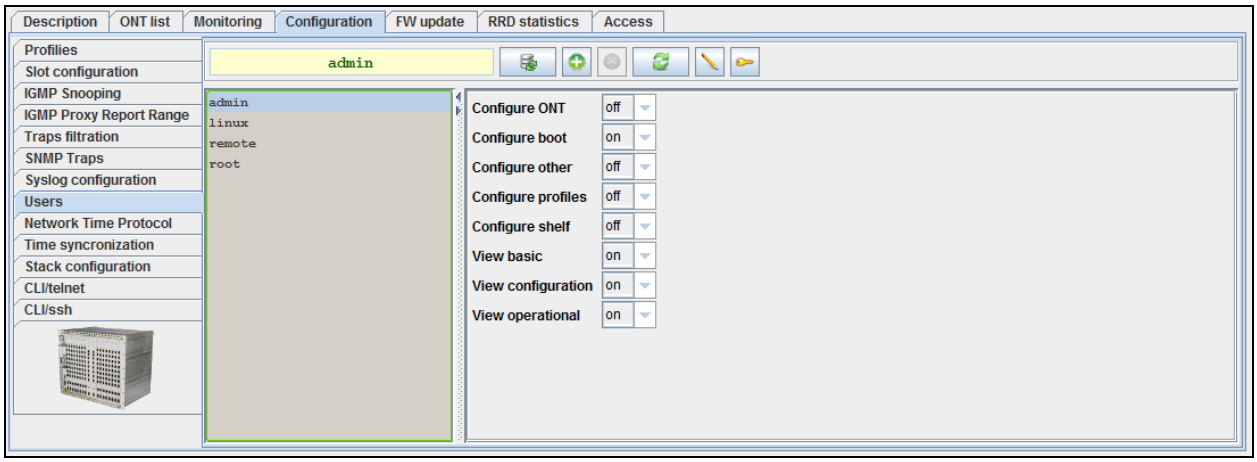
- *on* — enable;
- *off* — disable.

Click *Apply* button to save changes, or click *Cancel* button to exit from the edit mode without saving.

Click  (*Reload SyslogConfig list*) button to refresh the list of configured system logs.

9.5.8. USERS

Use this tab to view and edit user rights for configuration of the rack and subscriber-size devices.



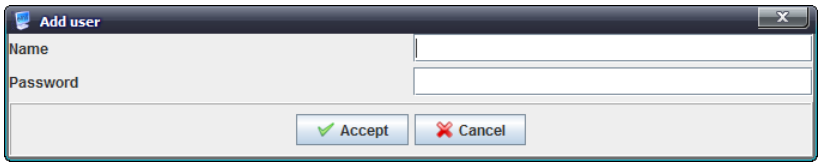
Users admin, linux, and root are always present on the device and cannot be deleted.

User rights:

- *Configure ONT* — ONT configuration rules;
- *Configure boot* — device boot configuration rules;
- *Configure other* — other control rules;
- *Configure profiles* — ONT profile configuration rules;
- *Configure shelf* — crate configuration rules;
- *View basic* — basic settings' viewing rules;
- *View configuration* — configuration viewing rights;
- *View operational* — rules for operational information viewing on the device.

Adding user

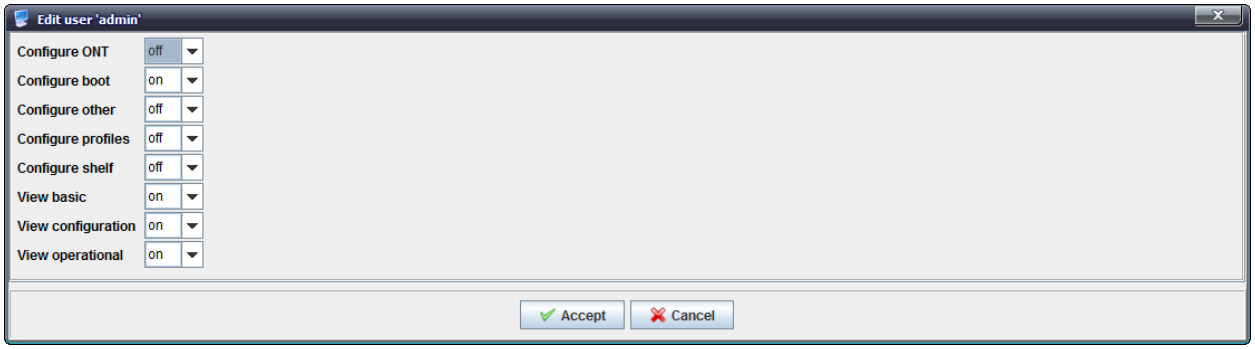
To add user, click  button and fill in the following fields:



- *Name* — user name;
- *Password* — user authorization password (at least 8 characters, only Latin).

Editing user rights

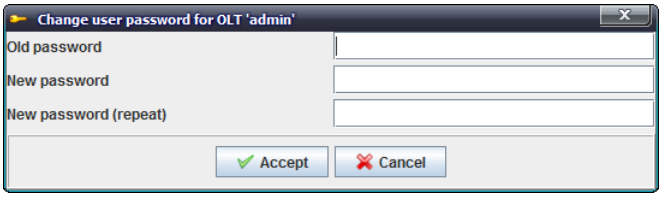
To edit user rights, select the desired record, click  button and set up access rights:



Change user password

To change the password, select the desired record, click  and fill in the following fields:

- *Current password* — current user password;
- *New password* — modified user password;
- *New password (verify)* — modified password verification.



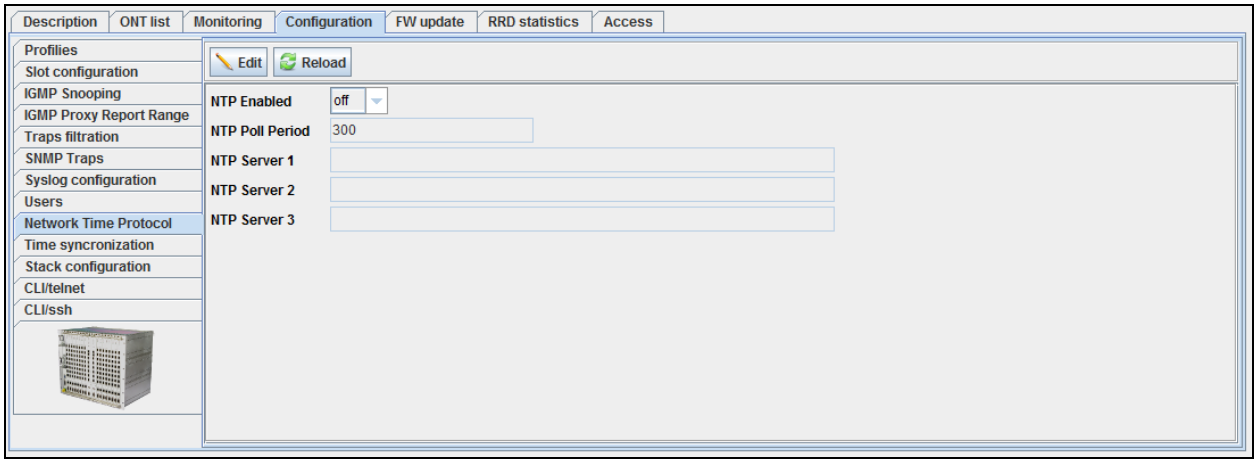
Click *Apply* button to save changes, or click Cancel button to exit from the edit mode without saving.

Click  (*Update user settings)* button to update parameters of a specific user.

Click  *(Reload user list)* button to refresh the list of users.

9.5.9. NETWORK TIME PROTOCOL

Use this menu to configure NTP service — device system time configuration.



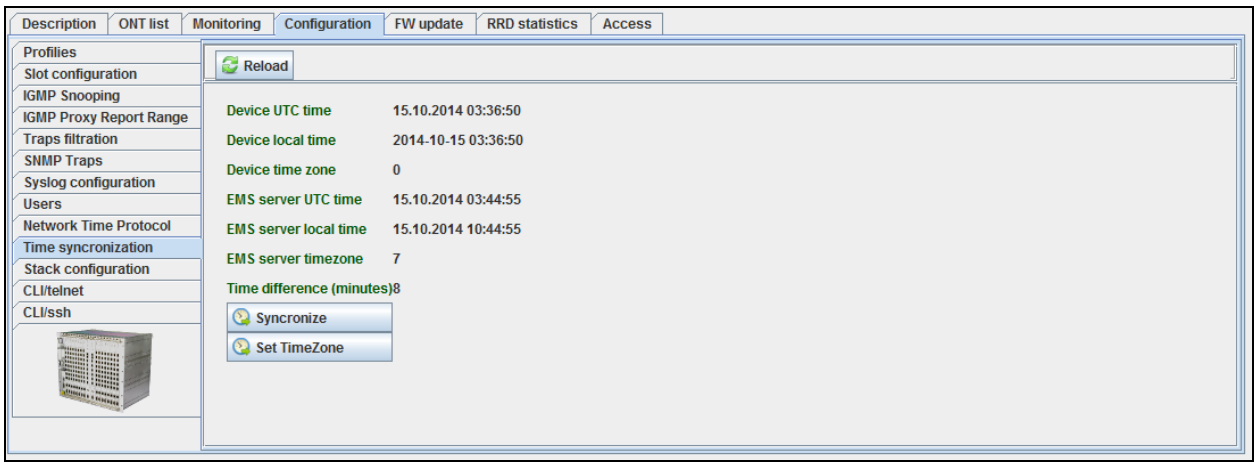
- *NTP Enabled* — enable/disable NTP;
- *NTP Poll Period* — time interval between NTP server polling attempts in minutes;
- *NTP Server 1..3* — address of time server, that will be used for device time and date synchronization.

Click *Apply* button to save changes, or click Cancel button to exit from the edit mode without saving.

Click *Reload* button to refresh the information in the tab.

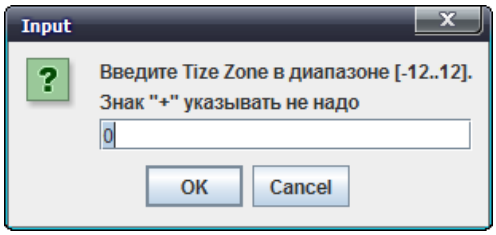
9.5.10. TIME SYNCHRONIZATION

Use this menu to synchronize device time with EMS server.



To ensure the proper scheduler operation, adjust the system time correctly. If NTP service is enabled for the device, manual time synchronization will not be available.

System time data



- *Device UTC time* — device time in UTC format;
- *Device local time* — device local time with UTC time offset;
- *Device time zone* — timezone in reference to UTC;
- *EMS server UTC time* — server time in UTC format;
- *EMS server local time* — server local time with UTC time offset;
- *EMS server timezone* — timezone in reference to UTC;
- *Time difference (minutes)* — difference in time on the device and EMS server;
- *Synchronize* — click to synchronize the system time on the device with EMS server;

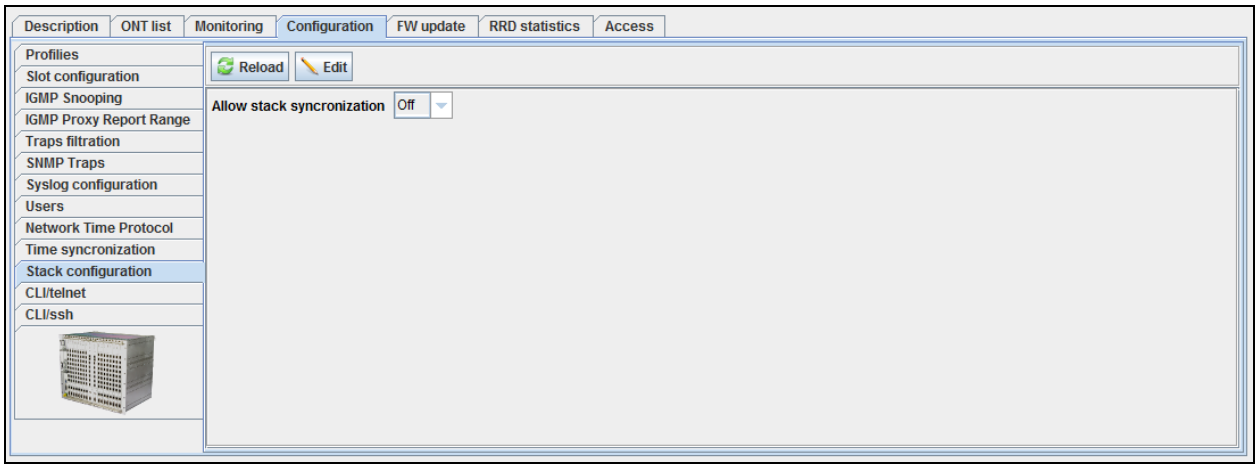
If NTP service is enabled on the device, manual synchronization will not be performed

- *Set TimeZone* — specify UTC offset and direction.

Click *Reload* button to refresh the information in the tab.

9.5.11. STACK CONFIGURATION

Use this menu to control the configuration file transmissions between PP4 control modules.

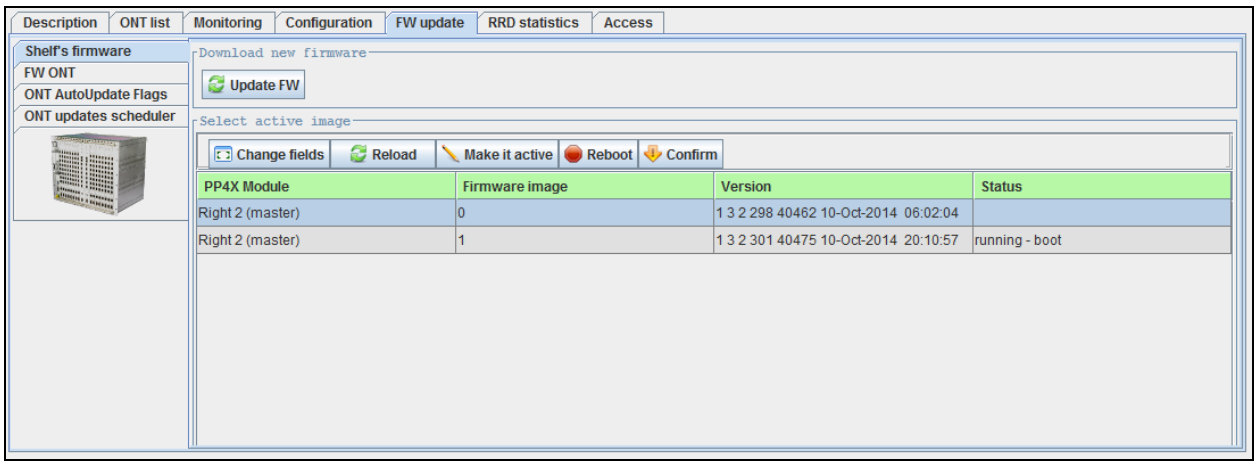


Click *Reload* button to refresh the information in the tab.

9.6. FW UPDATE

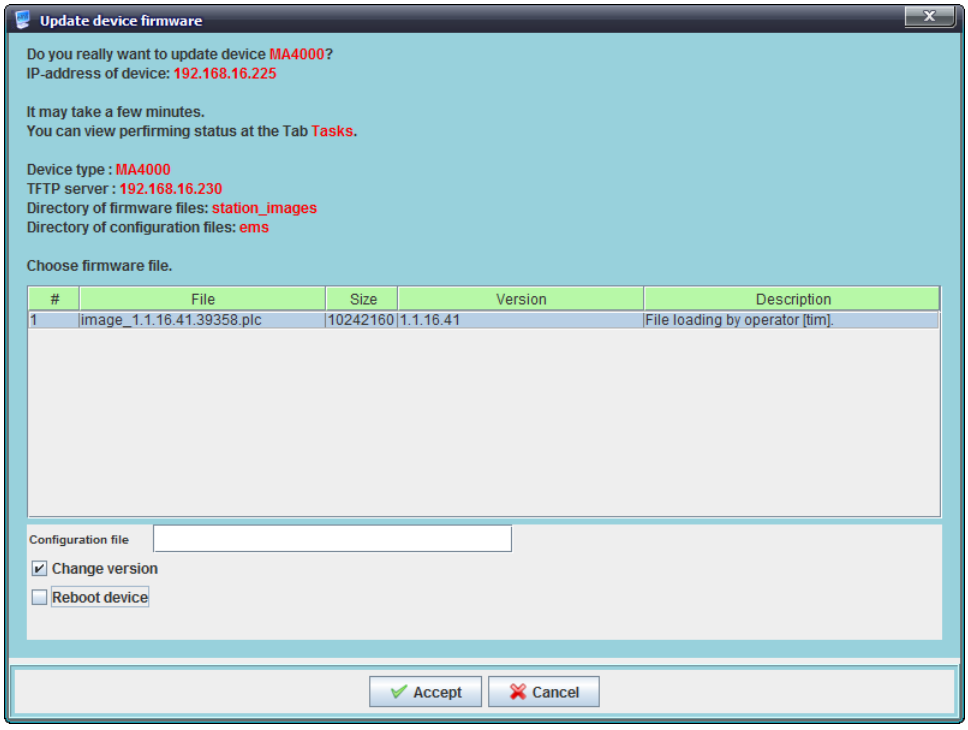
9.6.1. SHELF'S FIRMWARE

Use this tab to assign the active images for each of the device control modules.



To download new firmware, click *Update firmware* button and select the required record from the table in the next window. Click *Accept*, and the system will begin the firmware file download to MA4000.

If *Update FW button* is selected, the current version will be overwritten with the downloaded one.



If *Reboot button* is selected, the device will be rebooted after firmware download is finished.

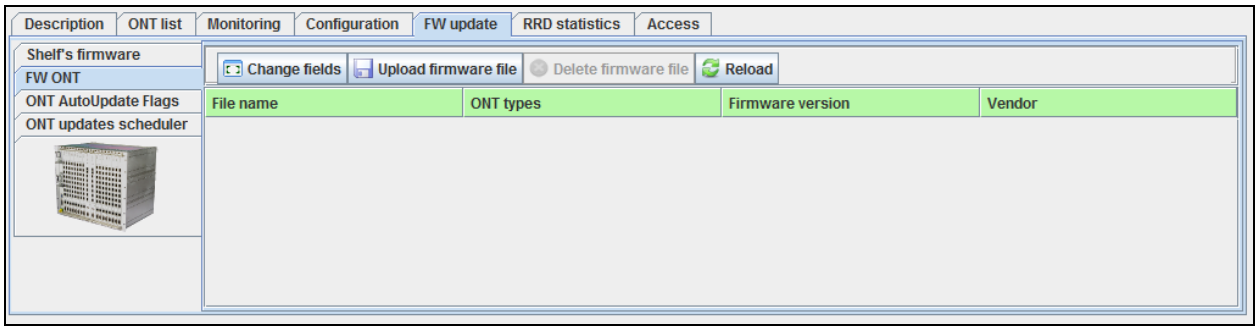
To activate the desired module, scroll to the desired line in the list and click *Make it active* button.

Click *Save* button to save changes, or click *Cancel* button to exit from the edit mode without saving.

Click *Reload* button to refresh the information in the tab.

9.6.2. FW ONT

Use this tab to manage firmware files for subscriber-side devices stored on OLT.



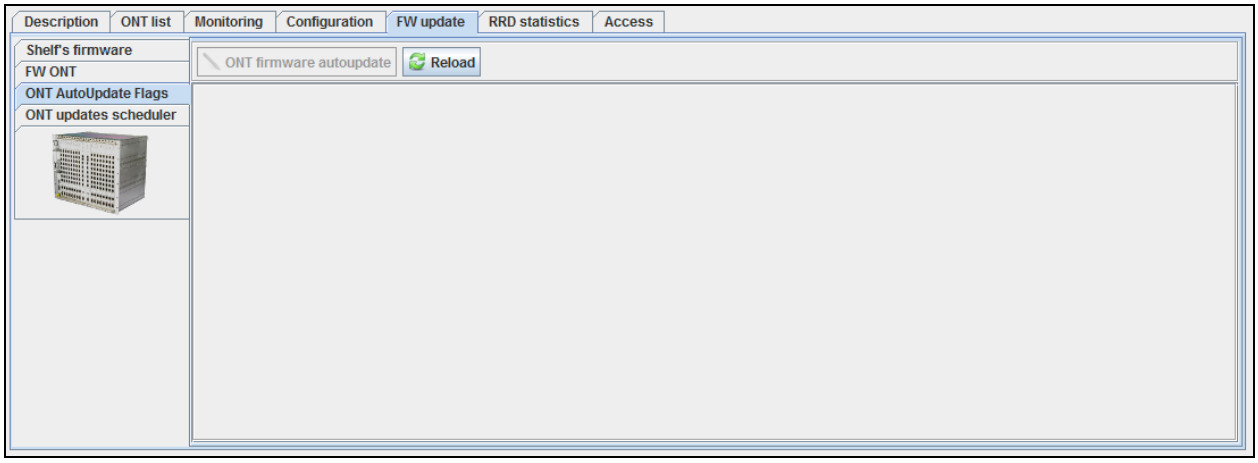
To download the firmware, click *Upload firmware file* button, and select the desired firmware file in the opened window. Click *Accept*, and the system will begin the firmware file download to MA4000. Later, it will be used for the automatic firmware update on the subscriber-side devices.

To delete the firmware file, select it in Firmware Files menu and click *Delete firmware file* button.

Click *Reload* button to refresh the information in the tab.

9.6.3. ONT AUTOUPDATE FLAGS[1]

Use this tab to update ONT firmware via OMCI for each slot with PLC8 board installed.

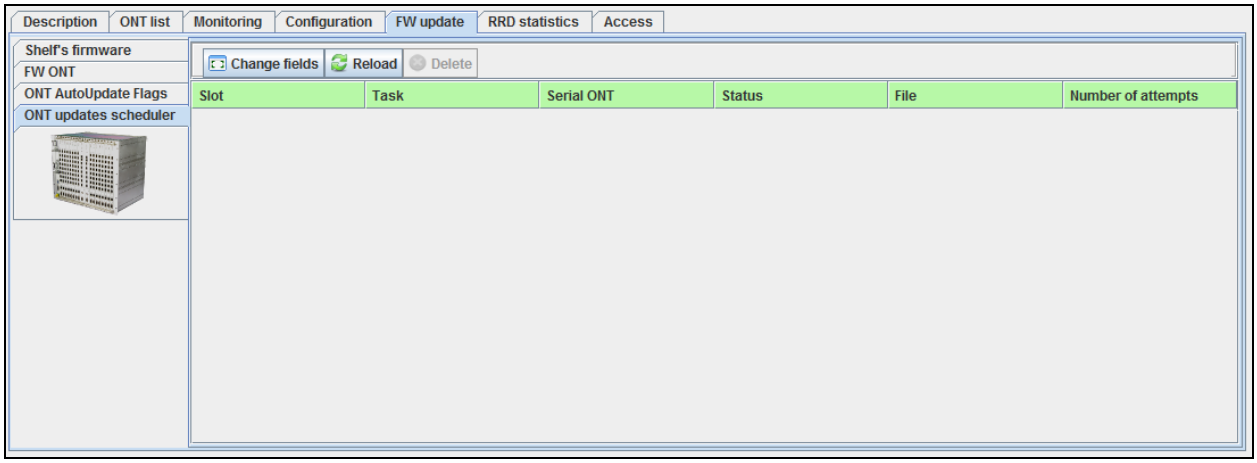


Click *Reload* button to refresh the information in the tab.

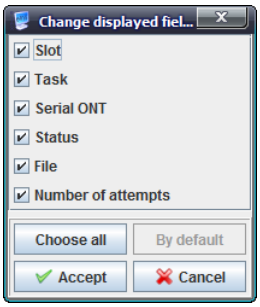
[1] For versions 1.3. x. x

9.6.4. ONT UPDATE SCHEDULER[1]

Use this menu to configure firmware update parameters for subscriber-side devices.



- *Slot* — slot number in the MA4000-PX rack;
- *Task* — update task parameters;
- *Serial ONT* — serial number of the ONT;
- *Status* — process status;
- *File* — firmware file for device update;
- *Number of attempts* — counter of the device firmware update attempts.

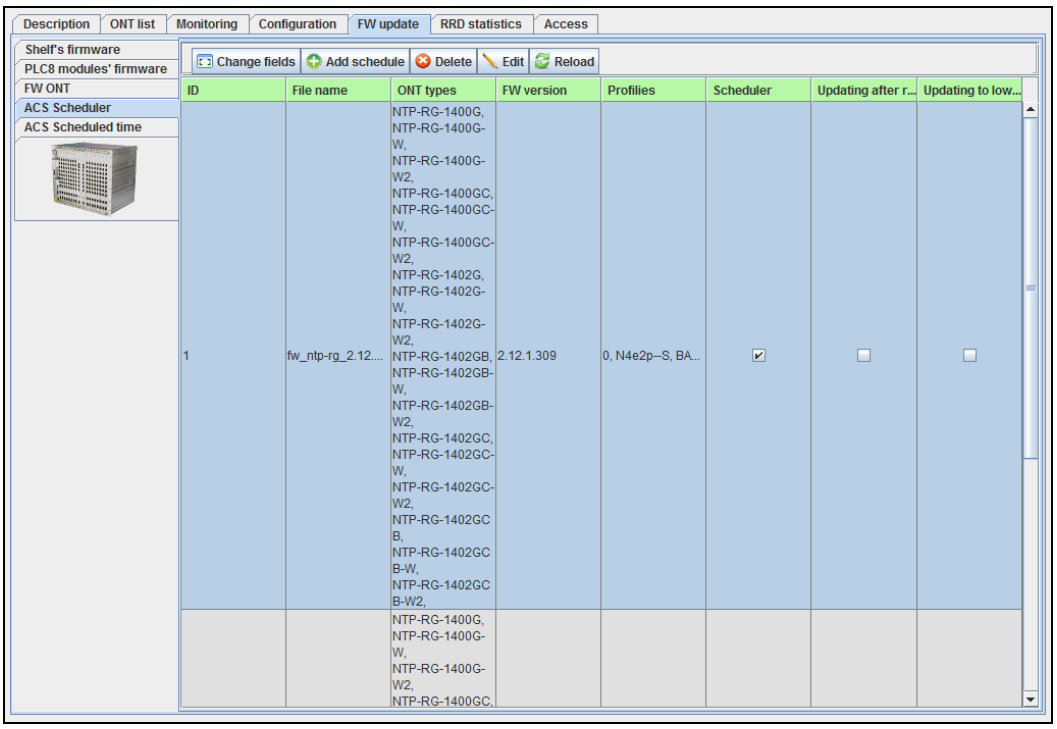


Click *Reload* button to refresh the information in the tab.

