User Manual

DAP-1620

AC1300 MU-MIMO Wi-Fi Range Extender

June 2020

Contents

CHAPTER 1. INTRODUCTION

Contents and Audience

This manual describes the extender DAP-1620 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.).
`192.168.0.50`	Data that you should enter in the specified field.
! Information	An important note.

Document Structure

Chapter 1 describes the purpose and structure of the document.

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

Chapter 3 explains how to install the extender DAP-1620 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 most commonly used in User Manuals for D-Link customer premises equipment.

CHAPTER 2. OVERVIEW

General Information

The wireless extender DAP-1620 is a portable device designed to increase the operational range of your wireless network. The extender supports operation with wireless devices of the standards 802.11a, 802.11b, 802.11g, 802.11n, and 802.11ac. DAP-1620 delivers reliable, high-speed wireless performance up to 867Mbps for 5GHz using the 802.11ac standard and up to 400Mbps for 2.4GHz. Simultaneous activity of 2.4GHz band and 5GHz band allows performing a wide range of tasks.

The device supports multiple functions for the wireless interface: several security standards (WEP, WPA/WPA2), MAC address filtering, different operation modes (repeater, client, access point), WPS, WMM.

The Super MESH function is D-Link implementation of Mesh networks designed to quickly connect multiple devices into one transport network, for example, when it's required to provide high-quality Wi-Fi coverage without dead zones in living units of complicated planning or it's needed to create a large temporary Wi-Fi network for an outdoor event.

Multi-user MIMO technology allows to distribute the extender's resources to let multiple wireless clients use the Wi-Fi network efficiently, keeping high rates for HD media streaming, lag-free gaming, and fast transfer of large files.

Transmit Beamforming technology allows to flexibly change the antennas' radiation pattern and to redistribute the signal directly to wireless devices connected to the extender.

Smart adjustment of Wi-Fi clients is useful for networks based on several D-Link access points or routers – when the smart adjustment function is configured on each of them, a client always connects to the access point (router, extender) with the highest signal level.

The wireless extender is equipped with one Gigabit Ethernet LAN port, which can be used to connect a wired client to the extender or to connect DAP-1620 to a wired router.

The LED clearly shows the signal level of the wireless network to which DAP-1620 is connected. Due to this, you can easily find the best location for the extender.

The SSH protocol support provides more secure remote configuration and management of the extender due to encryption of all transmitted traffic, including passwords.

Now the schedules are also implemented; they can be applied to MAC filter rules and used to reboot the extender at the specified time or every specified time period and to enable/disable the wireless network.

You can configure the settings of the DAP-1620 device via the user-friendly web-based interface (the interface is available in several languages).

The configuration wizard allows you to quickly switch the extender to the access point, repeater, or client mode and configure all needed settings for the selected mode in several simple steps.

You can simply update the firmware: when the Internet access is provided, the extender itself finds approved firmware on D-Link update server and notifies when ready to install it.

*Specifications**

Hardware	
Processor	· MT7621AT (880MHz, dual core)
RAM	· 128MB, DDR3 SDRAM
Flash	· 16MB, SPI
Interfaces	· 10/100/1000BASE-T LAN port
LEDs	· POWER/WPS · Wi-Fi Signal Strength
Buttons	· WPS button to set up wireless connection · RESET button to restore factory default settings
Antenna	· Two external non-detachable antennas (1dBi gain for 2.4GHz and 2dBi gain for 5GHz)
MIMO	· 2 x 2, MU-MIMO
Power connector	· CEE 7/16 plug for AC power supply

Software	
Network functions	· DHCP server · Advanced configuration of built-in DHCP server · Stateful/Stateless mode for IPv6 address assignment · Automatic obtainment of LAN IP address · DNS relay · Autonegotiation of speed, duplex mode, and flow control / Manual speed and duplex mode setup for Ethernet port
Firewall functions	· MAC filter
Management and monitoring	· Access to settings through SSH/TELNET/WEB (HTTP/HTTPS) · Multilingual web-based interface for configuration and management · Firmware update via web-based interface · Automatic notification on new firmware version · Saving/restoring configuration to/from file · Support of logging to remote host · Automatic synchronization of system time with NTP server and manual time/date setup · Ping utility · Traceroute utility · Schedules for MAC filters rules, automatic reboot, and enabling/disabling wireless network

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

Wireless Module Parameters	
Standards	· IEEE 802.11a/n/ac · IEEE 802.11b/g/n
Frequency range *The frequency range depends upon the radio frequency regulations applied in your country*	· 2400 ~ 2483.5MHz · 5150 ~ 5350MHz · 5650 ~ 5850MHz
Wireless connection security	· WEP · WPA/WPA2 (Personal/Enterprise) · MAC filter · WPS (PBC/PIN)
Advanced functions	· Super Mesh function · Support of client mode · WMM (Wi-Fi QoS) · Information on connected Wi-Fi clients · Advanced settings · Smart adjustment of Wi-Fi clients · Support of MBSSID · Limitation of wireless network rate · Periodic scan of channels, automatic switch to least loaded channel · Support of 802.11ac (5GHz) and 802.11n (2.4GHz) TX Beamforming · Autonegotiation of channel bandwidth in accordance with environment conditions (20/40 Coexistence)
Wireless connection rate[1]	· 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): 6.5–300Mbps (MCS0–MCS15) to 400Mbps (QAM256) · IEEE 802.11n (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) 12dBm (±2 dB) · 802.11b (typical at room temperature 25 °C) 14dBm (±2 dB) · 802.11g (typical at room temperature 25 °C) 15dBm (±2 dB) · 802.11n (typical at room temperature 25 °C) 2.4GHz 15dBm (±2 dB) 5GHz 12dBm (±2 dB) · 802.11ac (typical at room temperature 25 °C) 12dBm (±2 dB)

1 Maximum wireless signal rate is derived from IEEE standard 802.11ac and 802.11n specifications. In order to get the rate of 400Mbps in the 2.4GHz band, a Wi-Fi client should support MIMO 2x2 and QAM256 modulation scheme. Actual data throughput will vary. Network conditions and environmental factors, including volume of network traffic, building materials and construction, and network overhead, lower actual data throughput rate. Environmental factors will adversely affect wireless signal range.

Wireless Module Parameters	
Receiver sensitivity	· 802.11a (typical at PER = 10% (1000-byte PDUs) at room temperature 25 °C) -93dBm at 6Mbps -91dBm at 9Mbps -90dBm at 12Mbps -87dBm at 18Mbps -84dBm at 24Mbps -81dBm at 36Mbps -76dBm at 48Mbps -75dBm at 54Mbps · 802.11b (typical at PER = 10% (1000-byte PDUs) at room temperature 25 °C) -94dBm at 2Mbps -89dBm at 11Mbps · 802.11g (typical at PER = 10% (1000-byte PDUs) at room temperature 25 °C) -94dBm at 6Mbps -92dBm at 9Mbps -91dBm at 12Mbps -88dBm at 18Mbps -85dBm at 24Mbps -82dBm at 36Mbps -77dBm at 48Mbps -76dBm at 54Mbps · 802.11n, 2.4GHz (typical at PER = 10% (1000-byte PDUs) at room temperature 25 °C) HT20 / HT40 -93dBm at MCS0/8 / -91dBm at MCS0/8 -90dBm at MCS1/9 / -88dBm at MCS1/9 -88dBm at MCS2/10 / -85dBm at MCS2/10 -85dBm at MCS3/11 / -82dBm at MCS3/11 -81dBm at MCS4/12 / -79dBm at MCS4/12 -77dBm at MCS5/13 / -75dBm at MCS5/13 -76dBm at MCS6/14 / -73dBm at MCS6/14 -74dBm at MCS7/15 / -72dBm at MCS7/15 · 802.11n, 5GHz (typical at PER < 10% at room temperature 25 °C) HT20 / HT40 -92dBm at MCS0/8 / -90dBm at MCS0/8 -89dBm at MCS1/9 / -86dBm at MCS1/9 -87dBm at MCS2/10 / -84dBm at MCS2/10 -84dBm at MCS3/11 / -80dBm at MCS3/11 -80dBm at MCS4/12 / -77dBm at MCS4/12 -76dBm at MCS5/13 / -73dBm at MCS5/13 -75dBm at MCS6/14 / -71dBm at MCS6/14 -73dBm at MCS7/15 / -70dBm at MCS7/15

