Optical network terminals

NTU-RG-5402G-W
NTU-RG-5421G-Wac
NTU-RG-5421GC-Wac
NTU-RG-5421G-WZ
NTU-RG-5440G-WZ
NTU-RG-5440G-Wac

User manual, Firmware version 2.1.0

IP address: 192.168.1.1

Username: user

Password: user

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1 Introduction

A GPON is a network of passive optical networks (PON) type. It is one of the most effective state-of-the-art solutions of the last mile issue that enables cable economy and provides information transfer downlink rate up to 2.5 Gbps and uplink rate up to 1.25 Gbps. Being used in access networks, GPON-based solutions allow end users to have access to new services based on IP protocol in addition to more common ones.

The key GPON advantage is the use of one optical line terminal (OLT) for multiple optical network terminals (ONT). OLT converts Gigabit Ethernet and GPON interfaces and is used to connect a PON network with data communication networks of a higher level. ONT device is designed to connect user terminal equipment to broadband access services. It can be used in residential areas and office buildings.

The range of ONT NTU equipment produced by ELTEX comprises of terminals with four UNI interfaces of 10/100/1000Base-T and supports for FXS [1] , Wi-Fi, USB, Z-Wave [2] , RF [3] :

- NTU-RG-5402G-W, NTU-RG-5421G-Wac, NTU-RG-5421GC-Wac, NTU-RG-5421G-WZ, NTU-RG-5440G-WZ, NTU-RG-5440G-Wac

This user manual describes intended use, main specifications, configuration, monitoring, and firmware update for NTU-RG optical terminals.

Notes and warnings

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

Warnings inform users about hazardous conditions which may cause injuries or device damage and may lead to the device malfunctioning or data loss.

[1] Except NTU-RG-5440G-WZ, NTU-RG-5440G-Wac

[2] For NTU-RG-5421G-WZ, NTU-RG-5440G-WZ

[3] Only for NTU-RG-5421GC-WAC

2 Product Description

2.1 Purpose

NTU-RG GPON ONT (Gigabit Ethernet Passive Optical Network) devices represent high-performance user terminals designed to establish a connection with upstream passive optical network equipment and to provide broadband access services to the end user. GPON connection is established through the PON interface, while Ethernet interfaces are used for connection of terminal equipment.

The key GPON advantage is the optimal use of bandwidth. This technology is considered as the next step in provisioning of new high-speed Internet applications at home and office. Being developed for network deployment inside houses or buildings, these ONT devices provide robust connection with high throughput and at long distances for users living and working at remote apartment and office buildings.

An integrated router allows local network equipment to be connected to a broadband access network. The terminals protect PCs from DoS and virus attacks with the help of firewall and filter packets to control access based on ports and MAC/IP addresses of source and target. Users can configure a home or office web site by adding a LAN port into DMZ. Parental Control enables filtration of undesired web sites, blocks domains and allows for compilation of a schedule of Internet use. Virtual private network (VPN) provides mobile users and branch offices with a protected communication channel for connection to a corporate network.

FXS port enable IP telephony and provide various useful features such as display of caller ID, three-way conference call, phone book, and speed dialling. This makes dialling and call pick-up user friendly.

USB ports can be used for USB-enabled devices (USB flash drives, external HDD).

Network router NTU-RG-5402G-W provides the connection via b/g/n Wi-Fi standard and ensures 2,4 GHz operation of the device. NTU-RG-5421G-Wac, NTU-RG-5421G-WZ, NTU-RG-5421GC-Wac, NTU-RG-5440G-WZ, NTU-RG-5440G-Wac network routers allow Wi-Fi clients to be connected using IEEE 802.11a/b/g/n/ac standard. 802.11ac standard support ensures data transfer rate of 1733 Mbps and allows wireless network to be used for delivery of modern high-speed services to client equipment. Two integrated Wi-Fi network controllers enable simultaneous 2.4 GHz and 5 GHz dual-band operation.

NTU-RG-5421G-WZ, NTU-RG-5440G-WZ come with «Smart Home» controller.

«Smart Home» controller allows organizing an energy-efficient wireless channel specifically for remote control. Unlike Wi-Fi and other IEEE 802.11 data transmission standards, designed mainly for large streams of information, the «Smart Home» technology operates in the frequency range up to 1 GHz and is optimized for transmitting simple control commands with low delays (for example, turn on/off , change the volume, brightness, etc.). Selection of low radio-frequency range results from the small quantity of potential interfering sources (unlike the loaded 2,4 GHz band within which it is necessary to resort to measures that reduce potential interference from various wireless home appliances – Wi-Fi, ZigBee, Bluetooth).

«Smart Home» controller is intended to create low-cost and energy-efficient consumer electronics, including battery-powered devices such as remote controls, smoke detectors and temperature, humidity, motion sensors as well as other security sensors.

NTU-RG-5421GC-Wac device has an integrated RF output, to which a TV is connected to watch analog or digital cable television (if the service is provided by the carrier).

2.2 Models

NTU-RG series devices are designed to support various interfaces and features, see Table 1 .

Table 1 – Models

Model name	WAN	LAN	FXS	Z-Wave	TV	Wi-Fi	USB
NTU-RG-5402G-W	1xGPON	4x1Gigabit	2	-	-	802.11n, 2*2 - 300 Мбит/с – 2,4 ГГц	1
NTU-RG-5421G-Wac	1xGPON	4x1Gigabit	1	-	-	802.11n, 2*2 - 300 Мбит/с – 2,4 ГГц 802.11ac, 2*2 - 866 Мбит/с – 5 ГГц	1
NTU-RG-5421GC-Wac	1xGPON	4x1Gigabit	1	-	1	802.11n, 2*2 - 300 Мбит/с – 2,4 ГГц 802.11ac, 2*2 - 866 Мбит/с – 5 ГГц	1
NTU-RG-5421G-WZ	1xGPON	4x1Gigabit	1	1	-	802.11n, 2*2 - 300 Мбит/с – 2,4 ГГц 802.11ac, 2*2 - 866 Мбит/с – 5 ГГц	1
NTU-RG-5440G-Wac	1xGPON	4x1Gigabit	-	-	-	802.11n, 2*2 - 300 Мбит/с – 2,4 ГГц 802.11ac, 4*4 - 1733 Мбит/с – 5 ГГц	1
NTU-RG-5440G-WZ	1xGPON	4x1Gigabit	-	1	-	802.11n, 2*2 - 300 Мбит/с – 2,4 ГГц 802.11ac, 4*4 - 1733 Мбит/с – 5 ГГц	1

2.3 Device Specification

Device is equipped with the following interfaces:

- RJ-11 ports to connect network devices (FXS):
  - 2 ports in NTU-RG-5402G-W;
  - 1 port in NTU-RG-5421G-Wac, NTU-RG-5421G-WZ, NTU-RG-5421GC-Wac.
- 1xPON SC/APC port for connection to provider's network (WAN);
- Ethernet RJ-45 LAN ports for connection of network devices (LAN):
  - 4 ports of RJ-45 10/100/1000Base-T.
- Wi-Fi transceiver:
  - 11b/g/n for NTU-RG-5402G-W;
  - 11a/b/g/n/ac for NTU-RG-5421G-Wac, NTU-RG-5421G-WZ, NTU-RG-5421GC-Wac , NTU-RG-5440G-WZ, NTU-RG-5440G-Wac.
- 1xUSB 1 port for external USB or HDD storages.
- «Smart Home» controller, forms a part of NTU-RG-5421G-WZ, NTU-RG-5440G-WZ;
- 1 RF port for cable TV (CaTV) connection for NTU-RG-5421GC-Wac.

The terminal uses an external adapter for 220V/12V power supply.

The device supports the following functions:

- *Network functions:*
  - bridge or router operation mode;
  - PPPoE (auto, PAP, CHAP, MSCHAP authorization);
  - IPoE (DHCP-client and static);
  - static IP address and DHCP (DHCP client on WAN side, DHCP server on LAN side);
  - Multicast traffic transmission via Wi-Fi;
  - DNS (Domain Name System);
  - DynDNS (Dynamic DNS);
  - UPnP (Universal Plug and Play);
  - IPsec (IP Security);
  - NAT (Network Address Translation);
  - Firewall;
  - NTP (Network Time Protocol);
  - QoS;
  - IGMP snooping;
  - IGMP proxy;
  - Parental Control;
  - Storage service;
  - SMB, FTP, Print Server;
  - VLAN in accordance with IEEE 802.1Q.
- *Wi-Fi:*
  - support for IEEE 802.11a/b/g/n/ac standards;
  - Simultaneous dual-band operation: 2.4 GHz and 5 GHz.
- *VoIP*
  - SIP
  - Audio codecs: G.729 (A), G.711(A/U), G.723.1;
  - ToS for RTP packets;
  - ToS for RTP packets;
  - Echo cancellation (G.164 and G.165 guidelines);
  - Voice activity detection (VAD);
  - Comfort noise generator (CNG);
  - DTMF signal detection and generation
  - DTMF transmission (INBAND, RFC2833, SIP INFO)
  - Fax transmission: G.711, T.38;
  - Caller ID display.
- *Value added services (VAS):*
  - Call Hold;
  - Call Transfer;
  - Call Waiting;
  - Forward unconditionally;
  - Forward on «no answer»;
  - Forward on «busy»;
  - Caller ID Display for ETSI FSK;
  - Anonymous calling;
  - Warmline;
  - Flexible dial plan;
  - Voice mail notifications (MWI);
  - Anonymous call blocking;
  - Call Barring;
  - DND (Do not disturb).
- *Firmware updates via web interface, TR-069, OMCI.*

- *Remote monitoring, configuration, and setup:*
  - TR-069;
  - Web interface;
  - OMCI;
  - CaTV [1] .

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[1] Only for NTU-RG-5421GC-Wac

The figures below illustrate application schemes of NTU-RG.

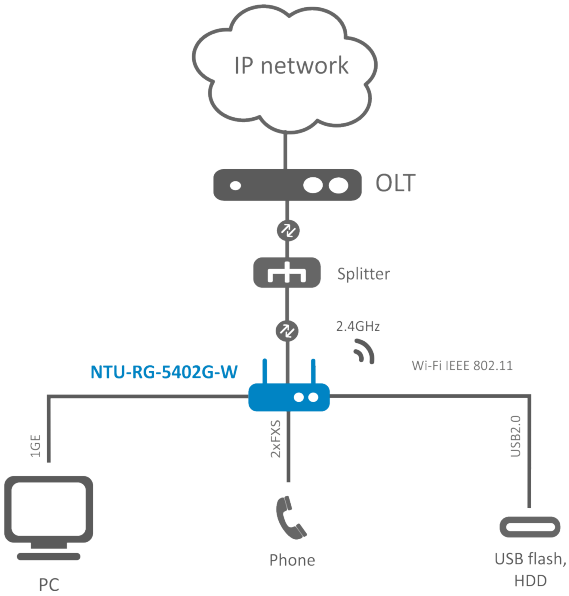


Figure 1 – NTU-RG-5402G-W application diagram

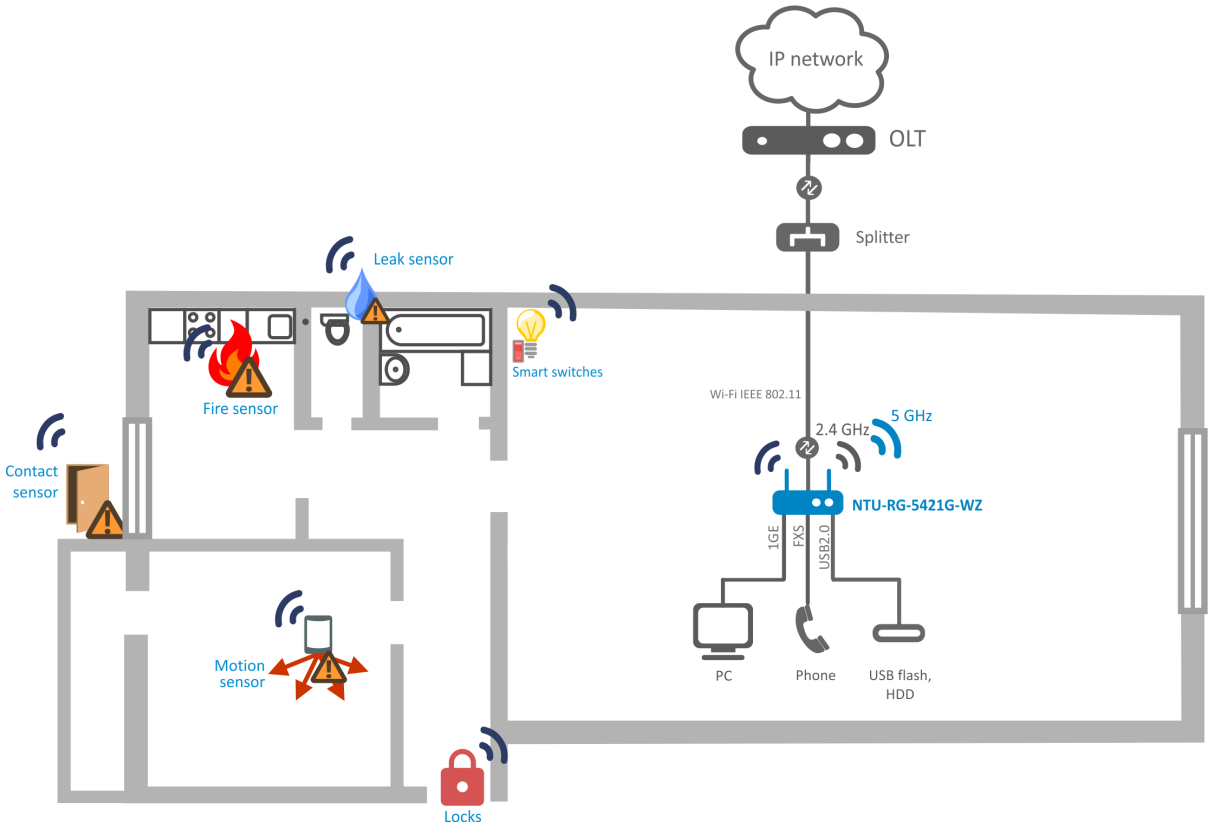


Figure 2 – NTU-RG-5421G-Wac, NTU-RG-5421G-WZ, NTU-RG-5440G-Wac and NTU-RG-5440G-WZ application diagram

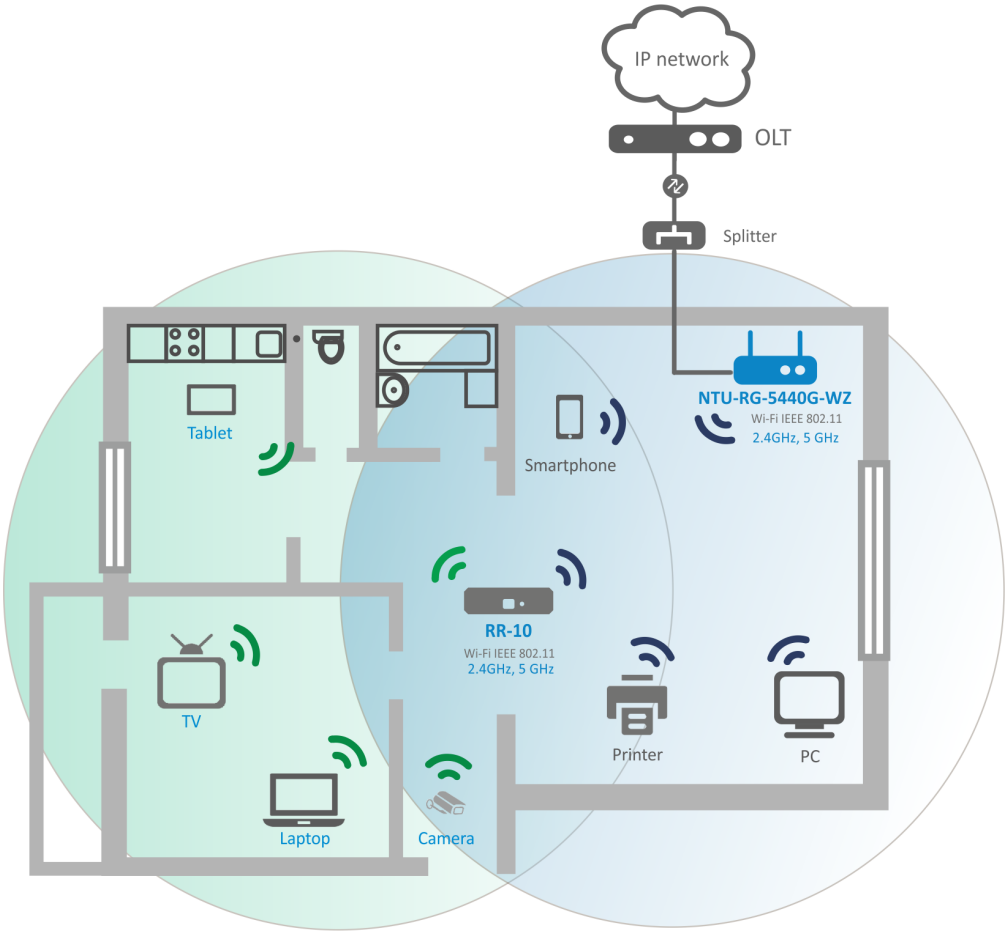


Figure 3 – NTU-RG-5421G-WZ and NTU-RG-5440G-WZ application diagram

2.4 Key Specifications

Table 2 shows main specifications of the terminals:

Table 2 – Main Specifications

VoIP protocols

Supported protocols	SIP

Audio codecs

Codecs	G.729, annex A G.711(A/μ) G.723.1 (5,3 Kbps) Fax transmission: G.711, T.38

Parameters of Ethernet LAN interfaces

Number of interfaces	4
Connector type	RJ-45

Data transfer rate, Mbps	Autonegotiation, 10/100/1000 Mbps, duplex/half-duplex
Standards	IEEE 802.3i 10Base-T Ethernet IEEE 802.3u 100Base-TX Fast Ethernet IEEE 802.3ab 1000Base-T Gigabit Ethernet IEEE 802.3x Flow Control IEEE 802.3 NWay auto-negotiation

Parameters of PON interface

Number of interfaces	1
Standards	ITU-T G.984.x Gigabit-capable passive optical networks (GPON) ITU-T G.988 ONU management and control interface (OMCI) specification IEEE 802.1Q Tagged VLAN IEEE 802.1P Priority Queues IEEE 802.1D Spanning Tree Protocol
Connector type	SC/APC in accordance with ITU-T G.984.2, ITU-T G.984.5 Filter, FSAN Class B+, SFF-8472
Transmission medium	Fiber optical cable SMF - 9/125, G.652
Splitting ratio	Up to 1:128
Maximum range of coverage	20 km
Transmitter:	1310 nm
• Upstream connection speed	1244 Mbps
• Transmitter power	from +0,5 to +5 dBm
• Optical spectrum width (RMS)	1 nm
Receiver:	1490 nm
• Downstream connection speed	2488 Mbps
• Receiver sensitivity	from -8 to -28, BER≤$1.0x10^{-10}$
Receiver optical congestion	-8 dBm

Parameters of subscriber analogue ports

Number of ports	NTU-RG-5402G-W	NTU-RG-5421G-Wac NTU-RG-5421GC-Wac NTU-RG-5421G-WZ
	2	1
Loop resistance	Up to 2 kΩ	
Call reception	Pulse/frequency (DTMF)	

Caller ID display	Yes

Wi-Fi interface parameters

Model	NTU-RG-5402G-W	NTU-RG-5421G-Wac NTU-RG-5421GC-Wac NTU-RG-5421G-WZ	NTU-RG-5440G-Wac NTU-RG-5440G-WZ
Standard	802.11 b/g/n	802.11 a/b/g/n/ac	802.11 a/b/g/n/ac
Frequency range	2400 ~ 2483,5 MHz	2400 ~ 2483,5 MHz, 5150 ~ 5350 MHz, 5650 ~ 5850 MHz Simultaneous Dual Band	
Modulation	CCK, BPSK, QPSK, 16 QAM, 64 QAM, 256 QAM	CCK, BPSK, QPSK, 16 QAM, 64 QAM, 256 QAM	
Data transfer rate, Mbps	– 802.11b/g/n: 1-13 – 802.11b: 1; 2; 5.5 and 11 Mbps – 802.11g: 6, 9, 12, 18, 24, 36, 48 and 54 Mbps – 802.11n: from 6.5 to 300 mbps (from MCS0 to MCS15)	– 802.11b/g/n: 1-13 – 802.11b: 1; 2; 5.5 and 11 Mbps – 802.11g: 6, 9, 12, 18, 24, 36, 48 and 54 Mbps – 802.11ac: 866 Mbps (80 MHz)	– 802.11b/g/n: 1-13 – 802.11b: 1; 2; 5.5 and 11 Mbps – 802.11g: 6, 9, 12, 18, 24, 36, 48 and 54 Mbps – 802.11ac: 1733 Mbps (80 MHz)
Maximum transmitter output power	– 802.11b (11 Mbps): 17 dBm – 802.11g (54 Mbps): 15 dBm – 802.11n (MCS7): 15 dBm	– 802.11b (11 Mbps): 17 dBm – 802.11g (54 Mbps): 15 dBm – 802.11n (MCS7): 15 dBm – 802.11ac (MCS0): 19 dBm	2.4 GHz: – 802.11b (11 Mbps): 18 dBm – 802.11g (54 Mbps): 16 dBm – 802.11n (MCS7): 16 dBm – 802.11n (MCS0): 18 dBm 5 GHz: – 802.11ac (MCS7): 18 dBm – 802.11ac (MCS0): 20 dBm
MAC protocol	CSMA/CA model of ACK 32 MAC		
Security	64/128-bit WEP encryption; WPA, WPA2 802.1x AES & TKIP		
MIMO	2,4 GHz- 2x2	2,4 GHz- 2x2, 5 GHz - 2x2	2,4 GHz- 2x2, 5 GHz - 4x4
Antenna gain	5 dBi		
Operating temperature range	from +5 to +40°C		

Control

Local control	Web interface
Remote control	Telnet, TR-069, OMCI
Firmware update	OMCI, TR-069, HTTP
Access resriction	By password

General parameters

Model	NTU-RG-5402G-W NTU-RG-5421G-Wac NTU-RG-5421G-WZ	NTU-RG-5421GC-Wac	NTU-RG-5440G-Wac NTU-RG-5440G-WZ
Power supply	12 V DC/220 AC power adapter		
Max. power consumption	18 W		
Operating temperature range	From +5 to +40°C		
Relative humidity	Up to 80%		
Dimensions	187x120x32 mm	220x120x50 mm	234x133x34 mm
Weight	0,3 kg	0,45 kg	0,57 kg

2.5 Design

Subscriber terminal is designed as desktop device in plastic housing.