[1] For versions 1.3. x. x

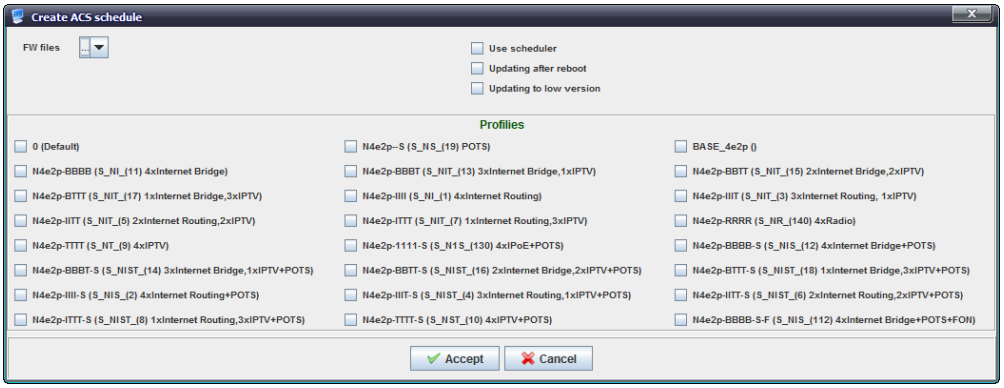
9.6.5. ACS SCHEDULER[1]

Use this menu to configure firmware update parameters for subscriber-side devices using ACS server.



Click *Add rule* button to proceed to adding rules screen, or click *Delete rule* to delete the rule. To edit the rule, select the desired row from the rights list and click *Edit* button.

Adding/Editing rules:



- *Firmware files* — select the firmware from the drop-down list;
- *Use scheduler* — when checked, use the scheduler, otherwise the scheduler will not be used;
- *Update after reboot* — when checked, perform firmware update after ONT is rebooted, otherwise device will be updated when ONT gets access to ACS;
- *Downgrading* — when checked, you can flash previous versions of ONT firmware;
- *Profiles* — when checked, the profile will be included into the used profile list.

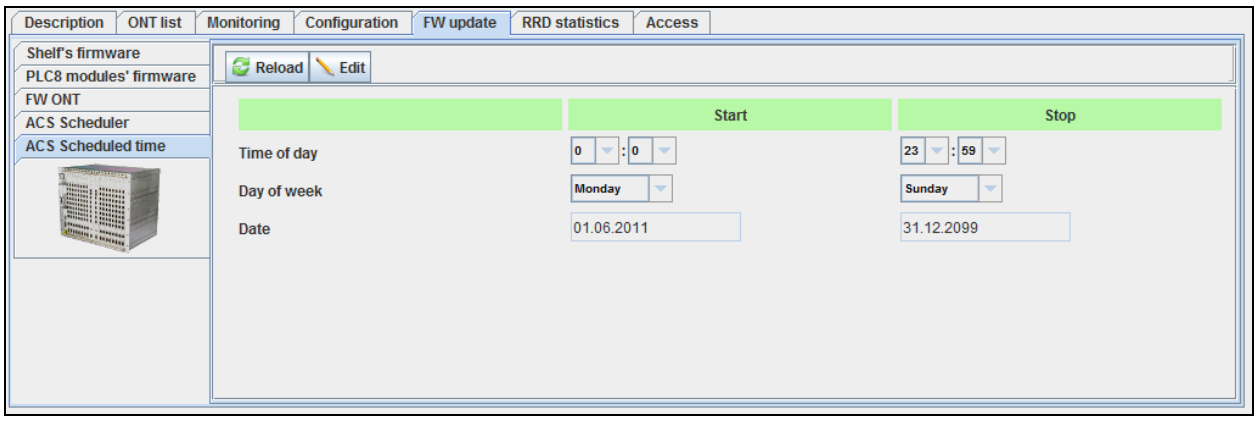
Click *Apply* button to confirm changes, or click Cancel button to exit from the edit mode without saving.

Click *Reload* button to refresh the information in the tab.

[1] For version 1.1.x.x with internal ACS enabled

9.6.6. ACS SCHEDULED TIME[1]

Use this menu to configure firmware update schedule for subscriber-side devices using ACS server.



- *Time of day* — set scheduler operation start/end time;
- *Day of week* — set scheduler operation start/end day of the week in DD.MM.YYYY format;
- *Date* — set scheduler operation start/end date in DD.MM.YYYY format;

To ensure the proper scheduler operation, adjust the system time correctly. If NTP service is enabled for the device, manual time synchronization will not be available.

Click *Reload* button to refresh the information in the tab.

[1] For version 1.1.x.x with internal ACS enabled

9.7. PP4X CONTROL MODULE

Central switch module is the basic platform element, that performs the general management and diagnostics of periphery modules, switching, traffic aggregation for interface modules and communication with the upstream network equipment. Modules operate in load distribution mode and reservation mode.

Table 6 lists description of the basic control tabs:

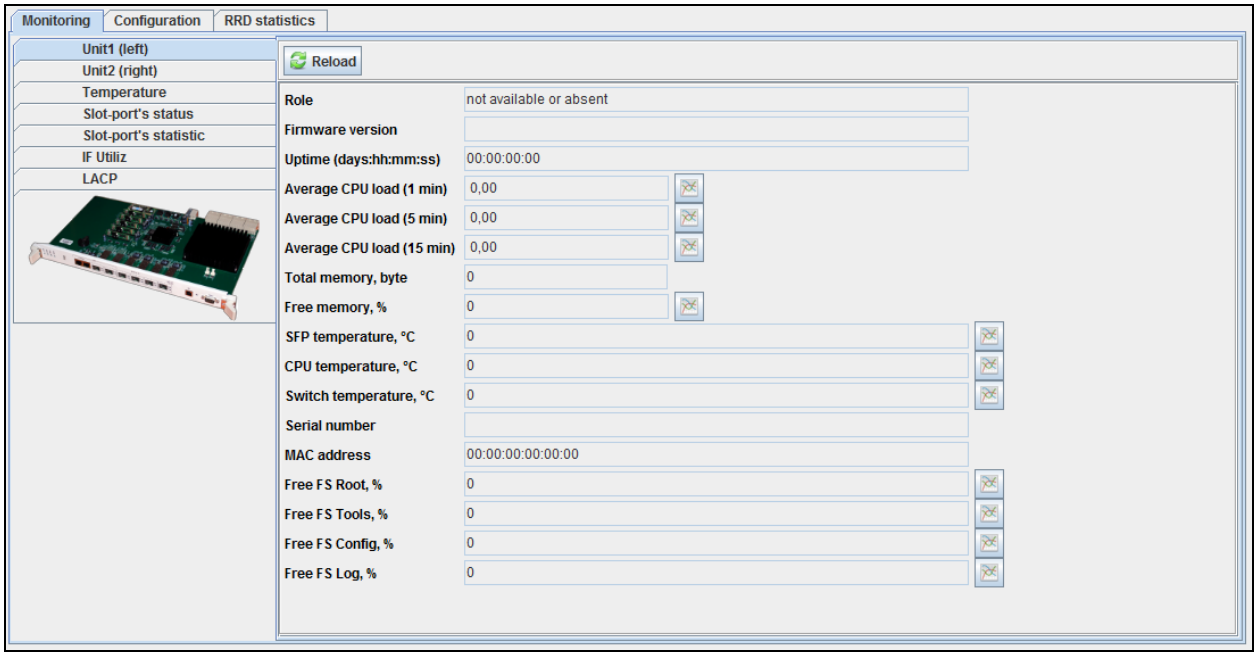
Table 6 — PP4X module control and monitoring menu

Menu	Description	Section
Monitoring	Monitoring of thePP4X control module parameters	9.7.1
Unit 1 (left)	Information on the PP4X control module parameters	9.7.1.1
Unit 2 (right)	Information on the PP4X control module parameters	9.7.1.1
Temperature	Statistic chart of PP4X module temperature variations	6.6.8
Slot-port's status	Monitoring of the ports state	9.7.1.2
Slot-port's statistics	Channel configuration	9.7.1.3
IF Utiliz	Traffic load statistics for MA4000 interfaces	9.7.1.4
LACP	Monitoring of the logical channels	9.7.1.5
Configuration	Trap settings configuration	9.7.2
VLAN list	VLAN configuration	9.7.2.1
QOS	Traffic prioritization settings	9.7.2.2
Access list	List of rules, that define the device availability via HTTP,SNMP, SSH, TELNET protocols	9.7.2.3
Ports config	Configuration of device control modules' uplink ports	9.7.2.4
Trunk membership	Configuration of LACP port aggregation	9.7.2.5
LACP	LACP System Priority setting configuration	9.7.2.6
RRD statistics	Collection of the network interface load statistics	6.6.10

9.7.1. MONITORING

9.7.1.1. UNIT1 (LEFT), UNIT 2 (RIGHT)

This tab shows information on each PP4X module parameters respectively. The information is read-only.



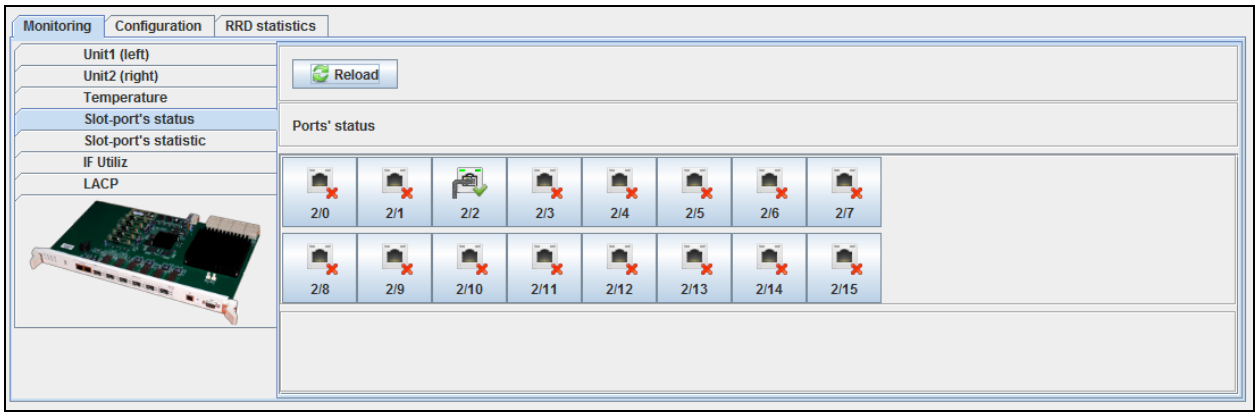
- *Role* — module role:
  - *Master* — master module;
  - *Backup* — slave module with the ability to take the master role;
  - *Backup* — slave module without the ability to take the master role;
  - *unknown* — not defined;
- *Firmware version* — module firmware version;
- *Uptime (days:hh:mm:ss)* — device operation time since the last reboot;
- *Average CPU load 1min/5min/15min, %* — average system load 1min/5min/15min;
- *Total memory* — total device memory in bytes;
- *Free memory, %*— free device memory in %;
- *SFP temperature, C* — SFP module thermal sensor readings in Celsius;
- *CPU temperature, C* — CPU thermal sensor readings in Celsius;
- *Switch temperature, C* — internal switch thermal sensor readings in Celsius;
- *Serial number* — device serial number;
- *MAC address* — PP4X module unit MAC address;
- *Free FS Root, Tools, Config, Log, %* — free space on disk partitions in percentage (in file systems).

For parameters that monitor the average system load, free memory, device temperature, click the button, located in the right area of the row, to go to the monitoring menu.

Click *Reload* button to refresh the information in the tab.

9.7.1.2. SLOT-PORT'S STATUS

In this tab you can perform online monitoring of the device port state.



Click *Reload* button to refresh the information in the tab.

Ports indication:

 – operation and administrative port status is *UP — in operation;*

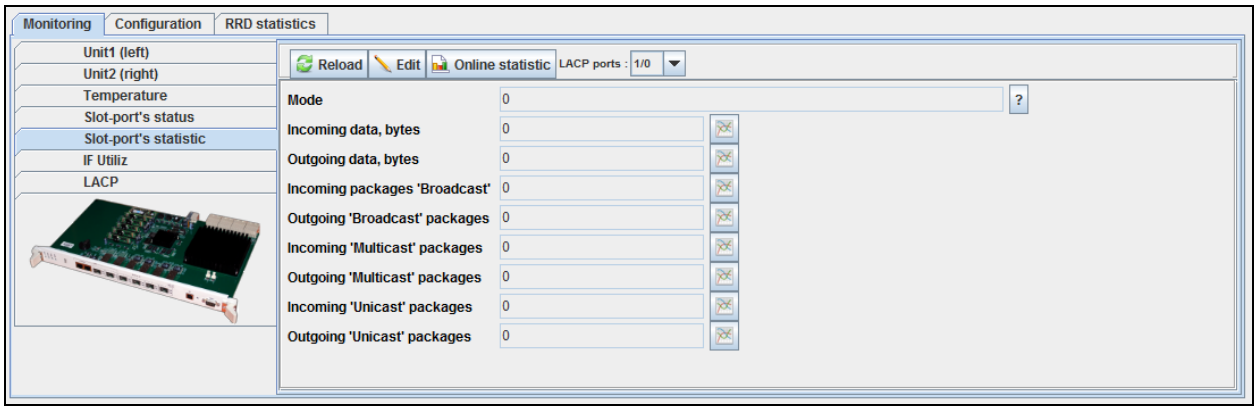
 – operation port status *DOWN* — shut down by administrator or in alarm state.

Buttons are the active elements. Click them to edit the selected port on the respective tab.

9.7.1.3. SLOT-PORT'S STATISTICS

Use this tab to view and edit Downlink port parameters of the device.

Use the drop-down menu to select the port for viewing and editing.



- *Mode* — interface operation speed in bit/s;
- *Current interface state* — port operation status (Up — enabled for operation, Down — disabled for operation);
- *Incoming data, bytes* — amount of data received to the interface, in bytes;
- *Outgoing data, bytes* — amount of data sent via the interface, in bytes;
- *Incoming 'Broadcast' packages* — amount of broadcast packets received to the interface;
- *Outgoing 'Broadcast' packages* — amount of broadcast packets sent from the interface;
- *Incoming 'Multicast' packages* — amount of multicast packets received to the interface;

- *Outgoing 'Multicast' packages* — amount of multicast packets sent from the interface.
- *Incoming 'Unicast' packages* — amount of unicast packets received to the interface;
- *Outgoing 'Unicast' packages* — amount of unicast packets sent via the interface.

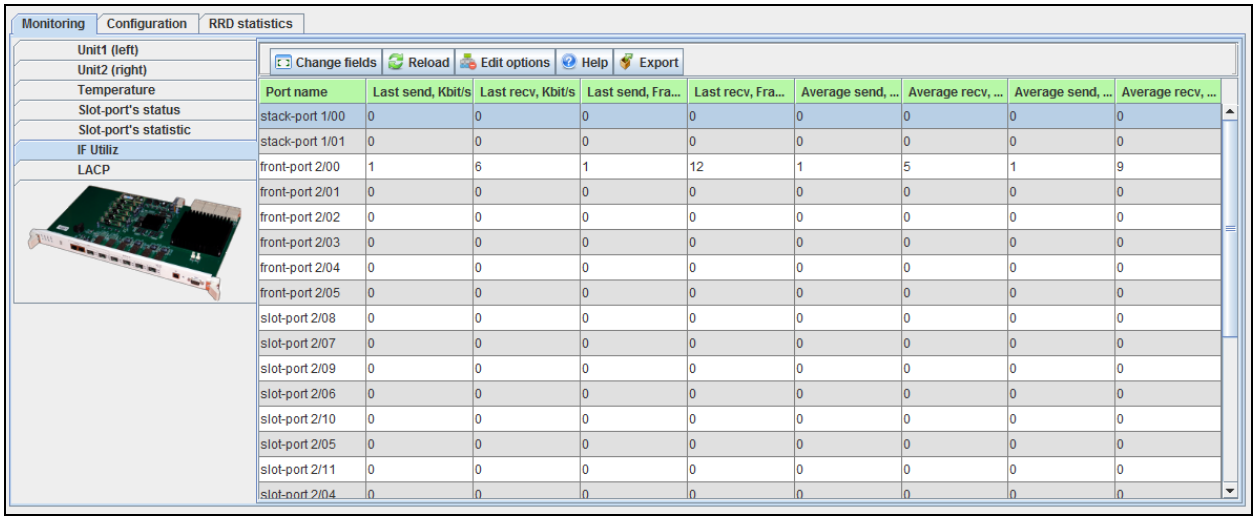
Click *Save* button to save entered parameters, or click *Cancel* to discard them.

Click  button to proceed to *RRD Statistics* tab, to add new parameter monitoring task or to view the statistics for the previously assigned task (for detailed information, see chapter **6.6.10 RRD Statistics menu**).

Click *Reload* button to refresh the information in the tab.

9.7.1.4. IF UTILIZ

This tab shows traffic load statistics for each of the MA4000 interfaces for the last time (Last Time Load Interfaces).

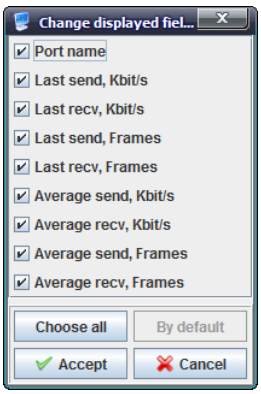


You can edit the Last Time Load Interfaces parameter by clicking *Edit parameters* button.

front-port X/Y — uplink interfaces on PP4X board, where X — PP4X number (1 or 2), Y — PP4X uplink port number (from 00 to 05).

slot-port X/Y — interfaces on PP4X board, connecting it to the subscriber-side PLC boards, where X — PP4X number (1 or 2), Y — PLC board number (from 00 to 15).

stack-port X/Y — interfaces on PP4X board, combining it in stack with the second PP4X board, where X — PP4X number (1 or 2), Y — stack port number (from 00 to 01).



Click *Change Fields* button to configure the set of fields for the event table.

- *PortName* — name of the port;
- *Last Sent, Kbit/s* — last known data rate (sent);
- *Last Recv, Kbit/s* — last known data rate (received);
- *Last Sent, Frames* — number of frames sent in the last transmission;
- *Last Recv, Frames* — number of frames received in the last transmission;
- *Average Sent, Kbit/s* — average data rate (sent);
- *Average Recv, Kbit/s* — average data rate (received);
- *Average Sent, Frames* — average number of frames sent;

– *Average Recv, Frames* — average number of frames received.

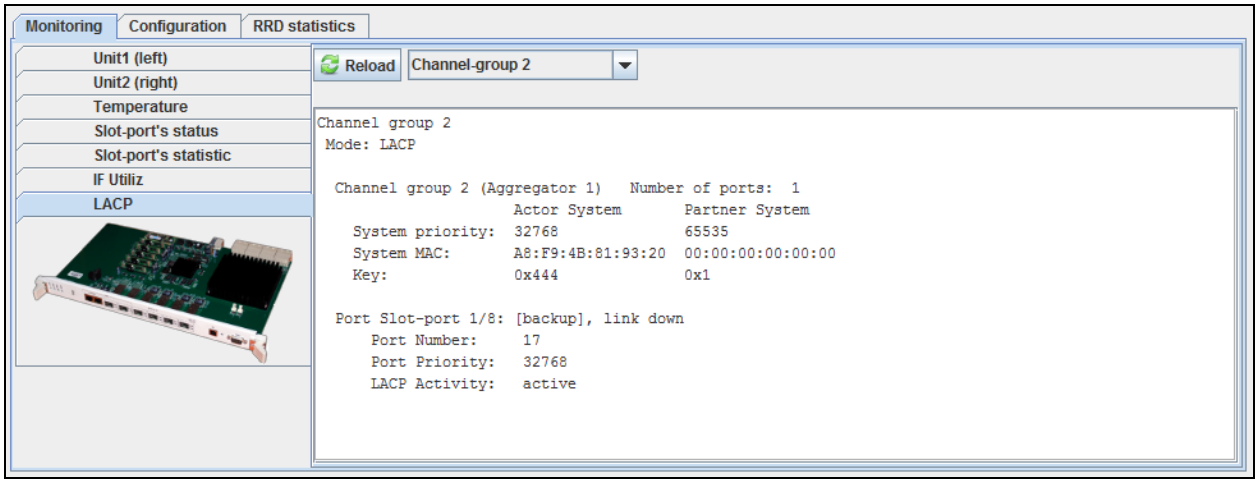
Click *Choose All* button to select all list fields that you want to add.

Click *Apply* button to confirm changes, or click Cancel button to exit from the edit mode without saving.

Click *Reload* button to refresh the information in the tab.

9.7.1.5. LACP

LACP is a protocol, designed for combining multiple physical channels into one logical channel in Ethernet networks. Use this tab to monitor the channel data. Configuration of channel groups is described in chapter **9.7.2.5 Trunk membership.**

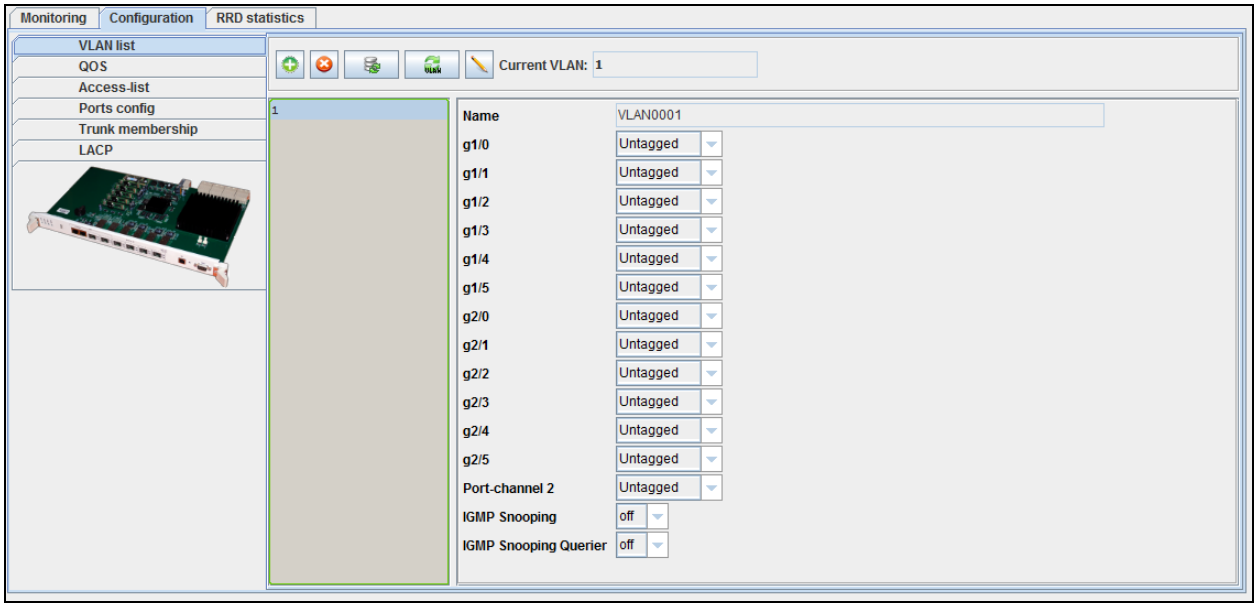


Click *Reload* button to refresh the information in the tab.

9.7.2. CONFIGURATION

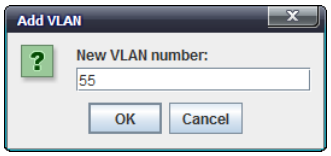
9.7.2.1. VLAN LIST

Use this tab to configure VLAN.



To add a new VID, click  button, specify VLAN group name and tagging rules for each port of the device:

- *Tagged* — all packets sent through ports will be tagged;
- *Untagged* — all packets sent through ports will not be tagged;
- *Not member* — this port is not a part of the group.



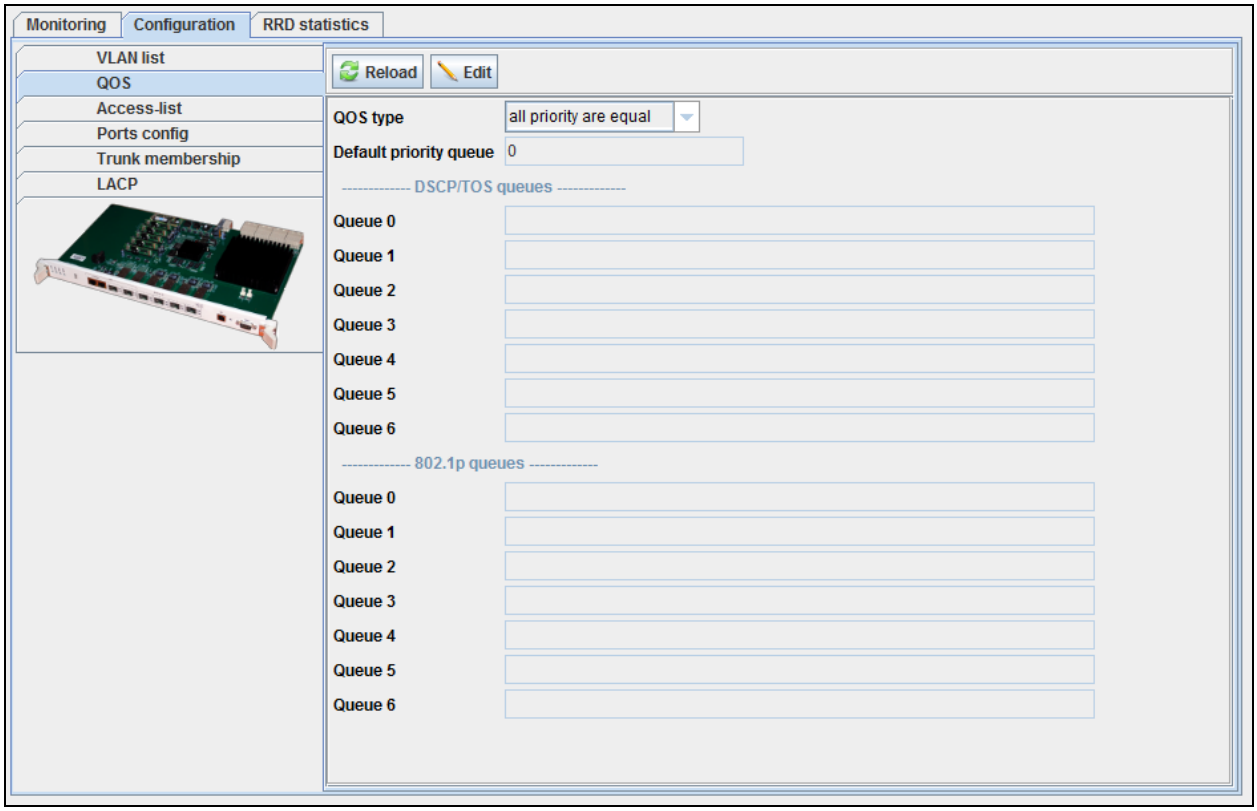
To edit record parameters, select the desired VID from the list and click  button, or click  button to delete them.