Wireless Module Parameters	
	· 802.11ac (typical at PER = 10% (1000-byte PDUs) at room temperature 25 °C) HT20 / HT40 -93dBm at MCS0 / -90dBm at MCS0 -90dBm at MCS1 / -86dBm at MCS1 -87dBm at MCS2 / -84dBm at MCS2 -84dBm at MCS3 / -81dBm at MCS3 -80dBm at MCS4 / -77dBm at MCS4 -76dBm at MCS5 / -73dBm at MCS5 -74dBm at MCS6 / -72dBm at MCS6 -73dBm at MCS7 / -70dBm at MCS7 -69dBm at MCS8 / -66dBm at MCS8 -65dBm at MCS9 / -64dBm at MCS9 HT80 -87dBm at MCS0 -83dBm at MCS1 -80dBm at MCS2 -77dBm at MCS3 -74dBm at MCS4 -70dBm at MCS5 -68dBm at MCS6 -67dBm at MCS7 -63dBm at MCS8 -61dBm at MCS9
Modulation schemes	· 802.11a: BPSK, QPSK, 16QAM, 64QAM with OFDM · 802.11b: DQPSK, DBPSK, DSSS, CCK · 802.11g: BPSK, QPSK, 16QAM, 64QAM with OFDM · 802.11n: BPSK, QPSK, 16QAM, 64QAM, 256QAM with OFDM · 802.11ac: BPSK, QPSK, 16QAM, 64QAM, up to 256QAM with OFDM

Physical Parameters	
Dimensions	· 64 x 50 x 105 mm (2.52 x 1.97 x 4.13 in)
Weight	· 165 g (0.36 lb)

Operating Environment	
Power	· Input: 110 to 240 V AC, 50/60 Hz
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 90% (non-condensing)

Product Appearance

Front Panel

Figure 1. Front panel view.

LED	Mode	Description
POWER/WPS	*Solid red*	The device is being loaded.
	Solid green	The device is ready for use.
	Blinking red	Attempting to add a wireless device via the WPS function.
	No light	The extender is powered off.
Wi-Fi Signal Strength	*Solid red*	The device is not connected to a wireless network or the signal strength is poor.
	Solid green	Fair signal strength.
	Solid green	Good signal strength.

LED	Mode	Description
	Solid green 	Excellent signal strength.
	No light	The device is not configured as a Wi-Fi client or the device's WLAN is off.

The **Wi-Fi Signal Strength** LED is a LED scale. It shows the signal strength of the wireless network to which DAP-1620 is connected. The more LEDs are on, the better the signal strength is. To improve the signal strength, move the extender closer to the source of the signal.

In case the **POWER/WPS** LED is solid red, one of the **Wi-Fi Signal Strength** LEDs is solid red and the other two are blinking green, the device is in the emergency mode. Restore the factory default settings via the hardware **RESET** button.

WPS button is located on the front panel of the extender.

Button	Description
WPS	A button to set up a wireless connection (the WPS function). To use the WPS function: with the device turned on, push the button, hold it for 2 seconds, and release. The **POWER/WPS** LED should start blinking.

Bottom Panel

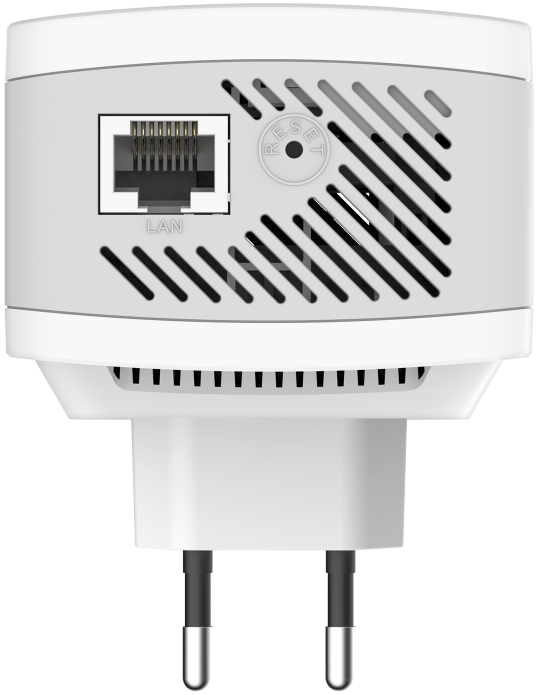

Figure 2. Bottom panel view.

The LAN port and **RESET** button are located on the bottom panel of the device.

Name	Description
LAN	An Ethernet port to connect to a computer or a wired router.
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.

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

Delivery Package

The following should be included:

- Extender DAP-1620
- "***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 different parameters than those indicated on the device will cause damage and void the warranty for this product.

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 extender DAP-1620 (hereinafter referred to as "the extender") 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 8 and later
- Google Chrome 48 and later
- Microsoft Internet Explorer 10 and later
- Microsoft Edge 20.10240 and later
- Mozilla Firefox 44 and later
- Opera 35 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 extender 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 extender.

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 extender for all these wireless workstations.

Connecting to PC

PC with Ethernet Adapter

1. Connect an Ethernet cable between the LAN port of the extender and the Ethernet port of your PC.
2. Plug the device into an electrical outlet or power strip.

Now you need to configure an IP address for the Ethernet adapter of your PC.

Configuring IP Address 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.)