The rear panel layout of the device is depicted in Figures 4 , 5 , 6 , 7 .

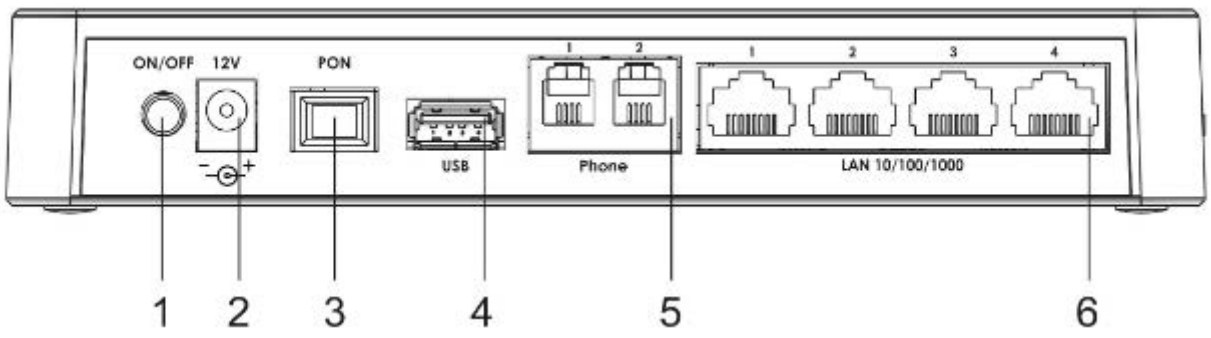


Figure 4 – NTU-RG-5402G-W-Wac rear panel layout

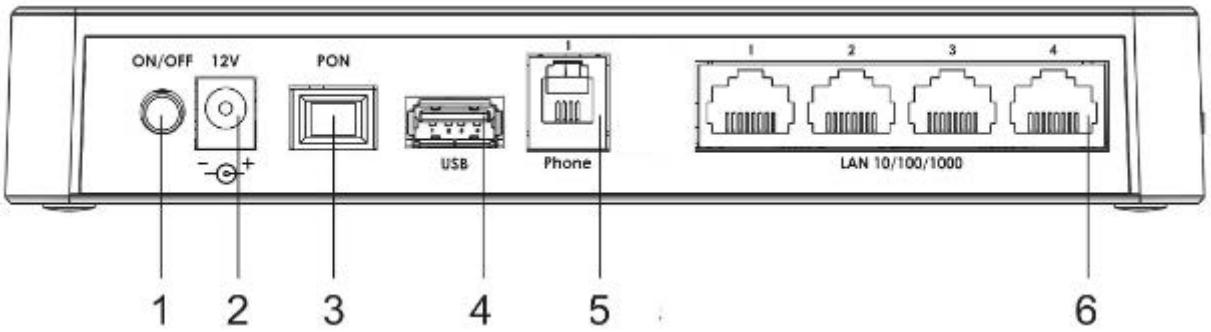


Figure 5 – NTU-RG-5421G-Wac and NTU-RG-5421G-WZ rear panel layout

The connectors and controls located on the NTU-RG-5402G-W, NTU-RG-5421G-Wac and NTU-RG-5421G-WZ rear panel are listed in Table 3.

Table 3 – Description of the connectors and controls on the rear panel

№	Rear panel element	Description
1	***On/Off***	Power button
2	***12V***	Power adapter connector
3	***PON***	SC port (socket) for PON with GPON interface
4	***USB***	Connector for external drives and other USB devices
5	***Phone***	RJ-11 connector for analogue phone connection: • 2 connectors in NTU-RG-5402G-W • 1 connector in NTU-RG-5421G-Wac и NTU-RG-5421G-WZ
6	***LAN 10/100/1000 1..4***	4 RJ-45 ports for connection to network devices

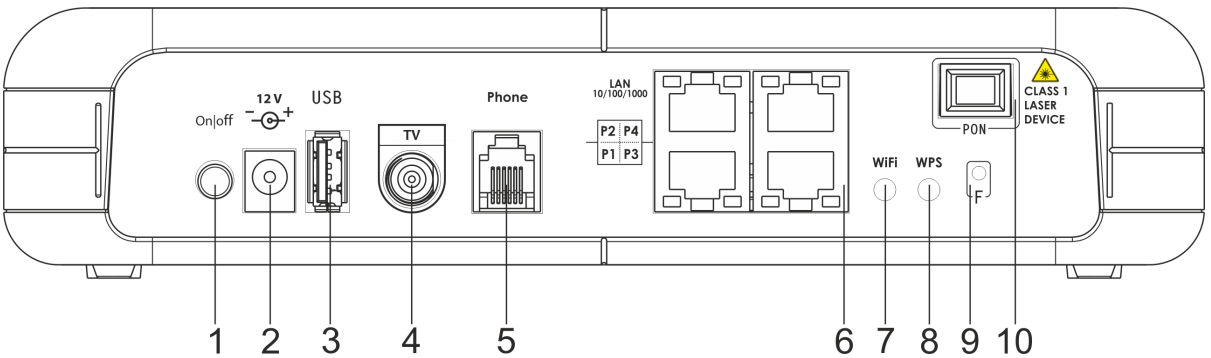


Figure 6 – NTU-RG-5421GC-Wac rear panel layout

Connectors and controls located on the rear panel of the device are listed in Table 4.

Table 4 – Description of the connectors and controls on the rear panel

№	Rear panel element	Description
1	***On/Off***	Power button
2	***12V***	Power adapter connector
3	***USB***	Connector for external drives and other USB devices
4	***TV***	RF port for connecting a coaxial cable
5	***Phone***	RJ-11 connector for analogue phone connection
6	***LAN 10/100/1000 P1..P4***	4 RJ-45 ports for connection to network devices
7	***Wi-Fi***	Wi-Fi enabling/disabling button
8	***WPS***	A button which enables automatic secure Wi-Fi connection
9	***F***	A functional key that reboots the device and resets it to factory settings
10	***PON***	SC port (socket) for PON with GPON interface

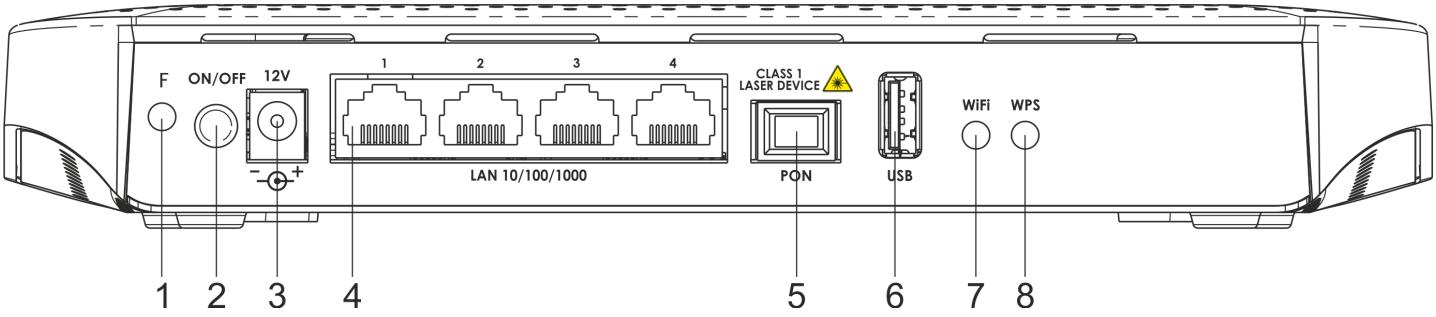


Figure 7 – NTU-RG-5440G-Wac and NTU-RG-5440G-WZ rear panel layout

The connectors and controls located on the NTU-RG-5440G-Wac and NTU-RG-5440G-WZ rear panel are listed in Table 5.

Table 5 – Description of the connectors and controls on the rear panel

№	Rear panel element	Description
1	***F***	A functional key to reboot the device and reset it to factory settings
2	***On/Off***	Power button
3	***12V***	Power adapter connector
4	***LAN 10/100/1000 1..4***	4 RJ-45 ports for connection to network devices

№	Rear panel element	Description
5	***PON***	SC port (socket) for PON with GPON interface
6	***USB***	Connector for external drives and other USB devices
7	***Wi-Fi***	Wi-Fi enabling/disabling button
8	***WPS***	A button to enable automatic secure Wi-Fi connection

Figure below shows NTU-RG-5402G-W, NTU-RG-5421G-Wac and NTU-RG-5421G-WZ side panel layout.

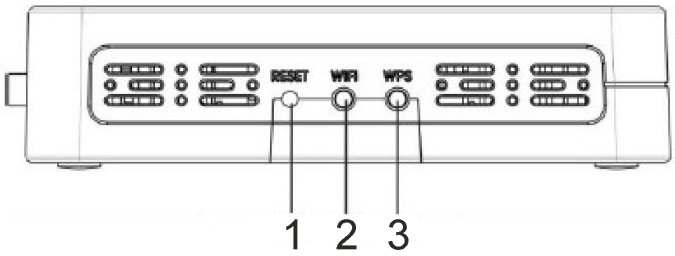


Figure 8 – NTU-RG-5402G-W, NTU-RG-5421G-Wac and NTU-RG-5421G-WZ side panel layout

See Table 6 for detailed information about buttons located on the side panel of the device.

Table 6 – NTU-RG-5402G-W, NTU-RG-5421G-Wac and NTU-RG-5421G-WZ side panel buttons description

№	Rear panel element	Description
1	***Reset***	A functional key to reboot the device and reset it to factory settings
2	***Wi-Fi***	Wi-Fi enabling/disabling button
3	***WPS***	A button to enable automatic secure Wi-Fi connection

2.6 Light Indication

Figure 9 shows NTU-RG-5402G-W, NTU-RG-5421G-Wac and NTU-RG-5421G-WZ top panel layout.

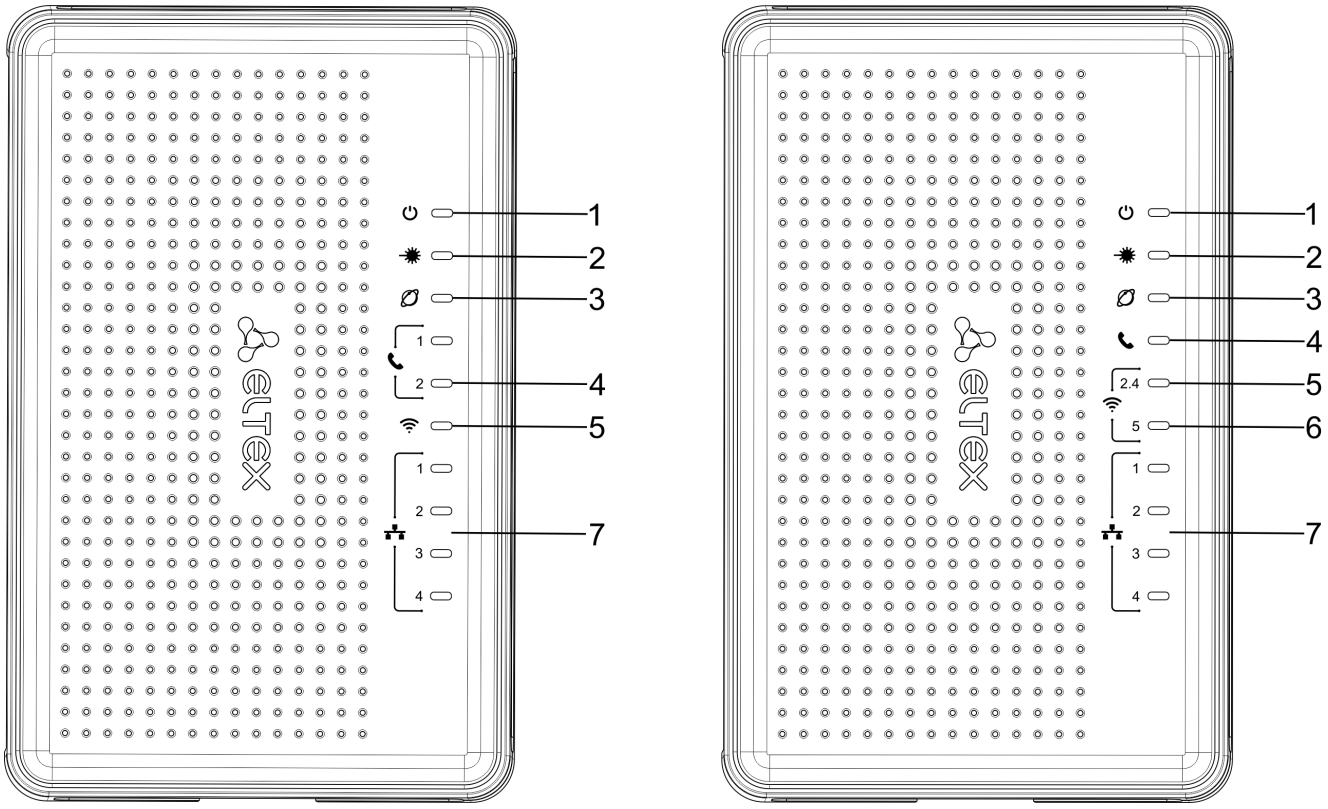


Figure 9 – NTU-RG-5402G-W (on the left) and NTU-RG-5421G-Wac, NTU-RG-5421G-WZ (on the right) top panel layout

Current status of the device is represented by means of indicators paced on the top panel. Table 7 provides possible statuses of the LEDs.

Table 7 – Description of NTU-RG-5402G-W, NTU-RG-5421G-Wac and NTU-RG-5421G-WZ top panel LEDs

№	Top panel element	LED status	Description
1	⏻ – device power and activity status indicator	off	device is disconnected from the power source or faulty
		red	device startup is in progress
		green	device startup completed, the current device configuration differs from the default one
		orange	device startup is completed, the default configuration is set
2	✹ – optical interface activity indicator	off	device booting
		green	connection between optical line terminal and the device has been established
		flashes green	connection between optical line terminal and the device has been established (the device is not activated)
		flashes red	no signal from optical line terminal

№	Top panel element	LED status	Description
3	– status indicator	off	Internet interface is not configured
		green	device is ready for operation, Internet connection is established
		flashes green slowly	device firmware update is in progress
		flashes green rapidly	device booting/connection to the Internet is being established
4	– FXS port activity indicator	off	SIP agent is not configured/not registered/off
		on	SIP agent is successfully registered
		flashes	off hook/phone call
5	***2.4*** – Wi-Fi activity indicator for 2.4 GHz	green	Wi-Fi network is active
		flashes	transmitting data via Wi-Fi
		off	Wi-Fi network is inactive
6	***5*** – Wi-Fi activity indicator for 5 GHz	green	Wi-Fi network is active
		flashes	transmitting data via Wi-Fi
		off	Wi-Fi network is inactive
7	***1..4*** – Ethernet port activity indicator	green	established 10/100 Mbps connection
		orange	established 1000 Mbps connection
		flashes	transferring data packets

The front panel of NTU-RG-5421GC-Wac is shown in Figure 10.

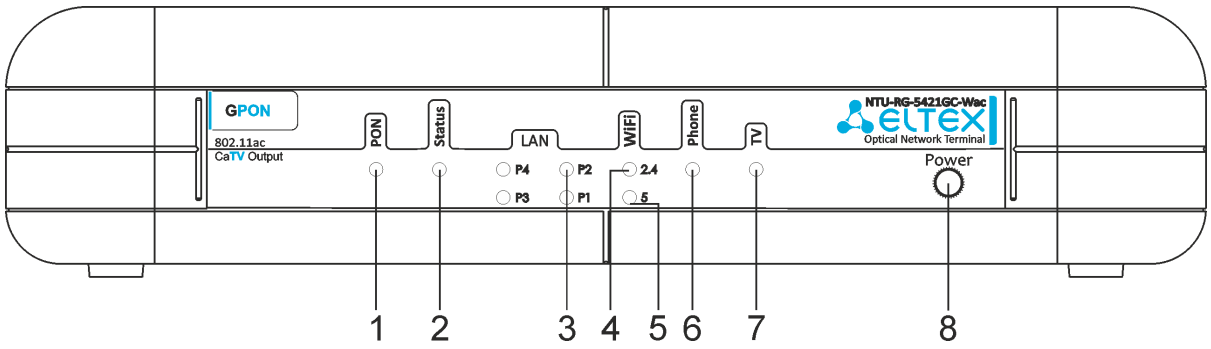


Figure 10 – NTU-RG-5421GC-Wac front panel layout

The LED indicators located on the front panel show the current state of the device. The list of indicator states is shown in Table 8.

Table 8 – Description of NTU-RG-5421GC-Wac front panel LEDs

№	Front panel element	LED status	Description
1	***PON*** – optical interface activity indicator	off	device booting
		green	connection between optical line terminal and the device has been established
		flashes green	connection between optical line terminal and the device has been established (the device is not activated)
		flashes green rapidly	device booting/connection to the Internet is being established
		flashes red	no signal from optical line terminal
2	***Status*** – status indicator	off	Internet interface is not configured
		green	device is ready for operation, Internet connection is established
		flashes green slowly	device firmware update is in progress
3	***LAN P1..P4*** – Ethernet port activity indicator	green	established 10/100 Mbps connection
		orange	established 1000 Mbps connection
		flashes	transferring data packets
4	***WiFi 2.4*** – Wi-Fi activity indicator for 2.4 GHz	green	Wi-Fi network is active
		flashes	transmitting data via Wi-Fi
		off	Wi-Fi network is inactive
5	***WiFi 5*** – Wi-Fi activity indicator for 5 GHz	green	Wi-Fi network is active
		flashes	transmitting data via Wi-Fi
		off	Wi-Fi network is inactive
6	***Phone*** – FXS port activity indicator	off	SIP agent is not configured/not registered/off
		on	SIP agent is successfully registered
		flashes	off hook/phone call
7	***TV*** – TV operation status indicator	green	8dBm < CATV signal power < +2dBm
		off	RF port is disabled
		red	TV signal is not available
		orange	signal level is not normal (more than +2 dBm)
8	***Power*** – power and operation status indicator	off	device is disconnected from the power source or faulty
		red	device startup is in progress
		green	device startup completed, the current device configuration differs from the default one
		orange	device startup is completed, the default configuration is set

Figure 11 shows NTU-RG-5440G-Wac, NTU-RG-5440G-WZ top panel layout.

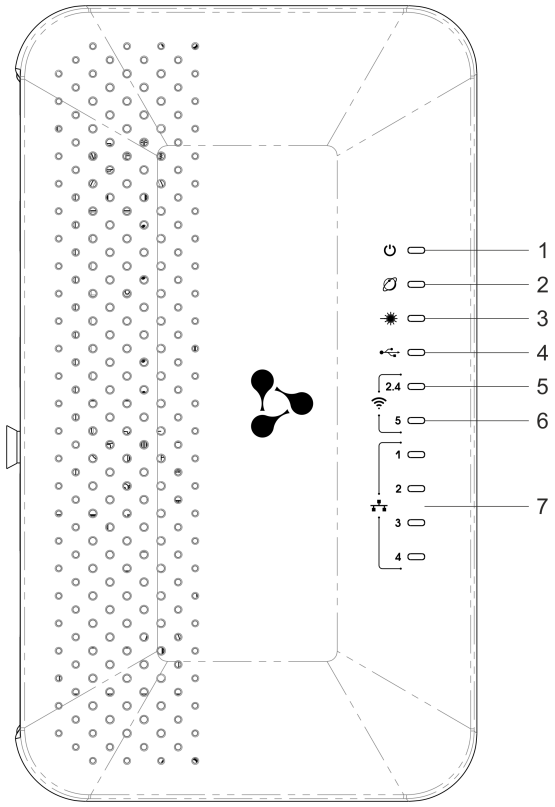


Figure 11 – NTU-RG-5440G-Wac and NTU-RG-5440G-WZ top panel layout

Current status of the device is represented by means of indicators paced on the top panel. Table 9 provides possible statuses of the LEDs.

Table 9 – Description of NTU-RG-5440G-Wac and NTU-RG-5440G-WZ top panel LEDs

№	Top panel element	LED state	Description
1	⏻ – device power and activity status indicator	off	device is disconnected from the power source or faulty
		red	device startup is in progress
		green	device startup completed, the current device configuration differs from the default one
		orange	device startup is completed, the default configuration is set
2	– status indicator	off	Internet interface is not configured
		green	device is ready for operation, Internet connection is established
		flashes green slowly	device firmware update is in progress
		flashes green rapidly	device booting/connection to the Internet is being established
3	– optical interface activity indicator	off	device booting

№	Top panel element	LED state	Description
		green	connection between optical line terminal and the device has been established
		flashes green	connection between optical line terminal and the device has been established (the device is not activated)
		flashes red	no signal from optical line terminal
4	– USB port activity indicator	off	USB device is not connected
		on	USB device is connected
		flashes	USB data transfer process
5	***2.4*** – Wi-Fi activity indicator for 2.4 GHz	green	Wi-Fi network is active
		flashes	transmitting data via Wi-Fi
		off	Wi-Fi network is inactive
6	***5*** – Wi-Fi activity indicator for 5 GHz	green	Wi-Fi network is active
		flashes	transmitting data via Wi-Fi
		off	Wi-Fi network is inactive
7	***1..4*** – Ethernet port activity indicator	green	established 10/100 Mbps connection
		orange	established 1000 Mbps connection
		flashes	transferring data packets

2.7 Indication of LAN Interfaces

Table 10 lists operation modes shown by LAN ports LEDs located on the rear panel of the device.