Click *Accept* button to save entered parameters, or click *Cancel* to discard them.

Click  button to update the list of configured VLANs, or click  button to refresh parameters for the current VLAN.

9.7.2.2. QOS

This tab shows configuration for traffic prioritization.



QoS type:

– *All priority are equal* — when checked, QoS mapping is disabled;
– *802.1p* — packet selection by 802.1p only (Priority field in 802.1Q tag);
– *DSCP/TOS* — packet selection by DSCP/TOS only (Differentiated Services field of the IP packet header, 6 high bits);
– *DSCP/TOS or 802.1p* — interaction either with 802.1p, or with DSCP/TOS.

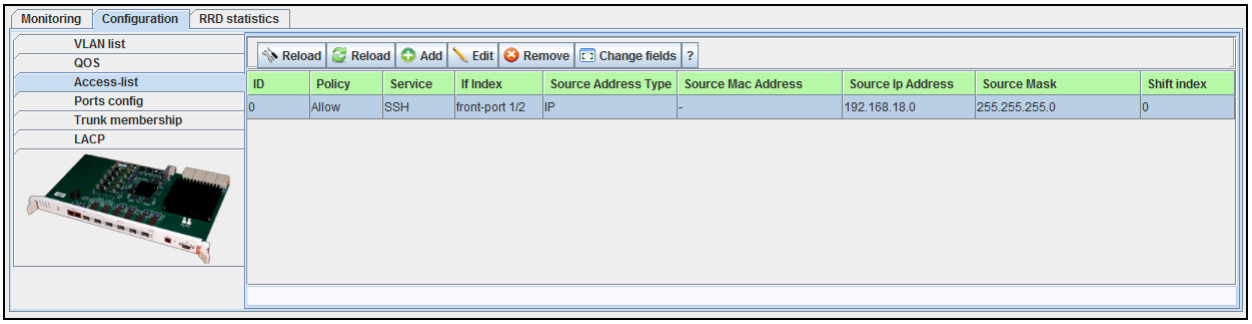
Queues — queues, field values should be comma-separated.

– *Queue* — queue number (7th has the highest priority);
– *DSCP/TOS* — differentiated Services field values of the IP packet header, 6 high bits, values should be entered in a decimal format;
– *802.1p* — priority field value in 802.1Q tag;
– *Default priority queue* — all packets, falling outside the scope of rules, will be placed into the defined queue.

Click *Reload* button to refresh the information in the tab.

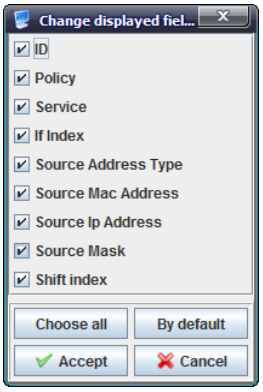
9.7.2.3. ACCESS LIST

This tab shows the list of rules, that define the device availability via HTTP, SNMP, SSH, TELNET protocols



Record parameters:

- *ID* — record number in the table;
- *Policy* — rule;
- *Service* — service type;
- *If index* — management protocol;
- *Source Address Type* — recipient's address type;
- *Source MAC Address* — recipient's MAC-address;
- *Source IP Address* — recipient's IP-address;
- *Source Mask* – recipient's subnet mask;
- *Shift Index* — sequence number.



All rules should follow in the MAC-IP-ANY order.

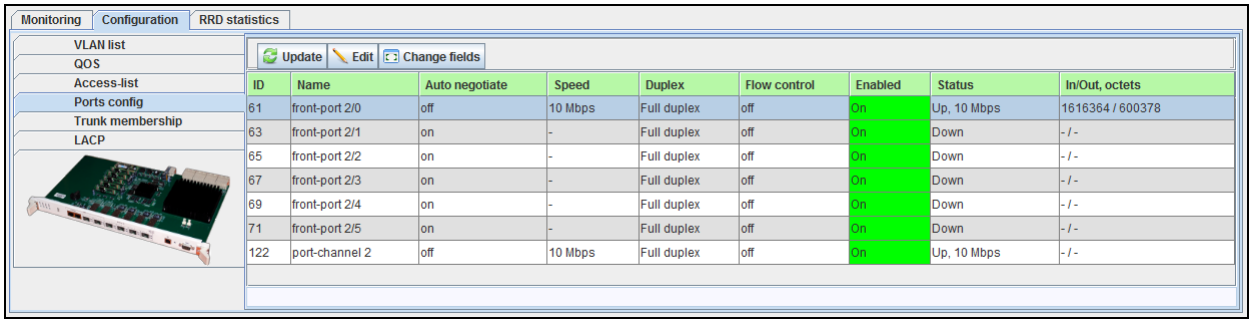
If you will try to shift or create a record with the out-of-order index, the *commit failed* error will be returned.

Example:

Permitted	**Permitted**	**Forbidden**
0 — Rule 0 — MAC	0 — Rule 0 — MAC	0 — Rule 0 — MAC
1 — Rule 1 — MAC	1 — Rule 1 — MAC	1 — Rule 3 — IP
2 — Rule 2 — IP	2 — Rule 4 — IP	2 — Rule 1 — MAC
3 — Rule 3 — IP	3 — Rule 3 — IP	3 — Rule 2 — IP
4 — Rule 4 — IP	4 — Rule 2 — IP	4 — Rule 4 — IP
5 — Rule 5 — ANY	5 — Rule 5 — ANY	5 — Rule 5 — ANY

9.7.2.4. PORTS CONFIG

Use this tab to configure the uplink ports of the device control modules.



ID	Name	Auto negotiate	Speed	Duplex	Flow control	Enabled	Status	In/Out, octets
61	front-port 2/0	off	10 Mbps	Full duplex	off	On	Up, 10 Mbps	1616364 / 600378
63	front-port 2/1	on	-	Full duplex	off	On	Down	- / -
65	front-port 2/2	on	-	Full duplex	off	On	Down	- / -
67	front-port 2/3	on	-	Full duplex	off	On	Down	- / -
69	front-port 2/4	on	-	Full duplex	off	On	Down	- / -
71	front-port 2/5	on	-	Full duplex	off	On	Down	- / -
122	port-channel 2	off	10 Mbps	Full duplex	off	On	Up, 10 Mbps	- / -

Configuration examples:

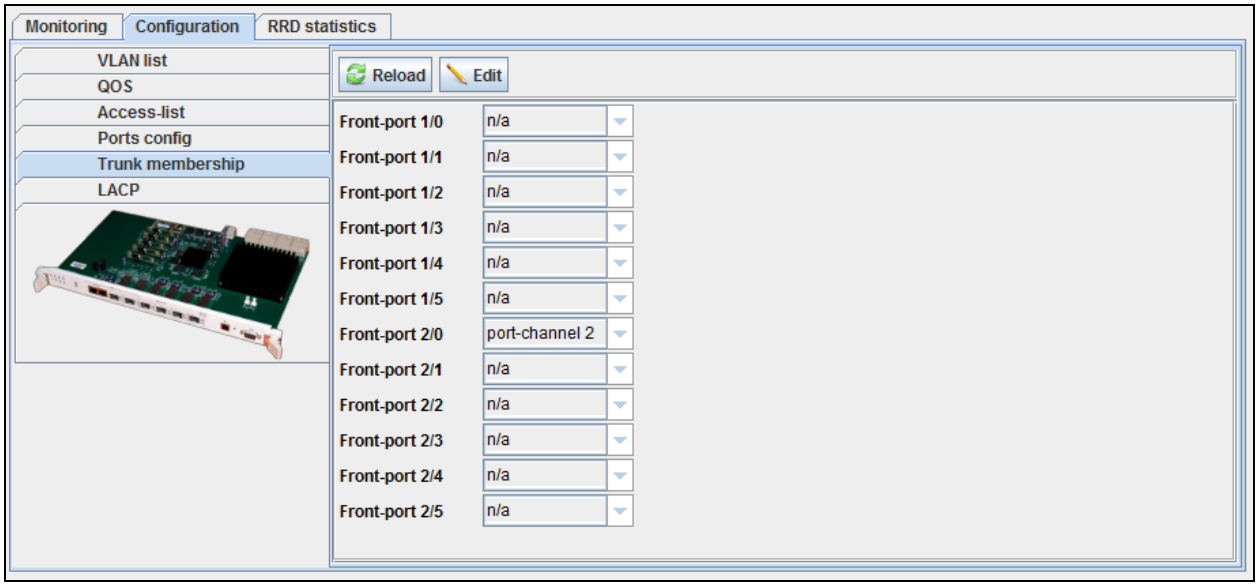
- *Id* — number of the record;
- *Name* — uplink port name;
- *Autonegotiation* — automatic detection of the port parameters;
- *Speed* — transfer rate;
- *Duplex* — duplex mode selection;
- *Flow control* — flow control mode (IEEE 802.3x PAUSE);
- *Enabled* — enable/disable the port;
- *Status* — current port status and operation speed;
- *In/Out, octets* — quantity of received/sent octets.

Click *Reload* button to refresh the information in the tab.

9.7.2.5. TRUNK MEMBERSHIP

Use this tab to configure LACP port aggregation.

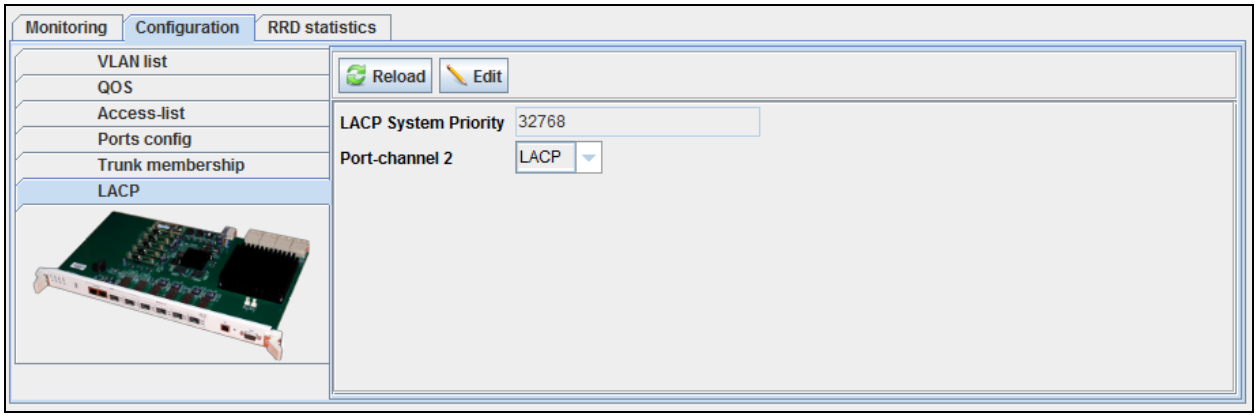
Each of the front ports can be included into one of the 8 aggregation groups. Click *Edit* button to proceed to configuration.



Click *Reload* button to refresh the information in the tab.

9.7.2.6. LACP

Use this tab to define LACP System Priority value.



Click *Reload* button to refresh the information in the tab.

9.8. PLC8 GPON MODULE

PLC8 module is designed to provide the broadband access to data networks using GPON technology with transfer rates up to 2.5Gbit/s downstream. This module is designed for 'last mile' operation and allows to connect up to 64 terminal devices (ONTs) per PON port. There are 8 PON ports per module.

Table 7 lists description of the basic control tabs.

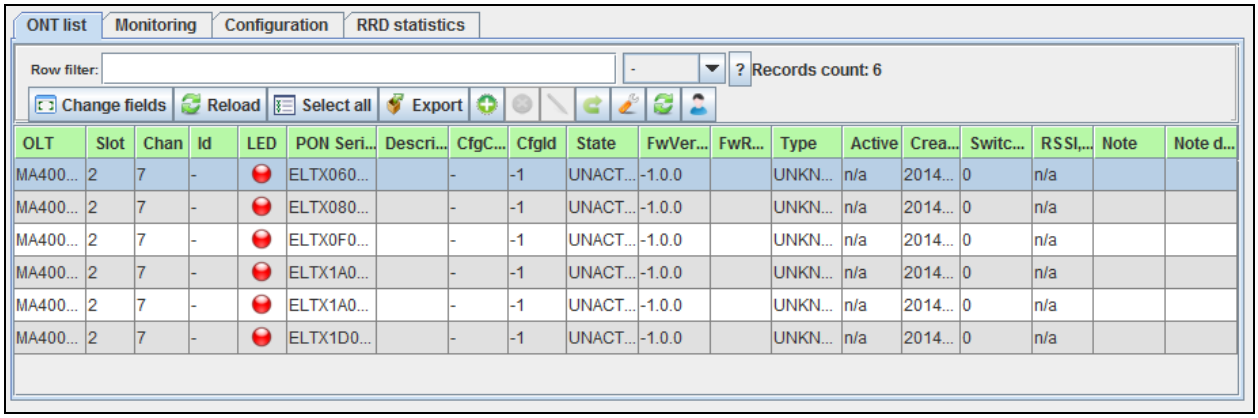
Table 7 — PLC8 module control and monitoring menu

Menu	Description	Section
ONT list	View and edit ONT configurations	9.8.1
Monitoring	View configuration parameters	9.8.2
Common	General device data (firmware version, uptime, CPU load, etc.)	9.8.2.1
PPPoE sessions	Information on PPPoE session parameters, running on the device	9.8.2.2
Temperature	Statistic chart of PP4X module temperature variations	6.6.8
PON channels	Information of SFP modules installed in the device	9.8.2.3
Multicast stats	List of IGMP groups, viewed by each of ONTs of the current board	9.8.2.4
Configuration	Configuration setup	9.8.3
VLAN	VLAN configuration	9.8.3.1
QoS	Assigning priority to packet transmission	9.8.3.2
ACL lists	Configuration of black/white lists for filtering traffic	9.8.3.3
ACL ports	Configuration of ACS LISTS tethering to PLC8 ports	9.8.3.4

9.8.1. ONT LIST

This tab contains the complete list of active ONTs in the current tree (including ONTs in error state).

The server gets ONT list after synchronization with the object.



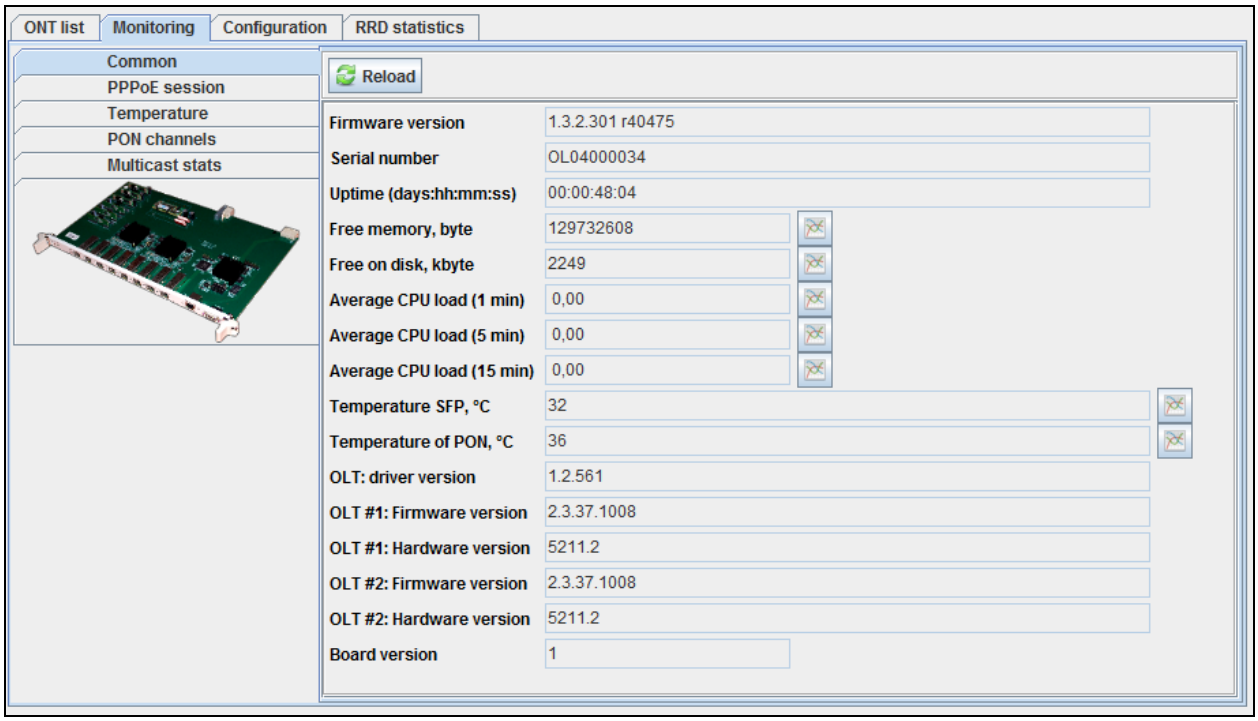
OLT	Slot	Chan	Id	LED	PON Seri...	Descri...	CfgC...	CfgId	State	FwVer...	FwR...	Type	Active	Crea...	Switc...	RSSI,...	Note	Note d...
MA400...	2	7	-		ELTX060...		-	-1	UNACT...	-1.0.0		UNKN...	n/a	2014...	0	n/a		
MA400...	2	7	-		ELTX080...		-	-1	UNACT...	-1.0.0		UNKN...	n/a	2014...	0	n/a		
MA400...	2	7	-		ELTX0F0...		-	-1	UNACT...	-1.0.0		UNKN...	n/a	2014...	0	n/a		
MA400...	2	7	-		ELTX1A0...		-	-1	UNACT...	-1.0.0		UNKN...	n/a	2014...	0	n/a		
MA400...	2	7	-		ELTX1A0...		-	-1	UNACT...	-1.0.0		UNKN...	n/a	2014...	0	n/a		
MA400...	2	7	-		ELTX1D0...		-	-1	UNACT...	-1.0.0		UNKN...	n/a	2014...	0	n/a		

For detailed description of the parameters listed in this tab, see LTP-8X operation instructions in chapter **8.2 ONT list.**

9.8.2. MONITORING

9.8.2.1. COMMON

The tab shows general data, received from the device. The information is read-only.



Parameters:

- *Firmware version* — module firmware version;
- *Serial number* — device serial number;
- *Uptime (days:hh:mm:ss)* — device operation time since the last reboot;
- *Free memory, byte* — free device memory in bytes;
- *Free on disk, kbyte* — free space on disk in percentage;
- *Average CPU load 1 min/5 min/15 min* — average system load 1min/5min/15min;

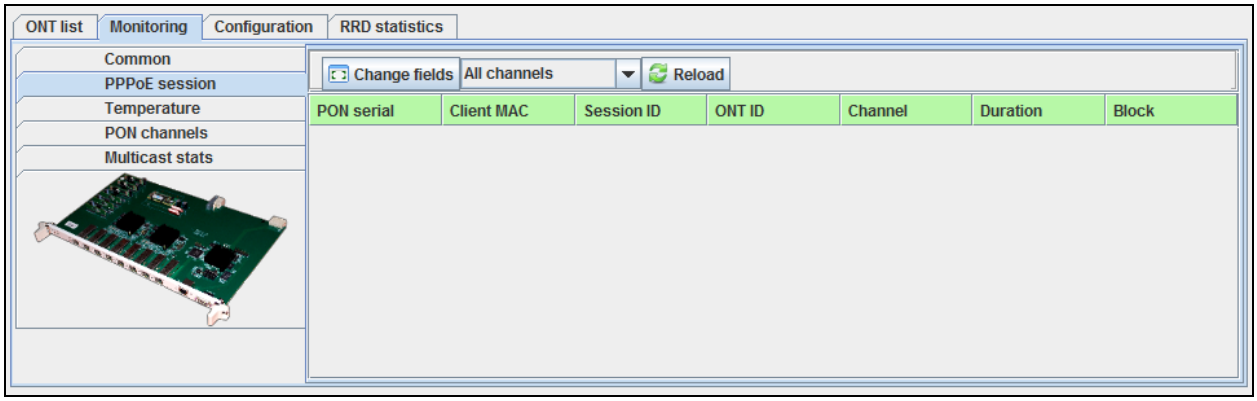
- *Temperature SFP, ˚C* — SFP thermal sensor readings in Celsius;
- *Temperature PON, ˚C* — PON thermal sensor readings in Celsius;
- *OLT: Driver version* — OLT optical chip driver version;
- *OLT №1,2: Firmware version (FW)* — OLT optical chip firmware version;
- *OLT №1,2: Hardware version (HW)* — OLT optical chip hardware version;
- *Board version.*

Click  button to proceed to *RRD Statistics* tab, to add new parameter monitoring task or to view the statistics for the previously assigned task (for detailed information, see chapter **6.6.10 RRD Statistics menu**).

Click *Reload* button to refresh the information in the tab.

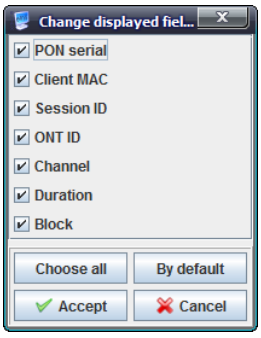
9.8.2.2. PPPOE SESSIONS

This section contains data on current active PPPoE sessions. The information is read-only.



Use drop-down menu to specify PON tree, which PPPoE sessions you want to view, or to show the statistics for all device trees.

The table lists the following information:



- *PON serial* — PON serial number;
- *Client MAC* — device address of the user that established the session;
- *Session ID* — assigned PPPoE session number;
- *ONT ID* — identifier of the subscriber-side device, that has established PPPoE session;
- *Channel* — PON channel, which includes the subscriber-side device, that has established PPPoE session;
- *Duration* — PPPoE session duration;
- *Block* — subscriber-side device block status.

Click *Change Fields* button to configure the set of fields for the event table.

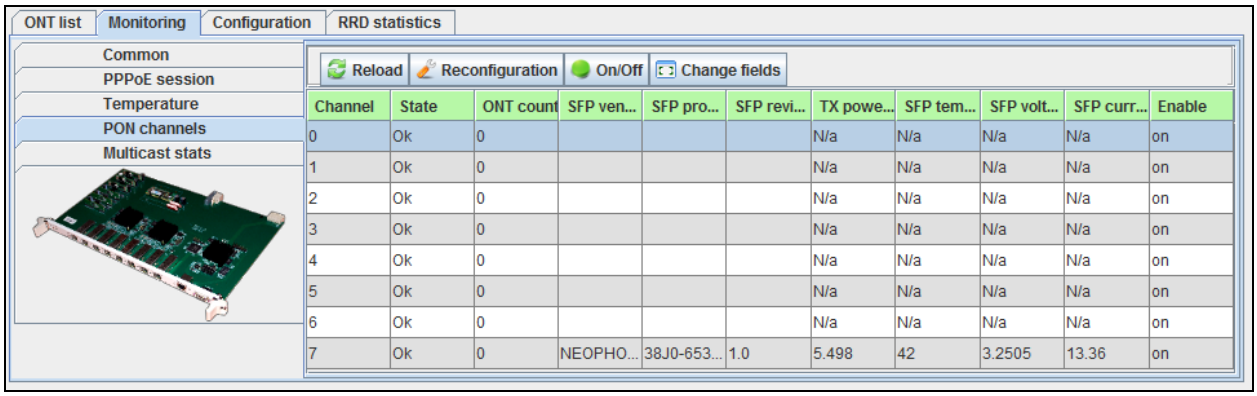
Click *Choose All* button to select all list fields, that you want to add.

To save changes in the set of displayed fields, click *Accept* button, or click *Cancel* to discard changes.

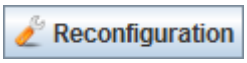
Click *Reload* button to refresh the information in the tab.

9.8.2.3. PON CHANNELS

Use this tab to control and monitor SFP modules of the device.



Click *Reload* button to refresh the information in the tab.

Click 

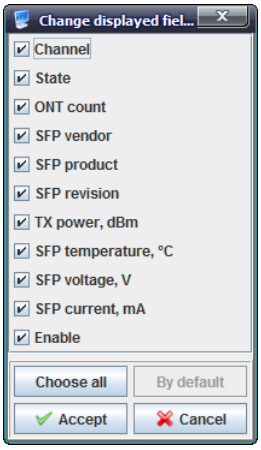
button to perform PON channel reconfiguration, or click 

button to enable/disable channel and operation.

MONITORING TABLE CONFIGURATION

Click *Change Fields* button to configure the set of the monitoring table fields.

List of displayed fields:



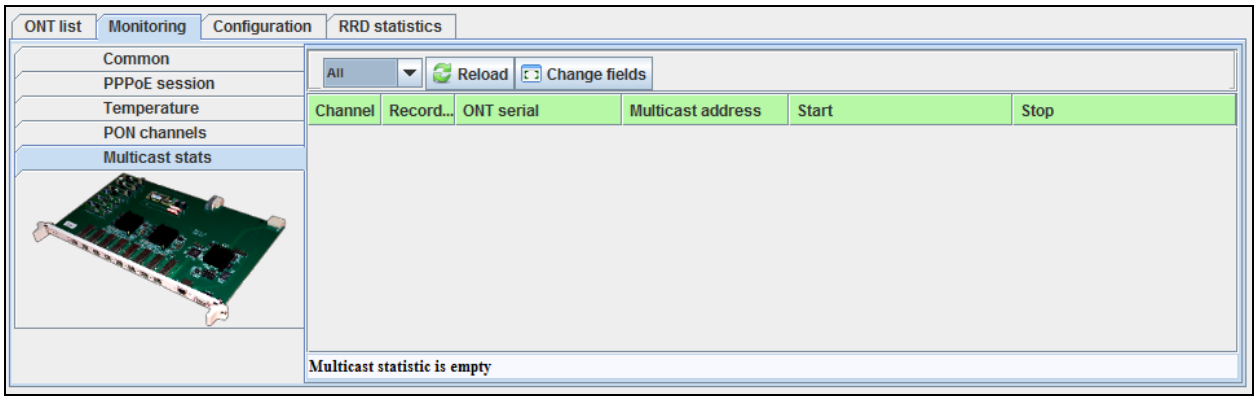
- *Channel* — PON channel number;
- *State* — SFP module state;
- *ONT count* — quantity of connected ONTs;
- *SFP vendor;*
- *SFP product;*
- *SFP revision;*
- *TX power, dBm;*
- *SFP temperature*, ˚C;
- *SFP voltage, V;*
- *SFP current, mA;*
- *Enable* — PON channel status.

