D-Link®

DVG-N5402G/ACF

Wireless AC1200 Dual Band Gigabit Router with Fiber WAN Port, 3G/LTE Support, 2 FXS Ports, 1 PSTN (lifeline) Port, and USB Port

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Introduction

CHAPTER 1.   INTRODUCTION

Contents and Audience

This manual describes the router DVG-N5402G/ACF and explains how to configure and operate it.

This manual is intended for users familiar with basic networking concepts, who create an in-home local area network, and system administrators, who install and configure networks in offices.

Conventions

Example	Description
text	The body text of the manual.
Before You Begin	A reference to a chapter or section of this manual.
"Quick Installation Guide"	A reference to a document.
Change	A name of a menu, menu item, control (field, checkbox, drop-down list, button, etc.).
`192.168.8.254`	Data that you should enter in the specified field.
❗ <u>Information</u>	An important note.

Document Structure

Chapter 1 describes the purpose and structure of the document.

Chapter 2 gives an overview of the router's hardware and software features, describes its appearance and the package contents.

Chapter 3 explains how to install the router DVG-N5402G/ACF and configure a PC in order to access its web-based interface.

Chapter 4 describes all pages of the web-based interface in detail.

Chapter 5 includes safety instructions and tips for networking.

Chapter 6 introduces abbreviations and acronyms used in this manual.

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CHAPTER 2. OVERVIEW

General Information

The DVG-N5402G/ACF device is a wireless dual band gigabit VoIP router with fiber WAN port, 3G/LTE support, two FXS ports, PSTN (lifeline) port, USB port, and built-in 4-port switch.

The router is equipped with a USB port for connecting a USB modem[1], which can be used to establish connection to the Internet. In addition, to the USB port of the router you can connect a USB storage device, which will be used as a network drive, or a printer.

Also you are able to connect the wireless router DVG-N5402G/ACF to a fiber optic line via the fiber WAN port of the device and use a high-speed Internet connection to successfully fulfill a wide range of professional tasks. The built-in 4-port switch enables you to connect Ethernet-enabled computers, game consoles, and other devices to your network. In addition, any Ethernet port of the device can be configured to connect to a private Ethernet line.

Using the DVG-N5402G/ACF device, you are able to quickly create a high-speed wireless network at home or in your office, which lets computers and mobile devices access the Internet virtually anywhere (within the operational range of your wireless network). Simultaneous activity of 2.4GHz band and 5GHz band allows performing a wide range of tasks. The router can operate as a base station for connecting wireless devices of the standards 802.11a, 802.11b, 802.11g, 802.11n, and 802.11ac (at the wireless connection rate up to 1167Mbps[2]).

The router supports multiple functions for the wireless interface: several security standards (WEP, WPA/WPA2), MAC address filtering, WPS, WMM.

In addition, the device is equipped with a button for switching the Wi-Fi network off/on. If needed, for example, when you leave home, you can easily switch the router's WLAN by pressing the button, and devices connected to the LAN ports of the router will stay online.

Support of guest Wi-Fi network allows you to create a separate wireless network with individual security settings and maximum rate limitation. Devices connected to the guest network will be able to access the Internet, but will be isolated from the devices and resources of the router's LAN.

The wireless router DVG-N5402G/ACF includes a built-in firewall. The advanced security functions minimize threats of hacker attacks, prevent unwanted intrusions to your network, and block access to unwanted websites for users of your LAN.

You can configure the settings of the wireless router DVG-N5402G/ACF via the user-friendly web-based interface (the interface is available in several languages).

You can simply update the firmware: the router itself finds approved firmware on D-Link update server and notifies when ready to install it.

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1 Not included in the delivery package. D-Link does not guarantee compatibility with all USB modems. For the list of supported USB modems, see the **Specifications*** section, page 7.

2 Up to 300Mbps for 2.4GHz and up to 867Mbps for 5GHz.

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*Specifications**

Hardware	
Interfaces	· 1000BASE-X SFP WAN port · 4 10/100/1000BASE-T LAN ports · 2 RJ-11 FXS ports · 1 RJ-11 PSTN (lifeline) port · USB 2.0 port
LEDs	· POWER · 2.4GHz · 5GHz · SFP · 4 LAN LEDs · USB · LINE · 2 PHONE LEDs · WPS
Buttons	· ON/OFF button to power on/power off · RESET button to restore factory default settings · WPS button to set up secure wireless connection and enable/disable wireless network
Antenna	· Two external non-detachable antennas (5dBi gain for 2.4GHz and 5GHz)
MIMO	· 2 x 2
Power connector	· Power input connector (DC)

Phone	
General SIP Features	· Individual account per port · Invite with Challenge · Register by IP address or domain name of SIP server · Backup proxy support · Support of DHCP option 120 · RFC3986 SIP URI format support · Outbound proxy support · STUN client · NAT keep-alive · Call types: voice/modem/fax · User programmable Dial Plan · Manual peer table (P2P)

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* The device features are subject to change without notice. For the latest versions of the firmware and relevant documentation, visit www.dlink.ru.

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Phone	
Call Features	· Direct IP-to-IP call without SIP proxy · Lifeline (PSTN-backup) · PSTN call by prefix · Call hold/retrieve · Call awaiting · Forwarding (unconditional, busy, no answer) · Do Not Disturb · Blocking hidden number calls · Speed dialing · Phone book · Hotline · Vertical service codes · Intercom (internal calls without SIP server) · Filtering by IP address (white/black list) · Alarm clock
Voice Features	· Codecs: G.711 a/μ-law, G.729A, G.726, G.722, G.723.1 · DTMF detection and generation · In-band DTMF, out-of-band DTMF (RFC2833, SIP-INFO) · Comfort Noise Generation (CNG) · Voice Activity Detection (VAD) · Dynamic Jitter Buffer · Call progress tone generation (FXS) · DTMF/PULSE dial support · Caller ID detection and generation · T.30 FAX bypass to G.711, T.38 Real Time FAX Relay · Adjustable Flash Time · Volume control (speaker/microphone)

Software	
WAN connection types	· LTE · 3G · PPPoE · IPv6 PPPoE · PPPoE Dual Stack · Static IP / Dynamic IP · Static IPv6 / Dynamic IPv6 · PPPoE + Static IP / Dynamic IP · PPTP/L2TP · PPTP/L2TP + Static IP · PPTP/L2TP + Dynamic IP

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Software	
Network functions	· Support of IEEE 802.1X for Internet connection · DHCP server/relay · DHCPv6 server (Stateful/Stateless), IPv6 prefix delegation · DNS relay · Support of DNSv6 AAAA records · Dynamic DNS · Static IP routing · Static IPv6 routing · IGMP Proxy · RIP · Support of UPnP IGD · Support of VLAN · WAN ping respond · Support of SIP ALG · Support of RTSP · Autonegotiation of speed, duplex mode, and flow control/Manual speed and duplex mode setup for each Ethernet port
Firewall functions	· Network Address Translation (NAT) · Stateful Packet Inspection (SPI) · IP filter · IPv6 filter · MAC filter · URL filter · DMZ · Prevention of ARP and DDoS attacks · Virtual servers
VPN	· IPSec/PPTP/L2TP/PPPoE pass-through · IPSec tunnels
USB interface functions	· USB modem Auto connection to available type of supported network (4G/3G/2G)[3] Auto configuration of connection upon plugging in USB modem[4] Enabling/disabling PIN code check, changing PIN code[5] · USB storage File browser Print server Access to storage via accounts Built-in Samba server Built-in FTP server Built-in DLNA server Built-in Transmission torrent client; uploading/downloading files from/to USB storage

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3 For LTE and GSM USB modems.

4 For LTE and GSM USB modems.

5 For GSM USB modems and some models of LTE USB modems.

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Software	
Management	· Local and remote access to settings through TELNET/WEB (HTTP/HTTPS)
	· Multilingual web-based interface for configuration and management
	· Notification on connection problems and auto redirect to settings
	· Firmware update via web-based interface
	· Automatic notification on new firmware version
	· Saving/restoring configuration to/from file
	· Support of logging to remote host/connected USB storage
	· Automatic synchronization of system time with NTP server and manual time/date setup
	· Ping utility
	· Traceroute utility
	· TR-069 client

Wireless Module Parameters	
Standards	· IEEE 802.11a/n/ac
	· IEEE 802.11b/g/n
Frequency range	· 2400 ~ 2483.5MHz
	· 5150 ~ 5350MHz
	· 5650 ~ 5725MHz
Wireless connection security	· WEP
	· WPA/WPA2 (Personal/Enterprise)
	· MAC filter
	· WPS (PBC/PIN)
Advanced functions	· Support of client mode
	· WMM (Wi-Fi QoS)
	· Information on connected Wi-Fi clients
	· Advanced settings
	· Guest Wi-Fi / support of MBSSID
	· Limitation of wireless network rate
Wireless connection rate	· IEEE 802.11a: 6, 9, 12, 18, 24, 36, 48, and 54Mbps
	· IEEE 802.11b: 1, 2, 5.5, and 11Mbps
	· IEEE 802.11g: 6, 9, 12, 18, 24, 36, 48, and 54Mbps
	· IEEE 802.11n (2.4GHz/5GHz): from 6.5 to 300Mbps (from MCS0 to MCS15)
	· IEEE 802.11ac (5GHz): from 6.5 to 867Mbps (from MCS0 to MSC9)
Transmitter output power *The maximum value of the transmitter output power depends upon the radio frequency regulations applied in your country*	· 802.11a (typical at room temperature 25 °C) 15dBm at 6, 54Mbps
	· 802.11b (typical at room temperature 25 °C) 14dBm at 1, 2, 5.5, 11Mbps
	· 802.11g (typical at room temperature 25 °C) 14dBm at 6, 9, 12, 18, 24, 36, 48, 54Mbps
	· 802.11n (typical at room temperature 25 °C) 2.4GHz, HT20 13dBm at MCS0~15 2.4GHz, HT40 12dBm at MCS0~15 5GHz, HT20/HT40 15dBm at MCS0 15dBm at MCS7
	· 802.11ac (typical at room temperature 25 °C) VHT20/VHT40/VHT80 15dBm at MCS0 15dBm at MCS9

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Wireless Module Parameters

Receiver sensitivity	· 802.11a (typical at PER < 10% at room temperature 25 °C)
	-87dBm at 6Mbps
	-86dBm at 9Mbps
	-84dBm at 12Mbps
	-82dBm at 18Mbps
	-79dBm at 24Mbps
	-76dBm at 36Mbps
	-71dBm at 48Mbps
	-70dBm at 54Mbps
	· 802.11b (typical at PER = 10% at room temperature 25 °C)
	-84dBm at 1, 2Mbps
	-82dBm at 5.5Mbps
	-79dBm at 11Mbps
	· 802.11g (typical at PER = 10% at room temperature 25 °C)
	-82dBm at 6Mbps
	-81dBm at 9Mbps
	-79dBm at 12Mbps
	-77dBm at 18Mbps
	-74dBm at 24Mbps
	-70dBm at 36Mbps
	-66dBm at 48Mbps
	-65dBm at 54Mbps
	· 802.11n (typical at PER < 10% at room temperature 25 °C)
	2.4GHz, HT20
	-82dBm at MCS0/8
	-79dBm at MCS1/9
	-77dBm at MCS2/10
	-74dBm at MCS3/11
	-70dBm at MCS4/12
	-66dBm at MCS5/13
	-65dBm at MCS6/14
	-64dBm at MCS7/15
	2.4GHz, HT40
	-79dBm at MCS0/8
	-76dBm at MCS1/9
	-74dBm at MCS2/10
	-71dBm at MCS3/11
	-67dBm at MCS4/12
	-63dBm at MCS5/13
	-62dBm at MCS6/14
	-61dBm at MCS7/15
	5GHz, HT20
	-86dBm at MCS0/8
	-83dBm at MCS1/9
	-81dBm at MCS2/10
	-77dBm at MCS3/11
	-75dBm at MCS4/12
	-70dBm at MCS5/13
	-69dBm at MCS6/14
	-68dBm at MCS7/15
	5GHz, HT40
	-83dBm at MCS0/8
	-80dBm at MCS1/9
	-78dBm at MCS2/10
	-75dBm at MCS3/11
	-72dBm at MCS4/12
	-67dBm at MCS5/13
	-66dBm at MCS6/14
	-65dBm at MCS7/15

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Wireless Module Parameters	
	· 802.11ac (typical at PER < 10% at room temperature 25 °C) HT20 -61dBm at MCS8 -59dBm at MCS9 HT40 -58dBm at MCS8 -56dBm at MCS9 HT80 -80dBm at MCS0 -77dBm at MCS1 -75dBm at MCS2 -71dBm at MCS3 -69dBm at MCS4 -64dBm at MCS5 -62dBm at MCS6 -61dBm at MCS7 -56dBm at MCS8 -53dBm at MCS9
Modulation schemes	· 802.11a: BPSK, QPSK, 16QAM, 64QAM with OFDM · 802.11b: DQPSK, DBPSK, CCK · 802.11g: BPSK, QPSK, 16QAM, 64QAM with OFDM · 802.11n: BPSK, QPSK, 16QAM, 64QAM with OFDM · 802.11ac: BPSK, QPSK, 16QAM, 64QAM, up to 256QAM with OFDM

Physical Parameters	
Dimensions (L x W x H)	· 227 x 159 x 38 mm (8.93 x 6.26 x 1.5 in)
Weight	· 160 g (0.35 lb)

Operating Environment	
Power	· Output: 12V DC, 2A
Temperature	· Operating: from 0 to 40 °C · Storage: from -20 to 65 °C
Humidity	· Operating: from 10% to 90% (non-condensing) · Storage: from 5% to 95% (non-condensing)

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Supported USB modems[6]	
GSM	· Alcatel X500 · D-Link DWM-152C1 · D-Link DWM-156A6 · D-Link DWM-156A7 · D-Link DWM-156C1 · D-Link DWM-157B1 · D-Link DWM-157B1 (Velcom) · D-Link DWM-158D1 · D-Link DWR-710 · Huawei E150 · Huawei E1550 · Huawei E156G · Huawei E160G · Huawei E169G · Huawei E171 · Huawei E173 (Megafon) · Huawei E220 · Huawei E352 (Megafon) · Prolink PHS600 · ZTE MF112 · ZTE MF192 · ZTE MF626 · ZTE MF627 · ZTE MF652 · ZTE MF667 · ZTE MF668 · ZTE MF752
CDMA	· Airplus MCD-650 · Airplus MCD-800 · AnyDATA ADU-300A · AnyDATA ADU-500A · AnyDATA ADU-510A · Huawei EC306 · ZTE AC5710 · ZTE AC5730
LTE	· Huawei E3131 · Huawei E3272 · Huawei E3351 · Huawei E3372 · Huawei E367 · Huawei E392 · Megafon M100-1 · Megafon M100-2 · Megafon M100-3 · Megafon M100-4 · Megafon M150-1 · Megafon M150-2 · Quanta 1K6E (Beeline 1K6E) · MTS 824F · MTS 827F · Yota LU-150 · Yota WLTUBA-107 · ZTE MF823 · ZTE MF827
Smartphones in USB tethering mode	· Some models of Android smartphones

6   The manufacturer does not guarantee proper operation of the router with every modification of the firmware of USB modems.

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Product Appearance

Front and Right Side Panels

Figure 1. Front panel view.

LED	Mode	Description
POWER	*Solid green*	The router is powered on.
	Blinking green	Firmware update is in progress.
	No light	The router is powered off.
2.4GHz 5GHz	*Solid green*	The router's WLAN of the relevant band is on.
	Blinking green	The WLAN interface of the relevant band is active (upstream or downstream traffic).
	No light	The router's WLAN of the relevant band is off.
SFP	*Solid green*	The cable is connected to the port.
	Blinking green	The SFP port is active (upstream or downstream traffic).
	No light	The cable is not connected.
LAN 1-4	*Solid green*	A device (computer) is connected to the relevant port, the connection is on.
	Blinking green	The LAN port is active (upstream or downstream traffic).
	No light	The cable is not connected to the relevant port.
USB	*Solid green*	A USB device is connected to the router's USB port.
	No light	No USB device.

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LED	Mode	Description
PHONE 1-2	*Solid green*	The receiver is on-hook, the phone is registered on the SIP server.
	Solid red	The receiver is off-hook, the phone is registered on the SIP server.
	Blinking green	The receiver is on-hook, an error occurred upon registration on the SIP server.
	Fast blinking red	If the receiver is on-hook: an incoming call. If the receiver is off-hook: dialing or talking.
	Slow blinking red	The line is busy.
	No light	The phone is not registered on the SIP server.
LINE	*Solid green*	Activity of the PSTN port (an incoming or outgoing call, dialing or talking).
	No light	The phone line is not connected or in the idle state.

On the right side panel of the router there is a **WPS** button designed to set up a secure wireless connection (the WPS function) and enable/disable the wireless network.

To use the WPS function: with the device turned on, push the button, hold it for 2 seconds, and release. The **WPS** LED should be blinking blue.

To enable/disable the router's wireless network: with the device turned on, press the button, hold for 10 seconds, and then release it.

A separate LED is located on the **WPS** button.

LED	Mode	Description
WPS	*Blinking blue*	Attempting to add a wireless device via the WPS function.
	No light	The WPS function is not in use.

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Back Panel

Figure 2. Back panel view.

Port	Description
DC 12V	Power connector.
ON/OFF	A button to turn the router on/off.
RESET	A button to restore the factory default settings. To restore the factory defaults, push the button (with the device turned on), hold it for 10 seconds, and then release the button.
USB	A port for connecting a USB device (modem, storage, printer).
LAN 1-4	4 Ethernet ports to connect computers or network devices. One port can be used to connect to a private Ethernet line.
SFP	An optical port to connect to a fiber optic line.
PHONE 1-2	Ports to connect analog phones.

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Port	Description
LINE	A PSTN port to connect to the telephone network.

The device is also equipped with two external non-detachable Wi-Fi antennas.

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Delivery Package

The following should be included:

- Router DVG-N5402G/ACF

- Power adapter DC 12V/2A

- Ethernet cable (CAT 5E)

- Two RJ-11 telephone cables

- "*Quick Installation Guide*" (brochure).

The "*User Manual*" and "*Quick Installation Guide*" documents are available on D-Link website (see www.dlink.ru).

> **!** Using a power supply with a different voltage rating than the one included will cause damage and void the warranty for this product.

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CHAPTER 3. INSTALLATION AND CONNECTION

Before You Begin

Please, read this manual prior to installing the device. Make sure that you have all the necessary information and equipment.

Operating System

Configuration of the wireless dual band gigabit VoIP router DVG-N5402G/ACF (hereinafter referred to as "the router") is performed via the built-in web-based interface. The web-based interface is available from any operating system that supports a web browser.

Web Browser

The following web browsers are recommended:

- Apple Safari 5 and later
- Google Chrome 10 and later
- Microsoft Internet Explorer 9 and later
- Microsoft Edge 20.10240 and later
- Mozilla Firefox 10 and later
- Opera 10 and later.

For successful operation, JavaScript should be enabled on the web browser. Make sure that JavaScript has not been disabled by other software (such as virus protection or web user security packages) running on your computer.

Wired or Wireless NIC (Ethernet or Wi-Fi Adapter)

Any computer that uses the router should be equipped with an Ethernet or Wi-Fi adapter (NIC). If your computer is not equipped with such a device, install an Ethernet or Wi-Fi adapter prior to using the router.

Wireless Connection

Wireless workstations from your network should be equipped with a wireless 802.11a, b, g, n, or ac NIC (Wi-Fi adapter). In addition, you should specify the values of SSID, channel number and security settings defined in the web-based interface of the router for all these wireless workstations.

SFP Transceiver

To connect to a fiber optic line, you need to use an SFP transceiver recommended by your ISP.

VoIP

On order to use VoIP over SIP, you need to connect an analog phone to the FXS port of the router. Then access the web-based interface of the router, and you will be able to configure all needed settings.

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USB Modem

To connect to an LTE, 3G GSM or CDMA network, you should use a USB modem. Connect it to the USB port of the router, then access the web-based interface of the router, and you will be able to configure a connection to the Internet[7].

!
Your USB modem should be equipped with an active identification card (SIM or R-UIM) of your operator.

Some operators require subscribers to activate their USB modems prior to using them. Please, refer to connection guidelines provided by your operator when concluding the agreement or placed on its website.

For LTE and CDMA USB modems, it is required to disable the PIN code check on the identification card prior to connecting the USB modem to the router.

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7   Contact your operator to get information on the service coverage and fees.

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Connecting to PC

PC with Ethernet Adapter

1. Make sure that your PC is powered off.

2. Connect an Ethernet cable between any of LAN ports located on the back panel of the router and the Ethernet port of your PC.

3. *To connect via USB modem*: connect your USB modem to the USB port[8] located on the back panel of the router.

   ❗ If you need to connect or change a USB modem to another one when the router is powered on, power off the router, connect the modem to the USB port, and power on the router.

4. *To connect the device to a fiber optic line*: connect your SFP transceiver to the SFP port, then connect the fiber optic cable to the SFP transceiver.

5. *To connect the device to an Ethernet line*: in the web-based interface of the router, select the router's LAN port that will be used as the WAN port and create an Ethernet WAN connection. Then connect an Ethernet cable between an available Ethernet port of the router and the Ethernet line.

   ❗ Please connect the router to the ISP's Ethernet line only after setting the WAN port and creating the Internet connection.

6. Connect the power cord to the power connector port on the back panel of the router, then plug the power adapter into an electrical outlet or power strip.

7. Turn on the router by pressing the **ON/OFF** button on its back panel.

8. Turn on your PC and wait until your operating system is completely loaded.

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8   It is recommended to use a USB extension cable to connect a USB modem to the router.

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Obtaining IP Address Automatically in OS Windows XP

1. Click the **Start** button and proceed to the **Control Panel > Network and Internet Connections > Network Connections** window.

2. In the **Network Connections** window, right-click the relevant **Local Area Connection** icon and select the **Properties** line in the menu displayed.
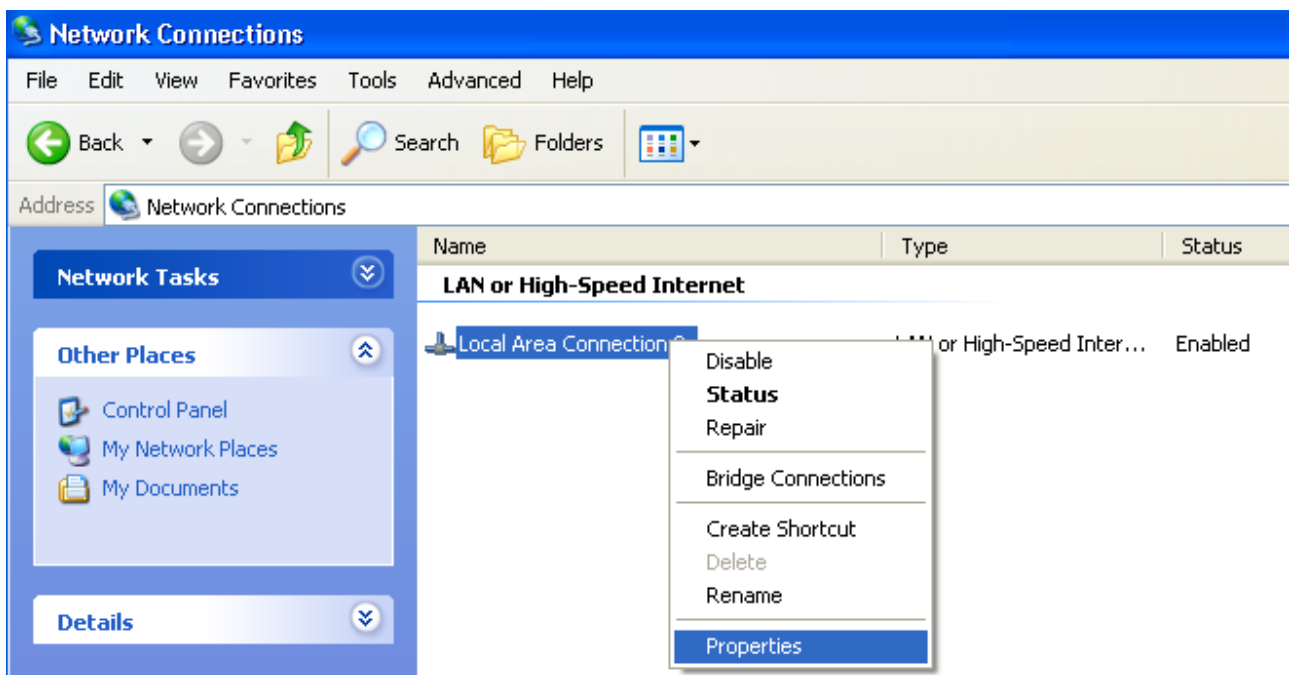
*Figure 3. The **Network Connections** window.*

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3. In the **Local Area Connection Properties** window, on the **General** tab, select the **Internet Protocol (TCP/IP)** line. Click the **Properties** button.
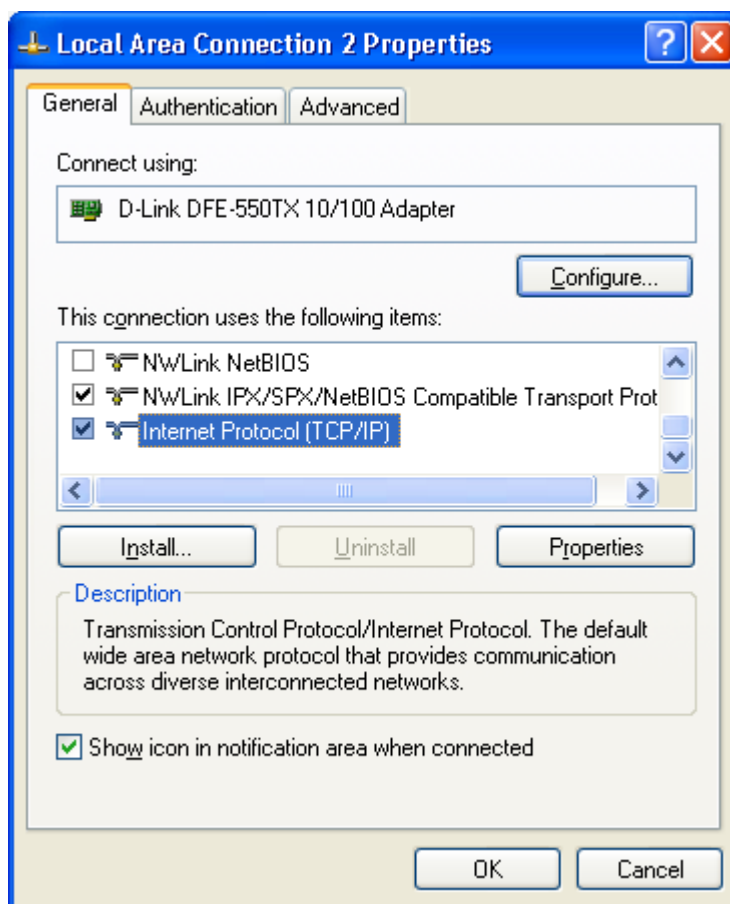
*Figure 4. The **Local Area Connection Properties** window.*

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4. Select the **Obtain an IP address automatically** and **Obtain DNS server address automatically** radio buttons. Click the **OK** button.
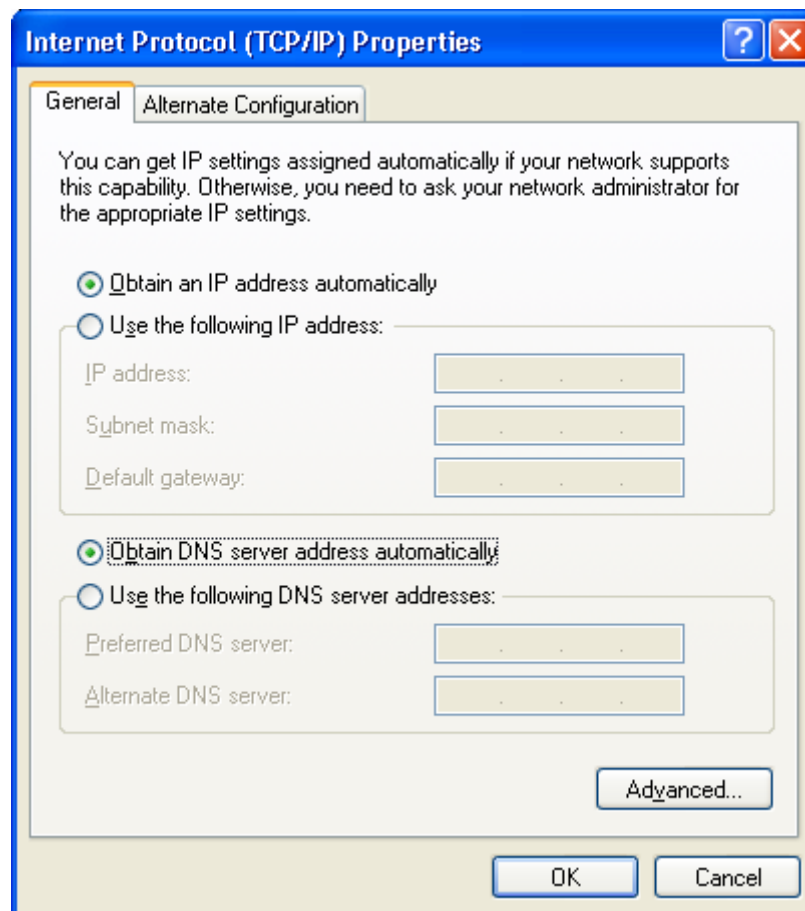
Figure 5. The Internet Protocol (TCP/IP) Properties window.

5. Click the **OK** button in the connection properties window.

Now your computer is configured to obtain an IP address automatically.

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Obtaining IP Address Automatically in OS Windows 7

1. Click the **Start** button and proceed to the **Control Panel** window.

2. Select the **Network and Sharing Center** section. (If the Control Panel has the category view (the **Category** value is selected from the **View by** drop-down list in the top right corner of the window), choose the **View network status and tasks** line under the **Network and Internet** section.)
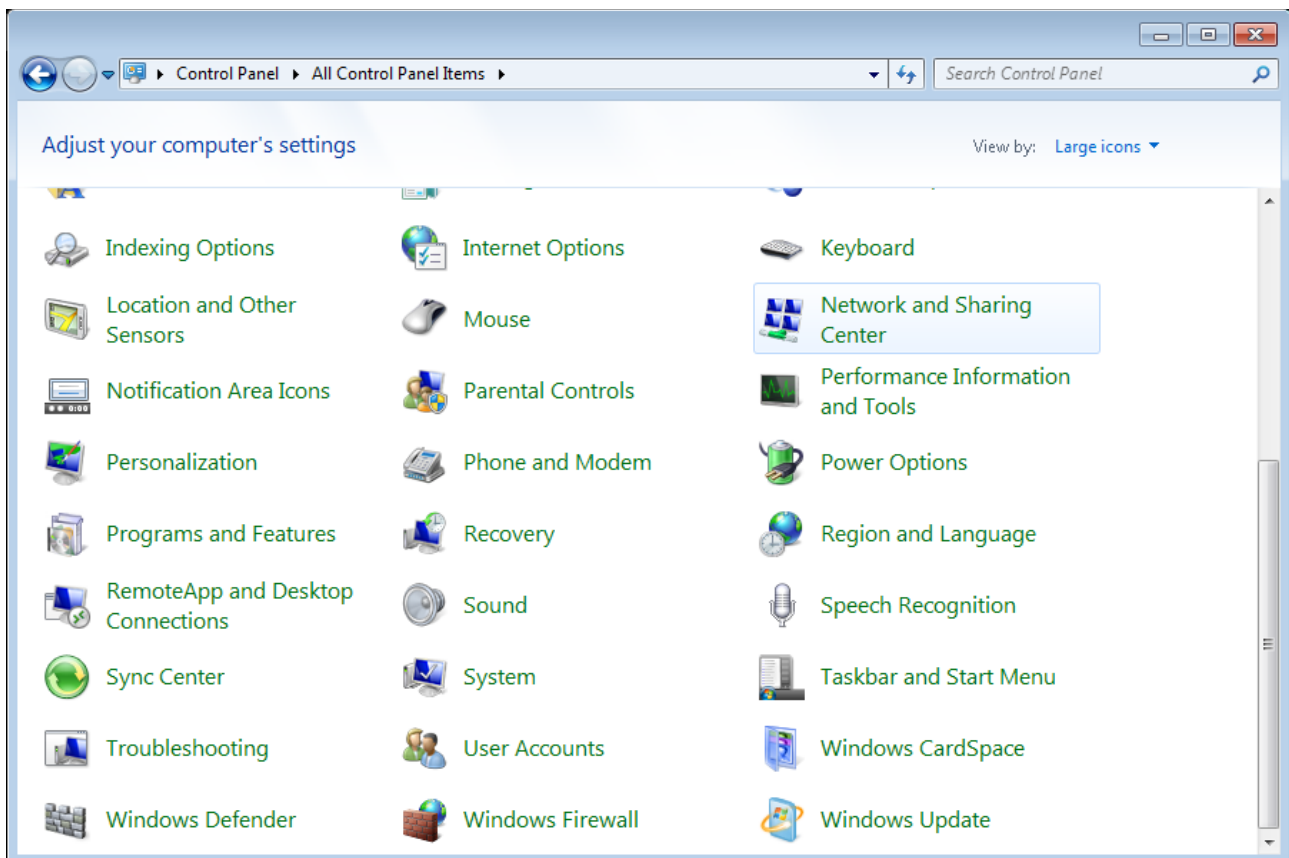
*Figure 6. The **Control Panel** window.*

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3. In the menu located on the left part of the window, select the **Change adapter settings** line.
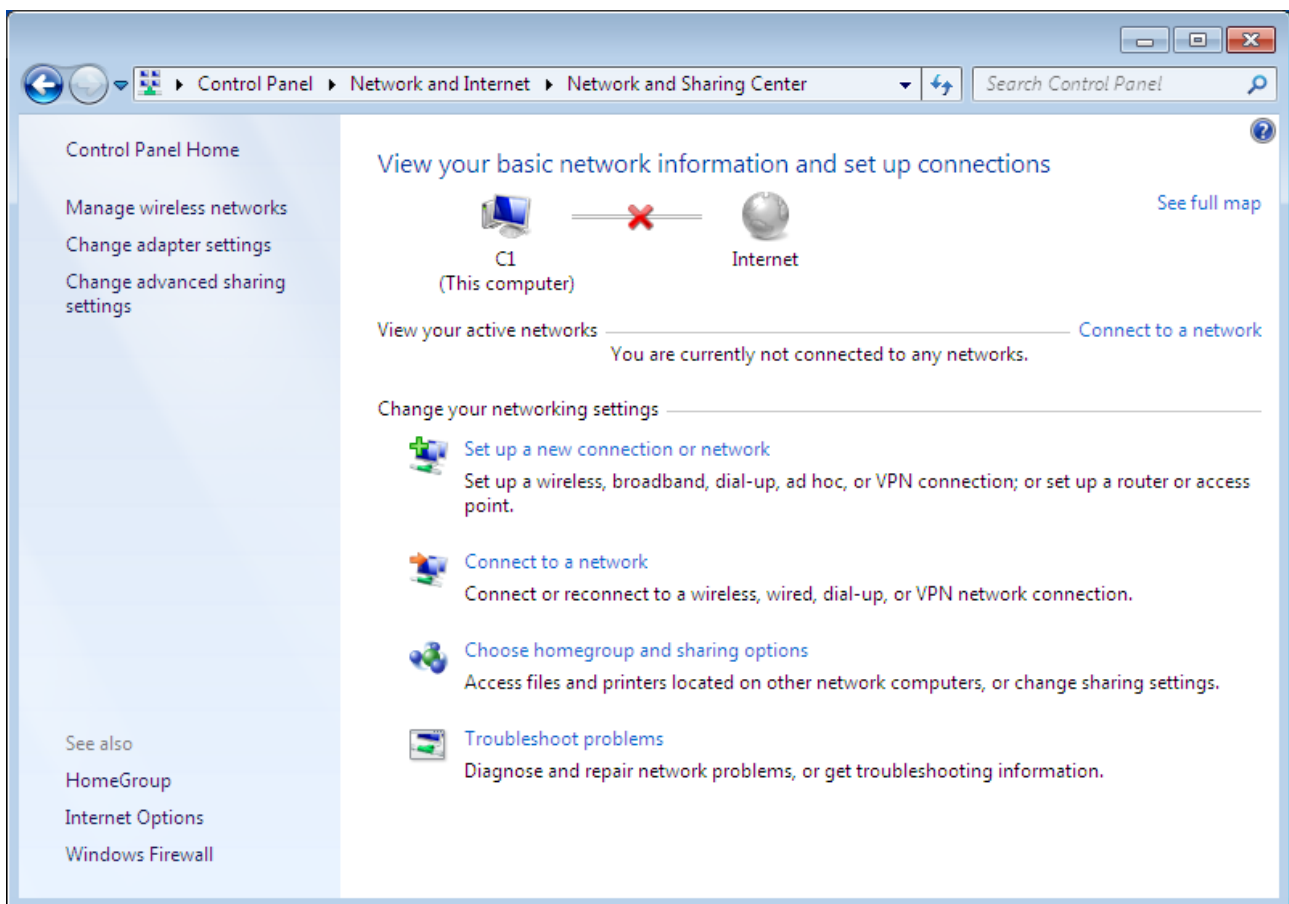
*Figure 7. The **Network and Sharing Center** window.*

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4. In the opened window, right-click the relevant **Local Area Connection** icon and select
the **Properties** line in the menu displayed.
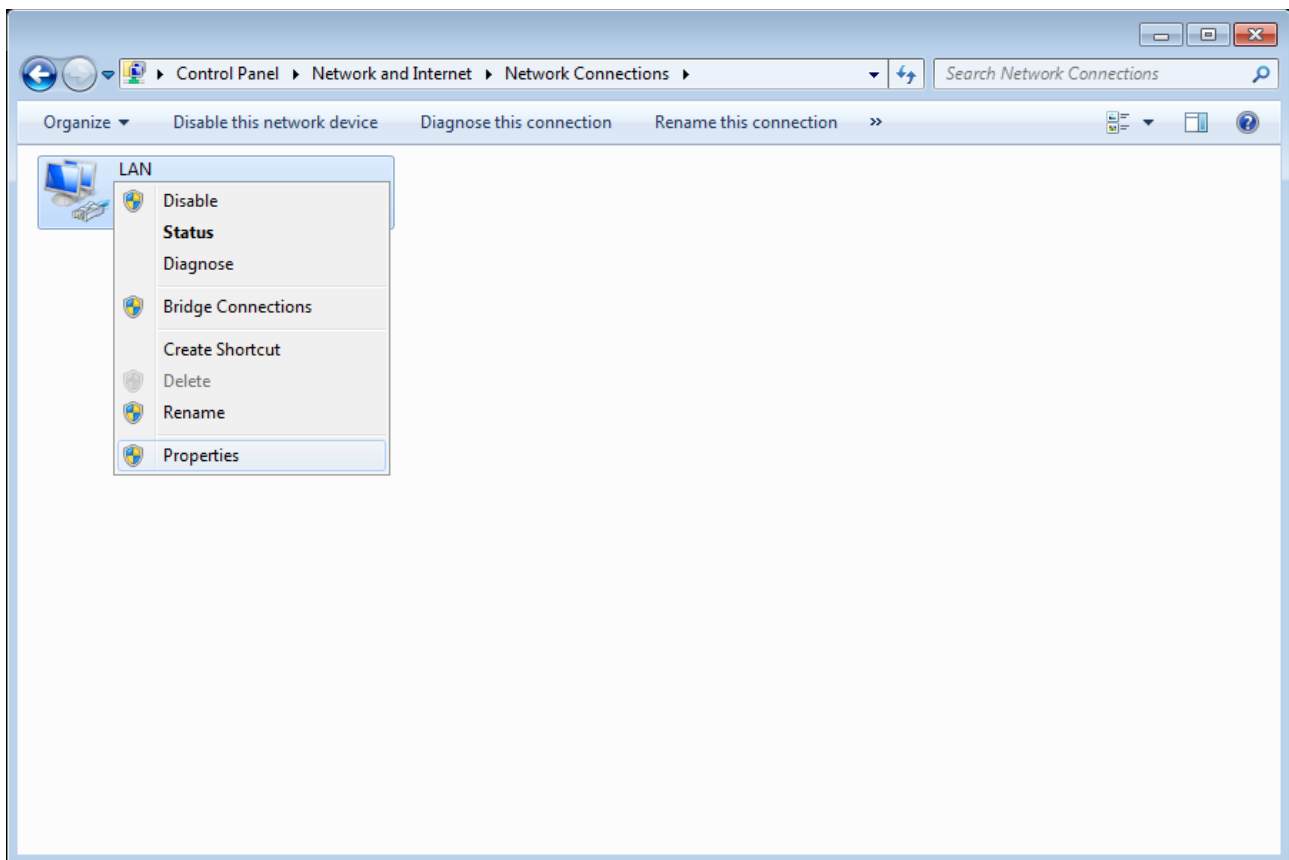
*Figure 8. The **Network Connections** window.*

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5. In the **Local Area Connection Properties** window, on the **Networking** tab, select the **Internet Protocol Version 4 (TCP/IPv4)** line. Click the **Properties** button.
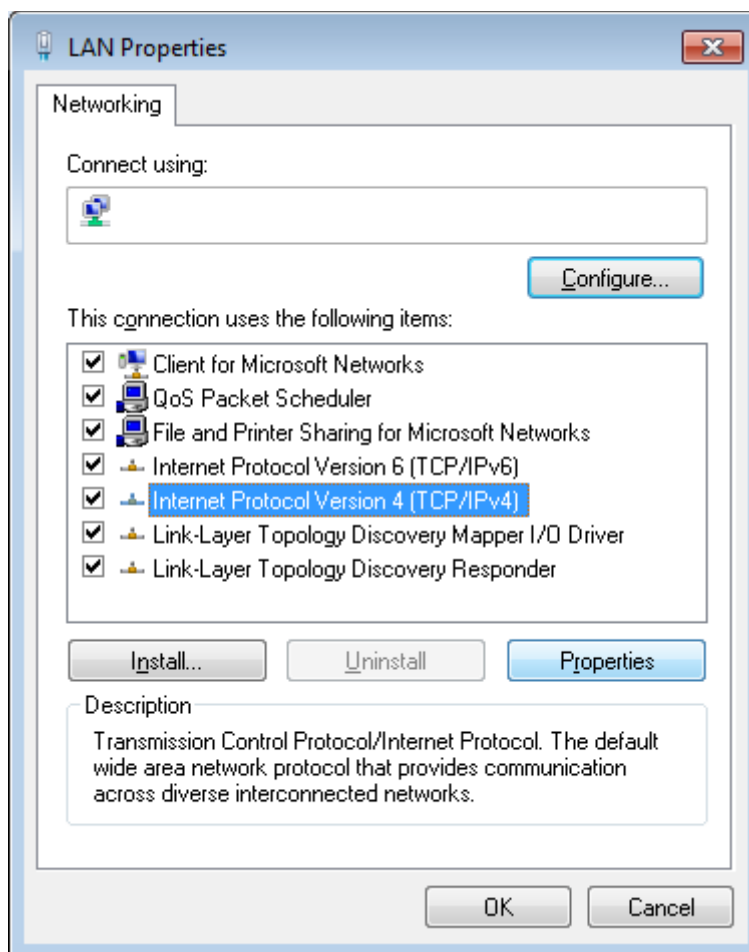
*Figure 9. The **Local Area Connection Properties** window.*

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6. Select the **Obtain an IP address automatically** and **Obtain DNS server address automatically** radio buttons. Click the **OK** button.

*Figure 10. The **Internet Protocol Version 4 (TCP/IPv4) Properties** window.*

7. Click the **OK** button in the connection properties window.

Now your computer is configured to obtain an IP address automatically.

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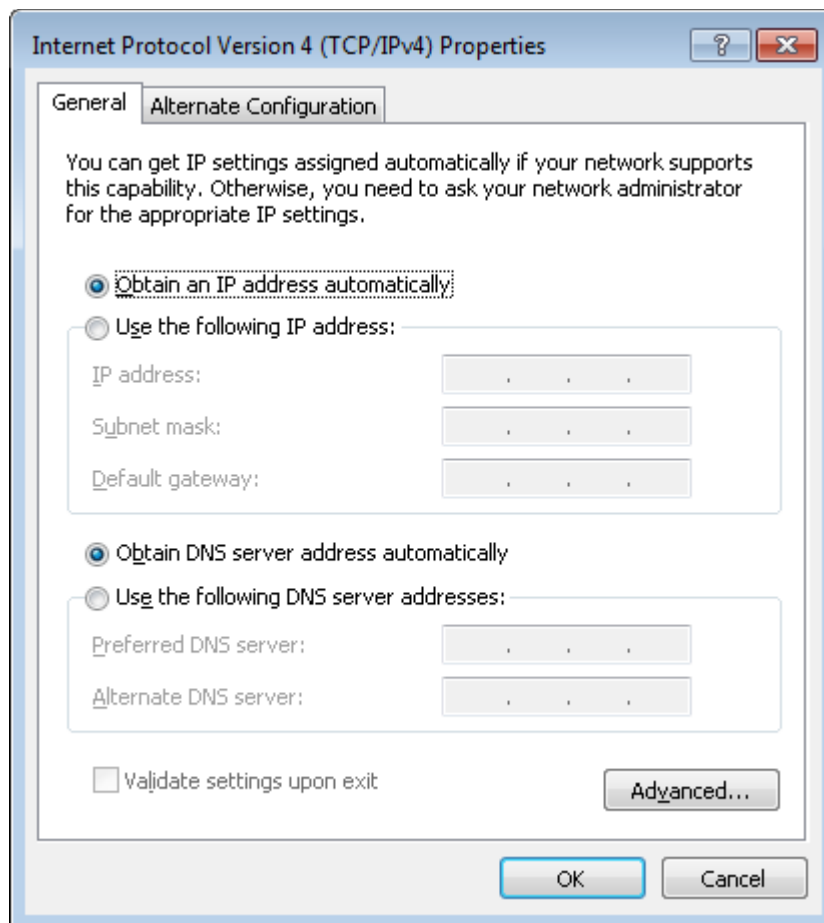
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PC with Wi-Fi Adapter

1. *To connect via USB modem*: connect your USB modem to the USB port[9] located on the back panel of the router.

   !   If you need to connect or change a USB modem to another one when the router is powered on, power off the device, connect the modem to the USB port, and power on the router.

2. *To connect the device to a fiber optic line*: connect your SFP transceiver to the SFP port, then connect the fiber optic cable to the SFP transceiver.

3. *To connect the device to an Ethernet line*: in the web-based interface of the router, select the router's LAN port that will be used as the WAN port and create an Ethernet WAN connection. Then connect an Ethernet cable between an available Ethernet port of the router and the Ethernet line.

   !   Please connect the router to the ISP's Ethernet line only after setting the WAN port and creating the Internet connection.

4. Connect the power cord to the power connector port on the back panel of the router, then plug the power adapter into an electrical outlet or power strip.

5. Turn on the router by pressing the **ON/OFF** button on its back panel.

6. Turn on your PC and wait until your operating system is completely loaded.

7. Turn on your Wi-Fi adapter. As a rule, modern notebooks with built-in wireless NICs are equipped with a button or switch that turns on/off the wireless adapter (refer to your PC documents). If your PC is equipped with a pluggable wireless NIC, install the software provided with your Wi-Fi adapter.

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9   It is recommended to use a USB extension cable to connect a USB modem to the router.

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Configuring Wi-Fi Adapter in OS Windows XP

1. Click the **Start** button and proceed to the **Control Panel > Network and Internet Connections > Network Connections** window.

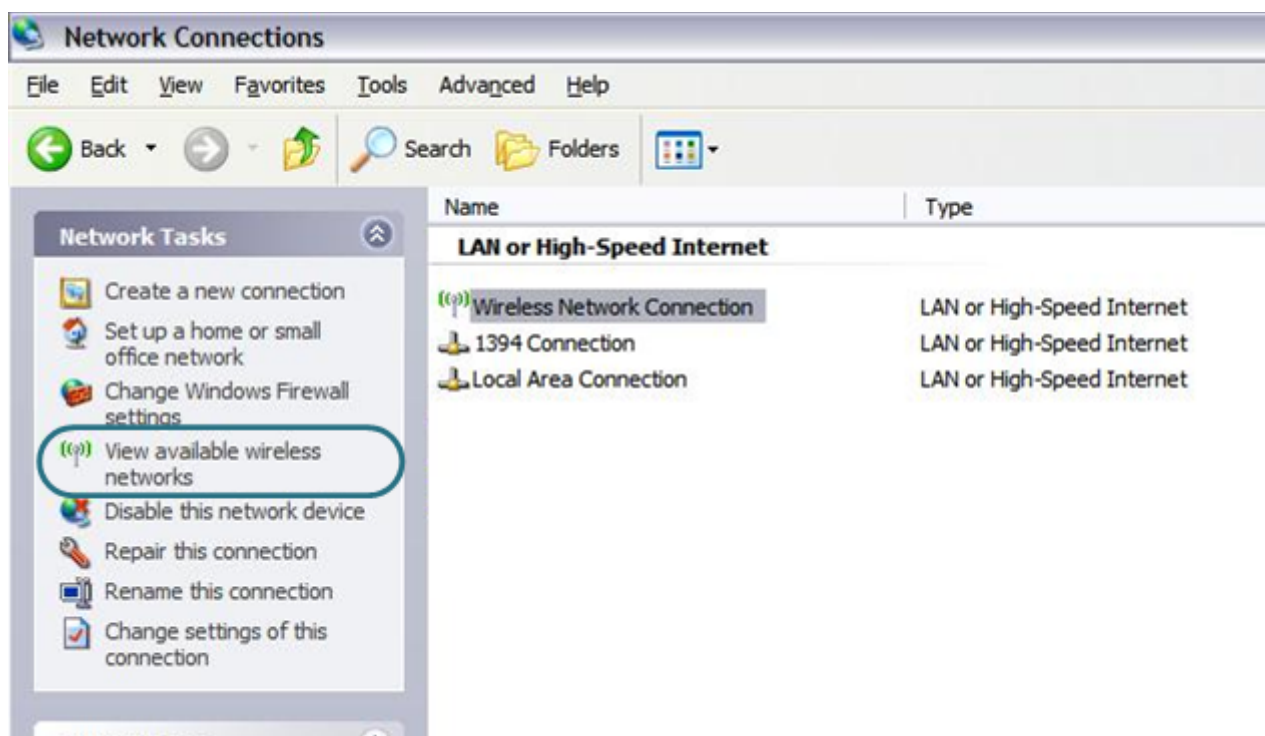2. Select the icon of the wireless network connection and make sure that your Wi-Fi adapter is on.

*Figure 11. The **Network Connections** window.*

3. Search for available wireless networks.

4. In the opened **Wireless Network Connection** window, select the wireless network `DVG-N5402G` (for operating in the 2.4GHz band) or `DVG-N5402G-5G` (for operating in the 5GHz band) and click the **Connect** button.

5. In the opened window, enter the network key (see WPS PIN on the barcode label on the bottom panel of the device) in the **Network key** and **Confirm network key** fields and click the **Connect** button.

After that the **Wireless Network Connection Status** window appears.

> If you perform initial configuration of the router via Wi-Fi connection, note that immediately after changing the wireless default settings of the router you will need to reconfigure the wireless connection using the newly specified settings.

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Configuring Wi-Fi Adapter in OS Windows 7

1. Click the **Start** button and proceed to the **Control Panel** window.

2. Select the **Network and Sharing Center** section. (If the Control Panel has the category view (the **Category** value is selected from the **View by** drop-down list in the top right corner of the window), choose the **View network status and tasks** line under the **Network and Internet** section.)
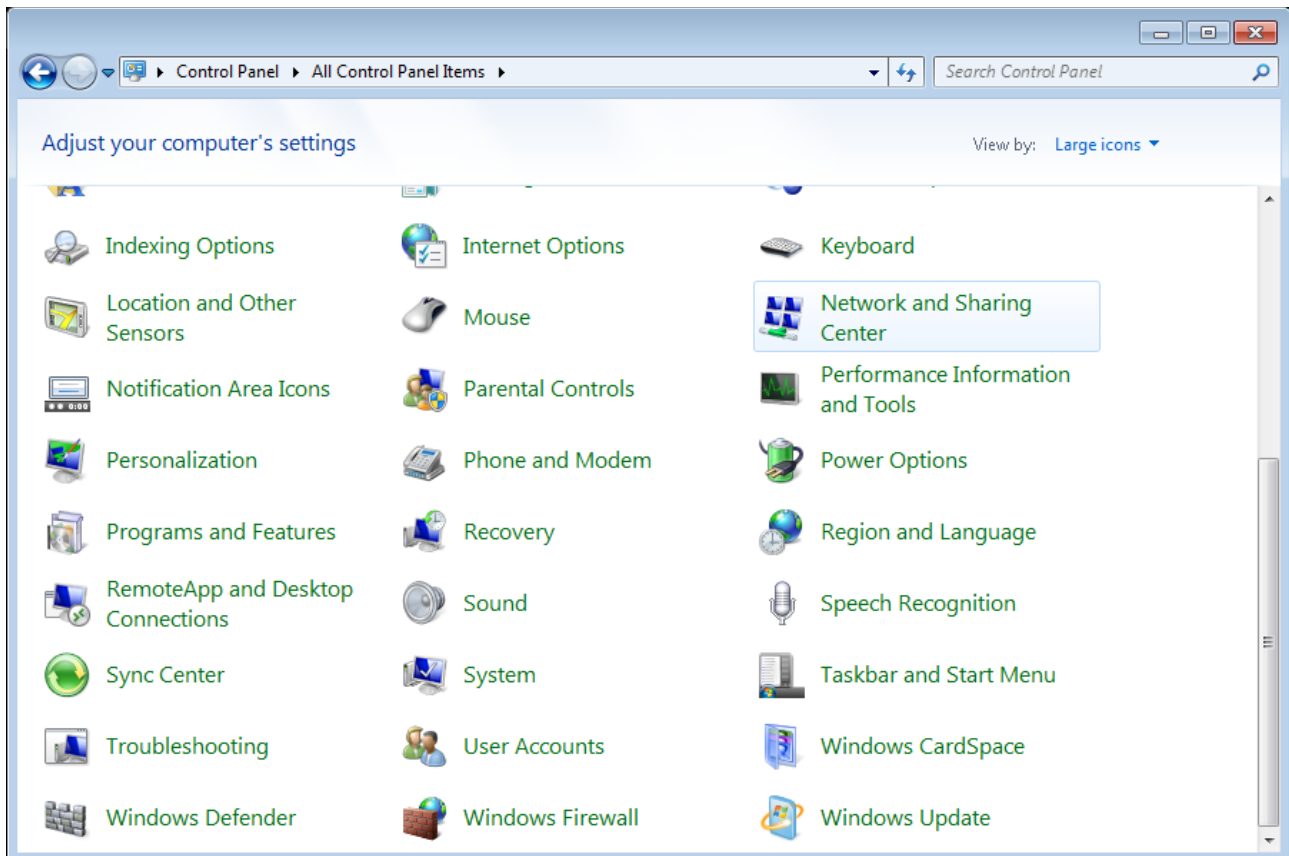
*Figure 12. The **Control Panel** window.*

3. In the menu located on the left part of the window, select the **Change adapter settings** line.

4. In the opened window, select the icon of the wireless network connection and make sure that your Wi-Fi adapter is on.

5. To open the list of available wireless networks, select the icon of the wireless network connection and click the **Connect To** button or left-click the network icon in the notification area located on the right side of the taskbar.