Table 10 – Light Indication of LAN Interfaces

Operation modes	Yellow LED	Green LED
Port operates in 1000Base-T mode, data transfer is inactive	solid on	off
Port operates in 1000Base-T mode, data transfer is active	flashes	off
Port operates in 10/100Base-TX, data transfer is inactive	off	solid on

Operation modes	Yellow LED	Green LED
Port operates in 10/100Base-TX, data transfer is active	off	flashes

2.8 Reboot and Reset to Factory Settings

For device reboot, press the «Reset» button once

- on the device side panel for NTU-RG-5402G-W, NTU-RG-5421G-Wac and NTU-RG-5421G-WZ;
- the «F» button on the device rear panel for NTU-RG-5421GC-Wac, NTU-RG-5440G-Wac, NTU-RG-5440G-WZ.

In order to reset the device to the factory settings, press the «Reset» button and hold it for 7-10 seconds until the indicator glows red and all other LEDs go out. Factory settings for IP address are: *LAN – 192.168.1.1*, subnet mask – *255.255.255.0*. Access can be provided from LAN 1, LAN 2, LAN 3 and LAN 4 ports.

2.9 Delivery Package

The NTU-RG standard delivery package includes:

- NTU-RG optical network terminal;
- 220V/12V power adapter;
- User manual.

3 NTU-RG architecture

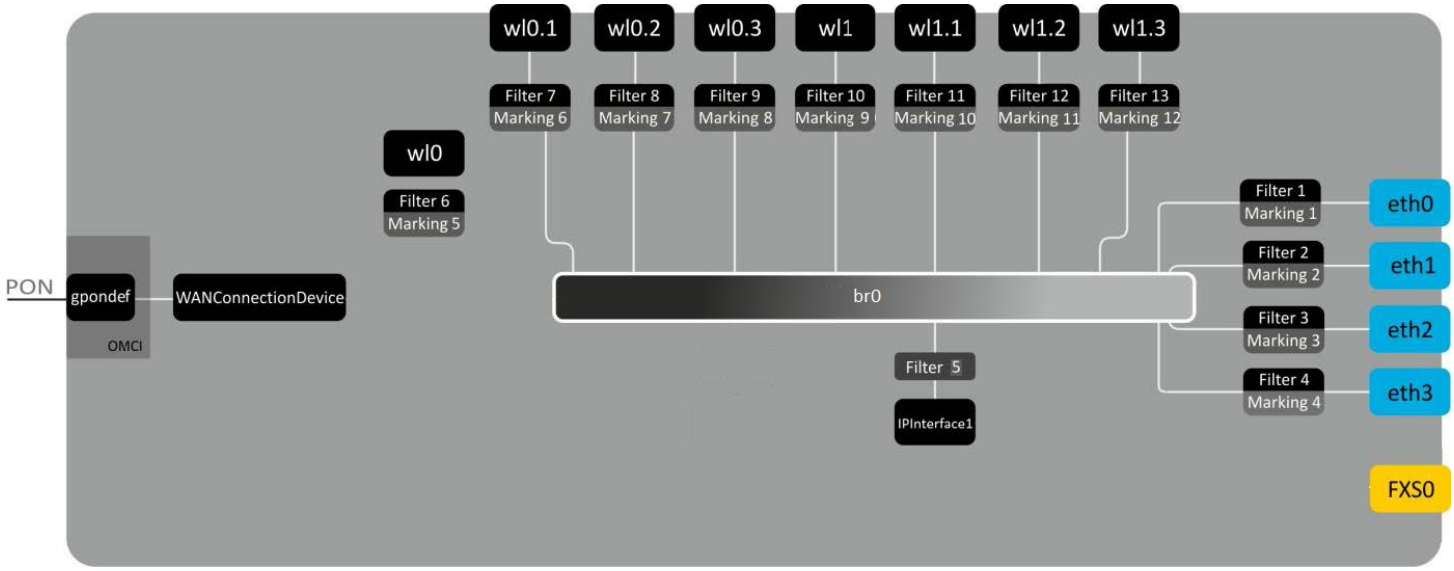


Figure 12 – Logical Architecture of a Device with Factory Settings

Main Components of the Device:

- **Optical receiver/transmitter (SFF module)** for conversion of an optical signal into an electric one;
- **Processor (PON chip)** which converts Ethernet and GPON interfaces**;**
- **Wi-Fi modules**for wireless interfaces of the device.

A device with factory (initial) settings have the following logical blocks (see Figure 12):

- Br0;
- Voice (VoIP block);
- eth0…3;
- FXS0;
- wl0, wl0.1, wl0.2, wl0.3, wl1, wl1.1, wl1.2, wl1.3;
- IPInterface1.

Br0 block here is used to combine LAN ports into a single group.

Eth0..3 blocks physically represent Ethernet ports with RJ-45 connector for connection of PC, STB, and other network devices. They are logically included into **br0** block

FXS0 block is a port with RJ-11 connectors for connection of analogue phone. It is logically included into the Voice block. The Voice block can be controlled through web interface or remotely with ACS server via TR-069 standard. The block specifies VoIP service parameters (SIP server address, phone number, VAS, etc.).

wl0, wl0.1…wl1.3 blocks for Wi-Fi modules connection. Wl0 blocks are interfaces for 2.4 GHz operation, wl1ones – for 5 GHz operation.

Filter and **Marking blocks** enable inclusion of local interfaces into a single group (to **br0** block). They deal with the traffic transmission rules, **Filter** blocks are responsible for the incoming traffic on the interface, **Marking** blocks – for the outgoing one.

IPInterface1 block is a logical entity on which IP address providing the access in LAN and DHCP server distributing addresses to clients are located.

4 Device configuration via Web interface. Administrator Access

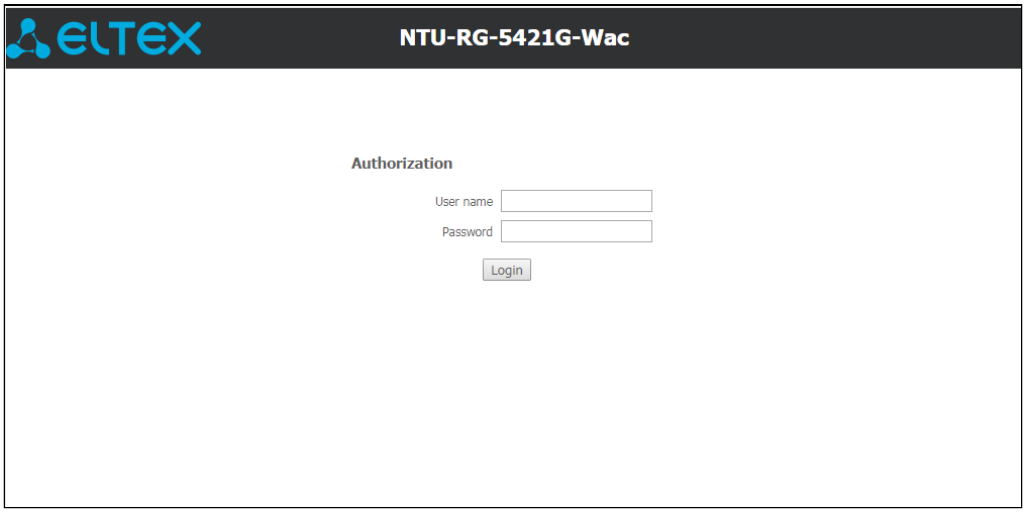
Getting Started

To configure the device, it is necessary to connect to it through Web browser:

1. Open the Web browser (program for viewing hypertext documents), for example, Firefox, Google Chrome and etc.
2. You should enter the device IP address in the browser address line

   The default IP-address of the device – *192.168.1.1*, subnet mask – *255.255.255.0*

   When the device is successfully connected, username and password request page will be shown in the browser window:



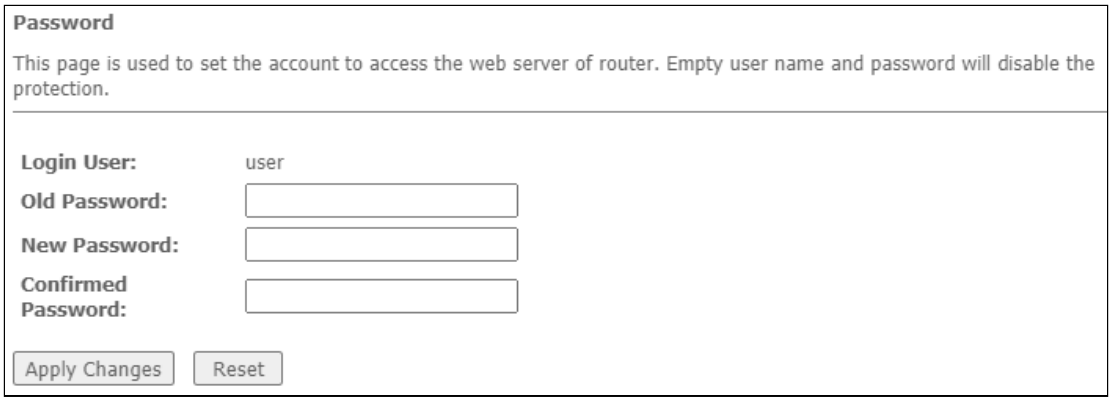
3. Enter your username into ‘User Name’ and password into ‘Password’ field.

   Username: *user*, password: *user*.

4. Click the ‘Login’ button. In the browser window, the home page of the device’s web interface will open.

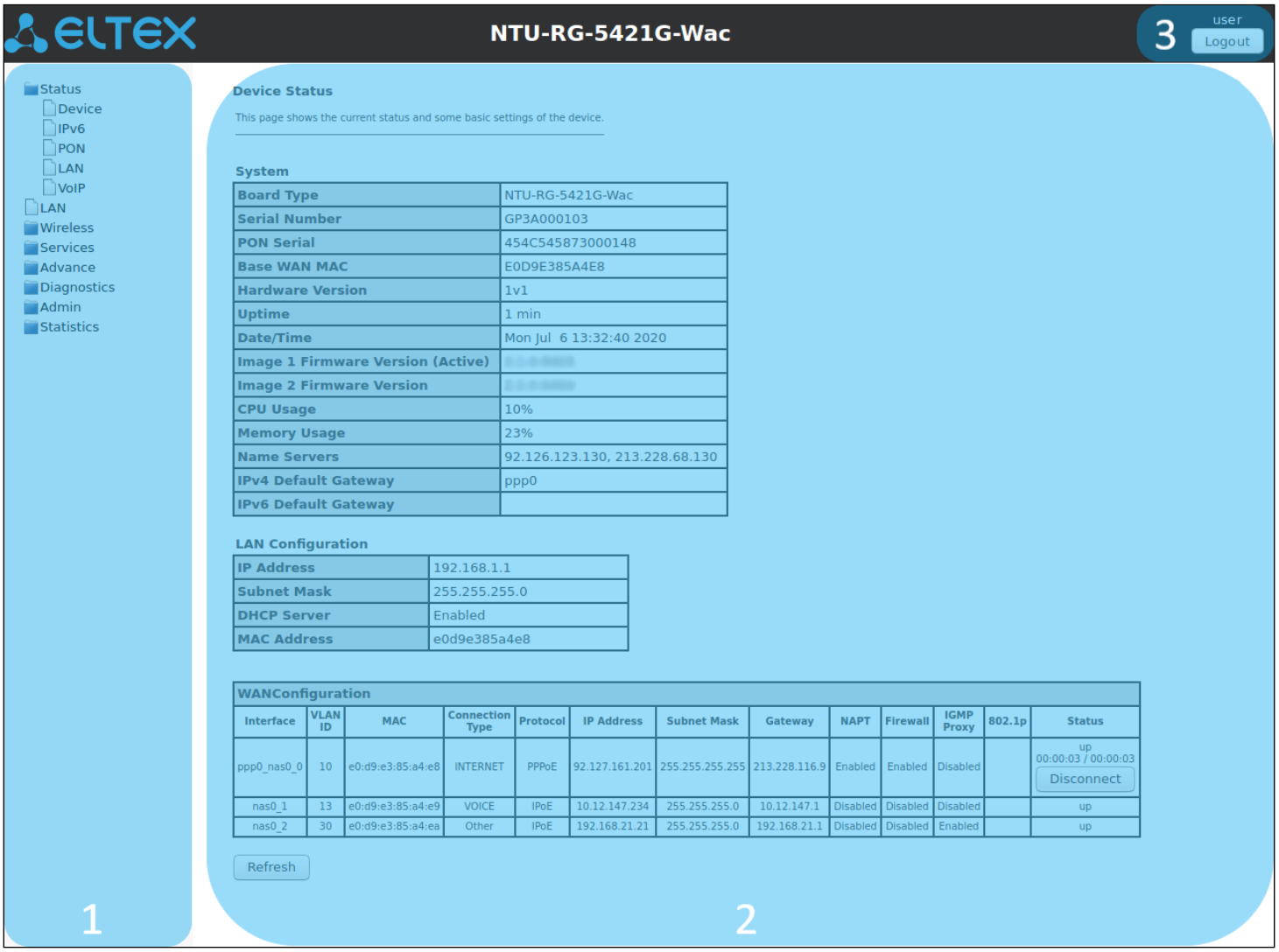
Password changing

To prevent unauthorized access to device in the future, it is recommended to change password. To change the password enter the new password in the *Admin,* menu, *«Password»,* section in the «*New Password*» and «*Confirm new password*» fields.



Main elements of the web interface

General view of the device configuration window is depicted below.



The user interface window can be divided into 3 parts:

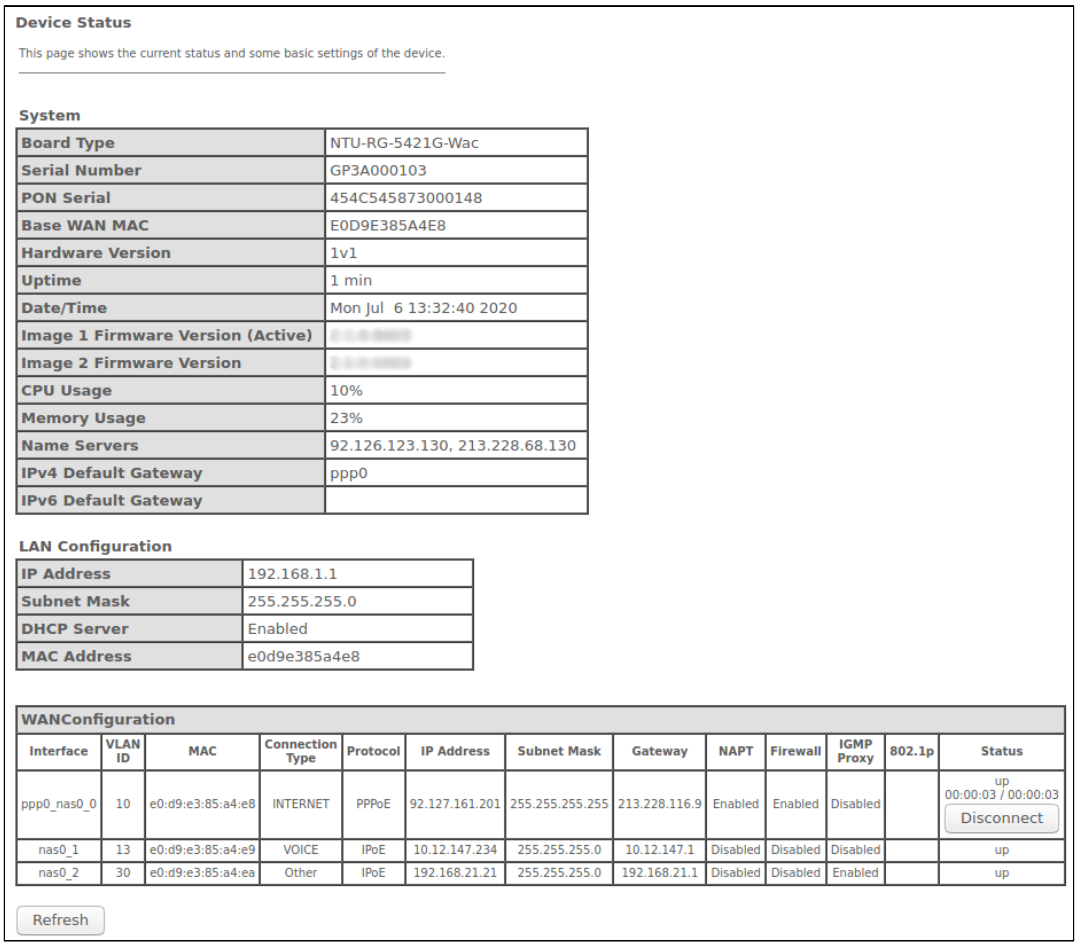
1. The navigation tree on the device settings menu.
2. The main settings window for the selected section.
3. User change button.

4.1 The «Status» menu. Device Information

4.1.1 The «Device status» submenu. Device General Information

This section displays general information about the device, the main parameters of the LAN and WAN interfaces.

Status → Device status



Device Status

This page shows the current status and some basic settings of the device.

System

Board Type	NTU-RG-5421G-Wac
Serial Number	GP3A000103
PON Serial	454C545873000148
Base WAN MAC	E0D9E385A4E8
Hardware Version	1v1
Uptime	1 min
Date/Time	Mon Jul 6 13:32:40 2020
Image 1 Firmware Version (Active)	[illegible]
Image 2 Firmware Version	[illegible]
CPU Usage	10%
Memory Usage	23%
Name Servers	92.126.123.130, 213.228.68.130
IPv4 Default Gateway	ppp0
IPv6 Default Gateway	

LAN Configuration

IP Address	192.168.1.1
Subnet Mask	255.255.255.0
DHCP Server	Enabled
MAC Address	e0d9e385a4e8

WANConfiguration

Interface	VLAN ID	MAC	Connection Type	Protocol	IP Address	Subnet Mask	Gateway	NAPT	Firewall	IGMP Proxy	802.1p	Status
ppp0_nas0_0	10	e0:d9:e3:85:a4:e8	INTERNET	PPPoE	92.127.161.201	255.255.255.255	213.228.116.9	Enabled	Enabled	Disabled		up 00:00:03 / 00:00:03 Disconnect
nas0_1	13	e0:d9:e3:85:a4:e9	VOICE	IPoE	10.12.147.234	255.255.255.0	10.12.147.1	Disabled	Disabled	Disabled		up
nas0_2	30	e0:d9:e3:85:a4:ea	Other	IPoE	192.168.21.21	255.255.255.0	192.168.21.1	Disabled	Disabled	Enabled		up

Refresh

System

- *Board Type* – device model;
- *Serial Number* – device serial number;
- *PON Serial* – device serial number in the PON network;
- *Base WAN MAC* – device WAN MAC address;
- *Hardware Version* – hardware version;
- *Uptime* – device uptime;
- *Date/Time* – current time on the device;
- *Image 1 Firmware Version (Active)* – current firmware version;
- *Image 2 Firmware Version* – backup firmware version;
- *CPU Usage* – CPU utilization percent;
- *Memory Usage* – Memory utilization percent;
- *Name Servers* – DNS server name;
- *IPv4 Default Gateway* – IPv4 default gateway;
- *IPv6 Default Gateway* – IPv6 default gateway.

LAN Configuration

- *IP Address* – device IP address;
- *Subnet Mask* – device subnet mask;
- *DHCP Server* – DHCP server state;
- *MAC Address* – device MAC address.

WAN Configuration

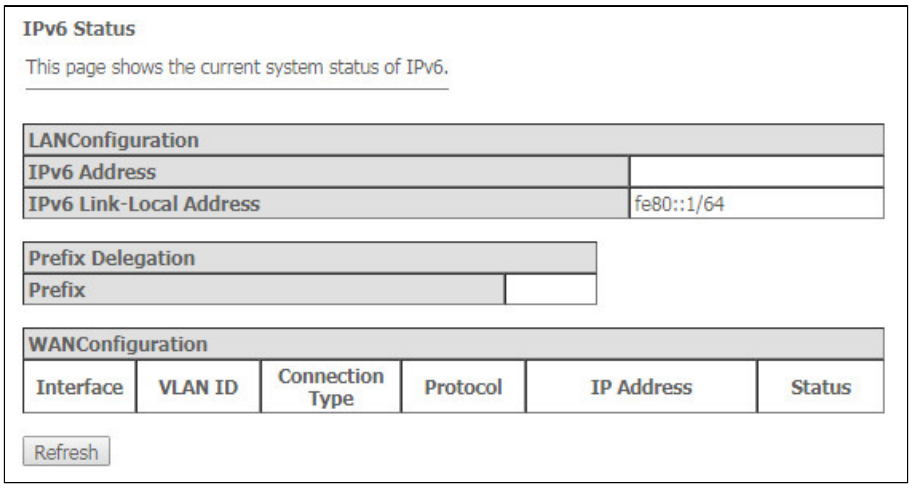
- *Interface* – interface name;
- *VLAN ID* – interface VLAN ID;
- *MAC* – interface MAC address;
- *Connection Type* – connection type;
- Protocol – protocol used;
- *IP Address* – interface IP address;
- *Gateway* – gateway;
- *Status* – interface status.