Click *Choose All* button to select all list fields, that you want to add.

To save changes in the set of displayed fields, click *Accept* button, or click *Cancel* to discard changes.

9.8.2.4. MULTICAST STATS

This tab shows the IGMP group log viewed from ONTs of the current board.

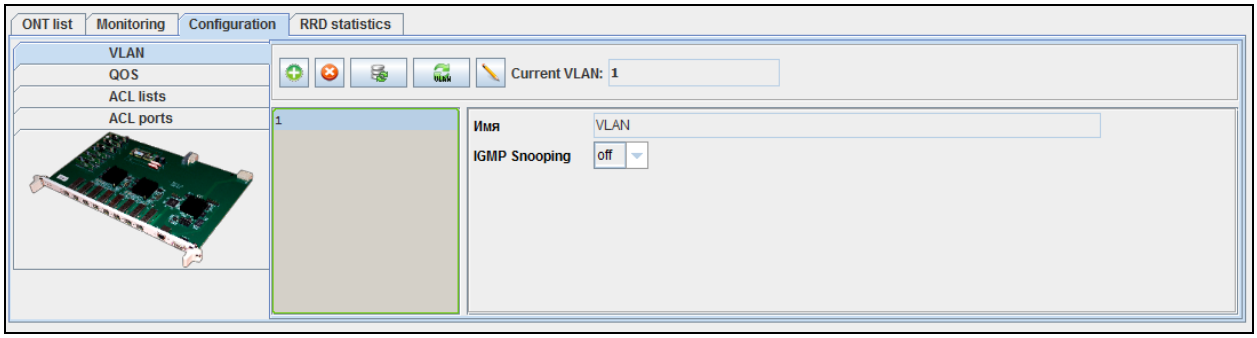


Click *Reload* button to refresh the information in the tab.

9.8.3. CONFIGURATION

9.8.3.1. VLAN

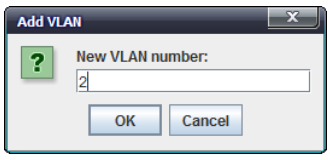
Use this tab to configure VLAN.



Click  (Re-read VLAN list) button to update the list of configured VLANs, or click  *(Refresh VLAN parameters)* button to refresh parameters for the current VLAN.

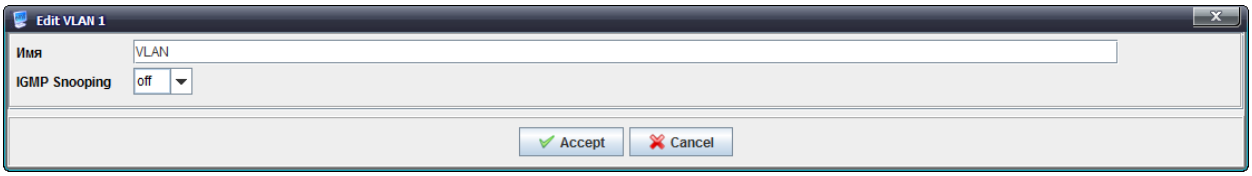
To enable or disable VLAN, use the corresponding buttons in the settings field.

Given below is the dialog window for adding VLAN:



Click  *(Edit VLAN parameters)* button to edit the selected VLAN name and respective IGMP configuration.

The following actions are available:

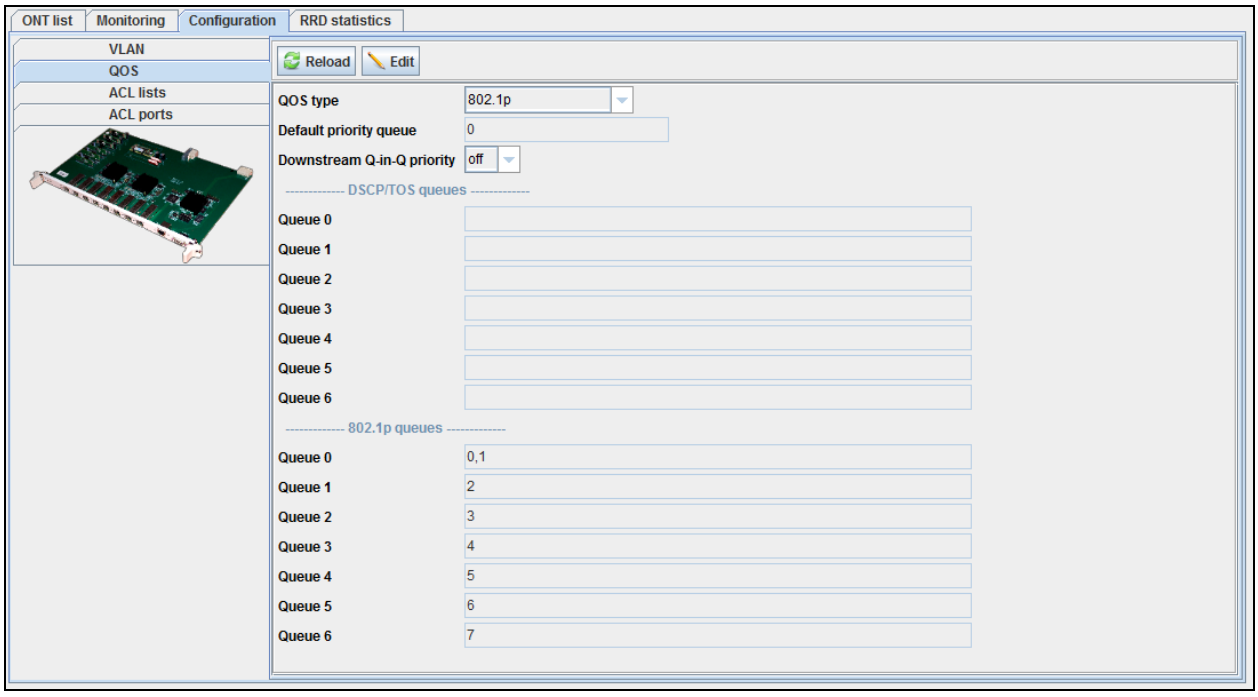


– *IGMP Snooping* — for selected VLAN, enable/disable listening to multicast groups' requests and organization of multicast groups in the traffic forwarding device;

Click *Accept* button to save entered parameters, or click *Cancel* to discard them.

9.8.3.2. QOS

Use this menu to prioritize traffic and assign the packet transmission priority (by COS/TOS field) to one of seven priority queues.



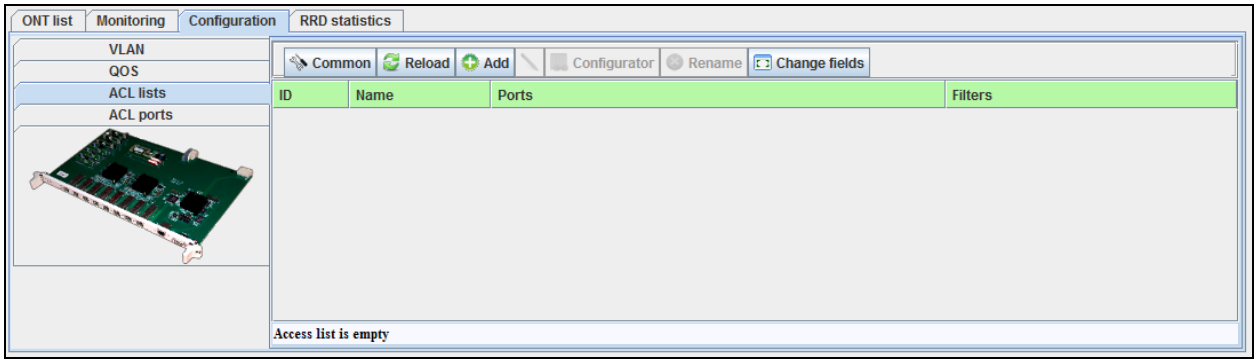
– *QoS type* — QoS type configuration:
  – *All priority are equal* — when value is set, QoS mapping is disabled;
  – *802.1p* — packet selection by 802.1p only (Priority field in 802.1Q tag);
  – *DSCP/TOS* — packet selection by DSCP/TOS only (Differentiated Services field of the IP packet header, 6 high bits);
  – *DSCP/TOS or 802.1p* — interaction either with 802.1p, or with DSCP/TOS;
– *Default priority queue* — all packets, falling outside the scope of rules, will be placed into this queue;
– *Downstream Q-in-Q priority* — prioritization by the internal tag in the downstream direction.

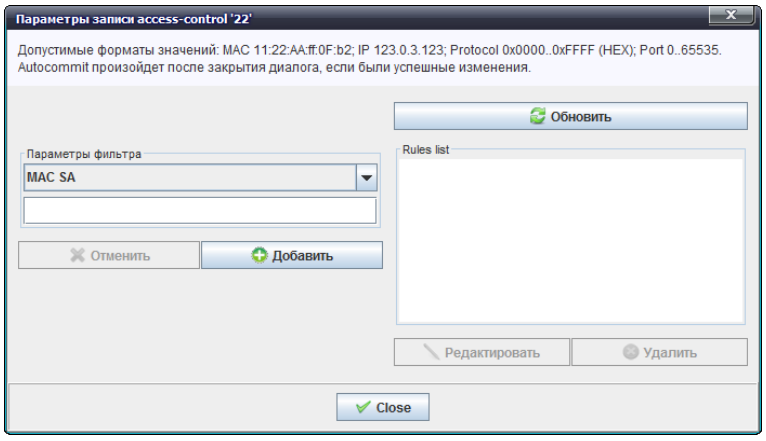
Click *Reload* button to refresh the information in the tab.

9.8.3.3. ACL LISTS

Use this tab to configure black/white lists for filtering traffic by the destination and source MAC/IP addresses, TCP/UDP ports and protocol.

Click *General* button to show the list type edit window.

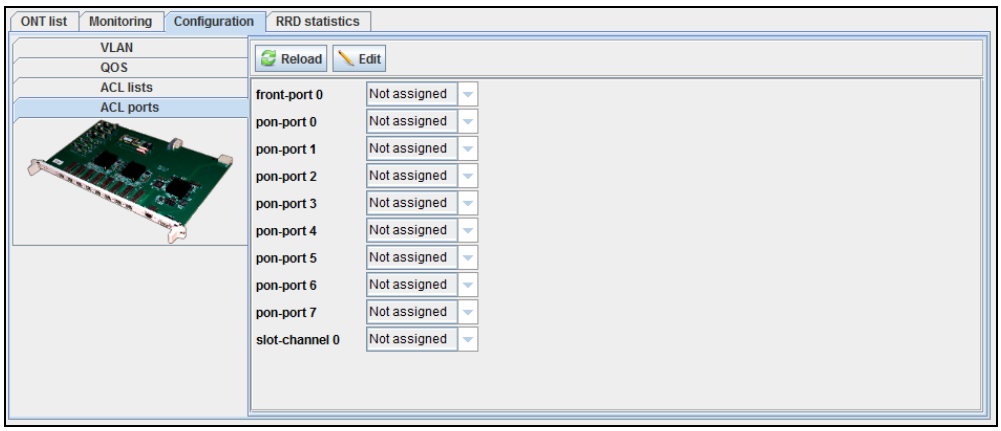




Permitted value formats: MAC 11:22:AA:ff:0F:b2; IP 123.0.3.123; Protocol 0x0000..0xFFFF (HEX); Port 0..65535. If changes were entered successfully, Autocommit will happen after the dialog window is closed.

9.8.3.4. ACL PORTS

Use this tab to perform ACL LISTS tethering to PLC8 ports.



Click  button to edit parameters.

Click *Reload* button to refresh the information in the tab.

10 EXPORT OF RECORDS

The application allows you to export statistics data from tables to the operator's PC.

To copy records, select desired records, click  (*Export)* button, located in the settings field, select the output directory and click *Save* button.

Log records will be saved in .csv format.

If you want to select all records in the log, use *Select all* button.

11 ADMINISTRATION. RIGHTS AND USERS. CONFIGURING USERS AND ROLES

11.1. PRINCIPLE OF USER RIGHTS' DISTRIBUTION

Role mechanism is used as a basic principle of rights' distribution. Role is a logical entity, that contains the following data:

- Role name;
- Text description;
- Idle time (seconds);
- List of permitted actions with objects;
- List of permitted nodes and objects;
- Alarm registration rights:
  - Info;
  - Warning;
  - Minor;
  - Major;
  - Critical.

The system has one basic administrator role, named 'SuperUser'. This role is disabled for editing. It automatically has all rights for each object.

All other roles are configured by the administrator according to operator job duties and logical breakdown by devices or locations.

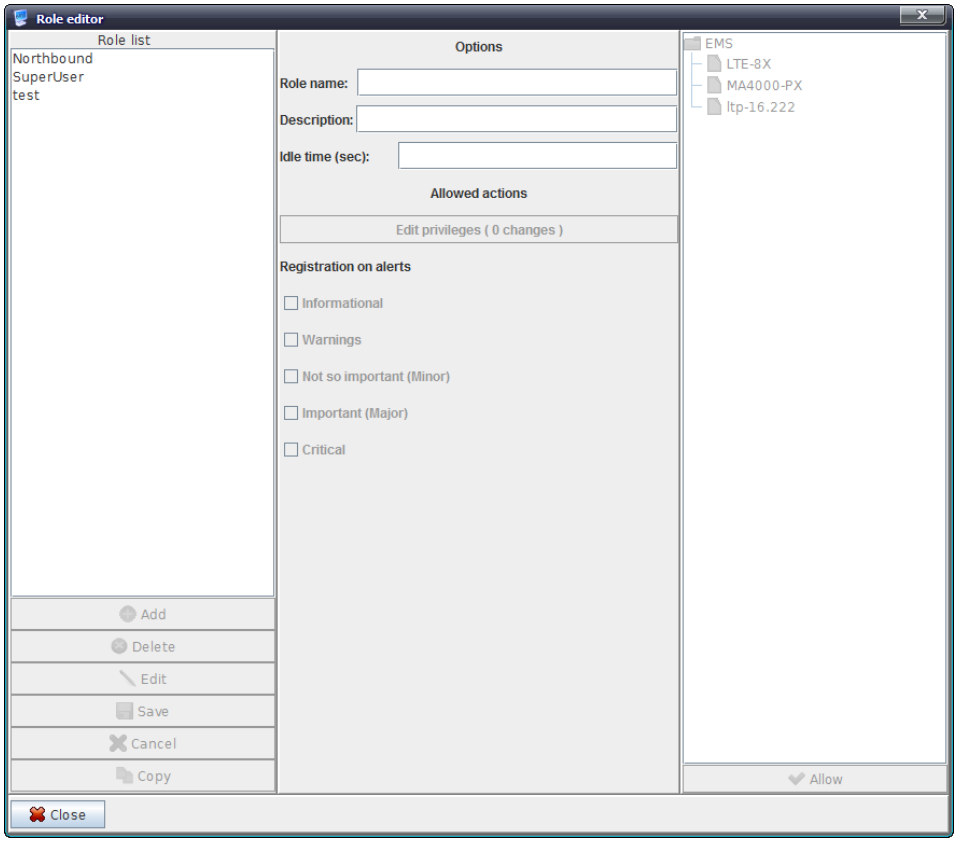
System user — is a logical entity that is designed for authorized logging into system. Each user has the following set of parameters:

- Name
- Password
- Description
- Role
- Account expiration date
- Email address
- Forwarding email messages to the user address

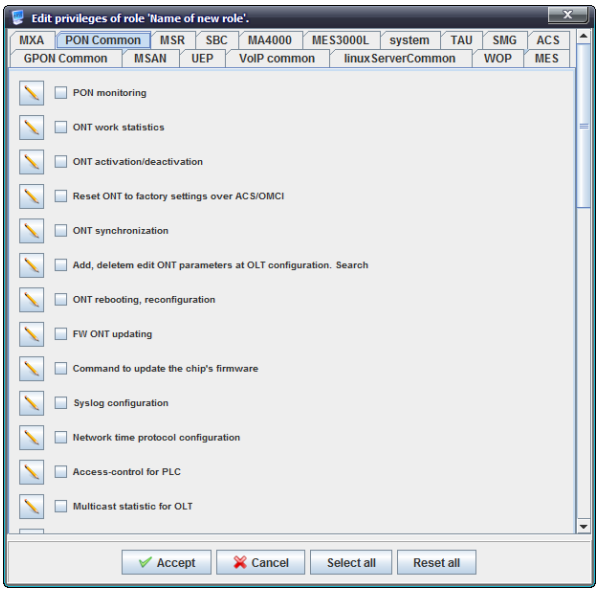
When creating a new user, you have to complete all available fields. The name and password are required for log in (authorization), the role describes the list of permitted actions, and the account expiration date defines the account lifetime and is checked upon each authorization attempt.

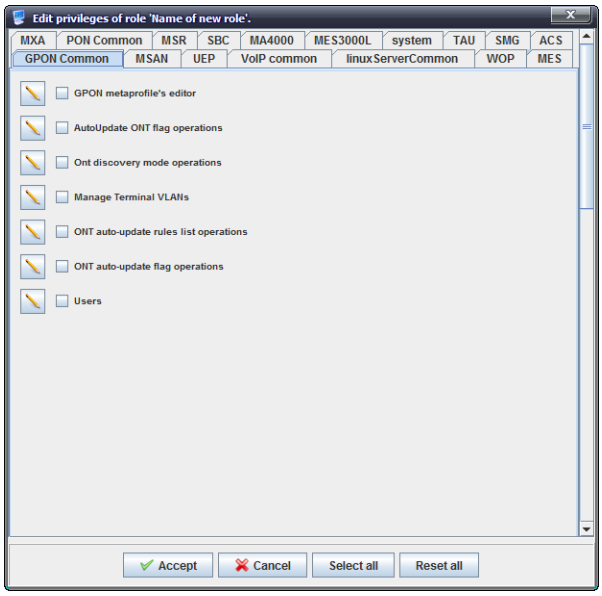
11.2. CONFIGURING ROLES

Configuration of roles and users is available for system users with *Edit rights and roles* rights. To add or edit roles, go to ***Administration/Rights and users/User role configuration*** menu item. When this menu item is selected, the application will give show the dialog window where you will be able to edit roles (except for the SuperUser system role), and also add or remove them.



There is a list of permissions for each role:



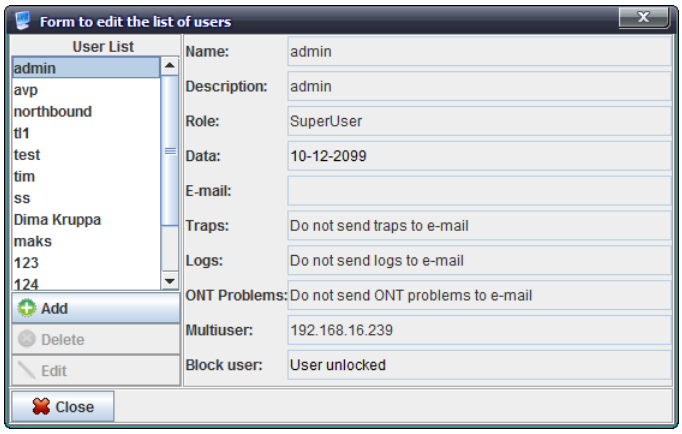


In addition to rules defined for each role, you have to specify the scope of effect for these rules. To do this, edit the role and select *Enable* checkbox against the respective nodes in the right part of the role configuration dialog window. If you enable access to a node for this role, all nested nodes and objects in this node will become available automatically. To enable full access to the tree, you should give permission to access the root node *RootNode.*

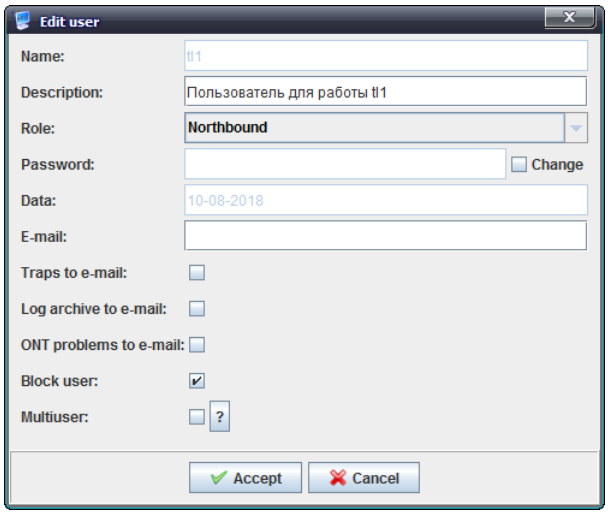
The application stores previously given permissions, and they are saved when these nodes being merged with the higher level nodes. Note this, when revoking permissions. Also note, that the application will not let you to delete the role, unless it is assigned at least to one user.

11.3. CONFIGURE SYSTEM USERS

You have to enter your account name and password in order to login. When user authentication is completed, you will see the dialog window with the list of permitted actions and nodes or the login error message. *You cannot operate the system without registration* Configuration of user rights is performed by the system administrator (admin) or another user with the respective rights.



To add or edit users, go to ***Administration/Rights and users/System users configuration*** menu item. If you choose this menu item, the application will show the user edit dialog window. System user **admin** cannot be deleted or renamed. Also, you can't change its expiration date or password. You can define the following parameters for other users:



- *Name* — arbitrary name, up to 32 characters;
- *Description* — arbitrary description, up to 64 characters;
- *Role* — role, that defines access rights;
- *Password* — arbitrary alphanumeric password;
- *Date* — user account expiration date;
- *E-mail* — e-mail address for sending alarm messages;
- *Log archive by e-mail* — when checked, send e-mail messages to the defined address, otherwise — do not send;
- *ONT problems by e-mail* — when checked, send e-mail messages to the defined address, otherwise — do not send. (for detailed monitor configuration, see **Appendix B. Paragraph 4 Monitor configuration**);

- *Block user;*
- *Multiuser* — mode, that allows authorization of multiple users with the single login In this mode you can define approved IP addresses for the user. If user performs authorization from one of these addresses, the password will not be prompted. Addresses should be delimited with space or comma. Validation of addresses is not performed. Field size limit — 255 characters.

If the address list database doesn't exist, this mode considered to be disabled.

Password is stored encrypted in the database, thus the system administrator will not be able to acces this information.

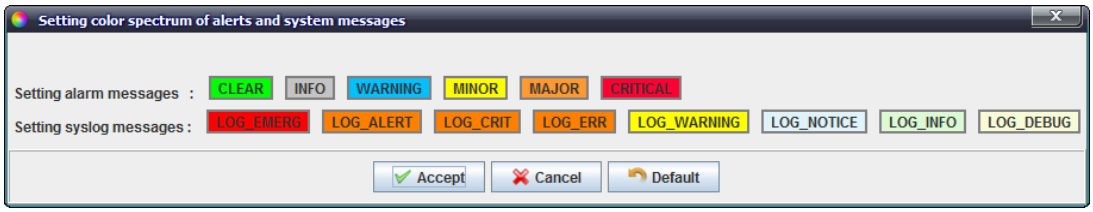
***Edit* checkbox next to *Password* field allows to change passwords. If you need to change the password (or to define it for the first time), select this checkbox and fill in the *Password* field. Otherwise, if you edit other parameters with this checkbox unselected, the password will not be changed. This feature allows the system administrator to avoid entering user password while changing other parameters of the account. Default password for 'admin' account — <empty>.**

After the user account expires, the access to the system with this name will be blocked. System administrator can modify the expiration date or delete the account.

12 ADMINISTRATION GUI BEHAVIOUR

12.1. SETTING THE COLOR SCHEME

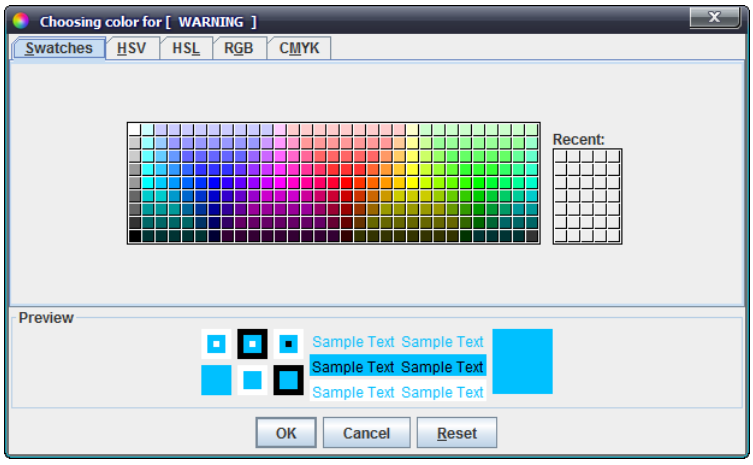
To configure the colour scheme, use **Administration/GUI behaviour/Setting the color scheme** menu.



The figure below shows the default colour for each type of alarm.

To change alarm colour marker, click the rectangle of the desired message level. Edit menu for this type of alarm will open.

Preview area (*Preview*) is located in the lower part of each tab. It allows you to estimate the selected colour visually.



Swatches tab

Swatches — sample palette Here you can select the colour from the palette.

HSV and HSL tabs

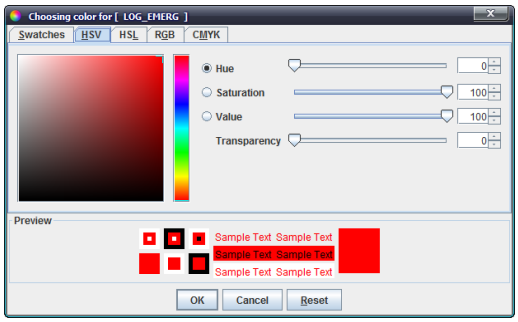
HSV(HSB) and *HSL colour models* — colour (tone), saturation, brightness (for

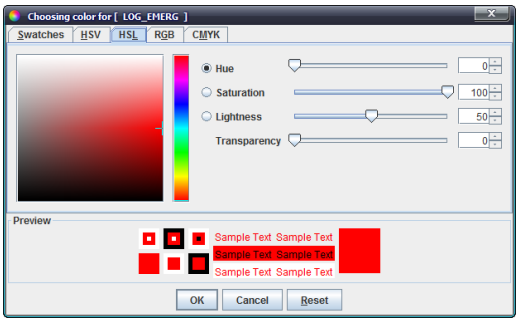
HSL — lightness level).

Palette types:

- *Hue* — colour hue Varies from 0 to 360.
- *Saturation* — colour saturation Varies from 0 to 100. The more the value of this parameter, the cleaner the colour. If the value is closer to zero, the colour will be closer to the neutral grey.
- *Lightness* — brightness (lightness level) Varies from 0 to 100.
- *Value* — colour value Varies from 0 to 100.
- *Transparency* — colour transparency Varies from 0 to 100.