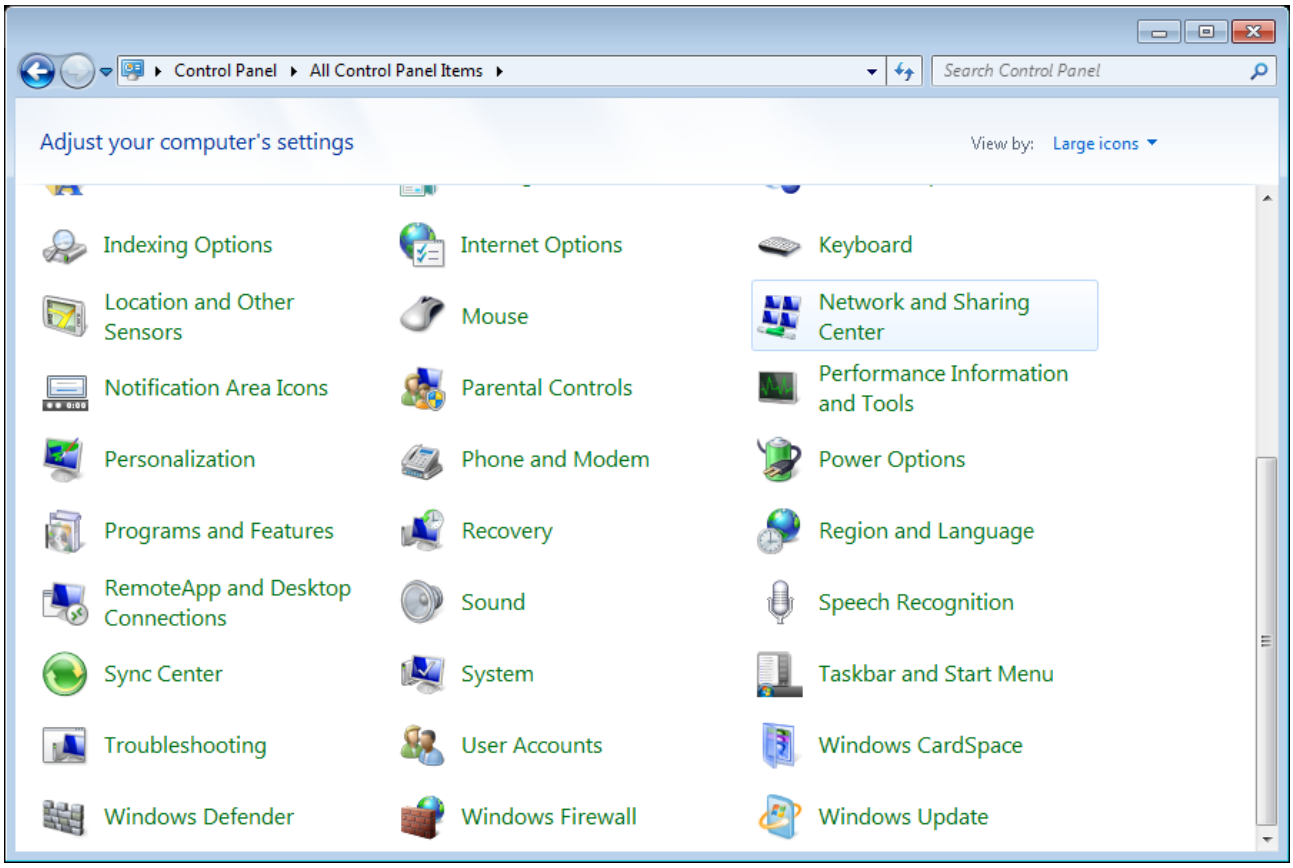

*Figure 3. The **Control Panel** window.*

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

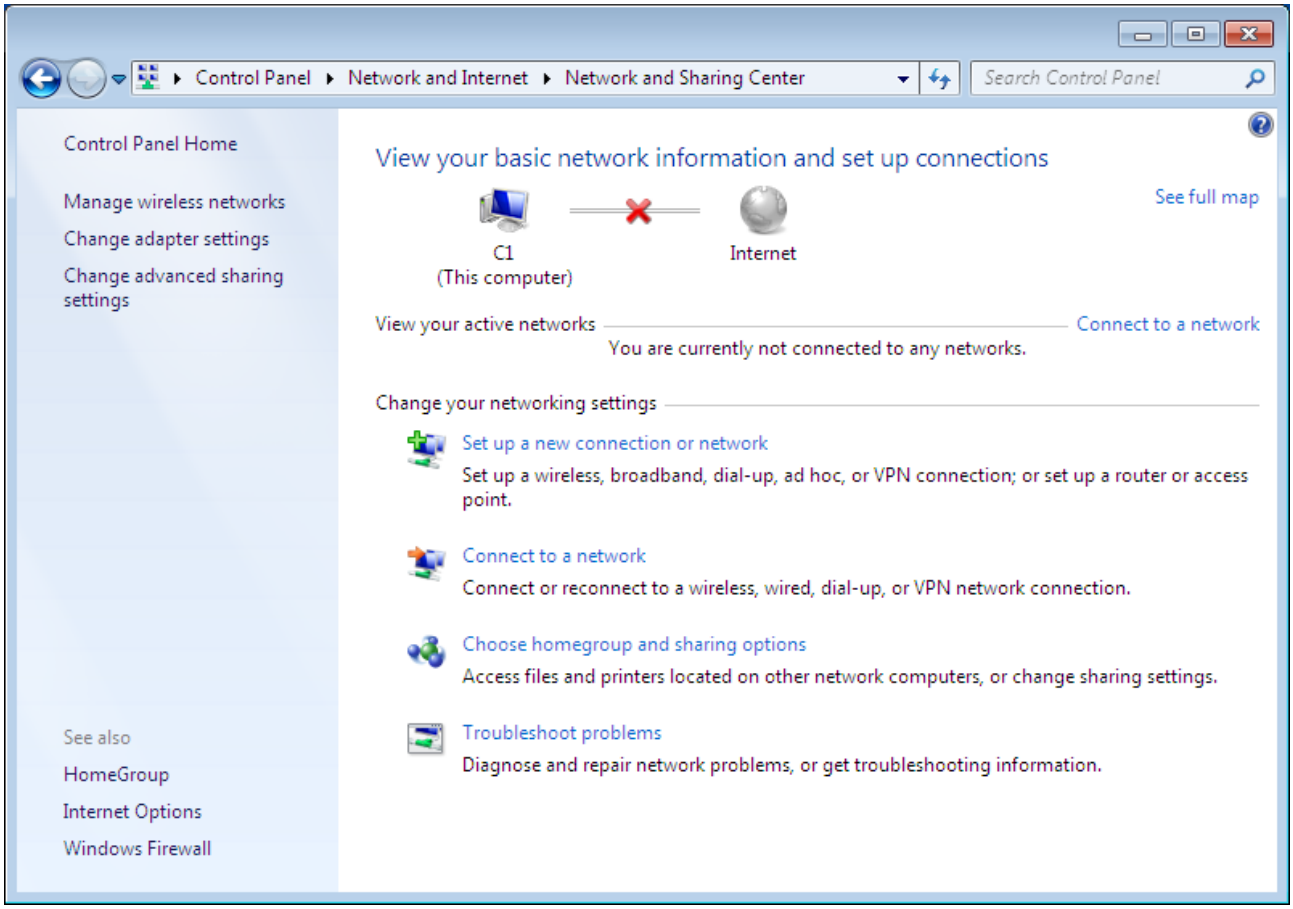

*Figure 4. The **Network and Sharing Center** window.*

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

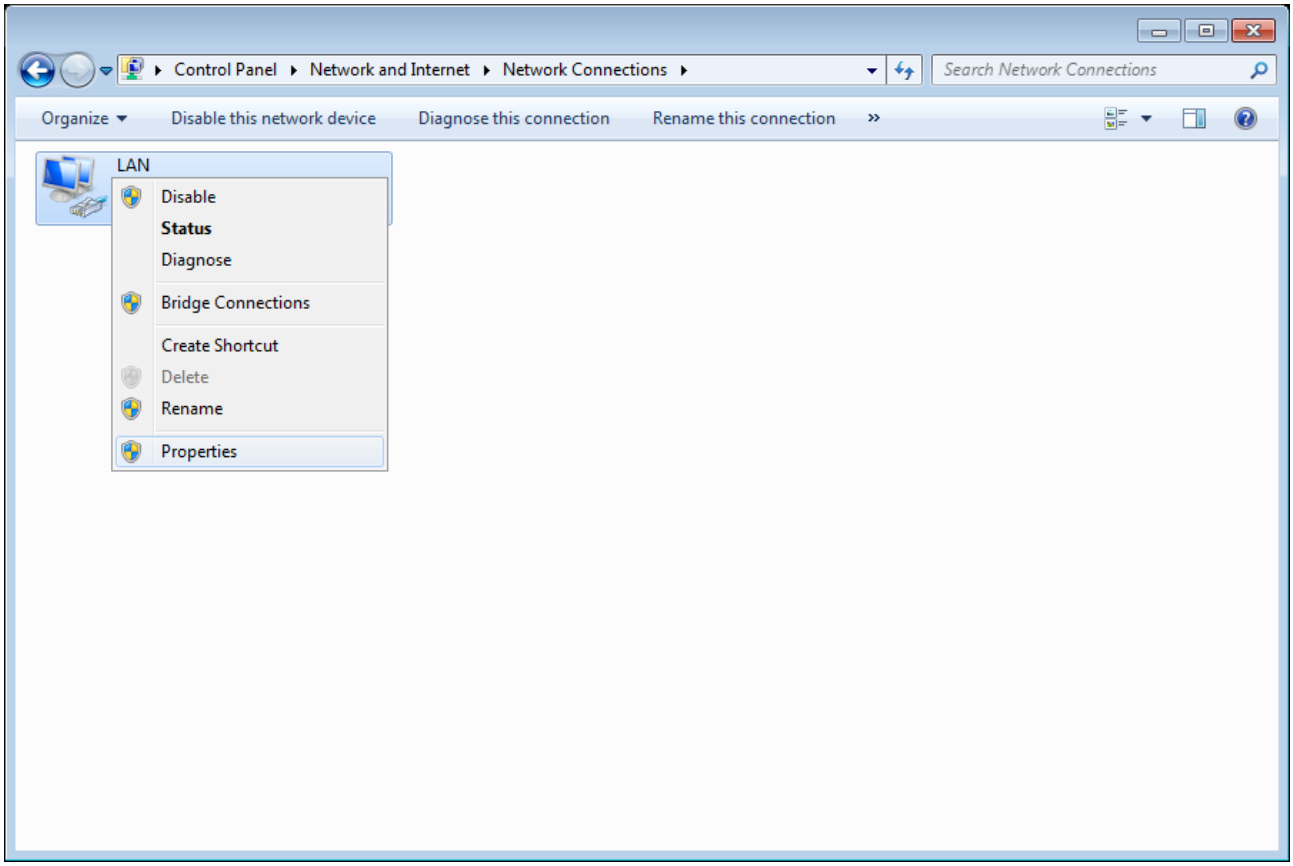

*Figure 5. The **Network Connections** window.*

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.

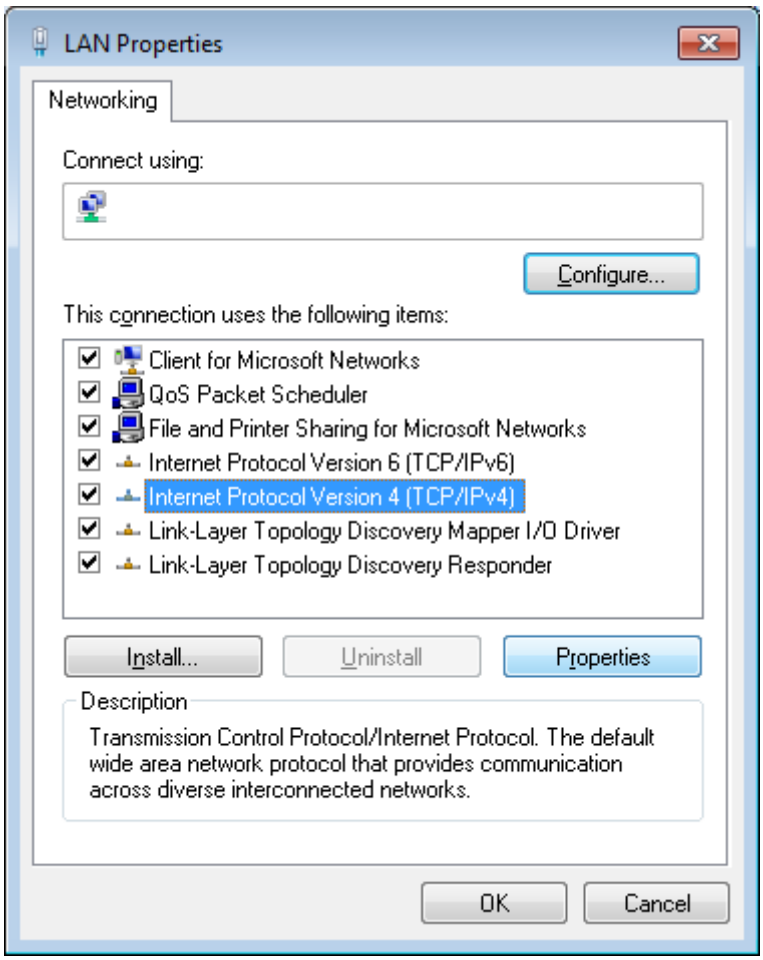

*Figure 6. The **Local Area Connection Properties** window.*