Click the «Refresh» button to update the page.

4.1.2 The «IPv6 Status» submenu. Information about IPv6 system

The tab displays the current status of IPv6 system.

Status → IPv6



LAN Configuration

- IPv6 Address – IPv6 address;
- IPv6 Link-Local Address – local IPv6 address.

Prefix Delegation

- *Prefix – IPv6 address prefix.*

WAN Configuration

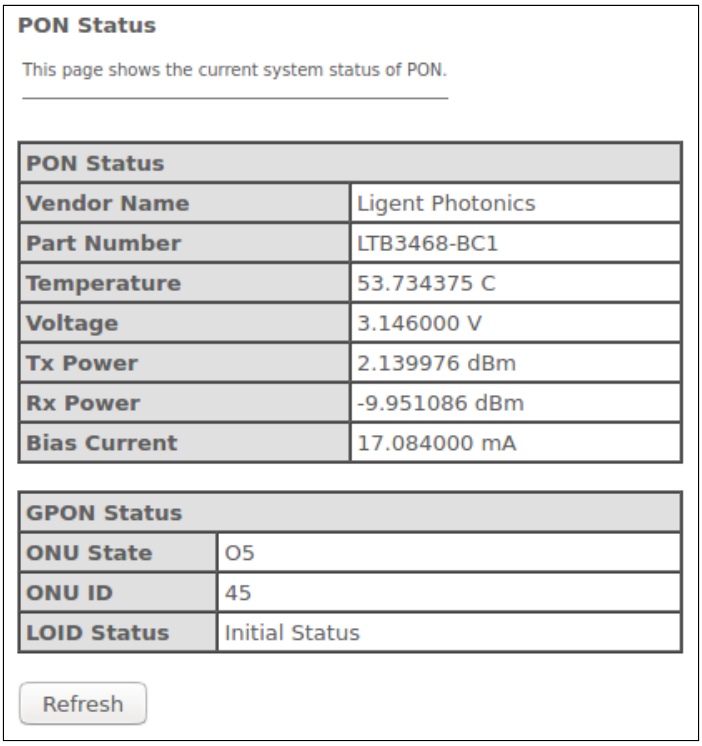
- *Interface* – interface name;
- *VLAN ID* – interface VLAN ID;
- *Connection Type* – connection type;
- *Protocol* – protocol used;
- *IP Address* – interface IP address;
- *Status* – interface status.

Click the «Refresh» button to update the page.

4.1.3 The «PON» submenu. Optical module status information

The tab displays the current status of PON interface system.

Status → PON



PON Status

- *Vendor Name* – manufacturer name;
- *Part Number* – part number;
- *Temperature* – current temperature;
- *Voltage* – voltage;
- *Tx Power* – transmission power;
- *Rx Power* – reception power;
- *Bias Current* – bias current;
- Video Power – video signal power[1].

PON Status

- *ONU State* – status of authorization on OLT (O1 -> O2 -> O3 -> O4 -> O5);
- *ONU ID* – device identifier on OLT;
- *LOID Status* – status of authorization on OLT (Initial -> Standby -> Serial Number -> Ranging -> Operation).

Click the «Refresh» button to update the page.

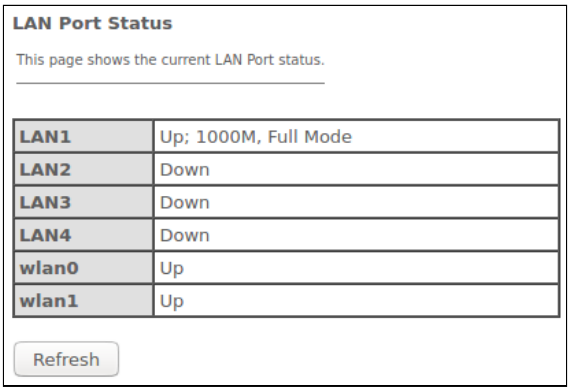
---

[1] Only for NTU-RG-5421GC-Wac

4.1.4 The «LAN» submenu. LAN interface status information

In the «LAN» section you can view the status of LAN ports of the device and Wi-Fi interfaces.

Status → LAN



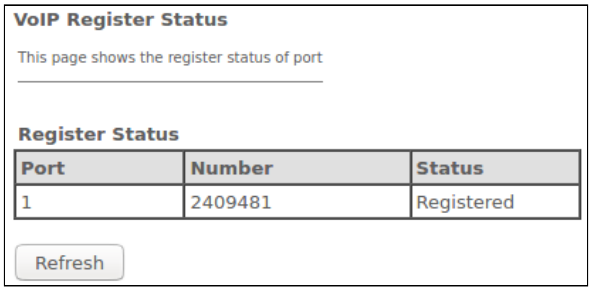
The LAN Port Status table shows:

- LAN port number;
- port state (Up/Down);
- rate of external network device connection to the port (10/100/1000 Mbps).

4.1.5 The «VoIP» submenu. Information on VoIP status

In the «VoIP» section you can view the status of the VoIP network interface.

Status → VoIP

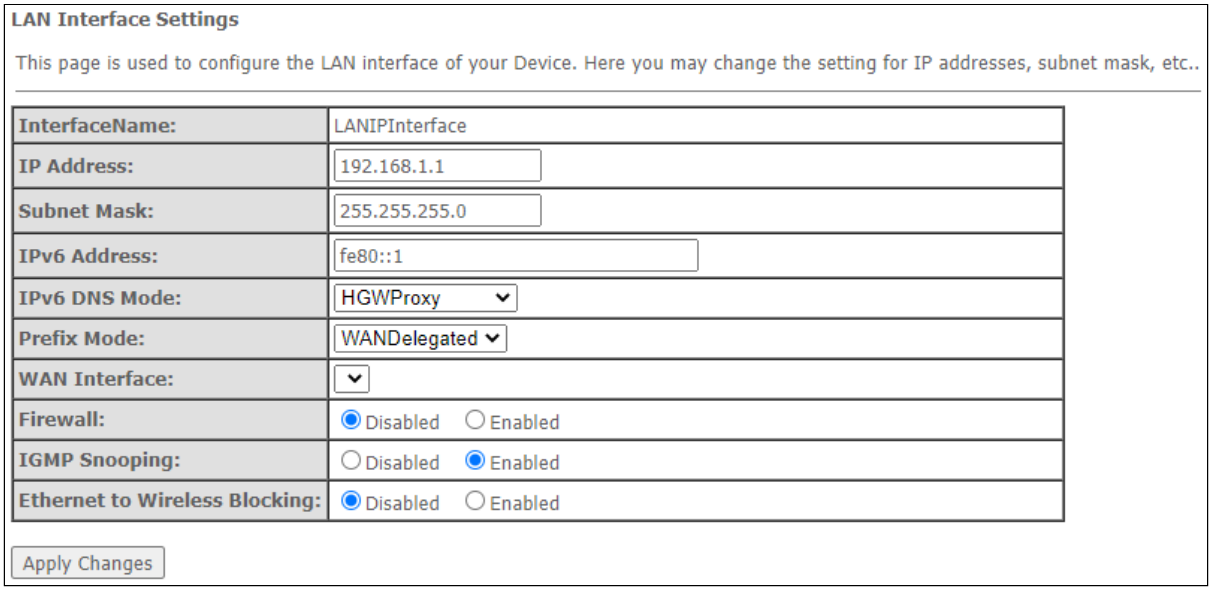


- Port – number of subscriber device set;
- Number – subscriber phone number;
- Status – state of phone number registration on proxy server.

4.2 The «LAN» menu. LAN interface configuration

You can configure main parameters of wired and wireless LAN interfaces in this menu.

LAN



- *Interface name* – interface name;
- *IP Address* – interface IP address;
- *Subnet Mask* – interface subnet mask;
- *IPv6 Address* – IPv6 address;
- *IPv6 DNS Mode* – configure the domain name usage mode:
  - *WANConnection* – use WAN interface for obtaining DNS server address;
  - *Static* – specify static DNS server address (IPv6 DNS1, IPv6 DNS2).
- *Prefix Mode* – configure the Prefix reception mode (from WAN interface or statically):
  - *WANDelegated* – enables the option of delegating the prefixes received from the ISP;
  - *Static* – specify static Prefix.
- *IPv6 DNS* – specify static DNS server address (IPv6 DNS1, IPv6 DNS2);
- *WAN Interface* – select the WAN interface to be used for WANDelegated.
- *Firewall (Enabled/Disabled)* – enable/disable firewall for LAN interface;
- *IGMP Snooping (Enabled/Disabled)* – enable/disable IGMP Snooping;
- *Ethernet to Wireless Blocking (Enabled/Disabled)* – enable/disable isolation of wired and wireless clients.

To save the changes, click the «Apply Changes» button.

4.3 The «Wireless» menu. Wireless network configuration

This section contains individual settings for each of the operating bands – 2.4 GHz (wlan0) and 5 GHz (wlan1).

4.3.1 The «Status» submenu. Current WLAN status

This submenu displays the current status of the WLAN.

Wireless → wlan0 (2.4GHz) / wlan1 (5GHz) → Status

WLAN Status

This page shows the WLAN current status.

WLAN Configuration	
Mode	AP
Band	2.4 GHz (B+G+N)
SSID	ELTX-2.4GHz_WiFi_A4E8
Channel Number	13
Channel Width	40 MHz
Encryption	WPA2
BSSID	e0:d9:e3:85:a4:e8
Associated Clients	0

WLAN Status

This page shows the WLAN current status.

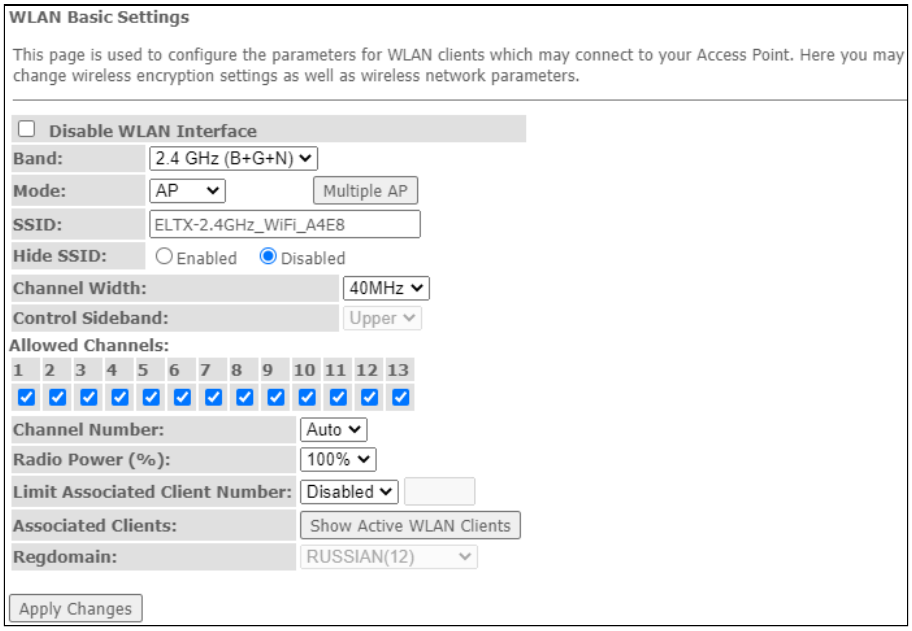
WLAN Configuration	
Mode	AP
Band	5 GHz (A+N+AC)
SSID	ELTX-5GHz_WiFi_A4E8
Channel Number	36
Channel Width	80 MHz
Encryption	WPA2
BSSID	e0:d9:e3:85:a4:e9
Associated Clients	0

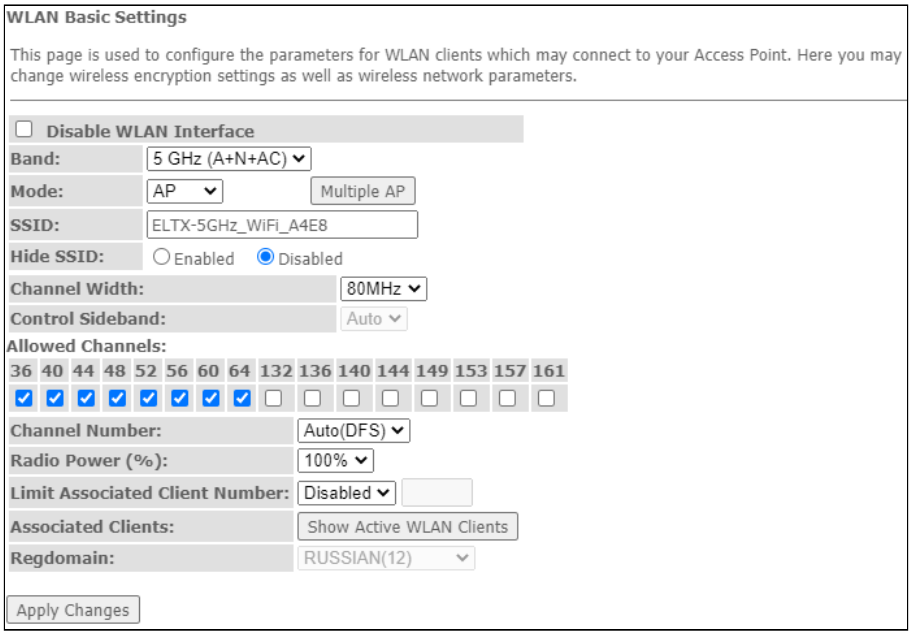
- *Mode* – AP - access point;
- *Band* – range, band, standards;
- *SSID* – access point network name;
- *Channel Number* – channel number;
- *Channel Width* – channel width;
- *Encryption* – encryption method;
- *BSSID* – access point MAC address;
- *Associated Clients* – number of connected clients.

4.3.2 The «Basic settings» submenu. Basic settings

This submenu is used for general setup of the WLAN wireless interface parameters and allows users to specify up to three virtual wireless access points.

Wireless → wlan0 (2.4GHz) / wlan1 (5GHz) → Basic settings





- *Disable WLAN Interface* – disable radio interface;
- *Band* – change Wi-Fi operation standard;
- *Mode* – switch the «AP/Client» operation mode;
- *SSID (ServiceSet Identifier)* – assign a wireless network name (case sensitive);

Default device SSID is ELTX-2.4GHz_WiFi__aaaa/ELTX-5GHz_WiFi_aaaa, where aaaa – the last 4 digits of WAN MAC. WAN MAC is labelled on the device housing. The network name contains a frequency band (2.4/5GHz).

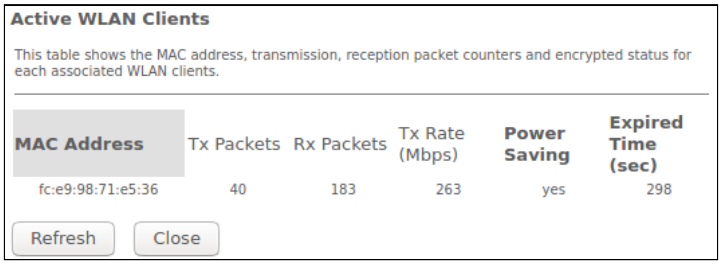
- *Hide SSID* – this feature enables the hidden wireless network identifier (SSID) mode. When using this feature, the access point will not be displayed in the list of available wireless networks on user devices

(its SSID will not be visible). However, users who are aware of the existence of this network and know its SSID will be able to connect to it;
- *Channel Width* – 20/40 MHz bandwidth;
- *Control Sideband* – management sideband, select the second channel (Lower or Upper) in 40 MHz mode;
- *Allowed channels* – configure the Wi-Fi channels allowed to connect clients to the router. By default, all channels are allowed;
- *Channel Number* – select utilized channel:
    - *Auto* – automatic channel selection.
- *Radio Power (%)* – transmitter power;
- *Limit Associated Client Number (Enable/Disabled)* – limit the maximum amount of associated clients;
- *Associated Clients* – maximum amount of associated clients;
- *Enable Universal Repeater Mode (Acting as AP and client simultaneouly)* – enable repeater mode;
- *Regdomain* – region settings.

To save the changes, click the «Apply Changes» button.

The «Show Active WLAN Client» button outputs the table of active WLAN clients.

Wireless → wlan0 (2.4GHz) / wlan1 (5GHz) → Basic settings → Show Active WLAN Client



- *MAC Address* – MAC address of the client;
- *Tx Packets* – amount of packets transmitted to the client;
- *Rx Packets* – amount of packets received from the client;
- *Tx Rate (Mbps)* – channel transmission rate, Mbps;
- *Power Saving* – power saving mode;
- *Expired Time (sec)* – address leasing expiration time, s .

To update the information in the table, click the «Refresh» button, to close the table, click «Close».

4.3.3 The «Advanced settings» submenu. Advanced settings

In this submenu you can perform advanced configuration of wireless network.

Wireless → wlan0 (2.4GHz) / wlan1 (5GHz) → Advanced settings

- *Fragment Threshold* – set the fragmentation threshold, in bytes. If a packet size exceeds the value, the packet is fragmented into parts of the corresponding size;
- *RTS Threshold* – if the packet is smaller than the RTS threshold value, the RTS/CTS mechanism (with request to send/clear to send packets) is not used;
- *Beacon Interval* – time period for transmission of informational packets, which indicate activity of the access point, to the wireless network;
- *Data rate* – transmission rate;
- *Preamble Type* – select the preamble - long (*Long Preamble*)/short (*Short Preamble*);
- *Client Isolation*(*Enable/Disabled*) – enable/disable client blocking;

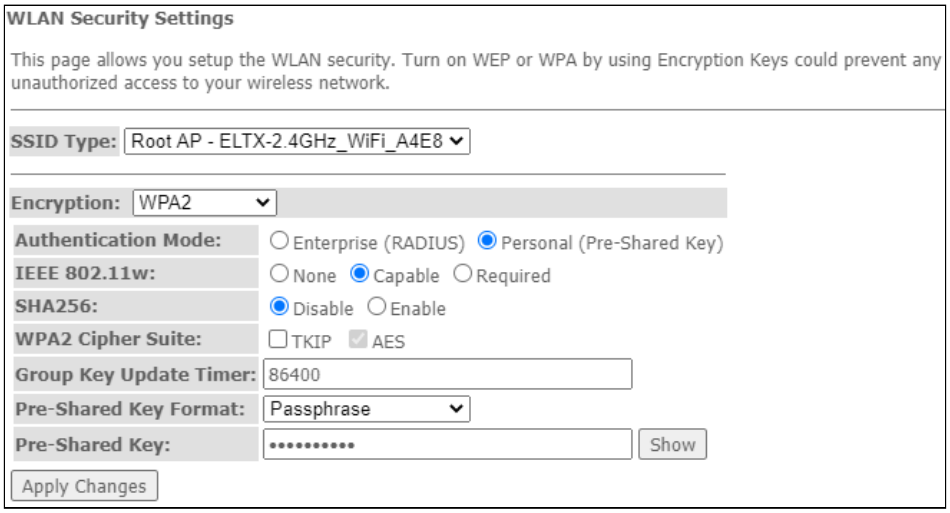
- *Protection (Enable/Disabled)* – enable/disable 802.11n protection;
- *Aggregation (Enable/Disabled)* – enable/disable frames aggregation to increase the bandwidth;
- *Short GI*(*Enable/Disabled)* – enable/disable a short guard interval;
- *TX beamforming* (*Enable/Disabled)* – enable/disable adaptive beamforming;
- *MU MIMO* – enable/disable Multi-user MIMO mode;
- *Multicast to Unicast*(*Enable/Disabled*) – enable/disable multicast-unicast conversion;
- *WMM Support*(*Enable/Disabled*) – enable/disable the support for Wi-Fi Multimedia;
- *802.11k Support* – enable/disable the Radio Resource Management option to send clients information about neighboring access points;
- *802.11v Support* – enable/disable the Wireless Network Management option for data exchange between access points.

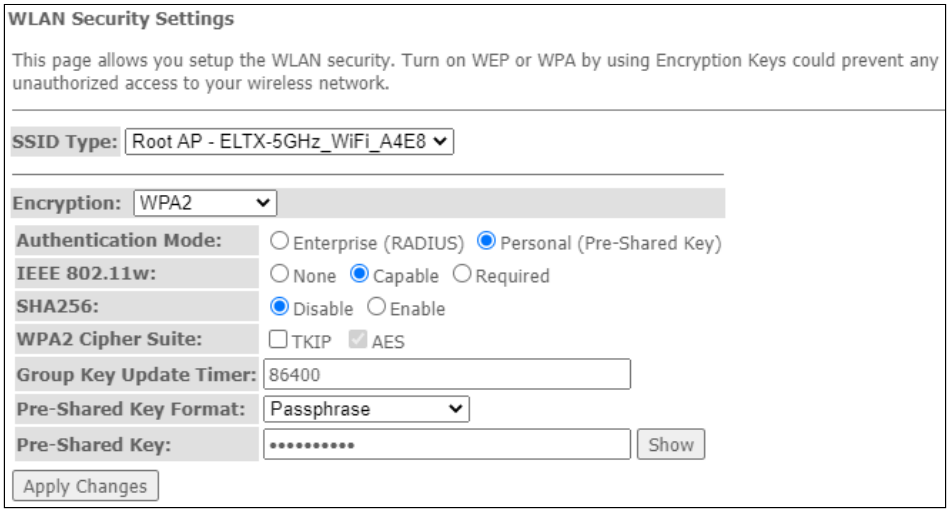
To save the changes, click the «Apply Changes» button.

4.3.4 The «Security» Submenu. Security Settings

Use this menu to configure general data encryption settings for a wireless network. The client wireless equipment can be configured either manually or automatically with the help of WPS.