You can select the desired colour by moving sliders, entering the specific values in fields or placing the mouse cursor onto the desired part of the colour field.

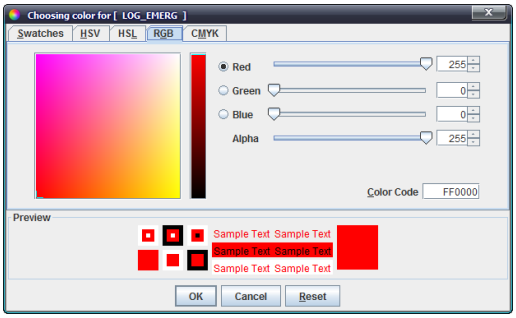




RGB tab

RGB colour model — additive colour model that describes colour mixing method for further reproduction. Channels — red, green, blue.

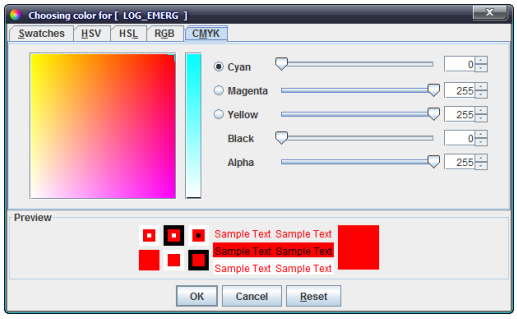
You can select the desired colour by moving sliders or entering the specific values in fields to the right of each scale.



CMYK tab

CMYK colour model — subtractive colour model, used primarily in standard four-colour process printing. CMYK model gamut is smaller compared to RGB.

You can select the desired colour by moving sliders or entering the specific values in fields to the right of each scale.

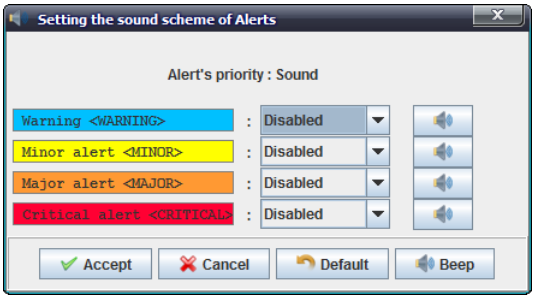


Click *OK* button to save changes, or click *Cancel* button to exit the edit menu without saving. Click *Reset* button to cancel changes without leaving the edit menu.

When alarm colour scheme configuration is finished, click *Accept* to save and apply changes, or click *Cancel* button to exit without saving. Click *Default* button to show the default colours.

12.2. SETTING THE SOUND SCHEME OF ALERTS

To configure the applet sound scheme, use **Administration/GUI behaviour/Setting the sound scheme of alerts** menu.



Use the drop-down menu to select the audible signal, that will play, when the message of particular type is received.

You can select the following sound settings:

- none — sound is disabled;
- beep — system beep sound;
- sound — system melody sound.

When alarm sound scheme configuration is finished, click *Accept* to save and apply changes, or click *Cancel* button to exit without saving. Click *Default* button to show the default values.

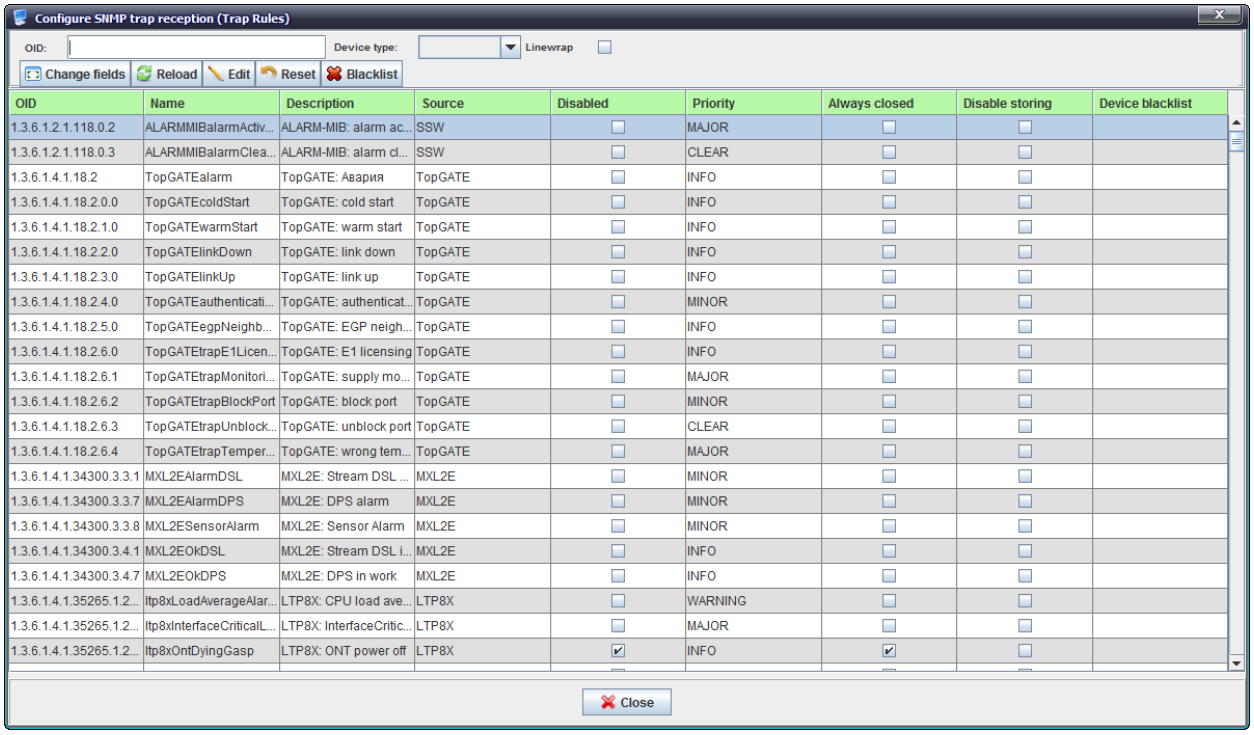
Click 

button to test the associated signal playback.

13 EMS SERVER CONFIGURATION

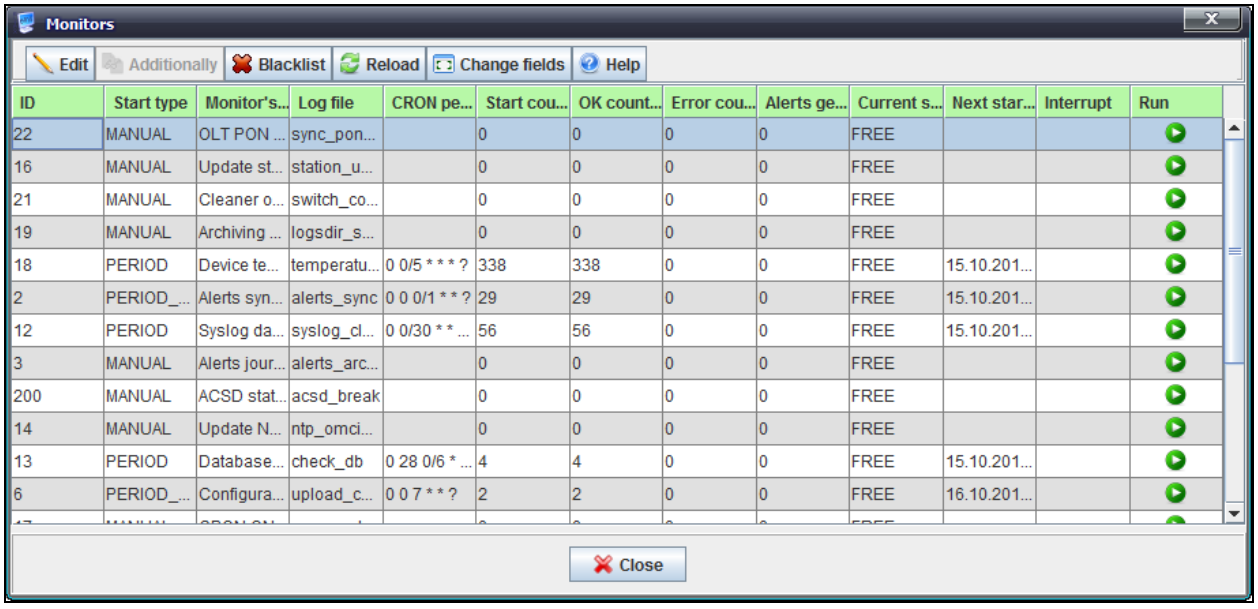
13.1. SNMP TRAP RECEIVING AND PROCESSING

Use this menu to configure SNMP traps receiving and processing in the system.



OID	Name	Description	Source	Disabled	Priority	Always closed	Disable storing	Device blacklist
1.3.6.1.2.1.118.0.2	ALARMMIBalarmActiv...	ALARM-MIB: alarm ac...	SSW	☐	MAJOR	☐	☐	
1.3.6.1.2.1.118.0.3	ALARMMIBalarmClea...	ALARM-MIB: alarm cl...	SSW	☐	CLEAR	☐	☐	
1.3.6.1.4.1.18.2	TopGATEalarm	TopGATE: Авария	TopGATE	☐	INFO	☐	☐	
1.3.6.1.4.1.18.2.0.0	TopGATEcoldStart	TopGATE: cold start	TopGATE	☐	INFO	☐	☐	
1.3.6.1.4.1.18.2.1.0	TopGATEwarmStart	TopGATE: warm start	TopGATE	☐	INFO	☐	☐	
1.3.6.1.4.1.18.2.2.0	TopGATElinkDown	TopGATE: link down	TopGATE	☐	INFO	☐	☐	
1.3.6.1.4.1.18.2.3.0	TopGATElinkUp	TopGATE: link up	TopGATE	☐	INFO	☐	☐	
1.3.6.1.4.1.18.2.4.0	TopGATEauthenticati...	TopGATE: authenticat...	TopGATE	☐	MINOR	☐	☐	
1.3.6.1.4.1.18.2.5.0	TopGATEegpNeighb...	TopGATE: EGP neigh...	TopGATE	☐	INFO	☐	☐	
1.3.6.1.4.1.18.2.6.0	TopGATEtrapE1Licen...	TopGATE: E1 licensing	TopGATE	☐	INFO	☐	☐	
1.3.6.1.4.1.18.2.6.1	TopGATEtrapMonitori...	TopGATE: supply mo...	TopGATE	☐	MAJOR	☐	☐	
1.3.6.1.4.1.18.2.6.2	TopGATEtrapBlockPort	TopGATE: block port	TopGATE	☐	MINOR	☐	☐	
1.3.6.1.4.1.18.2.6.3	TopGATEtrapUnblock...	TopGATE: unblock port	TopGATE	☐	CLEAR	☐	☐	
1.3.6.1.4.1.18.2.6.4	TopGATEtrapTemper...	TopGATE: wrong tem...	TopGATE	☐	MAJOR	☐	☐	
1.3.6.1.4.1.34300.3.3.1	MXL2EAlarmDSL	MXL2E: Stream DSL ...	MXL2E	☐	MINOR	☐	☐	
1.3.6.1.4.1.34300.3.3.7	MXL2EAlarmDPS	MXL2E: DPS alarm	MXL2E	☐	MINOR	☐	☐	
1.3.6.1.4.1.34300.3.3.8	MXL2ESensorAlarm	MXL2E: Sensor Alarm	MXL2E	☐	MINOR	☐	☐	
1.3.6.1.4.1.34300.3.4.1	MXL2EOkDSL	MXL2E: Stream DSL i...	MXL2E	☐	INFO	☐	☐	
1.3.6.1.4.1.34300.3.4.7	MXL2EOkDPS	MXL2E: DPS in work	MXL2E	☐	INFO	☐	☐	
1.3.6.1.4.1.35265.1.2...	ltp8xLoadAverageAlar...	LTP8X: CPU load ave...	LTP8X	☐	WARNING	☐	☐	
1.3.6.1.4.1.35265.1.2...	ltp8xInterfaceCriticalL...	LTP8X: InterfaceCritic...	LTP8X	☐	MAJOR	☐	☐	
1.3.6.1.4.1.35265.1.2...	ltp8xOntDyingGasp	LTP8X: ONT power off	LTP8X	☑	INFO	☑	☐	

13.2. SCHEDULED TASKS (MONITORS)



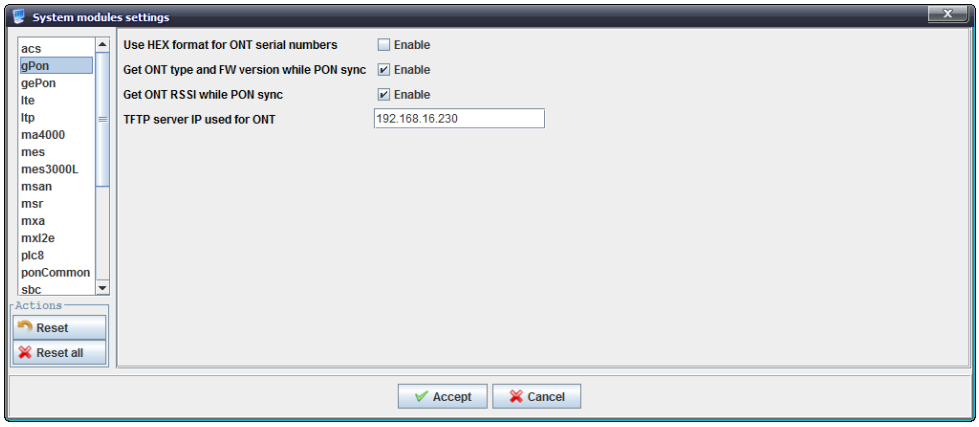
ID	Start type	Monitor's...	Log file	CRON pe...	Start cou...	OK count...	Error cou...	Alerts ge...	Current s...	Next star...	Interrupt	Run
22	MANUAL	OLT PON ...	sync_pon...		0	0	0	0	FREE			▶
16	MANUAL	Update st...	station_u...		0	0	0	0	FREE			▶
21	MANUAL	Cleaner o...	switch_co...		0	0	0	0	FREE			▶
19	MANUAL	Archiving ...	logsdir_s...		0	0	0	0	FREE			▶
18	PERIOD	Device te...	temperatu...	0 0/5 * * * ?	338	338	0	0	FREE	15.10.201...		▶
2	PERIOD_...	Alerts syn...	alerts_sync	0 0 0/1 * * ?	29	29	0	0	FREE	15.10.201...		▶
12	PERIOD	Syslog da...	syslog_cl...	0 0/30 * * ...	56	56	0	0	FREE	15.10.201...		▶
3	MANUAL	Alerts jour...	alerts_arc...		0	0	0	0	FREE			▶
200	MANUAL	ACSD stat...	acsd_break		0	0	0	0	FREE			▶
14	MANUAL	Update N...	ntp_omci...		0	0	0	0	FREE			▶
13	PERIOD	Database...	check_db	0 28 0/6 * ...	4	4	0	0	FREE	15.10.201...		▶
6	PERIOD_...	Configura...	upload_c...	0 0 7 * * ?	2	2	0	0	FREE	16.10.201...		▶

For detailed description of system monitors, see **APPENDIX B. System monitors.**

13.3. SYSTEM MODULES SETTINGS

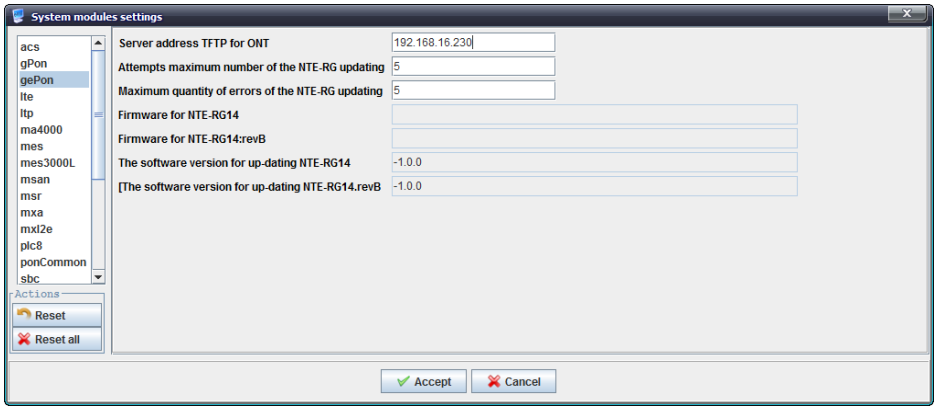
Use this menu to edit PON module parameters.

For **GPon:**



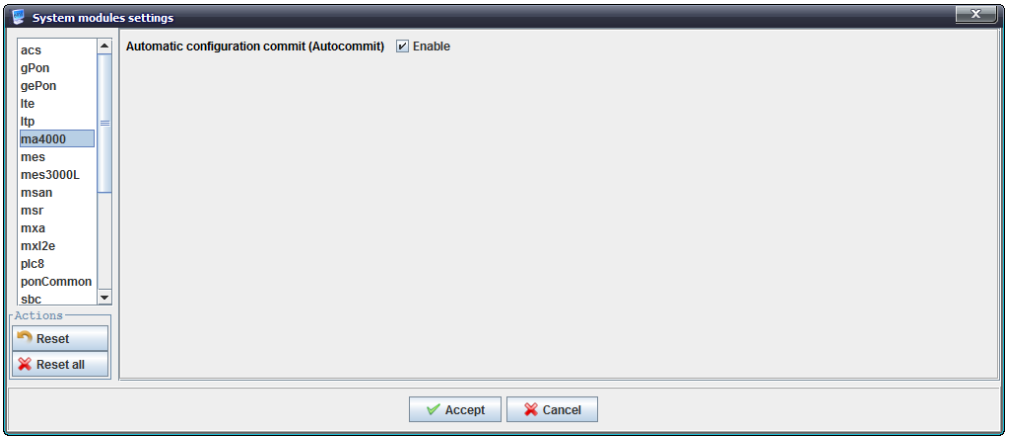
- *Show and save GPON serial in the DB in HEX format* (server reboot is required after changing this setting);
- *Request ONT type and firmware version in synchronization;*
- *Request ONT RSSI in synchronization;*
- *TFTP server address for ONT* — IP address of the interface server, that will be used for operations between the server and NTP.

For **GEPon:**



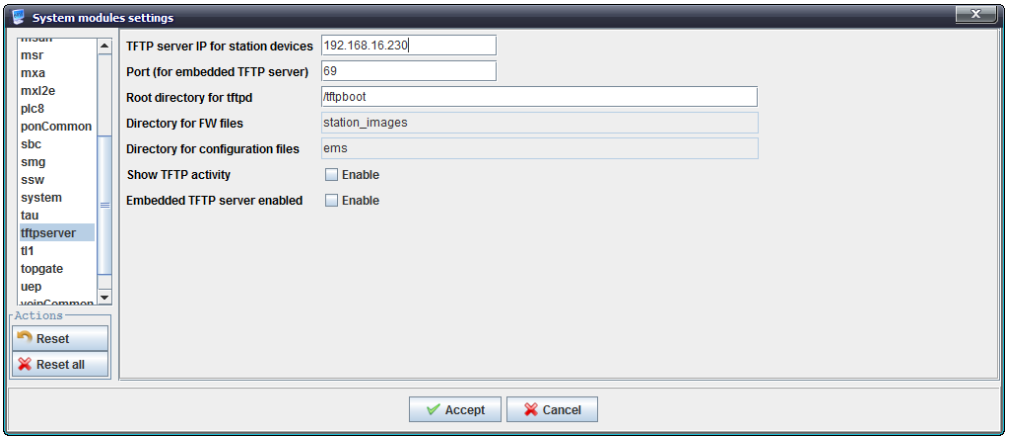
- *TFTP server address for ONT* — IP address of the interface server, that will be used for operations between the server and NTE;
- *Maximum quantity of update attempts for NTE-RG* — maximum possible quantity of update attempts for NTE-RG update scheduler, 1..1000 (default value is 5);
- *Maximum quantity of update errors for NTE-RG* — maximum possible quantity of update errors for NTE-RG update scheduler, 1..1000 (default value is 5);
- *Firmware for NTE-RG14 update* — image file name for the update (advanced configuration is performed via the Update scheduler (Chapter ***14.2*** **Subscriber's software 14.2.1.1 Update scheduler***);*
- *Firmware for NTE-RG14:rev.B update* — image file name for the update (advanced configuration is performed via the Update scheduler (Chapter ***14.2*** **Subscriber's software 14.2.1.1 Update scheduler***);*
- *Firmware version for NTE-RG14 update* — firmware version for the update (advanced configuration is performed via the Update scheduler (Chapter ***14.2*** **Subscriber's software 14.2.1.1 Update scheduler***);*
- *Firmware version for NTE-RG14:rev.B update* — firmware version for the update (advanced configuration is performed via the Update scheduler (Chapter ***14.2*** **Subscriber's software 14.2.1.1 Update scheduler***).*

For **ma4000:**



– *Automatic changes committing (Autocommit)* — apply configuration automatically, when changes has been made.

For **tftpserver:**

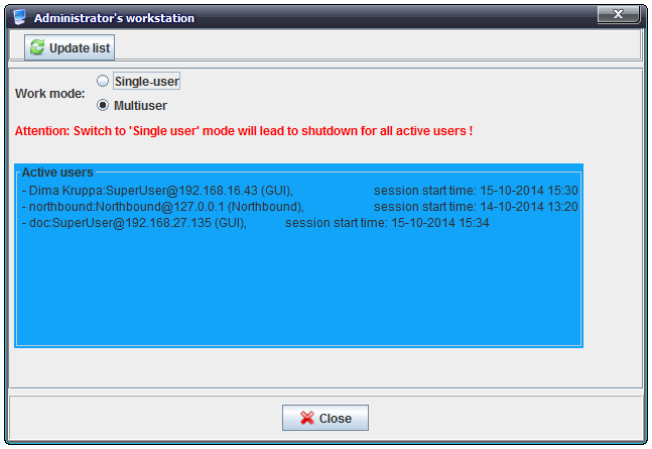


– *IP address for station-side devices* — common address, that is used for communication with the station-side devices;
– *Port (for internal TFTP)* — local TFTP server port (integrated to EMS), possible values — 1..65535 (default value is 69);
– *Root service catalog* — tftpd root service catalog;
– *Station-side firmware subcatalog* — name of subcatalog for station-side firmware files; this field cannot be changed;
– *Configuration files' subcatalog* — name of subcatalog for configuration files; this field cannot be changed;
– *Interaction tracing* — output debug messages into the log;
– *Enable internal TFTP server* — use TFTP server, integrated to EMS, otherwise — use TFTP at the same host outside of EMS.

13.4. ADMINISTRATOR'S WORKSTATION

Use this menu to assign the type of access to Eltex.EMS:

- *Multi-user* — multiple users can access the system simultaneously;
- *Exclusive* — only one user can access the database and exclusively manage configuration objects.



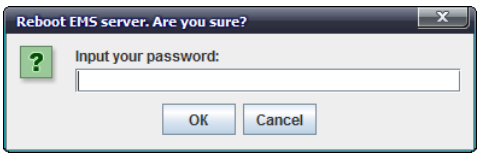
Use *Operation modes* selector to switch the operation modes.

In exclusive mode, all active system users will be disconnected.

The list of current active users is shown in *Active users* field. Click *Refresh list* button to refresh it.

13.5. EMS SERVER RESTART

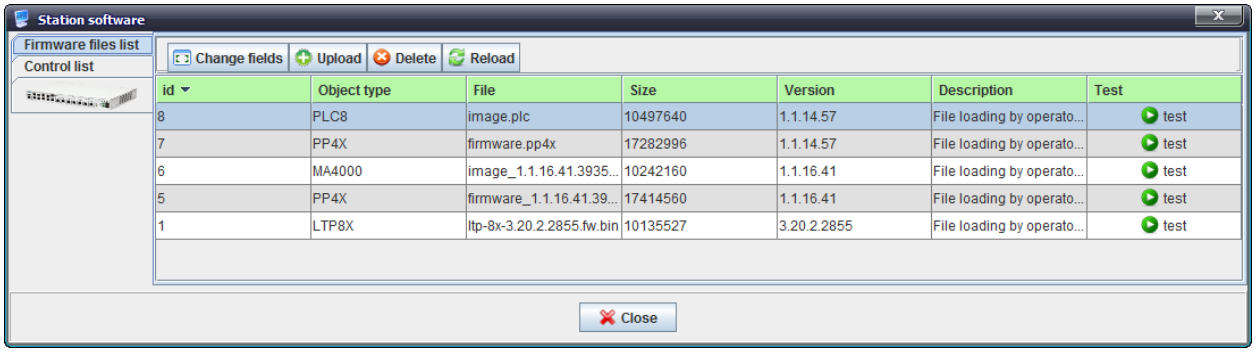
Use this menu to perform the forced reboot of EMS. To confirm the reboot, enter your system account password.



14 ADMINISTRATION DEVICE SOFTWARE

14.1. STATION-SIDE SOFTWARE

14.1.1. FIRMWARE FILES LIST

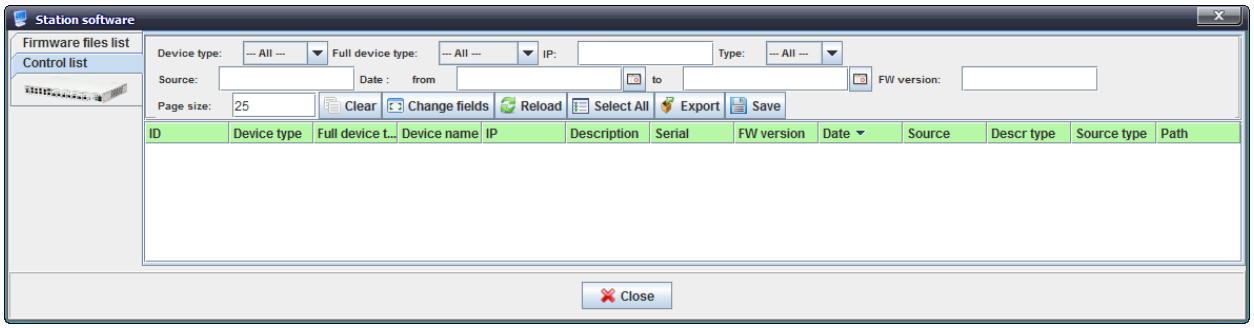


This menu contains the table designed for registration of firmware files in EMS, that allows to perform firmware update for every device.

Firmware files must be registered in order to be used for the update.