6. Select the **Use the following IP address** radio button and enter the value `192.168.0.51` in the **IP address** field. The **Subnet mask** field will be filled in automatically. Click the **OK** button.

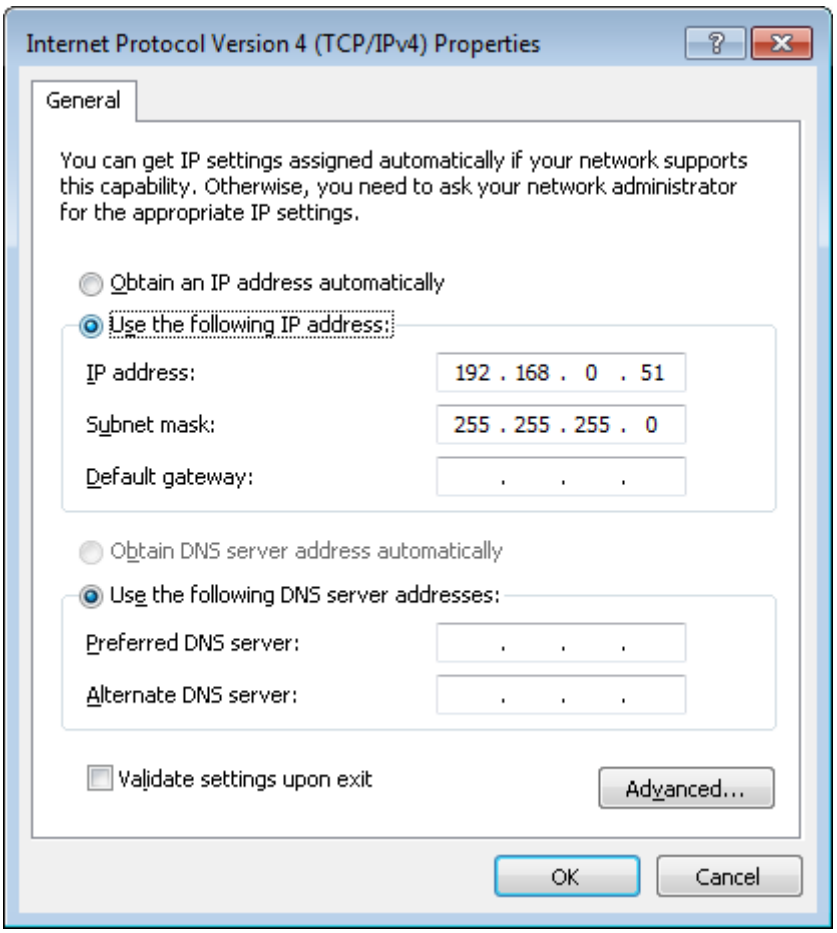

*Figure 7. The **Internet Protocol Version 4 (TCP/IPv4) Properties** window.*

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

Now you can connect to the web-based interface of DAP-1620 for configuring all needed parameters. To gain access to an external network (to the Internet), you also need to specify the default gateway and the addresses of DNS servers.