Wireless → wlan0 (2.4GHz) / wlan1 (5GHz) → Security





- *SSID Type* – current SSID;
- *Encryption* – set the encryption mode:
  - *NONE (open)* – no wireless network protection;
  - *WEP* – WEP encryption algorithm;
  - *WPA/WPA2/WPA2 Mixed* – WPA/WPA2/WPA2 Mixed encryption algorithm.

When the *«WEP»* encryption mode is selected, the following settings are available:

- *802.1x Authentication* – enables 802.1x standard (enables user authentication with RADIUS server, WEP key is used for data encryption);
- *Authentication* – select authentication mode:
  - *Open system* – without authentication;
  - *Shared Key* – pre-shared key authentication;
  - *Auto* – automatic authentication.
- *Key Length (encryption strength)* – use 64- or 128-bit keys;
- *Key Format* – use ASCII or HEX format;
- *Encryption Key (сетевой ключ)* – 10 hex characters key or 5 ASCII characters for 64-bit encryption. Other options are 26 hex characters or 13 ASCII characters for 128-bit encryption.

When selecting *WPA/WPA2/WPA2 Mixed* encryption mode, the following settings will be available:

- *Authentication Mode* – Enterprise (RADIUS) or Personal (Pre-Shared Key) authentication mode: In the Enterprise (RADIUS) mode perform next settings:
  - *RADIUS Server IP Address* – RADIUS server IP address;
  - *RADIUS Server Port* – RADIUS server port number. The default port is 1812;
  - *RADIUS Server Password* – Secret key for access to the RADIUS server;
- *IEEE 802.11w* – enable service frame encryption;
  - *None* – disable service frame encryption;
  - *Capable* – encryption compatibility mode;
  - *Required* – encryption is required.
- *SHA256 (Enable/Disable)* – enable/disable SHA256 usage.
- *WPA Cipher Suite* – set of WPA *TKIP* or *AES* fonts;
- *Group Key Update Timer* – key update timer;
- *Pre-Shared Key Format* – key format: ASCII or HEX;
- *Pre-Shared Key* – access key.

To see the encrypted access key, click the «Show» button. To save the changes, click the «Apply Changes» button.

4.3.5 The «Access Control» Submenu. Access settings

The menu allows filtering configuration for MAC addresses. All added MAC addresses will be displayed in *Current Access Control List*. When selecting the *«Allowed Listed»* mode, only those MAC addresses that are in the *Current Access Control List* can connect to the access point. When the *«Deny Listed»* mode is selected, all MAC addresses except those specified in the *Current Access Control List* will have access. To change the mode, click the «Apply Changes» button.

Wireless → wlan0 (2.4GHz) / wlan1 (5GHz) → Access control

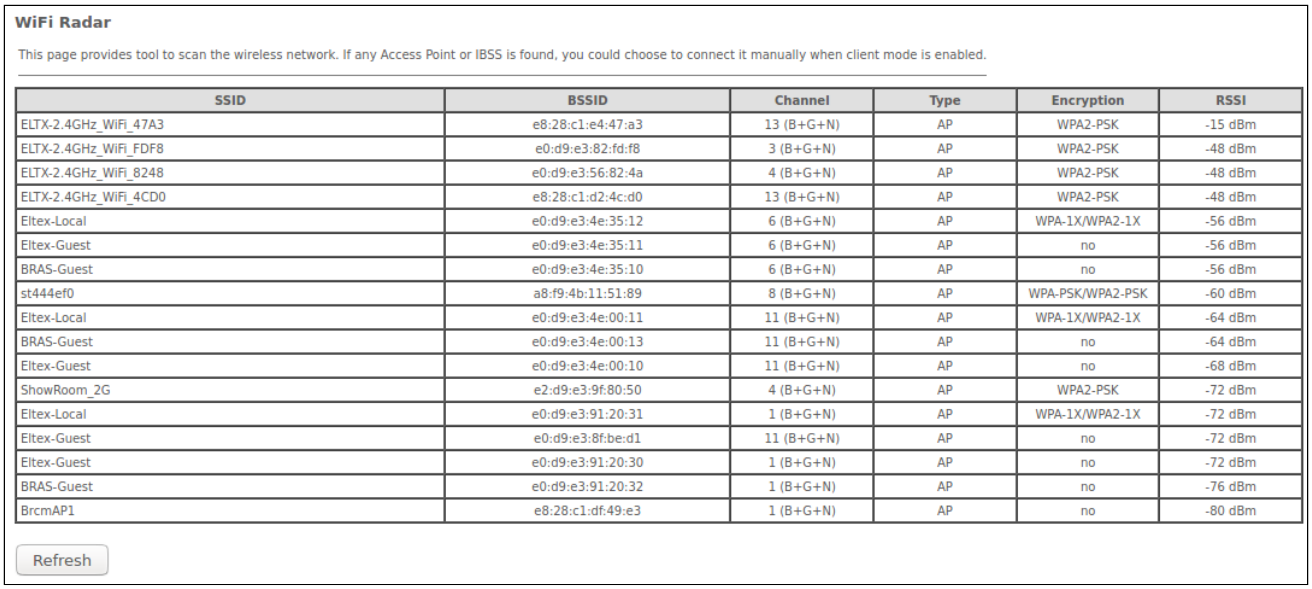
- *Mode* – MAC filtering mode:
  - *Disabled* – filter is not used;
  - *Allowed Listed* – filtering on the basis of allowed addresses (white list);
  - *Deny Listed* – filtering on the basis of denied addresses (black list).
- *MAC Address*– field to add MAC address to the filtering table. To enter the value, click «Add» or click «Reset» to reset the value.

To remove selected items in the list, click «Delete Selected»; click «Delete All» to remove the whole list.

4.3.6 The «Wi-Fi radar» submenu. Wireless network scanning

Use this menu to scan a wireless network and to detect nearby access points or IBSS.

Wireless → wlan0 (2.4GHz) / wlan1 (5GHz) → WiFi radar



WiFi Radar

This page provides tool to scan the wireless network. If any Access Point or IBSS is found, you could choose to connect it manually when client mode is enabled.

SSID	BSSID	Channel	Type	Encryption	RSSI
ELTX-2.4GHz_WiFi_47A3	e8:28:c1:e4:47:a3	13 (B+G+N)	AP	WPA2-PSK	-15 dBm
ELTX-2.4GHz_WiFi_FDF8	e0:d9:e3:82:fd:f8	3 (B+G+N)	AP	WPA2-PSK	-48 dBm
ELTX-2.4GHz_WiFi_8248	e0:d9:e3:56:82:4a	4 (B+G+N)	AP	WPA2-PSK	-48 dBm
ELTX-2.4GHz_WiFi_4CD0	e8:28:c1:d2:4c:d0	13 (B+G+N)	AP	WPA2-PSK	-48 dBm
Eltex-Local	e0:d9:e3:4e:35:12	6 (B+G+N)	AP	WPA-1X/WPA2-1X	-56 dBm
Eltex-Guest	e0:d9:e3:4e:35:11	6 (B+G+N)	AP	no	-56 dBm
BRAS-Guest	e0:d9:e3:4e:35:10	6 (B+G+N)	AP	no	-56 dBm
st444ef0	a8:f9:4b:11:51:89	8 (B+G+N)	AP	WPA-PSK/WPA2-PSK	-60 dBm
Eltex-Local	e0:d9:e3:4e:00:11	11 (B+G+N)	AP	WPA-1X/WPA2-1X	-64 dBm
BRAS-Guest	e0:d9:e3:4e:00:13	11 (B+G+N)	AP	no	-64 dBm
Eltex-Guest	e0:d9:e3:4e:00:10	11 (B+G+N)	AP	no	-68 dBm
ShowRoom_2G	e2:d9:e3:9f:80:50	4 (B+G+N)	AP	WPA2-PSK	-72 dBm
Eltex-Local	e0:d9:e3:91:20:31	1 (B+G+N)	AP	WPA-1X/WPA2-1X	-72 dBm
Eltex-Guest	e0:d9:e3:8f:be:d1	11 (B+G+N)	AP	no	-72 dBm
Eltex-Guest	e0:d9:e3:91:20:30	1 (B+G+N)	AP	no	-72 dBm
BRAS-Guest	e0:d9:e3:91:20:32	1 (B+G+N)	AP	no	-76 dBm
BrcmAP1	e8:28:c1:df:49:e3	1 (B+G+N)	AP	no	-80 dBm

Refresh

The table displays the following information:

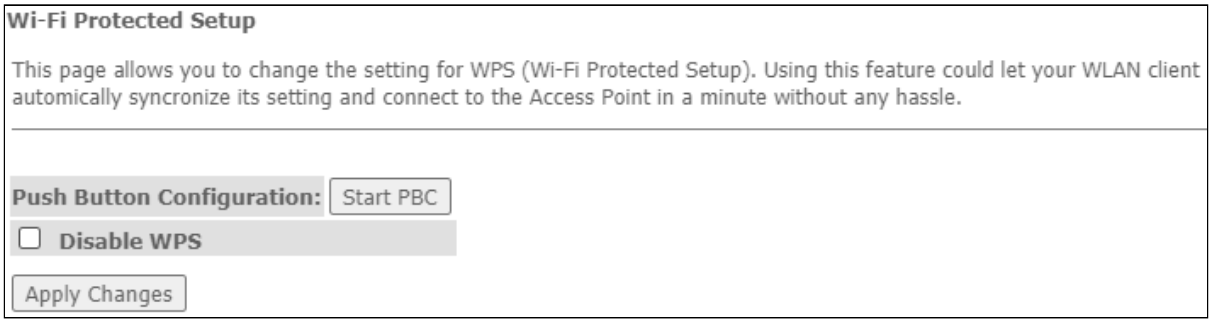
- *SSID* – wireless access point name;
- *BSSID* – access point MAC address;
- *Channel* – channel;
- *Type* – type (AP (Access Point), Client);
- *Encryption* – encryption method;
- *RSSI* – received signal level.

To scan the environment, click the «Refresh» button.

4.3.7 The «WPS» submenu. Easy connection to Wi-Fi network

This section configures WPS (Wi-Fi Protected Setup) connection.

Wireless → wlan0 (2.4GHz) / wlan1 (5GHz) → WPS



Wi-Fi Protected Setup

This page allows you to change the setting for WPS (Wi-Fi Protected Setup). Using this feature could let your WLAN client automically syncronize its setting and connect to the Access Point in a minute without any hassle.

Push Button Configuration: Start PBC

☐ **Disable WPS**

Apply Changes

- *Push Button Configuration* – activate the WPS function on the router to connect subscribers;
- *Disable WPS* – disable the possibility of connecting to the router using WPS technology.

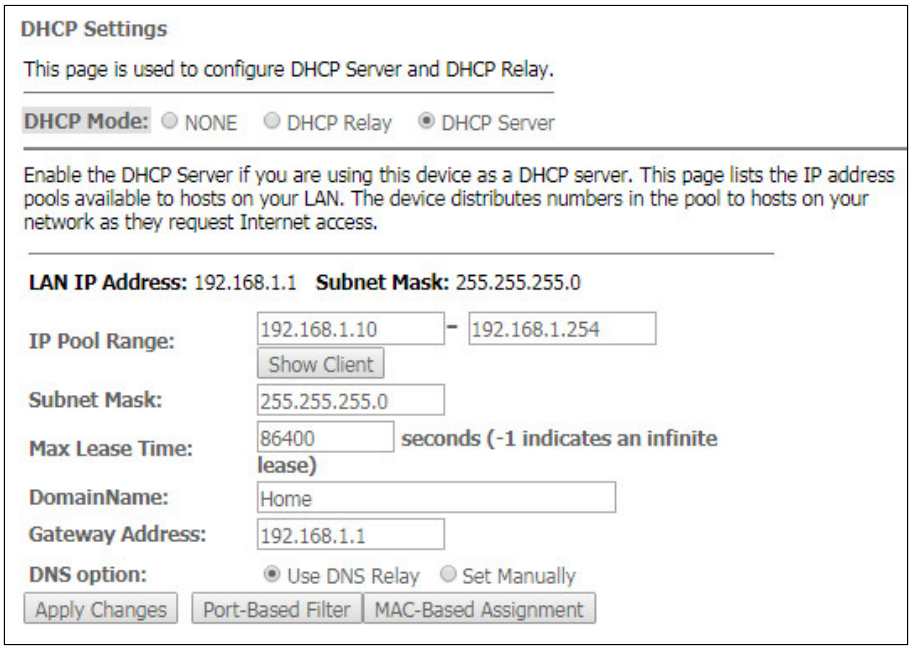
To save the changes, click the «Apply Changes» button.

4.4 The Services menu. Service configuration

4.4.1 The «DHCP Setting» submenu. DHCP configuration

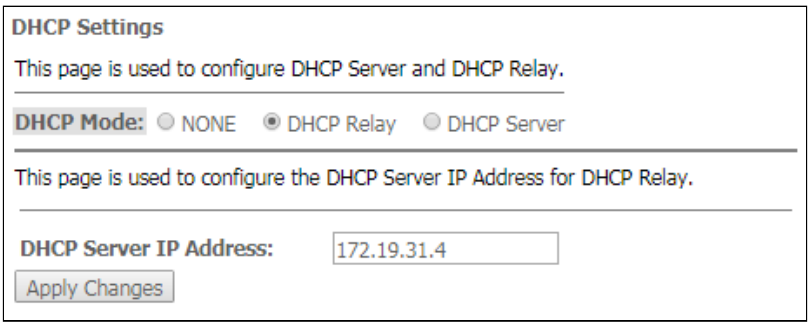
The menu allows DHCP server and DHCP repeater configuration.

Services → DHCP (Server)



- *DHCP Mode* – select operation mode:
  - *NONE* – DHCP disabled;
  - *DHCP Server* – operation in DHCP server mode;
  - *DHCP Relay* – operation in DHCP repeater mode.
- *IP Pool Range* – range of addresses distributed among clients;
- *Show Client* – button to view clients who leased the addresses. When clicking, a table with information about DHCP clients leased by a DHCP server is displayed;
- *Subnet Mask* – subnet mask;
- *Max Lease Time* – maximum lease time, -1 for endless lease;
- *DomainName* – domain name;
- *Gateway Address* – gateway address;
- *DNS option* – defines DNS operation:
  - *Use DNS relay* – ONT address will be returned as DNS and all queries will be relayed via ONT;
  - *Set manually* – set DNS manually.

Services → DHCP (Relay)



- *DHCP Server IP Address* – IP address of the remote DHCP server.

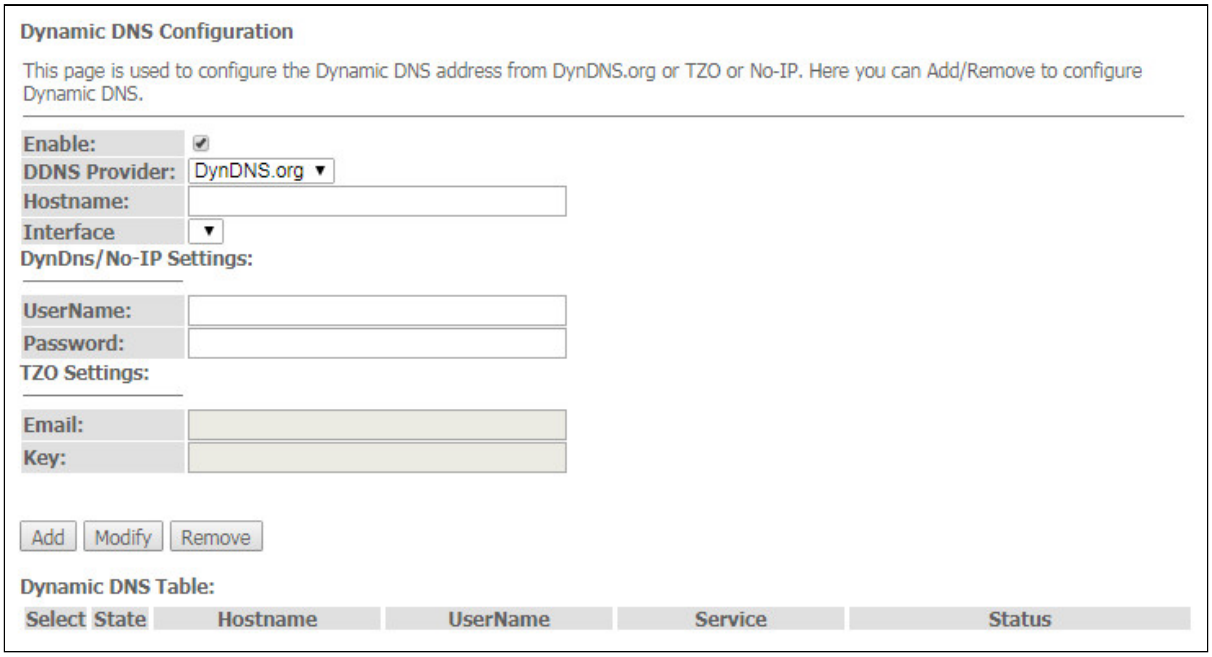
To save the changes, click the «Apply Changes» button. «Port-Based Filter» and «MAC-Based Assignment» buttons allow configuring port-based and MAC-based filtering, respectively.

4.4.2 The «Dynamic DNS» submenu. Dynamic DNS Configuration

Dynamic DNS (domain name system) allows information to be updated on DNS server in real time and (optionally) automatically. It is applied for assignment of a constant domain name to a device (computer, router, e. g. NTP-RG) having a dynamic IP address. The IP address can be assigned by IPCP in PPP connections or in DHCP.

Dynamic DNS is frequently used in local networks where clients are obtaining IP addresses through DHCP and then are registering their names on a local DNS server.

Services → DNS → Dynamic DNS



- *Enable* – when selected, enable DHCP server (IP addresses from the following range will be dynamically assigned to network devices);
- *D-DNS Provider* – select the type of D-DNS service (provider): org, TZO.com, No-IP.com;
- *Custom* – another provider selected by user. In this case, you need to specify the provider's name (*Hostname*) and address (*Interface*).

DynDns/No-IP Settings:

- *UserName* – user name;
- *Password* – authorization password on the service selected for operation with D-DNS.

«Dynamic DNS Table» table with the list of available DNS displayed in this section. To add a record, click the «Add» button. To remove/modify a record, click the «Remove»/«Modify» button for the selected record.

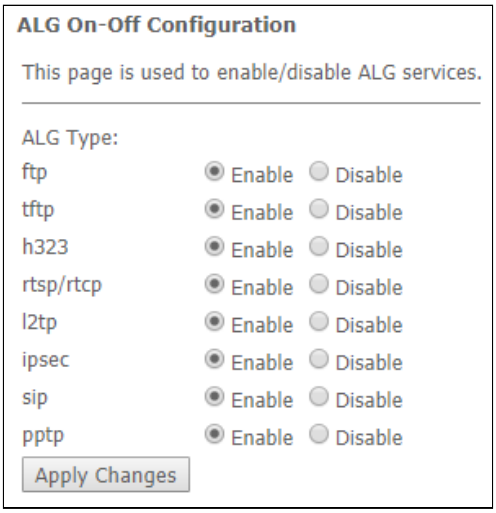
4.4.3 The «Firewall» submenu. Firewall configuration

4.4.3.1 The «ALG On-Off Configuration» submenu. Enable/disable ALG services

This section is used to enable/disable ALG services.

Application-level gateway (ALG) – NAT router component that understands an application protocol, and when packets of that protocol pass through it, modifies them so that users behind the NAT can use the protocol.

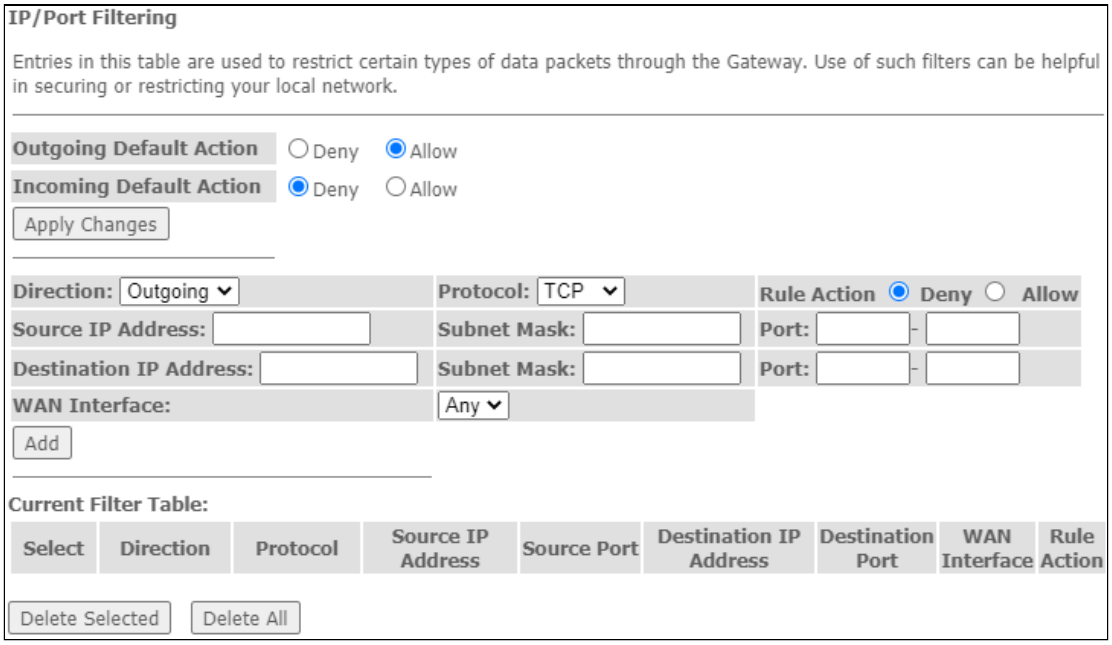
Services → Firewall → ALG



4.4.3.2 The «IP/Port Filtering» submenu. Address Filtering Settings

This section is used to configure address filtering. The IP Filtering function filters router traffic by IP addresses and ports.Using these filters can be useful to protect or restrict the local network.