Figure 13. The notification area of the taskbar.

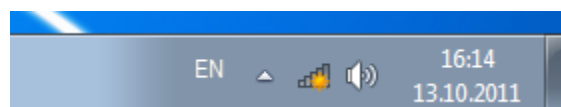**DVG-N5402G/ACF** Wireless AC1200 Dual Band Gigabit Router with Fiber WAN Port, 3G/LTE Support, 2 FXS Ports, 1 PSTN (lifeline) Port, and USB Port

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6. In the opened **Wireless Network Connection** window, select the wireless network `DVG-N5402G` (for operating in the 2.4GHz band) or `DVG-N5402G-5G` (for operating in the 5GHz band) and click the **Connect** button.
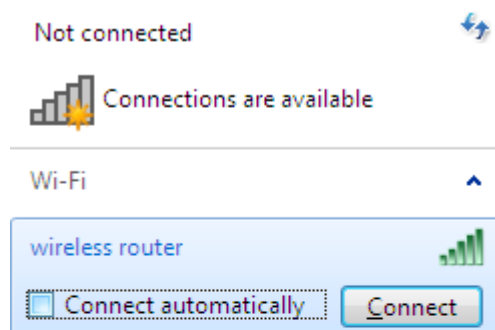
Figure 14. The list of available networks.

7. In the opened window, enter the network key (see WPS PIN on the barcode label on the bottom panel of the device) in the **Security key** field and click the **OK** button.

8. Wait for about 20-30 seconds. After the connection is established, the network icon will be displayed as the signal level scale.

! If you perform initial configuration of the router via Wi-Fi connection, note that immediately after changing the wireless default settings of the router you will need to reconfigure the wireless connection using the newly specified settings.

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Connecting to Web-based Interface

When you have configured your computer, you can access the web-based interface and configure needed parameters (create a WAN connection, change the parameters of the wireless network, specify the settings of the firewall, etc.).

> **!** Router DVG-N5402G/ACF with default settings cannot connect to the Internet. To get started, please set your own password for access to the web-based interface and change the WLAN name (SSID); then, if needed, configure other settings recommended by your ISP.

Start a web browser (see the ***Before You Begin*** section, page 19). In the address bar of the web browser, enter the IP address of the router (by default, the following IP address is specified: `192.168.0.1`). Press the **Enter** key.
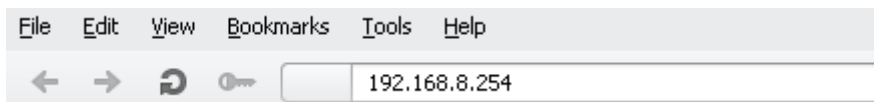

Figure 15. Connecting to the web-based interface of the DVG-N5402G/ACF device.

> **!** If the error "*The page cannot be displayed*" (or "*Unable to display the page*"/"*Could not connect to remote server*") occurs upon connecting to the web-based interface of the router, make sure that you have properly connected the router to your computer.

After the first access to the web-based interface you need to change the default administrator password. Enter the new password in the **Password** and **Confirmation** fields. You may set any password except `admin`. Use digits, Latin letters (uppercase and/or lowercase), and characters available on the keyboard. Also you need to change the default name of the wireless network. To do this, in the **Network name (SSID)** and **5GHz network name (SSID)** fields, enter a new name for the router's wireless network in the 2.4GHz and 5GHz band correspondingly or leave the values suggested by the router: `DVG-N5402G-XXXX` and `DVG-N5402G-5G-XXXX` where `XXXX` are the last 4 characters of the device's MAC address. Then click the **Apply** button.

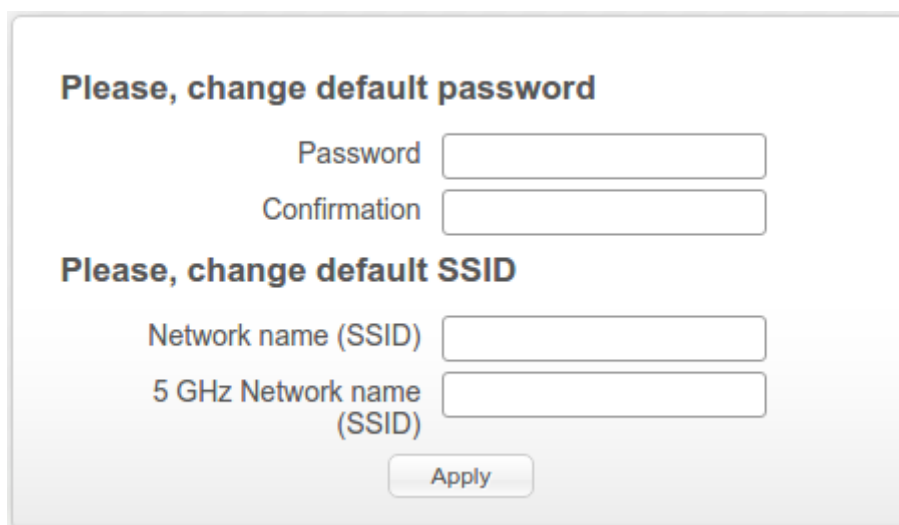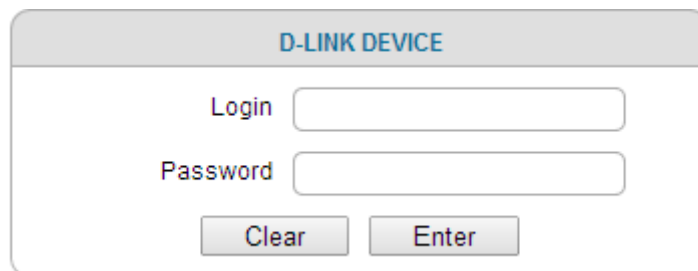*Figure 16. The page for changing the default administrator password.*

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! Remember or write down the new password for the administrator account. In case of losing the new password, you can access the settings of the router only after restoring the factory default settings via the hardware **RESET** button. This procedure wipes out all settings that you have configured for your router.

When the web-based interface is accessed the next time and after, the login page opens. Enter the username (`admin`) in the **Login** field and the new password in the **Password** field, then click the **Enter** button.
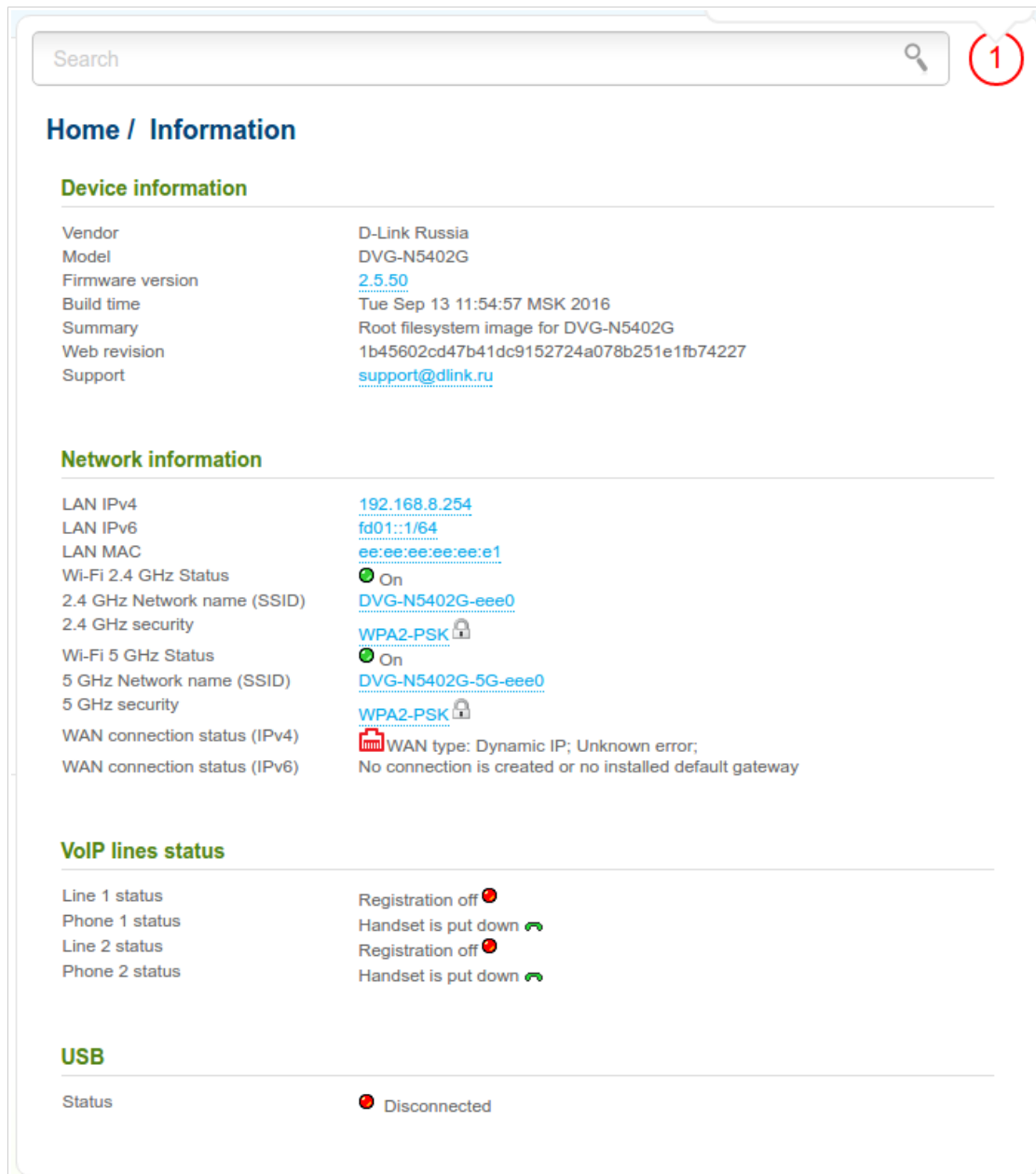
Figure 17. The login page.

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Web-based Interface Structure

General Information Page

After successful registration the **Home / Information** page opens.

Figure 18. The general information page.

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The web-based interface of the router is multilingual. If you need to select another language for the web-based interface, place the mouse pointer over the **English** caption in the top part of the page and select a language from the menu displayed.

Figure 19. Changing the language of the web-based interface.

The **Home / Information** page displays general information on the router and its software. From the page you can quickly get to some pages of the web-based interface.

To upgrade the firmware of the router, left-click the current firmware version (the right column of the **Firmware version** line) and follow the dialog box appeared.

To contact the technical support group (to send an e-mail), left-click the support e-mail address (the right column of the **Support** line). After clicking the line, the e-mail client window for sending a new letter to the specified address opens.

To edit the router's local interface parameters, left-click the IPv4, IPv6, or MAC address of the local interface (the right column of the lines **LAN IPv4**, **LAN IPv6** or **LAN MAC** correspondingly). After clicking the line, the page for editing the LAN interface opens (for the detailed description of the page, see the *LAN* section, page 132).

To configure the router's WLAN parameters, left-click the SSID of the WLAN (the right column of the **2.4 GHz Network name (SSID)** or **5 GHz Network name (SSID)** line). After clicking the line, the **Wi-Fi / Basic settings** page for the relevant band opens (for the detailed description of the page, see the *Basic Settings* section, page 136).

To configure security settings of the WLAN, left-click the network authentication type (the right column of the **2.4 GHz security** or **5 GHz security** line). After clicking the line, the **Wi-Fi / Security settings** page for the relevant band opens (for the detailed description of the page, see the *Security Settings* section, page 142).

In the **VoIP lines status** section, data on the status of registration on the SIP proxy server and the phone status are displayed.

In the **USB** section, data on the USB device connected to the router is displayed.

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Menu Sections

To configure the router use the menu in the left part of the page.

The **Monitoring** section provides an interactive scheme which illustrates the router's settings and the LAN structure.

In the **Home** section you can run the needed Wizard.

To configure connection to the Internet, go to the **Click'n'Connect** page (for the detailed description of the Wizard, see the *Click'n'Connect* section, page 47).

To configure the router's wireless network, go to the **Wireless network settings wizard** page (for the detailed description of the Wizard, see the *Wireless Network Settings Wizard* section, page 74).

To configure access from the Internet to a web server located in your LAN, go to the **Virtual server settings wizard** page (for the detailed description of the Wizard, see the *Virtual Server Settings Wizard* section, page 83).

To configure the router to use an IPTV set-top box, go to the **IPTV settings wizard** page (for the detailed description of the Wizard, see the *IPTV Settings Wizard* section, page 85).

To proceed to the basic or advanced settings of VoIP, go to the **Basic settings** or **Advanced settings** page in the **VoIP** section (for the description of the pages, see the *VoIP* section, page 219).

The pages of the **Status** section display data on the current state of the router (for the description of the pages, see the *Status* section, page 86).

The pages of the **Net** section are designed for configuring basic parameters of the LAN interface of the router and creating a connection to the Internet (for the description of the pages, see the *Net* section, page 92).

The pages of the **Wi-Fi** section are designed for specifying all needed settings of the router's wireless network (for the description of the pages, see the *Wi-Fi* section, page 136).

The pages of the **Advanced** section are designed for configuring additional parameters of the router (for the description of the pages, see the *Advanced* section, page 164).

The pages of the **Firewall** section are designed for configuring the firewall of the router (for the description of the pages, see the *Firewall* section, page 194).

The pages of the **3G/LTE modem** section are designed to operate the connected LTE, 3G GSM or CDMA USB modem (for the description of the pages, see the *3G/LTE Modem* section, page 202).

The pages of the **USB storage** section are designed to operate the connected USB storage (for the description of the pages, see the *USB Storage* section, page 207).

The pages of the **Transmission** section are designed for configuration of the built-in Transmission torrent client and management of downloading process (for the description of the pages, see the *Transmission* section, page 214).

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The pages of the **Control** section are designed for creating restrictions on access to the Internet (for the description of the page, see the *Control* section, page 217).

The pages of the **VoIP** section are designed for specifying all settings needed for VoIP (for the description of the pages, see the *VoIP* section, page 219).

The pages of the **System** section provide functions for managing the internal system of the router (for the description of the pages, see the *System* section, page 237).

Also you can find a specific page via search. To do this, enter the name of the page, wholly or partly, in the search bar in the top part of the web-based interface page, and then select a needed link in the search results.

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Notifications and System Drop-down Menu

The router's web-based interface displays the notifications in the top right part of the page.
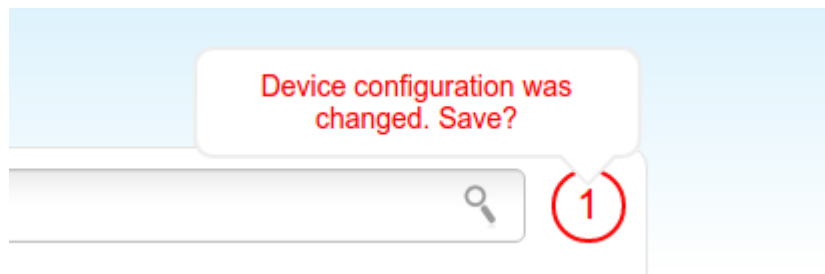
Figure 20. The web-based interface notifications.

Click the icon displaying the number of notifications to view the complete list and click the relevant link.

> **!** Note that you should regularly save the changes of the router's settings to the non-volatile memory.

You can save the router's settings via the menu displayed when the mouse pointer is over the **System** caption in the top left part of the page. Also the **System** menu allows you to reboot the device, create and load the configuration backup, restore the factory defaults, update the firmware, disable/enable the WLAN, and safely remove the USB storage connected to the router.

*Figure 21. The **System** menu in the top part of the page.*

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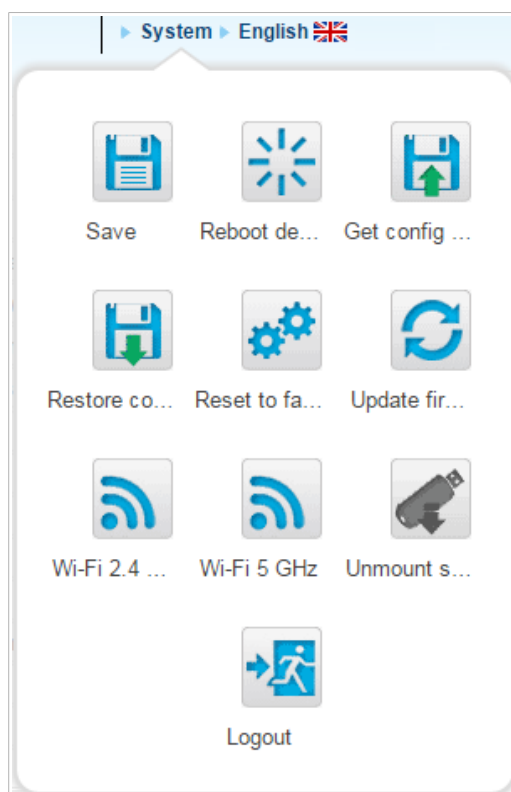| Control	Description
Save	Click the icon to save new settings to the non-volatile memory. Also you can save the device's parameters via the **Save** button on the **System / Configuration** page.
Reboot device	Click the icon to reboot the device. All unsaved changes will be lost after the device's reboot.
Get config backup	Click the icon to save the configuration (all settings of the router) to your PC. The configuration backup will be stored in the download location of your web browser. Also you can create the configuration backup via the **Backup** button on the **System / Configuration** page.
Restore config	Click the icon to go to the **System / Configuration** page.
Reset to factory	Click the icon to restore the factory default settings. Also you can restore the factory defaults via the **Factory** button on the **System / Configuration** page. Also you can restore the factory default settings via the hardware **RESET** button. The button is located on the back panel of the router next to the power connector. Push the button (with the router powered on) and hold for 10 seconds. Then release the button.
Update firmware	Click the icon to update the firmware of the router. Also you can update the firmware on the **System / Firmware upgrade** page.
Wi-Fi 2.4 GHz	Click the icon to disable or enable the device's WLAN in the 2.4GHz band. Also you can disable/enable the router's WLAN in the 2.4GHz band on the **Wi-Fi / Basic settings / 2.4 GHz** page.
Wi-Fi 5 GHz	Click the icon to disable or enable the device's WLAN in the 5GHz band. Also you can disable/enable the router's WLAN in the 5GHz band on the **Wi-Fi / Basic settings / 5 GHz** page.

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Control	Description
Unmount storage	Click the icon to safely disconnect the USB storage. Also you can safely disconnect the USB storage on the **USB storage / Information** page.
Logout	Click the icon to exit the web-based interface.

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Configuring via Web-based Interface

CHAPTER 4.   CONFIGURING   VIA   WEB-BASED INTERFACE

Monitoring

The page displays an interactive scheme which illustrates the router's settings and the LAN structure.
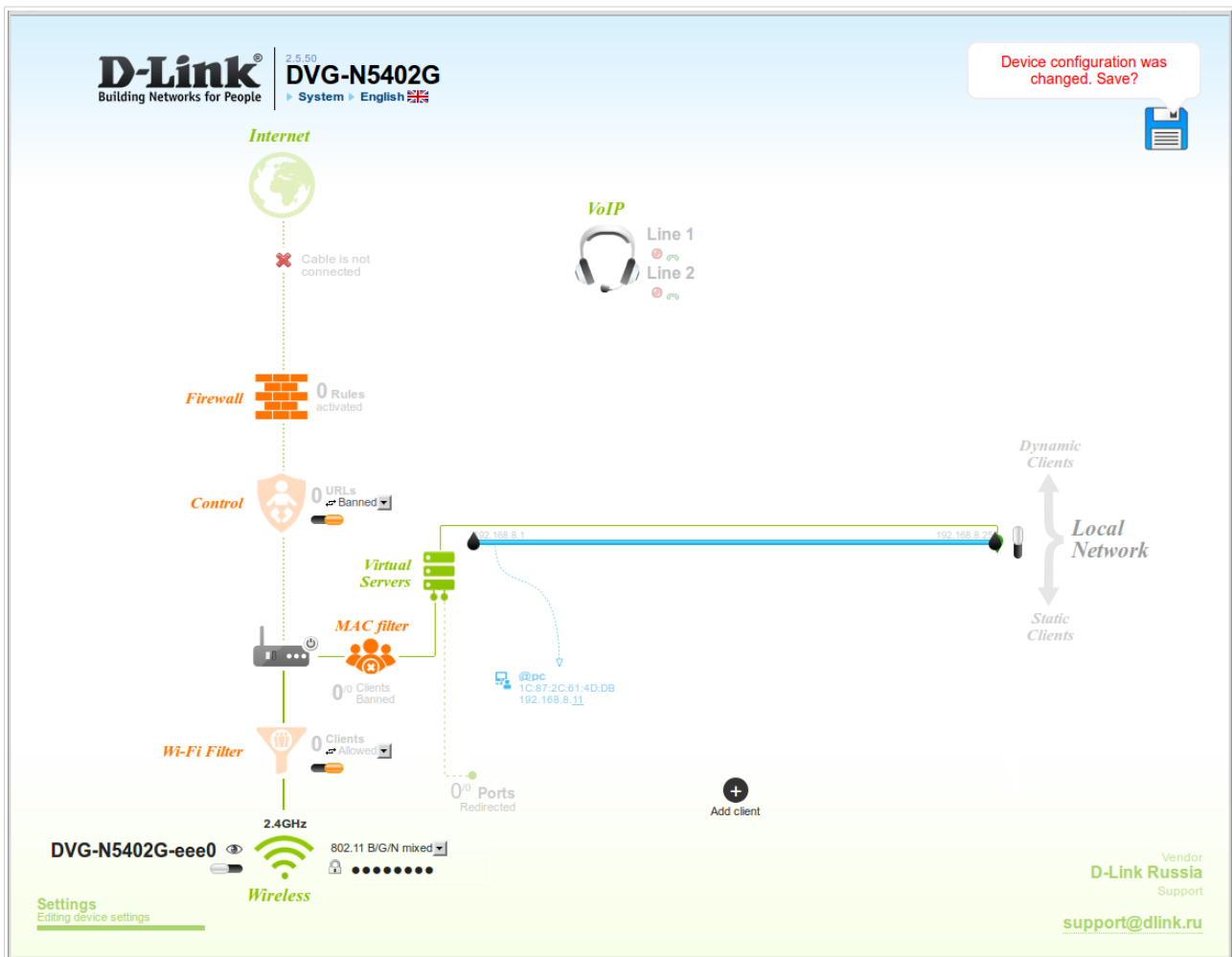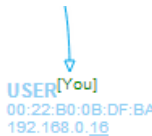
*Figure 22. The **Monitoring** page.*

Also you can modify the basic parameters of the router on the **Monitoring** page. To access the router's advanced settings, click the **Editing device settings** link in the bottom left corner of the page. For the detailed description of all the router's functions, see the relevant section of this manual.

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The interactive scheme displays the following elements:

Control	Description
Internet	The **Internet** element displays information on the active connection. Place the mouse pointer over the icon to switch to another connection, remove existing connections, or add new ones.
	If the Ethernet cable provided by your ISP is connected to the WAN port of the router, to the left, the name of the active connection, received or specified IP address, and the MAC address of this connection are displayed. You can change the MAC address in the editing mode or clone the MAC address of a connected device by placing the mouse pointer over the **Clone MAC address** icon (🗐).
	To the right, the approximate data transfer rate and the total value of the received data are displayed.
Firewall	The **Firewall** element displays the number of the IP filter active rules. Place the mouse pointer over the icon to view the list of the IP filter rules, remove existing rules, add new ones, or quickly switch the filtering mode for a rule.
Control	The **Control** element displays the number of blocked/allowed web sites. Place the mouse pointer over the icon to view the list of web sites, remove existing entries, or add new ones.
	Use the **Enable/Disable URL-filter** switch (⬤▬) to enable or disable the URL filter.
	Use the drop-down list to the right of the element to quickly change the operating mode: block access to web sites from the list or allow access to web sites from the list.
Device	The **Device** element displays the layout of your device. Place the mouse pointer over the top right corner of this icon to display the system menu which helps you to reboot the device, save the configuration, restore the factory default settings, update the firmware, exit the web-based interface.
MAC Filter	The **MAC Filter** element displays the total number of clients to which the filtering rules are applied and the number of blocked clients. Place the mouse pointer over the icon to view the list of filtered clients, remove existing clients, add new ones, or quickly switch the filtering mode for a client.

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Control	Description
Virtual Servers	The **Virtual Servers** element is designed for redirecting incoming traffic to a specific IP address in the LAN. It displays the total number of rules for redirecting traffic and the number of rules active in this specific LAN. Place the mouse pointer over the icon to view the list of all rules for redirecting traffic, remove existing rules, or add new ones.
VoIP	The **VoIP** element displays the status of registration on the SIP proxy server and the phone status. Click the icon to go to the page of basic settings for VoIP via SIP.
DHCP	The **DHCP** element is a scale where the range of the DHCP server addresses is placed. Dynamic clients receive IP addresses from this range. Use the **Enable/Disable DHCP Server** switch ( ) to enable or disable DHCP server. If you want to change the range, enter a value from the keyboard in the editing mode or move the sliders. In the editing mode, you can specify the subnet mask.
Dynamic Clients	The **Dynamic Clients** area displays all connected dynamic clients. An icon of a client displays the name of a device, its MAC address, and received IP address. The list of actions available for each client is displayed when the mouse pointer is over an icon. If you want to assign the current IP address to the MAC address of the client, drag and drop its icon to the static clients area.
Static Clients	The **Static Clients** area displays all static clients. An icon of a client displays the name of a device, its MAC address, and received IP address. The list of actions available for each client is displayed when the mouse pointer is over an icon. If you want to break the binding between the MAC address of the client and its current IP address, drag and drop its icon to the dynamic clients area. Use the **Add client** button to add static clients.

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Configuring via Web-based Interface

Control	Description
![Wireless icon] **Wireless**	The **Wireless** element displays information on Wi-Fi module operation in the 2.4GHz band. To switch to the editing mode of Wi-Fi module settings in the 5GHz band, click the icon **2.4GHz** (**Band**). To the left, the name of the access point is displayed. You can change it in the editing mode. Use the **Hide Access Point** switch (👁/�) to forbid or allow other users to see your wireless network. Use the **Enable/Disable Wireless** switch (▬▬) to enable or disable your wireless network. To the right, the standards of devices which can connect to the access point are displayed. You can select other standards from the drop-down list. Use the **Enable/Disable password protection** switch (🔓/🔒) to modify security settings of your wireless network. If you want to view or change the password, switch to the editing mode of the relevant field.
![Wi-Fi Filter icon] **Wi-Fi Filter**	The **Wi-Fi Filter** element displays the number of MAC addresses specified in the MAC filter. Place the mouse pointer over the icon to view the list of MAC addresses, remove existing addresses, or add new ones. Use the **Enable/Disable Wi-Fi filter** switch (▬▬) to enable or disable the Wi-Fi filter. Use the drop-down list to the right of the element to quickly change the mode of the filter (allow or forbid access to your wireless network).

To save new settings, left-click the notification displayed in the top right part of the page.

In this section, you can contact the technical support group (to send an e-mail). To do this, left-click the support e-mail address in the bottom right corner of the page. After clicking the line, the e-mail client window for sending a new letter to the specified address opens.

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Configuring via Web-based Interface

Click'n'Connect

To configure connection to the Internet, click the **Click'n'Connect** link in the **Home** section.
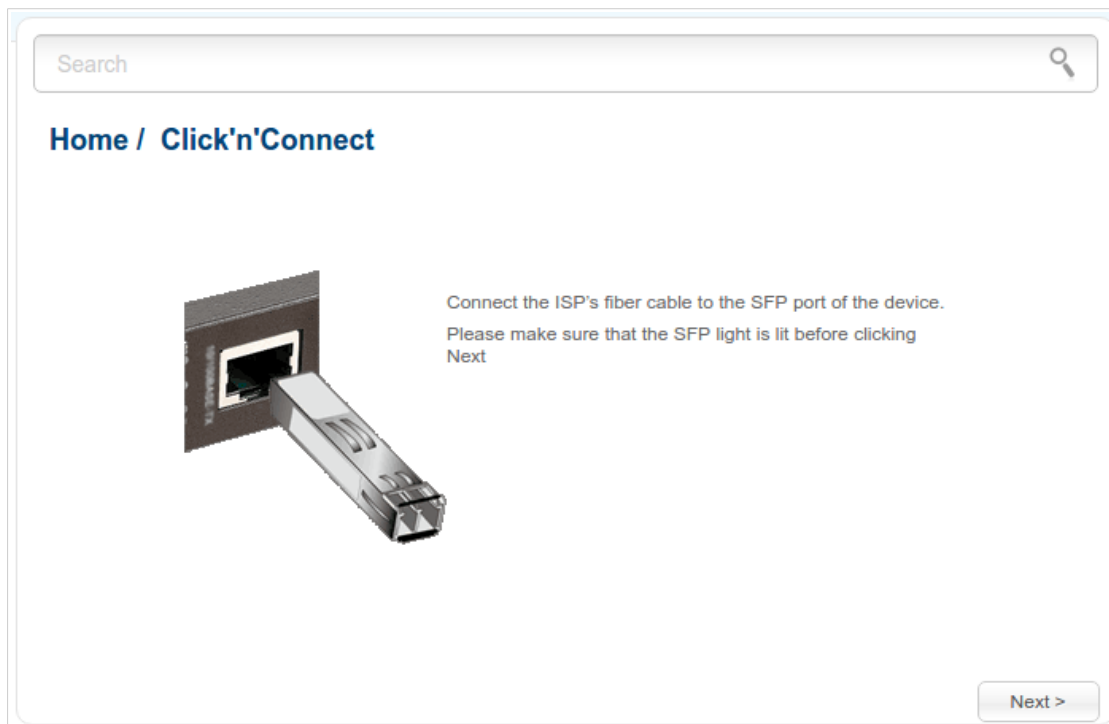
Figure 23. Configuring connection to the Internet.

Connect the fiber optic cable to the SFP transceiver, then connect the transceiver to the SFP port of the router. Verify the relevant LED (the **SFP** LED should be on).

When you configure a WAN connection for the Ethernet line, please do not connect the cable to the LAN port that will be used as the WAN port until the Wizard is finished.

Click the **Next** button to continue.

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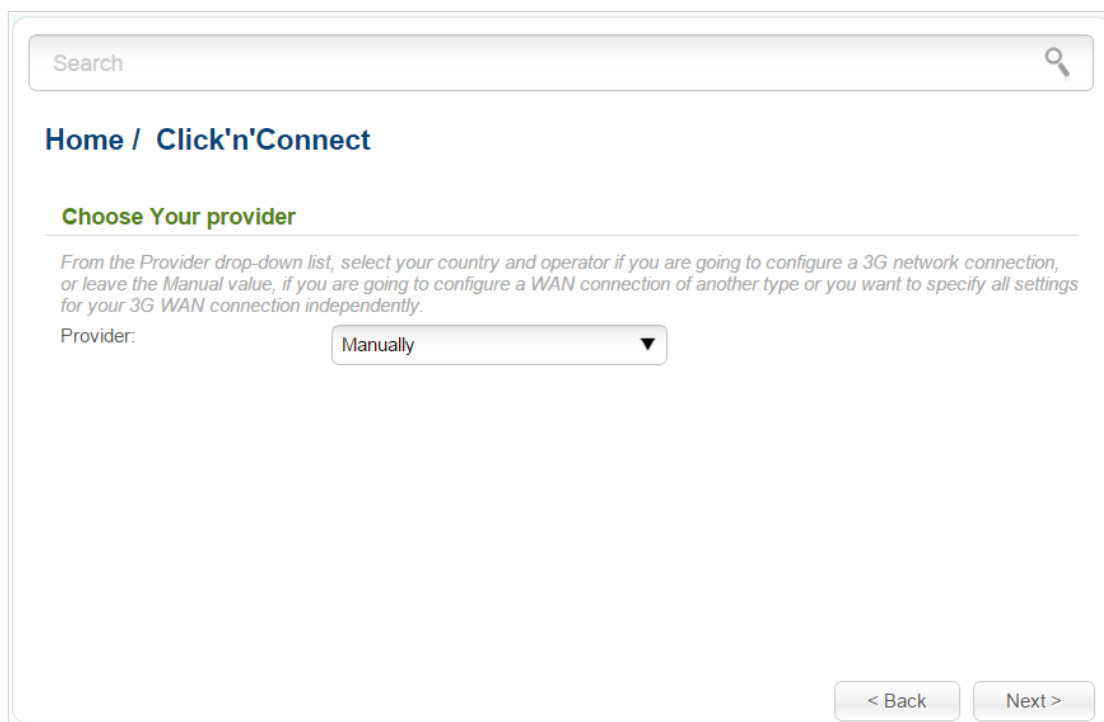
Figure 24. The page for selecting a 3G network operator.

On the opened page, from the **Provider** drop-down list, select your country and operator if you are going to configure a 3G network connection, or leave the **Manually** value, if you are going to configure a wired, LTE WAN connection or you want to specify all settings for your 3G WAN connection independently.

Click the **Next** button to continue.

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Configuring via Web-based Interface
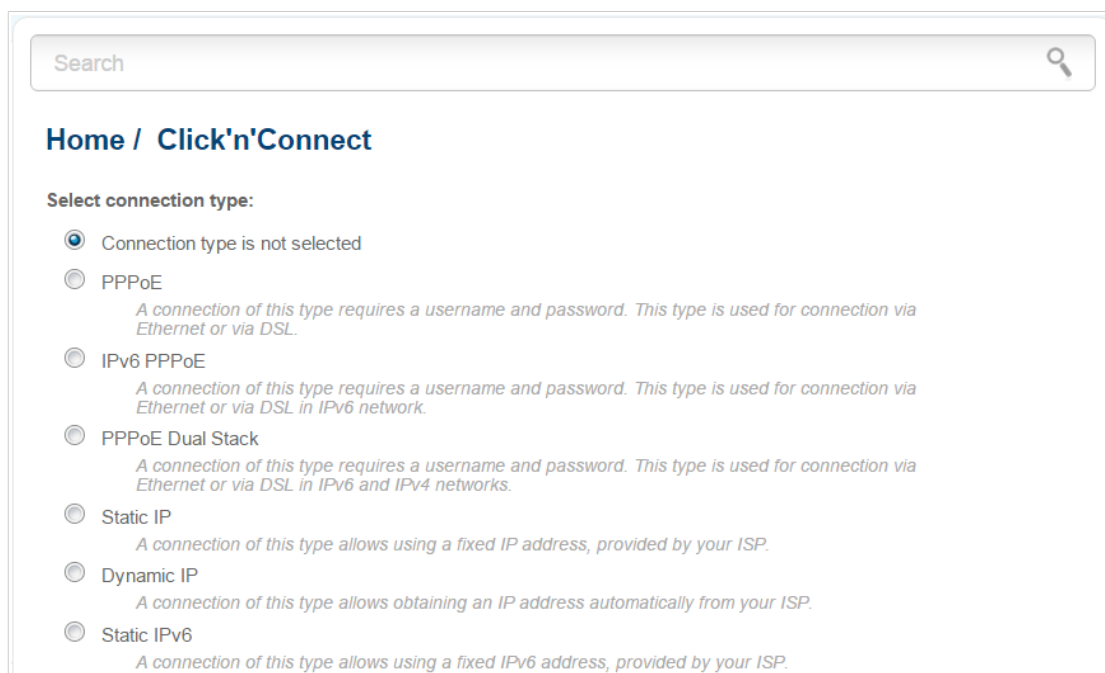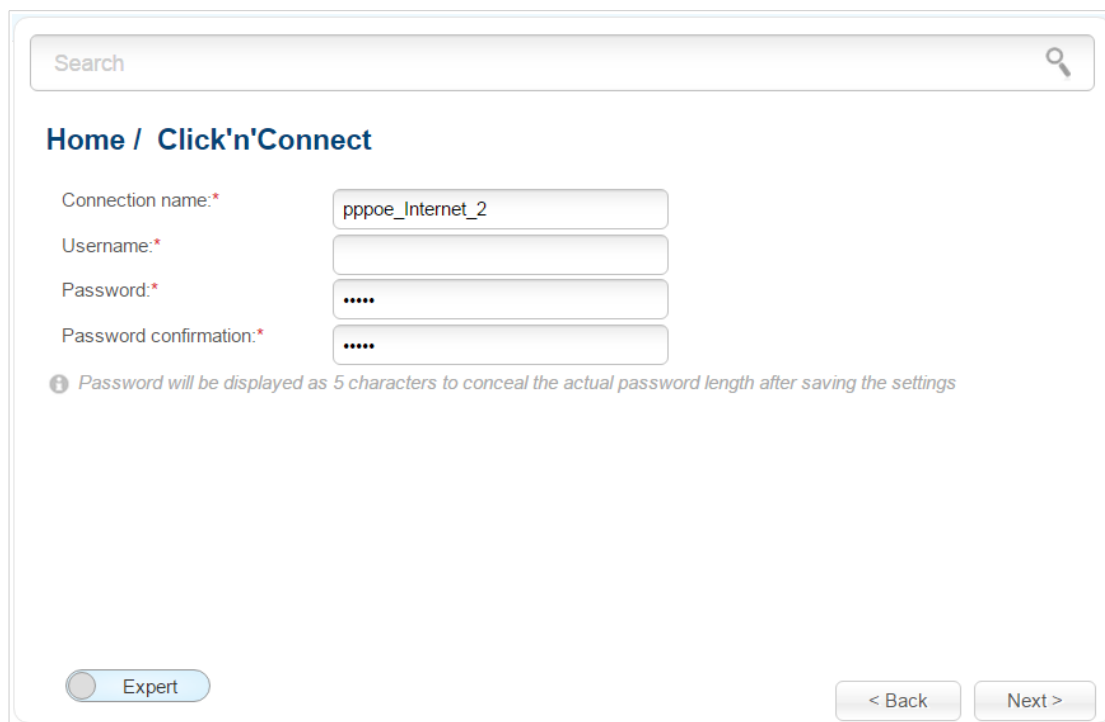
Figure 25. The page for selecting the connection type.

On the opened page, select the needed choice of the radio button and click the **Next** button.

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Configuring via Web-based Interface

Creating WAN Connection

PPPoE Connection

Figure 26. Configuring PPPoE WAN connection.

In the **Connection name** field, specify a name for the connection for easier identification.

In the **Username** field, enter your login, and in the **Password** and **Password confirmation** fields – the password provided by your ISP.

As a rule, the specified settings are enough to configure a connection of the selected type. If you need to specify additional settings, open the expert settings mode. To do this, use the switch in the bottom left corner of the page (for a detailed description of all the connection's parameters, see the *Creating PPPoE WAN Connection* section, page 93).

Click the **Next** button to continue.

After that the page displaying all specified settings opens. Click the **Apply** button to create the connection or the **Back** button to specify other settings.

After clicking the **Apply** button, the page for checking the Internet availability opens (see the *Checking Internet Availability* section, page 66).

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Configuring via Web-based Interface

IPv6 PPPoE or PPPoE Dual Stack Connection

Figure 27. Configuring IPv6 PPPoE WAN connection.

In the **Connection name** field, specify a name for the connection for easier identification.

In the **Username** field, enter your login, and in the **Password** and **Password confirmation** fields – the password provided by your ISP.

If you need to specify the gateway address manually, deselect the **SLAAC** checkbox and fill in the **Static IPv6 gateway address** field.

As a rule, the specified settings are enough to configure a connection of the selected type. If you need to specify additional settings, open the expert settings mode. To do this, use the switch in the bottom left corner of the page (for a detailed description of all the connection's parameters, see the *Creating IPv6 PPPoE or PPPoE Dual Stack WAN Connection* section, page 97).

Click the **Next** button to continue.

After that the page displaying all specified settings opens. Click the **Apply** button to create the connection or the **Back** button to specify other settings.

After clicking the **Apply** button, the page for checking the Internet availability opens (see the *Checking Internet Availability* section, page 66).

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Configuring via Web-based Interface

Static IP Connection

Figure 28. Configuring Static IP WAN connection.

In the **Connection name** field, specify a name for the connection for easier identification.

Fill in the **IP Address** and **Netmask** fields.

In the **Gateway IP address** field, enter the IP address of the gateway used by this WAN connection.

In the **Primary DNS server** field, enter the address of the primary DNS server.

If your wired ISP uses authorization via the 802.1x protocol, in the **Authorization via 802.1x protocol** section, select the **Authorization in the ISP's network via 802.1x protocol** checkbox and fill in the fields of the section in accordance with data provided by your ISP.

As a rule, the specified settings are enough to configure a connection of the selected type. If you need to specify additional settings, open the expert settings mode. To do this, use the switch in the bottom left corner of the page (for a detailed description of all the connection's parameters, see the *Creating Static IP or Dynamic IP WAN Connection* section, page 103).

Click the **Next** button to continue.

After that the page displaying all specified settings opens. Click the **Apply** button to create the connection or the **Back** button to specify other settings.

After clicking the **Apply** button, the page for checking the Internet availability opens (see the *Checking Internet Availability* section, page 66).

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Dynamic IP Connection

Figure 29. Configuring Dynamic IP WAN connection.

In the **Connection name** field, specify a name for the connection for easier identification.

If your ISP has provided the addresses of the DNS servers, deselect the **Obtain DNS server addresses automatically** checkbox and fill in the **Primary DNS server** field.
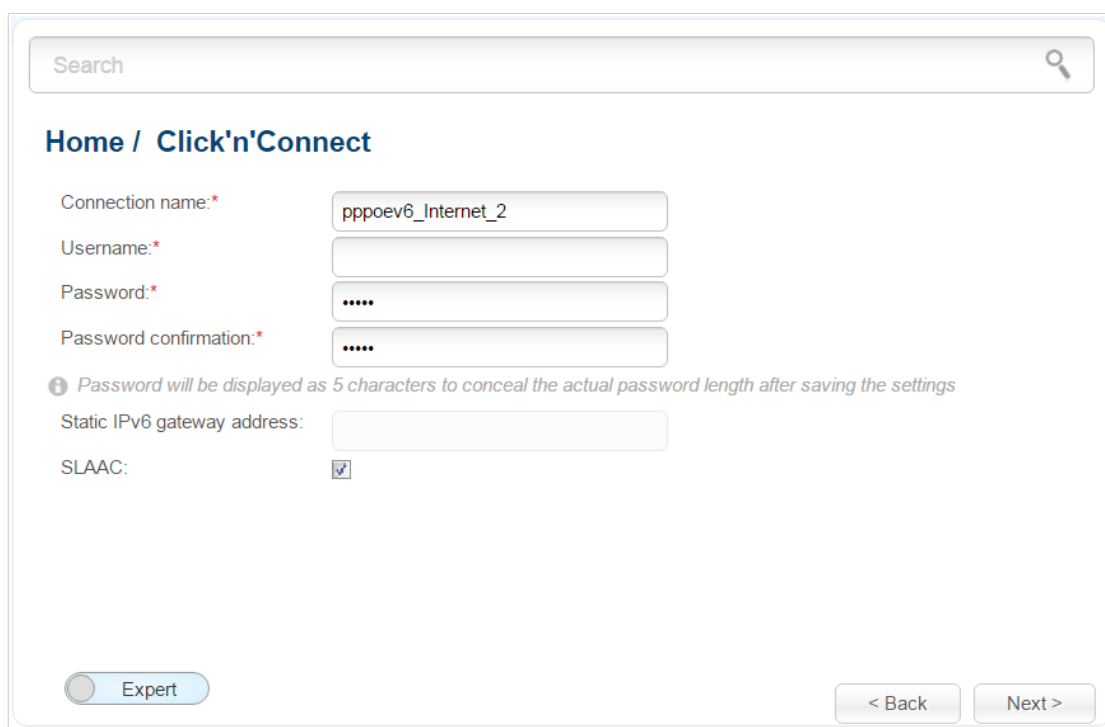
As a rule, the specified settings are enough to configure a connection of the selected type. If you need to specify additional settings, open the expert settings mode. To do this, use the switch in the bottom left corner of the page (for a detailed description of all the connection's parameters, see the *Creating Static IP or Dynamic IP WAN Connection* section, page 103).

Click the **Next** button to continue.

After that the page displaying all specified settings opens. Click the **Apply** button to create the connection or the **Back** button to specify other settings.

After clicking the **Apply** button, the page for checking the Internet availability opens (see the *Checking Internet Availability* section, page 66).

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Configuring via Web-based Interface

Static IPv6 Connection

Figure 30. Configuring Static IPv6 WAN connection.

In the **Connection name** field, specify a name for the connection for easier identification.

Fill in the **IPv6 address** and **Gateway IPv6 address** fields.

As a rule, the specified settings are enough to configure a connection of the selected type. If you need to specify additional settings, open the expert settings mode. To do this, use the switch in the bottom left corner of the page (for a detailed description of all the connection's parameters, see the *Creating Static IPv6 or Dynamic IPv6 WAN Connection* section, page 108).

Click the **Next** button to continue.

After that the page displaying all specified settings opens. Click the **Apply** button to create the connection or the **Back** button to specify other settings.

After clicking the **Apply** button, the page for checking the Internet availability opens (see the *Checking Internet Availability* section, page 66).

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Dynamic IPv6 Connection

Figure 31. Configuring Dynamic IPv6 WAN connection.

In the **Connection name** field, specify a name for the connection for easier identification.

If your ISP has provided the addresses of the DNS servers, deselect the **Obtain DNS server addresses automatically** checkbox and fill in the **Static primary DNS server** field.
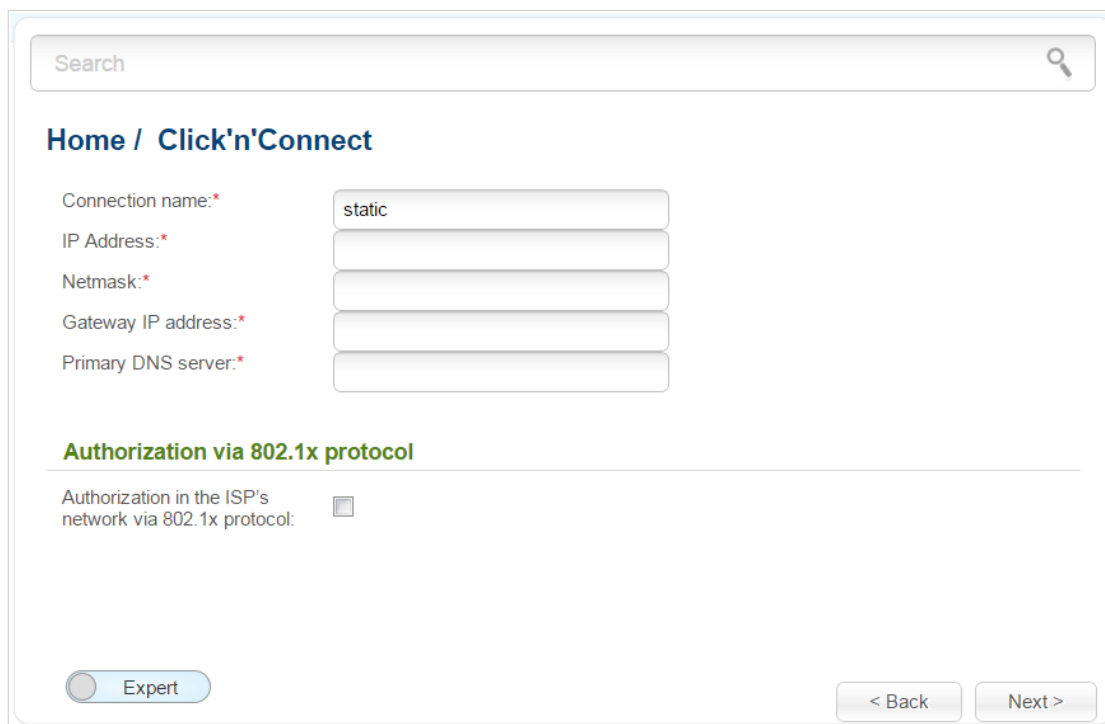
As a rule, the specified settings are enough to configure a connection of the selected type. If you need to specify additional settings, open the expert settings mode. To do this, use the switch in the bottom left corner of the page (for a detailed description of all the connection's parameters, see the *Creating Static IPv6 or Dynamic IPv6 WAN Connection* section, page 108).

Click the **Next** button to continue.

After that the page displaying all specified settings opens. Click the **Apply** button to create the connection or the **Back** button to specify other settings.

After clicking the **Apply** button, the page for checking the Internet availability opens (see the *Checking Internet Availability* section, page 66).

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Configuring via Web-based Interface

PPPoE + Static IP Connection

Figure 32. Configuring PPPoE + Static IP WAN connection.

Fill in the **IP Address** and **Netmask** fields.

In the **Gateway IP address** field, enter the IP address of the gateway used by this WAN connection.

In the **Primary DNS server** field, enter the address of the primary DNS server.

If your wired ISP uses authorization via the 802.1x protocol, in the **Authorization via 802.1x protocol** section, select the **Authorization in the ISP's network via 802.1x protocol** checkbox and fill in the fields of the section in accordance with data provided by your ISP.

As a rule, the specified settings are enough at this step to configure a connection of the selected type. If you need to specify additional settings, open the expert settings mode. To do this, use the switch in the bottom left corner of the page (for a detailed description of all the connection's parameters, see the *Creating PPPoE + Static IP or PPPoE + Dynamic IP WAN Connection* section, page 112).

Click the **Next** button to continue.

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Figure 33. Configuring PPPoE + Static IP WAN connection.

In the **Connection name** field, specify a name for the connection for easier identification.

In the **Username** field, enter your login, and in the **Password** and **Password confirmation** fields – the password provided by your ISP.

As a rule, the specified settings are enough to configure a connection of the selected type. If you need to specify additional settings, open the expert settings mode. To do this, use the switch in the bottom left corner of the page (for a detailed description of all the connection's parameters, see the *Creating PPPoE + Static IP or PPPoE + Dynamic IP WAN Connection* section, page 112).
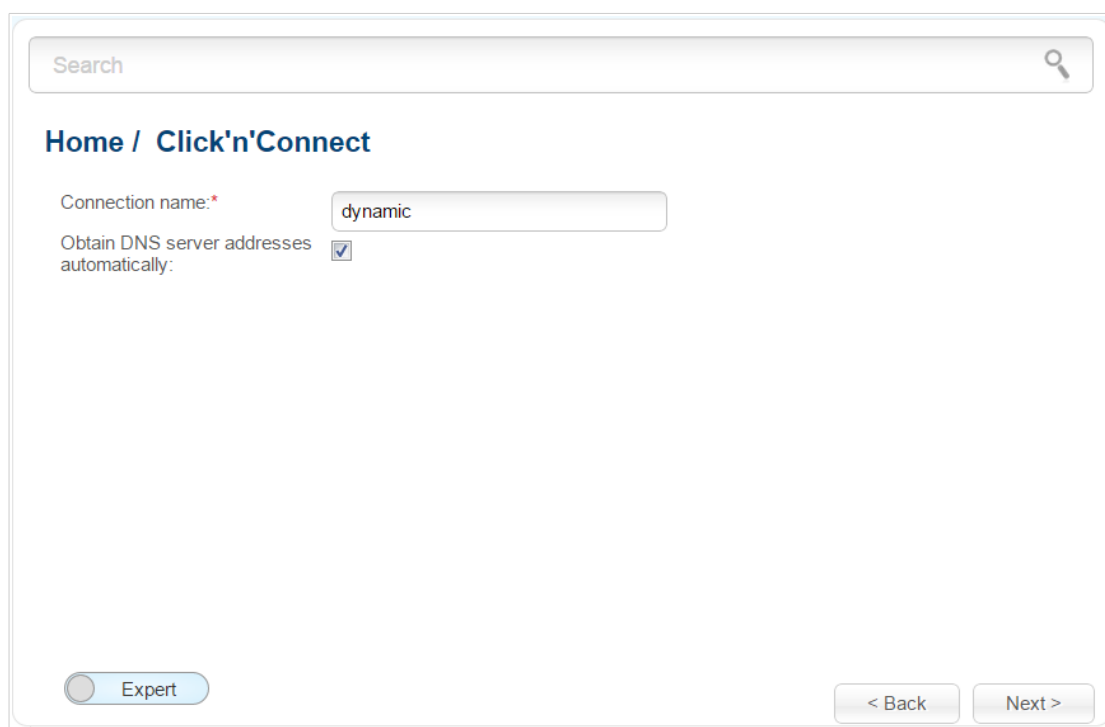
Click the **Next** button to continue.

After that the page displaying all specified settings opens. Click the **Apply** button to create the connection or the **Back** button to specify other settings.

After clicking the **Apply** button, the page for checking the Internet availability opens (see the *Checking Internet Availability* section, page 66).

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Configuring via Web-based Interface

PPPoE + Dynamic IP Connection

Figure 34. Configuring PPPoE + Dynamic IP WAN connection.