14.1.2. CONTROL LIST

This menu contains the table of device polling (current version poll). Version polling is performed by 'Firmware FW' monitor that polls all devices in the network according to its settings. This allows to control firmware versions on all the network devices. 'Information type' is identified=READ.



You can filter events in the log by one or multiple parameters.

Filter list for log records:

- *Device type* — select from the drop-down list;
- *Full device type* — device type, select from the drop-down list;
- *IP* — message source IP address;
- *Type* — all/UNKNOWN/UPLOAD/READ;
- *Source*— process initiator;
- *Date*: from/to — record creation date range in *DD.MM.YYYY* or *DD.MM.YYYY HH.MM* format;
- *FW version.*

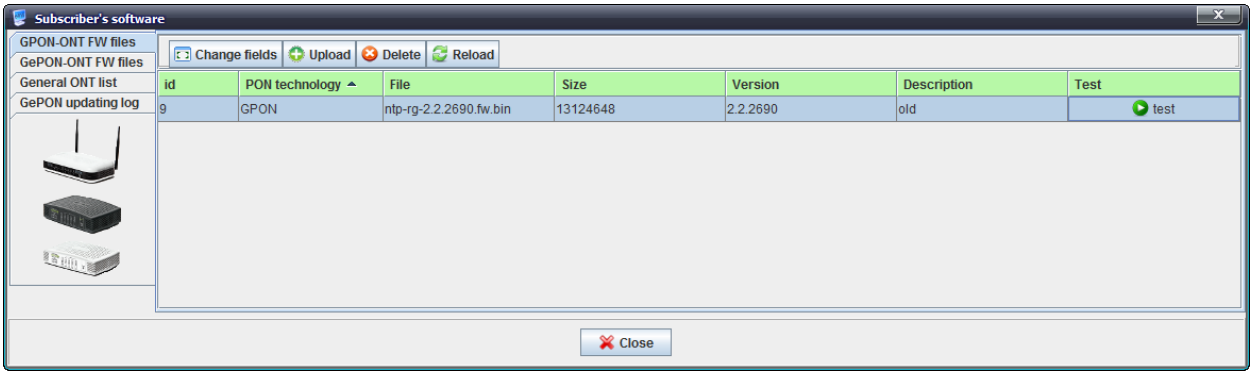
Record number field allows you to configure the quantity of messages displayed on the page. To navigate through pages, use the tab panel in the lower part of the window.

Use *Reset Filters* button to return all filters into their default state.

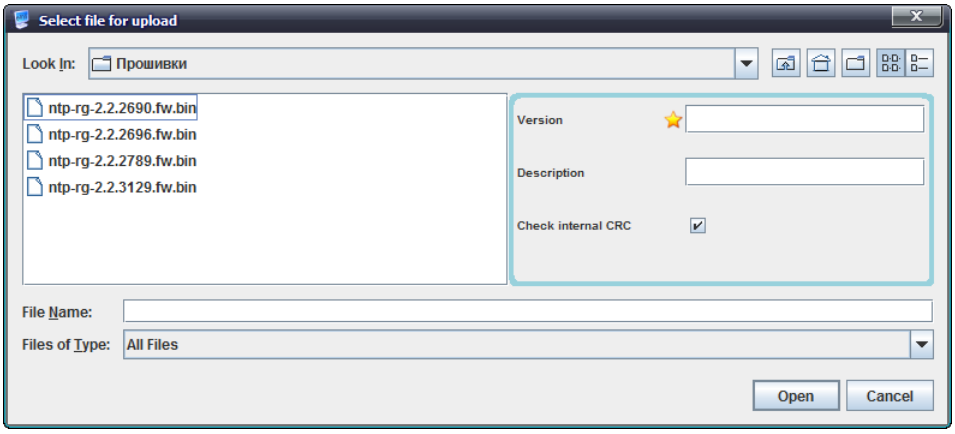
14.2. SUBSCRIBER'S SOFTWARE

Use this section to configure firmware update operation parameters.

14.2.1. GPON-ONT/GEPON-ONT FIRMWARE FILES



To add, remove and edit the table elements, use the respective buttons in the settings field.

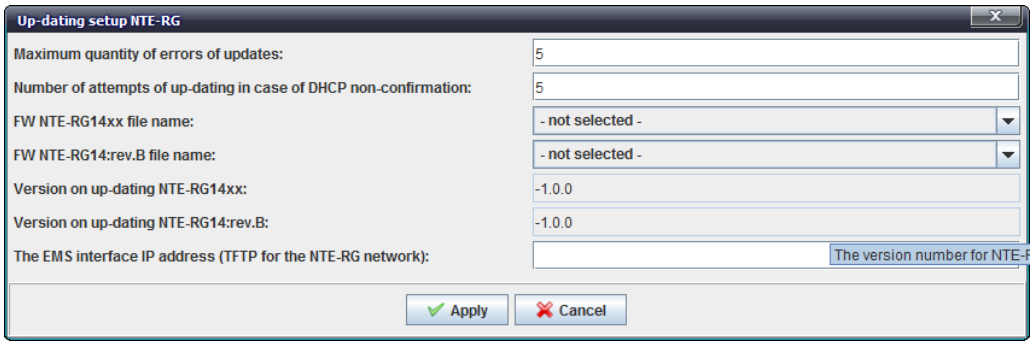


- *Version* — firmware file version;
- *Description* — arbitrary text description for firmware file identification;
- *File name* — firmware file name;
- *File type* — the type of files shown in the list.

After record has been added, you can verify its validity and firmware availability by double-clicking *Verify* button. Click *Start* button to start the verification process.

14.2.1.1. UPDATE SCHEDULER

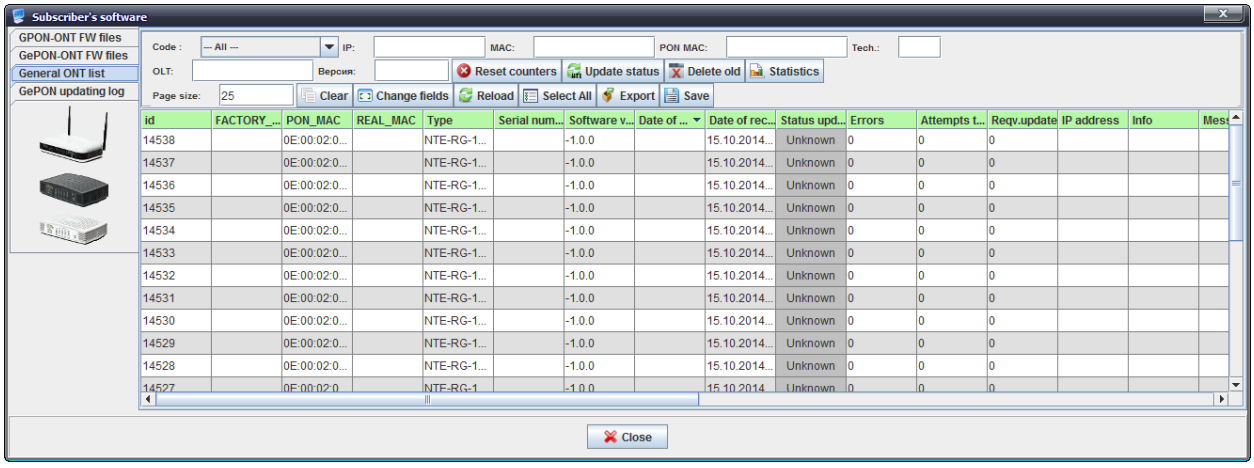
For GePON devices, you can specify scheduled updates. Click *Update scheduler* button to proceed to firmware update schedule configuration.



- *Maximum quantity of errors of updates* — maximum possible number of failures during the firmware update;
- *Maximum of updating in case of DHCP non-confirmation* — maximum possible number of firmware updates;
- *FW NTE-RG14xx file name* — select the firmware file from the drop-down list;
- *FW NTE-RG14xx rev.B file name* — select the firmware file from the drop-down list;
- *Version on updating NTE-RG14xx* — generated according to the firmware file name;
- *Version on updating NTE-RG14xx rev.B* — generated according to the firmware file name;
- *The EMS interface IP address (TFTP for NTE-RG network)* — address of the interface, which is used by server for connection to NTE.

14.2.2. GENERAL ONT LIST

This section lists information on all ONTs, registered in the system.



You can filter events in the table by one or multiple parameters.

Filter list for log records:

- *Code* — device update status:
  - *Unknown;*
  - *Updated successfully;*
  - *Overrun error;*
  - *Update required;*
  - *Update in progress;*
  - *Update error;*

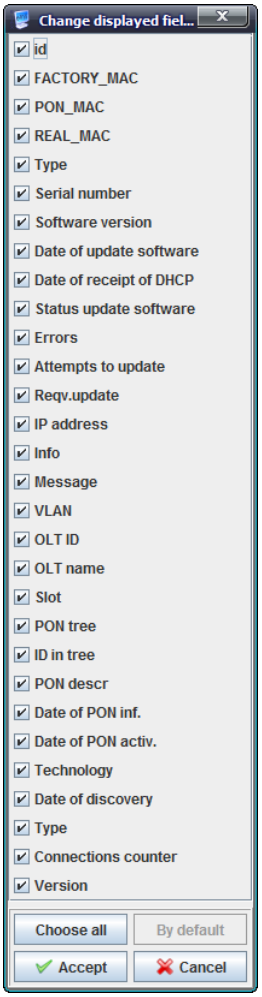
  - *Verification pending;*
- *IP* — device IP address;
- *MAC* — device MAC address;
- *PON MAC* — PON MAC address of the device;
- *Tech* — PON technology (GePON/GPON);
- *OLT* — name of device OLT, that ONT belongs to;
- *Version* — ONT firmware version.

14.2.3. ONT LIST APPEARANCE CONFIGURATION

Click *Change Fields* button to configure the set of the table fields.

List of displayed fields:

- *ID* — identification number of the record;
- *FACTORY_ MAC* — factory MAC address;
- *PON_MAC* — PON MAC address;
- *REAL_MAC* — current WAN MAC address;
- *Type* — device model;
- *Serial number* — device serial number;
- *Software Version* — current device firmware version;
- *Date of update software*— date and time when firmware was updated;
- *Date of receipt DHCP*— date and time when the data was received via DHCP;
- *Status update software* — device firmware update status;
- *Errors* — quantity of errors during the firmware update;
- *Attempts to update* — quantity of firmware update attempts;
- *Reqv. Update* — quantity of firmware update attempts;
- *IP address;*
- *Info;*
- *Message;*
- *VLAN* — number of VLAN, that the device belongs to;
- *OLT ID* — identifier of OLT, that the device is connected to;
- *OLT name* — name of OLT, that the device is connected to;
- *Slot* — number of slot, that the device is connected to (for ONTs connected to MA4000-PX);
- *PON tree* — PON tree number, that the device is located in;
- *ID in tree* — device identifier in the tree;
- *PON descr* — description of ONT in configuration;
- *Date of PON inf.* — OLT information receiving date;
- *Date of PON active.* — last known PON activity date;
- *Technology* — passive optic network technology, implemented in the device (GePON/GPON);
- *Date of discovery;*
- *Type;*
- *Connections counter;*
- *Version.*

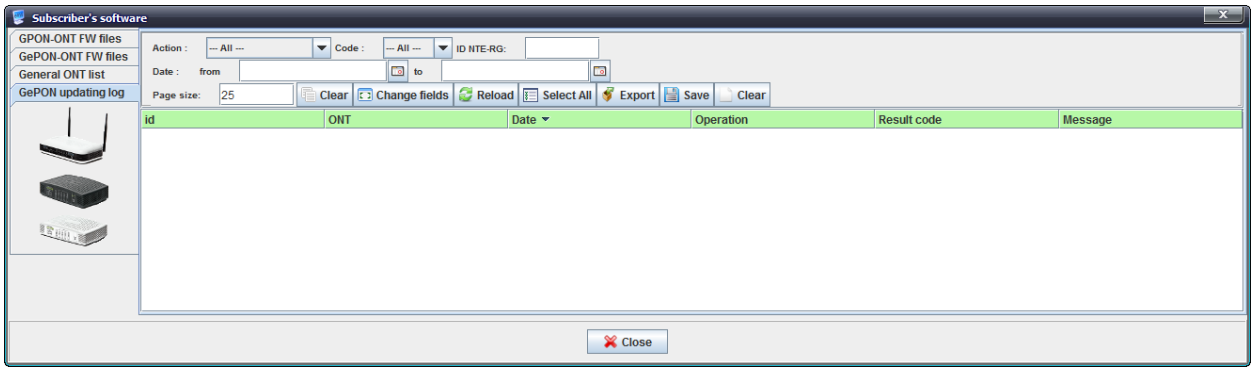


Click *Choose All* button to select all list fields, that you want to add.

Click *Remove Old* button to remove records, that are more than one month old.

To save changes in the set of displayed fields, click *Accept* button, or click *Cancel* to discard changes.

14.2.4. GEPON UPDATING LOG



You can filter events in the log by one or multiple parameters.

Filter list for log records:

- *Action* — activity, performed on the device firmware:
  - *All* — show all activities;
  - *Unknown* — show only non-identified activities;
  - *Firmware update* — show only successful firmware update activities;
  - *Update not required* — show only incorrectly finished firmware update activities;
- *Code* — operation result:
  - *Unknown* — operation is finished incorrectly;
  - *OK* — operation is finished correctly;
  - *Error* — error while performing operation;
- *ID NTE-RG* — identifier of the table record;
- *Date*: from/to — record creation date range in DD.MM.YYYY or DD.MM.YYYY HH.MM:SS format.

Page size field allows you to configure the quantity of messages displayed on the page. To navigate through pages, use the tab panel in the lower part of the window.

Use *Clear* button to return all filters into their default state.

15 HELP

15.1. ABOUT

View the current version of the application. This dialog window shows console build date and version, and EMS server build date and version (if available).

15.2. LICENSE

View information on used modules and their restrictions.

15.3. LIST OF CHANGES

View information on the major changes in each version of the product.

APPENDIX A. SYSTEM MONITORS

1. DESCRIPTION

Monitor is an instrument that performs the monitoring of various states and events. With monitors, you can control the occurrence of critical events, and perform the event archiving and log clearing tasks, etc.

The system equipped with several system monitors for process automation:

- *System pool size control (HandlersPool)* — system monitor that tracks EMS server software resources.
  Recommended execution frequency — once in an hour.

- *Message log export (AlertsArchiving)* — monitor performs message log (alerts) archiving with the subsequent data removal from the database. In monitor settings, you can define the execution frequency and parameters that is responsible for removal of the obsolete records.
  Recommended execution frequency — once in a day (e.g. every night, with settings to delete alarms older than 10–20 days.)

- *Firmware version scanning (FwReports)* — monitor performs scanning of installed firmware versions on all available devices and stores the information in the DB table, available to the administrator.
  Recommended execution frequency — once in a month.

- *Configuration Upload (UploadConfigure)* — monitor uploads configurations for all available devices to EMS TFTP server. Optimal settings for execution frequency depend on the current network conditions.
  Recommended execution frequency — no less than once in a month.

- *NTE-RG firmware update (FwNteUpdate)* — monitor allows to perform automatic firmware update for NTE-RG subscriber-side devices. To ensure the proper monitor operation, you will need an ad hoc DHCP server (dhcpd-eltex) and configured network for control data transmission (separate management VLAN for subscriber-side devices). Monitor performs the firmware upgrade according to defined settings.
  Recommended execution frequency — in hours with the lowest load (e.g. once in a day, at night for 3–4 hours).

- *PON synchronization (SyncPon)* — monitor performs the background synchronization of all PON devices, i.e. receives lists and states for all ONTs. It also stores the statistics for all enabled and available ONTs, that could be used later for analysis and removal of unused ONTs. Is stores the date of ONT discovery in the network, OLT, PON tree, PON activity date and NTE type for GePON technology. Besides, the monitor background activity allows operators to avoid the full polling of devices connected to EMS. It provides prepared information that could be used for ONT discovery, adding to OLT, etc.

- *EMS server diagnostics (EmsServerDiagnostics)* — monitor enables self-diagnostics of EMS server (operating system). It performs the periodic polling of internal parameters, such as CPU load, free memory, free space on disk. If the critical condition is discovered, the system message will be generated and saved in the database that could be sent to administrator GUI or e-mail later.
  Recommended execution frequency — once in an hour.

- *Syslog server database cleaner (SyslogCleaner)* — monitor performs data cleaning and removal from Syslog table. Data removal can be performed by size (mode size) or by time (mode time).

This configuration mode depends on the quantity of devices and the intensity of message sending process, and also the purpose of debug configuration through Syslog. In general, it's not recommended to store more than 200k records, as their viewing and search will be slow.

– *Check database connections (CheckDbConnect)* — system monitor, designed for maintaining socket connection to the database.
It's not recommended to change the settings.

– *NTP firmware update via OMCI protocol (NtpOmciSheduler)* — monitor performs sequential NTP-RG firmware update via OMCI Works in GPON 3.x or later. It's not recommended to use this parameter (use internal or external ACS TR -069 for firmware update purposes).

– *Delete obsolete log files (LogsDirCleaner)* — monitor performs periodic cleaning of logs (log files), created during EMS server operation.
Recommended execution frequency — once in 10–20 days.

– *GPON ONT autoupdate control (GponOntAutoupdateFlag)* — service monitor, designed for collection of debug information.
It's not recommended to change the settings.

– *Temperature control (CheckOltTermoMonitor)* — monitor performs periodic scanning of every OLT temperature sensor in the network. Monitoring results are used for construction of the temperature chart on Monitoring/Temperature tab. Also, if temperature for any of the sensors exceeds the defined limits the system will generate an alarm. You can define limits for each type of sensors in '/usr/lib/eltex-ems/conf/termoMonitor.xml' file. In the monitor settings, in addition to the execution frequency, you should define the following:
  - decision_factor — quantity of readings that should exceed the defined limits for the alarm to be generated
  - reports_amount — quantity of stored readings for traffic generation
  - process_size — quantity of processes (streams) in the server, that perform the poll simultaneously

  Monitor operation is affected by 'out-of-service' checkbox that is specific for each object. The monitor will not work for 'out-of-service' devices. Also, you can specify the 'black list' for the monitor that will skip polling operations for devices from the list. By default, polling is performed for all devices.
  Recommended execution frequency — once in an hour.

– *Archiving and sending log files (LogsSender)* — service monitor, designed for periodic sending of the debug information log.
It's not recommended to change the settings.

– *ONT problem reports (OntProblems)* — monitor allows to configure the periodic e-mail notifications about problems with PON ONT. Problems include frequent device reboots or RSSI parameter falling out of scope. You can define limits in the monitor settings. Monitoring results will be compiled into the text file with ONT list that will be sent to the address, defined in settings.
  - switchmax — maximum number of ONT reconnections
  - rssiminmax — minimum and maximum RSSI values, that, if exceeded, will place the ONT into the problem list.

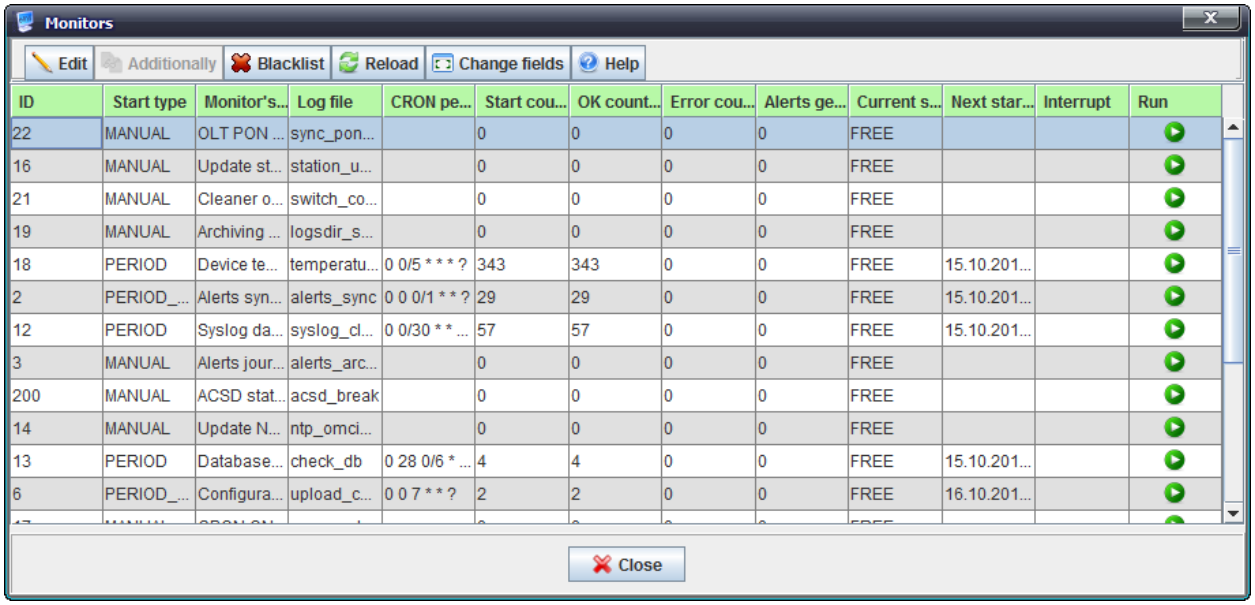
  Recommended execution frequency — once in an day.

– *ONT connection counter Switch counter reset (SwithCounterCleaner)* — monitor performs automatic reset of reconnection counters for all ONTs in the network (in EMS database).
Recommended execution frequency — once in a month.

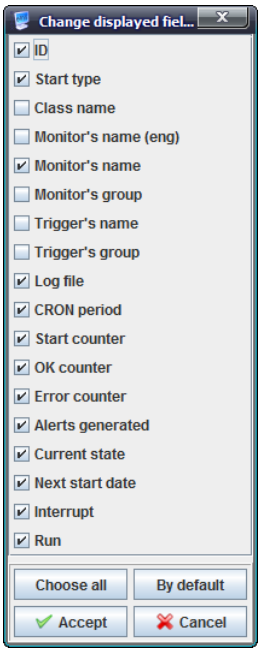
– *ACSD monitoring (*CheckAcsdBreak*)* — monitor controls the availability of Eltex.ACS service (core) Eltex.EMS management system. It has no settings, except for the execution frequency. Recommended execution frequency — once in an hour.

2. MONITORS IN GUI

You can view monitor state in the general device tree, on Monitors tab.



– *ID* — monitor ID;
– *Start type* — monitor execution type:
  – *manual* — manual;
  – *period* — periodic;
  – *start_server* — upon the server startup;
– *Class name* — class of the monitor;
– *Monitor's name (eng)* — monitor name (in Latin characters);
– *Monitor's name* — monitor name (in Cyrillic characters);
– *Monitor's group* — monitor workgroup;
– Trigger's name — name of the trigger;
– *Trigger's group* — the group of triggers;
– *Log file* — log file name, that stores the monitor operation data;
– *CRON period* — monitor execution period;
– *Start counter* — current number of monitor executions;
– *OK counter*— quantity of successful monitor executions;
– *Error counter* — quantity of unsuccessful monitor executions;
– *Alerts generated*— quantity of active monitor events;
– *Current state* — current monitor state:
  – *free* — monitor is idle;
  – *busy* — monitor is performing operations;
– *Next start date*— time of the next monitor execution;
– *Interrupt* — if the monitor is running, stop its operation;
– *Execute* — execute the monitor (execution by user demand).



In the Tips section, you will find some information on the monitor configuration.

3. DEFINING INTERVALS OF MONITORING RECURRENCE IN CALENDAR VIEW WITH CRON EXPRESSIONS

With ***cron*** expressions, you can set up recurrence intervals in calendar view.

3.1 EXPRESSION STRUCTURE

Cron expression is comprised of seven fields:

1	2	3	4	5	6	7
Seconds	Minutes	Hours	Day of the month	Month	Day of the week	Year

- required field

- optional field

3.2 SPECIAL CHARACTERS

Character	Name	Value	Example	Note
/	slash	increment	'5/15' in 'seconds' field means every 15 seconds from the 5th second	
?	Question mark	the field should not contain the defined value	if you entering the day of the week, you can enter '?' in the 'day of the week' field to mark the 'day of the week' value as irrelevant	You can use it in 'day of the month' and 'day of the week' fields only
L	Letter L	The last (day of the week, day of the month)	Letter L entered in the field means 7, if it's not accompanied by digits. Thus, 0L means that the task will be scheduled for the last Sunday of the current month.	You can use it in 'day of the month' and 'day of the week' fields only
W	Letter W	The closest (day of the week, day of the month)	1W in 'day of the month' field means, that the task will be scheduled for the working day, closest to the beginning of the month.	
#	Hash sign	Specific (day)	Enter 'MON#2' in 'day of the week' field to schedule the task for the second Monday of the month.	
*	Asterisk (star)	Any	This character in 'day of the week' field means, that the action may be performed on any day of the week.	