Services → Firewall → IP/Port Filtering



Default action

- *Incoming Default Action Deny Allow* – filtering for incoming packets;
- *Outgoing Default Action Deny / Allow* – filtering for outgoing packets.

To save the changes, click the «Apply Changes» button.

To add a filter, fill in the appropriate fields and click the «Add» button:

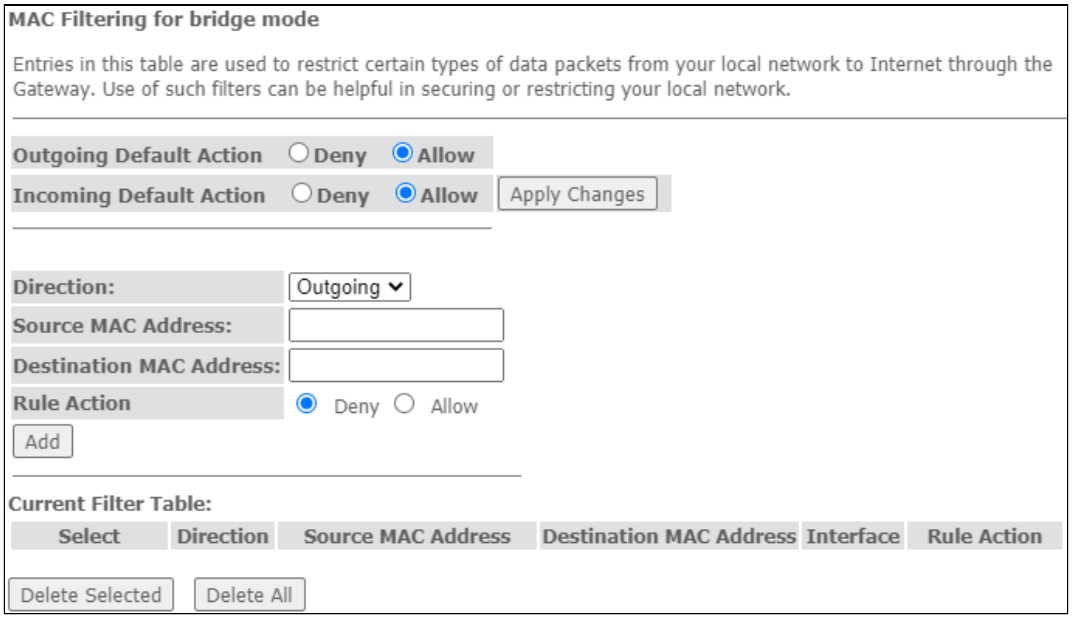
- *Protocol* – filtering protocol;
- *Rule Action Deny / Allow* – packet processing policy (deny/allow);
- *Source IP Address* – source IP address;
- *Destination IP Address* – destination IP address;
    - *Subnet mask* – subnet mask;
    - *Port* – port.
- *Ingress Interface* – ingress interface.

Added filters are displayed in the *«Current Filter Table»* located below. The entries in this table are used to restrict certain types of data packets pass through the gateway. To delete a specific filter, select the position and click the «Delete selected» button, to delete all filters click «Delete All».

4.4.3.3 The «MAC Filtering» submenu. Filtering Settings for MAC Addresses

MAC filtration allows traffic to be forwarded or blocked depending on source and destination MAC addresses. To change the mode click the «Apply Changes» button.

Services → Firewall → MAC Filtering



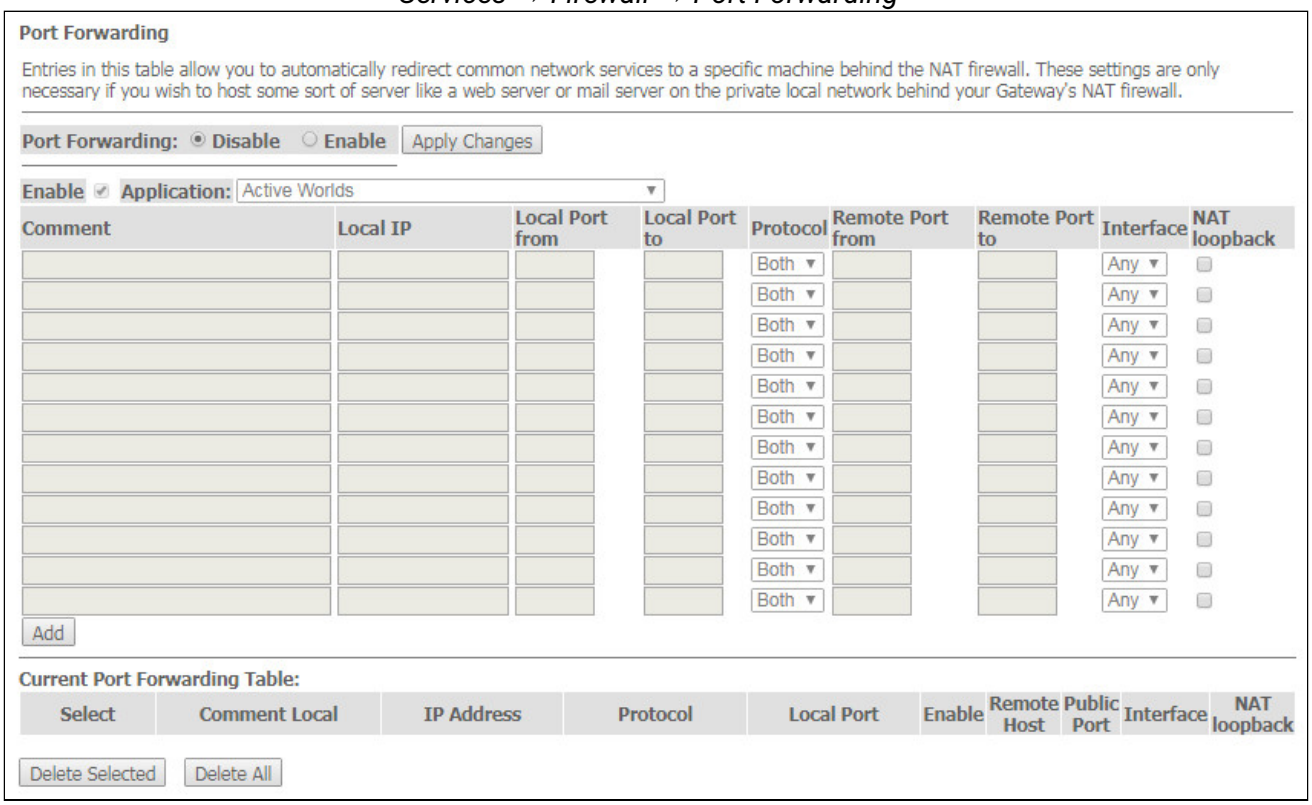
- *Default Action* – default settings:
  - *Deny* – when checked, traffic pass is prohibited by default;
  - *Allow* – when checked, traffic pass is allowed by default;
- *MAC Address* – MAC address for which limitation/access should be imposed.

Added filters are displayed in the *«Current Filter Table»* located below. The *«Rule»* field displays the type of created rule (*«Allow» - allowing* or *«Deny» - forbidding*). To delete a specific filter, select the position and click the «Delete selected» button, to delete all filters click «Delete All».

4.4.3.4 The «Port Forwarding» submenu. Port forwarding configuration

«Current Port Forwarding Table» with port forwarding information is displayed in this section. Entries in this table allow you to automatically redirect common network services to a specific machine behind the NAT firewall. These settings are only necessary if you wish to host some sort of server like a web server or mail server on the private local network behind your router's NAT firewall. To save the changes, click the «Apply Changes» button.

Services → Firewall → Port Forwarding



To add the entry in the *«Current Port Forwarding Table»* check the *Enable* flag and fill in the corresponding fields:

- *Port Forwarding (Enable/Disable)* – enable/disable port forwarding feature;
- *Application* – this menu has pre-settings for various applications port forwarding;
- *Comment* – comment;
- *Local IP* – local IP address to which forwarding is performed;
- *Local port from/to* – specify the range of local device ports for forwarding;
- *Protocol* – select protocol (TCP, UDP or both);
- *Remote port from/to* – specify the initial port of incoming connection. The *«Remote port to»* field will be filled automatically;
- *Interface* – select interface;
- *NAT-loopback* – NAT loop allows transferring queries from LAN to the router, thus, for example, you can check the work of rules created.

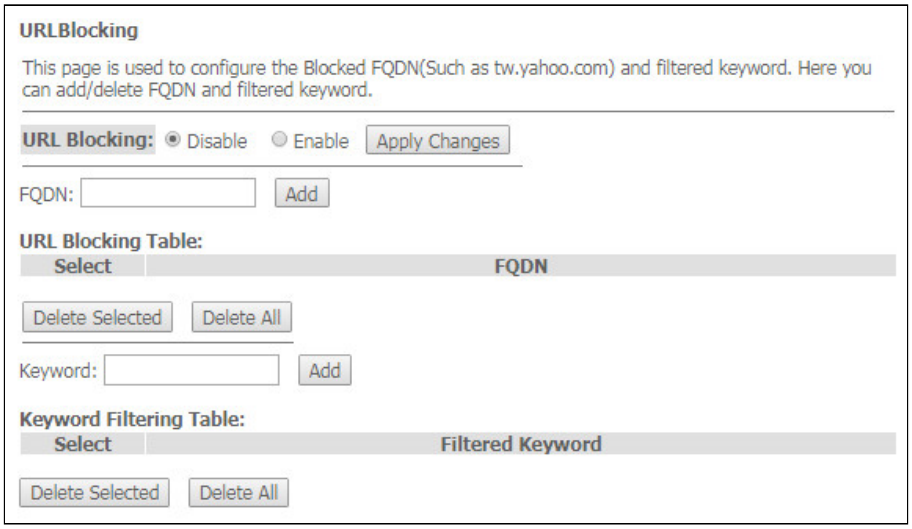
After filling the fields click the «Add» button to add the entry. To delete a selected position, click the «Delete Selected» button; to delete the whole table, click the «Delete All» button.

4.4.3.5 The «URL Blocking» submenu. Internet access restriction configuration

URL filter performs complete analysis and provides access control to specific Internet resources. This section sets and displays a list of forbidden/allowed URLs to visit. Here you can add the forbidden/allowed FQDN (Fully Qualified Domain Name) with the «Add» button, filtering by keywords is also possible. The added

restrictions are displayed in the *«URL Blocking Table»* and the *«Keyword Filtering Table»*. To remove a specific URL or keyword from the table, click on it and then on the «Delete Selected» button. To delete all restrictions click the «Delete All» button.

Services → Firewall → URL Blocking



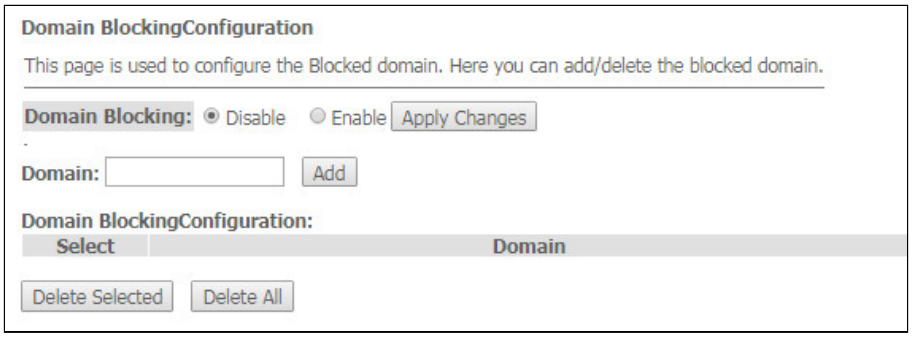
- *URL Blocking (Enable/Disable)* – enable/disable URL Blocking operation;
- *FQDN* – Fully Qualified Domain Name;
- *Keyword* – keyword.

To save the changes, click the «Apply Changes» button.

4.4.3.6 The «Domain Blocking» submenu. Domain blocking configuration

This section is used to set domain blocking.

Services → Firewall → Domain blocking



To block the domain check *Enable*, fill the *Domain* field and click the «Add» button

- *Domain Blocking (Enable/Disable)* – enable/disable blocking;
- *Domain* – domain name.

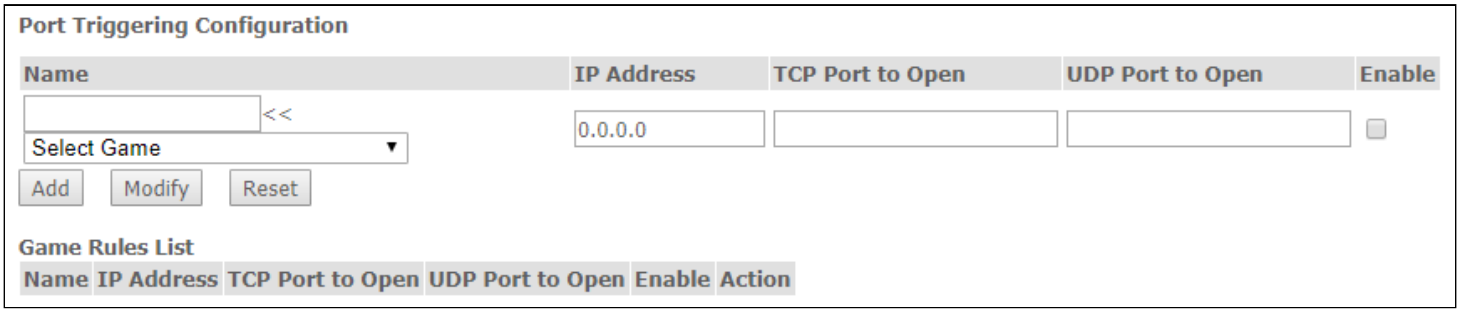
To save the changes, click the «Apply Changes» button. All blocked domains are listed in the *«Domain BlockingConfiguration»* table, to remove a blocking for one domain, select it and click the «Delete Selected» button, to remove all restrictions, click the «Delete All» button.

4.4.3.7 The «Port Triggering» submenu. Dynamic port opening configuration

⚠ Not supported in the current firmware version 1.2.0

When a certain event occurs, ports on its external interface are dynamically opened, which are tied to the corresponding ports on the computer on the local network.

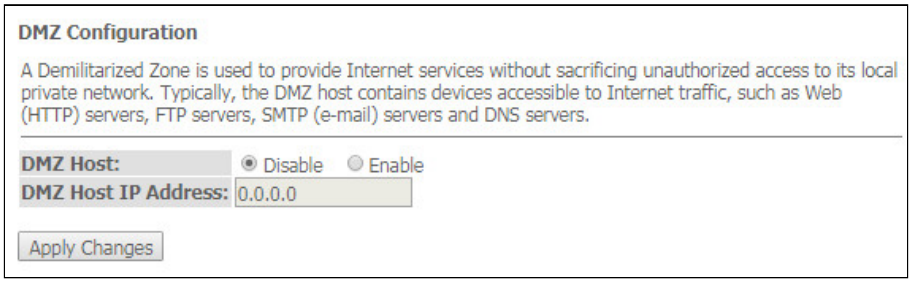
Services → Firewall → Port Triggering



4.4.3.8 The «DMZ» submenu. Demilitarized Zone configuration

When an IP address is set in the *«DMZ host IP address field»*, all requests from external network, that do not satisfy the *«Port Forwarding»* rules, will be redirected to a DMZ host (a trusted host with the specified address in the local network).

Services → Firewall → DMZ



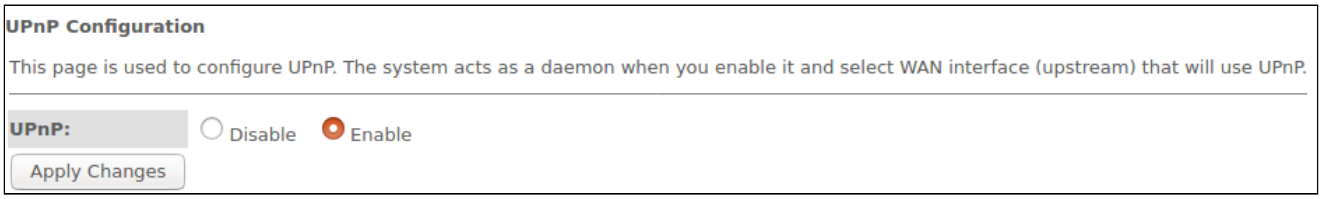
- *DMZ Host (Enable/Disable)* – enable/disable the host;
- *DMZ Host IP Address* – IP address.

To save the changes, click the «Apply Changes» button.

4.4.4 The «UPnP» submenu. Automated Setup of Network Devices

In this section you can configure Universal Plug and Play (UPnP™) function. UPnP ensures compatibility with network equipment, software and peripheral devices.

Services → UPnP



The use of UPnP requires NAT setup on an active WAN interface.

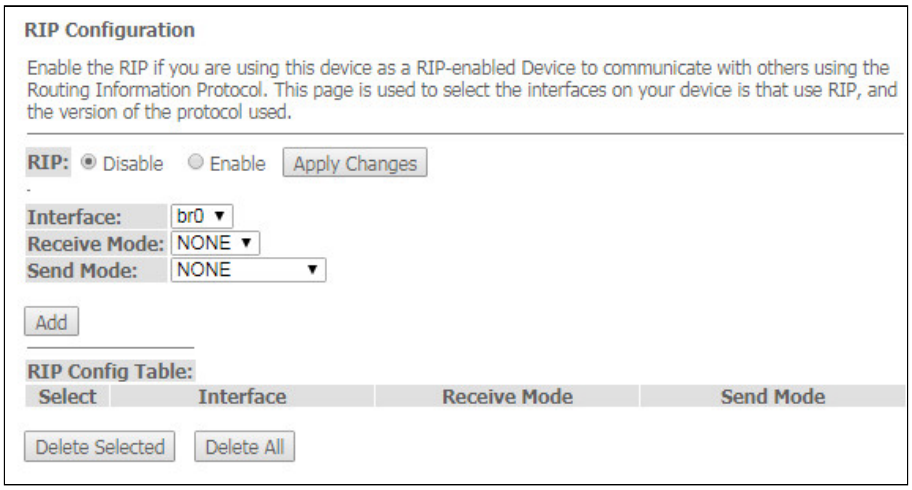
- *UPnP (Enable/Disable)* – enable/disable the UPnP function;
- *WAN Interface* – WAN interface on which the UPnP function will operate;

To save the settings, click the «Apply Changes» button.

4.4.5 The «RIP» submenu. Dynamic routing configuration

This section is used to select the interfaces on your device is that use RIP, and the version of the protocol used. Enable the RIP if you are using this device as a RIP-enabled Device to communicate with others using the Routing Information Protocol.

Services → RIP



- *RIP (Enable/Disable)* – enable/disable the use of dynamic routing protocol RIP;

To accept and save the settings, click the «Apply Changes» button.

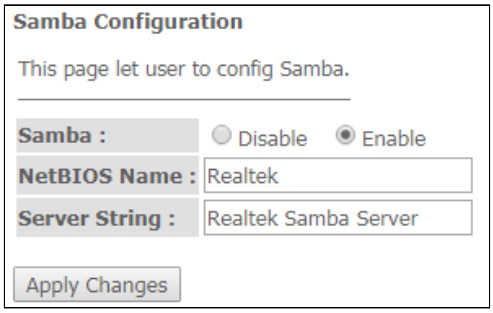
- *Interface* – interface on which RIP will be started;
- *Receive Mode* – incoming packets processing mode (NONE, RIP1, RIP2, both);
- *Send Mode* – sending mode (NONE, RIP1, RIP2, RIP1 COMPAT).

Interfaces with the support for RIP are displayed in the *«RIP Config Table»*. To delete all entries in the table click the «Delete All» button; to delete one position from the list select it and click «Delete Selected».

4.4.6 The «Samba» submenu. Configuration of Samba users

In this submenu you can configure Samba users.

Services → Samba → Samba

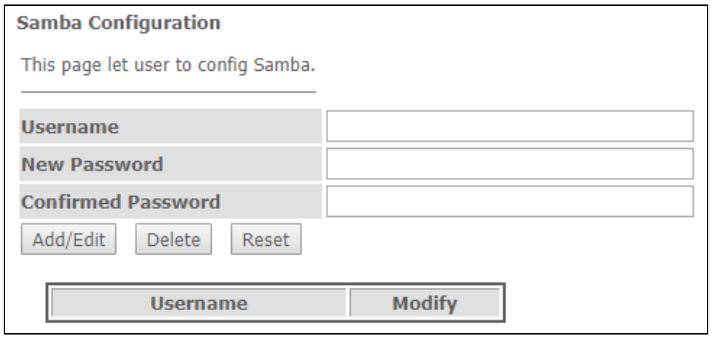


- *Samba Enable/Disable* – enable/disable Samba configuration;
- *Server String* – server name.

To save the changes, click the «Apply Changes» button.

In the *«Accounts»* section you can create personal Samba accounts.

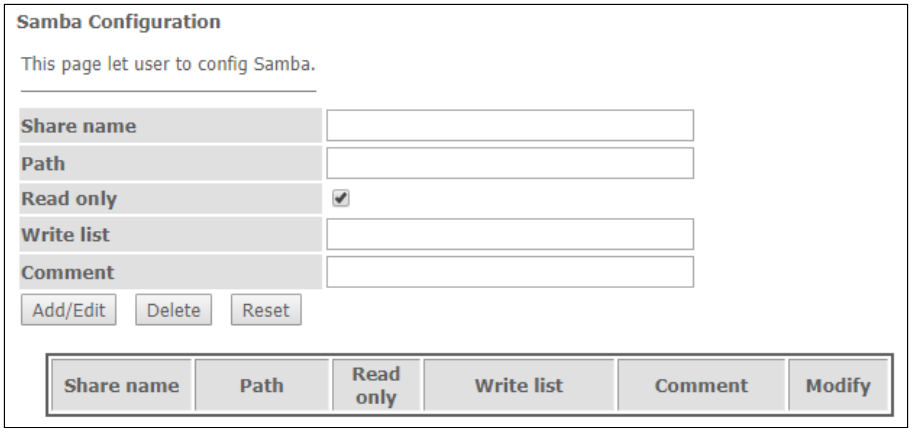
Services → Samba → Accounts



- *Username* – account name;
- *New password* – password;
- *Confirmed Password* – password confirmation.