If your ISP has provided the addresses of the DNS servers, deselect the **Obtain DNS server addresses automatically** checkbox and fill in the **Primary DNS server** field.
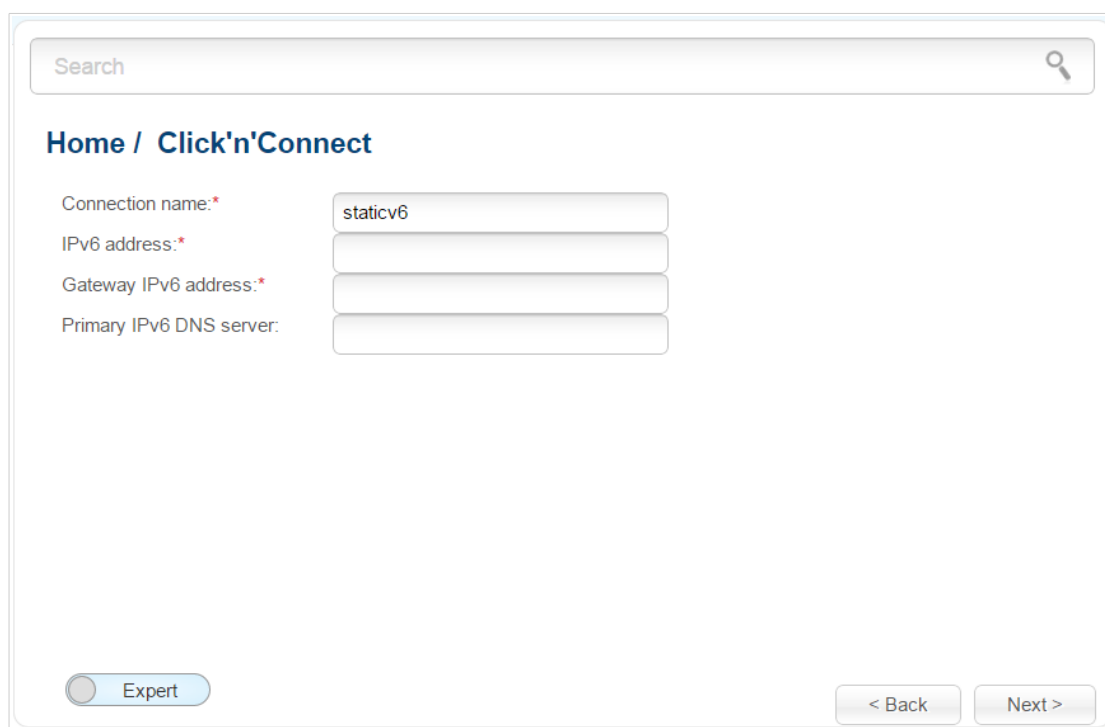
As a rule, the specified settings are enough at this step to configure a connection of the selected type. If you need to specify additional settings, open the expert settings mode. To do this, use the switch in the bottom left corner of the page (for a detailed description of all the connection's parameters, see the *Creating PPPoE + Static IP or PPPoE + Dynamic IP WAN Connection* section, page 112).

Click the **Next** button to continue.

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Figure 35. Configuring PPPoE + Dynamic IP WAN connection.

In the **Connection name** field, specify a name for the connection for easier identification.

In the **Username** field, enter your login, and in the **Password** and **Password confirmation** fields – the password provided by your ISP.
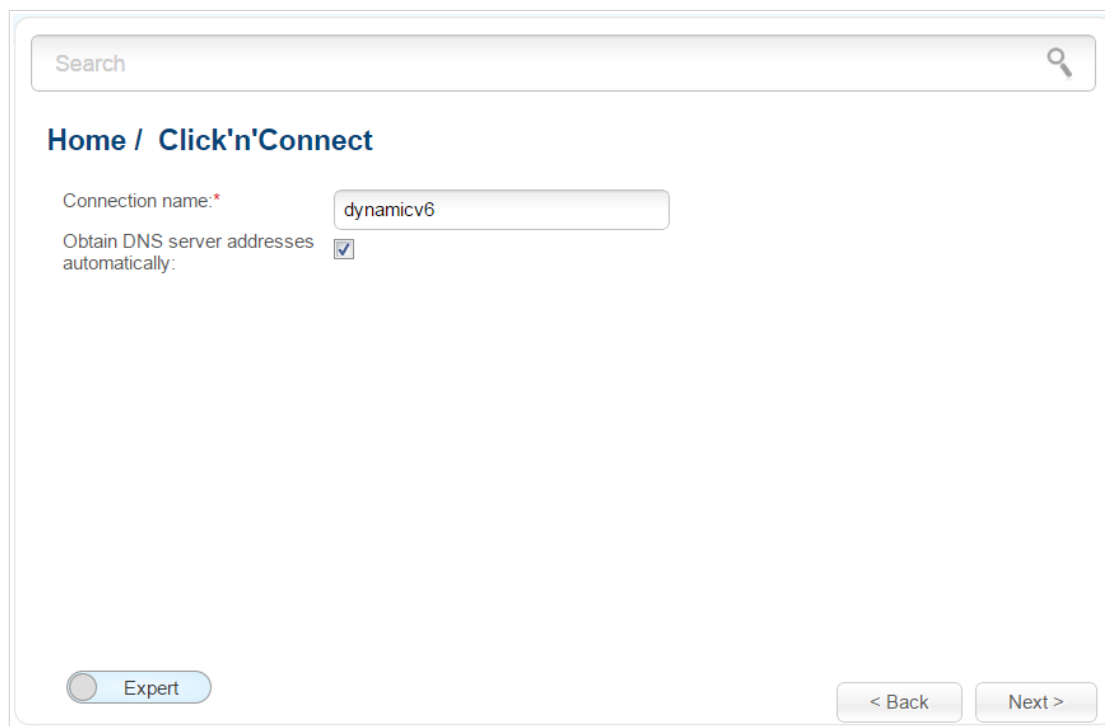
As a rule, the specified settings are enough to configure a connection of the selected type. If you need to specify additional settings, open the expert settings mode. To do this, use the switch in the bottom left corner of the page (for a detailed description of all the connection's parameters, see the ***Creating PPPoE + Static IP or PPPoE + Dynamic IP WAN Connection*** section, page 112).

Click the **Next** button to continue.

After that the page displaying all specified settings opens. Click the **Apply** button to create the connection or the **Back** button to specify other settings.

After clicking the **Apply** button, the page for checking the Internet availability opens (see the ***Checking Internet Availability*** section, page 66).

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Configuring via Web-based Interface

PPTP + Static IP or L2TP + Static IP Connection

Figure 36. Configuring PPTP + Static IP WAN connection.

Fill in the **IP Address** and **Netmask** fields.

In the **Gateway IP address** field, enter the IP address of the gateway used by this WAN connection.

In the **Primary DNS server** field, enter the address of the primary DNS server.

If your wired ISP uses authorization via the 802.1x protocol, in the **Authorization via 802.1x protocol** section, select the **Authorization in the ISP's network via 802.1x protocol** checkbox and fill in the fields of the section in accordance with data provided by your ISP.

As a rule, the specified settings are enough to configure a non-protected connection of the selected type. If you need to specify additional settings, open the expert settings mode. To do this, use the switch in the bottom left corner of the page (for a detailed description of all the connection's parameters, see the *Creating PPTP/L2TP + Static IP or PPTP/L2TP + Dynamic IP WAN Connection* section, page 119).

Click the **Next** button to continue.

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Figure 37. Configuring PPTP + Static IP WAN connection.

In the **Connection name** field, specify a name for the connection for easier identification.

In the **Username** field, enter your login, and in the **Password** and **Password confirmation** fields – the password provided by your ISP.

In the **VPN server address** field, enter the IP or URL address of the PPTP or L2TP authentication server.

As a rule, the specified settings are enough to configure a protected connection (the VPN tunnel). If you need to specify additional settings, open the expert settings mode. To do this, use the switch in the bottom left corner of the page (for a detailed description of all the connection's parameters, see the *Creating PPTP/L2TP + Static IP or PPTP/L2TP + Dynamic IP WAN Connection* section, page 119).

Click the **Next** button to continue.

After that the page displaying all specified settings opens. Click the **Apply** button to create the connection or the **Back** button to specify other settings.

After clicking the **Apply** button, the page for checking the Internet availability opens (see the *Checking Internet Availability* section, page 66).

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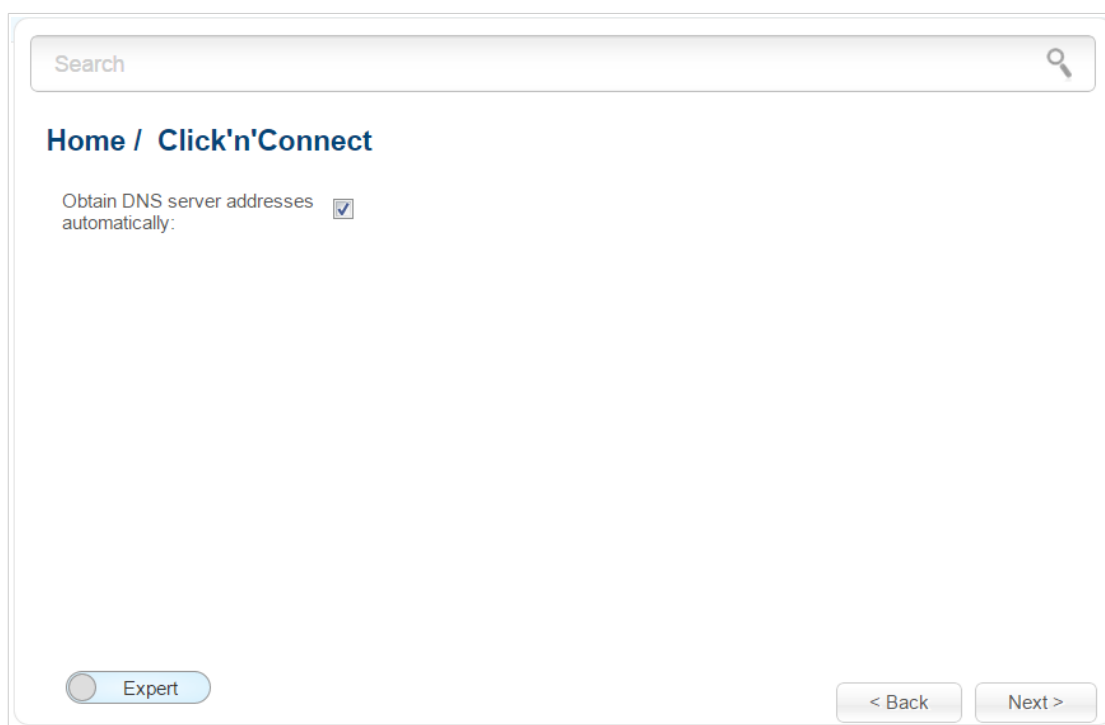
Figure 38. Configuring PPTP + Dynamic IP WAN connection.

If your ISP has provided the addresses of the DNS servers, deselect the **Obtain DNS server addresses automatically** checkbox and fill in the **Primary DNS server** field.

As a rule, the specified settings are enough to configure a non-protected connection of the selected type. If you need to specify additional settings, open the expert settings mode. To do this, use the switch in the bottom left corner of the page (for a detailed description of all the connection's parameters, see the *Creating PPTP/L2TP + Static IP or PPTP/L2TP + Dynamic IP WAN Connection* section, page 119).

Click the **Next** button to continue.

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Figure 39. Configuring PPTP + Dynamic IP WAN connection.

In the **Connection name** field, specify a name for the connection for easier identification.

In the **Username** field, enter your login, and in the **Password** and **Password confirmation** fields – the password provided by your ISP.

In the **VPN server address** field, enter the IP or URL address of the PPTP or L2TP authentication server.

As a rule, the specified settings are enough to configure a protected connection (the VPN tunnel). If you need to specify additional settings, open the expert settings mode. To do this, use the switch in the bottom left corner of the page (for a detailed description of all the connection's parameters, see the *Creating PPTP/L2TP + Static IP or PPTP/L2TP + Dynamic IP WAN Connection* section, page 119).

Click the **Next** button to continue.

After that the page displaying all specified settings opens. Click the **Apply** button to create the connection or the **Back** button to specify other settings.

After clicking the **Apply** button, the page for checking the Internet availability opens (see the *Checking Internet Availability* section, page 66).

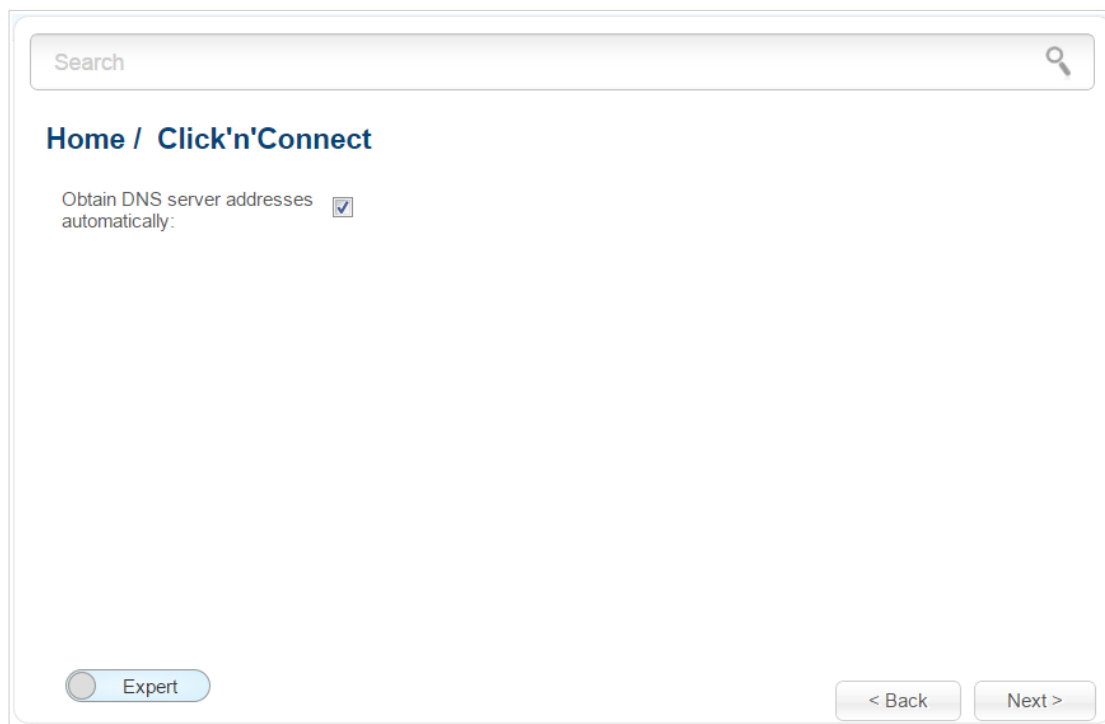**DVG-N5402G/ACF** Wireless AC1200 Dual Band Gigabit Router with Fiber WAN Port, 3G/LTE Support, 2 FXS Ports, 1 PSTN (lifeline) Port, and USB Port

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Configuring via Web-based Interface

3G Connection

Figure 40. Configuring 3G WAN connection.

In the **Connection name** field, specify a name for the connection for easier identification.

In the **Username** field, enter your login, and in the **Password** and **Password confirmation** fields – the password provided by your 3G operator.

In the **APN** field (for GSM USB modems only), enter the access point name, and in the **Dial number** field, enter the number dialed to connect to the authorization server of the operator.

As a rule, the specified settings are enough to configure a connection of the selected type. If you need to specify additional settings, open the expert settings mode. To do this, use the switch in the bottom left corner of the page (for a detailed description of all the connection's parameters, see the *Creating 3G WAN Connection* section, page 64).

Click the **Next** button to continue.

After that the page displaying all specified settings opens. Click the **Apply** button to create the connection or the **Back** button to specify other settings.

After clicking the **Apply** button, the page for checking the Internet availability opens (see the *Checking Internet Availability* section, page 66).

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LTE Connection

> ❗ For the USB modem Megafon M100-1, please reboot the router after finishing the Wizard.

Figure 41. Configuring LTE WAN connection.

In the **Connection name** field, specify a name for the connection for easier identification.

If your ISP has provided the addresses of the DNS servers, deselect the **Obtain DNS server addresses automatically** checkbox and fill in the **Primary DNS server** field.

As a rule, the specified settings are enough to configure a connection of the selected type. If you need to specify additional settings, open the expert settings mode. To do this, use the switch in the bottom left corner of the page (for a detailed description of all the connection's parameters, see the *Creating LTE WAN Connection* section, page 129).

Click the **Next** button to continue.

After that the page displaying all specified settings opens. Click the **Apply** button to create the connection or the **Back** button to specify other settings.

After clicking the **Apply** button, the page for checking the Internet availability opens (see the *Checking Internet Availability* section, page 66).

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Checking Internet Availability

On the page, you can check the WAN connection you have created.
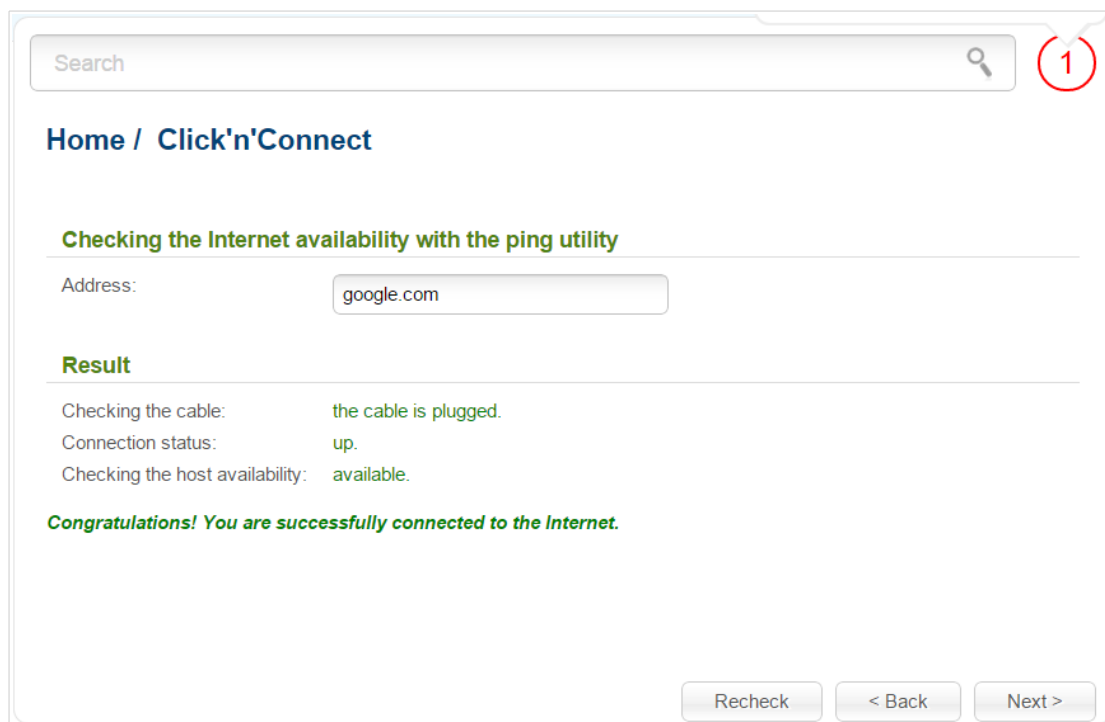
Figure 42. Checking the Internet availability.

In the **Result** section, the status of the WAN connection and possible causes of malfunctions are displayed. To recheck the status of the WAN connection, enter the IP address or name of a host in the **Address** field or leave the value specified by default (`google.com` for IPv4 connections, `ipv6.google.com` for IPv6 connections). Then click the **Recheck** button.

Click the **Back** button to specify other settings.

Click the **Next** button to continue.

After clicking the **Next** button, the page for configuring wireless connection opens (see the *Configuring Wireless Connection* section, page 67).

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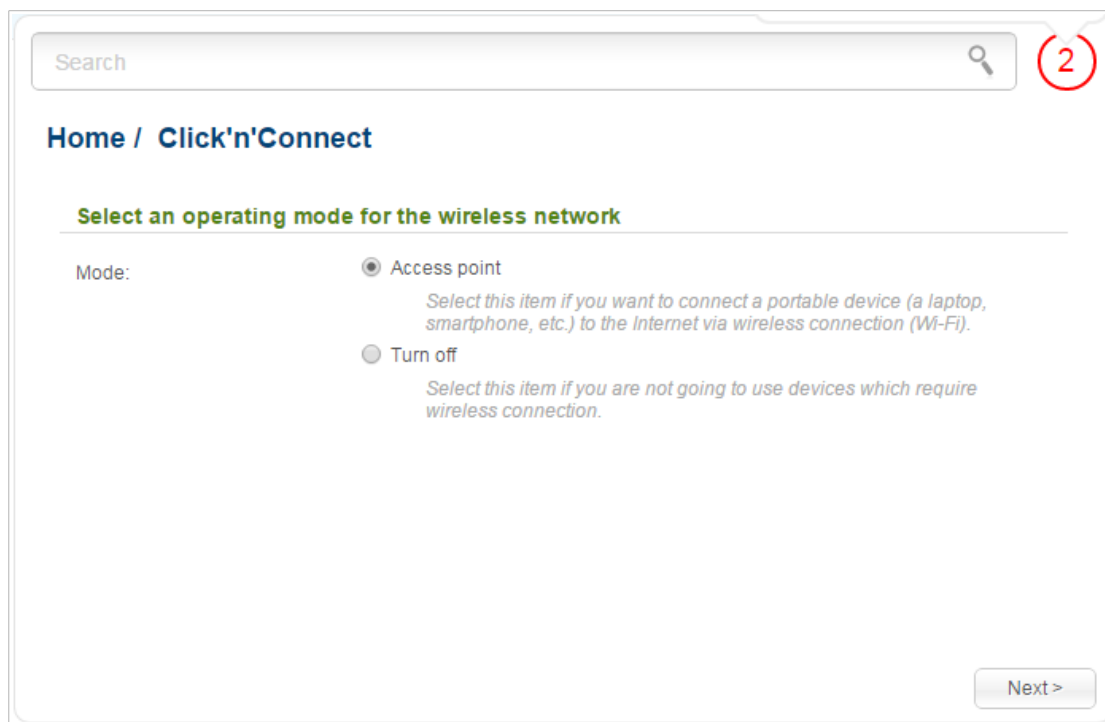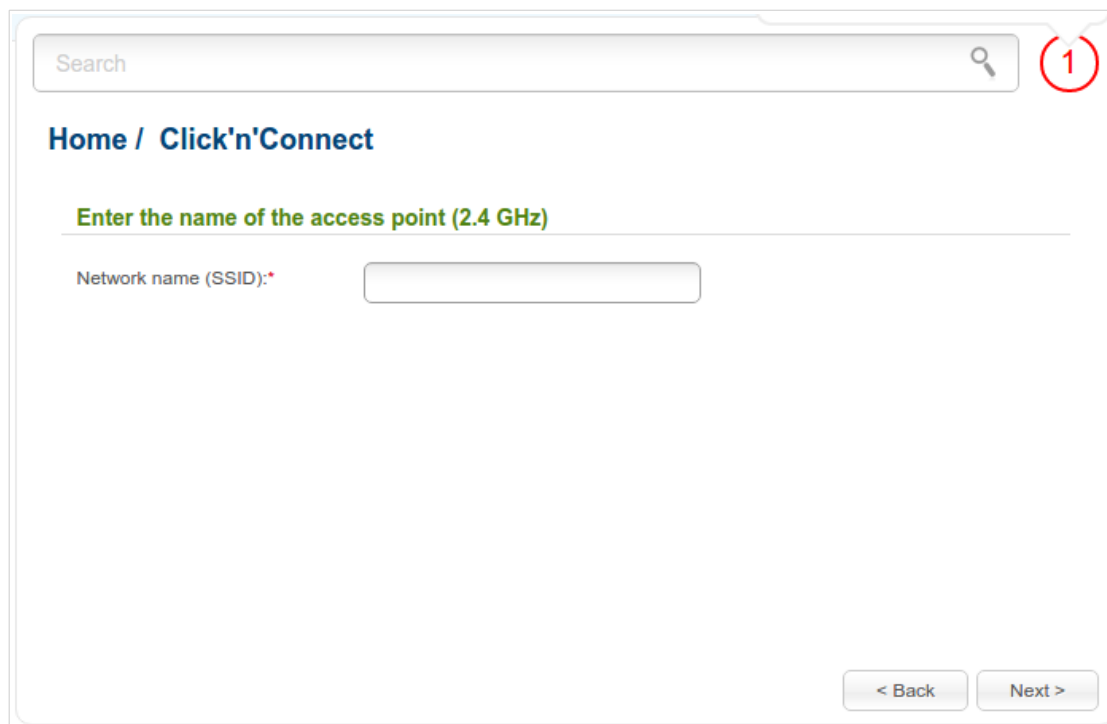
Figure 43. Selecting the operating mode for the wireless network.

If you want to disable one or both bands of the wireless network, select the **Turn off** choice of the **Mode** radio button and click the **Next** button. On the opened page, select the checkbox corresponding to the band that should be disabled, and click the **Next** button. Then click the **Apply** button. After clicking the button, the page for configuring the router to use an IPTV set-top box opens (see the *Configuring IPTV* section, page 73).

If you want to connect portable devices to the Internet via wireless connection, select the **Access point** choice of the **Mode** radio button. Click the **Next** button.

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On the opened page, in the **Network name (SSID)** field, specify a new name for the network in the 2.4GHz band (use digits and Latin characters).

Figure 44. Changing the name of the wireless LAN in the 2.4GHz band.

Click the **Next** button to continue.

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On the next page, you can modify security settings of the WLAN in the 2.4GHz band.

Select the **Protected** value from the **Security mode** drop-down list and enter a key (a password that will be used to access your wireless network) in the **Network key** field. Use digits and Latin characters. After applying this setting, the **WPA-PSK/WPA2-PSK mixed** authentication type is specified for the router's WLAN in the 2.4GHz band.

When the **Open** value is selected, the **Network key** field is unavailable. After applying this setting, the **Open** authentication type with no encryption is specified for the router's WLAN in the 2.4GHz band.

Figure 45. Selecting a security mode for the wireless network in the 2.4GHz band.

Click the **Next** button to continue.

On the next pages, specify a new name and configure security settings for the wireless network in the 5GHz band. Then click the **Next** button.

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On the opened page, you can configure a guest wireless network in the 2.4GHz band.
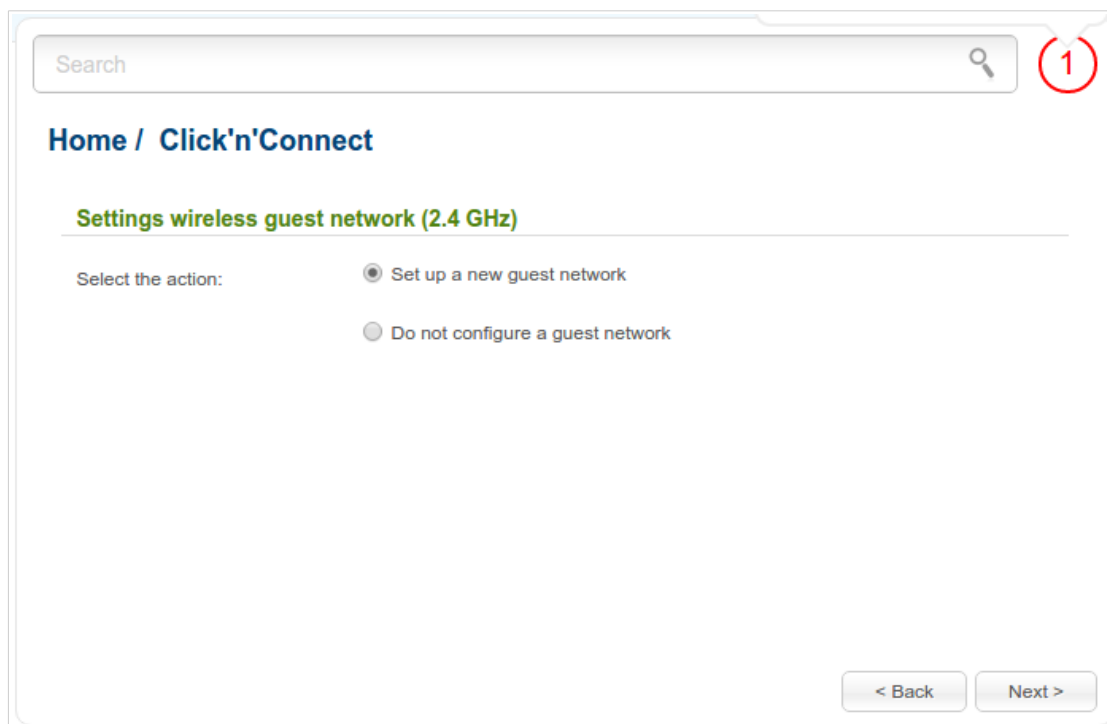
Figure 46. Creating a guest network in the 2.4GHz band.

If you are not going to use the guest wireless network, or you have configured all needed settings for the guest wireless network before starting the wizard, select the **Do not configure a guest network** choice of the **Select the action** radio button and click the **Next** button on the current page and on the next page.

After that the page displaying all specified settings opens. Make sure that they are correct, and then click the **Apply** button, or the **Back** button to specify other settings. After clicking the button, the page for configuring the router to use an IPTV set-top box opens (see the *Configuring IPTV* section, page 73).

If you want to create a guest wireless network or you need to change the existing settings of the guest network, select the **Set up a new guest network** choice or the **To configure an existing guest network** choice of the **Select the action** radio button correspondingly and click the **Next** button.

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Figure 47. Configuring a guest network in the 2.4GHz band.

On the opened page, in the **Network name (SSID)** field, specify a new name for the guest network. Use digits and Latin characters.

In the **Max Associated clients** field, specify the maximum number of devices that will be able to connect the guest network in the 2.4GHz band, or leave the value **0** not to limit the number of clients.

In the **Shaping** field, specify the maximum bandwidth of the guest network in the 2.4GHz band or leave the value **0** not to limit bandwidth of the network.

Click the **Next** button.

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On the opened page, modify security settings of the guest network in the 2.4GHz band.

Select the **Protected** value from the **Security mode** drop-down list and enter a key (a password that will be used to access your guest network) in the **Network key** field. Use digits and Latin characters. After applying this setting, the **WPA-PSK/WPA2-PSK mixed** authentication type is specified for the router's guest network in the 2.4GHz band.

When the **Open** value is selected, the **Network key** field is unavailable. After applying this setting, the **Open** authentication type with no encryption is specified for the router's guest network in the 2.4GHz band.

Figure 48. Selecting a security mode for the guest network in the 2.4GHz band.

Click the **Next** button to continue.

On the next pages, specify a new name and configure security settings for the guest network in the 5GHz band. Then click the **Next** button.

After that the page displaying all specified settings opens. Make sure that they are correct, and then click the **Apply** button, or the **Back** button to specify other settings. After clicking the button, the page for configuring the router to use an IPTV set-top box opens (see the *Configuring IPTV* section, page 73).

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Configuring IPTV

On the page, you can configure the router to use an IPTV set-top box.
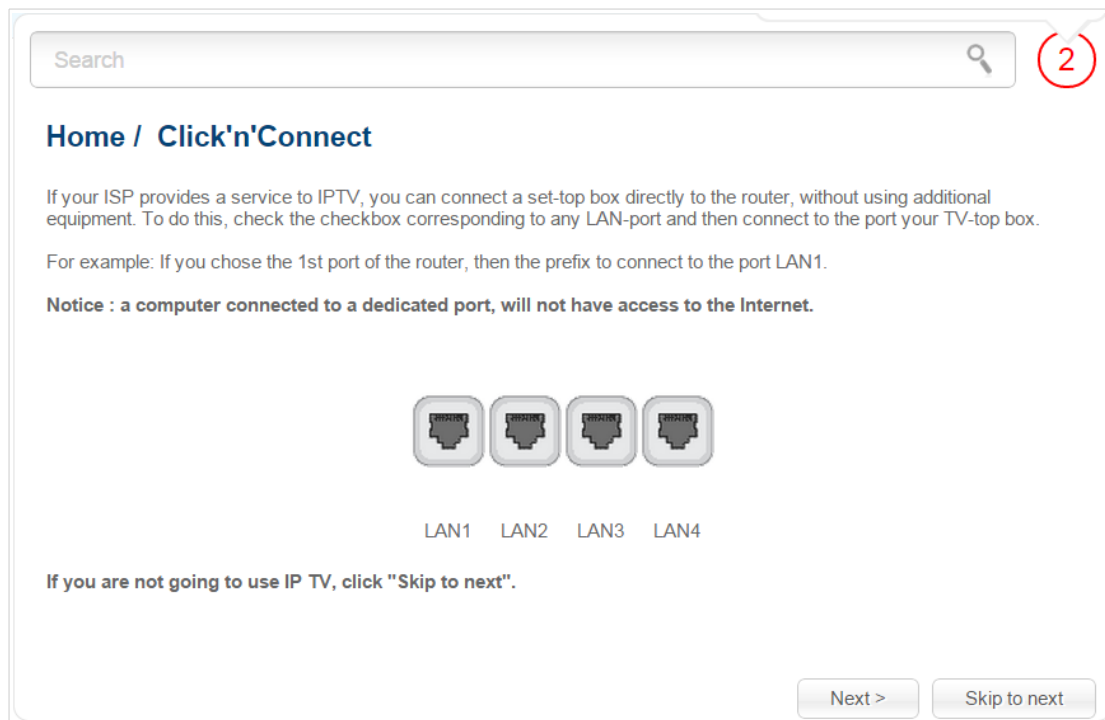
Figure 49. Selecting a LAN port to connect an IPTV set-top box.

On the opened page, select the LAN port of the router to which you will connect your IPTV set-top box.

If in the future you need to disconnect your IPTV set-top box from the specified LAN port and connect to it a computer, start the **IPTV settings wizard** (for the detailed description of the Wizard, see the *IPTV Settings Wizard* section, page 85).

If for accessing the Internet and IPTV services your ISP uses virtual local area networks with identifiers (VLAN ID), to configure access to the IPTV service, proceed to the **Advanced / VLAN** page, create a group of ports with the required value of the **VLAN ID** parameter, the **Bridge** type, and the port to which the set-top box will be connected (see the *VLAN* section, page 165, for a detailed description of the elements from the page).

Click the **Next** button to continue.
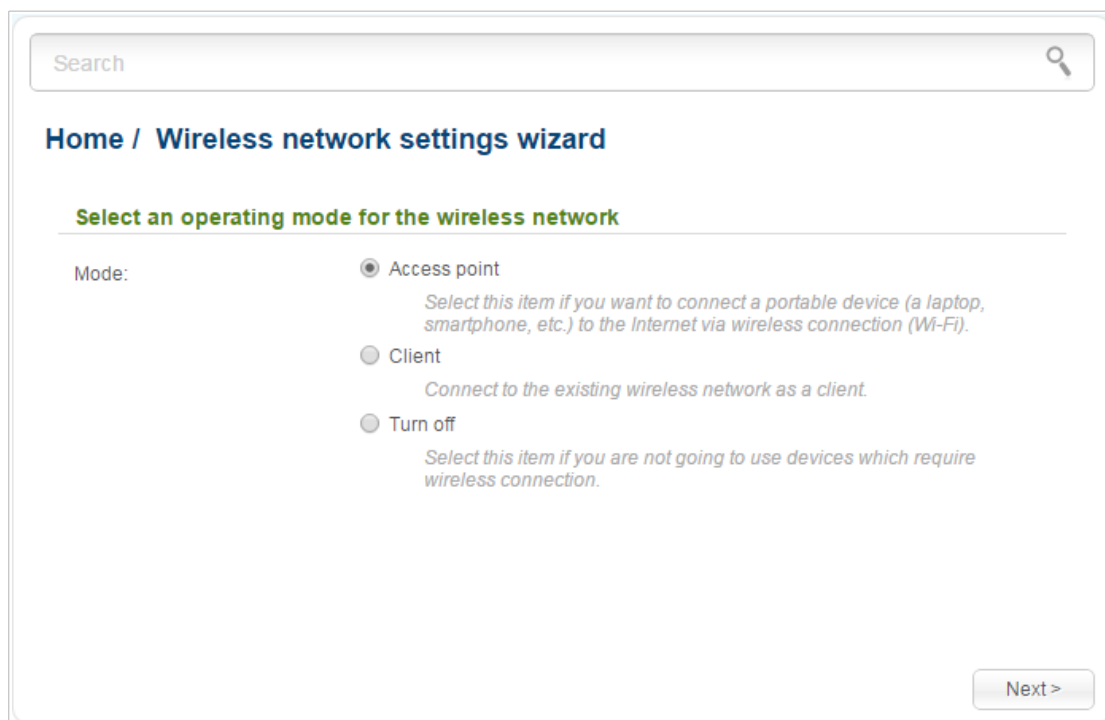
Click the **Skip to next** button in order not to apply the IPTV settings.

Click the **Apply** button to save the specified settings.

After clicking the **Apply** button, the **Home / Information** page opens.

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Wireless Network Settings Wizard

To specify all needed settings for your wireless network, click the **Wireless network settings wizard** link in the **Home** section.

Figure 50. The page for selecting the operating mode for the wireless network.
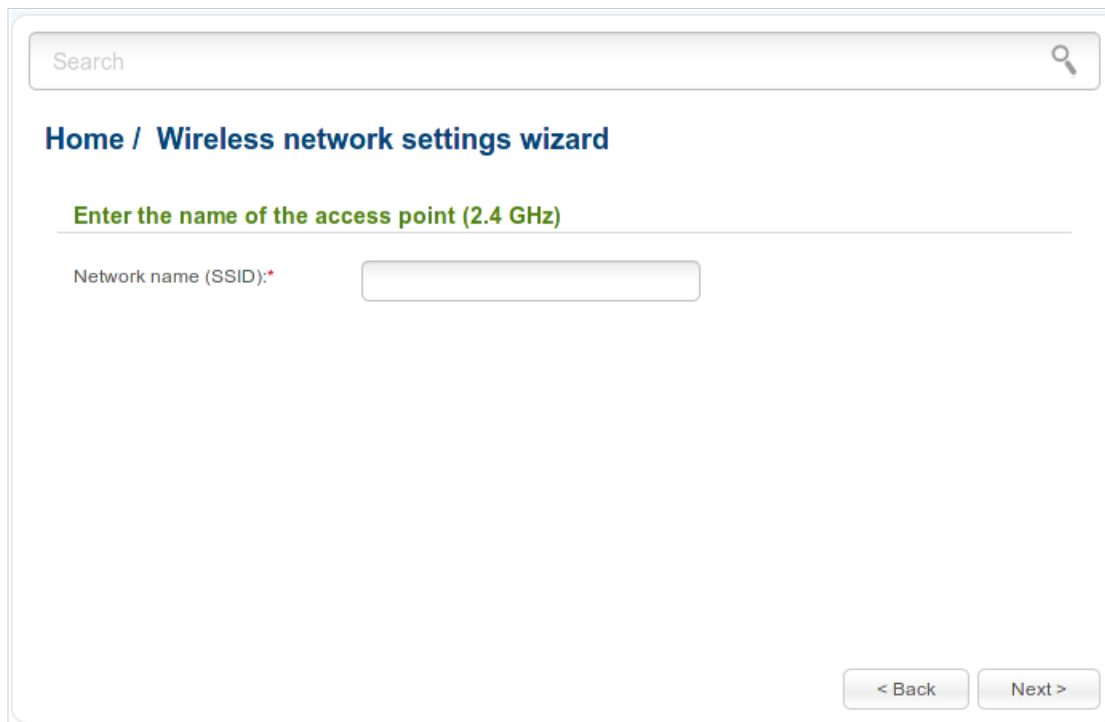
If you want to disable one or both bands of the wireless network, select the **Turn off** choice of the **Mode** radio button and click the **Next** button. On the opened page, select the checkbox corresponding to the band that should be disabled, and click the **Next** button. Then click the **Apply** button. After clicking the button, the **Home / Information** page opens.

If you want to connect portable devices to the Internet via wireless connection, select the **Access point** choice of the **Mode** radio button. Click the **Next** button.

If you want to configure the router as a client to connect to a wireless access point, select the **Client** choice of the **Mode** radio button. Click the **Next** button.

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Access Point Mode

On the opened page, in the **Network name (SSID)** field specify a new name for the network in the 2.4GHz band (use digits and Latin characters).
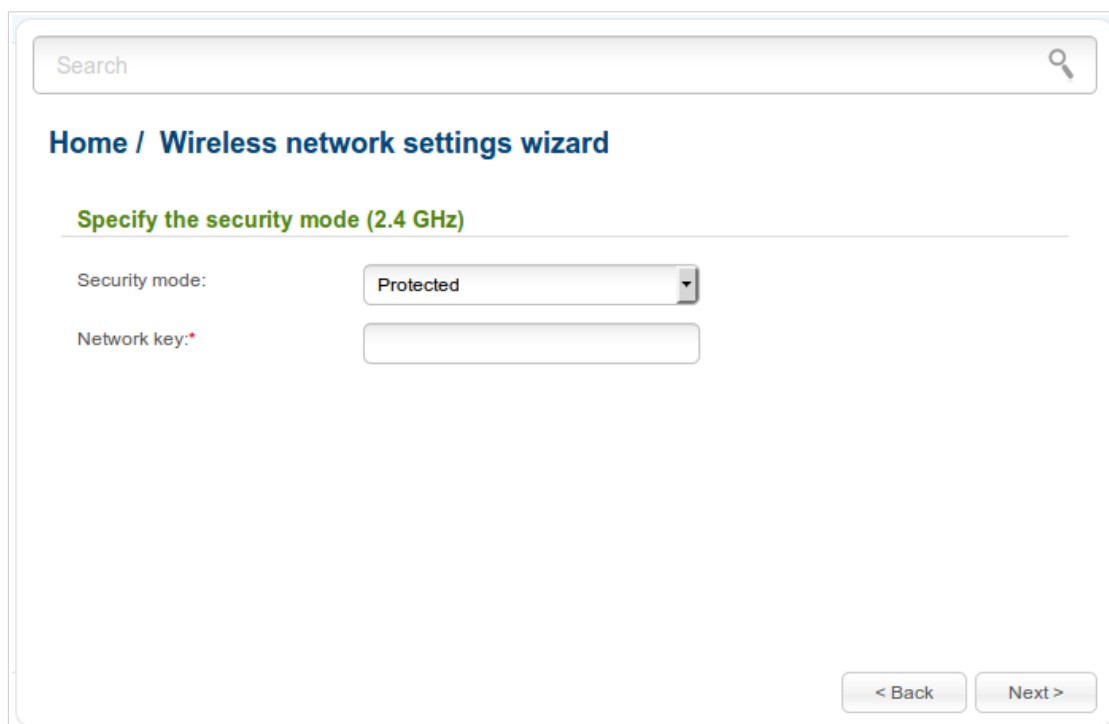
Figure 51. The page for changing the name of the wireless LAN in the 2.4GHz band.

Click the **Next** button to continue.

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On the next page, you can modify security settings of your wireless network in the 2.4GHz band.

Select the **Protected** value from the **Security mode** drop-down list and enter a key (a password that will be used to access your wireless network) in the **Network key** field. Use digits and Latin characters. After applying this setting, the **WPA-PSK/WPA2-PSK mixed** authentication type is specified for the router's WLAN in the 2.4GHz band.

When the **Open** value is selected, the **Network key** field is unavailable. After applying this setting, the **Open** authentication type with no encryption is specified for the router's WLAN in the 2.4GHz band.

Figure 52. The page for selecting a security mode for the wireless network in the 2.4GHz band.

Click the **Next** button to continue.

On the next pages, specify a new name and configure security settings for the wireless network in the 5GHz band. Then click the **Next** button.

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On the opened page, you can configure a guest wireless network in the 2.4GHz band.
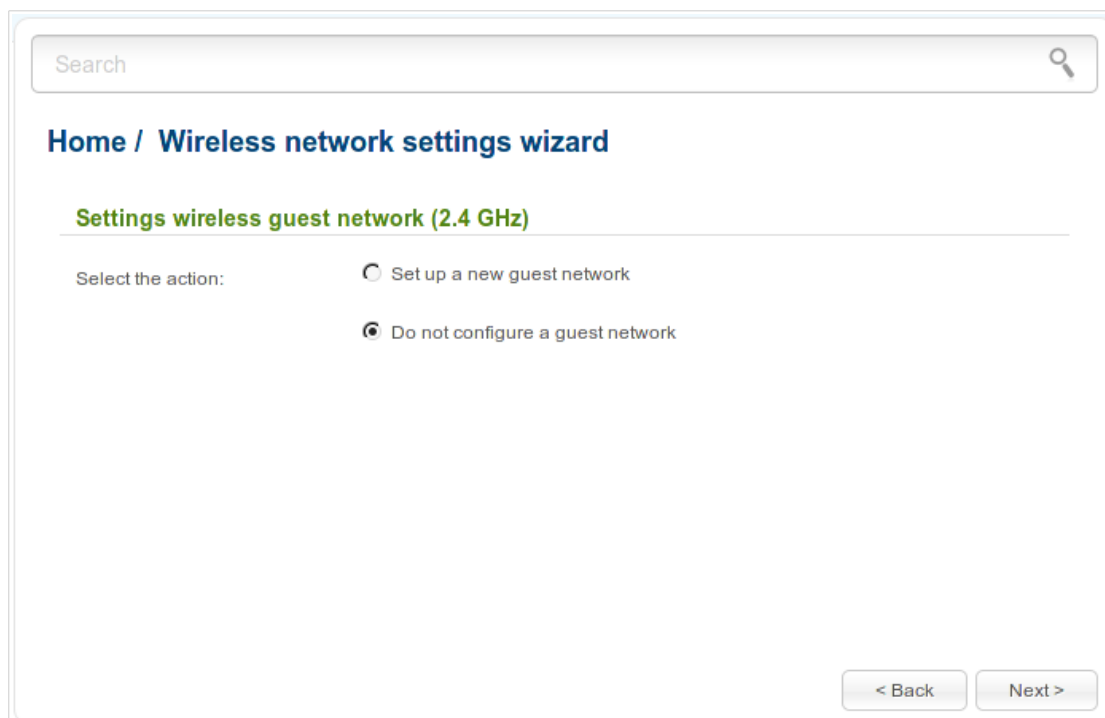
Figure 53. The page for creating a guest network in the 2.4GHz band.

If you are not going to use the guest wireless network, or you have configured all needed settings for the guest wireless network before starting the wizard, select the **Do not configure a guest network** choice of the **Select the action** radio button and click the **Next** button on the current page and on the next page.

After that the page displaying all specified settings opens. Make sure that they are correct, and then click the **Apply** button, or the **Back** button to specify other settings. After clicking the **Apply** button, the **Home / Information** page opens.

If you want to create a guest wireless network or you need to change the existing settings of the guest network, select the **Set up a new guest network** choice or the **To configure an existing guest network** choice of the **Select the action** radio button correspondingly and click the **Next** button.

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Figure 54. The page for configuring a guest network in the 2.4GHz band.

On the opened page, in the **Network name (SSID)** field, specify a new name for the guest network. Use digits and Latin characters.

In the **Max Associated clients** field, specify the maximum number of devices that will be able to connect to the guest network in the 2.4GHz band, or leave the value 0 not to limit the number of clients.

In the **Shaping** field, specify the maximum bandwidth of the guest network in the 2.4GHz band or leave the value 0 not to limit bandwidth of the network.

Click the **Next** button.

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On the opened page, modify security settings of the guest network in the 2.4GHz band.

Select the **Protected** value from the **Security mode** drop-down list and enter a key (a password that will be used to access your guest network) in the **Network key** field. Use digits and Latin characters. After applying this setting, the **WPA-PSK/WPA2-PSK mixed** authentication type is specified for the router's guest network in the 2.4GHz band.

When the **Open** value is selected, the **Network key** field is unavailable. After applying this setting, the **Open** authentication type with no encryption is specified for the router's guest network in the 2.4GHz band.

Figure 55. The page for selecting a security mode for the guest network in the 2.4GHz band.
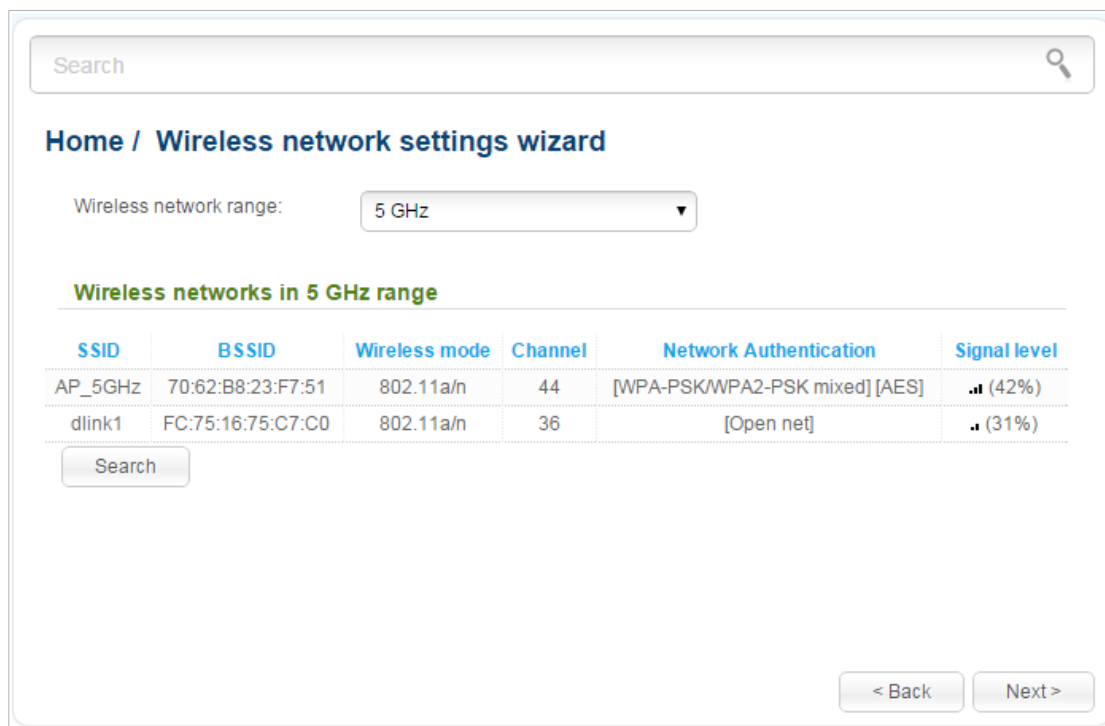
Click the **Next** button to continue.

On the next pages, specify a new name and configure security settings for the guest network in the 5GHz band. Then click the **Next** button.

After that the page displaying all specified settings opens. Make sure that they are correct, and then click the **Apply** button, or the **Back** button to specify other settings. After clicking the **Apply** button, the **Home / Information page** opens.

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Client Mode

On the opened page, select the band of the network to which you want to connect from the **Wireless network range** drop-down list and click the **Search** button.

Figure 56. The page for selecting a network to connect.

Select the network to which you want to connect and click the **Next** button.

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Figure 57. The page for entering the password for connection to the wireless network.

If you need a password to connect to the selected network, enter the password in the **Network key** field and click the **Next** button.

On the next page, you can specify an individual name (SSID) and security settings for the router or disable the router's wireless network broadcast.

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Figure 58. The page for changing the settings of the wireless local area network.

If you want to use the router's wireless network in the 2.4GHz or 5GHz band to connect devices, leave the corresponding checkbox (**Enable broadcasting network 2,4GHz** or **Enable broadcasting network 5GHz**) selected. Then, if needed, specify another name in the **Network name (SSID)** field of the relevant section. Use digits and Latin characters.

It is strongly recommended to configure the secure wireless network of DVG-N5402G/ACF. To do this, select the **Protected** value from the **Security mode** drop-down list and enter a key (a password that will be used to access your wireless network) in the **Network key** field. Use digits and Latin characters. After applying this setting, the **WPA-PSK/WPA2-PSK mixed** authentication type is specified for the router's WLAN. Click the **Next** button.

On the next page, the parameters of the network to which you want to connect, the entered password, and the settings of the wireless network of the router are displayed. Make sure that the specified settings are correct and then click the **Next** button or the **Back** button to specify other settings. Then click the **Apply** button. After that, the wireless channel of DVG-N5402G/ACF will switch to the channel of the wireless access point to which you have connected.

After configuring the device as a client, you need to create a WAN connection with relevant parameters for the **WiFiClient** interface.

After clicking the **Apply** button, the **Home / Information** page opens.

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Virtual Server Settings Wizard

To create a virtual server for redirecting incoming Internet traffic to a specified IP address in the LAN, click the **Virtual server settings wizard** link in the **Home** section.

Figure 59. The page for adding a virtual server.

On the opened page, you can specify the following parameters:

Parameter	Description
Template	Select a virtual server template from the drop-down list, or select **Custom** to specify all parameters of the new virtual server manually.
Name	Enter a name for the virtual server for easier identification. You can specify any name.
Interface	Select a WAN connection to which this virtual server will be assigned.
Protocol	A protocol that will be used by the new virtual server. Select a value from the drop-down list.
Public port (begin)/ Public port (end)	A port of the router from which traffic is directed to the IP address specified in the **Private IP** field. Specify the start and the end value for the port range. If you need to specify one port, enter the needed value in the **Public port (begin)** field and leave the **Public port (end)** field blank.

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Parameter	Description
Private port (begin)/ **Private port (end)**	A port of the IP address specified in the **Private IP** field to which traffic is directed from the **Public port**. Specify the start and the end value for the port range. If you need to specify one port, enter the needed value in the **Private port (begin)** field and leave the **Private port (end)** field blank.
Private IP	Enter the IP address of the server from the local area network. To choose a device connected to the router's LAN at the moment, select the relevant value from the drop-down list (the field will be filled in automatically).

When needed settings are configured, click the **Apply** button.

After clicking the **Apply** button, a dialog box appears.

If you are going to create a new virtual server, click the **OK** button. After clicking the button, the **Firewall / Virtual servers** page opens (see the *Virtual Servers* section, page 197, for a detailed description of the elements from the page).

If you are not going to create a new virtual server, click the **Cancel** button. After clicking the button, the **Home / Information** page opens.