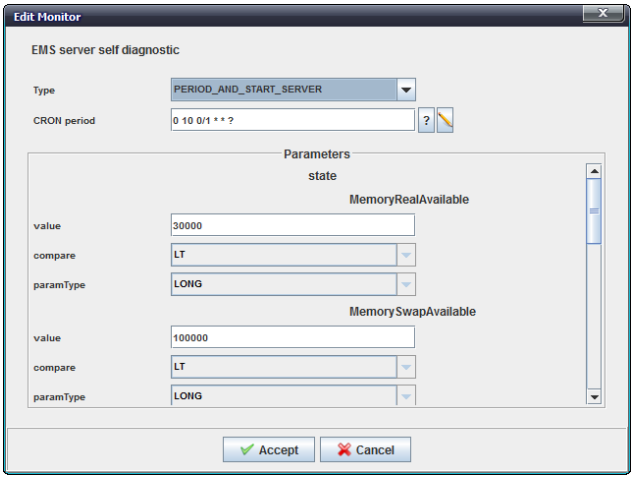
3.3 DEFINING INTERVALS OF MONITORING RECURRENCE, EXAMPLES

Table of the monitor execution examples

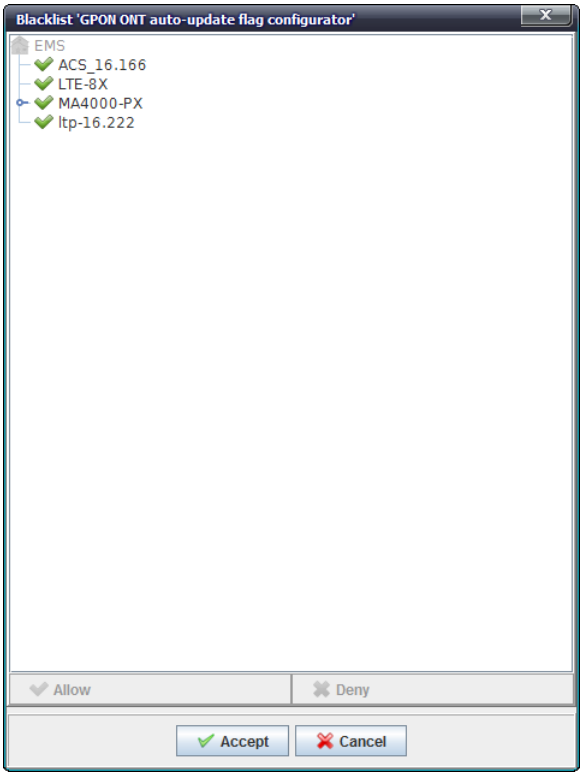
Seconds	Minutes	Hours	Day of the month	Month	Day of the week	Year	Meaning
0/20	*	*	*	*	?		every 20 seconds, from 0 second
15	0/2	*	*	*	?		in 2 minutes, from the 15th second of each interval
10	24	0/1	*	*	?		every hour at 24 minutes 10 seconds
0	0/2	8-17	*	*	?		every 2 minutes, in the interval from 8:00 to 17:00
0	0/3	17-23	*	*	?		every 3 minutes, in the interval from 17:00 to 23:00
0	0	10am	1.15	*	?		at 10am every 1st and 15th day of the month
0.30	*	*	?	*	MON-FRI		every 30 seconds from Monday till Friday
0.30	*	*	?	*	SAT, SUN		every 30 seconds on Saturday and Sunday
0	0	12	*	*	?		every day at noon
0	15	10	?	*	*		every day at 10:15
0	15	10	*	*	?		
0	15	10	*	*	?	*	
0	15	10	*	*	?	2005	in 2005, every day at 10:15
0	*	14	*	*	?		every day, every minute from 14:00 to 14:59
0/5	14	*	*	?			every day, every 5 minutes from 14:00 to 14:55
0	0/5	14.18	*	*	?		every day, every 5 minutes from 14:00 to 14:55 and from 18:00 to 15:55
0	0-5	14	*	*	?		every day, every minute from 14:00 to 14:05
0	10.44	14	?	3	WED		at 14:10 and 14:44, every Wednesday in March
0	15	10	?	*	MON-FRI		at 10:15 from Monday till Friday
0	15	10	15	*	?		at 10:15, each 15th day of each month
0	15	10	L	*	?		at 10:15 on the last day of each month
0	15	10	?	*	6L		at 10:15 on the last Friday of each month
0	15	10	?	*	6L	2002-2005	from 2002 till 2005, at 10:15 on the last Friday of each month
0	15	10	?	*	6#3		at 10:15 on the third Friday of each month

4. MONITOR CONFIGURATION

When configuring monitors, please note the following recommendations:

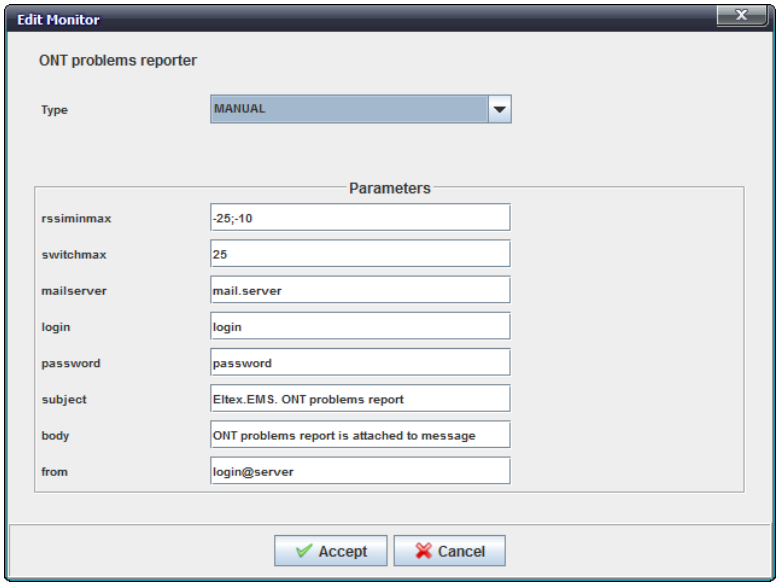


- *Handlers Pool* monitor. Leave the default values for this monitor settings;
- *Alerts Archiving* monitor. Consult the vendor for configuration of this monitor (recurrent execution with the defined period);
- *FwReports monitor.* Consult the vendor for configuration of this monitor (recurrent execution with the defined period);
- *CheckOltTermoMonitor.* To configure the monitor, use Administration/Server configuration/Scheduled tasks (monitors) section.
  - *Type* — monitor execution type: periodic, on server startup, manual;
  - *Cron period* — set the monitor execution period;
  - *decision_factor* — quantity of readings that should exceed the defined limits for the alarm to be generated;
  - *reports_amount* — quantity of stored readings for traffic generation;
  - *process_size* — quantity of processes (streams) in the server, that perform the poll simultaneously.



You can define limits for each type of sensors in '/usr/lib/eltex-ems/conf/termoMonitor.xml' file. Monitor operation is affected by 'out-of-service' checkbox, that is specific for each object. The monitor will not work for 'out-of-service' devices. Also, you can specify the 'black list' for the monitor, that will skip polling operations for devices from the list. All devices are polled by default. To exclude the device from the monitor polling list, go to 'Black list', select the device and click 'Disable'. Click 'Apply' when you finish the work with the black list.

- *OntProblems* monitor To send the problem message to the specific user, define user e-mail in settings (see paragraph **11.3 Configure system users**) and select the respective checkbox. Problems include frequent device reboots or RSSI parameter falling out of permitted scope. You can define limits in the monitor settings. Monitoring results will be compiled into the text file with ONT list, that will be sent to the address, defined in settings.

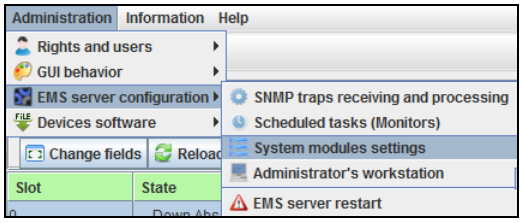


- *Type* — monitor execution type: periodic, on server startup, manual;
- *Cron period* — set the monitor execution period;
- *switchmax* — maximum number of ONT reconnections;
- *mailserver* — IP address of the mail server;
- *login* — login for authorization on the mail server;
- *password* — password for authorization on the mail server;
- *body* — information, shown in the message body;
- *rssiminmax* — minimum and maximum RSSI values, that, if exceeded, will place the ONT into the problem list, format: min;max;
- *from* — sender address;
- *subject* — information, shown in the message subject.

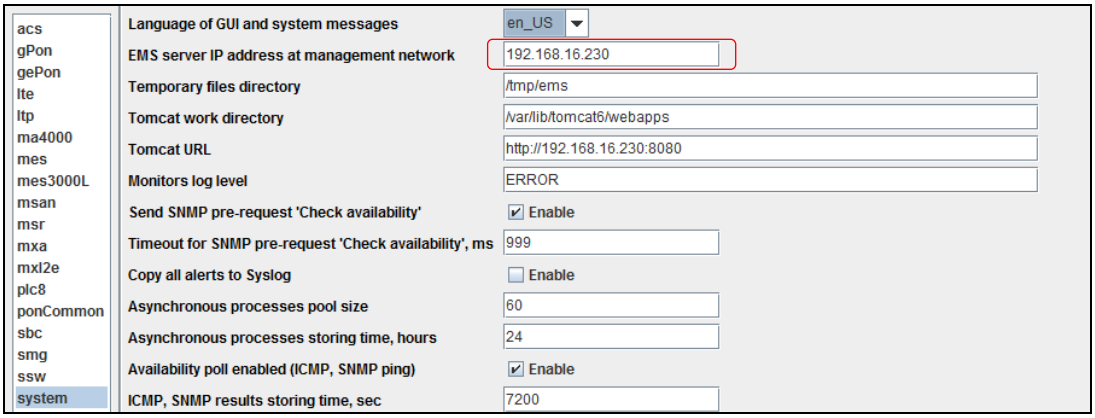
APPENDIX B. NTE-RG FIRMWARE UPDATE CONFIGURATION

1) Configuration of EMS server IP address for the firmware upload from operator's PC to the server

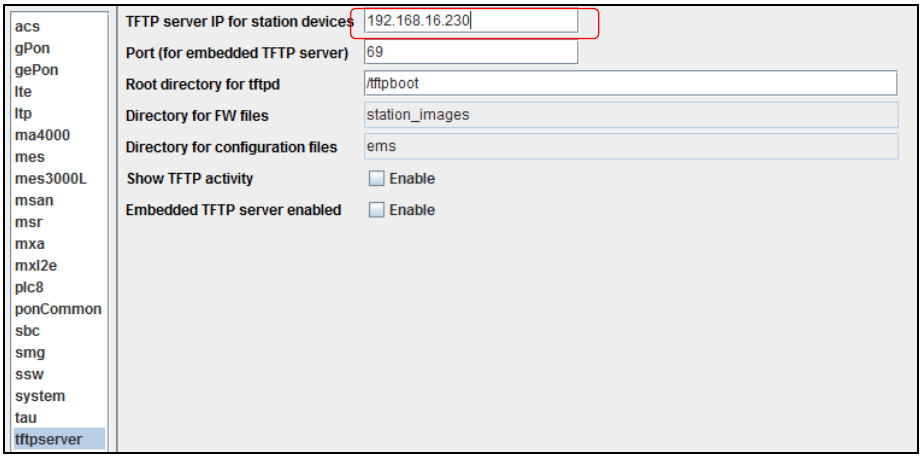
To perform configuration, go to server module configuration page *Administration/Server configuration/System modules.*



In **system** module settings, define the IP address, that will be used for interactions between station-side devices and EMS server.

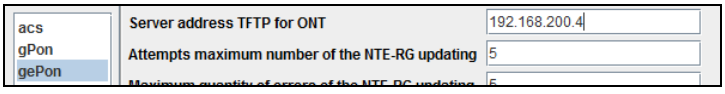


In **tftpserver** module settings, define the IP address, that will be used for operations with station-side devices.



2) Configuration of EMS server IP address for the firmware upload from the server to ONT

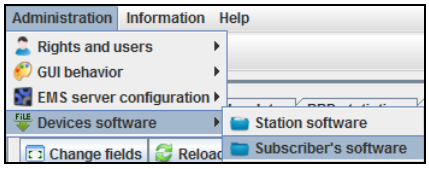
In **gePon** module settings, define the IP address, that will be used for interactions between the server and NTE-RG.



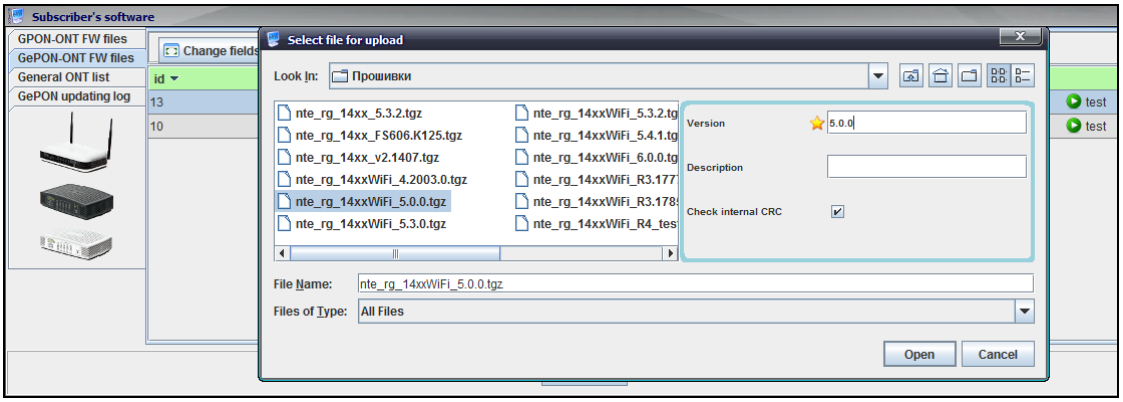
After configuration, perform the reboot of EMS *(Administration/Server configuration/EMS server reboot*).

3) Uploading NTE-RG firmware files

Go to *Administration/Device firmware/Subscriber firmware* section.

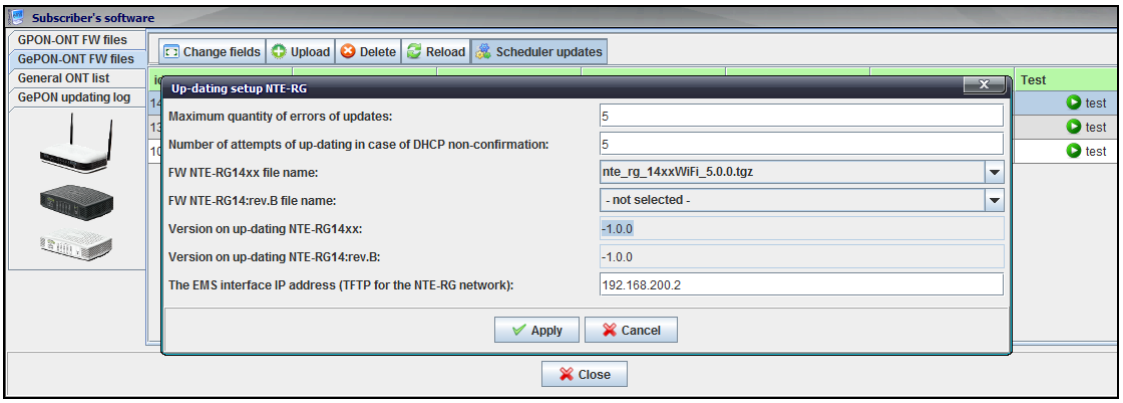


Upload files from operator's PC to EMS server.

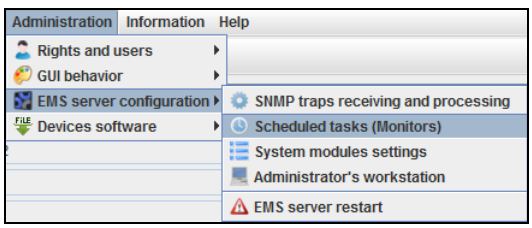


4) Update scheduler configuration

Select scheduler files in *NTE-RG14xx/NTE-RG14xx rev.B firmware file name* field and specify the IP address of the interface, that will be used for interactions between the server and NTE-RG.

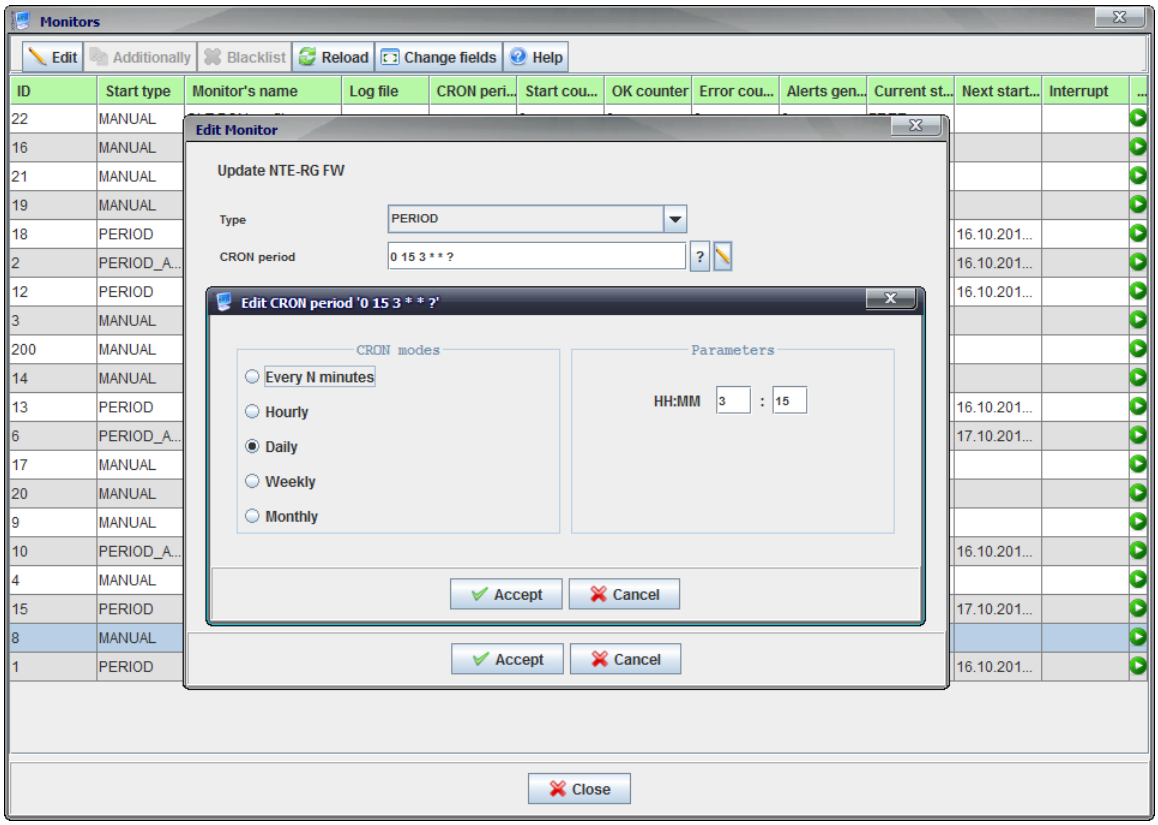


5) Update schedule configuration



Double-click on the 'Update NTE-RG FW' field to open the configuration window, where you will be able to specify recurrent execution of the update scheduler. Configure required parameters and click

Apply button.



Results of scheduler operation are shown in *Administration/Device firmware/Subscriber firmware/ONT general list* and *GePON update log* menus.

APPENDIX C. PON PROFILE SYNCHRONIZATION

1. PON profile synchronization

PON profile synchronization allows you to set up profile parameter values according to the reference list (XML template), that is considered common for devices of the same type/firmware version.

Automatic synchronization is performed periodically by the monitor. It verifies the current values and, in case of conflict, changes them accordingly or adds the missing parameters.

If necessary, you can use manual synchronization, e.g. when you have to perform the initial network configuration of a new device.

PON profile synchronization is performed with XML templates, stored in directory/usr/lib/eltex-ems/conf/module/pon/common/profileOlt.

```
/usr/lib/eltex-ems/conf/module/pon/common/profileOlt$ ls

AllProfiles_LTP8X_3.20.1.xml

AllProfiles_LTP8X_3.20.2.xml

AllProfiles_MA4000_1.3.xml
```

File format is defined strictly:

- 'AllProfiles_';
- device type (LTP8X or MA4000);
- underscore '_';
- firmware version, that is a rounded value of the actual firmware version;
- .xml extension.

Firmware versions are rounded down:

- versions 3.20.1.100, 3.20.1.500 are rounded to 3.20.1;
- versions 3.20.2.100, 3.20.2.500, 3.20.5.5 are rounded to 3.20.2.

If you try to synchronize profiles on the device, which firmware version is lower than any of the versions, listed for this device type, you will see the error message stating, that profile synchronization is not supported on this version yet.

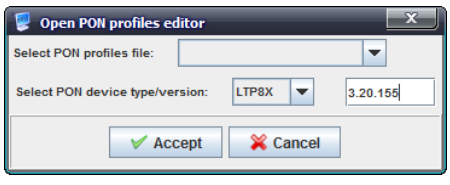
2. Template files

You can create template files by two methods:

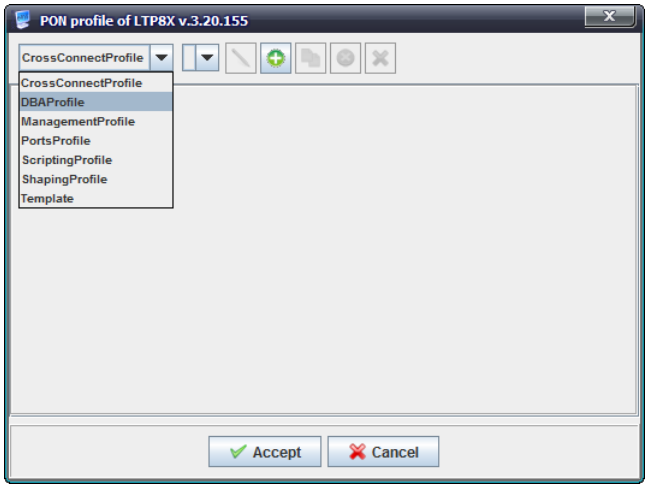
- Create files manually for the specific device type and version using the editor
- Upload parameters from the Device A with configured profiles (if you want to configure the same parameters on multiple OLTs in the network)

2.1 Creating files with editor

To open the editor, go to 'OLT/GUI OLT PON-profile's editor' menu. Select the required device type/version in the opened dialog window. No need to select files at this step.



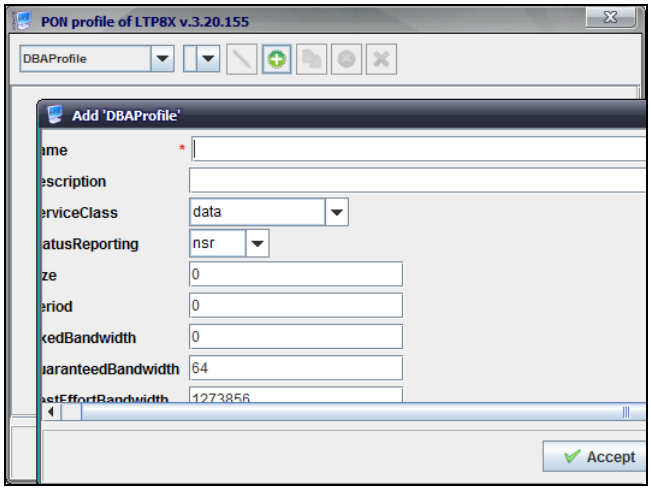
In the editor window will be shown all available profile types for this device/version. No profiles added.



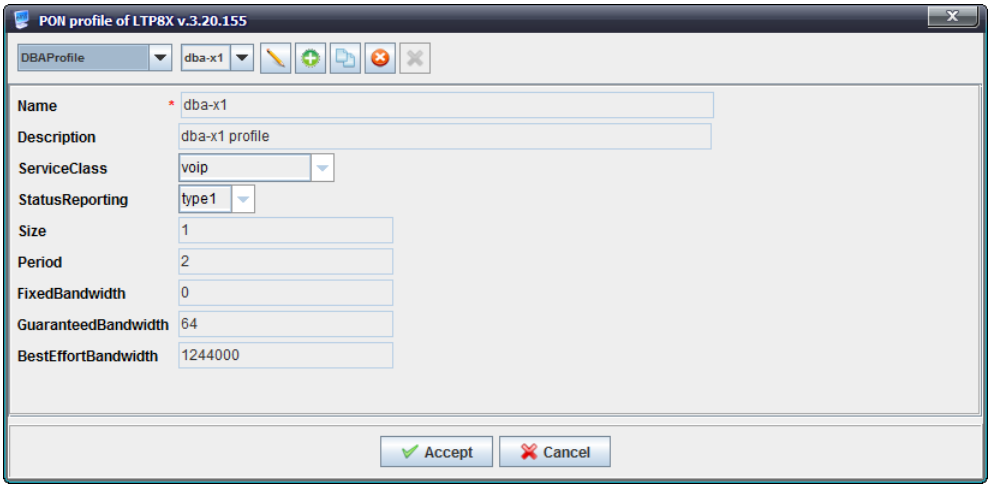
If profile synchronization is performed, the system will only work with profiles that are listed in the template file. If the selected profile is absent on the device, it will be added. If the profile with the same name is present on the device (regardless of its index), profile parameter values will be changed.

Thus, in the editor window, you have to add only those profiles that are needed for synchronization. It may be the only one profile or multiple profiles of the same type. Adding profiles to all types is not necessary, as empty profile types will not be changed on the devices.

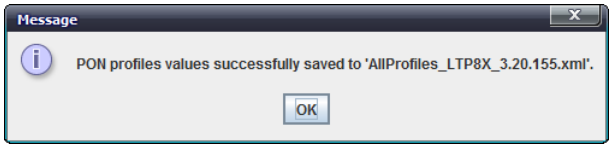
If you select the desired profile type, you will be able to add a new profile in it.



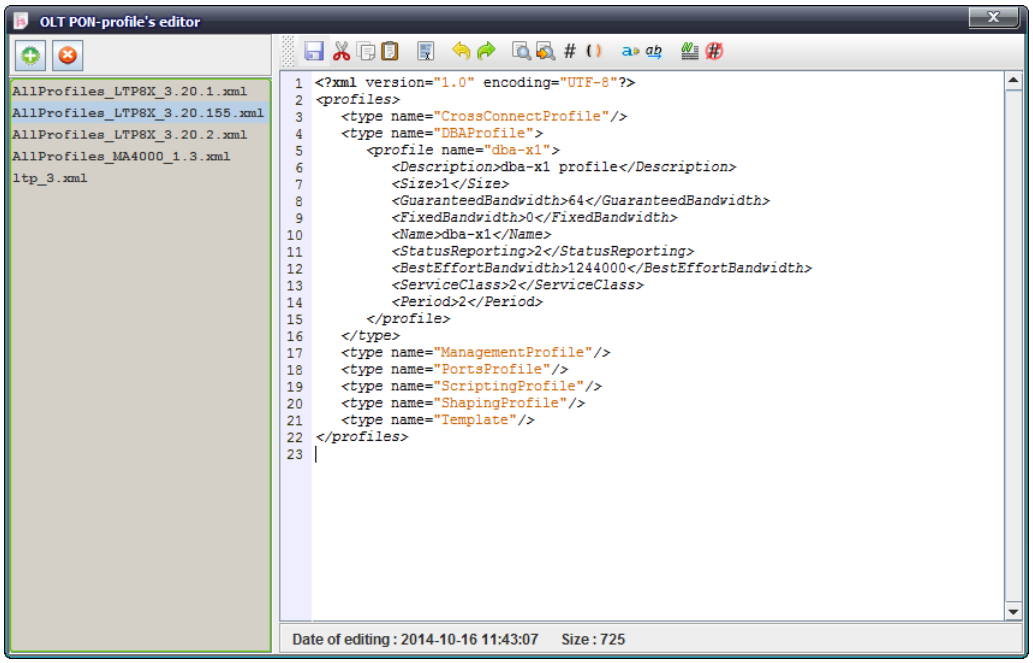
It's necessary to define the name for a new profile. All other values will be taken by default from the EMS system source code; required values can be changed. After successful editing, a new profile will be shown in the editor.