The «*Shares*» section is used to add Samba library.

Services → Samba → Shares



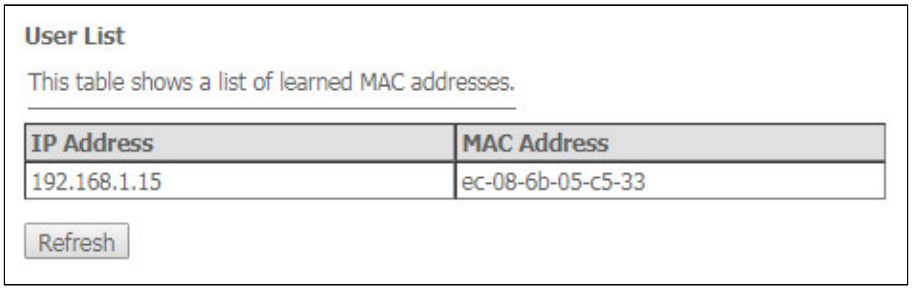
- *Share name* – library name;
- *Path* – path to library;
- *Read only* – read only;
- *Write list* – list of accounts who can change files in the library;
- *Comment* – comment for the library.

4.5 The «Advance» menu. Advanced settings

4.5.1 The «ARP Table» menu. View ARP cache

This section shows a list of learned MAC addresses. The ARP efficiency depends a lot on ARP cache presented in every host. The cache contains Internet addresses and corresponding hardware addresses. Every record created in the cache is stored for 5 minutes.

Advance → ARP table



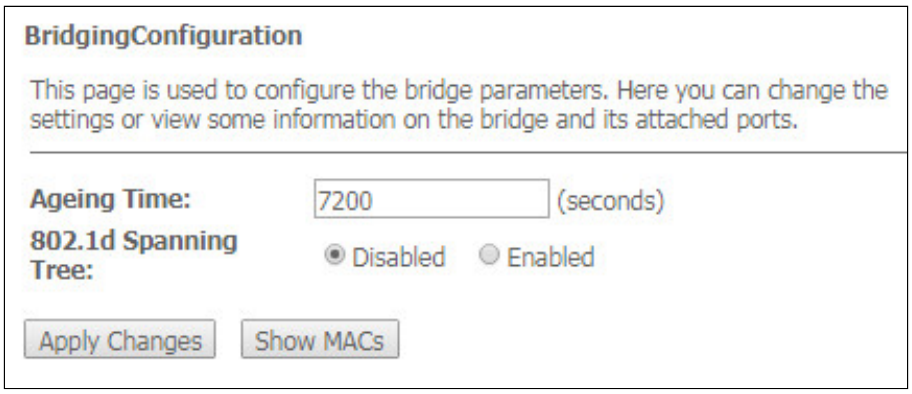
- *IP Address* – IP address of the client;
- *MAC Address* – MAC address of the client.

To update the information, click the «Refresh» button.

4.5.2 The «Bridging» submenu. Bridging parameters configuration

In this section you can configure bridge parameters. Here you can configure aging time of addresses in MAC table as well as to enable/disable 802.1d Spanning Tree.

Advance → Bridging

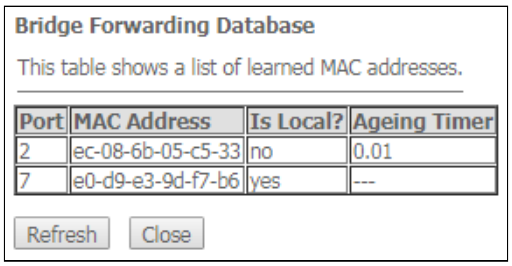


- *Ageing Time* – address lifetime (s);
- *802.1d Spanning Tree (Enable/Disable)* – enable/disable 802.1d Spanning Tree protocol.

To save the changes, click the «Apply Changes» button.

To view the information about bridge and its connected ports click the «Show MACs» button.

Advance → Bridging → Show MACs



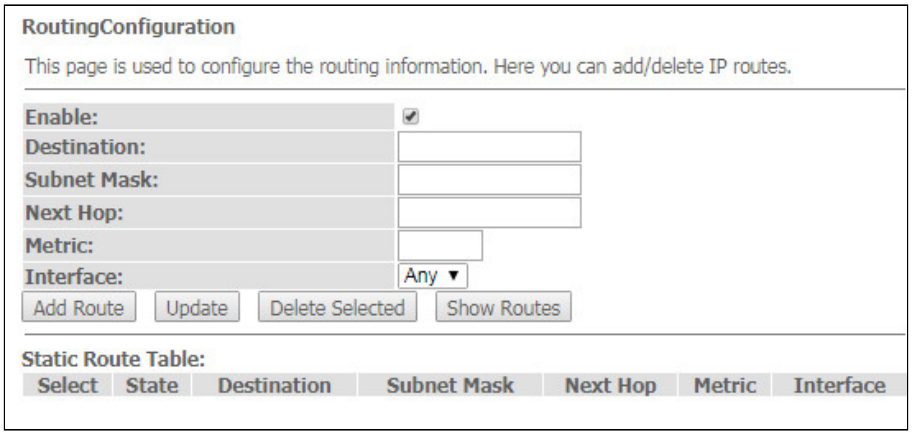
- *Port* – port number;
- *MAC Address* – MAC address;
- *Is Local* – local address;
- *Ageing Timer* – address lifetime.

To update the information in the table, click the «Refresh» button, to close the table, click «Close».

4.5.3 The «Routing» submenu. Routing configuration

This submenu is used to configure static routing.

Advance → Routing



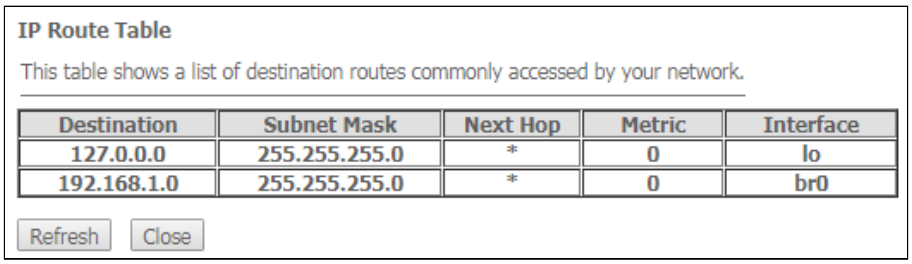
To add the static route check *«Enable»*, fill the corresponding fields and click «Add Route».

- *Enable* – flag for route adding;
- *Destination* – destination address;
- *Subnet Mask* – subnet mask;
- *Next Hop* – next host;
- *Metric* – metric;
- *Interface* – interface.

Added static routes are displayed in the *«Static Route Table»*. To update the information in the table, click the «Update» button, to delete the position from the table select it and click «Delete Selected».

To view the routes that the device often accesses, click the «Show Routes» button, then the *«IP Route Table»* will be displayed.

Advance → Routing → Show Routes

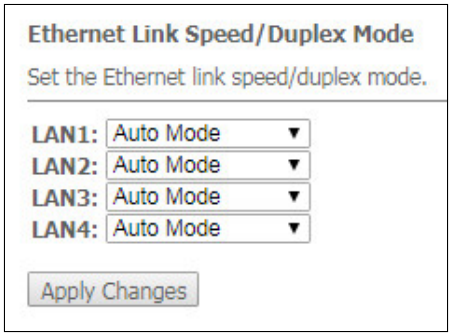


To update the information in the table, click the «Refresh» button, to close the table, click «Close».

4.5.4 The «Link mode» submenu. LAN ports configuration

In this submenu you can set the LAN ports operation mode. *LAN1/2/3/4* – operation mode configuration; available modes: *10M Half Mode, 10M Full Mode, 100M Half Mode, 100M Full Mode* and *Auto Mode* (auto-negotiation mode).

Advance → Link mode

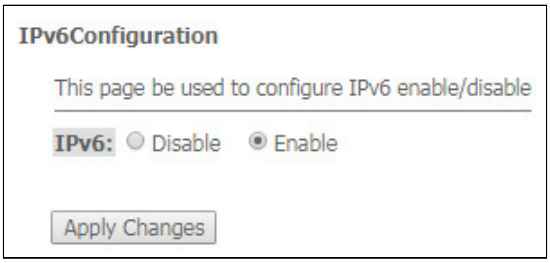


To save the changes, click the «Apply Changes» button.

4.5.5 The «IPv6» submenu. IPv6 configuration

In this section you can enable/disable IPv6 operation. For this you should check *«Enable/Disable»*.

Advance → IPv6

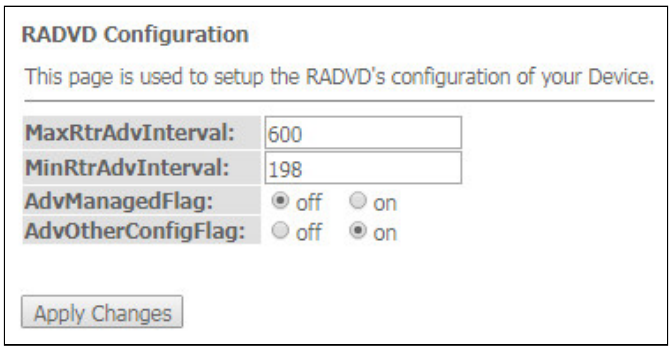


To save the changes, click the «Apply Changes» button.

4.5.5.1 The «RADVD» submenu. RADVD configuration

In this submenu you can configure RADVD (Router Advertisement Daemon).

Advance → IPv6 → RADVD



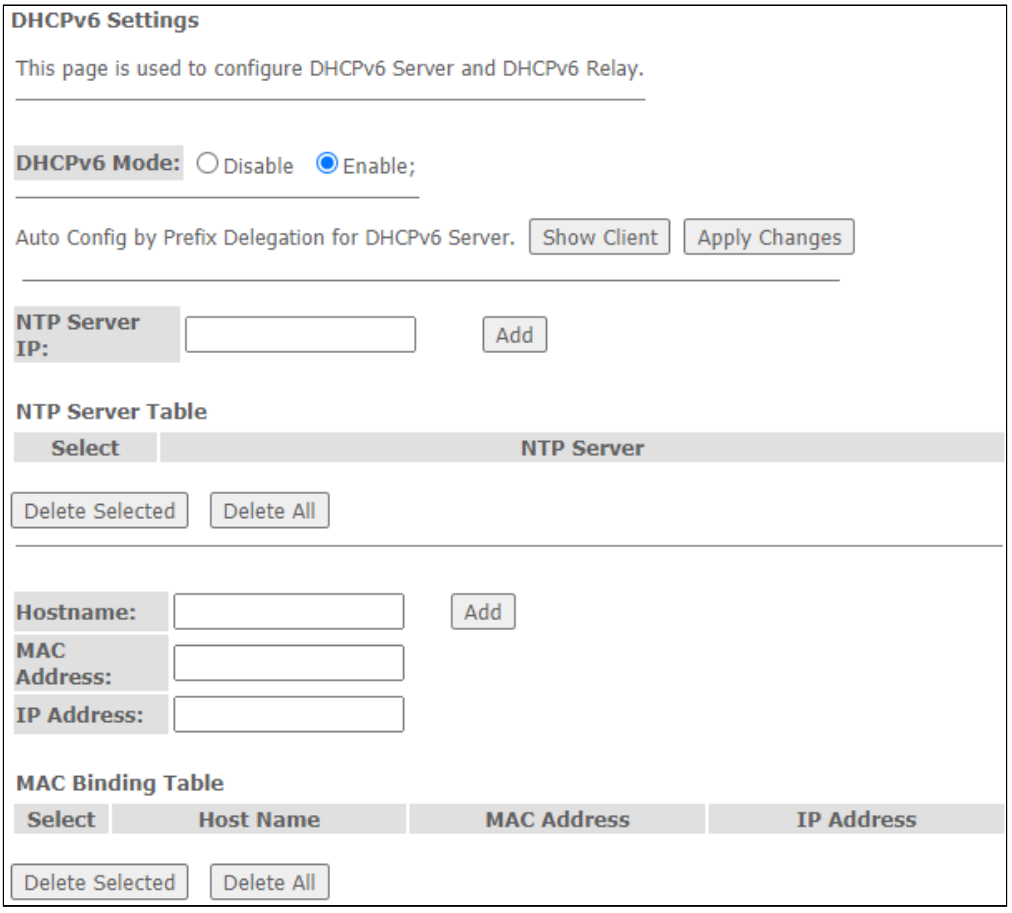
- *MaxRtrAdvInterval* – maximum RA (Router Advertisement) sending interval;
- *MinRtrAdvInterval* – minimum RA sending interval;
- *AdvManagedFlag* – enable/disable «Managed» flag sending in RA;
- *AdvOtherFlag* – enable/disable Other RA flag sending.

To save the changes, click the «Apply Changes» button.

4.5.5.2 The «DHCPv6 setting» submenu. DHCPv6 server configuration

This submenu is used to configure DHCPv6 server. By default, it operates in auto configuration mode (DHCPServer(Auto)) via prefix delegation.

Advance → IPv6 → DHCPv6

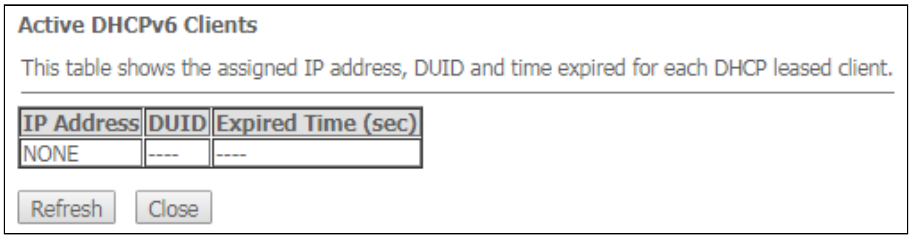


- *DHCPv6 Mode* – enable/disable DHCPv6 server operation;
- *NTP Server IP* – configure the IP address of the NTP server to synchronize time;
- *Hostname* – specify the hostname;
- *MAC Address* – specify the client's MAC address to bind the IP address;

- *IP Address* – specify the client's IP address to bind the MAC address;

To save the changes, click the «Apply Changes» button. After clicking on the «Show Client» button, a table of active DHCPv6 server IP addresses will be displayed.

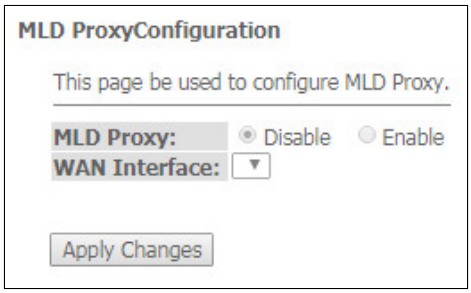
Advance → IPv6 → DHCPv6 → Show Client



4.5.5.3 The «MLD proxy» submenu. MLD proxy function configuration

In this section you can enable/disable MLD-proxy operation. For this you should check *«Enable/Disable»*.

Advance → IPv6 → MLD proxy

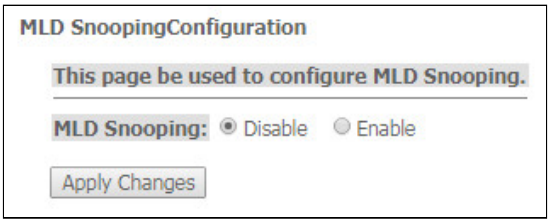


To save the changes, click the «Apply Changes» button.

4.5.5.4 The «MLD snooping» submenu. MLD snooping function configuration

In this section you can enable/disable MLD-snooping operation. For this you should check *«Enable/Disable»*.

Advance → IPv6 → MLD snooping

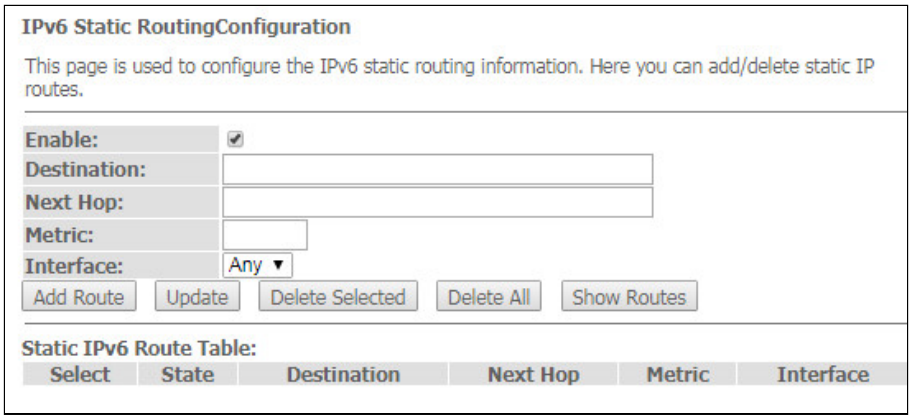


To save the changes, click the «Apply Changes» button.

4.5.5.5 The «IPv6 routing» routing. IPv6 routes configuration

This section configures static IPv6 routes.

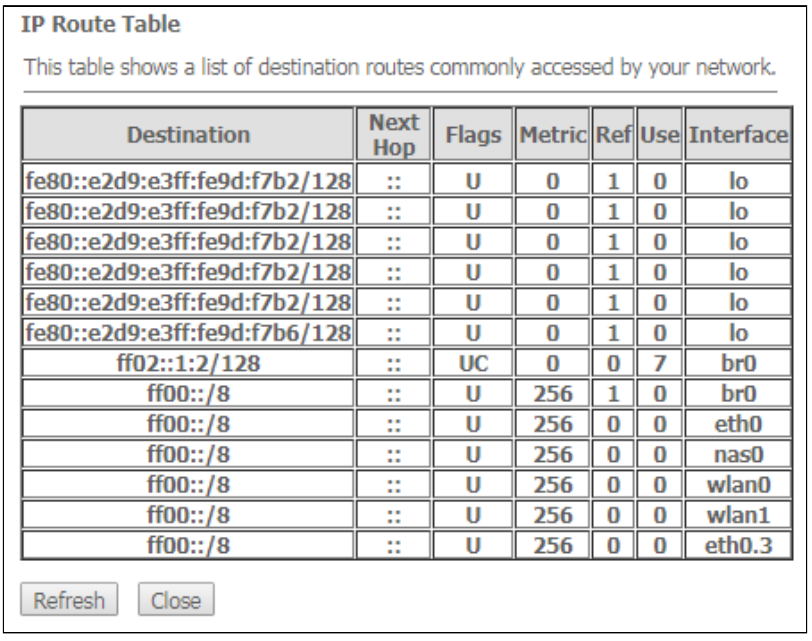
Advance → IPv6 → IPv6 routing



- *Enable* – flag for route adding;
- *Destination* – destination address;
- *Next Hop* – next host;
- *Metric* – metric;
- *Interface* – interface.

To add IPv6 Routing, fill in the appropriate fields and click the «Add Route» button: Added routes are displayed in the *«Static IPv6 Route Table»*, to update the information click the «Update» button. To delete the whole table, click the «Delete All» button; To delete one route, select it and click the «Delete Selected» button. The «Show Routes» button displays a table of static IPv6 routes that the network typically accesses.

Advance → IPv6 → IPv6 routing → Show Routes



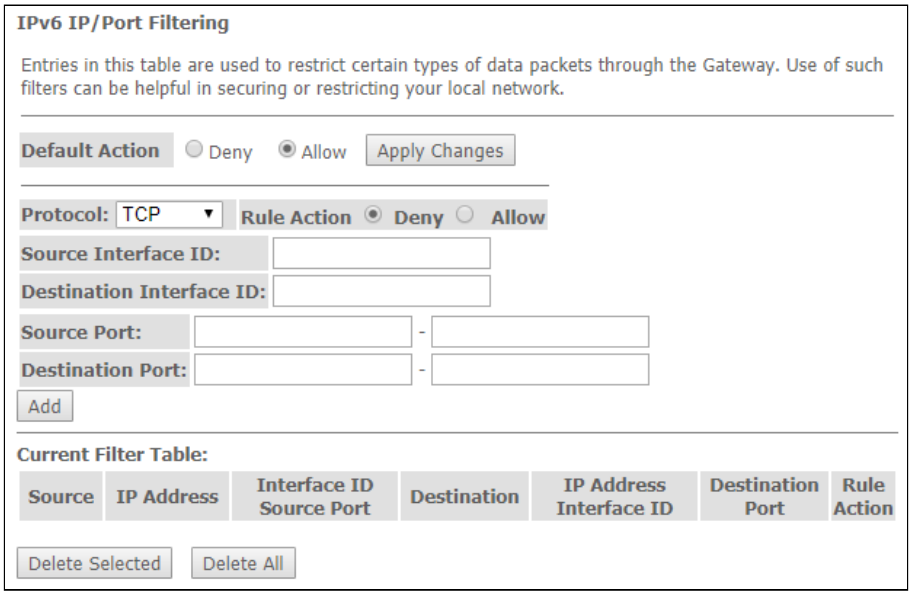
- *Destination* – destination network;
- *Next Hop* – nest host
- *Flags* – flags;
- *Metric* – metric;
- *Ref* – route source;
- *Use* – route usage;
- *Interface* – interface through which the specified route is available.

To update the table click «Refresh»; to close it click «Close»

4.5.5.6 The «IPv6 IP/Port filtering» submenu. Packet filtering configuration

Use this page to configure the filtering of data packets transmitted through the gateway.