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IPTV Settings Wizard

To configure the router to use an IPTV set-top box, click the **IPTV settings wizard** link in the **Home** section.
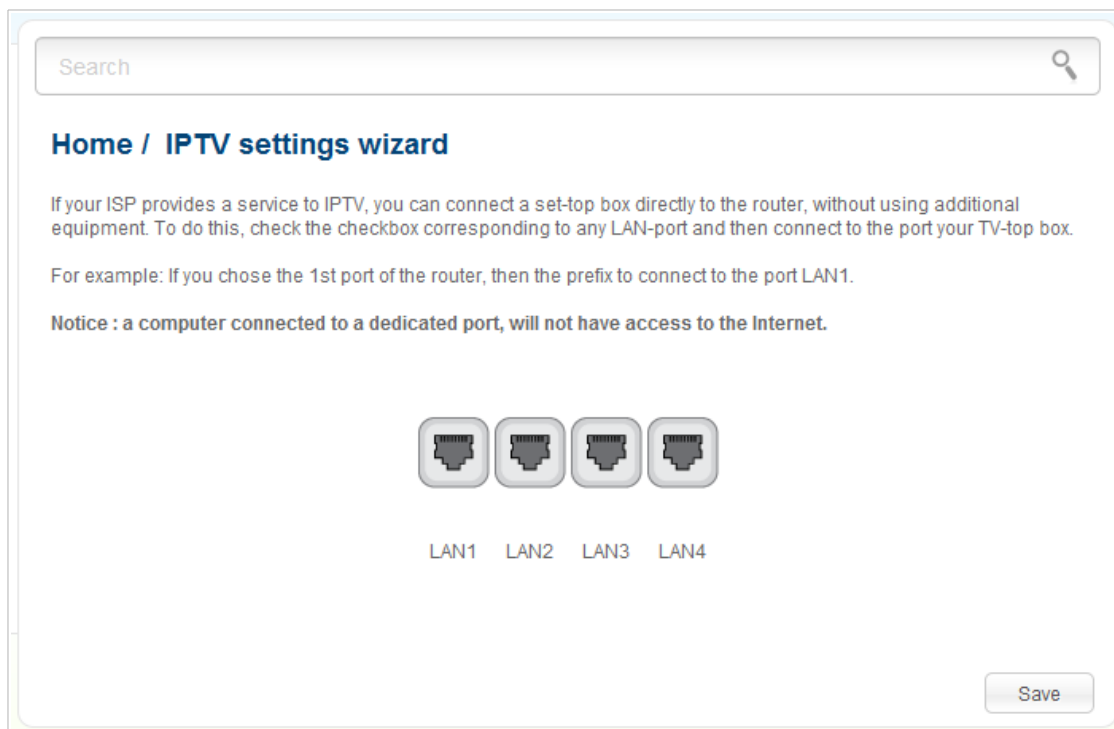
Figure 60. The page for selecting a LAN port to connect an IPTV set-top box.

On the opened page, select the LAN port of the router to which you will connect your IPTV set-top box and click the **Save** button.

If in the future you need to disconnect your IPTV set-top box from the specified LAN port and connect to it a computer, on the current page deselect the LAN port and click the **Save** button.

If for accessing the Internet and IPTV services your ISP uses virtual local area networks with identifiers (VLAN ID), to configure access to the IPTV service, proceed to the **Advanced / VLAN** page, create a group of ports with the required value of the **VLAN ID** parameter, the **Bridge** type, and the port to which the set-top box will be connected (see the *VLAN* section, page 165, for a detailed description of the elements from the page).

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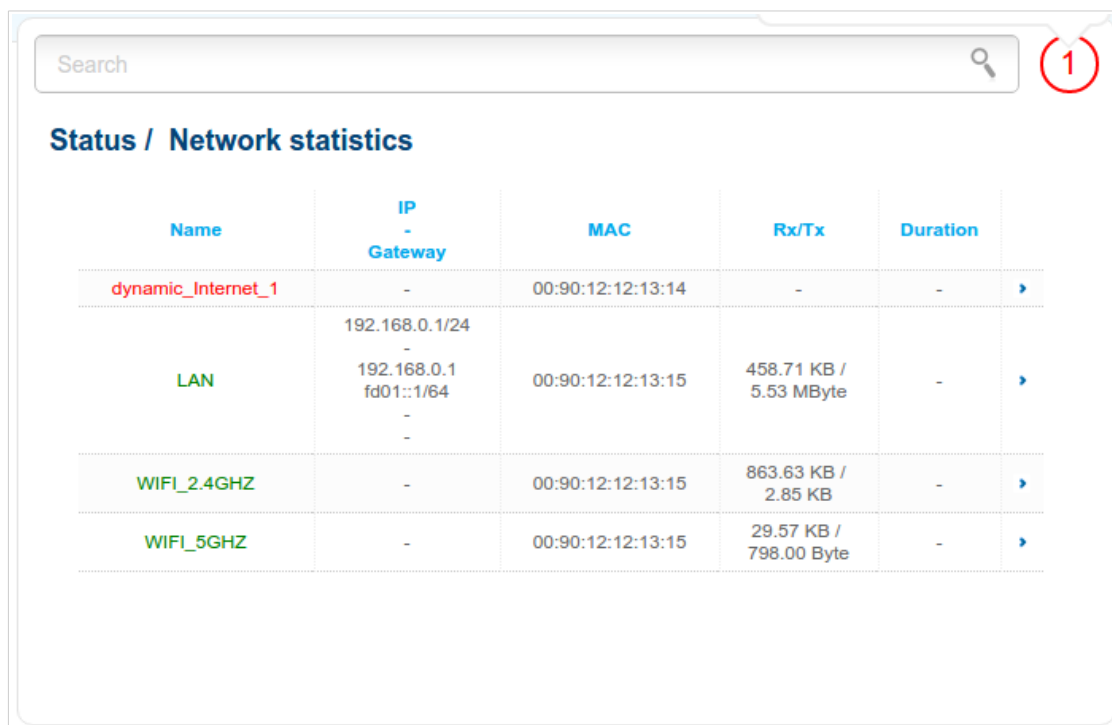
Status

The pages of this section display data on the current state of the router:

- network statistics

- IP addresses leased by the DHCP server

- the routing table

- data on devices connected to the router's network and its web-based interface

- active sessions

- addresses of active multicast groups.

Network Statistics

On the **Status / Network statistics** page, you can view statistics for all connections existing in the system (WAN connections, LAN, WLAN). For each connection the following data are displayed: name and state (when the connection is on, its name is highlighted in green, when the connection is off, its name is highlighted in red), IP address and subnet mask, gateway (if the connection is established), MAC address, MTU value, and volume of data received and transmitted (with increase of the volume the units of measurement are changed automatically: byte, Kbyte, Mbyte, Gbyte).

*Figure 61. The **Status / Network statistics** page.*

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DHCP

The **Status / DHCP** page displays the information on computers that have been identified by hostnames and MAC addresses and have got IP addresses from the DHCP server of the device, as well as the IP address expiration periods (the lease time).
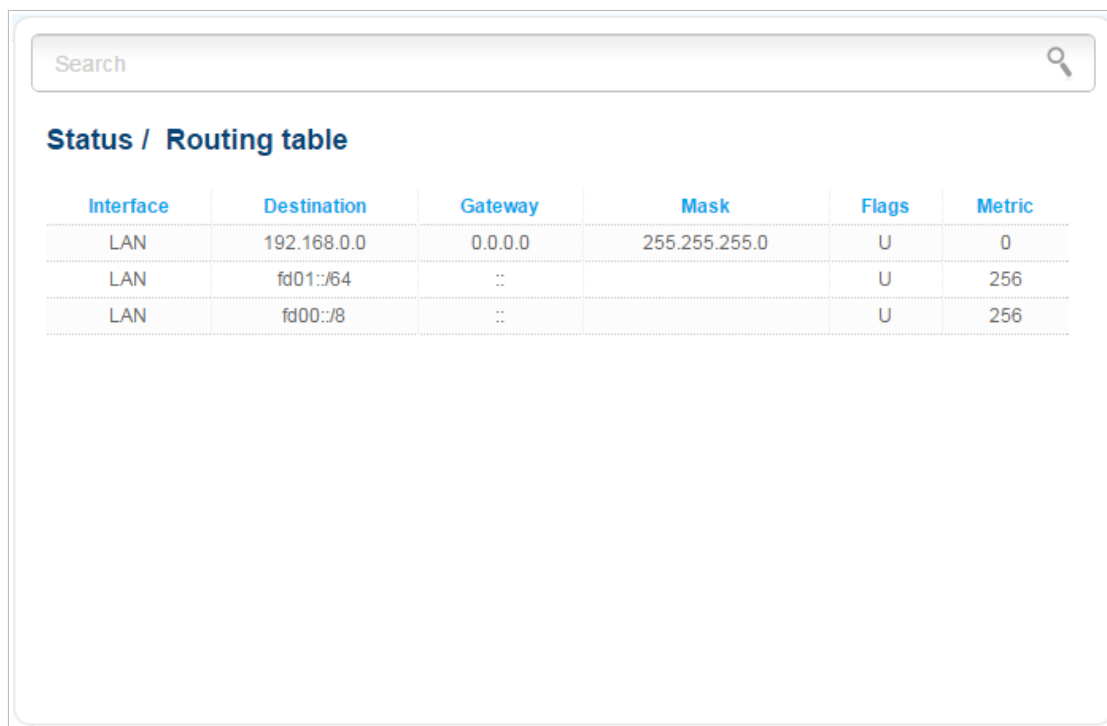
*Figure 62. The **Status / DHCP** page.*

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Routing Table

The **Status / Routing table** page displays the information on routes. The table contains destination IP addresses, gateways, subnet masks, and other data.
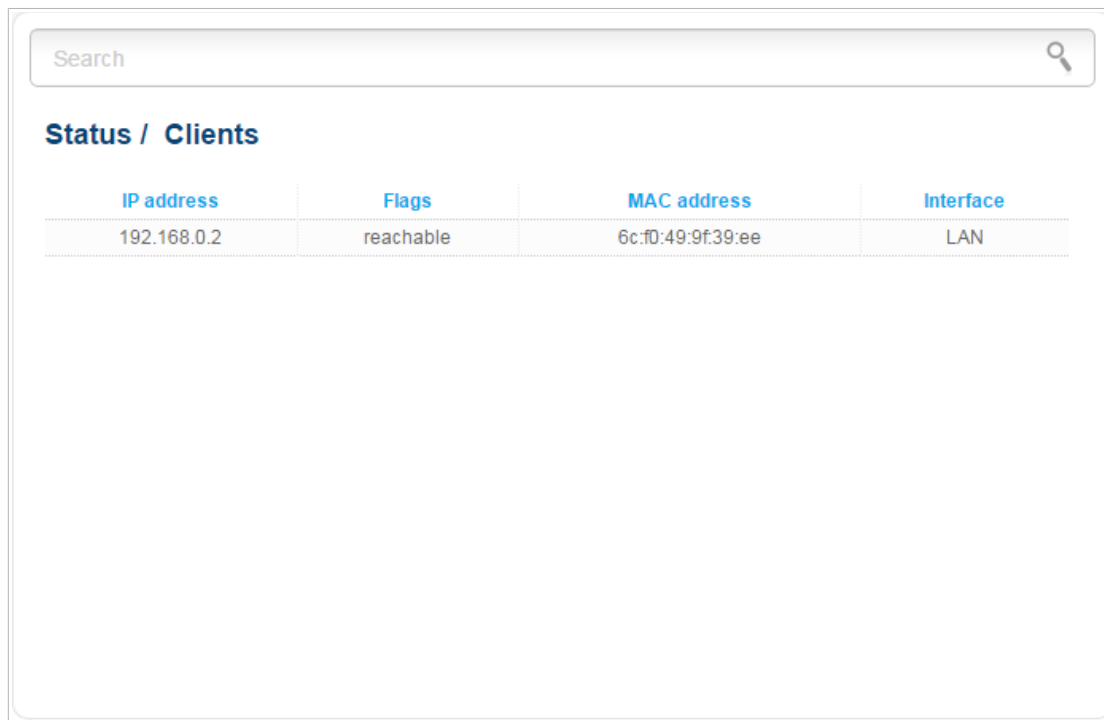
Interface	Destination	Gateway	Mask	Flags	Metric
LAN	192.168.0.0	0.0.0.0	255.255.255.0	U	0
LAN	fd01::/64	::		U	256
LAN	fd00::/8	::		U	256

*Figure 63. The **Status / Routing table** page.*

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Clients

On the **Status / Clients** page, you can view the list of devices connected to the router and devices accessing its web-based interface.

*Figure 64. The **Status / Clients** page.*

For each device the following data are displayed: the IP address, the MAC address, and the interface to which the device is connected.

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Active Sessions

On the **Status / Active sessions** page, you can view information on current sessions in the router's network. For each session the following data are displayed: a protocol for network packet transmission, a source IP address and port, a destination IP address and port.

*Figure 65. The **Status / Active sessions** page.*

To view the latest data on current sessions in the router's network, click the **Refresh** button.

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Multicast groups

The **Status / Multicast groups** page displays addresses of active multicast groups (including IPTV channels and groups for transferring service information) to which the device is subscribed, and the interface through which the device is subscribed.

*Figure 66. The **Status / Multicast groups** page.*

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Net

In this menu you can configure basic parameters of the router's local area network and configure connection to the Internet (a WAN connection).

WAN

On the **Net / WAN** page, you can create and edit connections used by the router.

By default, a **Dynamic IP** connection is configured in the system. It is assigned to the WAN port of the router. You can edit this connection or delete it.
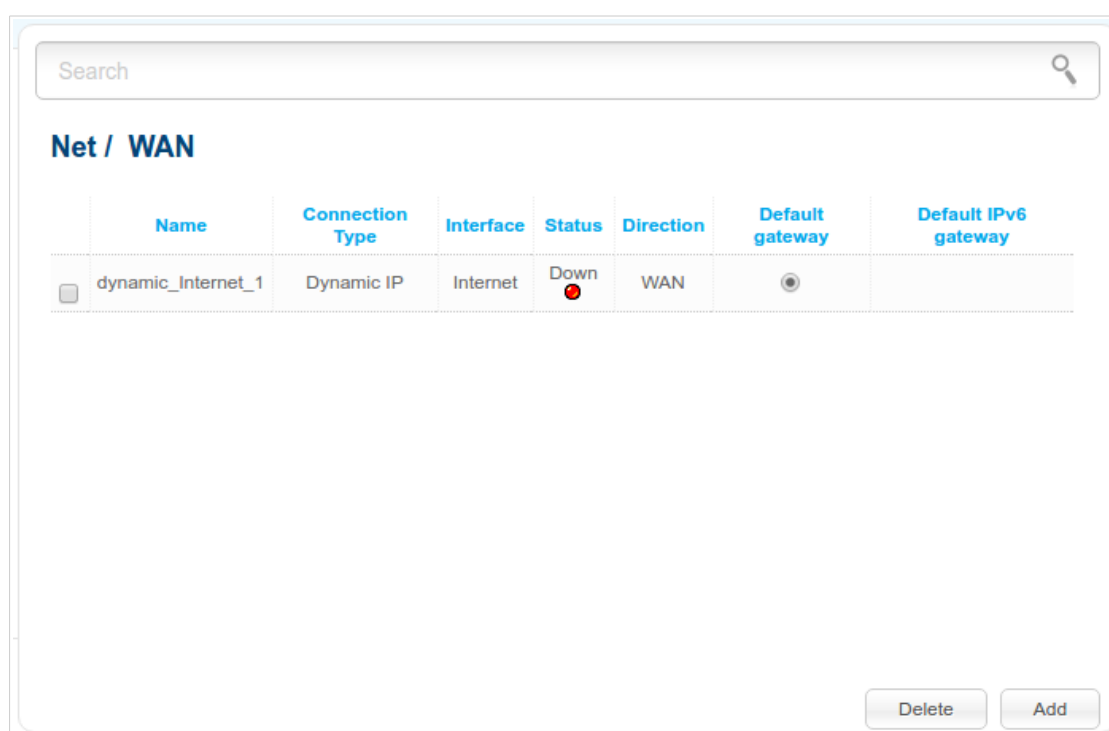
*Figure 67. The **Net / WAN** page.*

To create a new connection, click the **Add** button. On the page displayed, specify the relevant values.

To edit an existing connection, left-click the relevant line in the table. On the page displayed, change the parameters and click the **Apply** button.

To remove a connection, select the checkbox located to the left of the relevant line in the table and click the **Delete** button. Also you can remove a connection on the editing page.

To use one of existing WAN connections as a default IPv4 gateway, select the choice of the **Default gateway** radio button located in the line corresponding to this connection.

To use one of existing WAN connections as a default IPv6 gateway, select the choice of the **Default IPv6 gateway** radio button located in the line corresponding to this connection.

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Creating PPPoE WAN Connection

To create a connection of the PPPoE type, click the **Add** button on the **Net / WAN** page. On the opened page, select the **PPPoE** value from the **Connection Type** drop-down list and specify the needed values.

*Figure 68. The page for creating a new **PPPoE** connection. The **General settings** section.*

Parameter	Description
General settings	
Provider	Leave the **Manually** value.
Interface	A physical or virtual interface to which the new connection will be assigned.
Name	A name for connection for easier identification.
Enable	Select the checkbox to enable the connection.
Direction	The direction of this connection.

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*Figure 69. The page for creating a new **PPPoE** connection. The **Ethernet** section.*

Parameter	Description
Ethernet	
MTU	The maximum size of units transmitted by the interface.
MAC	A MAC address assigned to the interface. This parameter is mandatory if your ISP uses MAC address binding. In the field, enter the MAC address registered by your ISP upon concluding the agreement.
	You can click the **Clone MAC address of your computer** icon ( ) to set the MAC address of the network interface card (of the computer that is being used to configure the router at the moment) as the MAC address of the WAN interface.
	Also you can set the address of a device connected to the router's LAN at the moment. To do this, select the relevant value from the drop-down list (the field will be filled in automatically).
	You can click the **Restore default MAC address** icon ( ) to set the router's MAC address.

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*Figure 70. The page for creating a new **PPPoE** connection. The **PPP** section.*

Parameter	Description
PPP	
Username	A username (login) to access the Internet.
Without authorization	Select the checkbox if you don't need to enter a username and password to access the Internet.
Password	A password to access the Internet.
Password confirmation	The confirmation of the entered password (to avoid mistypes).
Service name	The name of the PPPoE authentication server.
Authentication algorithm	Select a required authentication method from the drop-down list or leave the **AUTO** value.
MTU	The maximum size of units transmitted by the interface.
Keep Alive	Select the checkbox if you want the router to keep you connected to your ISP even when the connection has been inactive for a specified period of time. When the checkbox is selected, the **LCP interval** and **LCP fails** fields are available. Specify the required values.

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Parameter	Description
Dial on demand	Select the checkbox if you want the router to establish connection to the Internet on demand. In the **Maximum idle time** field, specify a period of inactivity (in seconds) after which the connection should be terminated.
PPP IP extension	This option is used by some ISPs. Contact your ISP to clarify if this checkbox needs to be enabled.
Static IP Address	Fill in the field if you want to use a static IP address to access the Internet.
PPP debug	Select the checkbox if you want to log all data on PPP connection debugging.
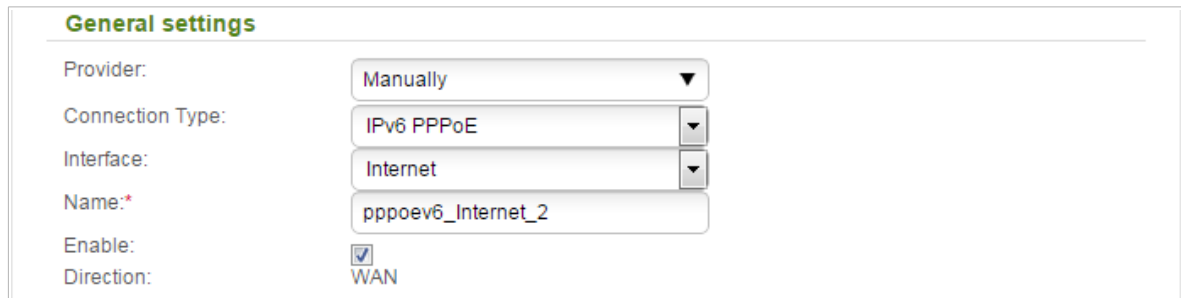
*Figure 71. The page for creating a new **PPPoE** connection. The **Miscellaneous** section.*

Parameter	Description
Miscellaneous	
Isolate connection	When the checkbox is selected, the router uses an alternate routing table for this connection. Select the checkbox only when your ISP requires this.
Enable RIP	Select the checkbox to allow using RIP for this connection.
NAT	Select the checkbox if you want one WAN IP address to be used for all computers of your LAN.
Firewall	Select the checkbox to enable protection against ARP and DDoS attacks.
Ping	Select the checkbox to allow the router to answer ping requests from the external network through this connection. For security reasons, it is recommended not to select this checkbox.

When all needed settings are configured, click the **Apply** button.

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Creating IPv6 PPPoE or PPPoE Dual Stack WAN Connection

To create a connection of the IPv6 PPPoE or PPPoE Dual Stack type, click the **Add** button on the **Net / WAN** page. On the opened page, select the relevant value from the **Connection Type** drop-down list and specify the needed values.

*Figure 72. The page for creating a new **IPv6 PPPoE** connection. The **General settings** section.*

Parameter	Description
General settings	
Provider	Leave the **Manually** value.
Interface	A physical or virtual interface to which the new connection will be assigned.
Name	A name for connection for easier identification.
Enable	Select the checkbox to enable the connection.
Direction	The direction of this connection.

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*Figure 73. The page for creating a new **IPv6 PPPoE** connection. The **Ethernet** section.*

Parameter	Description
Ethernet	
MTU	The maximum size of units transmitted by the interface.
MAC	A MAC address assigned to the interface. This parameter is mandatory if your ISP uses MAC address binding. In the field, enter the MAC address registered by your ISP upon concluding the agreement. You can click the **Clone MAC address of your computer** icon ( ) to set the MAC address of the network interface card (of the computer that is being used to configure the router at the moment) as the MAC address of the WAN interface. Also you can set the address of a device connected to the router's LAN at the moment. To do this, select the relevant value from the drop-down list (the field will be filled in automatically). You can click the **Restore default MAC address** icon ( ) to set the router's MAC address.

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*Figure 74. The page for creating a new **IPv6 PPPoE** connection. The **PPP** section.*

Parameter	Description
PPP	
Username	A username (login) to access the Internet.
Without authorization	Select the checkbox if you don't need to enter a username and password to access the Internet.
Password	A password to access the Internet.
Password confirmation	The confirmation of the entered password (to avoid mistypes).
Service name	The name of the PPPoE authentication server.
Authentication algorithm	Select a required authentication method from the drop-down list or leave the **AUTO** value.
MTU	The maximum size of units transmitted by the interface.
Keep Alive	Select the checkbox if you want the router to keep you connected to your ISP even when the connection has been inactive for a specified period of time. When the checkbox is selected, the **LCP interval** and **LCP fails** fields are available. Specify the required values.
Dial on demand	Select the checkbox if you want the router to establish connection to the Internet on demand. In the **Maximum idle time** field, specify a period of inactivity (in seconds) after which the connection should be terminated.
PPP IP extension	This option is used by some ISPs. Contact your ISP to clarify if this checkbox needs to be enabled.

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Parameter	Description
Static IP Address	*For the **PPPoE Dual Stack** type only.* Fill in the field if you want to use a static IP address to access the Internet.

*Figure 75. The page for creating a new Pv6 PPPoE connection. The **IPv6** section.*

Parameter	Description
IPv6	
Get IPv6	Select a method for IPv6 address assignment from the drop-down list or leave the **Automatically** value.

*Figure 76. The page for creating a new Pv6 PPPoE connection. The **IPv6 gateway** section.*

Parameter	Description
IPv6 gateway	
SLAAC	Select the checkbox to automatically assign the IPv6 gateway address with help of SLAAC (*Stateless Address Autoconfiguration*).
Static IPv6 gateway address	The static address of the IPv6 gateway. The field is available for editing, if the **SLAAC** checkbox is not selected.

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*Figure 77. The page for creating a new **Pv6 PPPoE** connection. The **IPv6 DNS addresses** section.*

Parameter	Description
IPv6 DNS addresses	
Obtain DNS server addresses automatically	Select the checkbox to configure automatic assignment of IPv6 DNS server addresses. If the checkbox is selected, the **Static primary DNS server** and **Static secondary DNS server** fields are not available for editing.
Static primary DNS server/Static secondary DNS server	Enter addresses of the primary and secondary IPv6 DNS servers in the relevant fields.
PPP debug	Select the checkbox if you want to log all data on PPP connection debugging.

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Figure 78. The page for creating a new **Pv6 PPPoE** *connection. The* **Miscellaneous** *section.*

Parameter	Description
Miscellaneous	
Isolate connection	When the checkbox is selected, the router uses an alternate routing table for this connection. Select the checkbox only when your ISP requires this.
Enable RIP	Select the checkbox to allow using RIP for this connection.
Enable IGMP Multicast	*For the* **PPPoE Dual Stack** *type only.* Select the checkbox to allow multicast traffic from the external network (e.g. video streaming) to be received.
NAT	*For the* **PPPoE Dual Stack** *type only.* Select the checkbox if you want one WAN IP address to be used for all computers of your LAN.
Firewall	Select the checkbox to enable protection against ARP and DDoS attacks.
Ping	Select the checkbox to allow the router to answer ping requests from the external network through this connection. For security reasons, it is recommended not to select this checkbox.

When all needed settings are configured, click the **Apply** button.

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Creating Static IP or Dynamic IP WAN Connection

To create a connection of the Static IP or Dynamic IP type, click the **Add** button on the **Net / WAN** page. On the opened page, select the relevant value from the **Connection Type** drop-down list and specify the needed values.

*Figure 79. The page for creating a new **Static IP** connection. The **General settings** section.*

Parameter	Description
General settings	
Provider	Leave the **Manually** value.
Interface	A physical or virtual interface to which the new connection will be assigned.
Name	A name for connection for easier identification.
Enable	Select the checkbox to enable the connection.
Direction	The direction of this connection.

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*Figure 80. The page for creating a new **Static IP** connection. The **Ethernet** section.*

Parameter	Description
Ethernet	
MTU	The maximum size of units transmitted by the interface.
MAC	A MAC address assigned to the interface. This parameter is mandatory if your ISP uses MAC address binding. In the field, enter the MAC address registered by your ISP upon concluding the agreement. You can click the **Clone MAC address of your computer** icon ( ) to set the MAC address of the network interface card (of the computer that is being used to configure the router at the moment) as the MAC address of the WAN interface. Also you can set the address of a device connected to the router's LAN at the moment. To do this, select the relevant value from the drop-down list (the field will be filled in automatically). You can click the **Restore default MAC address** icon ( ) to set the router's MAC address.

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*Figure 81. The page for creating a new **Static IP** connection. The **IP** section.*

Parameter	Description
IP	
*For **Static IP** type*	
IP Address	Enter an IP address for this WAN connection.
Netmask	Enter a subnet mask for this WAN connection.
Gateway IP address	Enter an IP address of the gateway used by this WAN connection.
Primary DNS server/ Secondary DNS server	Enter addresses of the primary and secondary DNS servers in the relevant fields.
*For **Dynamic IP** type*	
Obtain DNS server addresses automatically	Select the checkbox to configure automatic assignment of DNS server addresses. If the checkbox is selected, the **Primary DNS server** and **Secondary DNS server** fields are not displayed.
Primary DNS server/ Secondary DNS server	Enter addresses of the primary and secondary DNS servers in the relevant fields.
Vendor ID	The identifier of your ISP. *Optional*.
Hostname	A name of the router specified by your ISP. *Optional*.

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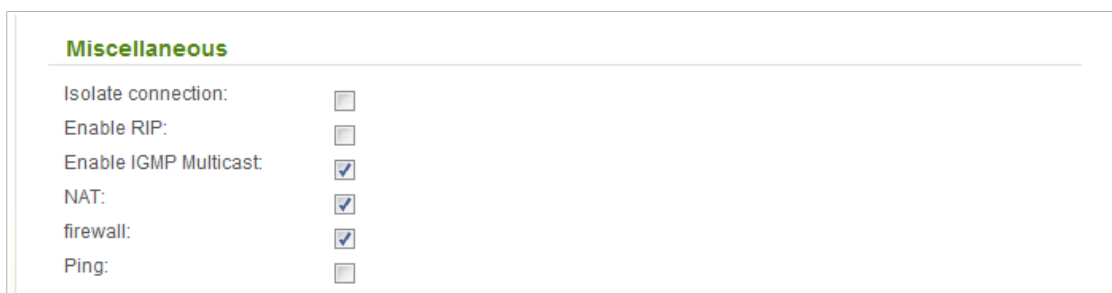
*Figure 82. The page for creating a new **Static IP** connection. The **Authorization via 802.1x protocol** section.*

Parameter	Description
Authorization via 802.1x protocol	
Authorization in the ISP's network via 802.1x protocol	Select the checkbox to allow authorization in the ISP's network via the 802.1x protocol.
Authentication method	Select a needed authentication method from the drop-down list.
Username	Enter the username provided by your ISP.
Password	Enter the password provided by your ISP.

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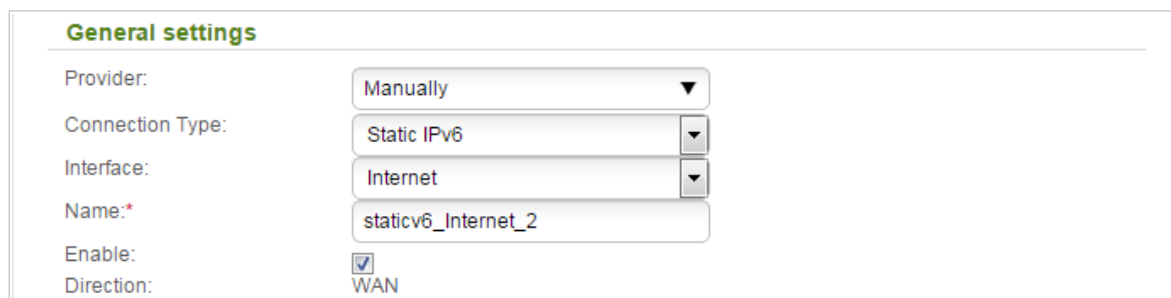
*Figure 83. The page for creating a new **Static IP** connection. The **Miscellaneous** section.*

Parameter	Description
Miscellaneous	
Isolate connection	When the checkbox is selected, the router uses an alternate routing table for this connection. Select the checkbox only when your ISP requires this.
Enable RIP	Select the checkbox to allow using RIP for this connection.
Enable IGMP Multicast	Select the checkbox to allow multicast traffic from the external network (e.g. video streaming) to be received.
NAT	Select the checkbox if you want one WAN IP address to be used for all computers of your LAN.
Firewall	Select the checkbox to enable protection against ARP and DDoS attacks.
Ping	Select the checkbox to allow the router to answer ping requests from the external network through this connection. For security reasons, it is recommended not to select this checkbox.

When all needed settings are configured, click the **Apply** button.

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Creating Static IPv6 or Dynamic IPv6 WAN Connection

To create a connection of the Static IPv6 or Dynamic IPv6 type, click the **Add** button on the **Net / WAN** page. On the opened page, select the relevant value from the **Connection Type** drop-down list and specify the needed values.

*Figure 84. The page for creating a new **Static IPv6** connection. The **General settings** section.*

Parameter	Description
General settings	
Provider	Leave the **Manually** value.
Interface	A physical or virtual interface to which the new connection will be assigned.
Name	A name for connection for easier identification.
Enable	Select the checkbox to enable the connection.
Direction	The direction of this connection.

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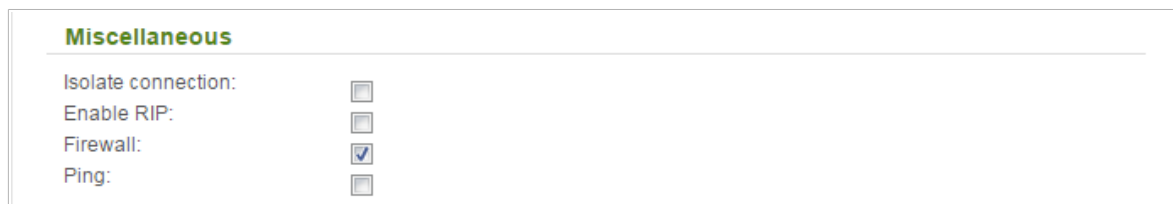
*Figure 85. The page for creating a new **Static IPv6** connection. The **Ethernet** section.*

Parameter	Description
Ethernet	
MTU	The maximum size of units transmitted by the interface.
MAC	A MAC address assigned to the interface. This parameter is mandatory if your ISP uses MAC address binding. In the field, enter the MAC address registered by your ISP upon concluding the agreement. You can click the **Clone MAC address of your computer** icon ( ) to set the MAC address of the network interface card (of the computer that is being used to configure the router at the moment) as the MAC address of the WAN interface. Also you can set the address of a device connected to the router's LAN at the moment. To do this, select the relevant value from the drop-down list (the field will be filled in automatically). You can click the **Restore default MAC address** icon ( ) to set the router's MAC address.

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*Figure 86. The page for creating a new **Static IPv6** connection. The **IP** section.*

Parameter	Description
IP	
*For **Static IPv6** type*	
IPv6 address	Enter an IPv6 address for this WAN connection.
Gateway IPv6 address	Enter an IPv6 address of the gateway used by this WAN connection.
Primary IPv6 DNS server/Secondary IPv6 DNS server	Enter addresses of the primary and secondary IPv6 DNS servers in the relevant fields.
*For **Dynamic IPv6** type*	
Get IPv6	Select a method for IPv6 address assignment from the drop-down list or leave the **Automatically** value.
Gateway by SLAAC	Select the checkbox to automatically assign the IPv6 gateway address with help of SLAAC (*Stateless Address Autoconfiguration*).
Static IPv6 gateway address	The static address of the IPv6 gateway. The field is available for editing, if the **Gateway by SLAAC** checkbox is not selected.
Obtain DNS server addresses automatically	Select the checkbox to configure automatic assignment of IPv6 DNS server addresses. If the checkbox is selected, the **Static primary DNS server** and **Static secondary DNS server** fields are not available for editing.
Static primary DNS server/Static secondary DNS server	Enter addresses of the primary and secondary IPv6 DNS servers in the relevant fields.

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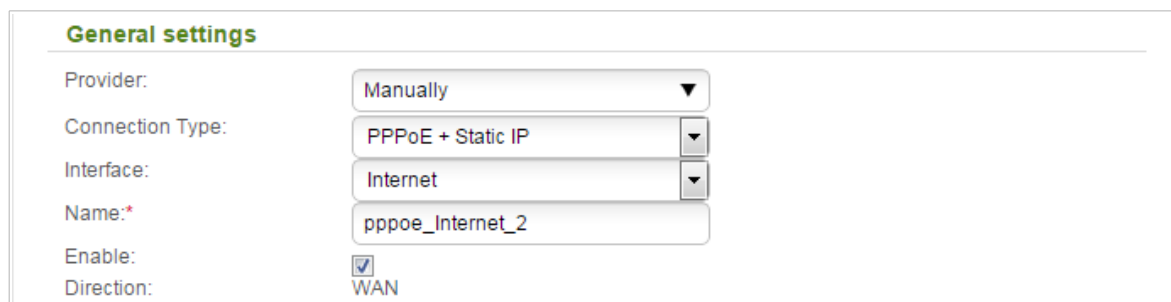
*Figure 87. The page for creating a new **Static IPv6** connection. The **Miscellaneous** section.*

Parameter	Description
Miscellaneous	
Isolate connection	When the checkbox is selected, the router uses an alternate routing table for this connection. Select the checkbox only when your ISP requires this.
Enable RIP	Select the checkbox to allow using RIP for this connection.
Firewall	Select the checkbox to enable protection against ARP and DDoS attacks.
Ping	Select the checkbox to allow the router to answer ping requests from the external network through this connection. For security reasons, it is recommended not to select this checkbox.

When all needed settings are configured, click the **Apply** button.

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Creating PPPoE + Static IP or PPPoE + Dynamic IP WAN Connection

To create a connection of the PPPoE + Static IP or PPPoE + Dynamic IP type, click the **Add** button on the **Net / WAN** page. On the opened page, select the relevant value from the **Connection Type** drop-down list and specify the needed values.

*Figure 88. The page for creating a new **PPPoE + Static IP** connection. The **General settings** section.*

Parameter	Description
General settings	
Provider	Leave the **Manually** value.
Interface	A physical or virtual interface to which the new connection will be assigned.
Name	A name for connection for easier identification.
Enable	Select the checkbox to enable the connection.
Direction	The direction of this connection.

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*Figure 89. The page for creating a new **PPPoE + Static IP** connection. The **Ethernet** section.*

Parameter	Description
Ethernet	
MTU	The maximum size of units transmitted by the interface.
MAC	A MAC address assigned to the interface. This parameter is mandatory if your ISP uses MAC address binding. In the field, enter the MAC address registered by your ISP upon concluding the agreement. You can click the **Clone MAC address of your computer** icon ( ) to set the MAC address of the network interface card (of the computer that is being used to configure the router at the moment) as the MAC address of the WAN interface. Also you can set the address of a device connected to the router's LAN at the moment. To do this, select the relevant value from the drop-down list (the field will be filled in automatically). You can click the **Restore default MAC address** icon ( ) to set the router's MAC address.

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*Figure 90. The page for creating a new **PPPoE + Static IP** connection. The **IP** section.*

Parameter	Description
IP	
*For **PPPoE + Static IP** type*	
IP Address	Enter an IP address for this WAN connection.
Netmask	Enter a subnet mask for this WAN connection.
Gateway IP address	Enter an IP address of the gateway used by this WAN connection.
Primary DNS server/ Secondary DNS server	Enter addresses of the primary and secondary DNS servers in the relevant fields.
*For **PPPoE + Dynamic IP** type*	
Obtain DNS server addresses automatically	Select the checkbox to configure automatic assignment of DNS server addresses. If the checkbox is selected, the **Primary DNS server** and **Secondary DNS server** fields are not displayed.
Primary DNS server/ Secondary DNS server	Enter addresses of the primary and secondary DNS servers in the relevant fields.
Vendor ID	The identifier of your ISP. *Optional*.
Hostname	A name of the router specified by your ISP. *Optional*.

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*Figure 91. The page for creating a new **PPPoE + Static IP** connection. The **Authorization via 802.1x protocol** section.*

Parameter	Description
Authorization via 802.1x protocol	
Authorization in the ISP's network via 802.1x protocol	Select the checkbox to allow authorization in the ISP's network via the 802.1x protocol.
Authentication method	Select a needed authentication method from the drop-down list.
Username	Enter the username provided by your ISP.
Password	Enter the password provided by your ISP.

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*Figure 92. The page for creating a new **PPPoE + Static IP** connection. The **Miscellaneous** section.*

Parameter	Description
Miscellaneous *(for **IP** section)*	
Isolate connection	When the checkbox is selected, the router uses an alternate routing table for this connection. Select the checkbox only when your ISP requires this.
Enable RIP	Select the checkbox to allow using RIP for this connection.
Enable IGMP Multicast	Select the checkbox to allow multicast traffic from the external network (e.g. video streaming) to be received.
NAT	Select the checkbox if you want one WAN IP address to be used for all computers of your LAN.
Firewall	Select the checkbox to enable protection against ARP and DDoS attacks.
Ping	Select the checkbox to allow the router to answer ping requests from the external network through this connection. For security reasons, it is recommended not to select this checkbox.

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*Figure 93. The page for creating a new **PPPoE + Static IP** connection. The **PPP** section.*

Parameter	Description
PPP	
Username	A username (login) to access the Internet.
Without authorization	Select the checkbox if you don't need to enter a username and password to access the Internet.
Password	A password to access the Internet.
Password confirmation	The confirmation of the entered password (to avoid mistypes).
Service name	The name of the PPPoE authentication server.
Authentication algorithm	Select a required authentication method from the drop-down list or leave the **AUTO** value.
MTU	The maximum size of units transmitted by the interface.
Keep Alive	Select the checkbox if you want the router to keep you connected to your ISP even when the connection has been inactive for a specified period of time. When the checkbox is selected, the **LCP interval** and **LCP fails** fields are available. Specify the required values.
Dial on demand	Select the checkbox if you want the router to establish connection to the Internet on demand. In the **Maximum idle time** field, specify a period of inactivity (in seconds) after which the connection should be terminated.

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Parameter	Description
PPP IP extension	This option is used by some ISPs. Contact your ISP to clarify if this checkbox needs to be enabled.
Static IP Address	Fill in the field if you want to use a static IP address to access the Internet.
PPP debug	Select the checkbox if you want to log all data on PPP connection debugging.
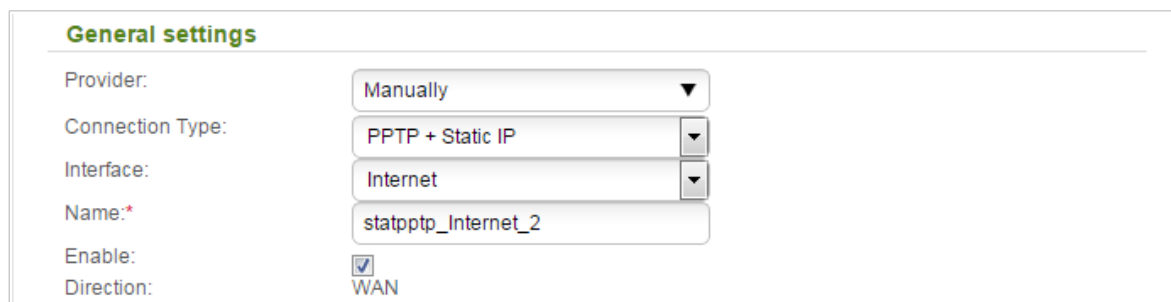
*Figure 94. The page for creating a new **PPPoE + Static IP** connection. The **Miscellaneous** section.*

Parameter	Description
Miscellaneous *(for **PPP** section)*	
Isolate connection	When the checkbox is selected, the router uses an alternate routing table for this connection. Select the checkbox only when your ISP requires this.
Enable RIP	Select the checkbox to allow using RIP for this connection.
NAT	Select the checkbox if you want one WAN IP address to be used for all computers of your LAN.
Firewall	Select the checkbox to enable protection against ARP and DDoS attacks.
Ping	Select the checkbox to allow the router to answer ping requests from the external network through this connection. For security reasons, it is recommended not to select this checkbox.

When all needed settings are configured, click the **Apply** button.

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Creating PPTP/L2TP + Static IP or PPTP/L2TP + Dynamic IP WAN Connection

To create a connection of the PPTP + Static IP, L2TP + Static IP, PPTP + Dynamic IP, or L2TP + Dynamic IP type, click the **Add** button on the **Net / WAN** page. On the opened page, select the relevant value from the **Connection Type** drop-down list and specify the needed values.

*Figure 95. The page for creating a new **PPTP + Static IP** connection. The **General settings** section.*

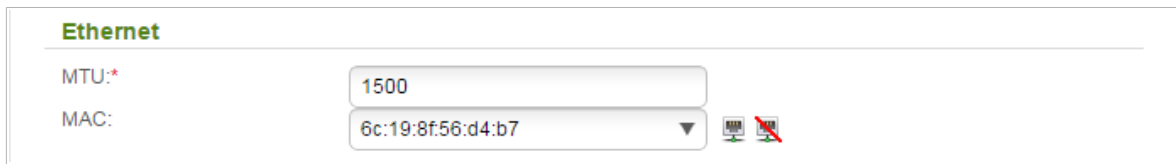| Parameter	Description
General settings	
Provider	Leave the **Manually** value.
Interface	A physical or virtual interface to which the new connection will be assigned.
Name	A name for connection for easier identification.
Enable	Select the checkbox to enable the connection.
Direction	The direction of this connection.

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*Figure 96. The page for creating a new **PPTP + Static IP** connection. The **Ethernet** section.*

Parameter	Description
Ethernet	
MTU	The maximum size of units transmitted by the interface.
MAC	A MAC address assigned to the interface. This parameter is mandatory if your ISP uses MAC address binding. In the field, enter the MAC address registered by your ISP upon concluding the agreement. You can click the **Clone MAC address of your computer** icon ( ) to set the MAC address of the network interface card (of the computer that is being used to configure the router at the moment) as the MAC address of the WAN interface. Also you can set the address of a device connected to the router's LAN at the moment. To do this, select the relevant value from the drop-down list (the field will be filled in automatically). You can click the **Restore default MAC address** icon ( ) to set the router's MAC address.

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*Figure 97. The page for creating a new **PPTP + Static IP** connection. The **IP** section.*

Parameter	Description
IP	
*For **PPTP + Static IP** and **L2TP + Static IP** types*	
IP Address	Enter an IP address for this WAN connection.
Netmask	Enter a subnet mask for this WAN connection.
Gateway IP address	Enter an IP address of the gateway used by this WAN connection.
Primary DNS server/ Secondary DNS server	Enter addresses of the primary and secondary DNS servers in the relevant fields.
*For **PPTP + Dynamic IP** and **L2TP + Dynamic IP** types*	
Obtain DNS server addresses automatically	Select the checkbox to configure automatic assignment of DNS server addresses. If the checkbox is selected, the **Primary DNS server** and **Secondary DNS server** fields are not displayed.
Primary DNS server/ Secondary DNS server	Enter addresses of the primary and secondary DNS servers in the relevant fields.
Vendor ID	The identifier of your ISP. *Optional*.
Hostname	A name of the router specified by your ISP. *Optional*.

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*Figure 98. The page for creating a new **PPTP + Static IP** connection. The **Authorization via 802.1x protocol** section.*

Parameter	Description
Authorization via 802.1x protocol	
Authorization in the ISP's network via 802.1x protocol	Select the checkbox to allow authorization in the ISP's network via the 802.1x protocol.
Authentication method	Select a needed authentication method from the drop-down list.
Username	Enter the username provided by your ISP.
Password	Enter the password provided by your ISP.
Isolate connection	When the checkbox is selected, the router uses an alternate routing table for this connection. Select the checkbox only when your ISP requires this.
Enable RIP	Select the checkbox to allow using RIP for this connection.
Enable IGMP Multicast	Select the checkbox to allow multicast traffic from the external network (e.g. video streaming) to be received.
NAT	Select the checkbox if you want one WAN IP address to be used for all computers of your LAN.
Firewall	Select the checkbox to enable protection against ARP and DDoS attacks.
Ping	Select the checkbox to allow the router to answer ping requests from the external network through this connection. For security reasons, it is recommended not to select this checkbox.

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*Figure 99. The page for creating a new **PPTP + Static IP** connection. The **VPN** section.*

Parameter	Description
VPN	
Connect automatically	Select the checkbox to enable auto-start of the connection upon the boot-up of the router.
Username	A username (login) to access the Internet.
Without authorization	Select the checkbox if you don't need to enter a username and password to access the Internet.
Password	A password to access the Internet.
Password confirmation	The confirmation of the entered password (to avoid mistypes).
VPN server address	The IP or URL address of the PPTP or L2TP authentication server.

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Parameter	Description
Encryption	Select a method of MPPE encryption. • **No encrypt**: MPPE encryption is not applied. • **MPPE 40/128 bit**: MPPE encryption with a 40-bit or 128-bit key is applied. • **MPPE 40 bit**: MPPE encryption with a 40-bit key is applied. • **MPPE 128 bit**: MPPE encryption with a 128-bit key is applied. MPPE encryption can be applied only if the **MS-CHAP, MS-CHAP-V2**, or **AUTO** value is selected from the **Authentication algorithm** drop-down list.
Authentication algorithm	Select a required authentication method from the drop-down list or leave the **AUTO** value.
MTU	The maximum size of units transmitted by the interface.
Keep Alive	Select the checkbox if you want the router to keep you connected to your ISP even when the connection has been inactive for a specified period of time. When the checkbox is selected, the **LCP interval** and **LCP fails** fields are available. Specify the required values.
Extra options	Advanced options of the pppd daemon which need to be specified for this connection. *Optional*.
Dial on demand	Select the checkbox if you want the router to establish connection to the Internet on demand. In the **Maximum idle time** field, specify a period of inactivity (in seconds) after which the connection should be terminated.
Static IP Address	Fill in the field if you want to use a static IP address to access the Internet.
PPP debug	Select the checkbox if you want to log all data on PPP connection debugging.
IP received	The IP address assigned by the ISP.
Isolate connection	When the checkbox is selected, the router uses an alternate routing table for this connection. Select the checkbox only when your ISP requires this.
Enable RIP	Select the checkbox to allow using RIP for this connection.

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Parameter	Description
NAT	Select the checkbox if you want one WAN IP address to be used for all computers of your LAN.
Firewall	Select the checkbox to enable protection against ARP and DDoS attacks.
Ping	Select the checkbox to allow the router to answer ping requests from the external network through this connection. For security reasons, it is recommended not to select this checkbox.

When all needed settings are configured, click the **Apply** button.

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Creating 3G WAN Connection

If the PIN code check is enabled for the SIM card inserted into your USB modem, then prior to creating a 3G WAN connection, proceed to the **3G/LTE modem / PIN** menu and enter the PIN code on the page displayed (see the *3G/LTE Modem* section, page 202). Then proceed to the **Net / WAN** page, click the **Add** button, and select the **3G** value from the **Connection Type** drop-down list.

Figure 100. The page for creating a new 3G connection. The General settings section.

Parameter	Description
General settings	
Provider	To automatically specify all settings required to connect to the Internet, select your country and operator from the drop-down list. To specify all settings independently, leave the **Manually** value.
Interface	Select the **USB** value.
Name	A name for connection for easier identification.
Enable	Select the checkbox to enable the connection.
Direction	The direction of this connection.

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*Figure 101. The page for creating a new **3G** connection. The **USB modem** section.*

Parameter	Description
USB modem	
Mode	The value of the field specifies the type of the network to which the router connects. Leave the **auto** value to let the router connect automatically to an available type of network, or select a needed value from the drop-down list. *For GSM USB modems only*.

*Figure 102. The page for creating a new **3G** connection. The **PPP** section.*

Parameter	Description
PPP	
Username	A username (login) to connect to the network of the operator.
Without authorization	Select the checkbox if your operator does not require authorization.
Password	A password to connect to the network of the operator.
Password confirmation	The confirmation of the entered password (to avoid mistypes).
APN	An access point name. *For GSM USB modems only*.

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Parameter	Description
Dial number	A number dialed to connect to the authorization server of the operator.
Authentication algorithm	Select a required authentication method from the drop-down list or leave the **AUTO** value.
MTU	The maximum size of units transmitted by the interface. *Optional*.
Keep Alive	Select the checkbox if you want the router to keep you connected to the network of your operator even when the connection has been inactive for a specified period of time. When the checkbox is selected, the **LCP interval** and **LCP fails** fields are available. Specify the required values.
Extra options	In the field, you can specify additional data for encryption or authentication. *Optional*.
Dial on demand	Select the checkbox if you want the router to establish connection to the Internet on demand. In the **Maximum idle time** field, specify a period of inactivity (in seconds) after which the connection should be terminated.
PPP debug	Select the checkbox if you want to log all data on PPP connection debugging.

*Figure 103. The page for creating a new **3G** connection. The **Miscellaneous** section.*
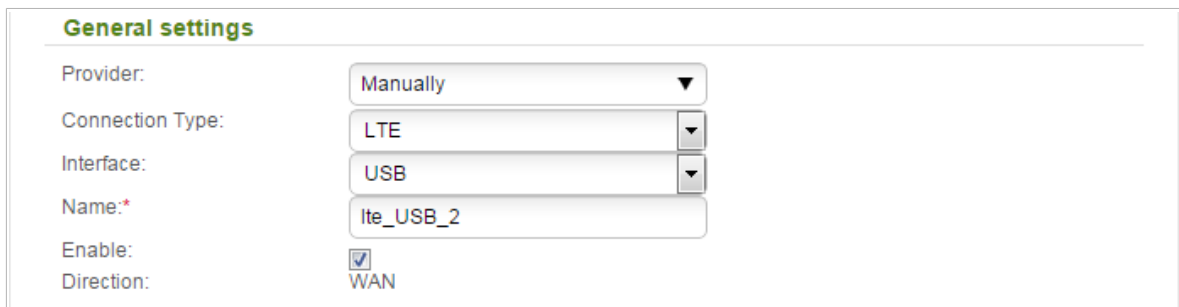
Parameter	Description
Miscellaneous	
NAT	Select the checkbox if you want one WAN IP address to be used for all computers of your LAN.
Firewall	Select the checkbox to enable protection against ARP and DDoS attacks.
Ping	Select the checkbox to allow the router to answer ping requests from the external network through this connection. For security reasons, it is recommended not to select this checkbox.

When all needed settings are configured, click the **Apply** button.

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Creating LTE WAN Connection

> ! For the USB modem Megafon M100-1, please reboot the router after creating the WAN connection.

To create a connection of the LTE type, click the **Add** button on the **Net / WAN** page. On the opened page, select the relevant value from the **Connection Type** drop-down list and specify the needed values.

*Figure 104. The page for creating a new **LTE** connection. The **General settings** section.*

Parameter	Description
General settings	
Provider	Leave the **Manually** value.
Interface	Select the **USB** value.
Name	A name for connection for easier identification.
Enable	Select the checkbox to enable the connection.
Direction	The direction of this connection.

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*Figure 105. The page for creating a new **LTE** connection. The **USB modem** section.*

Parameter	Description
USB modem	
Mode	The value of the field specifies the type of the network to which the router connects. Leave the **auto** value to let the router connect automatically to an available type of network, or select a needed value from the drop-down list.[10]
APN	An access point name.
Set username and password	Select the checkbox if authorization is required to connect to the network of the operator.
Username	A username (login) to connect to the network of the operator.
Password	A password to connect to the network of the operator.

---

10 Some LTE USB modems do not support network type selection and work in the **auto** mode regardless of the value selected from the drop-down list.