Configuring IP Address in OS Windows 10

1. Click the **Start** button and proceed to the **Settings** window.
2. Select the **Network & Internet** section.

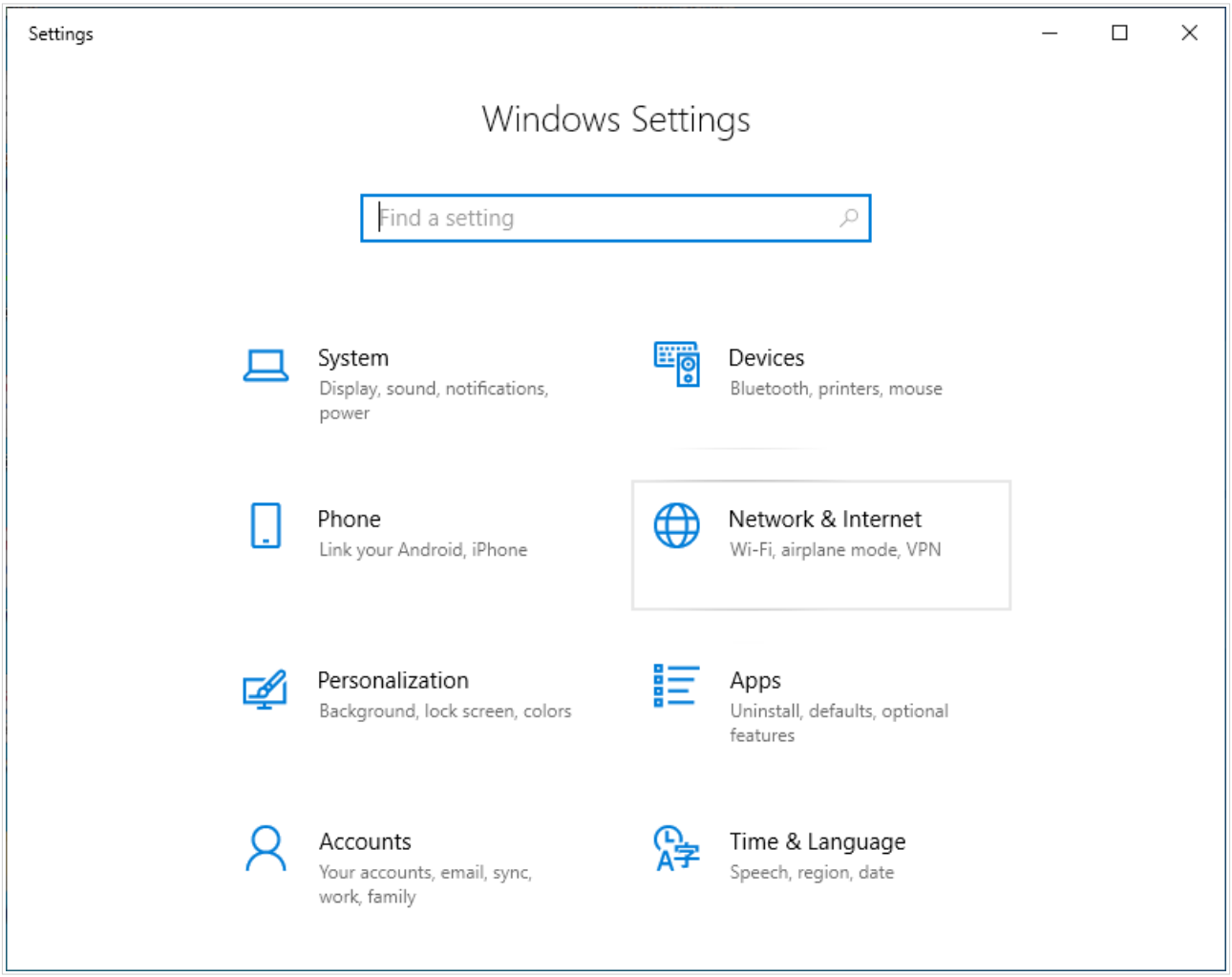

*Figure 8. The **Windows Settings** window.*

3. In the **Change your network settings** section, select the **Change adapter options** line.

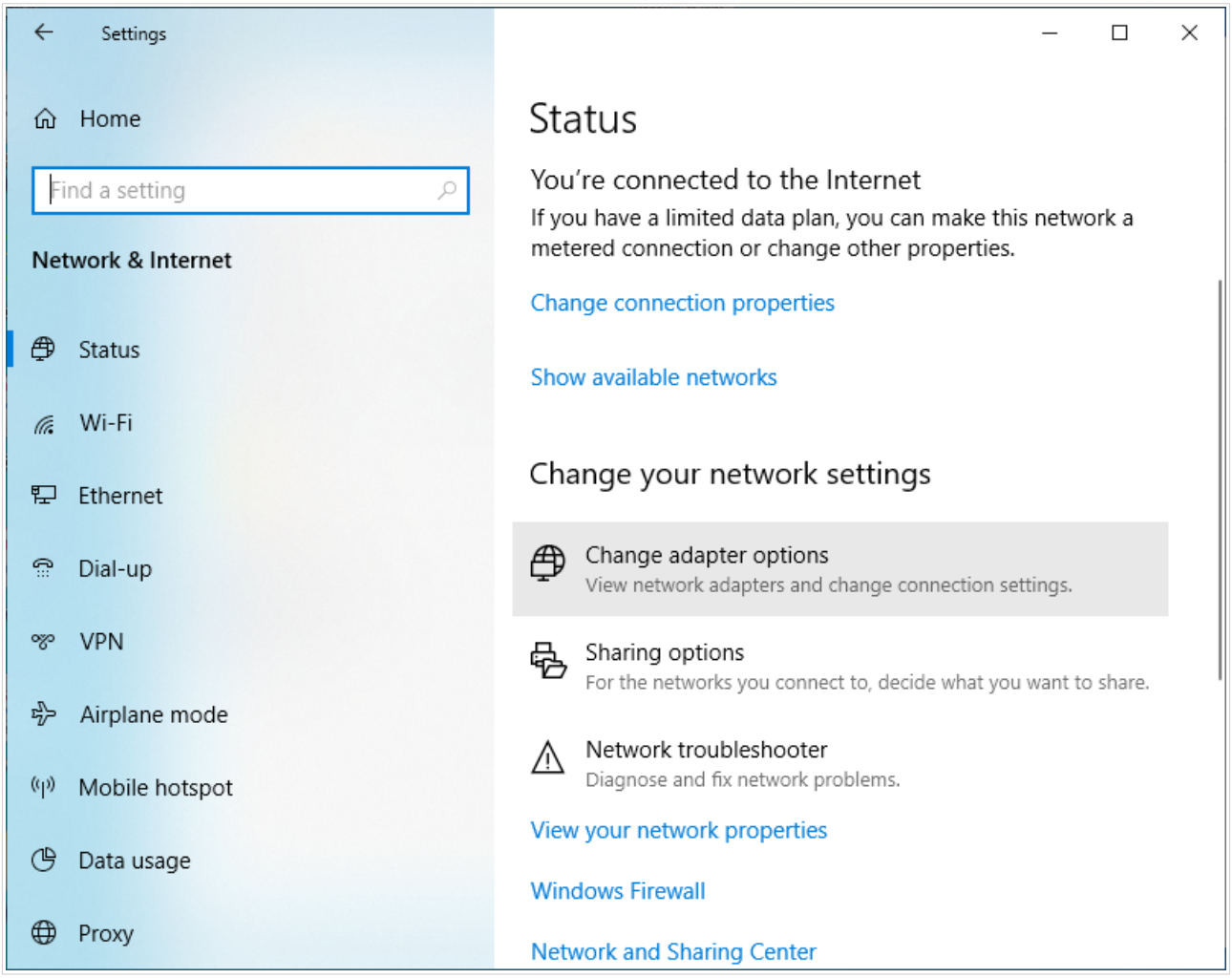

*Figure 9. The **Network & Internet** window.*

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

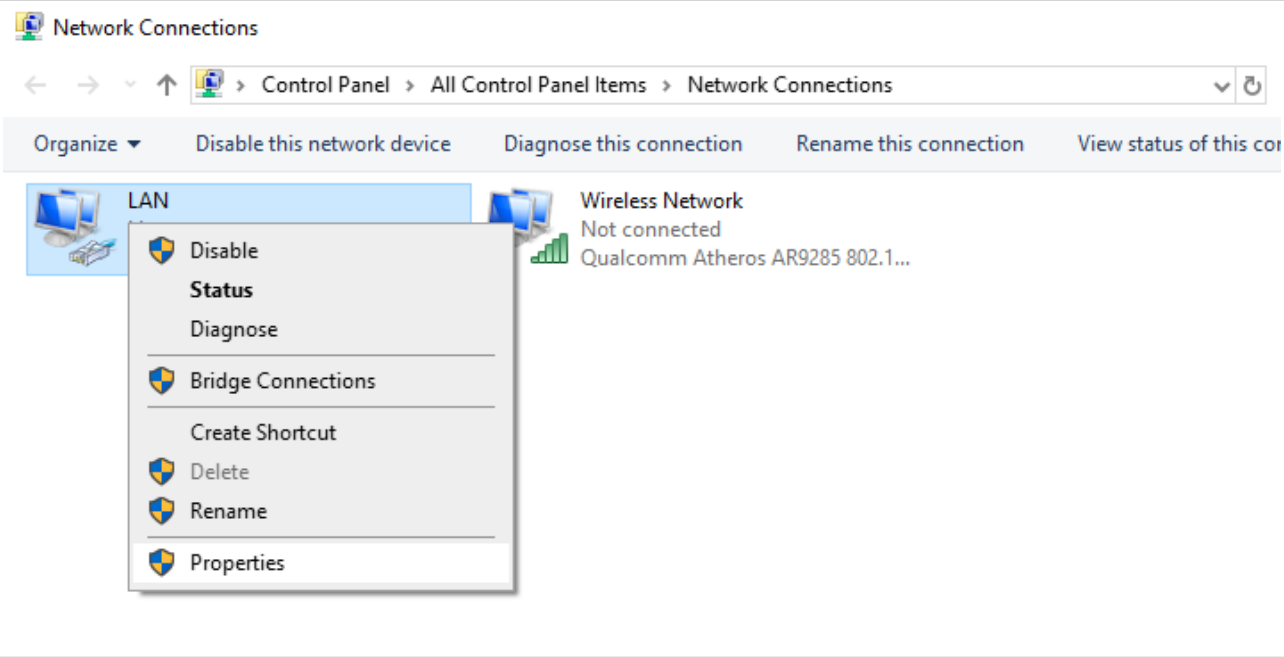

*Figure 10. The **Network Connections** window.*

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.

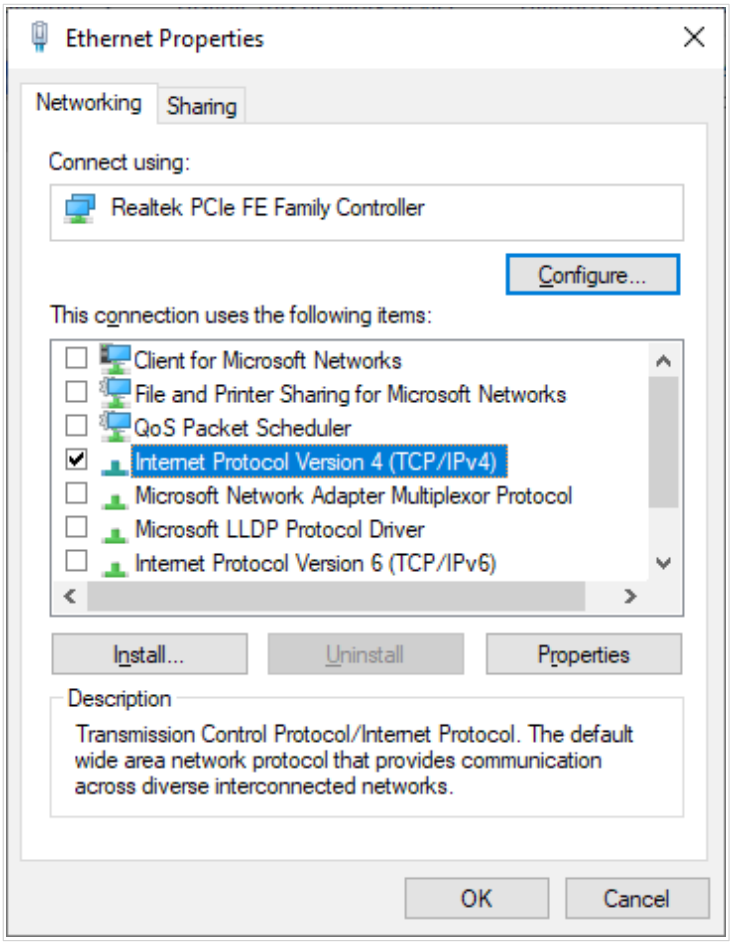