Advance → IPv6 → IP/Port filtering



- *Default Action* – default action:
  - *Deny* – when checked, traffic pass is prohibited by default;
  - *Allow* – when checked, traffic pass is allowed by default;
- *Protocol* – select protocol;
- *Source Interface ID* – source interface;
- *Destination Interface ID* – destination interface;
- *Source Port* – source port;
- *Destination Port* – destination port.

To add a filter fill the corresponding fields and click the *«Add»* button. Added filters are displayed in the *«Current Filter Table»*. To delete the whole table, click the «Delete All» button; To delete one filter, select it and click the «Delete Selected» button.

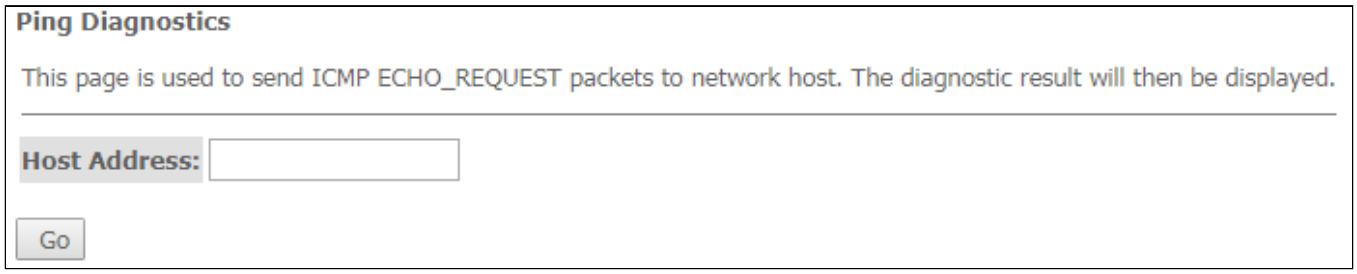
4.6 The «Diagnostics» submenu

Diagnostics section of access to various network nodes.

4.6.1 The «Ping» submenu. Checking the Availability of Network Devices

Use this menu to test the availability of network devices with Ping utility.

Diagnostics → Ping

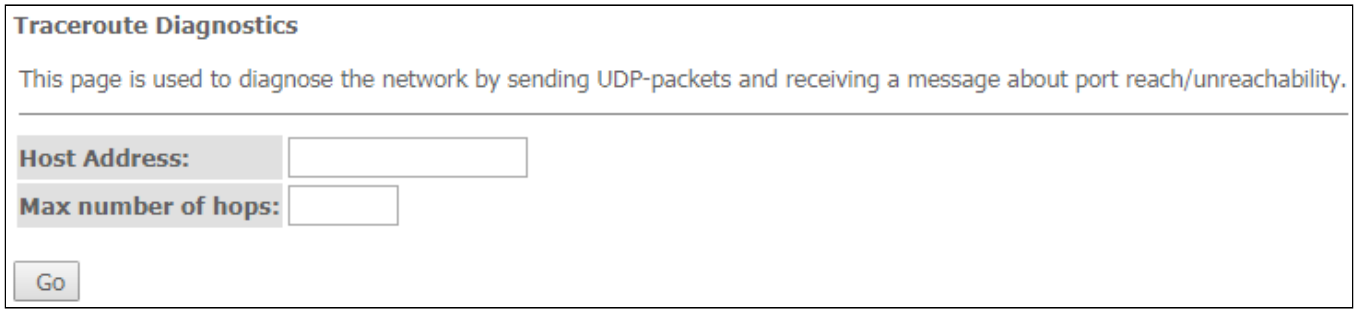


To test the availability of the connected device, enter its IP address into the *«Host Address»* field and click the «Go» button.

4.6.2 The «Traceroute» submenu

This submenu is intended for network diagnostics by sending UDP packets and receiving a message about port availability/inaccessibility.

Diagnostics → Traceroute



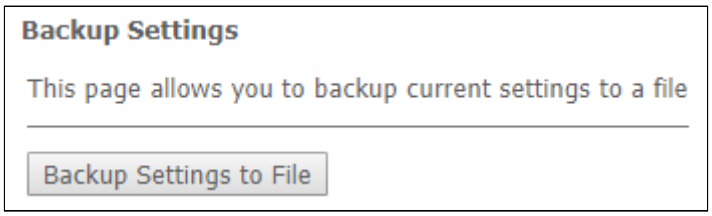
To display the path of the information packet from its source to its destination, you should enter its IP address in the *«Host Address»* field, specify the number of transit sections and press the «Go» button.

4.7 The «Admin» submenu

Device management section. In this menu, you can configure passwords, time, configurations, etc.

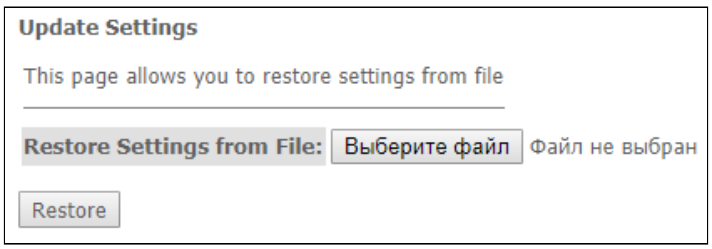
4.7.1 The «Settings» submenu. Configuration restore and reset

Admin → Settings → Backup Settings



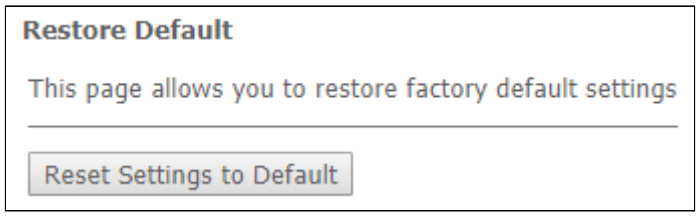
In this section, you can copy the current settings to a file *(Backup Settings)* by clicking on the «Backup Settings to File» button.

Admin → Settings → Update Settings



In this section, you can restore settings from a file that was previously saved *(Update Settings)* with the «Restore» button.

Admin → Settings → Restore Default

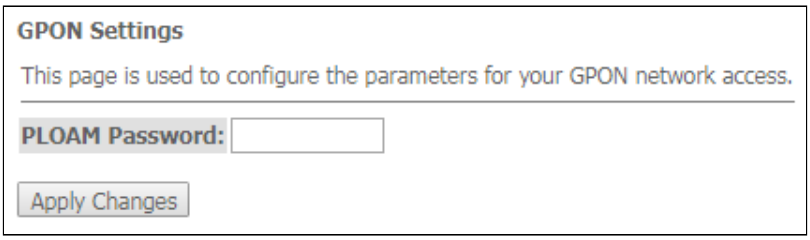


In this section you can reset the current settings to the factory default settings *(Restore Default)*, click the «Reset Settings to Default» button.

4.7.2 The «GPON Setting» submenu. GPON access configuration

In this section you can specify the password for activating the terminal on OLT.

Admin → GPON Setting



- *PLOAM Password* – password to activate the terminal on OLT.

To save the changes, click the «Apply Changes» button.

It is not recommended to change the activation password without consulting your ISP.

4.7.3 The «Commit/Reboot» submenu. Saving changes and rebooting the device

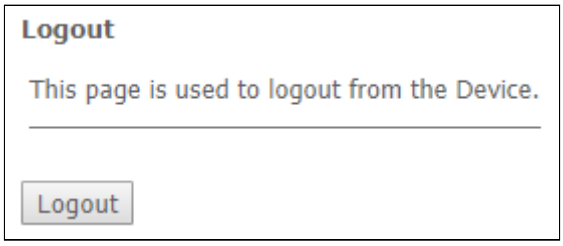
Click the «Commit and Reboot» button to reboot the device or to save changes in system memory. The rebooting process takes a few minutes to complete.

Admin → Commit/Reboot

4.7.4 The «Logout» submenu. Log Out

In this section it is possible to log out by clicking on the «Logout» button.

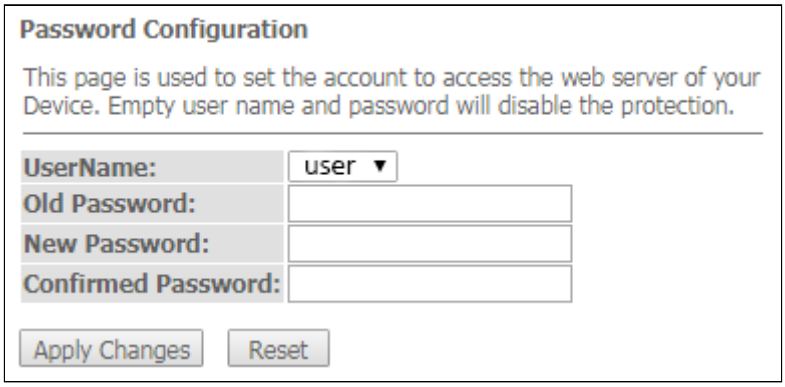
Admin → Logout



4.7.5 The «Password» submenu. Access control configuration (setting passwords)

In this section you can change a password to access the device.

Admin → Password



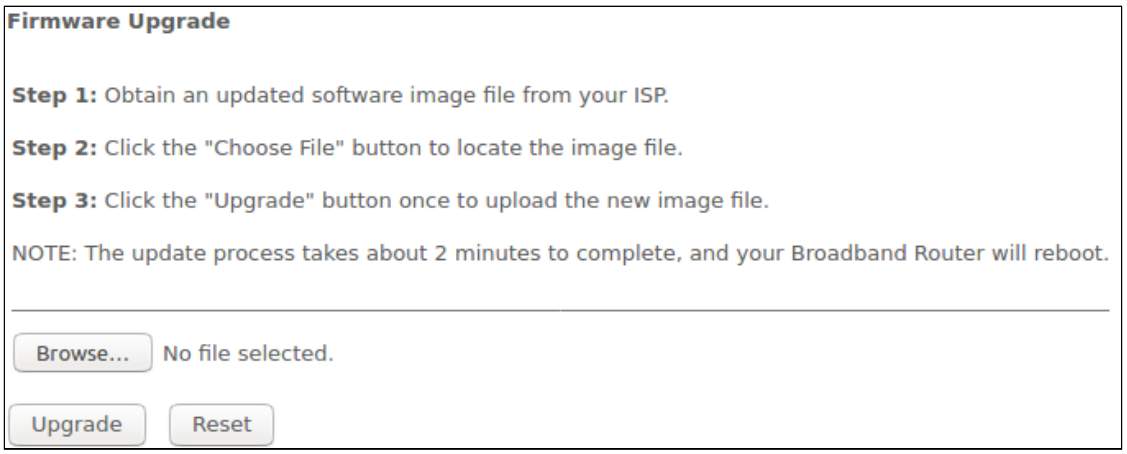
To change the password, you must enter the existing password in the *«Old Password»* field, then the new password in *«New Password»* and confirm it with *«Confirmed Password»*.

To confirm and save changes, click the «Apply changes» button. Click the «Reset» button to reset the value.

4.7.6 The «Firmware upgrade» submenu. Firmware Update

To update firmware, it is necessary to select firmware file by using the «Select file» button and click «Upgrade». To reset the value, click the «Reset» button.

Admin → Firmware upgrade

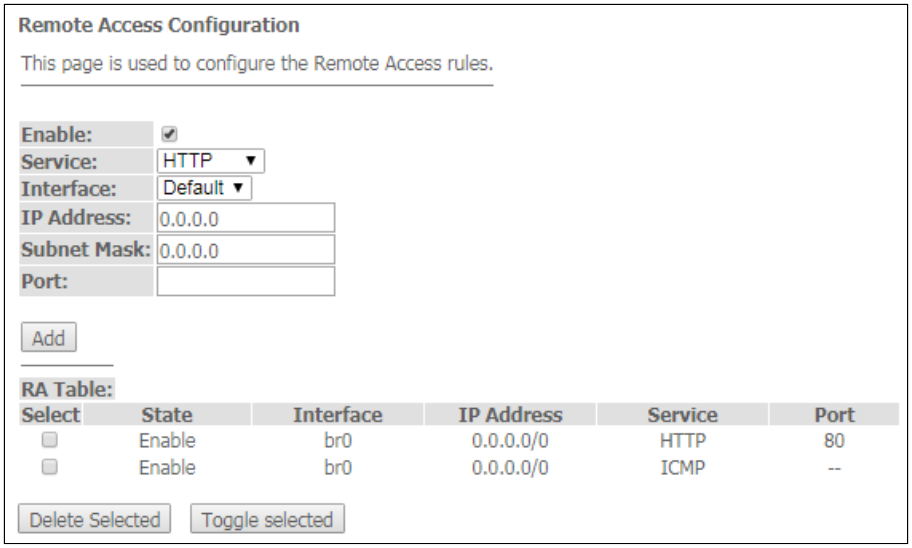


Do not switch off or reboot the device during the update. The process may take several minutes. The device will be automatically rebooted when the update is completed.

4.7.7 The «Remote Access» submenu. Remote access rules configuration

In this section you can configure remote access rules via HTTP/Telnet/ICMP protocols.

Admin → Remote Access



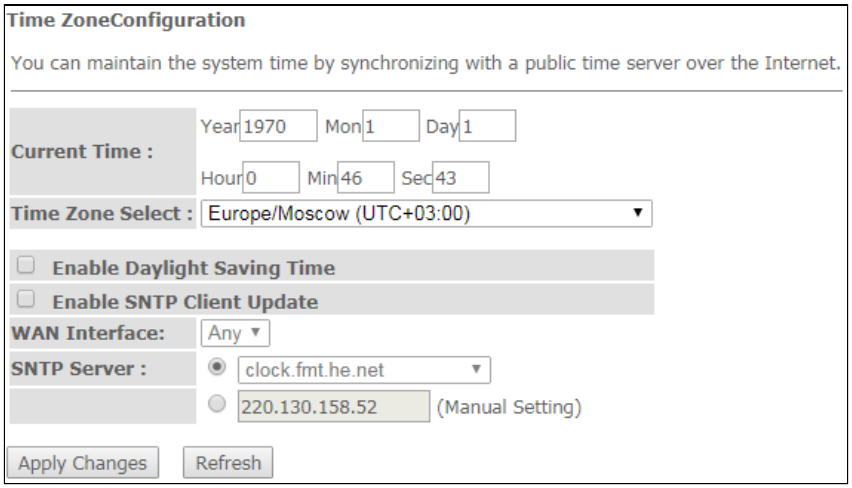
- Enable – enabling the rule to add;
- Service – selection of the protocol used;
- Interface – interface to which the rule applies;
- IP Address – source IP adress;
- Subnet Mask – subnet mask;
- Port – destination port.

To add a rule fill the corresponding fields and click the «Add» button. Added rules are displayed in the *«RA Table»*. To activate/deactivate the selected rule, click the *«Toggle selected»* button. To delete one rule, select it with a flag in the *Select* column and click the «Delete Selected» button.

4.7.8 The «Time zone» submenu. System time configuration

In this section you can configure the device system time. Synchronization with accurate online time-servers is available.

Admin → Time zone



- *Current time* – current time;
- *Time Zone Select* – timezone;
- *Enable Daylight Saving Time* – enable daylight saving time;
- *Enable SNTP Client Update* – enable time synchronization via SNMP;
- *WAN Interface* – interface for time update;
- *SNTP Server* – preferred time server.

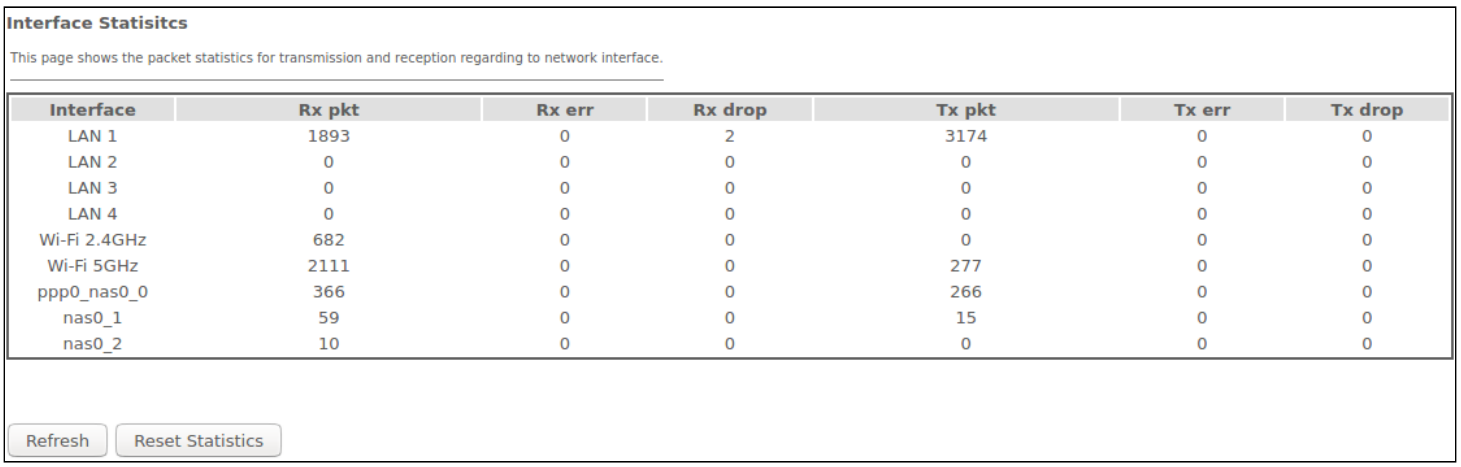
To save the changes click the «Apply Changes» button, update the information click «Refresh».

4.8 The «Statistics» menu. Traffic flow information for device ports

4.8.1 The «Interface» submenu. Information about timers and errors

This section displays timers/errors for packets for each interface:

Statistics → Interface



Interface	Rx pkt	Rx err	Rx drop	Tx pkt	Tx err	Tx drop
LAN 1	1893	0	2	3174	0	0
LAN 2	0	0	0	0	0	0
LAN 3	0	0	0	0	0	0
LAN 4	0	0	0	0	0	0
Wi-Fi 2.4GHz	682	0	0	0	0	0
Wi-Fi 5GHz	2111	0	0	277	0	0
ppp0_nas0_0	366	0	0	266	0	0
nas0_1	59	0	0	15	0	0
nas0_2	10	0	0	0	0	0

- *Interface* – interface;
- *Rx pkt* – packets received;
- *RX err* – errors on receive;
- *Rx drop* – rejected on receive;

- *Tx pkt* – packets sent;
- *Tx err* – transmission error;
- *Tx drop* – rejected on transmission.

4.8.2 Th «PON» submenu

This section displays timers for the optical interface:

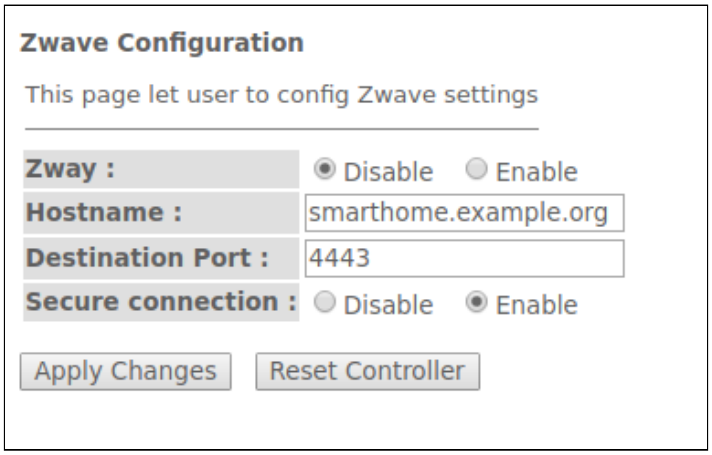
Statistics → PON

PON Statistics

Bytes Sent	58932
Bytes Received	196338
Packets Sent	330
Packets Received	1309
Unicast Packets Sent	324
Unicast Packets Received	445
Multicast Packets Sent	0
Multicast Packets Received	549
Broadcast Packets Sent	6
Broadcast Packets Received	315
FEC Errors	0
HEC Errors	0
Packets Dropped	0
Pause Packets Sent	0
Pause Packets Received	0

- *Bytes Sent* – transmitted bytes;
- *Bytes Received* – received bytes;
- *Packets Sent* – packets transmitted;
- *Packets Received* – packets received;
- *Unicast Packet Sent* – Unicast packets transmitted;
- *Unicast Packet Received* – Unicast packets received;
- *Multicast Packets Sent* – Multicast packets transmitted;
- *Multicast Packets Received* – Multicast packets received;
- *Broadcast Packet Sent* – Broadcast packets transmitted;
- *Broadcast Packet Received* – Broadcast packets received;
- *FEC Errors* – FEC errors
- *Packets Dropped* – packets rejected.

4.9 The «Z-Wave» menu. For NTU-RG-5421G-WZ, NTU-RG-5440G-WZ



Here you can configure «Smart Home» parameters.

- *Zway* – enable/disable the «Smart Home» controller;
- *Hostname* – specify the remote «Smart Home» platform address;
- *Destination port* – specify the platform port to which the «Smart Home» controller connects;
- *Secure connection* – set to Enable if a secure channel is used to communicate with the platform;
- *Reset controller (clear Zway cache)* – when clicking this button, the controller disables; all information on the platform connection, bound sensors and scenarios is removed.

To accept and save the settings, click the *«Apply Changes»* button.

5 The list of changes

Document version	Suitable firmware version	**Issue date**	**Revisions**
Version 1.4	2.1.0	07.2020	Fifth issue
Version 1.3	1.2.1	12.2019	Fourth issue
Version 1.2	1.2.0	10.2019	Third issue
Version 1.1	1.1.0	04.2019	Second issue
Version 1.0	1.0.1	11.2018	First issue