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*Figure 106. The page for creating a new **LTE** connection. The **IP** section.*

Parameter	Description
IP	
Obtain DNS server addresses automatically	Select the checkbox to configure automatic assignment of DNS server addresses. If the checkbox is selected, the **Primary DNS server** and **Secondary DNS server** fields are not displayed.
Primary DNS server/ Secondary DNS server	Enter addresses of the primary and secondary DNS servers in the relevant fields.
Vendor ID	The identifier of your ISP. *Optional*.
Hostname	A name of the router specified by your ISP. *Optional*.
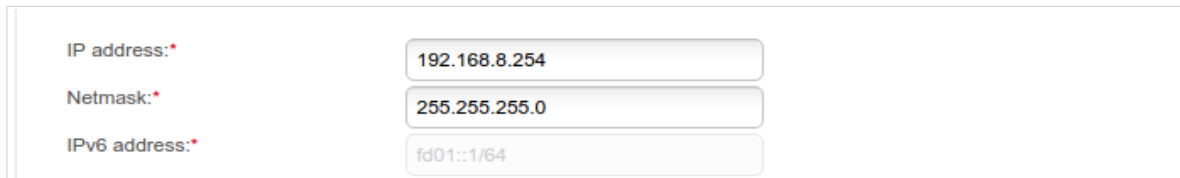
*Figure 107. The page for creating a new **LTE** connection. The **Miscellaneous** section.*

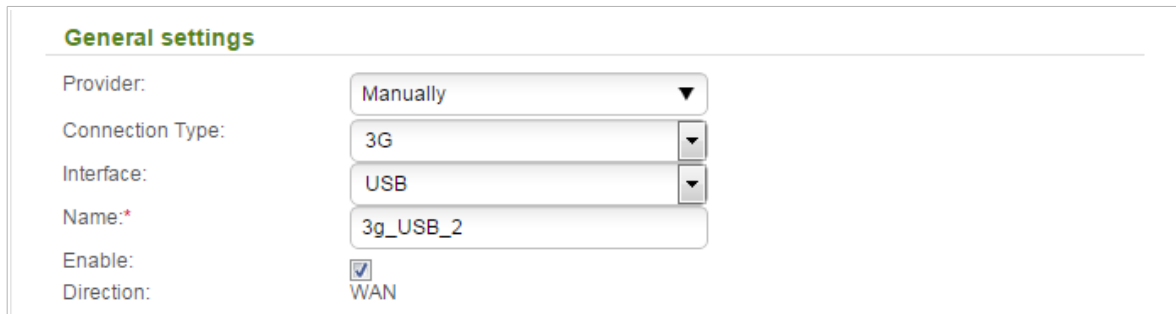| Parameter	Description
Miscellaneous	
NAT	Select the checkbox if you want one WAN IP address to be used for all computers of your LAN.
Firewall	Select the checkbox to enable protection against ARP and DDoS attacks.
Ping	Select the checkbox to allow the router to answer ping requests from the external network through this connection. For security reasons, it is recommended not to select this checkbox.

When all needed settings are configured, click the **Apply** button.

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LAN

To configure the router's local interface, proceed to the **Net / LAN** page.
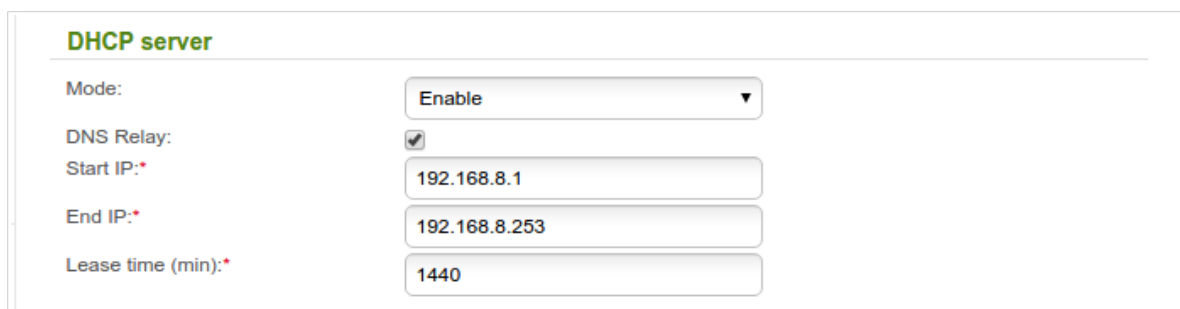
Figure 108. Basic settings of the local interface.

If needed, edit the basic settings of the local interface.

Parameter	Description
IP Address	The IP address of the router in the local subnet. By default, the following value is specified: `192.168.0.1`.
Netmask	The mask of the local subnet. By default, the following value is specified: `255.255.255.0`.
IPv6 address	The IPv6 address of the router in the local subnet. By default, the following value is specified: `fd01::1/64`. The field is available for editing, if the **DHCP PD** checkbox is not selected.

When needed settings are configured, click the **Apply** button.

In the **DHCP server** section, you can configure the built-in DHCP server of the router.

Figure 109. The section for configuring the DHCP server.

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Parameter	Description
Mode	An operating mode of the router's DHCP server. **Enable**: the router assigns IP addresses to clients automatically in accordance with the specified parameters. When this value is selected, the **DNS Relay**, **Start IP**, **End IP**, and the **Lease time** fields are displayed on the page. **Disable**: the router's DHCP server is disabled, clients' IP addresses are assigned manually. **Relay**: an external DHCP server is used to assign IP addresses to clients. When this value is selected, the **External DHCP server IP** field is displayed on the page.
DNS Relay	Select the checkbox so that the devices connected to the router obtain the address of the router as the DNS server address. Deselect the checkbox so that the devices connected to the router obtain the address transmitted by the ISP or specified on the **Advanced / DNS** page as the DNS server address.
Start IP	The start IP address of the address pool used by the DHCP server to distribute IP addresses to clients.
End IP	The end IP address of the address pool used by the DHCP server to distribute IP addresses to clients.
Lease time	The lifetime of IP addresses leased by the DHCP server. At the end of this period the leased IP address is revoked and can be distributed to another device, unless the previous device has confirmed the need to keep the address.
External DHCP server IP	The IP address of the external DHCP server which assigns IP addresses to the router's clients.

When all needed settings are configured, click the **Apply** button.

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In the **IPv6 address assignment** section, you can configure how clients from the LAN should obtain IPv6 addresses.

Figure 110. The section of IPv6 address assignment settings.

Parameter	Description
DHCP PD	Select the checkbox to activate the Prefix Delegation function. When the checkbox is selected, the router requests a prefix to configure IPv6 addresses for clients of the LAN from a delegating router.
Mode	Select a mode of IPv6 address assignment from the drop-down list. **Stateless**: clients themselves configure IPv6 addresses using the prefix. **Stateful**: the built-in DHCPv6 server of the router allocates addresses from the range specified in the **Start IP** and **End IP** fields. **Disable**: clients' IPv6 addresses are assigned manually.
Start IP	The start IPv6 address of the address pool used by the DHCPv6 server to distribute addresses to clients.
End IP	The end IPv6 address of the address pool used by the DHCPv6 server to distribute addresses to clients.
DNS Relay	Select the checkbox so that the devices connected to the router obtain the IPv6 address of the router as the DNS server address. Deselect the checkbox so that the devices connected to the router obtain the IPv6 address transmitted by the ISP or specified on the **Advanced / DNS** page as the DNS server address.
Leased Time	The lifetime of IPv6 addresses provided to clients. The field is available for editing, if the **DHCP PD** checkbox is not selected.

When all needed settings are configured, click the **Apply** button.

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In the **Static DHCP** section, you can specify MAC address and IP address pairs (set a fixed IPv4 address in the local area network for a device with a certain MAC address). The router assigns IP addresses in accordance with the specified pairs only when the DHCP server is enabled (in the **DHCP server** section, in the **Mode** drop-down list, the **Enable** value is selected).

Figure 111. The section for creating MAC-IP pairs.

To create a MAC-IP pair, click the **Add** button. In the **IP** field, enter an IPv4 address which will be assigned to the device from the LAN, then in the **MAC** field, enter the MAC address of this device. In the **Host** field, specify a network name of the device for easier identification (*optional*).

Also you can create a MAC-IP pair for a device connected to the router's LAN at the moment. To do this, select the relevant value from the **Known IP/MAC addresses** drop-down list (the **IP** and **MAC** fields will be filled in automatically).

When all needed MAC-IP pairs are specified, click the **Apply** button.

Existing MAC-IP pairs are displayed in the table of the **Static DHCP** section. To remove a pair, select the checkbox in the relevant line in the table and click the **Remove** button. Then click the **Apply** button.

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Wi-Fi

In this menu you can specify all needed settings for your wireless network.

Basic Settings

On pages of the **Wi-Fi / Basic settings** section, you can enable your wireless local area network (WLAN) and configure its basic parameters. To configure the 2.4GHz band or 5GHz band, proceed to the relevant page.

2.4GHz Band

Figure 112. Basic settings of the wireless LAN in the 2.4GHz band.

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Parameter	Description
Enable Wireless	The checkbox enables Wi-Fi connections in the 2.4GHz. If you want to disable your WLAN in this band, deselect the checkbox.
Broadcast wireless network	If the checkbox is not selected, devices cannot connect to the router's WLAN in the 2.4GHz band (or to the selected part of the network). Upon that the router can connect to another access point as a wireless client.
MBSSID	To split the network into two several parts in the 2.4GHz band, select a relevant value (**2**, **3**, or **4**) from the drop-down list. By default, the wireless network is not split (the **Disabled** value is selected from the list). For every part of the WLAN you can specify a name (SSID), security settings, and rules for MAC filtering. To specify these values, select the needed part from the **BSSID** drop-down list and click the **Apply** button. Then proceed to the relevant page of the **Wi-Fi** menu section.
BSSID	The unique identifier for your Wi-Fi network (for the 2.4GHz and 5GHz band). You cannot change the value of this parameter, it is determined in the device's internal settings. If you have split your WLAN into parts, the drop-down list contains several values. Each identifier corresponds to a single part of the WLAN.
Enable guest network	The field is available for the additional parts of the network. Select the checkbox if you want the devices connected to the additional part of the WLAN to be isolated from the devices and resources of the router's LAN.
Hide Access Point	If the checkbox is selected, other users cannot see your Wi-Fi network (or the selected part of the network). It is recommended not to select this checkbox in order to simplify initial configuration of your WLAN.
Network name (SSID)	A name for the WLAN (or the selected part of the network). The name can consist of digits and Latin characters.
Country	The country you are in. Select a value from the drop-down list.
Channel	The wireless channel number. When the **auto** value is selected, the router itself chooses the channel with the least interference.

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Parameter	Description
Periodic scan	Select the checkbox to let the router search for a free channel in certain periods of time. When the checkbox is selected, the **Rescan by** field is displayed on the page.
Wireless mode	Operating mode of the wireless network of the router. This parameter defines standards of the devices that will be able to use this band of your wireless network. Select a value from the drop-down list.
Max Associated Clients	The maximum number of devices connected to the wireless network (or the selected part of the network) of the router. When the value **0** is specified, the device does not limit the number of connected clients.
Shaping	The maximum bandwidth (Kbit/s) of your WLAN (or the selected part of the network). Specify the needed value or leave the value **0** not to limit bandwidth of your WLAN.
Clients Isolation	Select the checkbox to forbid wireless clients of your WLAN (or the selected part of the WLAN) to communicate to each other.

When you have configured the parameters, click the **Apply** button.

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5GHz Band

Figure 113. Basic settings of the wireless LAN in the 5GHz band.

Parameter	Description
Enable Wireless	The checkbox enables Wi-Fi connections in the 5GHz. If you want to disable your WLAN in this band, deselect the checkbox.
Broadcast wireless network	If the checkbox is not selected, devices cannot connect to the router's WLAN in the 5GHz band (or to the selected part of the network). Upon that the router can connect to another access point as a wireless client.

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Parameter	Description
MBSSID	To split the network into several parts in the 5GHz band, select the a relevant value (**2**, **3**, or **4**) from the drop-down list. By default, the wireless network is not split (the **Disabled** value is selected from the list).
	For every part of the WLAN you can specify a name (SSID), security settings, and rules for MAC filtering. To specify these values, select the needed part from the **BSSID** drop-down list and click the **Apply** button. Then proceed to the relevant page of the **Wi-Fi** menu section.
BSSID	The unique identifier for your Wi-Fi network (for the 2.4GHz and 5GHz band). You cannot change the value of this parameter, it is determined in the device's internal settings.
	If you have split your WLAN into parts, the drop-down list contains several values. Each identifier corresponds to a single part of the WLAN.
Enable guest network	The field is available for the additional part of the network. Select the checkbox if you want the devices connected to the additional part of the WLAN to be isolated from the devices and resources of the router's LAN.
Hide Access Point	If the checkbox is selected, other users cannot see your Wi-Fi network (or the selected part of the network). It is recommended not to select this checkbox in order to simplify initial configuration of your WLAN.
Network name (SSID)	A name for the WLAN (or the selected part of the network). The name can consist of digits and Latin characters.
Country	The country you are in. Select a value from the drop-down list.
Channel	The wireless channel number. When the **auto** value is selected, the router itself chooses the channel with the least interference.
Periodic scan	Select the checkbox to let the router search for a free channel in certain periods of time. When the checkbox is selected, the **Rescan by** field is displayed on the page.
Wireless mode	Operating mode of the wireless network of the router. This parameter defines standards of the devices that will be able to use this band of your wireless network. Select a value from the drop-down list.

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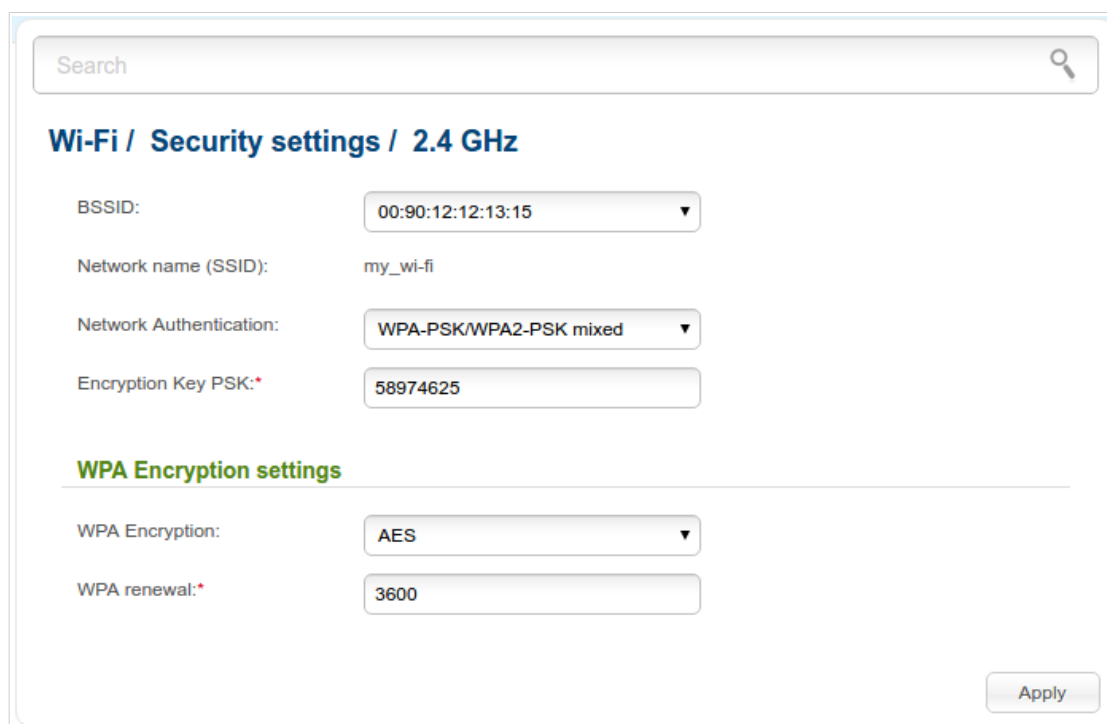
Parameter	Description
Max Associated Clients	The maximum number of devices connected to the wireless network (or the selected part of the network) of the router. When the value **0** is specified, the device does not limit the number of connected clients.
Shaping	The maximum bandwidth (Kbit/s) of your WLAN (or the selected part of the network). Specify the needed value or leave t the value **0** not to limit bandwidth of your WLAN.
Clients Isolation	Select the checkbox to forbid wireless clients of your WLAN (or the selected part of the WLAN) to communicate to each other.

When you have configured the parameters, click the **Apply** button.

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Security Settings

On pages of the **Wi-Fi / Security settings** section, you can modify security settings of the WLAN. To configure the 2.4GHz band or 5GHz band, proceed to the relevant page.

Figure 114. The default security settings.

By default, the **WPA2-PSK** network authentication type is specified for both bands of the WLAN. WPS PIN from the barcode label is used as the network key.

In the **BSSID** drop-down list, the unique identifier of the Wi-Fi network is displayed. If your network is split into parts, in the **BSSID** list, select the part for which the security settings should be changed.

When you split the network into parts, an additional wireless network with the **Open** network authentication type with no encryption is specified. It is strongly recommended to specify individual security settings for your network.

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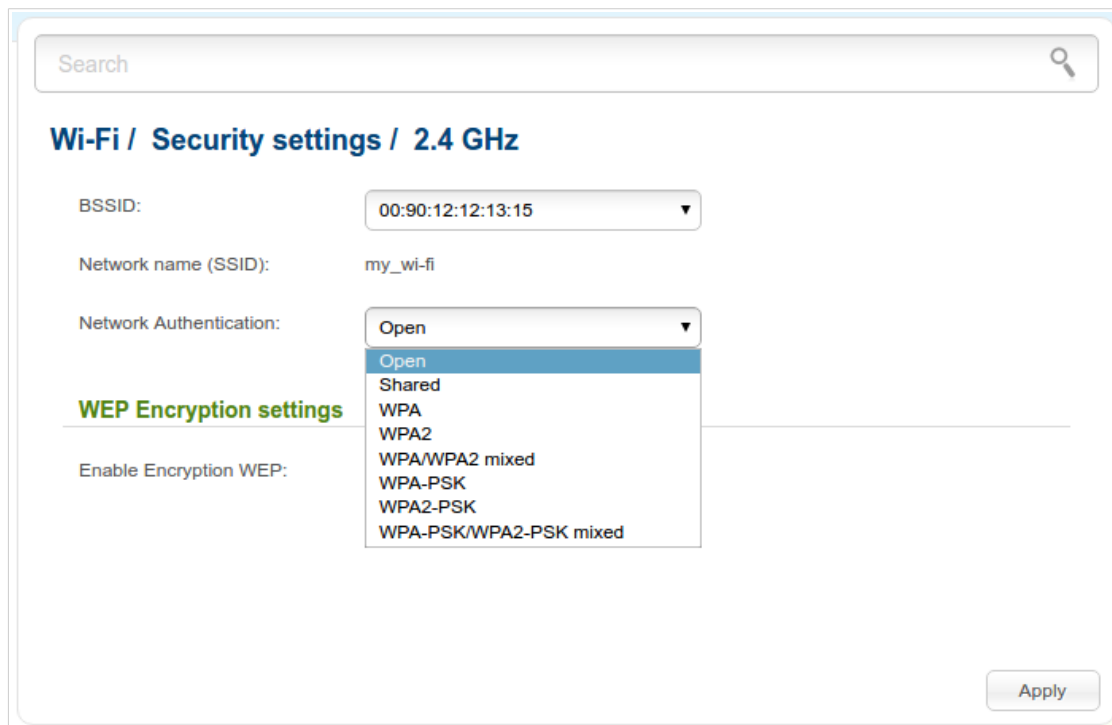
Figure 115. Network authentication types supported by the router.

The router supports the following authentication types:

Authentication type	Description
Open	Open authentication (with WEP encryption for wireless network modes not supporting 802.11n and 802.11ac devices).
Shared	Shared key authentication with WEP encryption. This authentication type is not available when on the **Wi-Fi / Basic settings** page of the relevant band, in the **Wireless mode** drop-down list, a mode supporting 802.11n or 802.11ac devices is selected.
WPA	WPA-based authentication using a RADIUS server.
WPA-PSK	WPA-based authentication using a PSK.
WPA2	WPA2-based authentication using a RADIUS server.
WPA2-PSK	WPA2-based authentication using a PSK.
WPA/WPA2 mixed	A mixed type of authentication. When this value is selected, devices using the **WPA** authentication type and devices using the **WPA2** authentication type can connect to the WLAN of the router.
WPA-PSK/WPA2-PSK mixed	A mixed type of authentication. When this value is selected, devices using the **WPA-PSK** authentication type and devices using the **WPA2-PSK** authentication type can connect to the WLAN of the router.

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> ! The **WPA**, **WPA2**, and **WPA/WPA2 mixed** authentication types require a RADIUS server.

When the **Open** or **Shared** value is selected, the **WEP Encryption settings** section is displayed (the section is unavailable for the wireless network operating modes which support the standards 802.11n and 802.11ac):

*Figure 116. The **Open** value is selected from the **Network Authentication** drop-down list.*

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Parameter	Description
Enable Encryption WEP	The checkbox activating WEP encryption. When the checkbox is selected, the **Default Key ID** field, the **Encryption Key WEP as HEX** checkbox, the **WEP key length** drop-down list, and four **Encryption Key WEP** fields are displayed on the page. For the **Shared** authentication type the checkbox is always selected.
Default Key ID	The number of the key (from first to fourth) which will be used for WEP encryption.
Encryption Key WEP as HEX	Select the checkbox to set a hexadecimal number as a key for encryption.
WEP key length	The length of WEP encryption key. Select the value **64bit** to specify keys containing 5 ASCII symbols or 10 HEX symbols. Select the value **128bit** to specify keys containing 13 ASCII symbols or 26 HEX symbols.
Encryption Key WEP (1-4)	Keys for WEP encryption. The router uses the key selected from the **Default Key ID** drop-down list. It is required to specify all the fields.

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When the **WPA-PSK**, **WPA2-PSK**, or **WPA-PSK/WPA2-PSK mixed** value is selected, the **WPA Encryption settings** section is displayed:

*Figure 117. The **WPA2-PSK** value is selected from the **Network Authentication** drop-down list.*

Parameter	Description
Encryption Key PSK	A key for WPA encryption. The key can contain digits and/or Latin characters.
WPA Encryption	An encryption method: **TKIP**, **AES**, or **TKIP+AES**.
WPA renewal	The time period (in seconds), at the end of which a new key for WPA encryption is generated. When the value **0** is specified for this field, the key is not renewed.

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When the **WPA**, **WPA2**, or **WPA/WPA2 mixed** value is selected, the **RADIUS settings** and **WPA Encryption settings** sections are available:

*Figure 118. The **WPA2** value is selected from the **Network Authentication** drop-down list.*

Parameter	Description
WPA2 Pre-authentication	The checkbox activating preliminary authentication (displayed only for the **WPA2** and **WPA/WPA2 mixed** authentication types).
IP address	The IP address of the RADIUS server.
Port	A port of the RADIUS server.
RADIUS encryption key	The password which the router uses for communication with the RADIUS server (the value of this parameter is specified in the RADIUS server settings).
WPA Encryption	An encryption method: **TKIP**, **AES**, or **TKIP+AES**.
WPA renewal	The time period (in seconds), at the end of which a new key for WPA encryption is generated. When the value **0** is specified for this field, the key is not renewed.

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When you have configured the parameters, click the **Apply** button.

MAC Filter

On pages of the **Wi-Fi / MAC Filter** section, you can define a set of MAC addresses of devices which will be allowed to access the WLAN, or define MAC addresses of devices which will not be allowed to access the WLAN. To configure the 2.4GHz band or 5GHz band, proceed to the relevant page.

Figure 119. The page for configuring the MAC filter for the wireless network.

In the **BSSID** drop-down list, the unique identifier of the Wi-Fi network is displayed. If your network is split into parts, in the **BSSID** list, select the part for which MAC filter should be configured.

By default, MAC filtering is not active (the **Disabled** value is selected from the **MAC filter restrict mode** drop-down list on the **Wi-Fi / MAC Filter** page of the corresponding band).

To open your wireless network for the devices which MAC addresses are specified on this page and to close the wireless network for all other devices, select the **Allow** value from the **MAC filter restrict mode** drop-down list and click the **Apply** button.

To close your wireless network for the devices which MAC addresses are specified on this page, select the **Deny** value from the **MAC filter restrict mode** drop-down list and click the **Apply** button.

Click the **Add** button to specify a MAC address to which the selected filtering mode will be applied.

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Figure 120. The page for adding a MAC address.

You can specify the following parameters:

Parameter	Description
MAC address	In the field, enter the MAC address to which the selected filtering mode will be applied.
	Also you can set the address of a device connected to the router's LAN at the moment. To do this, select the relevant value from the drop-down list (the field will be filled in automatically).
Hostname	The name of the device for easier identification. You can specify any name.
Enable	Select the checkbox to enable the selected filtering mode of the device.

When you have configured the parameters, click the **Apply** button.

To remove a MAC address from the list of MAC addresses, select the checkbox located to the left of the relevant MAC address and click the **Delete** button.

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List of Wi-Fi Clients

On the **Wi-Fi / List of Wi-Fi clients** page, you can view the list of wireless clients connected to the router.
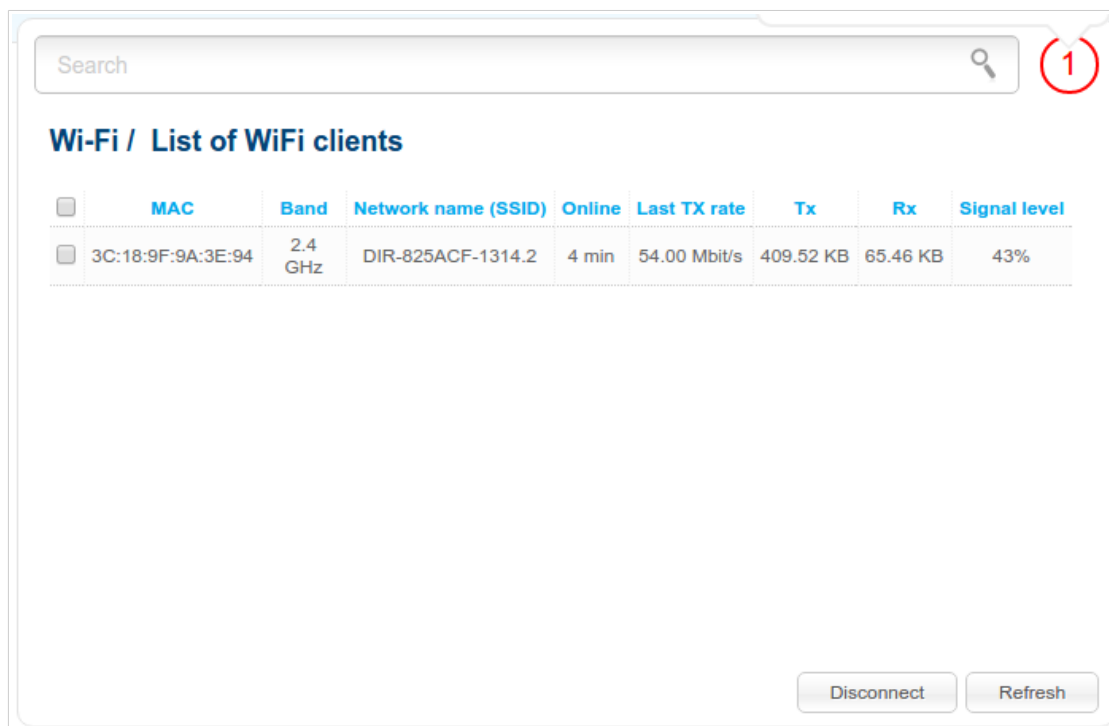
Figure 121. The list of the wireless clients.

If you want to disconnect a wireless device from your WLAN, select the checkbox in the line containing the relevant MAC address, and click the **Disconnect** button.

To view the latest data on the devices connected to the WLAN, click the **Refresh** button.

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WPS

On pages of the **Wi-Fi / WPS** section, you can enable the function for secure configuration of the WLAN and select a method used to easily add wireless devices to the WLAN.

The WPS function helps to configure the protected wireless network automatically. Devices connecting to the wireless network via the WPS function must support the WPS function.

> ❗ If the router's WLAN is split into parts (the value **2**, **3**, or **4** is selected from the **MBSSID** drop-down list on the **Wi-Fi / Basic settings** page of the relevant band), the WPS function can be used only for the first part of the WLAN (the first value from the **BSSID** drop-down list).

> ❗ Before using the function you need to configure one of the following authentication types: **Open** with no encryption, **WPA2-PSK**, or **WPA-PSK/WPA2-PSK mixed** with the **AES** encryption method (on the relevant band page of the **Wi-Fi / Security settings** section). When other security settings are specified for the band of the WLAN, controls of the **Wi-Fi / WPS** page of the relevant band are not available.

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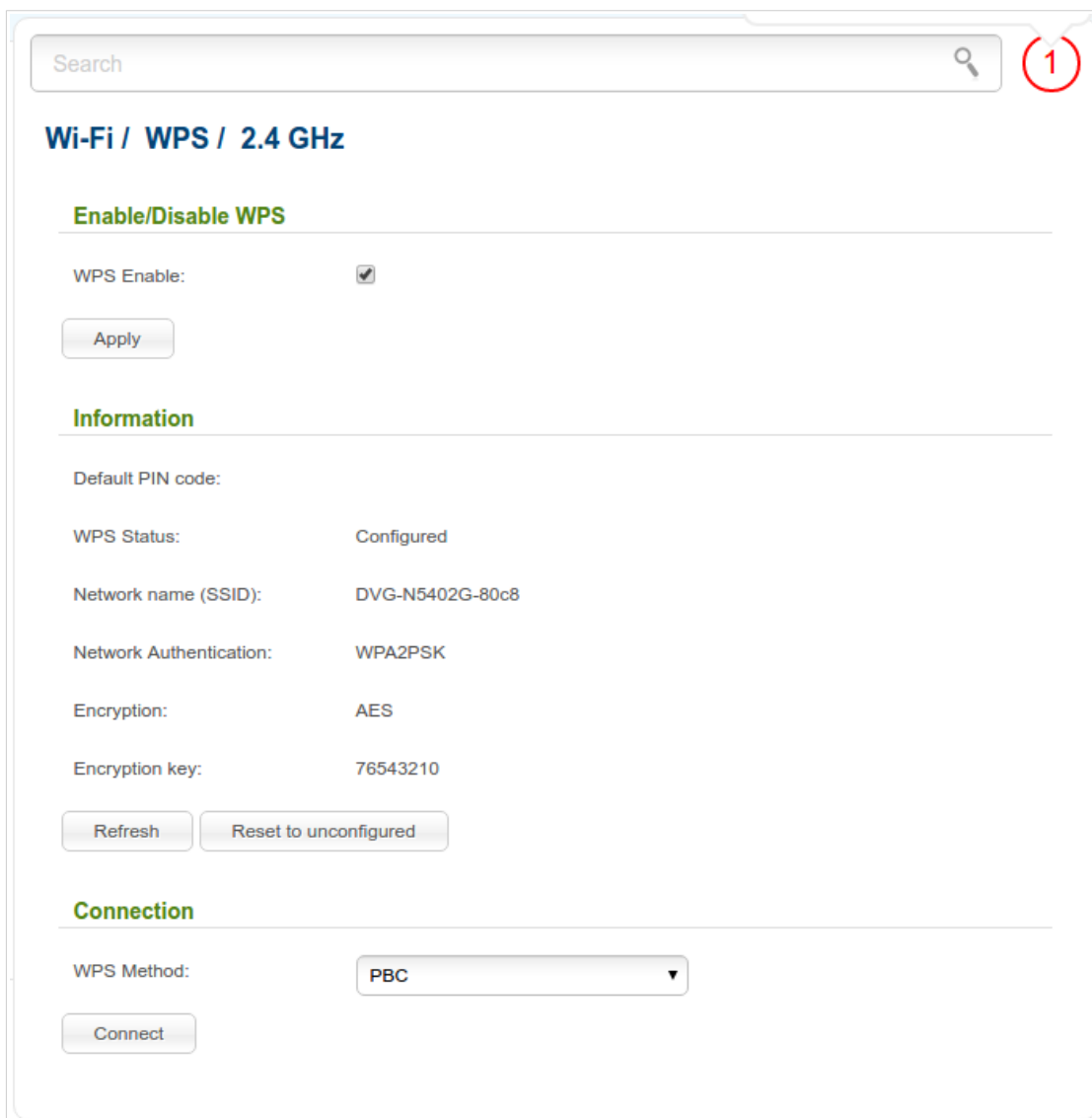
Figure 122. The page for configuring the WPS function.

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To activate the WPS function, select the **WPS Enable** checkbox on the **Wi-Fi / WPS/ 2.4 GHz** or **Wi-Fi / WPS / 5 GHz** page and click the **Apply** button. When the checkbox is selected, the **Information** and **Connection** sections are available on the page.

Parameter	Description
Default PIN code	The PIN code of the router. This parameter is used when connecting the router to a registrar to set the parameters of the WPS function.
WPS Status	The state of the WPS function: • **Configured** (all needed settings are specified; these settings will be used upon establishing the wireless connection) • **Unconfigured** (after activating the WPS function, the SSID and the encryption key will be configured automatically, the network authentication type will be changed to WPA2-PSK).
Network name (SSID)	The name of the router's WLAN.
Network Authentication	The network authentication type specified for the WLAN.
Encryption	The encryption type specified for the WLAN.
Encryption key	The encryption key specified for the WLAN.
Refresh	Click the button to refresh the data on the page.
Reset to unconfigured	Click the button to reset the parameters of the WPS function.
WPS Method	A method of the WPS function. Select a value from the drop-down list. **PIN**: Connecting the device via the PIN code. **PBC**: Connecting the device via the push button (actual or virtual).
PIN Code	The PIN code of the WPS-enabled device that needs to be connected to the wireless network of the router. The field is displayed only when the **PIN** value is selected from the **WPS Method** drop-down list.
Connect	Click the button to connect the wireless device to the router's WLAN via the WPS function.

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Using WPS Function via Web-based Interface

To add a wireless device via the PIN method of the WPS function, follow the next steps:

1. Select the **WPS Enable** checkbox.

2. Click the **Apply** button.

3. Select the **PIN** value from the **WPS Method** drop-down list.

4. Select the PIN method in the software of the wireless device that you want to connect to the router's WLAN.

5. Click the relevant button in the software of the wireless device that you want to connect to the WLAN.

6. Right after that, enter the PIN code specified on the cover of the wireless device or in its software in the **PIN Code** field.

7. Click the **Connect** button in the web-based interface of the router.

To add a wireless device via the PBC method of the WPS function, follow the next steps:

1. Select the **WPS Enable** checkbox.

2. Click the **Apply** button.

3. Select the **PBC** value from the **WPS Method** drop-down list.

4. Select the PBC method in the software of the wireless device that you want to connect to the router's WLAN.

5. Click the relevant button in the software or press the WPS button on the cover of the wireless device that you want to connect to the WLAN.

6. Click the **Connect** button in the web-based interface of the router.

Using WPS Function without Web-based Interface

You can add a wireless device to the router's WLAN without accessing the web-based interface of the router. To do this, you need to configure the following router's settings:

1. Specify corresponding security settings for the wireless network of the router.

2. Select the **WPS Enable** checkbox.

3. Click the **Apply** button.

4. Save the settings and close the web-based interface (click the icon (**Save**) in the menu displayed when the mouse pointer is over the **System** caption in the top left part of the page, then click the icon (**Logout**)).

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Later you will be able to add wireless devices to the WLAN by pressing the **WPS** button of the router.

1. Select the PBC method in the software of the wireless device that you want to connect to the router's WLAN.

2. Click the relevant button in the software or press the WPS button on the cover of the wireless device that you want to connect to the WLAN.

3. Press the **WPS** button of the router and release. The **WPS** LED will start blinking blue.

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Additional Settings

On pages of the **Wi-Fi / Additional settings** section, you can define additional parameters for the WLAN of the router. To configure the 2.4GHz band or 5GHz band, proceed to the relevant page.

> ! Changing parameters presented on this page may negatively affect your WLAN!

Figure 123. Additional settings of the WLAN.

The following fields are available on the page:

Parameter	Description
Station Keep Alive	The time interval (in seconds) between keep alive checks of wireless devices from your WLAN. When the value **0** is specified, the checking is disabled.
Beacon Period	The time interval (in milliseconds) between packets sent to synchronize the wireless network.
RTS Threshold	The minimum size (in bytes) of a packet for which an RTS frame is transmitted.
Frag Threshold	The maximum size (in bytes) of a non-fragmented packet. Larger packets are fragmented (divided).

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Parameter	Description
DTIM Period	The time period (in seconds) between sending a DTIM (a message notifying on broadcast or multicast transmission) and data transmission.
TX Power	The transmit power (in percentage terms) of the router.
Drop multicast	Select the checkbox to disable multicasting for the router's WLAN. Deselect the checkbox to enable multicasting from WAN connections for which the **Enable IGMP Multicast** checkbox is selected.
Bandwidth	The channel bandwidth for 802.11n devices in 2.4GHz band (the **Wi-Fi / Additional settings / 2.4 GHz** page). **20MHz**: 802.11n clients operate at 20MHz channels. **40MHz**: 802.11n clients operate at 40MHz channels. **20/40MHz -**: 802.11n clients operate at 20MHz or 40MHz channels (the channel is combined with the previous adjacent channel). **20/40MHz +**: 802.11n clients operate at 20MHz or 40MHz channels (the channel is combined with the next adjacent channel). The channel bandwidth for 802.11n and 802.11ac devices in 5GHz band (the **Wi-Fi / Additional settings / 5 GHz** page). **20MHz**: 802.11n and 802.11ac clients operate at 20MHz channels. **40MHz**: 802.11n and 802.11ac clients operate at 40MHz channels. **20/40MHz -**: 802.11n and 802.11ac clients operate at 20MHz or 40MHz channels (the channel is combined with the previous adjacent channel). **20/40MHz +**: 802.11n and 802.11ac clients operate at 20MHz or 40MHz channels (the channel is combined with the next adjacent channel). **80MHz**: 802.11ac clients operate at 80MHz channels. **20/40/80MHz -**: 802.11ac clients operate at 20MHz, 40MHz, or 80MHz channels (the channel is combined with the previous adjacent channels). **20/40/80MHz +**: 802.11ac clients operate at 20MHz, 40MHz, or 80MHz channels (the channel is combined with the next adjacent channels).

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Parameter	Description
Short GI	Guard interval (in nanoseconds). This parameter defines the interval between symbols transmitted when the router is communicating to wireless devices. **Enable**: the router uses the 400 ns short guard interval. Only for the wireless network operating modes which support 802.11n or 802.11ac standard (see the value of the **Wireless mode** drop-down list on the **Wi-Fi / Basic settings** page). **Disable**: the router uses the 800 ns standard guard interval.

When you have configured the parameters, click the **Apply** button.

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WMM

On the **Wi-Fi / WMM** page, you can enable the Wi-Fi Multimedia function.

The WMM function implements the QoS features for Wi-Fi networks. It helps to improve the quality of data transfer over Wi-Fi networks by prioritizing different types of traffic.

To enable the function, select the **WMM** checkbox and click the **Apply** button.

Figure 124. The page for configuring the WMM function.

> ! All needed settings for the WMM function are specified in the device's system. It is recommended not to change the default values.

The WMM function allows assigning priorities for four Access Categories (AC):

- **AC_BK** (*Background*), low priority traffic (print jobs, file downloads, etc.).
- **AC_BE** (*Best Effort*), traffic from legacy devices or devices/applications that do not support QoS.
- **AC_VI** (*Video*).
- **AC_VO** (*Voice*).

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Parameters of the Access Categories are defined for both the router itself (in the **Parameters of Access Point** section) and wireless devices connected to it (in the **Parameters of Station** section).

For every Access Category the following fields are available:

Parameter	Description
Aifsn	*Arbitrary Inter-Frame Space Number*. This parameter influences time delays for the relevant Access Category. The lower the value, the higher is the Access Category priority.
CWMin/CWMax	*Contention Window Minimum/Contention Window Maximum*. Both fields influence time delays for the relevant Access Category. The **CWMax** field value should not be lower, than the **CWMin** field value. The lower the difference between the **CWMax** field value and the **CWMin** field value, the higher is the Access Category priority.
Txop	*Transmission Opportunity*. The higher the value, the higher is the Access Category priority.
ACM	*Admission Control Mandatory*. If on, prevents from using the relevant Access Category.
Ack	*Acknowledgment*. Answering response requests while transmitting. Displayed only in the **Parameters of Access Point** section. If off, the router answers requests. If on, the router does not answer requests.

When you have configured the parameters, click the **Apply** button.

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Client

On the **Wi-Fi / Client** page, you can configure the router as a client to connect to a wireless access point.

As a rule, the client mode is used to connect to a WISP network. All parameters specified on this page should be provided by your WISP.

Figure 125. The page for configuring the client mode.

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To configure the router as a client, select the **Enable client** checkbox. When the checkbox is selected, the following fields are displayed on the page:

Parameter	Description
Broadcast wireless network 2.4GHz / Broadcast wireless network 5GHz	If the checkbox is not selected, devices cannot connect to the relevant band of the router's WLAN. Upon that the router can connect to another access point as a wireless client.
Wireless network settings	
Network name (SSID)	The name of the network to which the router connects.
BSSID	The unique identifier of the network to which the router connects.
Network Authentication	The authentication type of the network to which the router connects.

When the **Open** or **Shared** authentication type is selected, the following fields are available:

Parameter	Description
Enable Encryption WEP	The checkbox activating WEP encryption. When the checkbox is selected, the **Default Key ID** field, the **Encryption Key WEP as HEX** checkbox, the **WEP key length** drop-down list, and four **Encryption Key WEP** fields are displayed on the page. For the **Shared** authentication type the checkbox is always selected.
Default Key ID	The number of the key (from first to fourth) which will be used for WEP encryption.
Encryption Key WEP as HEX	Select the checkbox to set a hexadecimal number as a key for encryption.
WEP key length	The length of WEP encryption key. Select the value **64bit** to specify keys containing 5 ASCII symbols or 10 HEX symbols. Select the value **128bit** to specify keys containing 13 ASCII symbols or 26 HEX symbols.
Encryption Key WEP (1-4)	Keys for WEP encryption. The router uses the key selected from the **Default Key ID** drop-down list. It is required to specify all the fields.

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When the **WPA-PSK**, **WPA2-PSK**, or **WPA-PSK/WPA2-PSK mixed** authentication type is selected, the following fields are available:

Parameter	Description
Encryption Key PSK	A key for WPA encryption. The key can contain digits and/or Latin characters.
WPA Encryption	An encryption method: **TKIP**, **AES**, or **TKIP+AES**.

When you have configured the parameters, click the **Apply** button.

In addition, when the **Enable client** checkbox is selected, the list of available wireless networks is displayed on the page.

To view the latest data on the available 2.4GHz band wireless networks, click the **Search** button in the **Wireless networks in 2.4 GHz range** section.

To view the latest data on the available 5GHz band wireless networks, click the **Search** button in the **Wireless networks in 5 GHz range** section.

To connect to a wireless network from the list, select the needed network. Upon that the relevant values are automatically inserted in the **Network name (SSID)**, **BSSID**, and **Network Authentication** fields.

For the **Open** authentication type with no encryption, click the **Apply** button.

For the **Open** authentication type with encryption and the **Shared** authentication type, select a needed value from the **Default Key ID** drop-down list. If needed, select the **Encryption Key WEP as HEX** checkbox to set a hexadecimal number as a key for encryption. Then select a needed value in the **WEP key length** drop-down list, fill in 4 **Encryption Key WEP** fields, and click the **Apply** button.

For the **WPA-PSK**, **WPA2-PSK**, or **WPA-PSK/WPA2-PSK mixed** authentication types, fill in the **Encryption Key PSK** field and click the **Apply** button.

After clicking the **Apply** button, the wireless channel of DVG-N5402G/ACF will switch to the channel of the wireless access point to which you have connected.

If the router is connected to the selected network successfully, the green indicator appears to the right of the network's SSID in the table.

After configuring the device as a client, you need to create a WAN connection with relevant parameters for the **WiFiClient** interface.

The step-by-step description of how to configure the router as a wireless client is available on D-Link website. To access it, click the **Configuring router in wireless client mode** link in the top part of the page.

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Advanced

In this menu you can configure advanced settings of the router:

- create groups of ports for VLANs

- enable the UPnP IGD protocol

- allow the router to connect to a private Ethernet line

- configure autonegotiation or manually configure speed and duplex mode for each Ethernet port of the router

- configure notifications on the reason of the Internet connection failure

- configure a DDNS service

- add name servers

- define static routes

- create rules for remote access to the web-based interface

- allow the router to use IGMP, RTSP, enable the SIP ALG function, PPPoE/PPTP/L2TP/IPSec pass through functions

- configure TR-069 client

- configure VPN tunnels based on IPsec protocol.

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VLAN

On the **Advanced / VLAN** page, you can create and edit groups of ports for virtual networks (VLANs).

By default, 2 groups are created in the router's system:

- **lan**: it includes ports 1-4. You cannot delete this group.

- **wan**: for the WAN interface; it includes the **INTERNET** port. You can edit or delete this group.

*Figure 126. The **Advanced / VLAN** page.*

If you want to create a group including LAN ports of the router, first delete relevant records from the **lan** group on this page. To do this, select the **lan** group, deselect the needed checkbox located to the left of the relevant port, and click the **Apply** button.

To create a new group for VLAN, click the **Add** button.

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Figure 127. The page for adding a group of ports for VLAN.

You can specify the following parameters:

Parameter	Description
Name	A name for the port for easier identification.
Enable	Select the checkbox to allow using this group of ports.
Type	The type of the VLAN. **Untagged NAT**. The group of this type is an external connection with address translation. It is mostly used to transmit untagged traffic. When this value is selected, the **VLAN ID** field and the **QOS**, **Tagged port** drop-down lists are not displayed. **Tagged NAT**. The group of this type is an external connection with address translation. It is mostly used to connect to the Internet. Later the VLAN which identifier is specified in the **VLAN ID** field is used to create a WAN connection (on the **Net / WAN** page). When this value is selected, the **Untagged ports** section is not displayed. **Bridge**. The group of this type is a transparent connection between an internal port and an external connection. It is mostly used to connect IPTV set-top boxes.
VLAN ID	An identifier of the VLAN to which this group of ports will be assigned.

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Parameter	Description
QoS	A priority tag for the type of traffic transmitted.
Tagged port	From the list, select an available value to assign it to this group.
Untagged ports	The section includes the ports that can be added to the group. To add a port to the group, select the needed checkbox located to the left of the relevant port. To remove a port from the group, deselect the needed checkbox located to the left of the relevant port.

Click the **Apply** button.

To edit or remove an existing group, select the relevant group on the **Advanced / VLAN** page. On the page displayed, change the parameters and click the **Apply** button, or click the **Delete** button.

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UPnP IGD

On the **Advanced / UPnP IGD** page, you can enable the UPnP IGD protocol. The router uses the UPnP IGD protocol for automatic configuration of its parameters for network applications requiring an incoming connection to the router.

*Figure 128. The **Advanced / UPnP IGD** page.*

If you want to manually specify all parameters needed for network applications, deselect the **Enabled** checkbox and click the **Apply** button.

If you want to enable the UPnP IGD protocol in the router, select the **Enabled** checkbox and click the **Apply** button.

When the protocol is enabled, the router's parameters configured automatically are displayed on the page:

Parameter	Description
Protocol	A protocol for network packet transmission.
IP	The IP address of a client from the local area network.
Private port	A port of a client's IP address to which traffic is directed from a public port of the router.
Public port	A public port of the router from which traffic is directed to a client's IP address.
Comments	Information transmitted by a client's network application.

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EtherWAN

On the **Advanced / EtherWAN** page, you can configure the router to connect to a private Ethernet line.

> ! The Ethernet WAN function allows using any LAN port of the router to access the Internet via Ethernet technology. When the function is enabled, the optical port of the router is inactive.
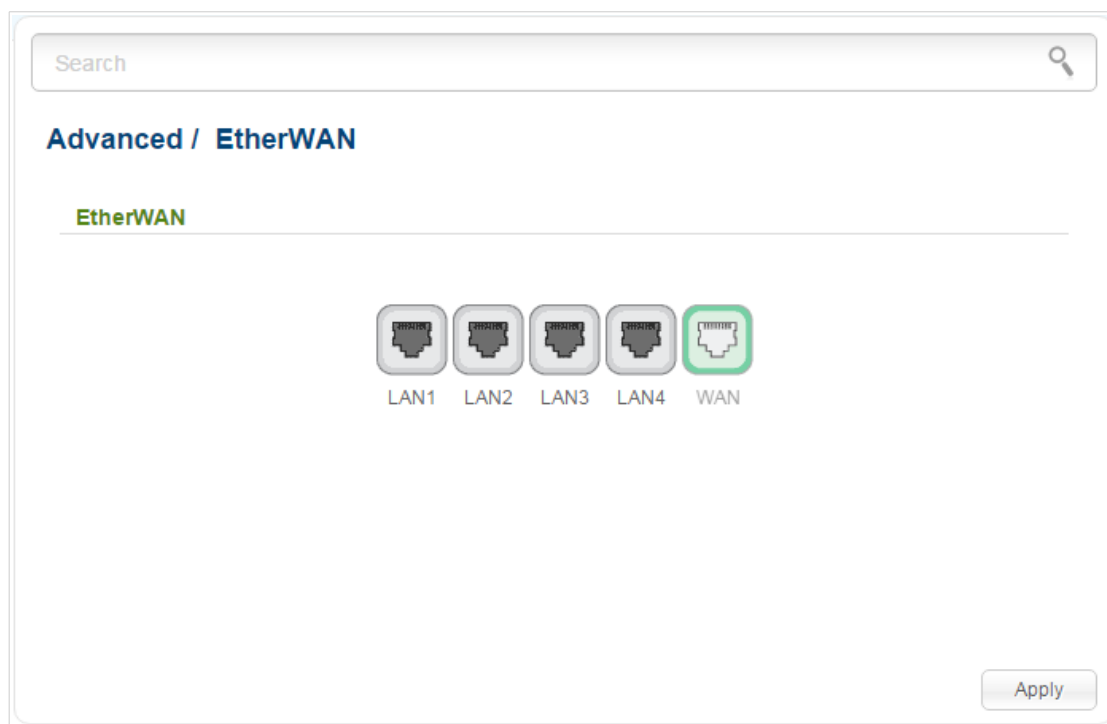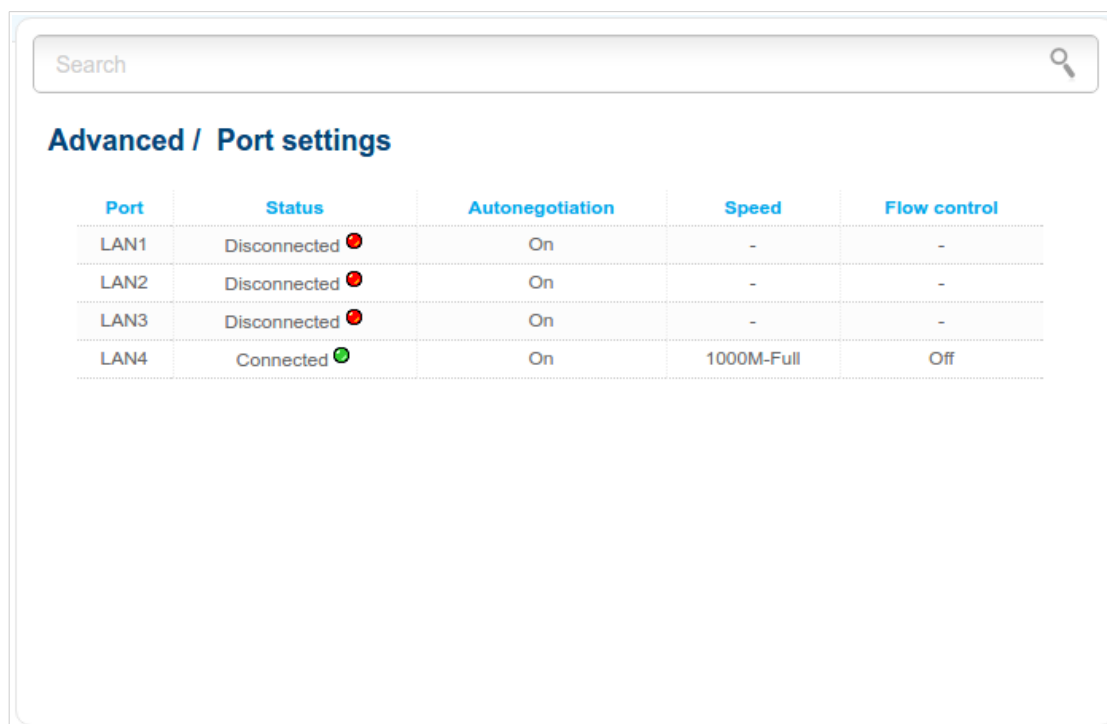
*Figure 129. The **Advanced / EtherWAN** page.*

To use one of the router's LAN port as the WAN port, click the icon corresponding to this port and click the **Apply** button. Port configured as the WAN port is highlighted in green.

If in the future you need to connect the router to a fiber optic line, click the **WAN** icon and then click the **Apply** button.

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Port Settings

On the **Advanced / Port settings** page, you can configure or disable autonegotiation of speed and duplex mode or manually configure speed and duplex mode for each Ethernet port of the router.

Also you can enable or disable data flow control in the autonegotiation mode. This function is used for equal load balancing in ISPs' networks. Contact your ISP to clarify if this function needs to be enabled.

*Figure 130. The **Advanced / Port settings** page.*

By default, autonegotiation of speed, duplex mode, and data flow control is configured for each Ethernet port of the router. If you need to specify speed and duplex mode manually or change autonegotiation settings (speed, duplex mode, or enable/disable data flow control) for a port, select the relevant port in the table.

> !   Autonegotiation should be enabled for both devices connected to each other.

> !   When autonegotiation is disabled, speed and duplex mode settings for both devices connected to each other should be the same.

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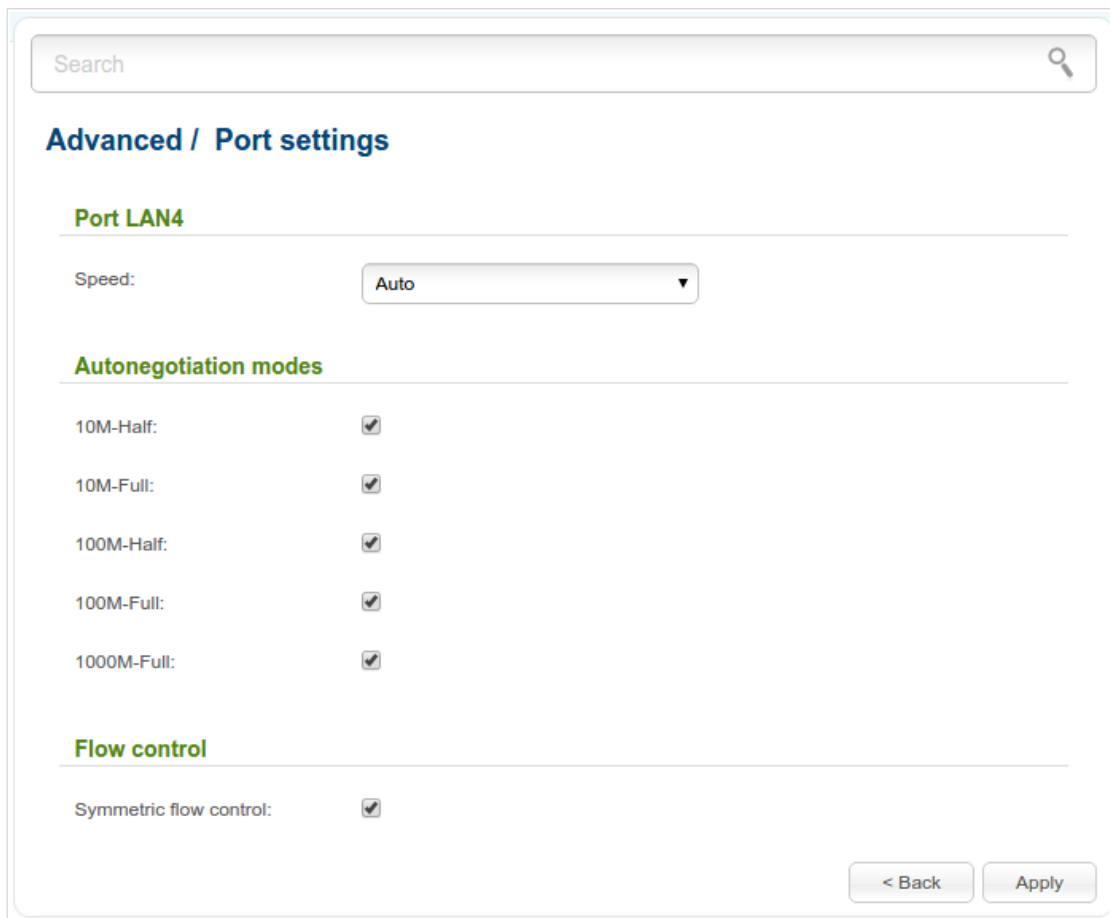
Figure 131. The page for changing the settings of the router's port.