Figure 11. The local area connection properties window.

6. Select the **Use the following IP address** radio button and enter the value `192.168.0.51` in the **IP address** field. The **Subnet mask** field will be filled in automatically. Click the **OK** button.

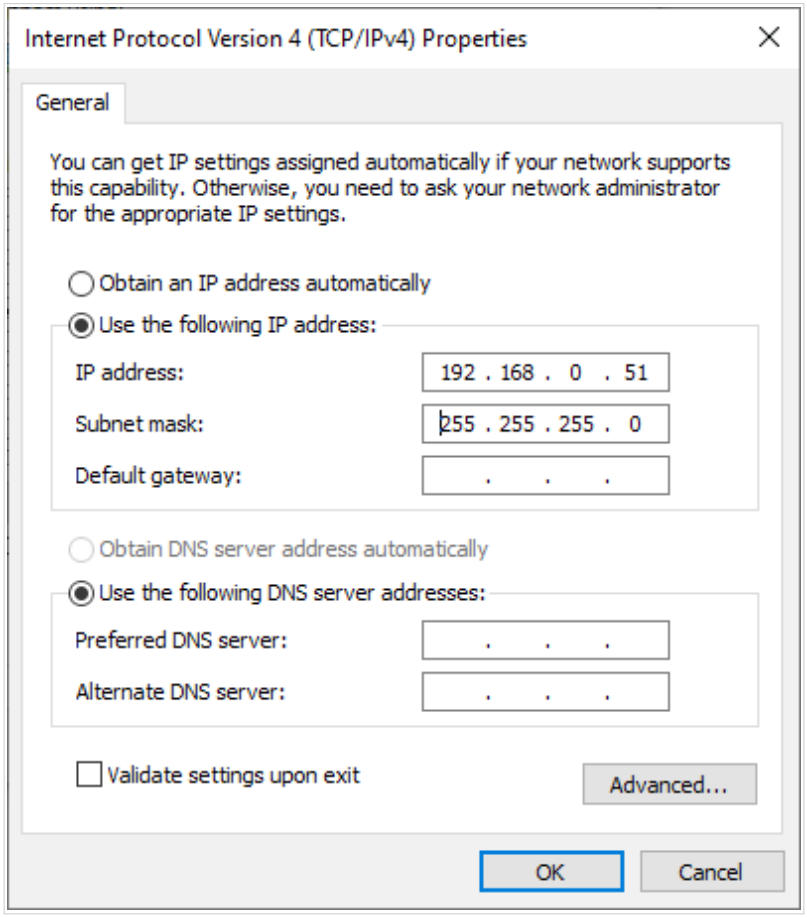

*Figure 12. The **Internet Protocol Version 4 (TCP/IPv4) Properties** window.*

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

Now you can connect to the web-based interface of DAP-1620 for configuring all needed parameters. To gain access to an external network (to the Internet), you also need to specify the default gateway and the addresses of DNS servers.