After adding all the necessary profiles, the editor will close. The system will notify you on PON profiles' successful saving into a file.

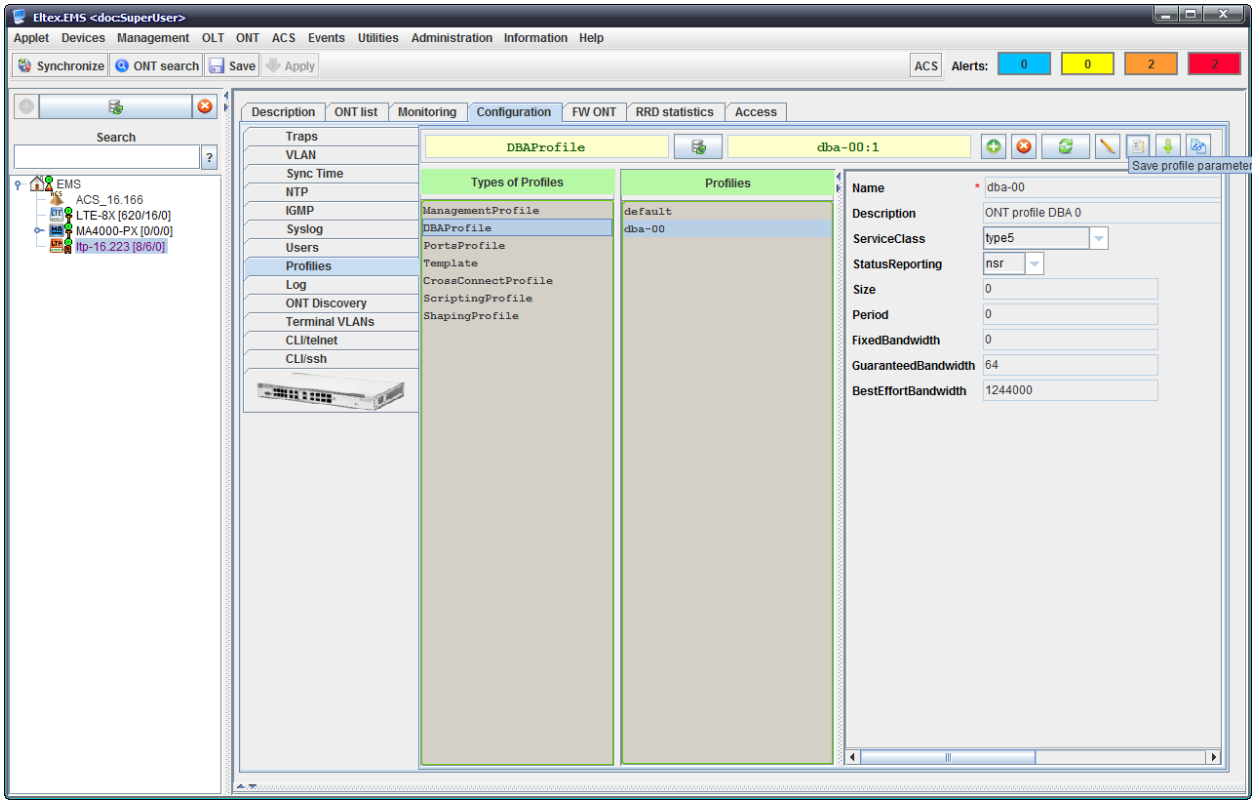


You can edit the resulting file using the same editor or view it in 'OLT/XML OLT PON-profile's editor' menu. Avoid using XML editor for editing the resulting files, as you can easily commit an error and disrupt the structure of parameters.

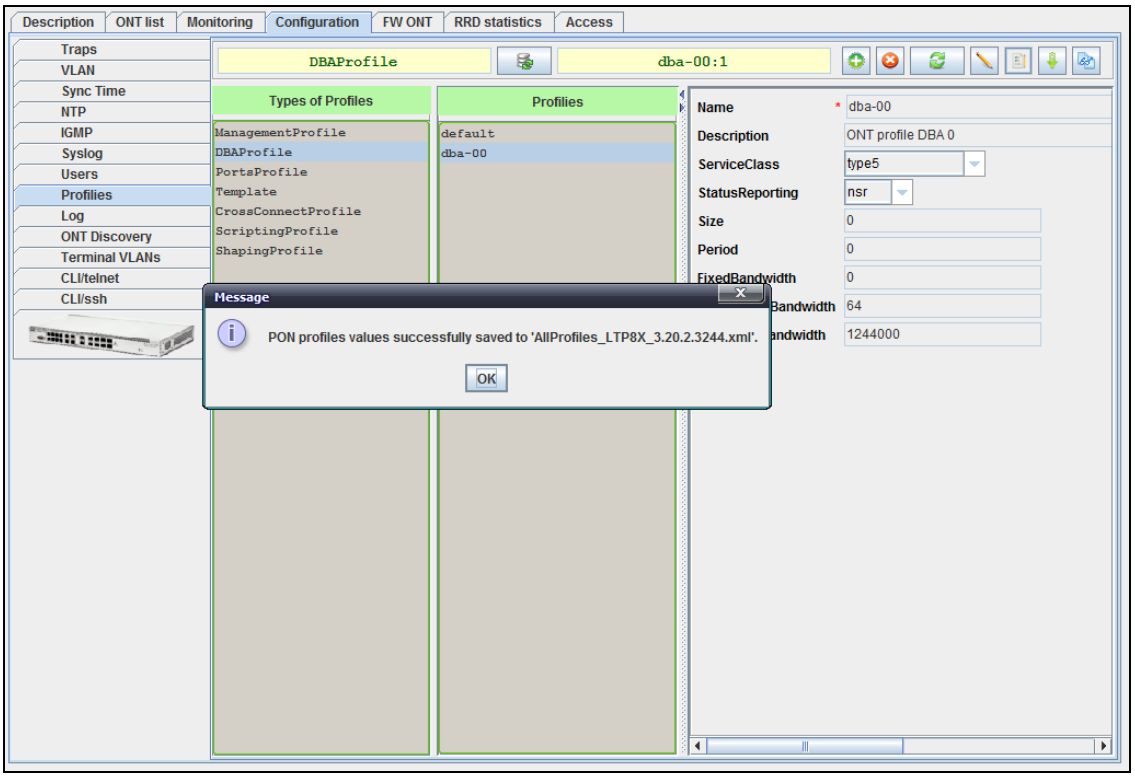


2.2 Creating files by uploading them from the device

You can upload profile parameters on profile edit tab on the device by clicking 'Save profile parameters into XML file on server'.



The current device firmware version will be taken as a version of the file name.



You can view and edit the resulting file using editors (see paragraph 2.1).

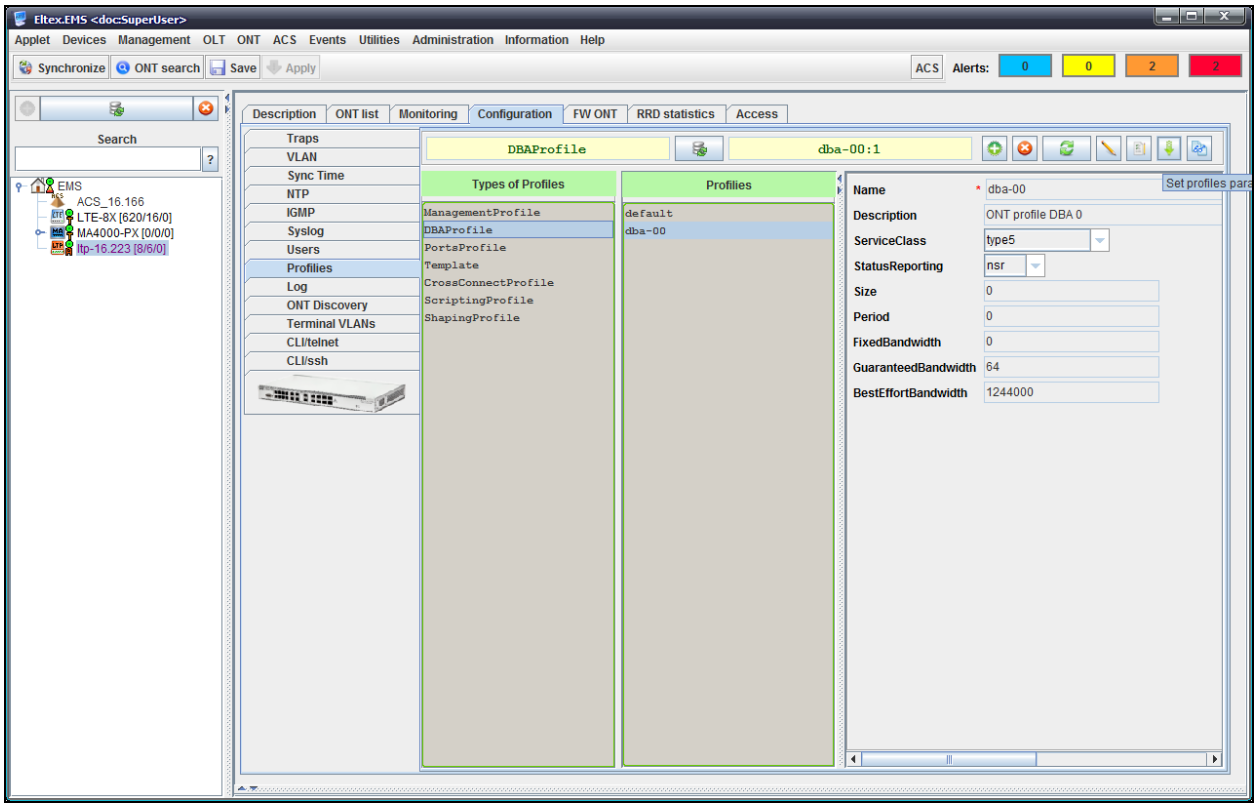
3. PON profile parameter synchronization

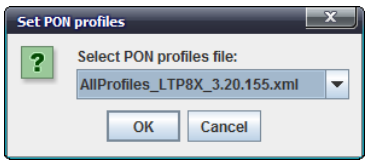
PON profile synchronization (setting up parameters from templates) can be performed in manual or automatic mode (by EMS monitor).

3.1 Manual parameter synchronization

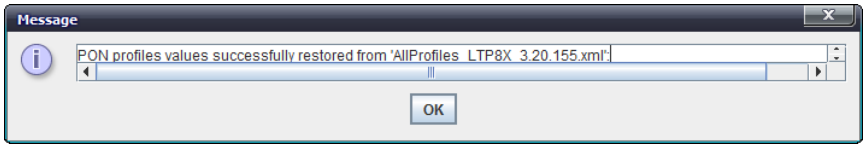
This option may be convenient for initial configuration of devices in the network.

To set the profile parameters from the template, you have to synchronize the device (*Synchronization* button*)* and proceed to the profile edit tab on the device. Click 'Load profile values from XML template' to open file select dialog window.



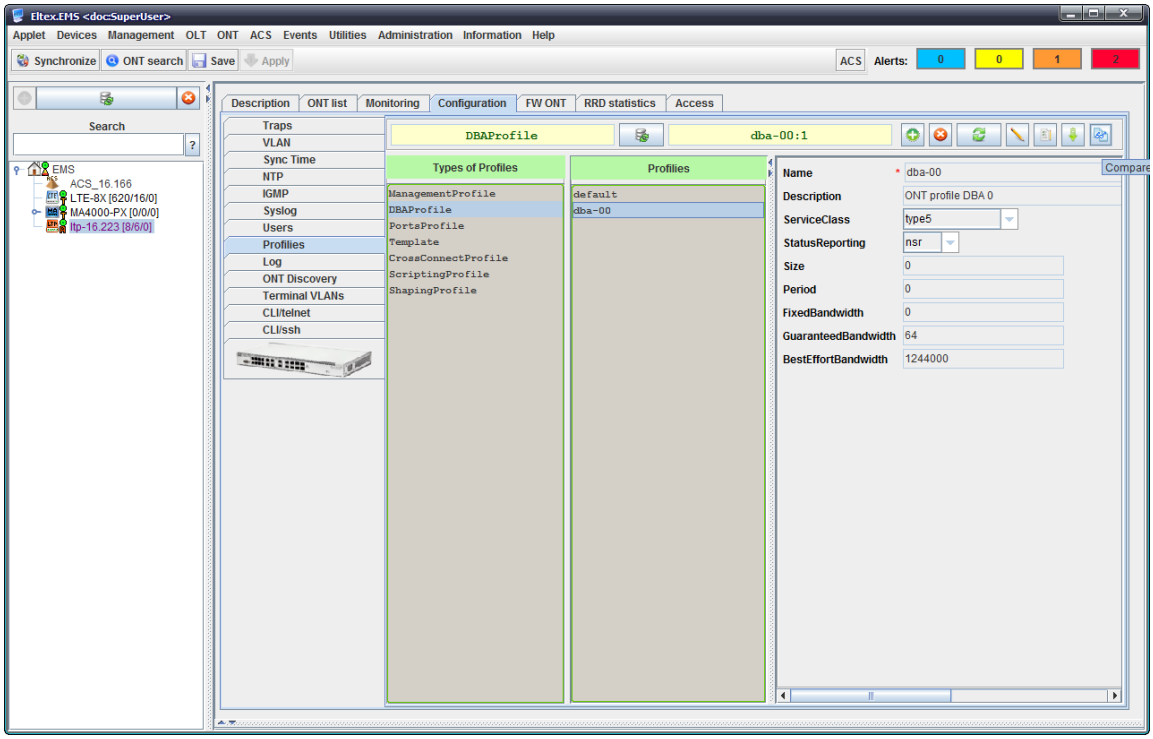


Select the file and click *OK* button to set the parameters; result will be shown in the dialog window.

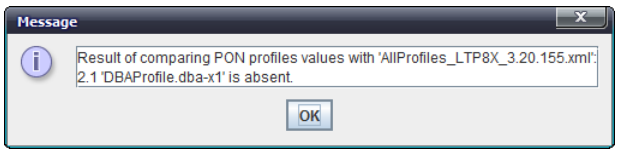


After the next synchronization, a new profile will appear in the list. Then, click *Save* button to save the device configuration.

Also, the manual mode allows you to compare values (without modification of parameters). To do this, click 'Compare profile parameters with XML template' button.

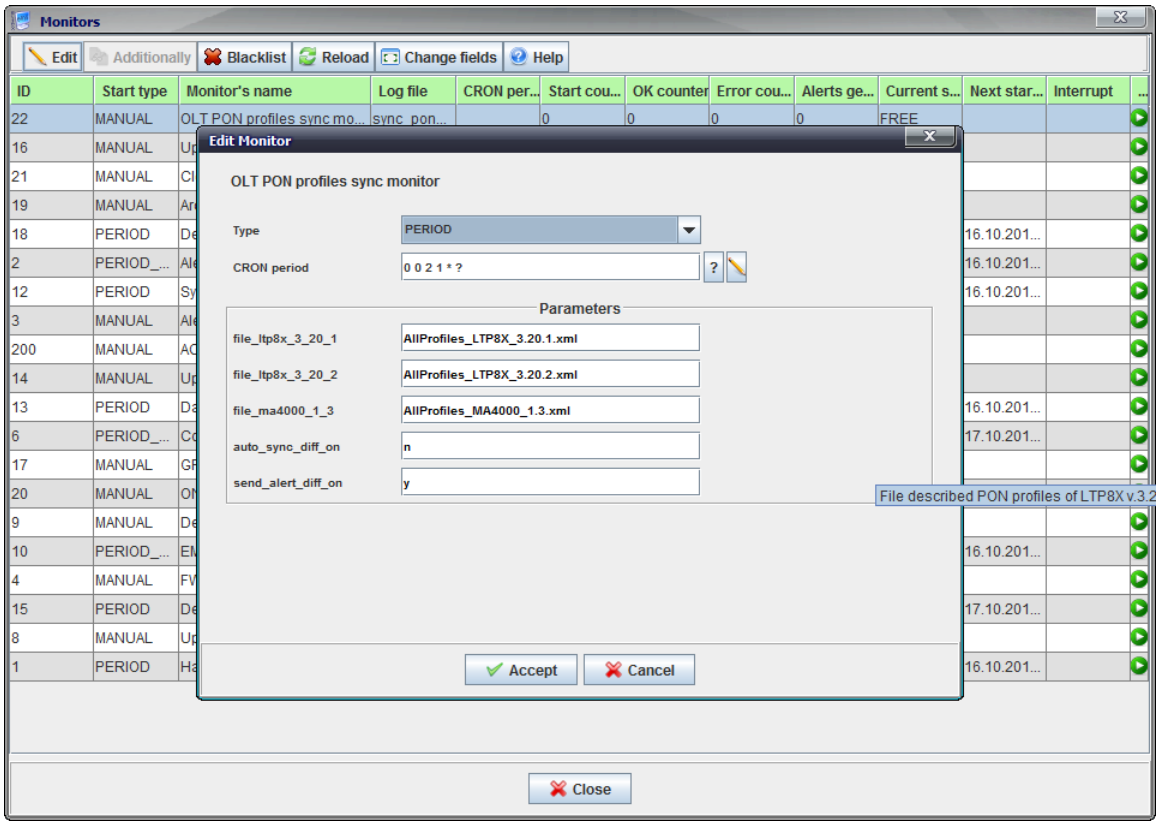


Results of comparison will be shown in a dialog window.



3.2 Automatic parameter synchronization

Automatic synchronization is performed by *OLT PON profile sync monitor.*



Monitor verifies PON device firmware versions and compares their profiles with the reference file, which is basically a previously created template file with the description of parameters. In current monitor implementation, it can recognize three types of devices: LTP8X v.3.20.1, LTP8X v.3.20.2, MA4000 v.1.3. As it was said earlier, the actual firmware version is rounded down. This scheme is used for selection of the reference file, which name should be defined explicitly in the monitor settings.

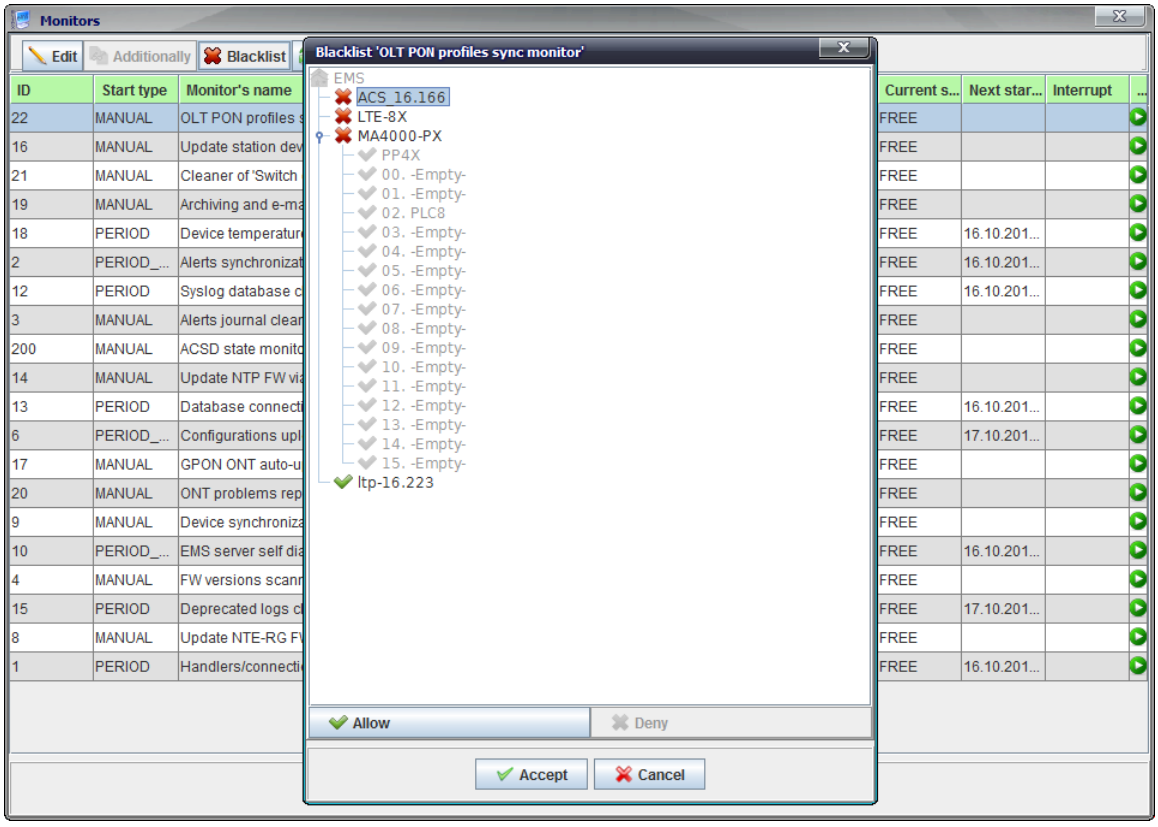
If the file with the specified name is not found, the corresponding alarm will appear in the active alarm list, located in the tree root, and the monitor will suspend operations with this type/version.

Also, in the monitor parameters, there are the following radio buttons:

- profile autosynchronization (y-yes, n-no) — if 'y' value is selected, parameter values will be actually changed during autosync; if 'n' value is selected, the comparison will be performed, and results will be output to logs and/or alarms.

- notify on profile mismatch (y-yes, n-no) — if 'y' value is selected, mismatch will be treated as an alarm, and you will see the corresponding message in the active alarm list; if 'n' value is selected, the alarm will not be initiated, and the result will be available in the log only.

If PON profile control monitor is used, it is recommended to use the black list, in order to prevent unintentional editing of configuration for devices, that doesn't require the profile synchronization.



The monitor will not perform PON synchronization for these devices (other mechanisms should do this task). If the PON synchronization is not performed, the profile list will not be discovered on the device, and the device itself will be skipped, so the message will be shown in active alarms list about missing synchronization for that specific device.

After parameter editing, the monitor will issue *Save* command to store changes into the non-volatile memory. You can view the monitor operation results in the file /var/log/eltex-ems/monitor/SyncPonProfiles/sync_pon_profiles.txt.

```
LTP-8X-16.151 (192.168.16.151) version '3.20.2.3186': compare with
AllProfiles_LTP8X_3.20.155.xml

LTP-8X-16.151 (192.168.16.151 v.3.20.2.3186) profiles compare result: Profiles
modified successfully

2.1 'DBAProfile.dba-x1' added

Device LTP-8X-16.223 is blacklisted

Device LTP-8X-192.168.16.152 is blacklisted

Device LTP-8X-192.168.99.19 is blacklisted

Device ma4000-192.168.99.2 is blacklisted

Device MA4000_16.225 is blacklisted

Device MA4000_16.99 is blacklisted

Device MA4000_26.33 is blacklisted

Device TEST12334 is blacklisted

Device TEST_26.106 is blacklisted
```

APPENDIX D. CHANGE LOG

Version 2.0.41

- LTP GPON 3.20.2 support;
- Eltex.ACS.GUI multilanguage support;
- STB support in ACS.GUI;
- Enhanced STB support in ACS.GUI: Application management, log management;
- Implemented 'Cancel' feature for long operations;
- GPON ports now are shown faster on devices;
- Implemented logging for all modifying TL1 commands;
- Implemented correct sorting in tables by IP and URL fields depending on the port;
- TL1 interface improvements ACS method support;
- Implemented GPON unified profile subsystem for all network OLTs.

Version 2.0.40

- General TAU port list, search by number;
- TAU SIP v2.12 support;
- TAU-16.IP, TAU-24.IP support;
- New MSAN capabilities support;
- TAU.Megaco advanced monitoring;
- SMG-4 device added;
- SMG-2016 device added;
- Device parameter monitoring (RRD);
- Downloading large files (logs) via web-browser;
- Configuration of e-mail message sending via GUI;
- Integration of authorization data into EMS (login, telnet, ssh password), autologin;
- Modified installer, periodic database saving;
- UEP monitoring improvements;
- Fixed sorting in tables by firmware version and IP address.

Version 2.0.33

- Multilanguage GUI support;
- Multilanguage: System module;
- Multilanguage: LTP8X;
- Multilanguage: MA4000;
- Multilanguage: LTE8ST/LTE8X/LTE2X.

Version 2.0.32

- Monitors: Implemented 'Black list' feature to exclude the unnecessary devices from polling;
- Full support of 'Out of service' checkbox by all processors;
- Automatic cleaning mechanism for exported configurations;
- GPON NTU template support;
- Group operations by double click in the device list;
- Added support for special SFP GPON power values;
- Disabling tooltips in the device tree is possible;
- Group operation for changing 'Internal/external ACS' mode;
- Removed 'OK' information messages that blocked GUI operation;
- Implemented 'control' information page, accessible via browser;
- Group operation for assigning trap recipients for ONT;
- In GUI, saving catalog on the user PC during the transfer of ACS files;
- In GUI, saving username in the authorization dialog window, if the login is successful;
- SNMP exchange optimization, pause during parallel operations, control;
- MES: Show stack in monitoring;
- Implemented reconnection counter reset for ONT group;

- Improvements of device status icon shown depending on the alarm;
- Implemented logging configuration on LTP v3.x;
- Trap assigning configuration control for OLTs;
- Show 1U PON devices as a single monitoring object;
- Wi-Fi devices support WEP-12AC, WOP-12, WB-2;
- UEP 4.1 support;
- Support of group device configuration with SNMP templates (scenarios);
- Device list export to the text file;
- Device import from the text file;
- User alarm generation for SNMP traps or parameter polling;
- Configuration of e-mail notifications for SuperUser role;
- Added user blocking in settings.

Version 2.0.27

- Support for actual changes of GPON versions: LTP 2.x and MA4000 1.1.x;
- Full support of TL1 as NBI protocol for interactions with GPON equipment;
- Monitor that traces temperature of station-side devices, 'black list' in the monitor;
- Monitor for problem ONT report generation (RSSI, reconnections);
- Monitor for periodic ONT reconnection counter clearing;
- Operation logics configuration for the single Eltex.ACS through the common OLT settings (LTE, LTP, MA4000);
- MA4000, added alarm for possible optic fiber break;
- Enhancements of the monitor graphic editor 'Once in a week' setting;
- 4-digit ONT versions support;
- LTE firmware automatic update mechanism;
- Simultaneous work with ONT configurations in a single OLT for multiple users;
- 'Tree changes' modal dialog window removed;
- Added reconnection counter reset for ONT group;
- Added group trap configuration for OLT;
- Implemented 'Out of service' OLT configuration, suspends the monitor interactions with the device;
- For GUI, applet certificate was signed, applet is trusted by the browser;
- Added trap processors for OLT chip events;
- Implemented additional fields in ONT table Notes and the date of notes.