On the opened page, specify the needed parameters:

Parameter	Description
Port LAN	
Speed	Data transfer mode. Select the **Auto** value to enable autonegotiation. When this value is selected, the **Autonegotiation modes** and **Flow control** sections are displayed. Select the **10M-Half**, **10M-Full**, **100M-Half**, **100M-Full**, or **1000M-Full** value to manually configure speed and duplex mode for the selected port: • **10M-Half**: Data transfer in just one direction at a time (data can be either sent or received) at the maximum possible rate of up to 10Mbps. • **10M-Full:** Data transfer in two directions simultaneously (data can be sent and received at the same time) at the maximum possible rate of up to 10Mbps.

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Parameter	Description
	• **100M-Half:** Data transfer in just one direction at a time (data can be either sent or received) at the maximum possible rate of up to 100Mbps. • **100M-Full:** Data transfer in two directions simultaneously (data can be sent and received at the same time) at the maximum possible rate of up to 100Mbps.
Autonegotiation modes	
Select checkboxes corresponding to the needed data transfer modes.	
Flow control	
Symmetric flow control	Select the checkbox to enable the flow control function for the port.

After specifying the needed parameters, click the **Apply** button.

If in the future you need to edit the parameters of the router's port, select the port in the table. On the opened page, change the needed parameters and click the **Apply** button.

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Redirect

On the **Advanced / Redirect** page, you can enable notifications on the reason of the Internet connection failure. Notifications will be displayed in the browser window when a user is attempting to open a web site on the Internet.
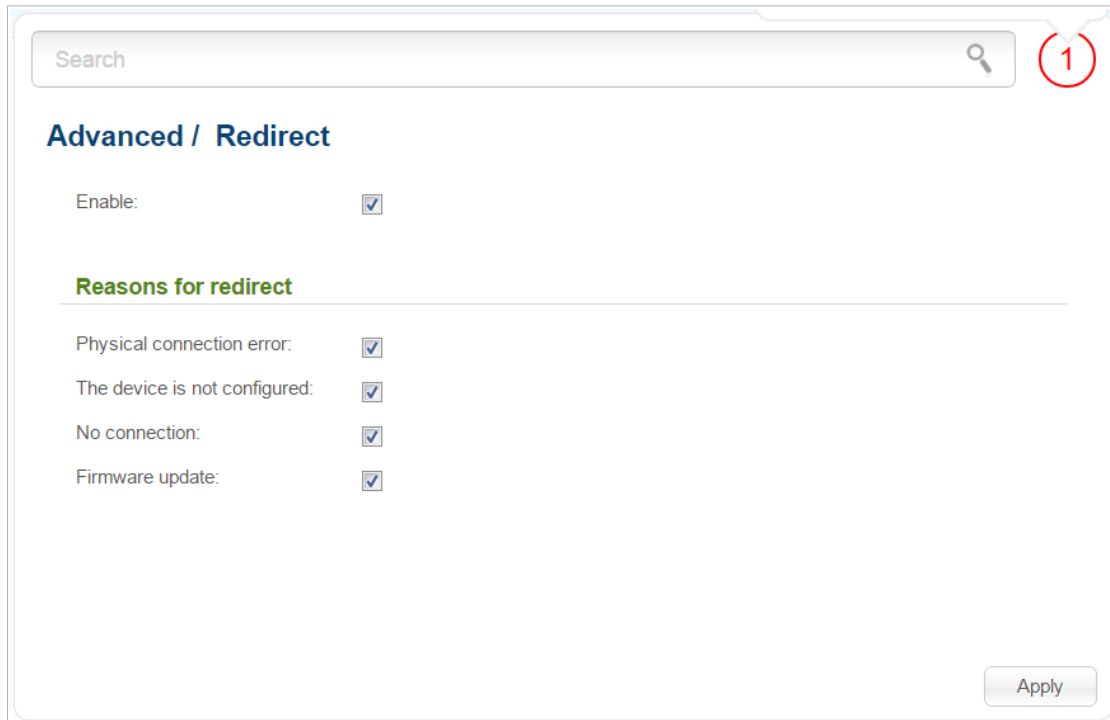
*Figure 132. The **Advanced / Redirect** page.*

To configure notifications, select the **Enable** checkbox. Then select needed checkboxes in the **Reasons for redirect** section.
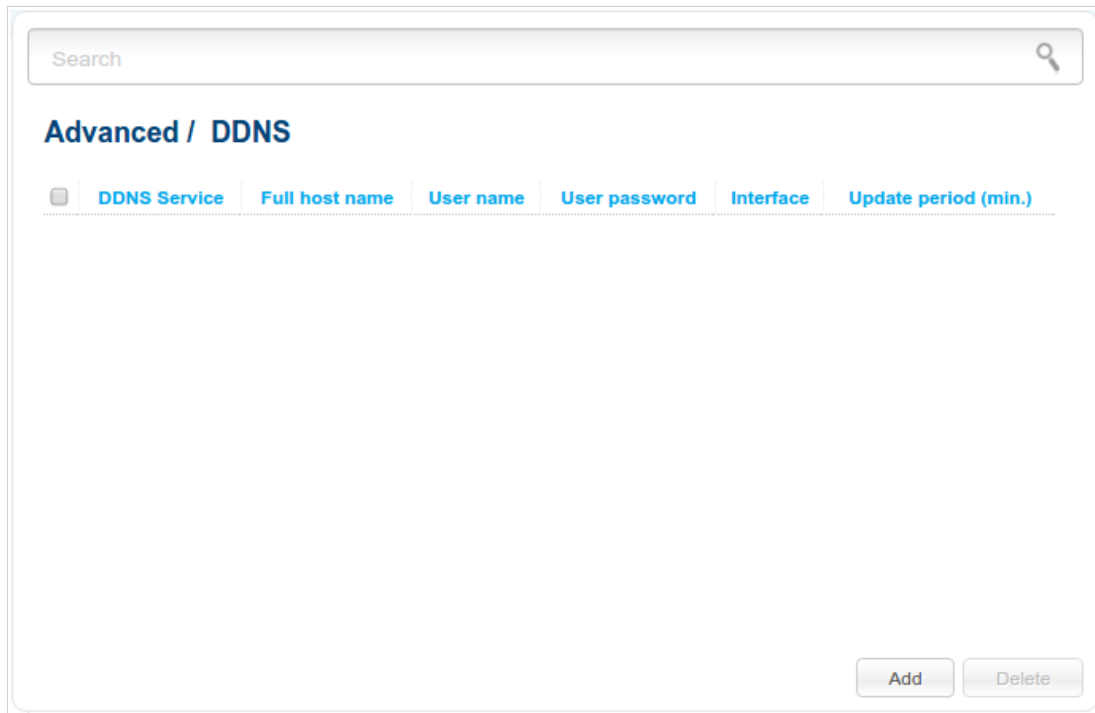
Parameter	Description
Reasons for redirect	
Physical connection error	Notifications in case of physical connection problems (the ISP's cable is not connected, an additional device needed to access the Internet is not connected).
The device is not configured	Notifications in case when the device works with default settings.
No connection	Notifications in case of problems of the connection used as the default gateway (authorization error, the IPS's server does not respond, etc.).
Firmware update	Notifications in case of update of the device's firmware.

When you have configured the parameters, click the **Apply** button.

To disable notifications, deselect the **Enable** checkbox and click the **Apply** button.

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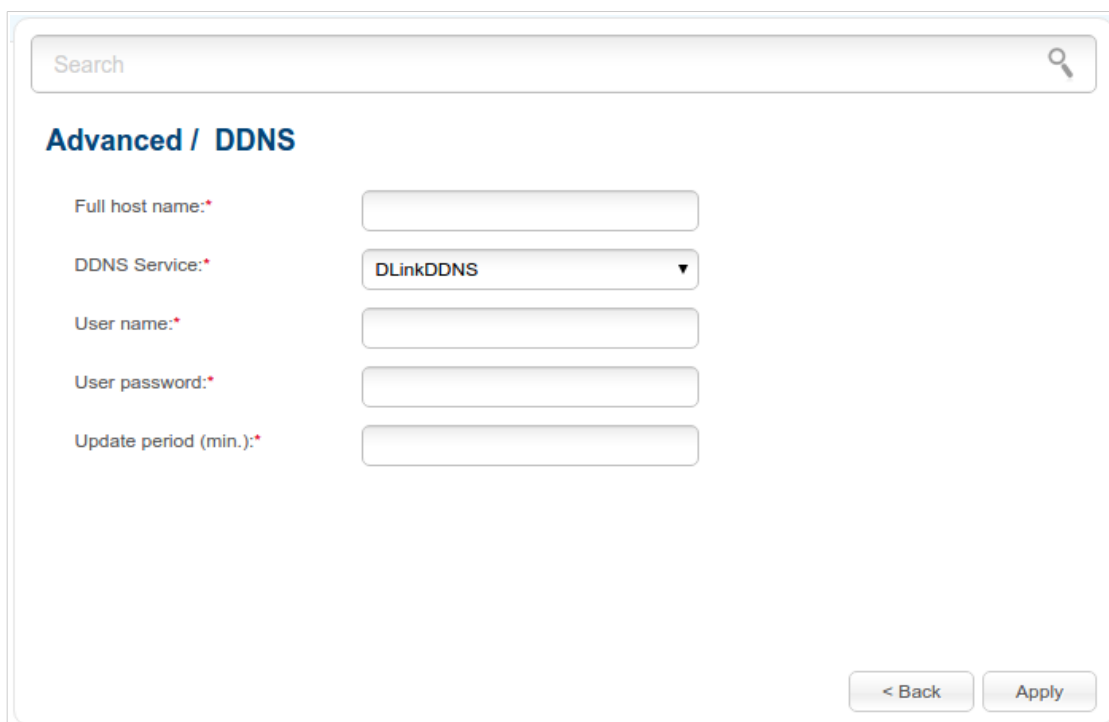
DDNS

On the **Advanced / DDNS** page, you can define parameters of the DDNS service, which allows associating a domain name with dynamic IP addresses.

*Figure 133. The **Advanced / DDNS** page.*

To add a new DDNS service, click the **Add** button.

Figure 134. The page for editing the DDNS service.

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You can specify the following parameters:

Parameter	Description
Full host name	The domain name registered at your DDNS provider. The field will be filled in automatically.
DDNS Service	Select a DDNS provider from the drop-down list.
User name	The username to authorize for your DDNS provider.
User password	The password to authorize for your DDNS provider.
Update period	An interval (in minutes) between sending data on the router's external IP address to the relevant DDNS service.

After specifying the needed parameters, click the **Apply** button.

To edit parameters of the existing DDNS service, click the relevant service link. On the opened page, change the needed parameters and click the **Apply** button.

To remove an existing DDNS service, select the checkbox located to the left of the relevant line in the table and click the **Delete** button. Also you can remove a service on the editing page.

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DNS

On the **Advanced / DNS** page, you can add DNS servers to the system.
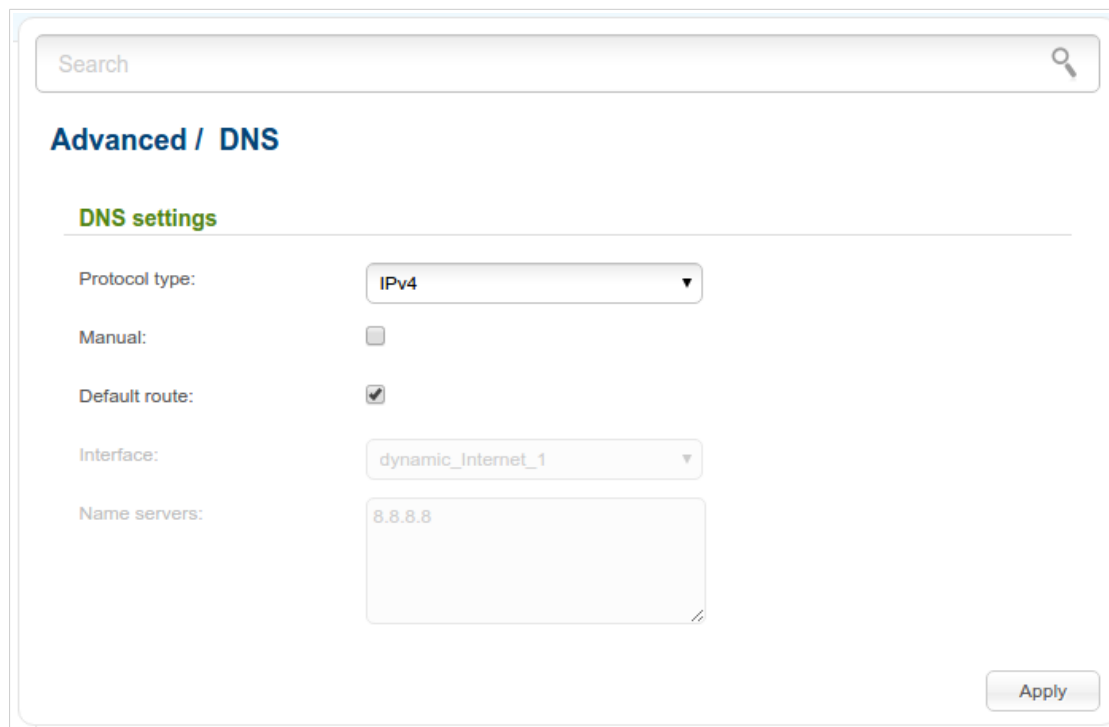
*Figure 135. The **Advanced / DNS** page.*

DNS servers are used to determine the IP address from the name of a server in Intranets or the Internet (as a rule, they are specified by an ISP or assigned by a network administrator).

You can specify the addresses of DNS servers manually on this page, or configure the router to obtain DNS servers addresses automatically from your ISP upon installing a connection.

> **!** When you use the built-in DHCP server, the network parameters (including DNS servers) are distributed to clients automatically.

From the **Protocol type** drop-down list, select an IP version for which DNS servers should be configured.

If you want to configure automatic obtainment of DNS servers addresses, deselect the **Manual** checkbox, select a WAN connection which will be used to obtain addresses of DNS servers automatically from the **Interface** drop-down list or select the **Default route** checkbox, so that the router could use the connection set as the default gateway (on the **Net / WAN** page) to obtain DNS server addresses, and click the **Apply** button.

If you want to specify the DNS server manually, select the **Manual** checkbox and enter a DNS server address in the **Name servers** list. To specify several addresses, press the **Enter** key and enter a needed address in the next line. Then click the **Apply** button.

To remove a DNS server from the system, remove the relevant line from the **Name servers** field and click the **Apply** button.

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Routing

On the **Advanced / Routing** page, you can add static routes (routes for networks that are not connected directly to the device but are available through the interfaces of the device) into the system.
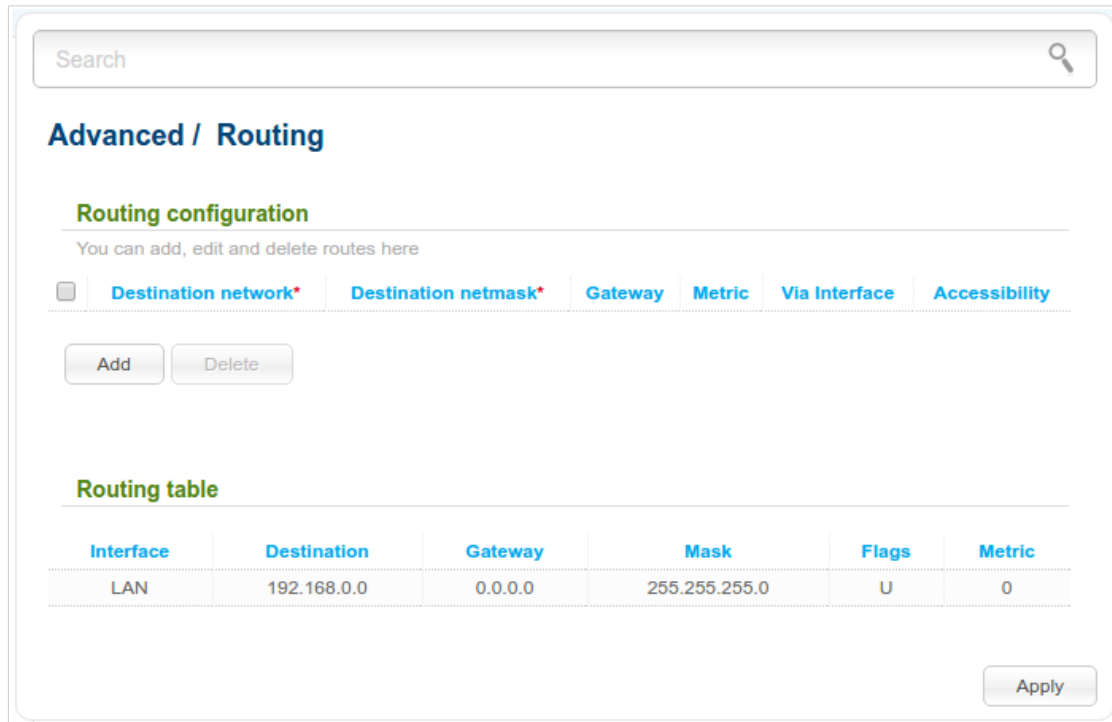
*Figure 136. The **Advanced / Routing** page.*

To create a new route, click the **Add** button. In the line displayed, you can specify the following parameters:

Parameter	Description
Destination network	A destination network to which this route is assigned.
Destination netmask	The destination network mask.
Gateway	An IP address through which the destination network can be accessed. The field is available when the **<Auto>** value is selected from the **Via Interface** drop-down list of this line.
Metric	A metric for the route. The lower the value, the higher is the route priority. *Optional*.
Via Interface	Select an interface through which the destination network can be accessed from the drop-down list. If you have selected the **<Auto>** value of this drop-down list, the router itself sets the interface on the basis of data on connected networks.

After specifying the needed parameters, click the **Apply** button.

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To edit an existing route, select a needed field in the relevant line of the table, change its value, and click the **Apply** button.

To remove an existing route, select the checkbox located to the left of the relevant line in the table and click the **Delete** button. Then click the **Apply** button.

In the **Routing table** section the information on the routes for IPv4 protocol is displayed. See the full list of routes on the **Status / Routing table** page.

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IPv6 Routing

On the **Advanced / IPv6 routing** page, you can add static routes (routes for networks that are not connected directly to the device but are available through the interfaces of the device) into the system.
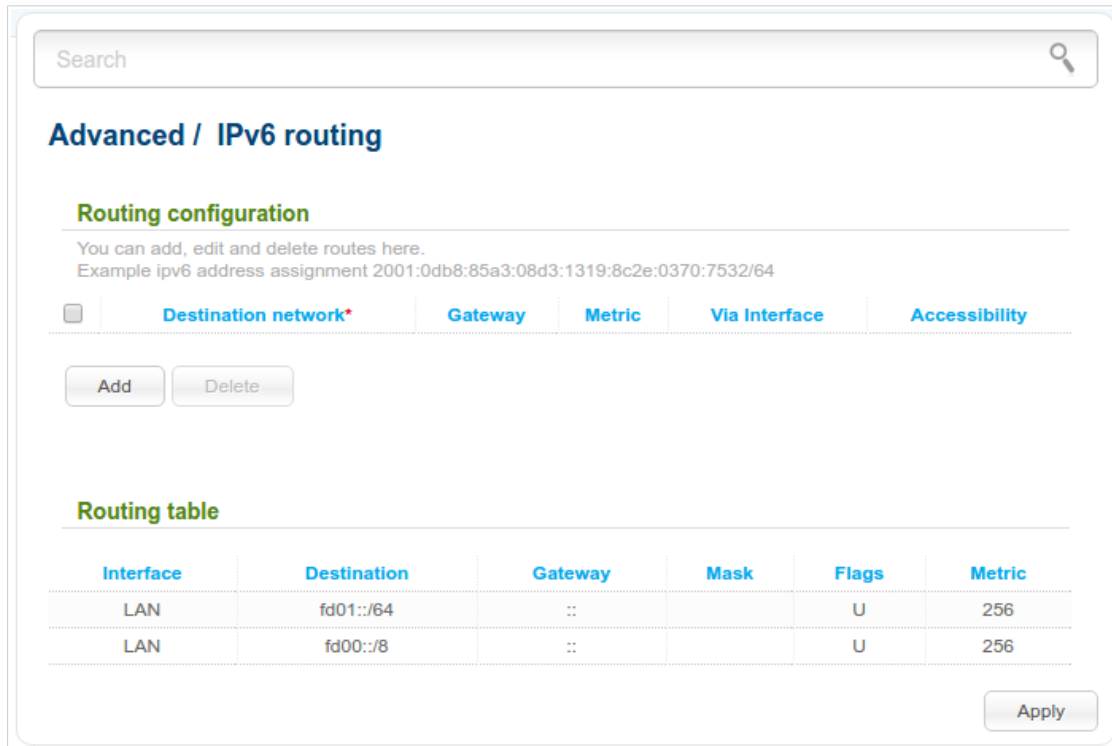
*Figure 137. The **Advanced / IPv6 routing** page.*

To create a new route, click the **Add** button. In the line displayed, you can specify the following parameters:

Parameter	Description
Destination network	A destination network to which this route is assigned. You can specify an IPv6 address (`2001:db8:1234::1`) or an IPv6 address with a prefix (`2001:db8:1234::/64`).
Gateway	An IPv6 address through which the destination network can be accessed. The field is available when the **<Auto>** value is selected from the **Via Interface** drop-down list of this line.
Metric	A metric for the route. The lower the value, the higher is the route priority. *Optional*.

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Parameter	Description
Via Interface	Select an interface through which the destination network can be accessed from the drop-down list. If you have selected the **<Auto>** value of this drop-down list, the router itself sets the interface on the basis of data on connected networks.

After specifying the needed parameters, click the **Apply** button.

To edit an existing route, select a needed field in the relevant line of the table, change its value, and click the **Apply** button.

To remove an existing route, select the checkbox located to the left of the relevant line in the table and click the **Delete** button. Then click the **Apply** button.

In the **Routing table** section the information on the routes for IPv6 protocol is displayed. See the full list of routes on the **Status / Routing table** page.

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Remote Access to Device

On the **Advanced / Remote access to device** page, you can configure access to the web-based interface of the router. By default, the access from external networks to the router is closed. If you need to allow access to the router from the external network, create relevant rules.
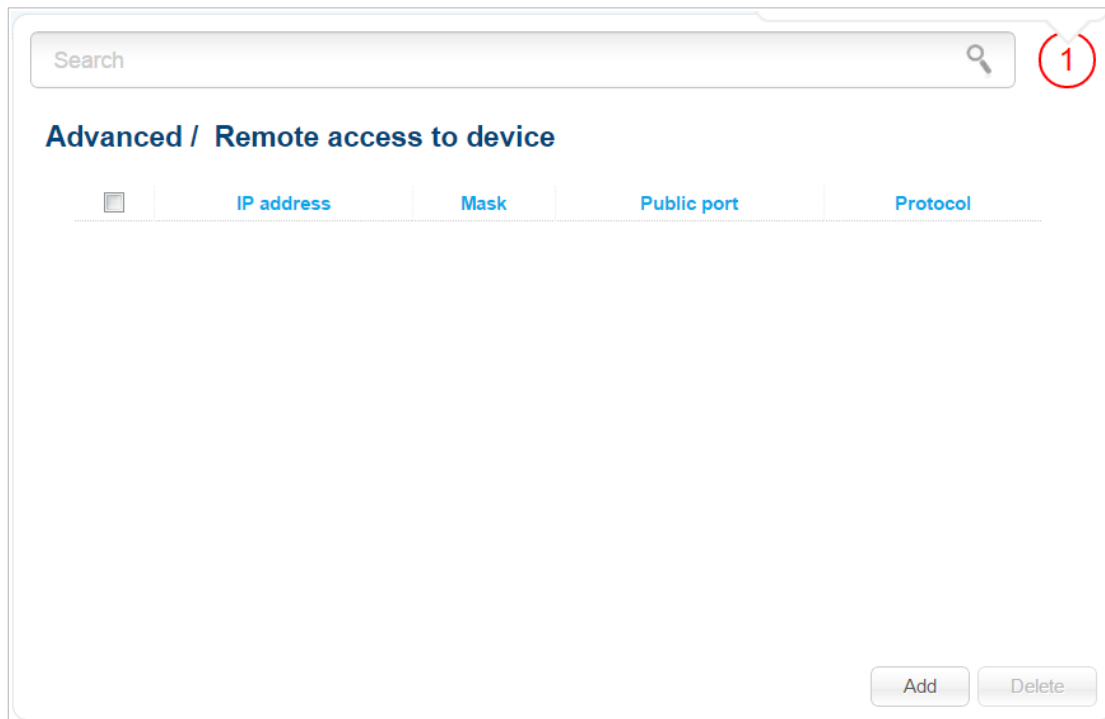
*Figure 138. The **Advanced / Remote access to device** page.*

To create a new rule, click the **Add** button.

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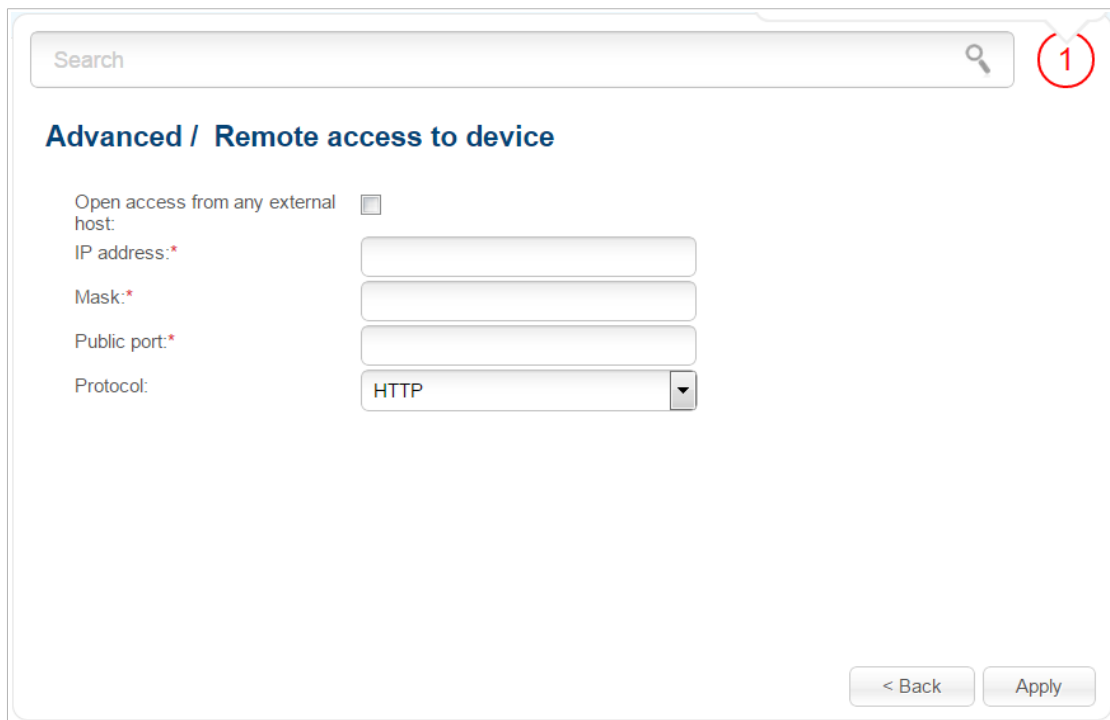
Figure 139. The page for adding a rule for remote management.

You can specify the following parameters:

Parameter	Description
Open access from any external host	Select the checkbox to allow access to the router for any host. When the checkbox is selected, the **IP version** drop-down list is displayed on the page, and the **IP address** and **Mask** fields are not available for editing.
IP version	An IP version to which the rule will be applied. Select the relevant value from the drop-down list.
IP address	A host or a subnet to which the rule is applied. You can specify an IPv4 or IPv6 address.
Mask	*For the IPv4-based network only.* The mask of the subnet.
Public port	*For the IPv4-based network only.* An external port of the router. You can specify only one port.
Protocol	The protocol available for remote management of the router.

After specifying the needed parameters, click the **Apply** button.

To edit a rule for remote access, click the link to the relevant rule. On the opened page, change the needed parameters and click the **Apply** button.

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To remove a rule for remote access, select the checkbox located to the left of the relevant line in the table and click the **Delete** button. Also you can remove a rule on the editing page.

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Miscellaneous

On the **Advanced / Miscellaneous** page, you can allow the router to use IGMP and RTSP, enable the SIP ALG function and the PPPoE/PPTP/L2TP/IPSec pass through functions.

IGMP is used for managing multicast traffic (transferring data to a group of destinations). This protocol allows using network resources for some applications, e.g., for streaming video, more efficiently.

SIP is used for creating, modifying, and terminating communication sessions. This protocol allows telephone calls via the Internet.

RTSP is used for real-time streaming multimedia data delivery. This protocol allows some applications to receive streaming audio/video from the Internet.

The PPPoE pass through function allows PPPoE clients of computers from your LAN to connect to the Internet through PPPoE connections of the router.

The PPTP pass through, L2TP pass through and IPSec pass through functions allow VPN PPTP, L2TP and IPSec traffic to pass through the router so that clients from your LAN can establish relevant connections with remote networks.
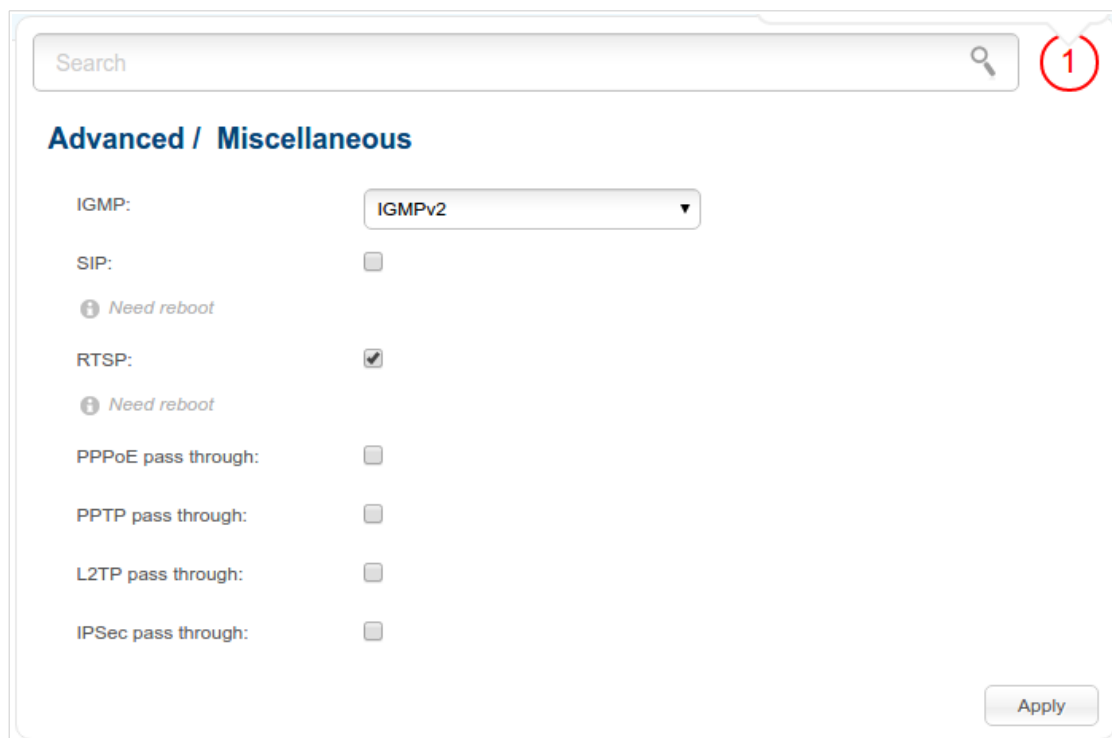
*Figure 140. The **Advanced / Miscellaneous** page.*

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The following elements are available on the page:

Parameter	Description
IGMP	Select a version of IGMP from the drop-down list to enable IGMP. Such a setting allows using the IGMP Proxy function for all WAN connections for which the **Enable IGMP Multicast** checkbox is selected. To disable IGMP, select the **Off** value from the drop-down list.
SIP	Select the checkbox to enable SIP. Such a setting allows using the SIP ALG function. This function allows VoIP traffic to pass through the NAT-enabled router.[11]
RTSP	Select the checkbox to enable RTSP. Such a setting allows managing media stream: fast forward streaming audio/video, pause and start it.
PPPoE pass through	Select the checkbox to enable the PPPoE pass through function.
PPTP pass through	Select the checkbox to enable the PPTP pass through function.
L2TP pass through	Select the checkbox to enable the L2TP pass through function.
IPSec pass through	Select the checkbox to enable the IPSec pass through function.

After specifying the needed parameters, click the **Apply** button.

---

11 On the **Net / WAN** page, create a WAN connection, on the **Advanced / Miscellaneous** page, select the **SIP** checkbox, connect the phone cable between a LAN port of the router and the IP phone. Specify SIP parameters on the IP phone and configure it to obtain an IP address automatically (as DHCP client).

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TR-069 Client

On the **Advanced / TR-069 Client** page, you can configure the router for communication with a remote Auto Configuration Server (ACS).

The TR-069 client is used for remote monitoring and management of the device.

Figure 141. The page for configuring the TR-069 client.

You can specify the following parameters:

Parameter	Description
Interface	The interface which the router uses for communication with the ACS. Leave the **automatic** value to let the device select the interface basing on the routing table or select another value if required by your ISP.

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Parameter	Description
Enable TR-069 Client	Select the checkbox to enable the TR-069 client.
Inform settings	
Enable	Select the checkbox so the router may send reports (data on the device and network statistics) to the ACS.
Interval	Specify the time period (in seconds) between sending reports.
Auto Configuration Server settings	
URL address	The URL address of the ACS provided by the ISP.
User name	The username to connect to the ACS. The username can contain digits, Latin letters (uppercase and/or lowercase), and characters available on the keyboard.
Password	The password to connect to the ACS. The password can contain digits, Latin letters (uppercase and/or lowercase), and characters available on the keyboard.
ConnectionRequest Settings	
User name	The username used by the ACS to transfer a connection request to the router. The username can contain digits, Latin letters (uppercase and/or lowercase), and characters available on the keyboard.
Password	The password used by the ACS. The password can contain digits, Latin letters (uppercase and/or lowercase), and characters available on the keyboard.
Request port	The port used by the ACS. By default, the port `8999` is specified.
Request path	The path used by the ACS.

When you have configured the parameters, click the **Apply** button.

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IPsec

On the **Advanced / IPsec** page, you can configure VPN tunnels based on IPsec protocol.

IPsec is a protocol suite for securing IP communications.
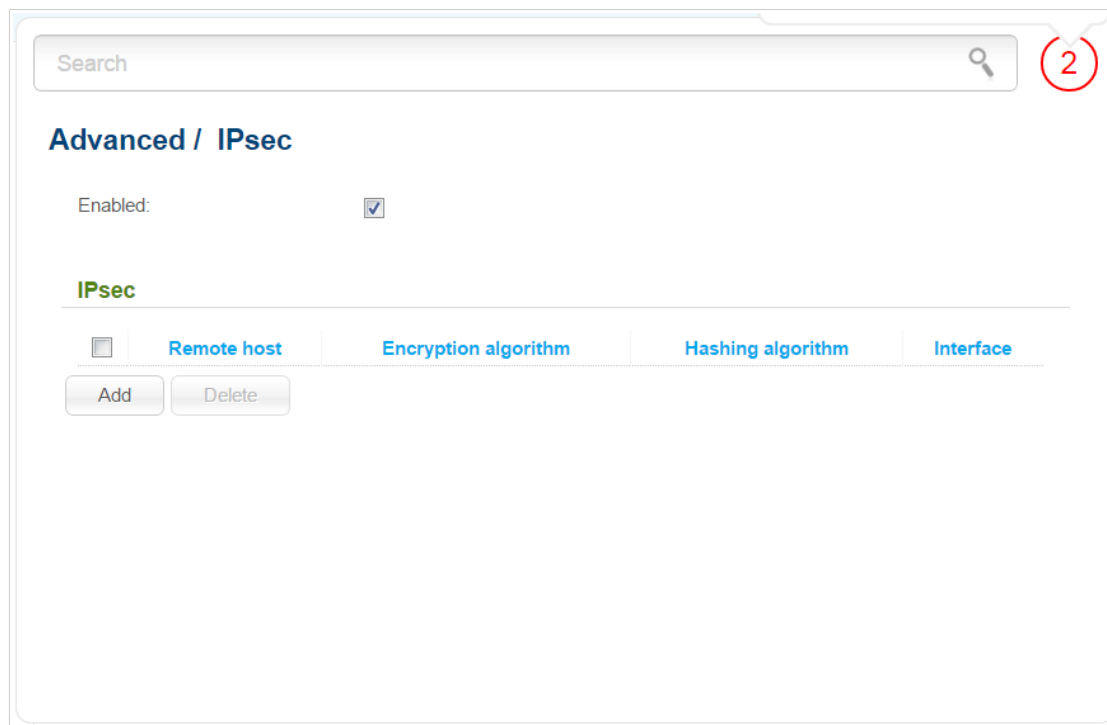
*Figure 142. The **Advanced / IPsec** page.*

To allow IPsec tunnels, select the **Enabled** checkbox. Then click the **Add** button to create a new tunnel.

> ! Setting for both devices which establish the tunnel should be the same.

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Figure 143. The page for adding an IPsec tunnel.

You can specify the following parameters:

Parameter	Description
Dynamic IPsec	Select the checkbox to allow a remote host with any public IP address to connect to the router via IPsec protocol. The checkbox can be selected for one tunnel only. Connection requests via the tunnel, for which this checkbox is selected, can be sent by a remote host only.
Remote address	A remote subnet VPN gateway IP address. The field is available, if the **Dynamic IPsec** checkbox is not selected.
Identifier	Select an identification method of a remote host from the drop-down list: **Address:** A remote host is identified by its IP address. **FQDN:** A remote host is identified by its domain name.
Local identifier value	Specify the value of the identifier.
Pre-shared key	A key for mutual authentication of the parties.

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Parameter	Description
Interface	Select a WAN connection through which the tunnel will pass. When the **<auto>** value is selected, the router uses the connection set as the default gateway.
NAT Traversal	The NAT Traversal function allows VPN traffic to pass through the NAT-enabled router. Select the **Disabled** value to disable the function**.** Select the **Enabled** value to enable the function if it is supported by a remote host. Select the **Force** value to make the function be always on even if it is not supported by a remote host.
Exchange mode	Select the mode of negotiation from the drop-down list: **Main:** The mode provides the most secure communication between the parties in the course of negotiation of the authentication procedures. **Base:** The draft negotiation mode with preliminary authentication of a host. **Aggressive:** The mode provides faster operation as it skips several stages of negotiation of the authentication procedures.
Enable DPD	Select the checkbox to enable using DPD protocol for this tunnel. Such a setting allows to check the status of a remote host: if encrypted packets exchange between the router and the remote host breaks down, the router starts sending DPD messages to the remote host. If the checkbox is not selected, the **Dead Peer Detection delay** and **Dead Peer Detection maximum fail** fields are not available for editing.
Dead Peer Detection delay	A time period (in seconds) between attempts to check the status of a remote host. By default, the value 5 is specified.
Dead Peer Detection maximum fail	A number of DPD messages that were sent to check the status of a remote host and left unanswered. By default, the value 3 is specified. If a remote host does not answer the specified number of messages, the router breaks down the tunnel connection, removes the encryption keys, and tries to activate the connection.

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Parameter	Description
TCP MSS	*Maximum Segment Size of a TCP packet.* This parameter influences the size of a TCP packet which will be sent from a remote host to the router. If the **Manual** value is selected, you can specify the parameter in the **TCP MSS Value** field. If the **Path MTU Discovery** value is selected, the parameter will be configured automatically.
TCP MSS Value	The maximum size (in bytes) of a non-fragmented packet. The field is available for editing when the **Manual** value is selected from the **TCP MSS** drop-down list.
Allow traffic between tunneled networks	Select the checkbox to allow data exchange between subnets with which IPsec tunnels have been created.

*Figure 144. The page for adding an IPsec tunnel. **The first phase / The second phase** sections.*

Parameter	Description
The first phase	
First phase encryption algorithm	Select encryption algorithm from the drop-down list.
Hashing algorithm	Select hashing algorithm from the drop-down list.

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Parameter	Description
First phase DHgroup type	A Diffie-Hellman key group for Phase 1. Select a value from the drop-down list.
IKE-SA lifetime	The lifetime of IKE-SA keys in seconds. After the specified period it is required to renegotiate the keys. The value specified in this field should exceed the value specified in the **IPsec-SA lifetime** field. Specify 0 if you don't want to limit the lifetime of the keys.
The second phase	
Second phase encryption algorithm	Select encryption algorithm from the drop-down list.
Authentication algorithm	Select authentication algorithm from the drop-down list.
Enable PFS	Select the checkbox to enable the PFS option (*Perfect Forward Secrecy*). If the checkbox is selected, a new encryption key exchange will be used for Phase 2. This option increases the security level of data transfer.
Second phase PFSgroup type	A Diffie-Hellman key group for Phase 2. Select a value from the drop-down list. The field is available, if the **Enable PFS** checkbox is selected.
IPsec-SA lifetime	The lifetime of IPsec-SA keys in seconds. After the specified period it is required to renegotiate the keys. Specify 0 if you don't want to limit the lifetime of the keys.

If you need to specify IP addresses of local and remote subnets for creating a tunnel, click the **Add** button in the **Tunneled networks** section.

*Figure 145. The page for adding an IPsec tunnel. The **Tunneled networks** section.*

In the line displayed, you can specify the following parameters:

Parameter	Description
Local subnet	A local subnet IP address and mask.
Remote subnet	A remote subnet IP address and mask.

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To edit fields in the **Tunneled networks** section, select a needed field in the relevant line of the table and change its value.

To remove IP addresses of subnets, select the checkbox located to the left of the relevant line in the table and click the **Delete** button.

Click the **Apply** button.

After clicking the **Apply** button, the page with the sections **IPsec** and **Status** opens.

To edit the parameters of an existing tunnel, in the **IPsec** section, select the relevant tunnel in the table. On the opened page, change the needed parameters and click the **Apply** button.

To remove an existing tunnel, select the checkbox located to the left of the relevant line in the table and click the **Delete** button.

In the **Status** section, the current state of an existing tunnel is displayed.

To disable VPN tunnels based on IPsec protocol, deselect the **Enabled** checkbox.

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Firewall

In this menu you can configure the firewall of the router:

- add rules for IP filtering
- create virtual servers
- configure the MAC filter.

IP Filters

On the **Firewall / IP filters** page, you can create new rules for filtering IP packets and edit or remove existing rules.
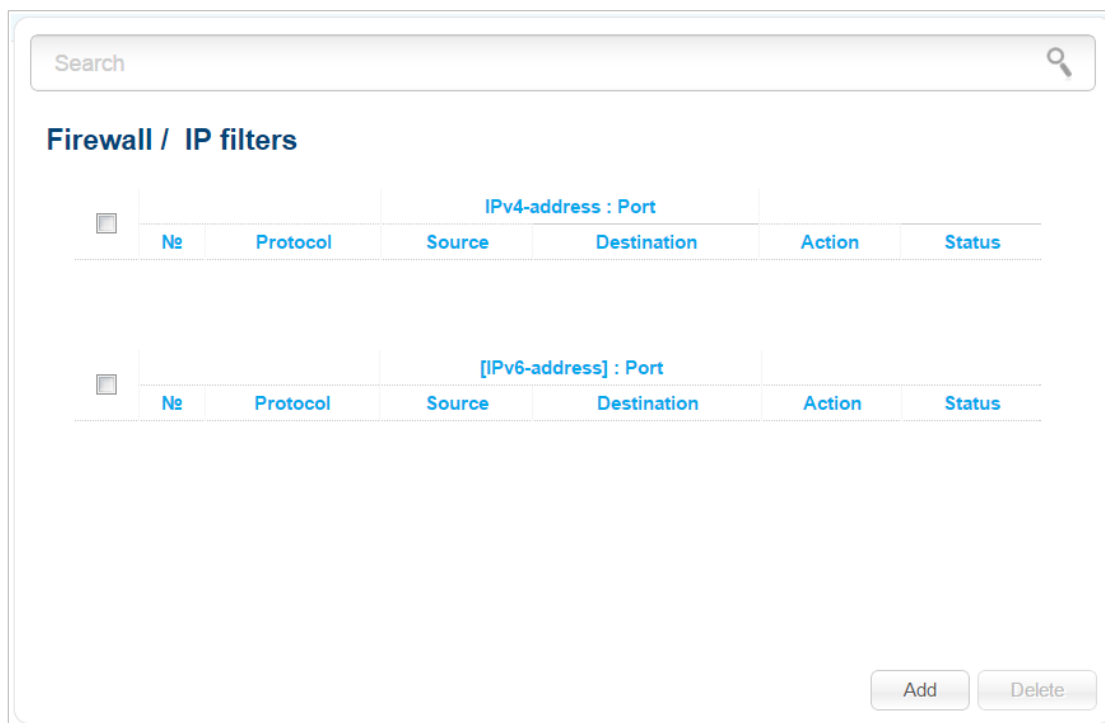
*Figure 146. The **Firewall / IP filters** page.*

To create a new rule, click the **Add** button.

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Figure 147. The page for adding a rule for IP filtering.

You can specify the following parameters:

Parameter	Description
General	
Protocol	A protocol for network packet transmission. Select a value from the drop-down list.
Action	Select an action for the rule. **Allow**: Allows packet transmission in accordance with the criteria specified by the rule. **Deny**: Denies packet transmission in accordance with the criteria specified by the rule.
Activate	If the checkbox is selected, the rule is enabled. Deselect the checkbox to disable the rule.
IP version	An IP version to which the rule will be applied. Select the relevant value from the drop-down list.

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Parameter	Description
IP Addresses	
Source IP address	The source host/subnet IP address. To choose a device connected to the router's LAN at the moment, select the relevant IP address from the drop-down list (the field will be filled in automatically).
Destination IP address	The destination host/subnet IP address. To choose a device connected to the router's LAN at the moment, select the relevant IP address from the drop-down list (the field will be filled in automatically).
Ports	
Source port	A port of the source IP address. You can specify one port, several ports separated by a comma, or a range of ports separated by a colon.
Destination port	A port of the destination IP address. You can specify one port, several ports separated by a comma, or a range of ports separated by a colon.

Click the **Apply** button.

To edit a rule for IP filtering, click the link to the relevant rule. On the opened page, change the needed parameters and click the **Apply** button.

To remove a rule, select the checkbox located to the left of the relevant line in the table and click the **Delete** button. Also you can remove a rule on the editing page.

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Virtual Servers

On the **Firewall / Virtual servers** page, you can create virtual servers for redirecting incoming Internet traffic to a specified IP address in the local area network.
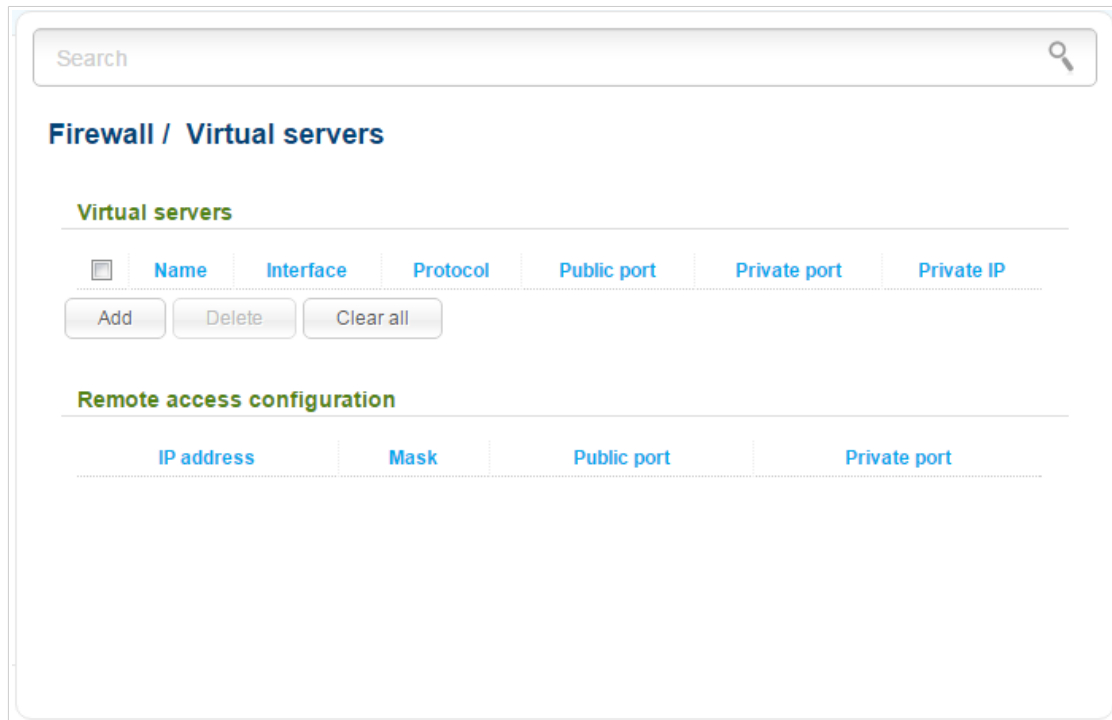

*Figure 148. The **Firewall / Virtual servers** page.*

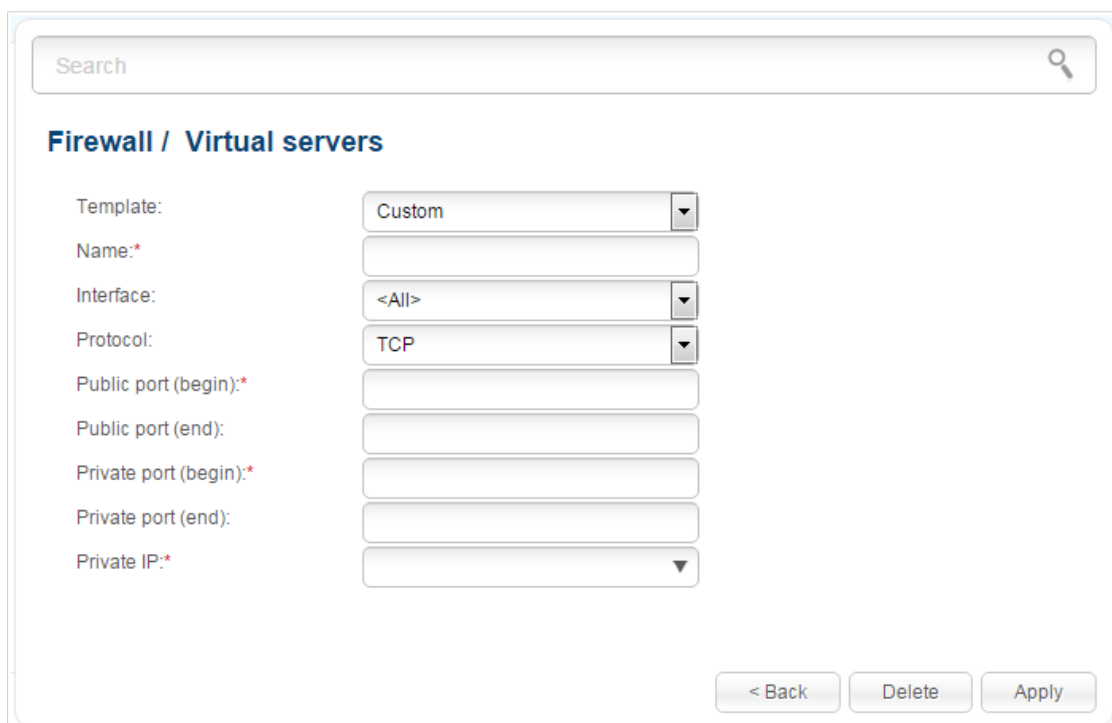To create a new virtual server, click the **Add** button.

Figure 149. The page for adding a virtual server.

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You can specify the following parameters:

Parameter	Description
Template	Select a virtual server template from the drop-down list, or select **Custom** to specify all parameters of the new virtual server manually.
Name	A name for the virtual server for easier identification. You can specify any name.
Interface	A WAN connection to which this virtual server will be assigned.
Protocol	A protocol that will be used by the new virtual server. Select a value from the drop-down list.
Public port (begin)/ Public port (end)	A port of the router from which traffic is directed to the IP address specified in the **Private IP** field. Specify the start and the end value for the port range. If you need to specify one port, enter the needed value in the **Public port (begin)** field and leave the **Public port (end)** field blank.
Private port (begin)/ Private port (end)	A port of the IP address specified in the **Private IP** field to which traffic is directed from the **Public port**. Specify the start and the end value for the port range. If you need to specify one port, enter the needed value in the **Private port (begin)** field and leave the **Private port (end)** field blank.
Private IP	The IP address of the server from the local area network. To choose a device connected to the router's LAN at the moment, select the relevant value from the drop-down list (the field will be filled in automatically).