PC with Wi-Fi Adapter

1. Plug the device into an electrical outlet or power strip.
2. Make sure that the Wi-Fi adapter of your PC is on. 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.

Now you should configure your Wi-Fi adapter.

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.)

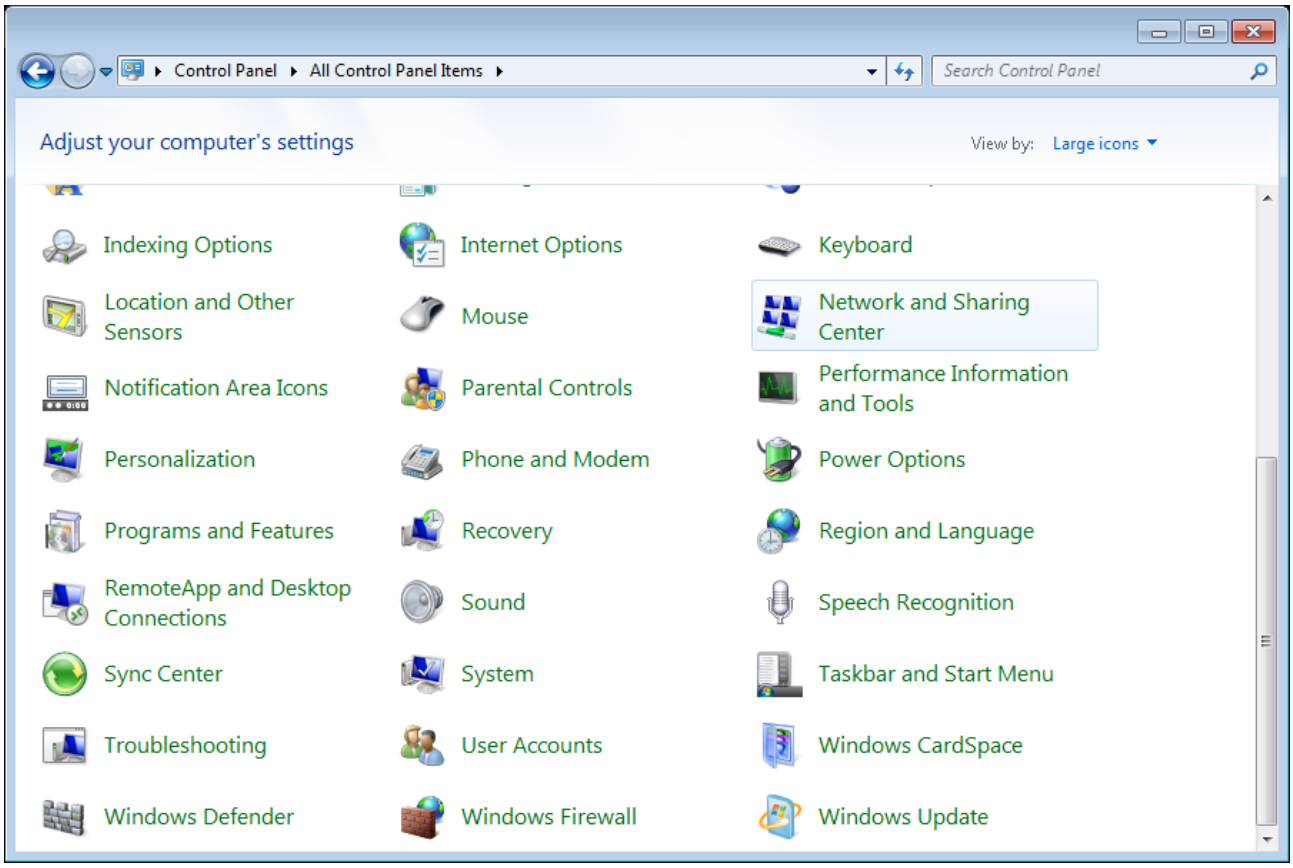

*Figure 13. The **Control Panel** window.*

3. In the menu located on the left part of the window, select the **Change adapter settings** line.
4. In the opened window, right-click the relevant **Wireless Network Connection** icon. Make sure that your Wi-Fi adapter is on, then select the **Properties** line in the menu displayed.
5. In the **Wireless Network Connection Properties** window, on the **Networking** tab, select the **Internet Protocol Version 4 (TCP/IPv4)** line. Click the **Properties** button.

6. Select the **Use the following IP address** radio button and enter the value `192.168.0.51` in the **IP address** field. The **Subnet mask** field will be filled in automatically. Click the **OK** button.

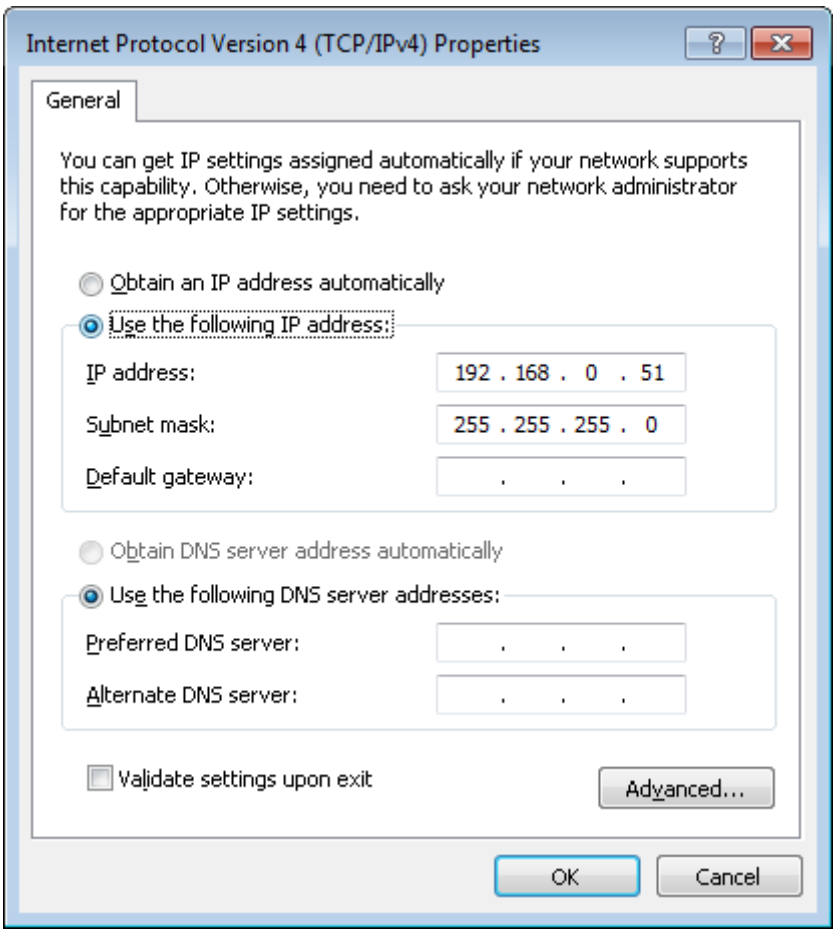

*Figure 14. The **Internet Protocol Version 4 (TCP/IPv4) Properties** window.*

7. Click the **OK** button in the connection properties window.
8. 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.