Click the **Apply** button.

To edit the parameters of an existing server, select the relevant server in the table. On the opened page, change the needed parameters and click the **Apply** button.

To remove a server, select the checkbox located to the left of the relevant line in the table and click the **Delete** button. Also you can remove a server on the editing page.

To remove all servers from this page, click the **Clear all** button.

In the **Remote access configuration** section, rules created on the **Advanced / Remote access to device** page are displayed. If after creating virtual servers you need to edit rules for remote access, you can quickly get to the **Advanced / Remote access to device** page by clicking the link to the relevant rule.

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DMZ

A DMZ is a host or network segment located "between" internal (local) and external (global) networks. In the router, the DMZ implements the capability to transfer a request coming to a port of the router from the external network to a specified host of the internal network.

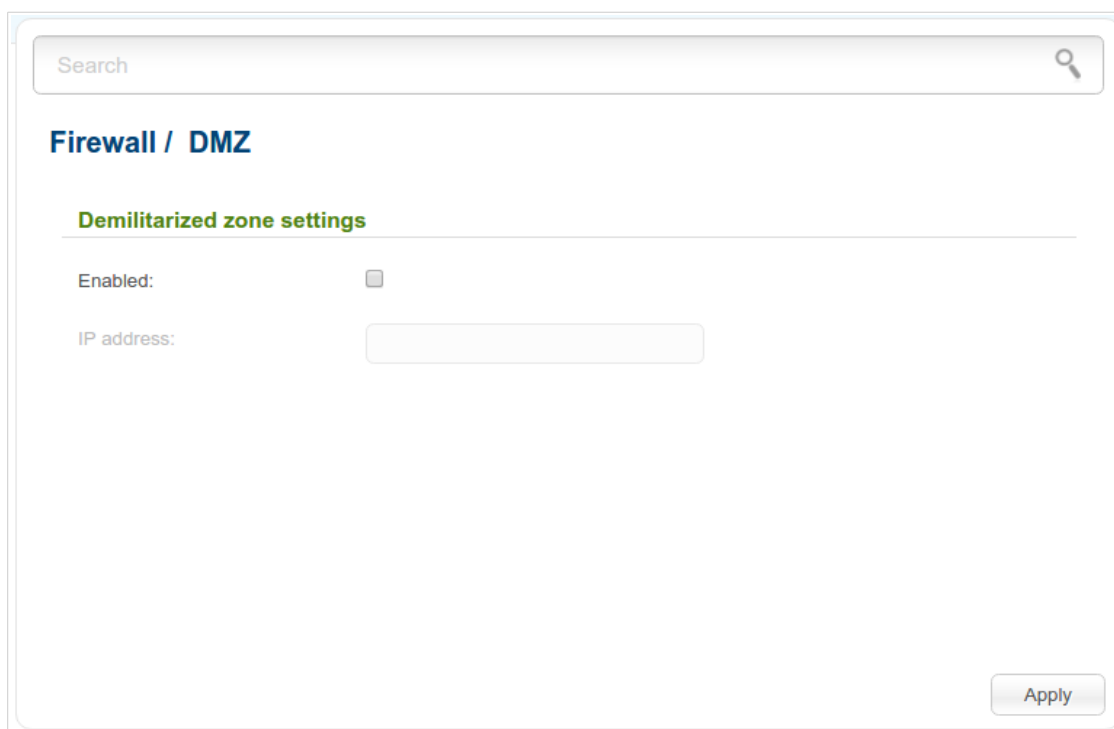On the **Firewall / DMZ** page you can specify the IP address of the DMZ host.

*Figure 150. The **Firewall / DMZ** page.*

To enable the DMZ, select the **Enabled** checkbox.

Enter the IP address of a host from your network in the **IP address** field. To choose a device connected to the router's LAN at the moment, select the relevant value from the drop-down list (the field will be filled in automatically).

Click the **Apply** button.

Note that when the DMZ is enabled, all traffic coming to a port of the WAN interface of the router is directed to the same port of the specified IP address. Also note that virtual servers have higher priority than the DMZ host. In other words, if there has been created a virtual server that directs traffic from external port 80 to a port of the device from the router's local network, then entering `http://router_WAN_IP` in the address bar, users of the external network are directed to the specified port and IP address configured for the virtual server, but not to port 80 of the device with the IP address specified on the **Firewall / DMZ** page.

To disable the DMZ, deselect the **Enabled** checkbox and click the **Apply** button.

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MAC Filter

On the **Firewall / MAC filter** page, you can configure MAC-address-based filtering for computers of the router's LAN.
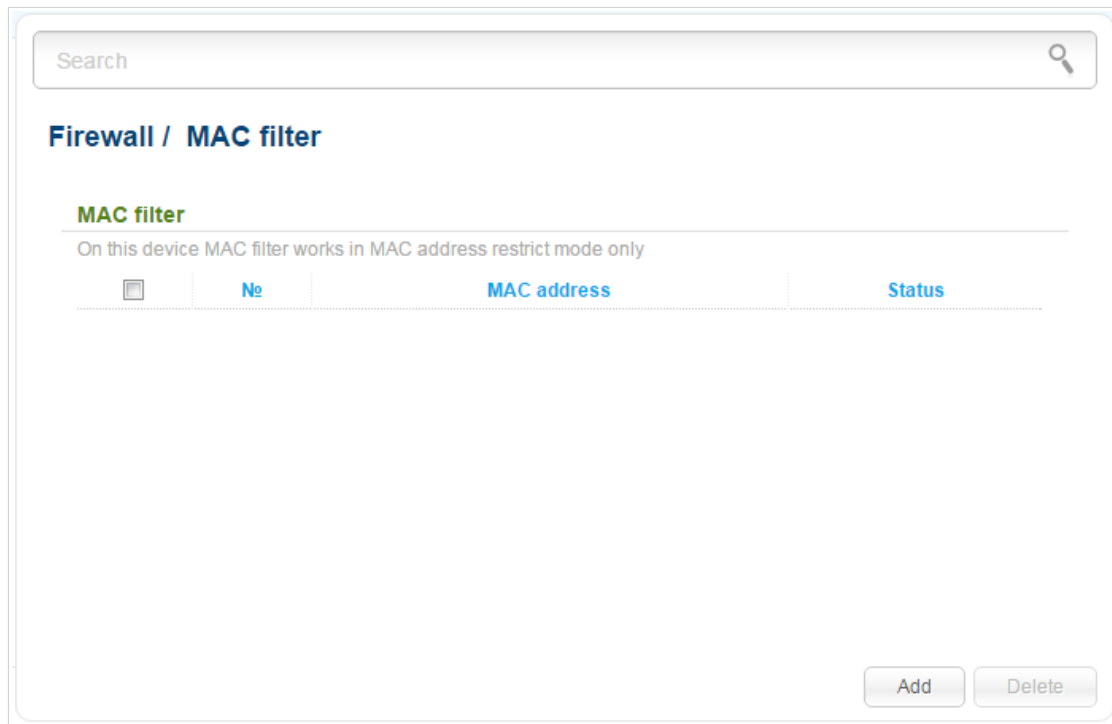

*Figure 151. The **Firewall / MAC filter** page.*

To block access to the router's network for a device, click the **Add** button.
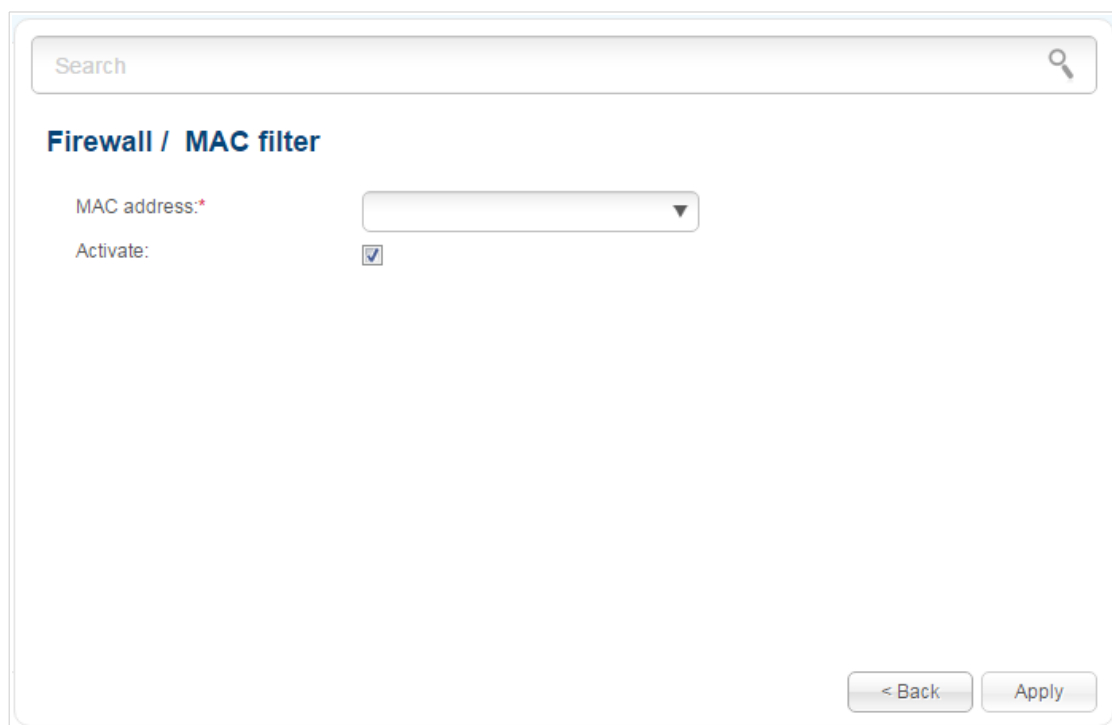

Figure 152. The page for adding a rule for the MAC filter.

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You can specify the following parameters:

Parameter	Description
MAC address	The MAC address of a device from the router's LAN. You can enter the MAC address of a device connected to the router's LAN at the moment. To do this, select the relevant device from the drop-down list (the field will be filled in automatically).
Activate	If the checkbox is selected, the rule is enabled. Deselect the checkbox to disable the rule.

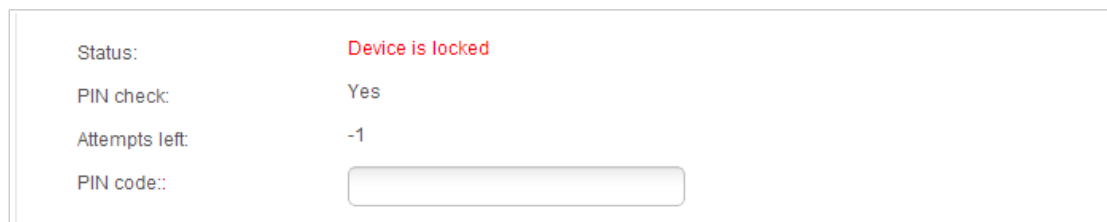After specifying the needed parameters, click the **Apply** button.

To edit a rule for filtering, click the link to the relevant rule. On the opened page, change the needed parameters and click the **Apply** button.

To remove a rule, select the checkbox located to the left of the relevant line in the table and click the **Delete** button. Also you can remove a rule on the editing page.

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3G/LTE Modem

This menu is designed to operate USB modems.

If the PIN code check for the SIM card inserted into your USB modem is not disabled, proceed to the **3G/LTE modem / PIN** section. On the opened page, enter the PIN code in the **PIN code** field and click the **Enter** button[12].

Figure 153. The page for checking the PIN code.

Some USB modems[13] have an IP address from the subnet which coincides with the router's local subnet. In this case, the relevant notification will be displayed in the web-based interface. For proper operation of a USB modem, proceed to the **Net / LAN** page and change the value of the **IP Address** field (for example, specify the `192.168.2.1` value). Wait until the router is rebooted.

---

12 For GSM USB modems and some models of LTE USB modems. For other USB modems, it is required to disable the PIN code check on the identification card prior to connecting the USB modem to the router.

13 For Huawei E3272, ZTE MF823, ZTE MF827 USB modems only.

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Settings

On the **3G/LTE modem / Settings** page, you can enable/disable the function for automatic creation of 3G/LTE WAN connection upon plugging a USB modem into the router[14].
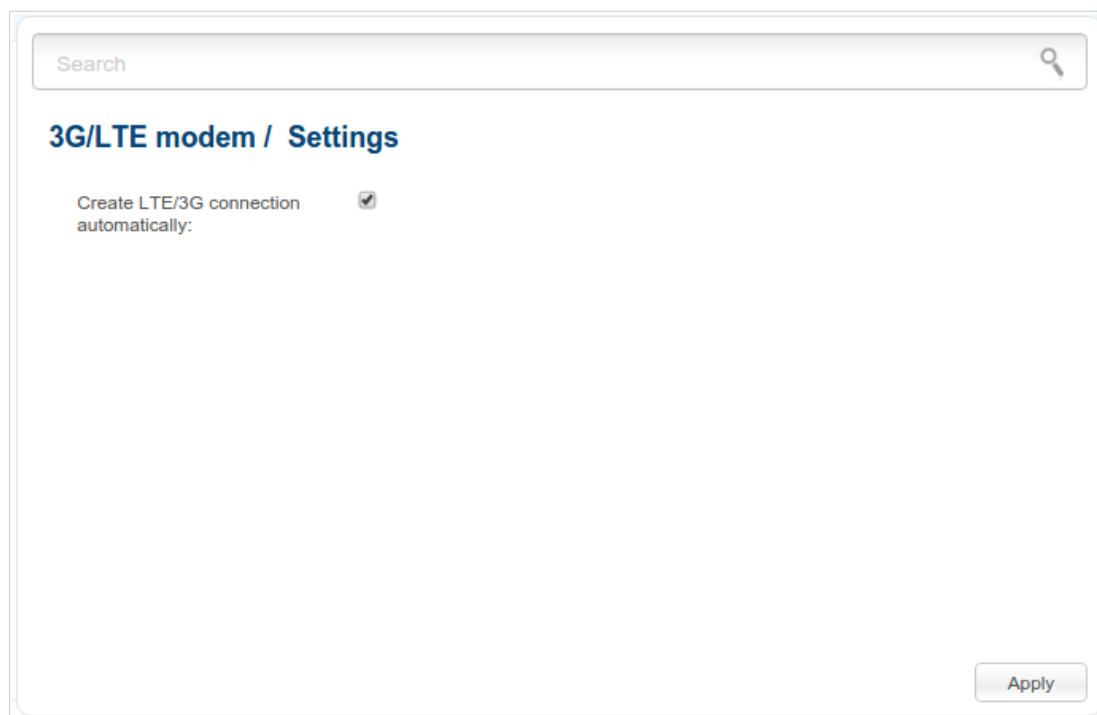

*Figure 154. The **3G/LTE modem / Settings** page.*

If the **Create LTE/3G connection automatically** checkbox is enabled and the PIN code check for the SIM card inserted into your USB modem is disabled, then an active WAN connection with default settings (for LTE modems) or the operator's settings (for GSM modems) will be automatically created when plugging a USB modem into the router. The connection will be displayed on the **Net / WAN** page.

If you don't want to use this function, deselect the **Create LTE/3G connection automatically** checkbox and click the **Apply** button.

---

14 For LTE and GSM USB modems only.

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Information

On the **3G/LTE modem / Information** page, you can view data on the USB modem connected to the router.
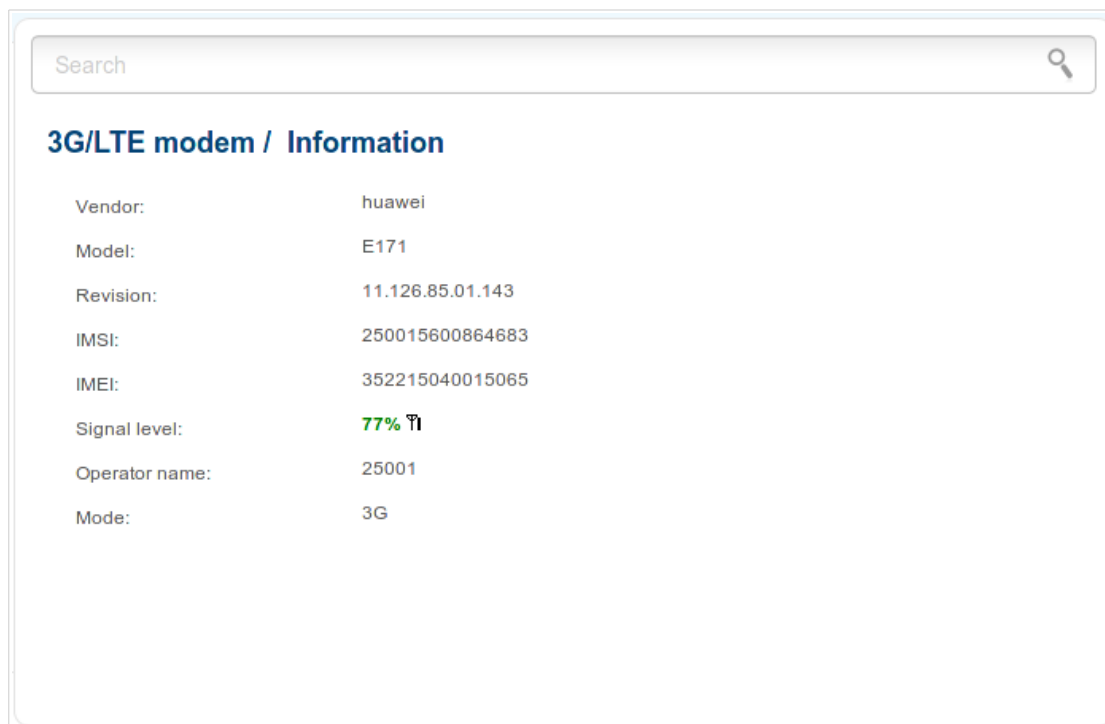

*Figure 155. The **3G/LTE modem / Information** page.*

When a USB modem is connected to the router, the following data are displayed on the page:

Parameter	Description
Vendor	The manufacturer of your USB modem.
Model	The alphanumeric code of the model of your USB modem.
Revision	The revision of the firmware of your USB modem.
IMSI	The code stored in the SIM card inserted to your USB modem.
IMEI	The code stored in the memory of the USB modem.
Signal level	The signal level at the input of the modem's receiver. The zero signal level shows that you are out of the coverage area of the selected operator's network.
Operator name	When the needed network is available, the name of the operator is displayed in this field.
Mode	A type of the network to which the USB modem is connected.

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PIN

On pages of the **3G/LTE modem / PIN** section, you can change the PIN code of the identification card inserted into your USB modem, disable or enable the check of the PIN code.

> **!** The operations presented in this section are not available for LTE and CDMA USB modems.

On the **3G/LTE modem / PIN / PIN code management** page, the current state of the identification card inserted into your USB modem is displayed in the **Status** field. If the PIN code is entered incorrectly or the PIN code is not entered when the PIN code check is enabled, the **Device is locked** value is displayed in the **Status** field. If the PIN code is entered correctly or the PIN check is disabled, the **Device is unlocked** value is displayed in the **Status** field.

If the PIN code check for the SIM card inserted into your USB modem is not disabled, the **Yes** value is displayed in the **PIN check** field. If the PIN check is disabled, the **No** value is displayed in the **PIN check** field.
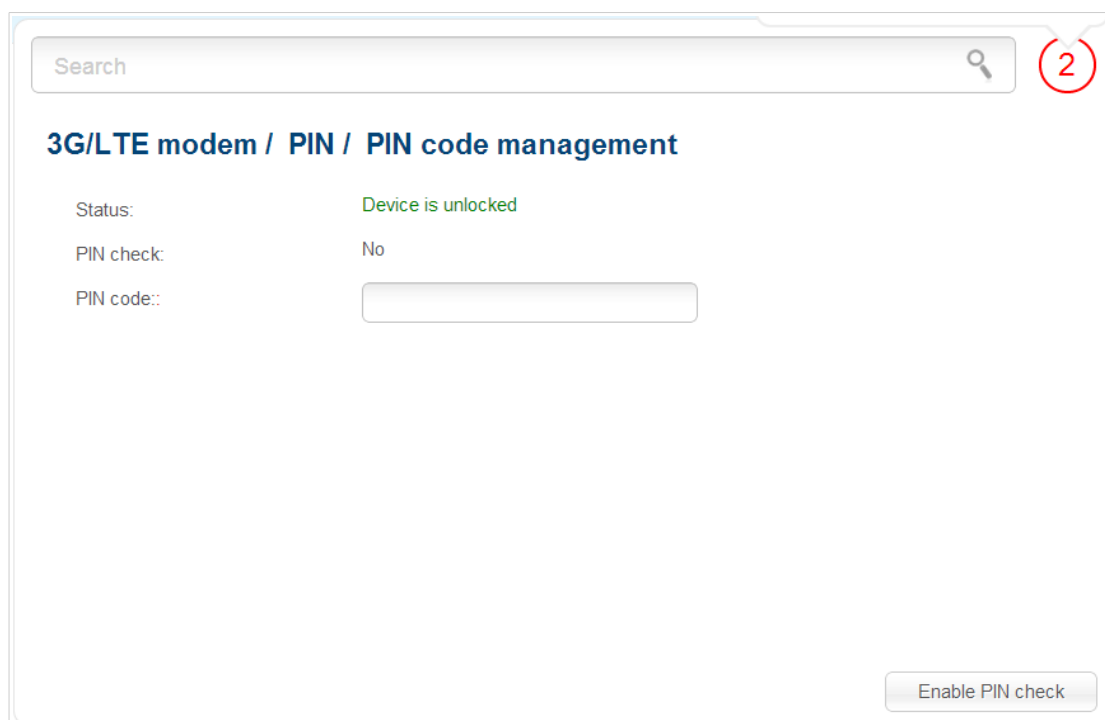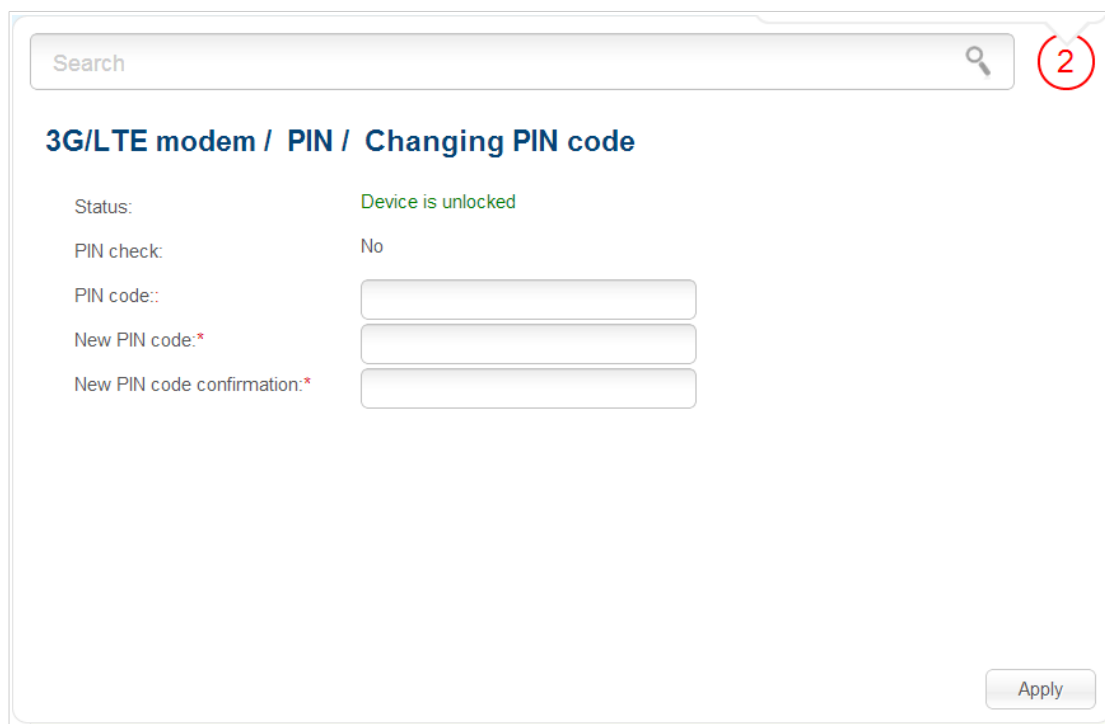

*Figure 156. The **3G/LTE modem / PIN / PIN code management** page.*

To disable the PIN code check, enter the current PIN code in the **PIN code** field and click the **Disable PIN check** button (the button is displayed if the PIN code check is enabled).

To enable the PIN code check, enter the PIN code, used before disabling the check, in the **PIN code** field and click the **Enable PIN check** button (the button is displayed if the PIN code check is disabled).

To change the PIN code, enable the PIN code check on the **3G/LTE modem / PIN / PIN code management** page and proceed to the **3G/LTE modem / PIN / Changing PIN code** page.

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Figure 157. The 3G/LTE modem / PIN / Changing PIN code page.

Enter the current code in the **PIN code** field, then enter a new code in the **New PIN code** and **New PIN code confirmation** fields and click the **Apply** button.

If upon one of the operations described above you have entered an incorrect value in the **PIN code** field three times (the number of remaining attempts is displayed in the **Attempts left** field), the identification card inserted into your USB modem is blocked.

For further use of the card, enter the PUK code in the relevant field, and then specify a new PIN code for your SIM card in the **New PIN code** field. Click the **Enter** button.

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USB Storage

This menu is designed to operate USB storages. Here you can do the following:

- view data on the connected USB storage

- view content of the connected USB storage

- configure the router as a print server

- configure SMB-based access to the USB storage

- enable the built-in FTP server of the router

- enable the built-in DLNA server of the router.

Information

On the **USB storage / Information** page, you can view data on the USB storage connected to the router.
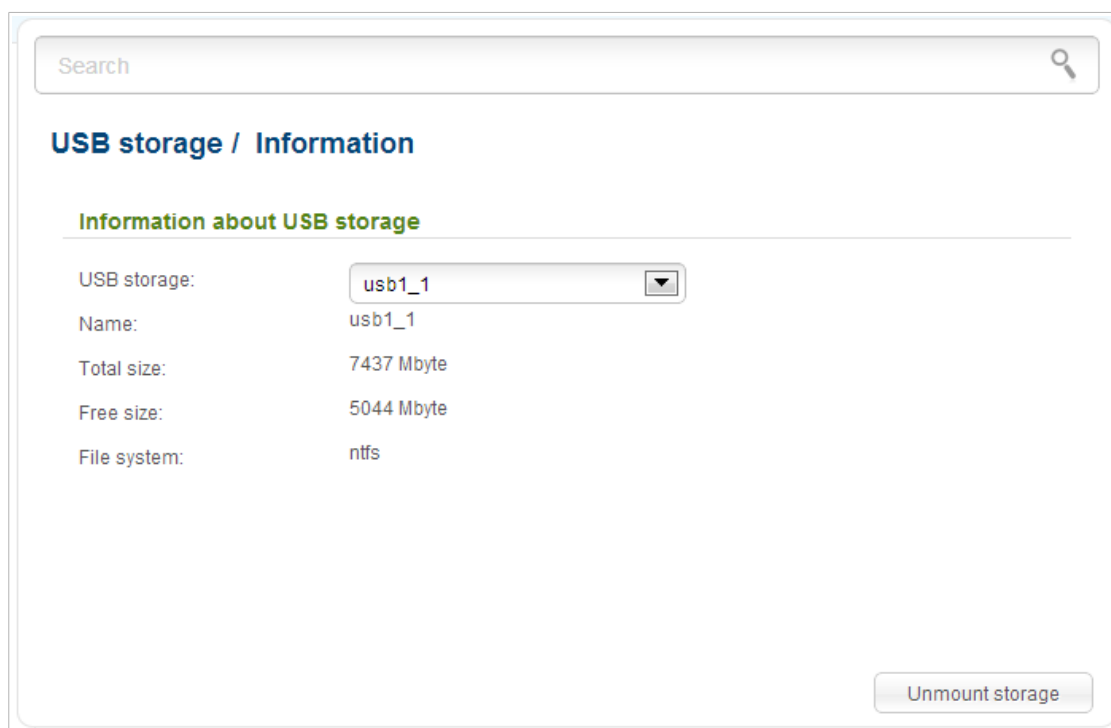

*Figure 158. The **USB storage / Information** page.*

The following data are presented on the page: the name, total and free space of the storage, and the type of its file system (supported file systems: FAT16/32, NTFS, and ext2/3).

If the USB storage is divided into volumes, several values are displayed in the **USB storage** drop-down list. Select the needed value to view data on the volume (partition) of the USB storage.

To safely disconnect the USB storage, click the **Unmount storage** button. When the **Disconnected** value is displayed on the page, remove the storage from the router.

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To disconnect one volume of the storage, select the needed value from the **USB storage** drop-down list and click the **Unmount volume** button.

Filebrowser

On the **USB storage / Filebrowser** page, you can view the content of your USB storage connected to the router and remove separate folders and files from the USB storage.
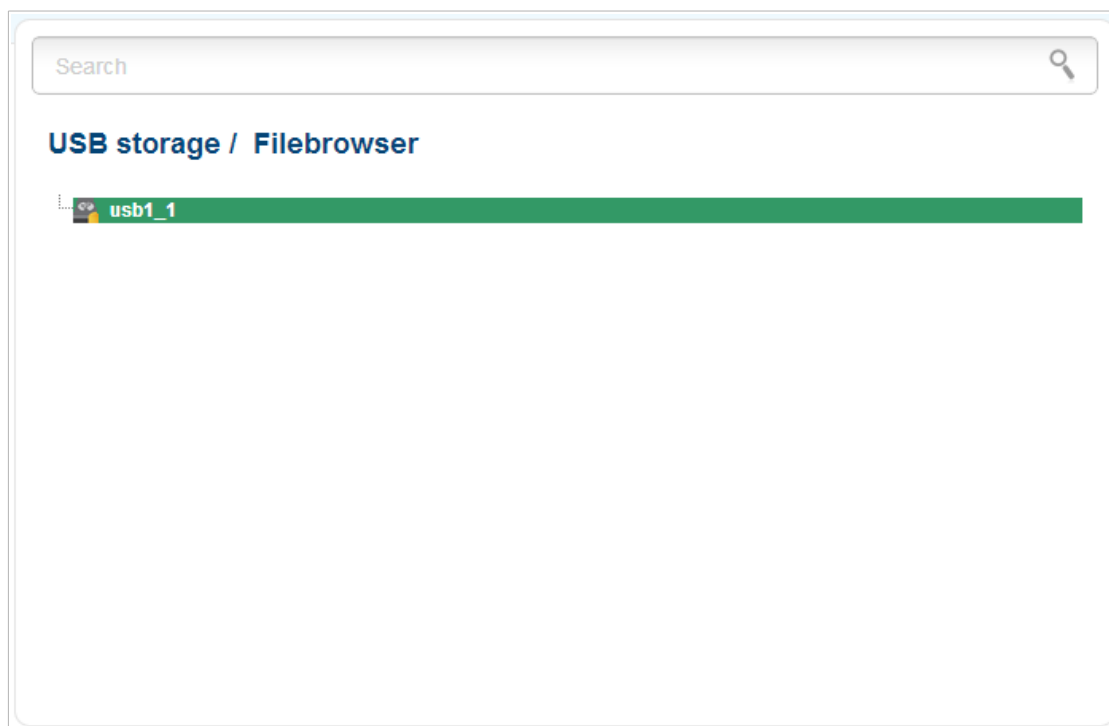

*Figure 159. The **USB storage / Filebrowser** page.*

To view the content of the USB storage, double-click the icon of the storage or storage partition. The list of folders and files will be displayed on the page.

To proceed to a folder, select it in the directory structure on the left part of the page and double-click the line corresponding to this folder.

To refresh the folder contents, right-click the line corresponding to this folder, and select the **Refresh** value in the menu displayed.

To remove a folder or file, right-click the line corresponding to this folder or file, and select the **Delete** value in the menu displayed.

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Print Server

On the **USB storage / Print-server** page, you can configure the router as a print server. Being configured in this way, the router will allow your LAN users to share the printer connected to the USB port of the router.

To connect a printer to the router, power off both devices. Connect printer to the USB port of the router, power on the printer, then power on the router.
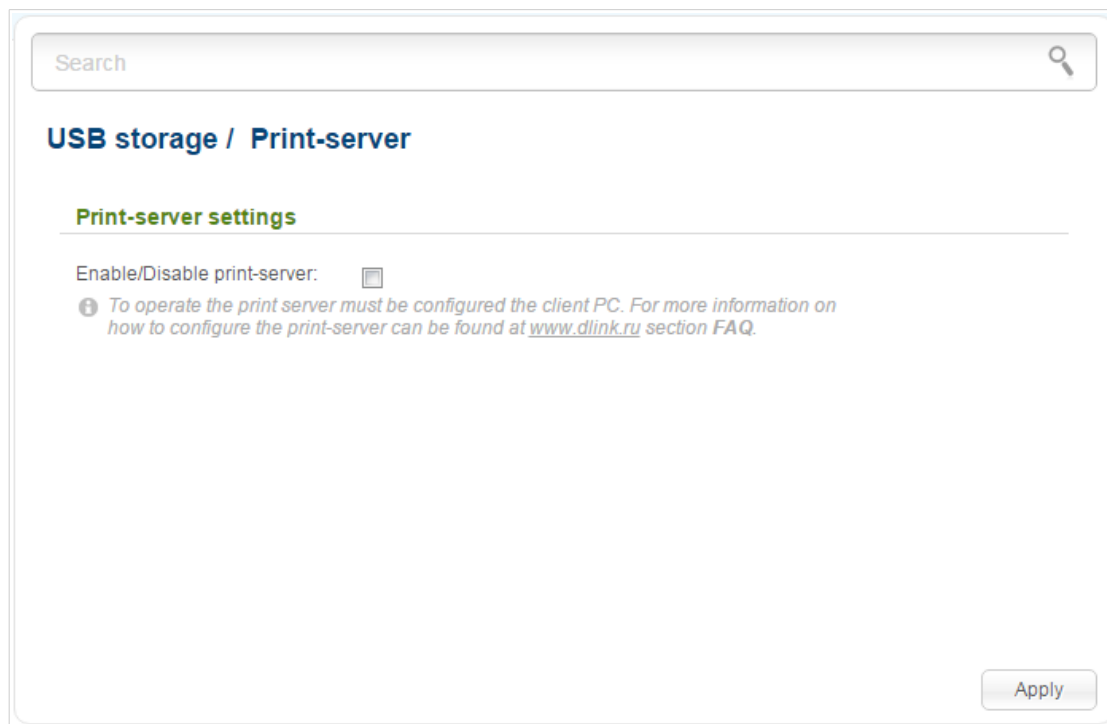
*Figure 160. The **USB storage / Print-server** page.*

To configure the router as a print server, select the **Enable/Disable print-server** checkbox and click the **Apply** button.

If you don't want to use the router as a print server, deselect the **Enable/Disable print-server** checkbox and click the **Apply** button.

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Samba

On the **USB storage / Samba** page, you can enable the built-in Samba server of the router to provide access to the USB storage for users of your LAN.

*Figure 161. The **USB storage / Samba** page.*

You can enable the Samba server only when a USB storage is connected to the router (in this case, the **Connected** value is displayed in the **USB storage** field). To enable the Samba server, select the **Enable** checkbox.

The **Anonymous login** checkbox enables anonymous access to the content of the USB storage for users of your LAN. By default, the checkbox is selected.

If you want to provide authorized access to the content of the USB storage for users of your LAN, deselect the checkbox. After applying the parameters on this page, proceed to the **System / USB users** page and create needed accounts.

In the **Workgroup** field, leave the value specified by default (`WORKGROUP`) or specify a new name of a workgroup which participants will have access to the content of the USB storage.

In the **Short description** field, you can specify an additional description for the USB storage. This value will be displayed in some operating systems. Use digits and/or Latin characters.

In the **NetBIOS** field, specify a new name of the USB storage for identification in your LAN. Use digits and/or Latin characters.

After specifying the needed parameters, click the **Apply** button.

To disable the built-in Samba server of the router, deselect the **Enable** checkbox and click the **Apply** button.

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FTP

On the **USB storage / FTP** page, you can enable the built-in FTP server of the router to provide access to the USB storage for users of your LAN.

*Figure 162. The **USB storage / FTP** page.*

You can enable the FTP server only when a USB storage is connected to the router (in this case, the **Connected** value is displayed in the **USB storage** field).

Select the **Enable** checkbox; if needed, change the router's port used by the FTP server in the **Port** field (by default, the standard port `21` is specified).

Select the **Anonymous login** checkbox to enable anonymous access to the content of the USB storage for users of your LAN. If you want to provide authorized access to the content of the USB storage for users of your LAN, leave the checkbox unselected. After applying the parameters on this page, proceed to the **System / USB Users** page and create needed accounts.

After specifying the needed parameters, click the **Apply** button.

To disable the built-in FTP server of the router, deselect the **Enable** checkbox and click the **Apply** button.

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DLNA

On the **USB storage / DLNA** page, you can enable the built-in DLNA server of the router to provide access to the USB storage for users of your LAN.

The built-in media server allows DLNA certified devices of your LAN to play multimedia content of the USB storage. Multimedia content can be played only when a USB storage is connected to the router.

*Figure 163. The **USB storage / DLNA** page.*

To enable the DLNA server, select the **Enabled** checkbox.

In the **Update interval** field, specify the time period (in seconds), at the end of which the media server updates the file list of the USB storage, or leave the value specified by default (`900`). The minimal value you can specify is 60 seconds.

In the **DLNA server name** field, specify a new name of the DLNA server for easier identification in your LAN or leave the value specified by default (`D-Link DLNA Server`). Use digits and/or Latin characters.

To allow access to the content of the USB storage for users of your LAN, click the **Add** button. In the line displayed, locate a folder. To do this, click the button located to the right of the **Path** field (the button is available if the **Path** field is selected). In the opened window, double-click the icon of the storage or storage partition, select the needed folder in the directory structure, and click the **Open** button.

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For each folder you can define the type of files which will be available for users of your LAN. To do this, select the needed type of files from the **Type** drop-down list. To share all files of a folder, select the **All** value from the **Type** drop-down list.

To undo the last changes, click the **Reset** button.

After specifying the needed parameters, click the **Apply** button.

To remove a folder from the list, select the checkbox in the line containing the relevant folder and click the **Apply** button.

To disable the built-in DLNA server of the router, deselect the **Enabled** checkbox and click the **Apply** button.

The step-by-step description of how to configure the DLNA server of the router is available on D-Link website. To access it, click the **Setting up DLNA server on the router** link in the top part of the page.

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Transmission

In this menu you can configure the built-in Transmission torrent client and manage distributing and downloading processes.

Transmission Settings

On the **Transmission / Transmission settings** page, you can configure all needed settings for the built-in Transmission client.

*Figure 164. The **Transmission / Transmission settings** page.*

You can specify the following parameters:

Parameter	Description
Enabled	Select the checkbox to activate the Transmission client.
Port	The router's port which will be used by the Transmission client.

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Parameter	Description
Torrents directory	The folder on the USB storage where files of the Transmission client will be stored.
USB-storage path	The name of the USB storage in the file system of the router. If the USB storage is divided into volumes, several values are displayed in the drop-down list.
Web-interface port	The port on which the web-based interface of the Transmission client is available.
Open files limit	The maximum number of files which clients can download simultaneously.
Peer limit	The maximum number of the service users from which you can download files.
Authorization	Select the checkbox if you want the Transmission client to request for username and password when accessing its web-based interface. Then fill in the **User name** and **Password** fields.
User name	The username to access the web-based interface of the Transmission client.
Password	The password to access the web-based interface of the Transmission client.

After specifying the needed parameters, click the **Apply** button.

In the **Web-interface page** field, the address of the web-based interface of the Transmission client is displayed. To access the web-based interface of the Transmission client, click the link.

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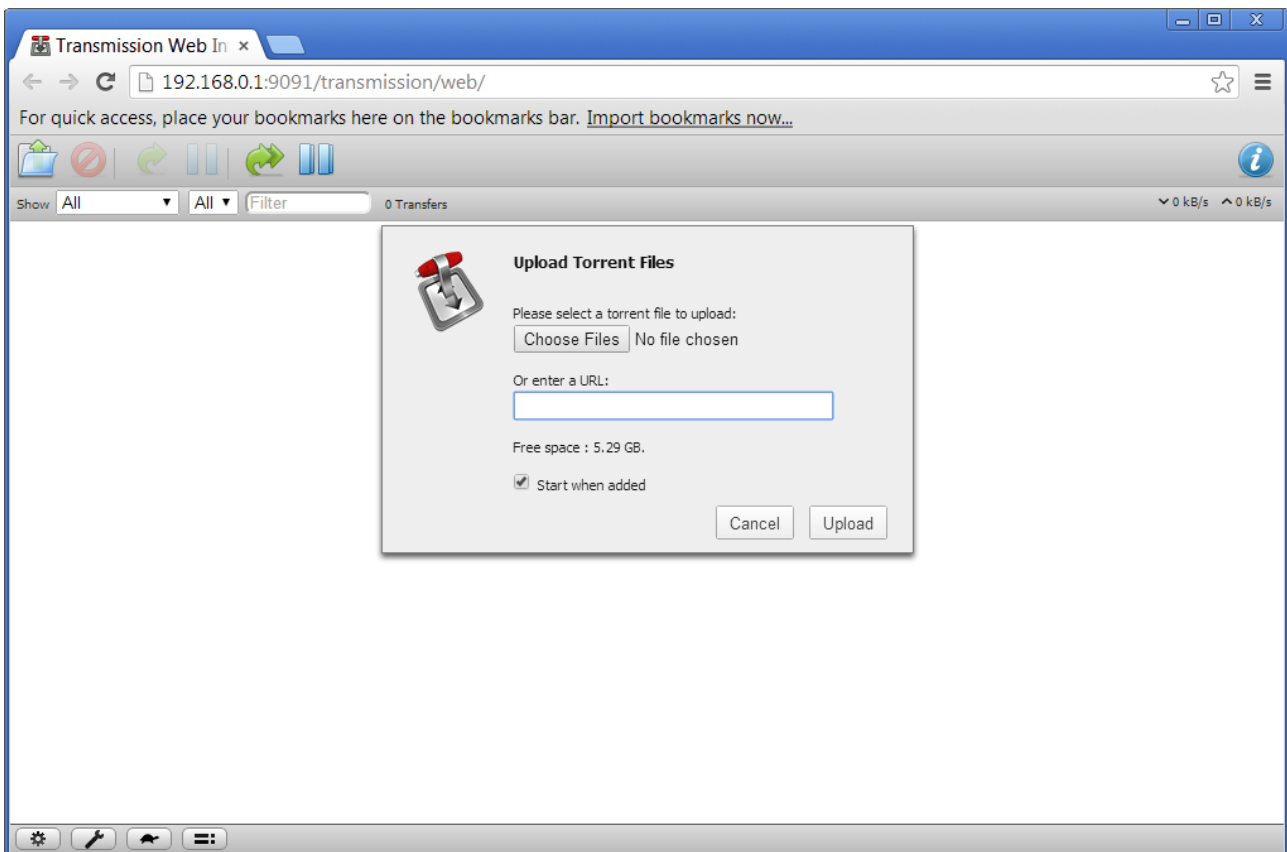
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Figure 165. The web-based interface of the Transmission torrent client.

Using the web-based interface of the built-in Transmission torrent client you can manage the process of downloading files to the USB storage connected to the router.

To add a new torrent file, click the button (**Open Torrent**) and select a file stored on your PC. Click the button **Upload** in the dialog box appeared.

To stop downloading of a file, select it in the list and click the button (**Pause Selected Torrents**).

To resume downloading of a file, select it in the list and click the button (**Start Selected Torrents**).

To view data on a file, select it in the list and click the button (**Toggle Inspector**).

To remove a file presented on the page, select it in the list and click the button (**Remove Selected Torrents**).

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Control

This menu is designed to create restrictions on access to certain web sites.

URL Filter

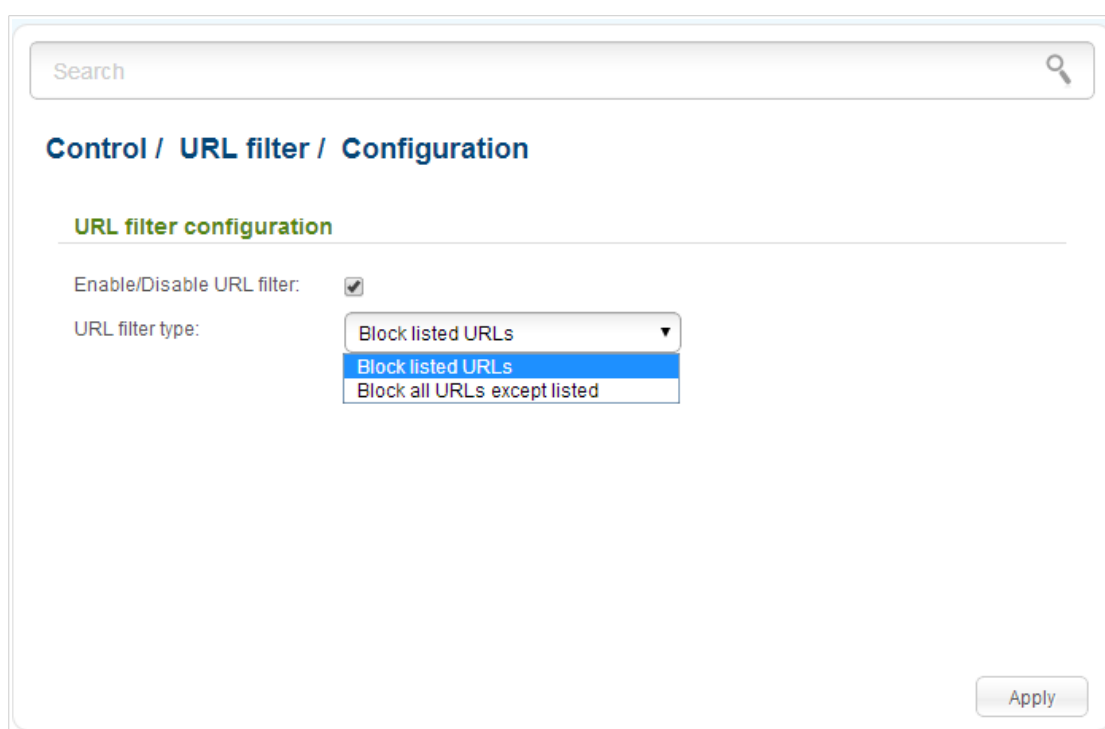On the pages of the **Control / URL filter** section, you can specify restrictions on access to certain web sites.

*Figure 166. The **Control / URL filter / Configuration** page.*

To enable the URL filter, select the **Enable/Disable URL filter** checkbox on the **Control / URL filter / Configuration** page, then select a needed mode from the **URL filter type** drop-down list:

- **Block listed URLs**: when this value is selected, the router blocks access to all addresses specified on the **Control / URL filter / Configuration** page;

- **Block all URLs except listed**: when this value is selected, the router allows access to addresses specified on the **Control / URL filter / Configuration** page and blocks access to all other web sites.

Click the **Apply** button.

To specify URL addresses to which the selected filtering will be applied, go to the **Control / URL filter / URL addresses** page.
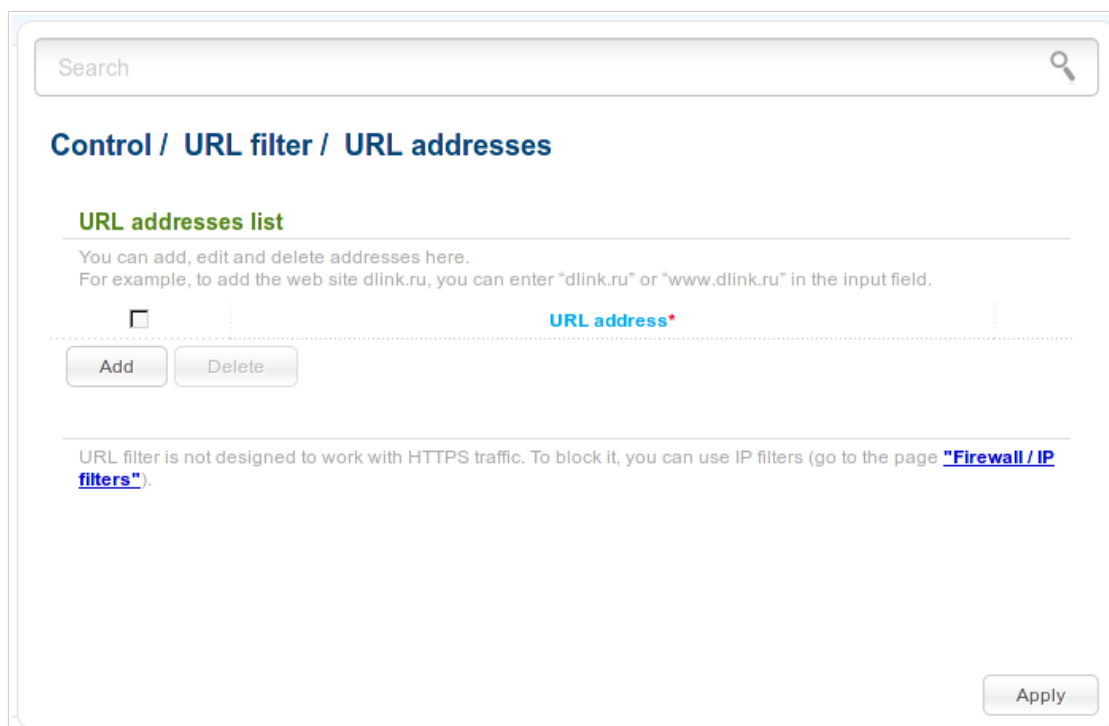
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*Figure 167. The **Control / URL filter / URL addresses** page.*

Click the **Add** button and enter an address in the field displayed. Then click the **Apply** button.

To remove an address from the list of URL addresses, select the checkbox located to the left of the relevant URL address and click the **Delete** button. Then click the **Apply** button.

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VoIP

In this menu you can configure all parameters essential for VoIP via SIP and specify all needed settings for the phone connected to the router.

Basic Settings

On the **VoIP / Basic settings** page, you can configure all needed settings for VoIP via SIP.

*Figure 168. The **VoIP / Basic settings** page. The **Basic settings** section.*

Parameter	Description
Basic settings	
Locale selection	Select your country from the drop-down list. By default, the value **RU** (Russia) is specified. This setting defines the parameters of the phone signals traditional for the specific country.
Use Domain to Register	Select the checkbox if your ISP requires to specify a domain name upon registration on the SIP proxy server. Then fill in the **SIP domain name** field.

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Parameter	Description
SIP domain name	When this field is filled in, the router registers on the SIP proxy server using the specified domain name. When the field is blank, the router uses the IP address assigned to it.
SIP proxy	An IP or URL address of the SIP proxy server.
SIP proxy port	A port of the SIP proxy server. Unless another setting is given by your ISP, it is recommended to leave the default value (`5060`).
Local port	The router's port used for exchanging data with the SIP server. Unless another setting is given by your ISP, it is recommended to leave the default value (`5060`).
SIP outbound proxy	An IP or URL address of the SIP outbound proxy server.
SIP outbound proxy port	A port of the SIP outbound proxy server. Unless another setting is given by your ISP, it is recommended to leave the default value (`5060`).
SIP registrar	An IP or URL address of the SIP registrar server. Unless another setting is given by your ISP, it is recommended to enter the address of the SIP proxy server.
SIP registrar port	A port of the SIP registrar server. Unless another setting is given by your ISP, it is recommended to leave the default value (`5060`).
Enable DHCP option 120	Select the checkbox to allow using DHCP option 120. When the option is enabled, the **SIP proxy**, **SIP registrar**, and **Backup SIP proxy address** fields are filled in automatically.
Backup SIP proxy address	An IP address of the backup SIP proxy server. The router uses the backup SIP proxy server in case of no response from the main SIP proxy server.
Bound interface name	From the drop-down list, select an interface (the local interface or an IPv4 WAN connection) which will be used for VoIP.

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*Figure 169. The **VoIP / Basic settings** page. The **SIP lines** section.*

Parameter	Description
SIP lines	
Line 1, Line 2	
Registration	Select the checkbox to register the line on the SIP proxy server.
Username	A username for this line. For most SIP proxy servers the username coincides with the phone number.
SIP ID / Number	A number for this line. The called party sees the specified value as the caller number.
Password	A user password for this line.
Line status	The status of registration on the SIP proxy server.
Phone status	The status of the phone connected to this line.

When all needed settings are configured, click the **Apply** button.

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Advanced Settings

On the **VoIP / Advanced settings** page, you can specify additional settings for VoIP via SIP.

*Figure 170. The **VoIP / Advanced settings** page. The **Basic settings** and **Fax settings** sections.*

Parameter	Description
Basic settings	
Registration expire timeout	A time period (in seconds) after which the router changes the registration status in case of no response from the SIP proxy server.
DTMF relay setting	From the drop-down list, select a mode for DTMF signal transmission. • **InBand**: transmission with voice data. • **RFC2833**: transmission in accordance with RFC2833. • **SIPInfo**: transmission in the relevant SIP messages.
Payload type	Select a data type from the drop-down list. The list is displayed if the **RFC2833** value is selected from the **DTMF relay setting** drop-down list.

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Parameter	Description
Flash type	The **FLASH** action type. • **Transfer**: switching between calls. • **SIPInfo**: sending a service message to the SIP server.
Dial delay time	The delay time before the next digit is dialed (from 3 to 9 seconds). When this time expires, the router regards that the dialing is completed and sends the request to the server. Select a needed value from the drop-down list.
Enable internal calls	Select the checkbox to allow calls from the phones connected the FXS ports pass through the router without the SIP server.
Enable NAT support	Select checkbox to allow the router to support the state of automatically forwarded ports by periodic exchange of service messages. In the **NAT support interval** field specify the time interval between service messages.
Voip dialplan setting	The dial plan for VoIP. You can specify several rules separated by the character | (vertical bar). For specifying the rules you can use the following characters: **[]** – a range of values for a certain position in the number. You can specify one rage, several ranges separated by a comma, or several digits. **X** – any digit. **.** – arbitrary number of any digits or no digits. **T#** – additional time before dialing. # is mandatory. It can take values from 0 to 9. This parameter should be the last two characters of the dial plan. When the parameter is not specified, it is assumed that T=0 for all dial plans.
Content type for flash button	If the **SIPInfo** value is selected from the **DTMF relay setting** drop-down list, you can select the type of data transferred in SIP INFO messages.
Fax settings	
Enable T38 support	Select the checkbox to allow support of the T.38 protocol. When the checkbox is selected, the **T.38** section is displayed on the page.
Enable V.152 support	Select the checkbox to allow support of the V.152 recommendation. When the checkbox is selected, the **V.152** section is displayed on the page.

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Parameter	Description
T.38	
Support SoftX3000	Select the checkbox to let the router support operation with SoftX3000.
Port	The router's port for data transfer via T.38.
Fax/Modem determination	From the drop-down list, select a mode of fax/modem signal detection.
Custom parameters	Select the checkbox to specify additional parameters for T.38.
Maximal buffer	The maximum buffer size for data received by the router.
Rate management	From the drop-down list, select a method for facsimile data transfer rate management: **Local** or **Remote**.
Maximal rate	From the drop-down list, select the maximum rate for facsimile data receipt/transfer.
Error correction mode	Select the checkbox to enable the error correction mode. When the checkbox is selected, the **ECC signal** and **ECC data** fields are available for editing.
Enable spoofing	Select the checkbox to let the router simulate facsimile data receipt/transfer in case of delays.
Duplicate number	Specify number of packet duplications.
V.152	
Payload type	Payload data type in accordance with RFC2833.
Codec type	From the drop-down list, select a codec for data transfer via V.152.

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*Figure 171. The **VoIP / Advanced settings** page. The **STUN server**, **Caller ID**, **PSTN options**, and **Network settings** sections.*

Parameter	Description
STUN server	
Enable	Select the checkbox to enable the STUN client (*Session Traversal Utilities for NAT*). The STUN client sends requests to a STUN server. On the basis of the received replies, the client allows VoIP traffic to pass through the NAT-enabled router.
Server address	An IP or URL address of a STUN server to which a connection is established.
Port	A port of a STUN server to which a connection is established. By default, the port `3478` is specified.
Caller ID	
Auto detection	Select the checkbox to activate the automatic caller identification function for the phones connected to the FXS ports of the router.
NTT	Select the checkbox to enable support of the NTT standard.
Detection mode	Select the Caller ID mode for the phones connected to the FXS ports of the router.
PSTN options	
PSTN Routing Prefix	Specify a digit code which will be used when dialing to make calls through the telephone line connected to the router's PSTN port.

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Parameter	Description
Network settings	
RTP DSCP / SIP DSCP	*Differentiated Services Codepoint.* From the relevant drop-down list, select tags for voice and signaling traffic.

*Figure 172. The **VoIP / Advanced settings** page. The **SIP lines** section.*

Parameter	Description
SIP lines	
Line 1, Line 2	
Call waiting	Select the checkbox to accept incoming calls when the line is busy. To switch between calls, press the **FLASH** key on the phone.
Forwarding	From the drop-down list, select a forwarding mode for the current line. Leave the **Off** value if forwarding is not needed.

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Parameter	Description
Call forwarding number	A number to which the router redirects calls in accordance with the mode selected from the **Forwarding** list.
Forwarding delay	A time period (in seconds) after which the router redirects calls to the number specified in the **Call forwarding number** field. The field is displayed if the **If no answer** value is selected from the **Forwarding** list.
DND	*Do Not Disturb*. Select the checkbox to reject all incoming calls (the busy tone will be heard).
Anonymous call blocking	Select the checkbox to reject calls when the calling party conceals its number.
Anonymous calling	Select the checkbox to conceal your number from the called party.
Enable pound key	Select the checkbox to speed up dialing with pressing # (the pound key) immediately after dialing numbers.
Advanced Transfer	Select the checkbox to enable call switching with help of combination of the **FLASH** key and number keys of the phone in order to organize three-party calls. Use of **FLASH** key • The Advanced Transfer function is enabled. The phone connected to this line has an incoming call in the standby mode and an outgoing call in the talk mode. It's needed to press the **FLASH** key, hear the dial tone, and then press: ◦ the number key **1** in order to end the second call and continue the first call, ◦ the number key **2** in order to put the second call on hold and continue the first call, ◦ the number key **3** to have a three-party call with the first and second speakers. • The Advanced Transfer function is not enabled. The phone connected to this line has an incoming call in the standby mode and an outgoing call in the talk mode. It's needed: ◦ to press the **FLASH** key in order to put the second call on hold and continue the first call, ◦ to hang up the receiver in order to end both calls and connect the first and second speakers to each other.

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Parameter	Description
PIN code to dial	Fill in the field to allow the user of the phone to make calls only after dialing the PIN code.
Hotline	
Enable	Select the checkbox to make the phone connected to this line dial the number specified in the **Number** field after the receiver is lifted.
Number	A number dialed by the phone connected to this line after the receiver is lifted. Also you can specify a number in the format `phone_number@IP_address` for direct IP calls bypassing the SIP proxy server.
Connect after	A time period (in seconds) between lifting up the receiver and dialing the hotline number.
Flash time	
Flash time / Flash time minimum	The maximum and minimum value for flash time (the user hangs up the receiver and lifts it again) which the router will regard as pressing the **FLASH** key.

When all needed settings are configured, click the **Apply** button.

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Audio Settings

On the **VoIP / Audio settings** page you can configure audio parameters, volume and voice codecs.

*Figure 173. The **VoIP / Audio settings** page. The **SIP lines** section.*

Parameter	Description
SIP lines	
Line 1, Line 2	
CNG	*Comfort Noise Generation.* Select the checkbox to enable the function.
CNG Amp	Signal amplitude threshold to start comfort noise generation. Specify a value from `0` to `200`. If `0` is specified, the threshold is not set.
VAD	*Voice Activity Detection.* Select the checkbox to enable the function.
VAD Amp	Signal amplitude threshold to start silence compression. Specify a value from `0` to `200`.
LEC	*Line Echo Cancellation.* Select the checkbox to enable the function.
NLP	*Nonlinear Processing.* Select the checkbox to enable the function.

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Parameter	Description
Echo Tail	Maximum echo tail length (in milliseconds).

*Figure 174. The **VoIP / Audio settings** page. The **Volume settings** and **Codecs settings** section.*

In the **Volume settings** section, you can configure the earphone volume and the microphone sensitivity for the phone connected to the FXS port of the router.

In the **Codecs settings** section, you can select voice codecs which should be used, assign priority for the codecs (the order in which they are used), and change the period of packetization (quantity of milliseconds transmitted in one packet).

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Phone Book

On the **VoIP / Phone book** page, you can fill in the phone book for devices connected to the FXS ports of the router. Select the value corresponding to the FXS port to which an analog phone is connected from the **Line** drop-down list and specify the needed values.

*Figure 175. The **VoIP / Phone book** page.*

In the **Speed dial** section, you can assign phone numbers to the digital keys of the phone set connected to this line. To do this, left-click the **Number** column of the line corresponding to the key of the phone set and enter the needed number. Also you can specify a number in the format `phone_number@IP_address` for direct IP calls bypassing the SIP proxy server.

To change or delete the number assigned to the digital key, left-click in the **Number** column of the relevant line, then edit or remove the value of this field.

To use a number specified in the **Speed dial** section, press # (the pound key) on the phone set, then press the relevant digital key.

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In the **Abbreviated dial** section, you can assign short numbers (as a rule, such numbers consist of two or three digits) to frequently used phone numbers. To do this, left-click the **Source number** column of the blank line and enter a short number, then left-click the **Destination number** column of the same line and enter the actual phone number. Also in the **Destination number** field you can specify a number in the format `phone_number@IP_address` for direct IP calls bypassing the SIP proxy server.

To change a short or actual phone number, left-click the **Source number** column (for editing the short number) of **Destination number** column (for editing the actual number) of the relevant line and make the needed changes.

To use a number specified in the **Abbreviated dial** section, dial the needed short number on the phone set.

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Call Feature Code

On the **VoIP / Call feature code** page, you can allow changing some parameters of the router directly from the phone sets connected to the FXS ports of the router.

*Figure 176. The **VoIP / Call feature code** page.*

The following call feature codes are available:

Parameter	Description
Disable Call Waiting	Disables the call waiting function.
Enable Call Waiting	Enables the call waiting function.
Disable Do Not Disturb	Disables rejection of incoming calls.
Enable Do Not Disturb	Enables rejection of all incoming calls (the busy tone will be heard).
Enable Call Forwarding No Answer	Enables call forwarding when this line gives no reply.
Disable Call Forwarding No Answer	Disables call forwarding when this line gives no reply.
Enable Call Forwarding On Busy	Enables call forwarding when this line is busy.

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Parameter	Description
Disable Call Forwarding On Busy	Disables call forwarding when this line is busy.
Enable Unconditional forwarding	Enables forwarding for all calls.
Disable Unconditional forwarding	Disables forwarding for all calls.
Disable Hot Line	Disables the hotline.
Enable Hot Line	Enables the hotline.
Enable alarm clock	Enables the alarm clock for the time specified for this line.
Disable alarm clock	Disables the alarm clock.

In order to enable or disable a code for the phone connected to a FXS port of the router, select or deselect the checkbox in the code string of the **Enable code** column of the relevant router's line and click the **Apply** button.

In order to inform the SIP server where the phone connected to a FXS port of the router is registered that a code is enabled or disabled, select the checkbox in the code string of the **Sent to server** column of the relevant router's line and click the **Apply** button. Is the server should not be informed, deselect the checkbox and click the **Apply** button.

The **VSC** column displays the values of the codes. If a code ends with ***** (the asterisk key), further you can enter a value for the function in use (a number for call forwarding or time for the alarm clock). For example, the code for enabling the alarm clock: ***55*HHMM#**, where **HHMM** is time in 24-hour format.

To change a code, left-click the **VSC** column of the relevant code string, enter the needed value, and click the **Apply** button.

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Alarm Clock

On the **VoIP / Alarm clock** page, you can configure the phones connected to the FXS ports of the router as alarm clocks.

*Figure 177. The **VoIP / Alarm clock** page.*

Select the **Enable** checkbox in the **Line 1** and/or **Line 2** section. Then specify the time at which the phone should ring in the **Hour** and **Minutes** fields. In the **Ring time** field, specify the signal duration. Then click the **Save** button.

> When the router is powered off or rebooted, the system time is reset to the default value. If you have set automatic synchronization for the system time, the internal clock of the device will be configured after connecting to the Internet. If you have set the system time manually, you need to set the time and date again.

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Security

On the **VoIP / Security** page, you can configure filtering rules for incoming calls of the phones connected to the FXS ports of the router.

*Figure 178. The **VoIP / Security** page.*

From the **Filtering policy** drop-down list, select a needed value.

- **White list**: the router accepts incoming calls (INVITE packets) only from IP addresses or domains specified in the **White list** section;
- **Black list**: the router accepts incoming calls (INVITE packets) from any IP addresses or domains except for those specified in the **Black list** section;
- **Filtering is turned off**: filtering by IP addresses or domain names is not performed.

To add an IP address or domain name, click the **Add** button in the **White list** or **Black list** section correspondingly. In the line displayed, specify the needed value.

After specifying the needed parameters, click the **Apply** button.

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System
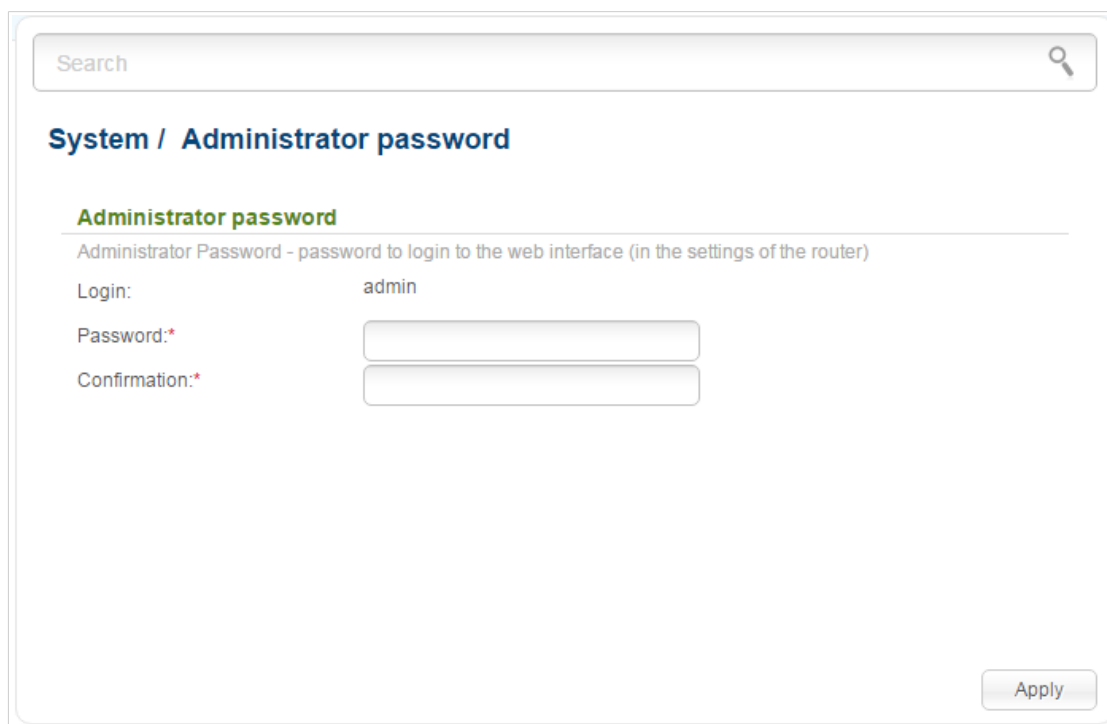
In this menu you can do the following:

- change the password used to access the router's settings

- save the current settings to the non-volatile memory

- reboot the router

- create a backup of the router's configuration

- restore the router's configuration from a previously saved file

- restore the factory default settings

- view the system log; configure sending the system log to a remote host or USB storage

- update the firmware of the router

- configure automatic notification on new firmware version

- configure automatic synchronization of the system time or manually configure the date and time for the router

- check availability of a host on the Internet through the web-based interface of the router

- trace the route to a host

- allow or forbid access to the router via TELNET

- create accounts for users to allow access to the content of the USB storage

- configure the interface parameters.

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Administrator Password

On the **System / Administrator password** page, you can change the password for the administrator account used to access the web-based interface of the router and to access the device settings via TELNET.

> **!** For security reasons, it is strongly recommended to change the administrator password upon initial configuration of the router.

Figure 179. The page for modifying the administrator password.

Enter the new password in the **Password** and **Confirmation** fields and click the **Apply** button.

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Configuration

On the **System / Configuration** page, you can reboot the device, save the changed settings to the non-volatile memory, restore the factory defaults, backup the current configuration, or restore the router's configuration from a previously created file.
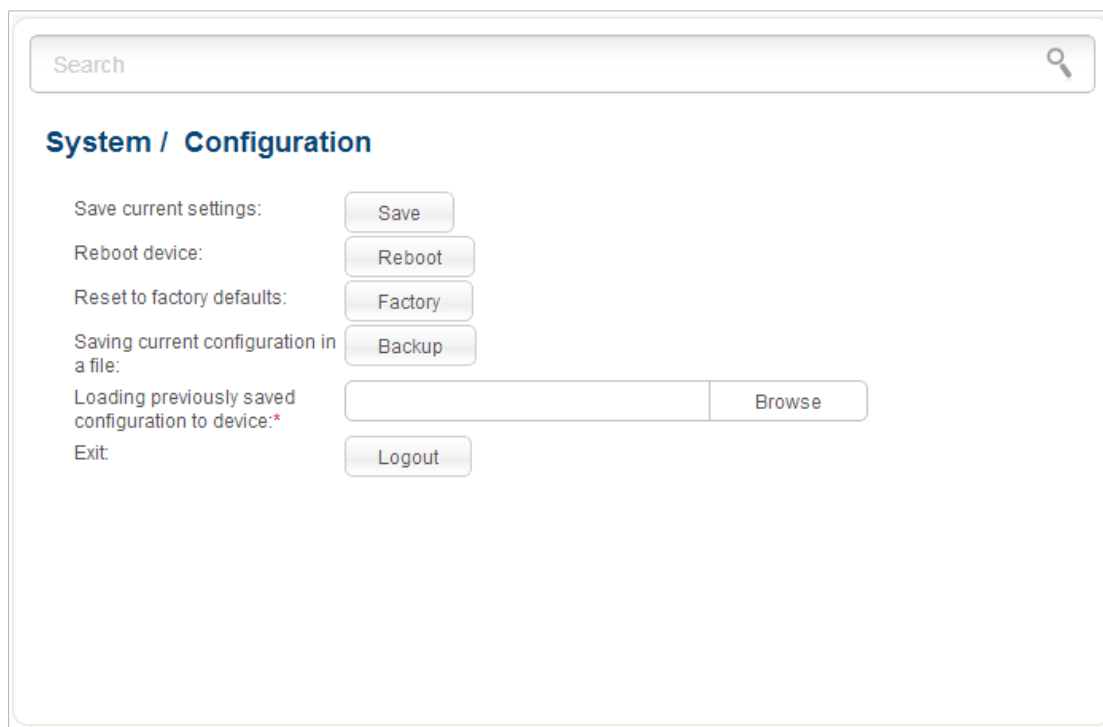

*Figure 180. The **System / Configuration** page.*

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The following buttons are available on the page:

Control	Description
Save	Click the button to save settings to the non-volatile memory. Please, save settings every time you change the router's parameters. Otherwise the changes will be lost upon hardware reboot of the router.
Reboot	Click the button to reboot the device. All unsaved changes will be lost after the device's reboot.
Factory	Click the button to restore the factory default settings. Also you can restore the factory defaults via the hardware **RESET** button (see the *Back Panel* section, page 16).
Backup	Click the button to save the configuration (all settings of the router) to your PC. The configuration backup will be stored in the download location of your web browser.
Browse	Click the button and follow the dialog box appeared to select a previously saved configuration file (all settings of the router) located on your PC and upload it.
Logout	Click the button to exit the web-based interface.

Actions of the **Save**, **Reboot**, **Factory**, **Backup**, and **Logout** buttons also can be performed via the top-page menu displayed when the mouse pointer is over the **System** caption.

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System Log

On the **System / System log / Configuration** page, you can set the system log options and configure sending the system log to a remote host and/or a USB storage connected to the router.

*Figure 181. The **System / System log / Configuration** page.*

To enable logging of the system events, select the **Logging** checkbox. Then specify the needed parameters.

Parameter	Description
Logging type	Select a type of logging from the drop-down list. • **Local**: the system log is stored in the router's memory (and displayed on the **System / System log / Log** page). When this value is selected, the **Server** and **Port** fields are not displayed. • **Remote**: the system log is sent to the remote host specified in the **Server** field. • **Local and remote**: the system log is stored in the router's memory (and displayed on the **System / System log / Log** page) and sent to the remote host specified in the **Server** field.

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Parameter	Description
Logging level	Select a type of messages and alerts/notifications to be logged.
Server	The IP or URL address of the host from the local or global network, to which the system log will be sent.
Port	A port of the host specified in the **Server** field. By default, the value `514` is specified.
Settings record to external media	
Save a log to an external storage	Select the checkbox so that the device could send the system log to the USB storage connected to it.
Max file size before rotation	The maximum size (in kilobytes) of one system log file.
Number rotated logs to keep	The maximum number of files allowed to be recorded on the USB storage. When this number is exceeded, the file containing the oldest data will be deleted.
Path	Click the button located to the right of the field in order to locate the folder where system log files will be stored.
File name	A name for system log files.

After specifying the needed parameters, click the **Apply** button.

To disable logging of the system events, deselect the **Logging** checkbox and click the **Apply** button.

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On the **System / System log / Log** page, the events specified in the **Logging level** list are displayed.
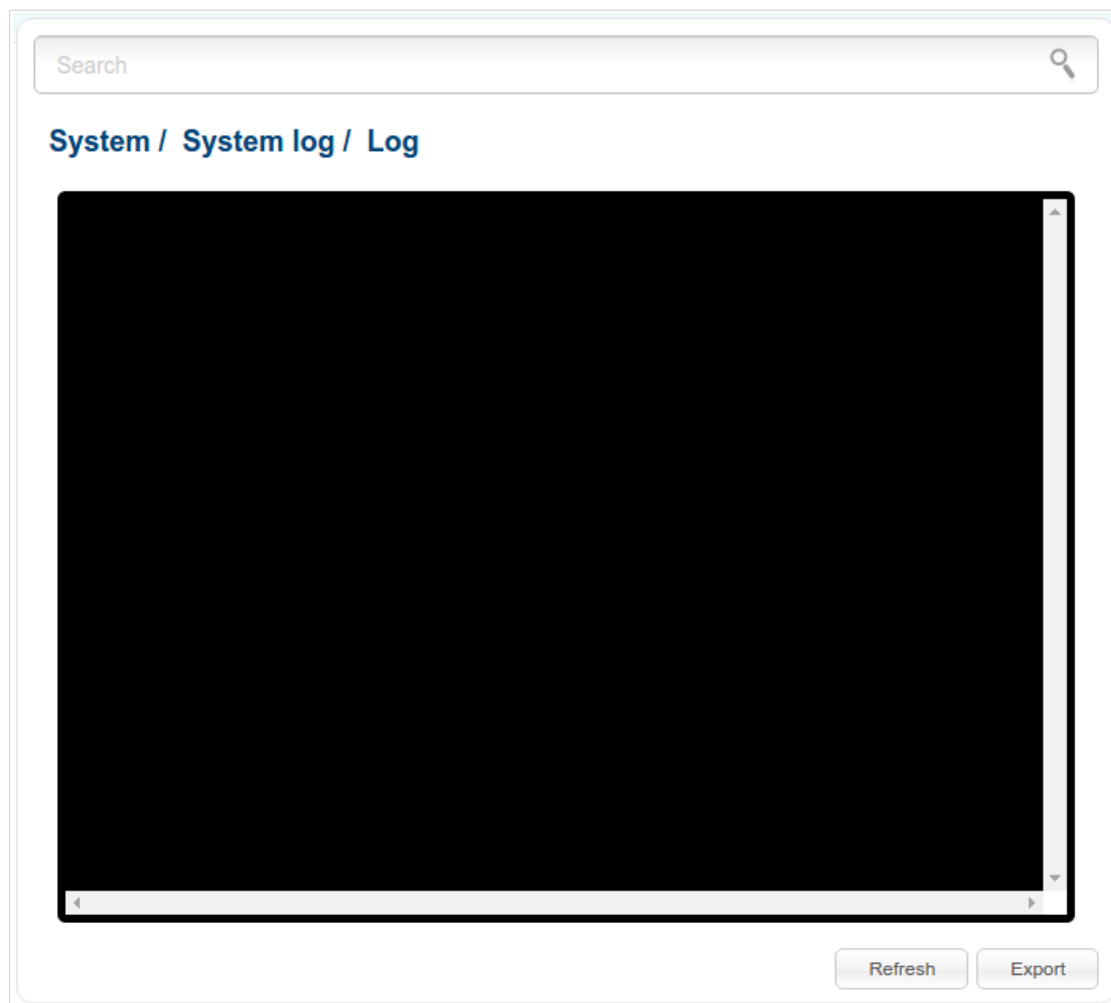

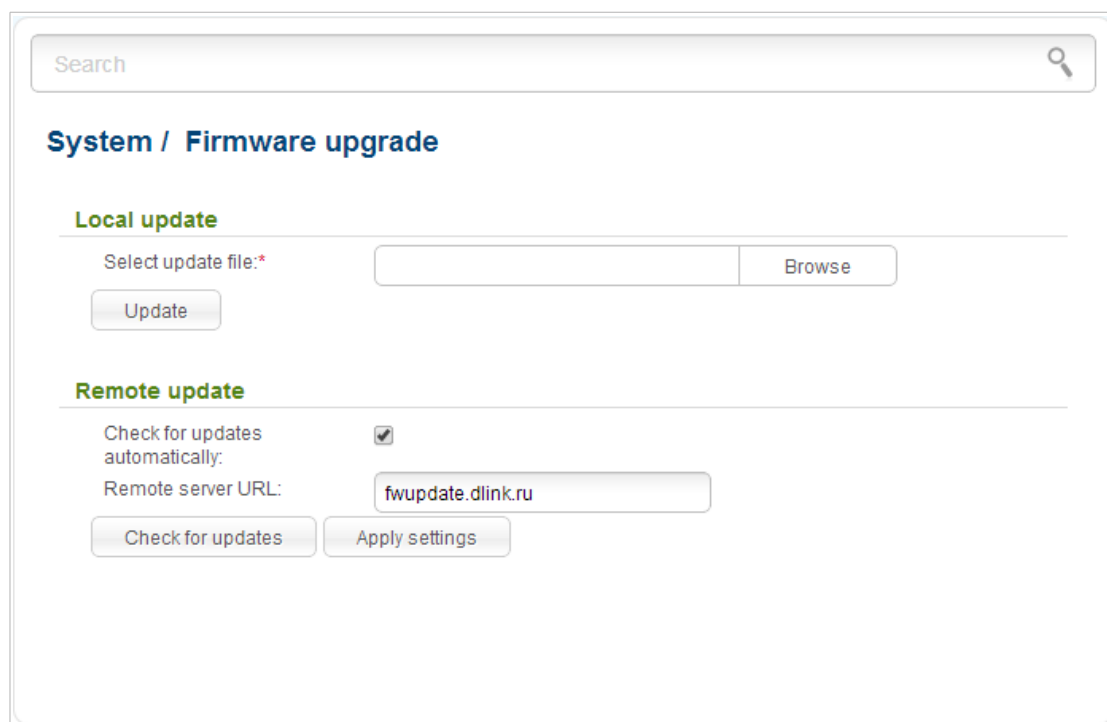*Figure 182. The **System / System log / Log** page.*

To view the latest system events, click the **Refresh** button.

To save the system log to your PC, click the **Export** button and follow the dialog box appeared.

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Firmware Upgrade

On the **System / Firmware upgrade** page, you can upgrade the firmware of the router and configure the automatic check for updates of the router's firmware.

! Upgrade the firmware only when the router is connected to your PC via a wired connection.

*Figure 183. The **System / Firmware upgrade** page.*

The current version of the router's firmware is displayed next the D-Link logo in the top left corner of the page.

By default, the automatic check for the router's firmware updates is enabled. If a firmware update is available, a notification will be displayed in the top right corner of the page.

To disable the automatic check for firmware updates, in the **Remote update** section, deselect the **Check for updates automatically** checkbox and click the **Apply settings** button.

To enable the automatic check for firmware updates, in the **Remote update** section, select the **Check for updates automatically** checkbox and click the **Apply settings** button. By default, in the **Remote server URL** field, the D-Link update server address (`fwupdate.dlink.ru`) is specified.

You can upgrade the firmware of the router locally (from the hard drive of your PC) or remotely (from the update server).

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Local Update

> ! Attention! Do not turn off the router before the firmware upgrade is completed. This may cause the device breakdown.

To update the firmware of the router locally, follow the next steps:

1. Download a new version of the firmware from www.dlink.ru.

2. Click the **Browse** button on the **System / Firmware upgrade** page to locate the new firmware file.

3. Click the **Update** button to upgrade the firmware of the router.

4. Wait until the router is rebooted (about one and a half or two minutes).

5. Log into the web-based interface using the login (`admin`) and the current password.

After the upgrade is completed, the new version of the firmware will be displayed in the top left corner of the page.

If after updating the firmware the router doesn't work correctly, please restore the factory default settings. To do this, place the mouse pointer over the **System** caption in the top left corner of the page and click the (**Reset to factory**) icon. Wait until the router is rebooted.

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Remote Update

> **!** Attention! Do not turn off the router before the firmware upgrade is completed. This may cause the device breakdown.

To update the firmware of the router remotely, follow the next steps:

1. On the **System / Firmware upgrade** page, in the **Remote update** section, click the **Check for updates** button to check if a newer firmware version exists.

2. Click the **OK** button in the window displayed to upgrade the firmware of the router. Also you can upgrade the firmware of the router by clicking the **Remote update** button (the button is displayed if a newer version of the firmware is available).

3. Wait until the router is rebooted (about one and a half or two minutes).

4. Log into the web-based interface using the login (`admin`) and the current password.

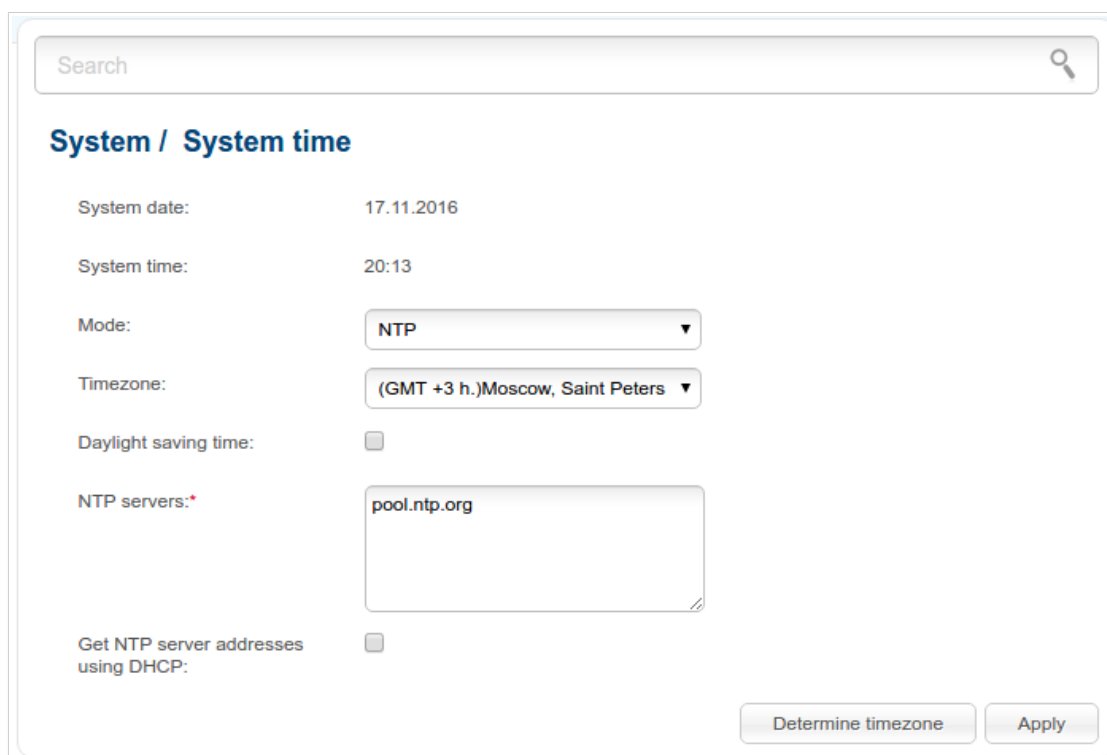After the upgrade is completed, the new version of the firmware will be displayed in the top left corner of the page.

If after updating the firmware the router doesn't work correctly, please restore the factory default settings. To do this, place the mouse pointer over the **System** caption in the top left corner of the page and click the (**Reset to factory**) icon. Wait until the router is rebooted.

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System Time

On the **System / System time** page, you can manually set the time and date of the router or configure automatic synchronization of the system time with a time server on the Internet.

*Figure 184. The **System / System time** page.*

To set the system time manually, select the **Manual** value from the **Mode** drop-down list and set the time and date in the fields displayed. Then click the **Apply** button.

To enable automatic synchronization with a time server, follow the next steps:

1. Select the **NTP** value from the **Mode** drop-down list.

2. Select your time zone from the drop-down list. To set the time zone in accordance with the settings of your operating system, click the **Determine timezone** button in the bottom right corner of the page.

3. Specify the needed NTP server in the **NTP servers** field or leave the server specified by default.

4. Click the **Apply** button.

To enable automatic adjustment for daylight saving time of the router, select the **Daylight saving time** checkbox.

In some cases NTP servers addresses are provided by your ISP. In this case, you need to select the **Get NTP server addresses using DHCP** checkbox. Contact your ISP to clarify if this checkbox needs to be enabled. If the **Get NTP server addresses using DHCP** checkbox is selected, the **NTP servers** field is not available.

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After clicking the **Apply** button, the date and time set for the router will be displayed in the **System date** and **System time** fields.

! When the router is powered off or rebooted, the system time is reset to the default value. If you have set automatic synchronization for the system time, the internal clock of the device will be configured after connecting to the Internet. If you have set the system time manually, you need to set the time and date again (see above).

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Ping

On the **System / Ping** page, you can check availability of a host from the local or global network via the Ping utility.

The Ping utility sends echo requests to a specified host and receives echo replies.
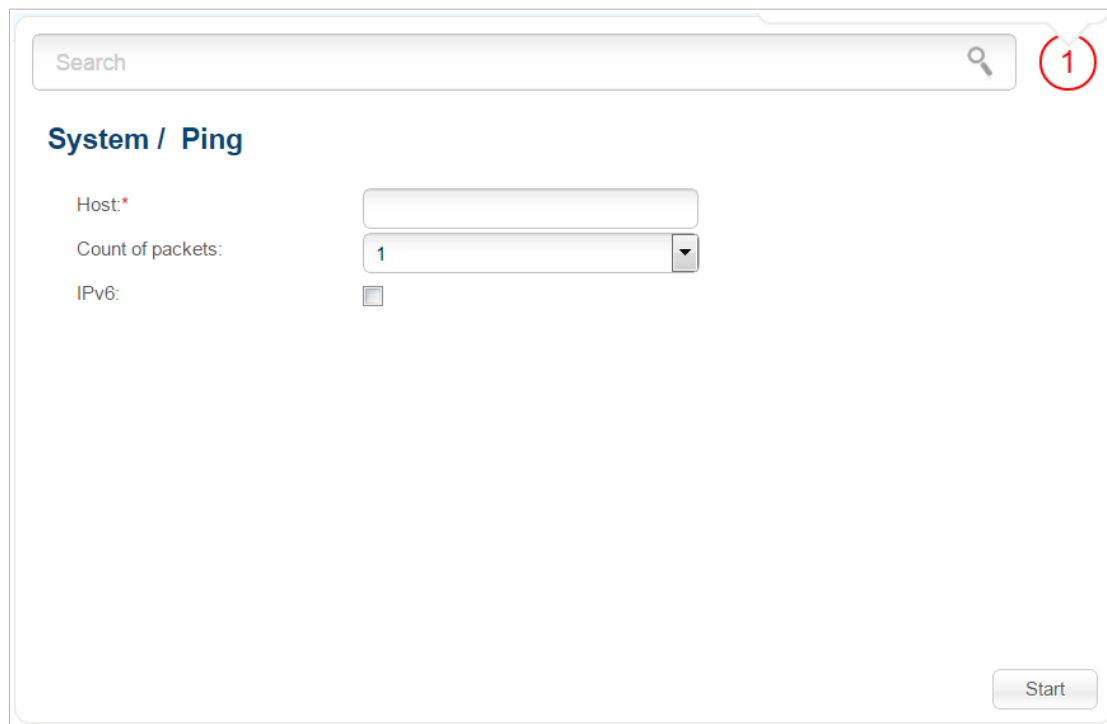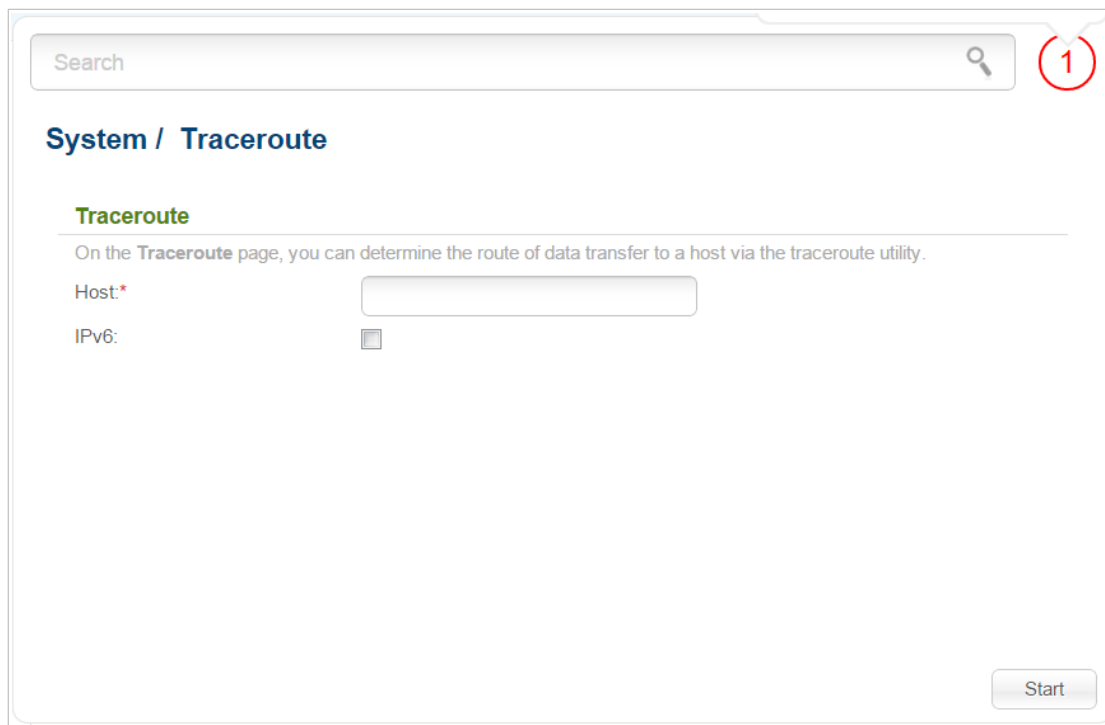

*Figure 185. The **System / Ping** page.*

To check availability of a host, enter the IP address or name of this host in the **Host** field, and select a number of requests that will be sent in order to check its availability from the **Count of packets** drop-down list. If availability check should be performed with IPv6, select the relevant checkbox. Click the **Start** button. After a while, the results will be displayed on the page.

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Traceroute

On the **System / Traceroute** page, you can determine the route of data transfer to a host via the traceroute utility.

*Figure 186. The **System / Traceroute** page.*

To determine the route, enter the name or IP address of a host in the **Host** field. If the route should be determined using IPv6, select the relevant checkbox. Click the **Start** button. After a while, the results will be displayed on the page.

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Telnet

On the **System / Telnet** page, you can enable or disable access to the device settings via TELNET from your LAN. By default, access is enabled.
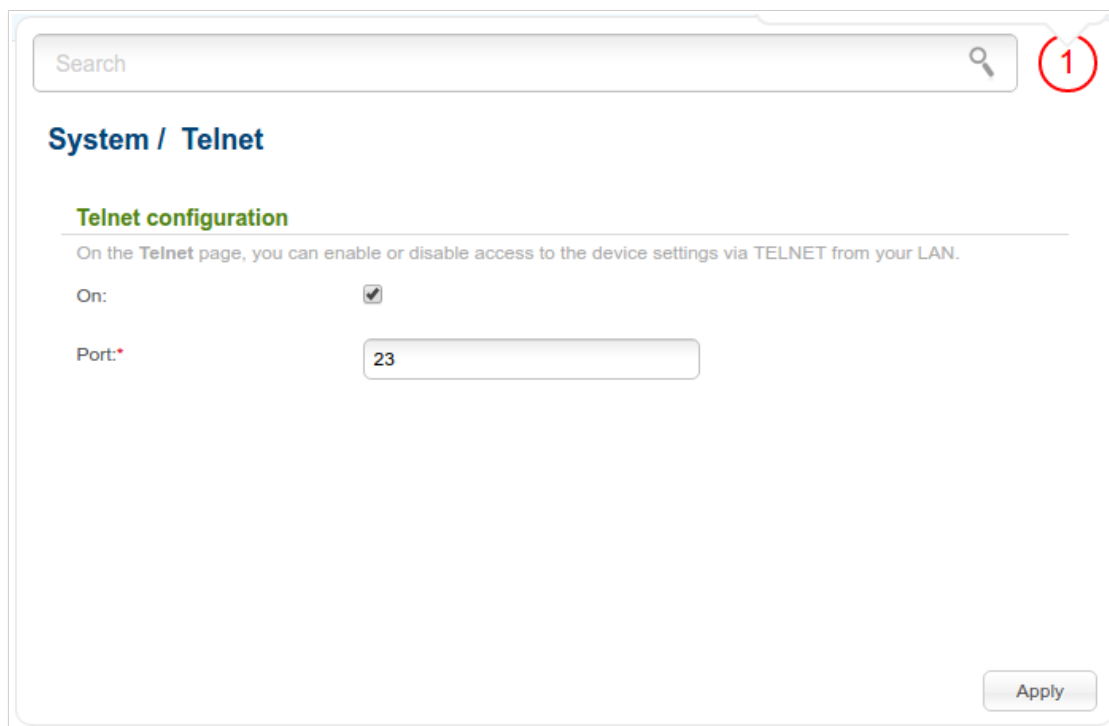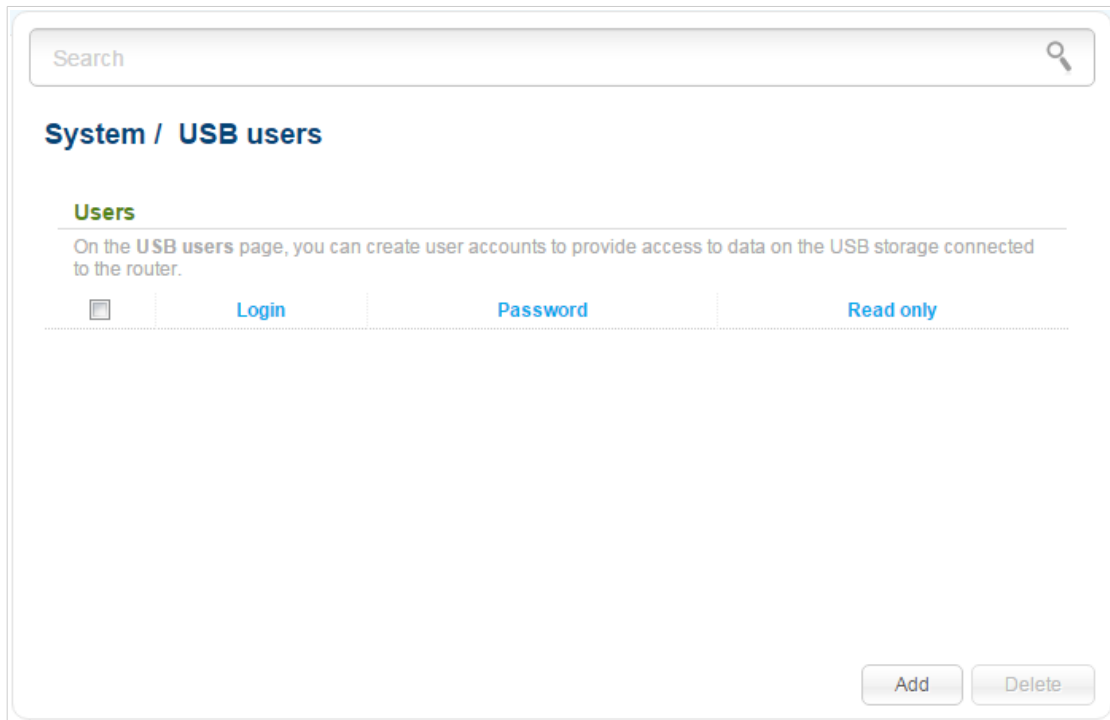

*Figure 187. The **System / Telnet** page.*

To disable access via TELNET, deselect the **On** checkbox and click the **Apply** button.

To enable access via TELNET again, select the **On** checkbox. In the **Port** field, enter the number of the router's port through which access will be allowed (by default, the port `23` is specified). Then click the **Apply** button.

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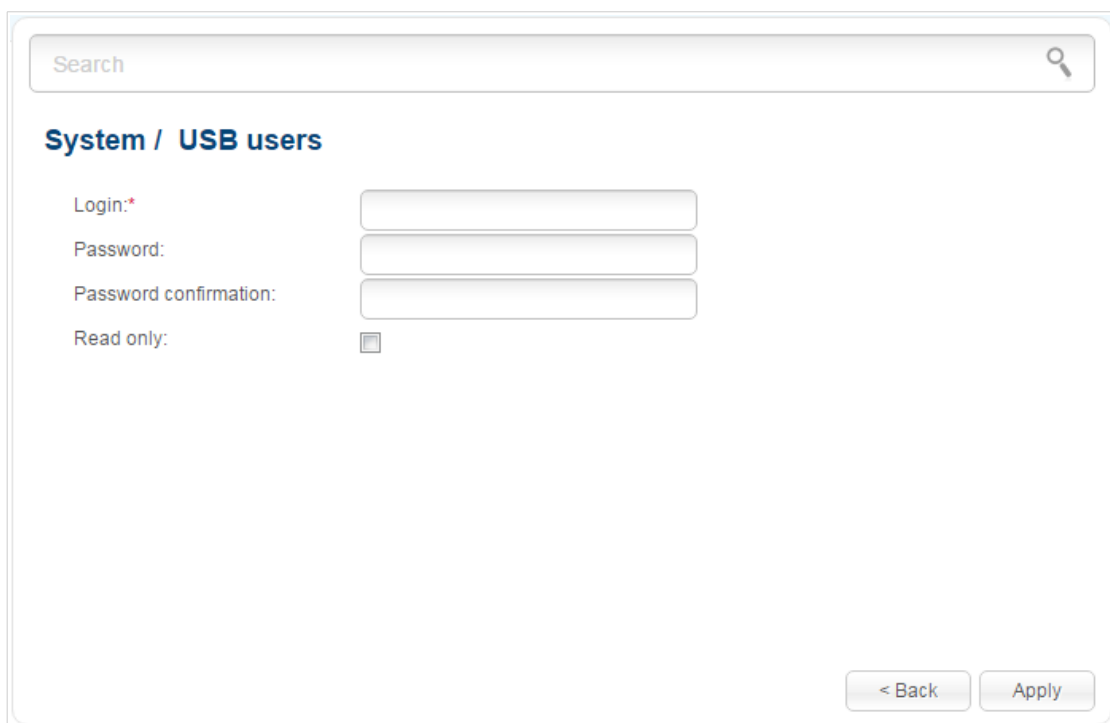
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USB Users

On the **System / USB users** page, you can create user accounts to provide access to data on the USB storage connected to the router.

*Figure 188. The **System / USB users** page.*

To create a new user account, click the **Add** button.

Figure 189. The page for adding a user.

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On the opened page, in the **Login** field, specify a username, and in the **Password** and **Password confirmation** fields – the password for the account. You can use letters of the Latin alphabet (uppercase and/or lowercase) and digits.

> **!** You cannot create accounts with the following usernames: `ftp`, `admin`, `support`, `user`, `nobody`.

For ext2, ext3, or FAT storages or storage partitions, it is possible to create users with limited rights. Select the **Read only** checkbox not to let the user create, change, or delete files.

Click the **Apply** button.

To change the password of an account, select the relevant line in the table. On the opened page, enter a new value in the **Password** and **Password confirmation** fields, then click the **Apply** button.

To remove an account, select the checkbox located to the left of the relevant line in the table and click the **Delete** button. Also you can remove an account on the editing page.

To remove all accounts from this page, click the **Clear all** button (the button is displayed if at least one account exists).

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Interface Settings

On the **System / Interface settings** page, you can configure the interface language and specify an idle period at the end of which the session with the interface is completed.
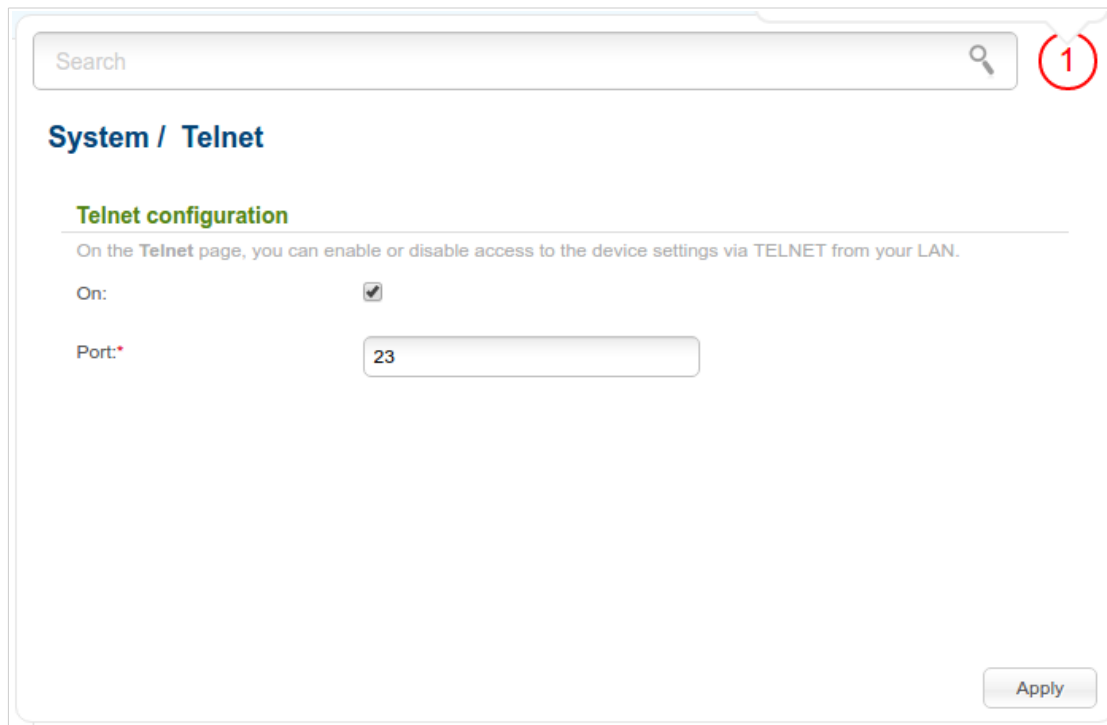

*Figure 190. The **System / Interface settings** page.*

Select a needed value from the **Language interface** drop-down list.

In the **Idle time** field specify a period of inactivity (in minutes) after which the router completes the session of the interface. By default, the value **5** is specified.

When you have configured the parameters, click the **Save** button.

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CHAPTER 5.   OPERATION GUIDELINES

Safety Rules and Conditions

Please carefully read this section before installation and connection of the device. Make sure that the power adapter and cables are not damaged. The device should be used only as intended in accordance with the documents.

The device is intended for use in dry, clean, dust-free, and well ventilated areas with normal humidity away from strong heat sources. Do not use the device outdoors or in the areas with high humidity. Do not place foreign objects on the device. Do not obstruct the ventilation openings of the device. The environmental temperature near the device and the temperature inside the device's cover should be within the range from 0 °C to +40 °C.

Only use the power adapter supplied with the device. Do not plug in the adapter, if its case or cable are damaged. Plug the adapter only into working electrical outlets with parameters indicated on the adapter.

Do not open the cover of the device! Unplug the device before dusting and cleaning. Use a damp cloth to clean the device. Do not use liquid/aerosol cleaners or magnetic/static cleaning devices. Prevent moisture getting into the device or the power adapter.

The service life of the device is 2 years.

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Wireless Installation Considerations

The DVG-N5402G/ACF device lets you access your network using a wireless connection from virtually anywhere within the operating range of your wireless network. Keep in mind, however, that the number, thickness and location of walls, ceilings, or other objects that the wireless signals must pass through, may limit the range. Typical ranges vary depending on the types of materials and background RF noise in your home or office. To maximize your wireless range, follow the guidelines below.

1. Keep the number of walls and ceilings between the DVG-N5402G/ACF device and other network devices to a minimum – each wall or ceiling can reduce your wireless network range by 3-90 feet (1-30 meters).

2. Be aware of the direct line between network devices. Place your devices so that the signal travels straight through a wall or ceiling (instead of at an angle) for better reception.

3. Building materials make a difference. A solid metal door or aluminum studs may have a negative effect on your wireless range. Try to position your router, access points, and computers so that the signal passes through drywalls or open doorways. Materials and objects such as glass, steel, metal, walls with insulation, water (fish tanks), mirrors, file cabinets, brick, and concrete will degrade your wireless signal.

4. Keep your router away (at least 3-6 feet or 1-2 meters) from electrical devices or appliances that generate RF noise.

5. If you are using 2.4 GHz cordless phones or X-10 equipment (wireless devices such as ceiling fans, lights, and home security systems), your wireless connection may degrade dramatically or drop completely. Make sure your 2.4 GHz phone base is as far away from your wireless devices as possible. Note, that the base transmits a signal even if the phone in not in use.

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Abbreviations and Acronyms

CHAPTER 6.   ABBREVIATIONS AND ACRONYMS

3G	Third Generation
AC	Access Category
AES	Advanced Encryption Standard
ARP	Address Resolution Protocol
BSSID	Basic Service Set Identifier
CDMA	Code Division Multiple Access
CRC	Cyclic Redundancy Check
DDNS	Dynamic Domain Name System
DDoS	Distributed Denial of Service
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
DTIM	Delivery Traffic Indication Message
GMT	Greenwich Mean Time
GSM	Global System for Mobile Communications
IGD	Internet Gateway Device
IGMP	Internet Group Management Protocol
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
ISP	Internet Service Provider
L2TP	Layer 2 Tunneling Protocol
LAN	Local Area Network
LCP	Link Control Protocol
LTE	Long Term Evolution
MAC	Media Access Control
MTU	Maximum Transmission Unit

NAT	Network Address Translation
NTP	Network Time Protocol
OFDM	Orthogonal Frequency Division Multiplexing
PBC	Push Button Configuration
PIN	Personal Identification Number
PPPoE	Point-to-point protocol over Ethernet
PPTP	Point-to-point tunneling protocol
PSK	Pre-shared key
PUK	PIN Unlock Key
QoS	Quality of Service
R-UIM	Removable User Identity Module
RADIUS	Remote Authentication in Dial-In User Service
RIP	Routing Information Protocol
RTS	Request To Send
RTSP	Real Time Streaming Protocol
SIP	Session Initiation Protocol
SIM	Subscriber Identification Module
SMB	Server Message Block
SSID	Service Set Identifier
TKIP	Temporal Key Integrity Protocol
UDP	User Datagram Protocol
UPnP	Universal Plug and Play
URL	Uniform Resource Locator
USB	Universal Serial Bus
VLAN	Virtual Local Area Network
VPN	Virtual Private Network
WAN	Wide Area Network

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WEP	Wired Equivalent Privacy
Wi-Fi	Wireless Fidelity
WLAN	Wireless Local Area Network
WMM	Wi-Fi Multimedia
WPA	Wi-Fi Protected Access
WPS	Wi-Fi Protected Setup