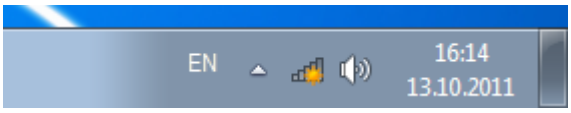

Figure 15. The notification area of the taskbar.

9. In the opened window, in the list of available wireless networks, select the wireless network **dlink-XXXX**[2] (for operating in the 2.4GHz band) or **dlink-XXXX-5GHz**[3] (for operating in the 5GHz band) and click the **Connect** button.

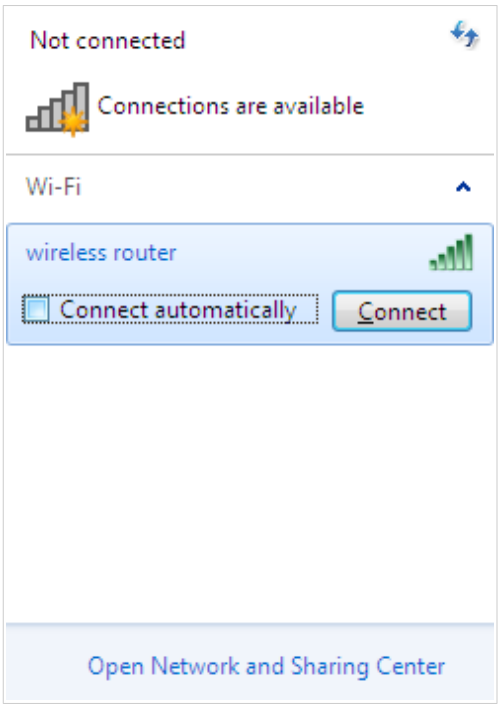

Figure 16. The list of available networks.

10. In the opened window, enter the network key (see the field **Password** on the back panel of the device) in the **Security key** field and click the **OK** button.
11. Wait for about 20-30 seconds. After the connection is established, the network icon will be displayed as the signal level scale.

Now you can connect to the web-based interface of DAP-1620 for configuring all needed parameters. To gain access to an external network (to the Internet), you also need to specify the default gateway and the addresses of DNS servers.

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

2 See the field **Wi-Fi Name (SSID) 2.4GHz** on the back panel of the device.
3 See the field **Wi-Fi Name (SSID) 5GHz** on the back panel of the device.

Configuring Wi-Fi Adapter in OS Windows 10

1. Click the **Start** button and proceed to the **Settings** window.
2. Select the **Network & Internet** section.

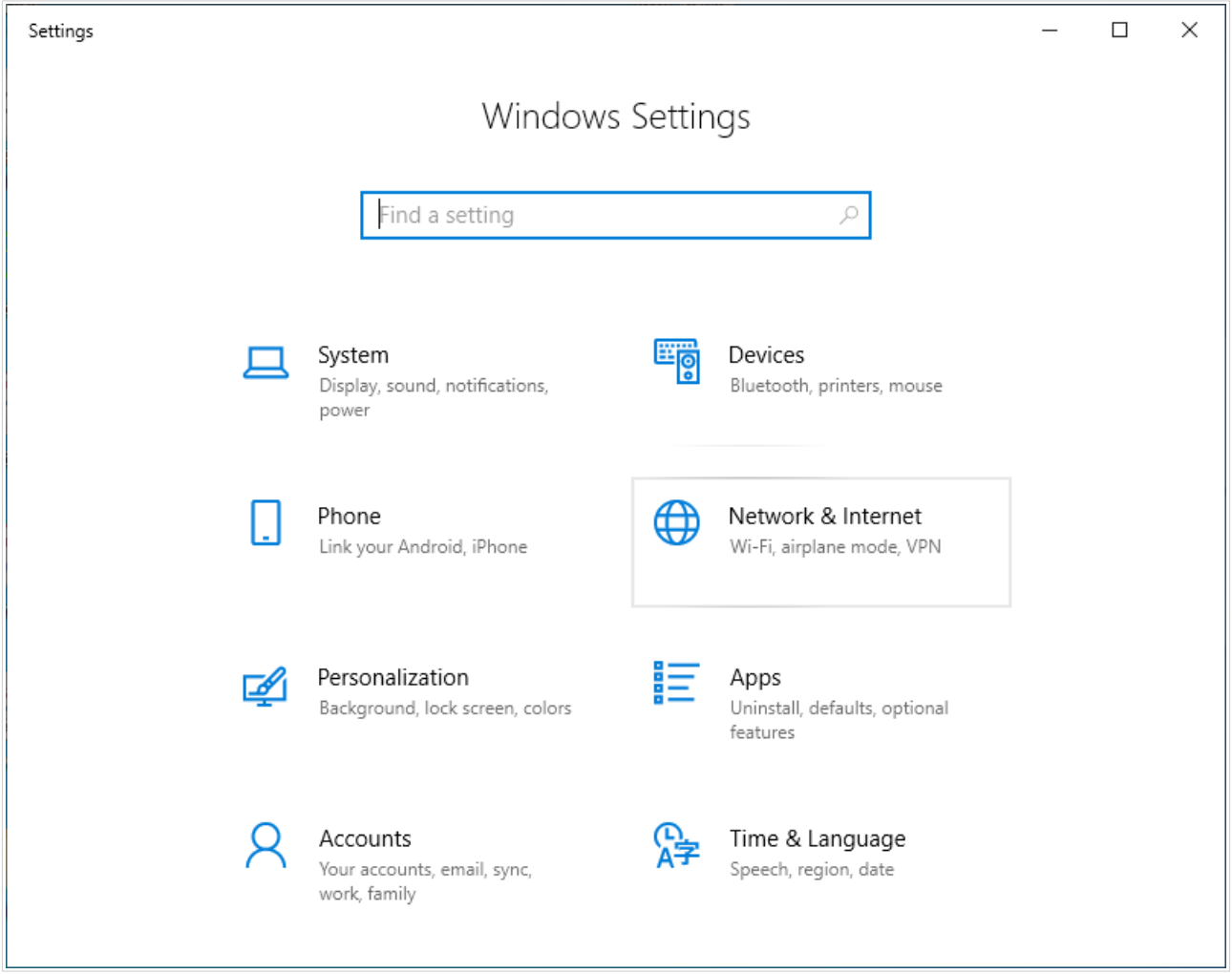

*Figure 17. The **Windows Settings** window.*

3. In the **Change your network settings** section, select the **Change adapter options** line.
4. In the opened window, right-click the relevant **Wireless Network Connection** icon. Make sure that your Wi-Fi adapter is on, then select the **Properties** line in the menu displayed.
5. In the **Wireless Network Connection Properties** window, on the **Networking** tab, select the **Internet Protocol Version 4 (TCP/IPv4)** line. Click the **Properties** button.

6. Select the **Use the following IP address** radio button and enter the value `192.168.0.51` in the **IP address** field. The **Subnet mask** field will be filled in automatically. Click the **OK** button.

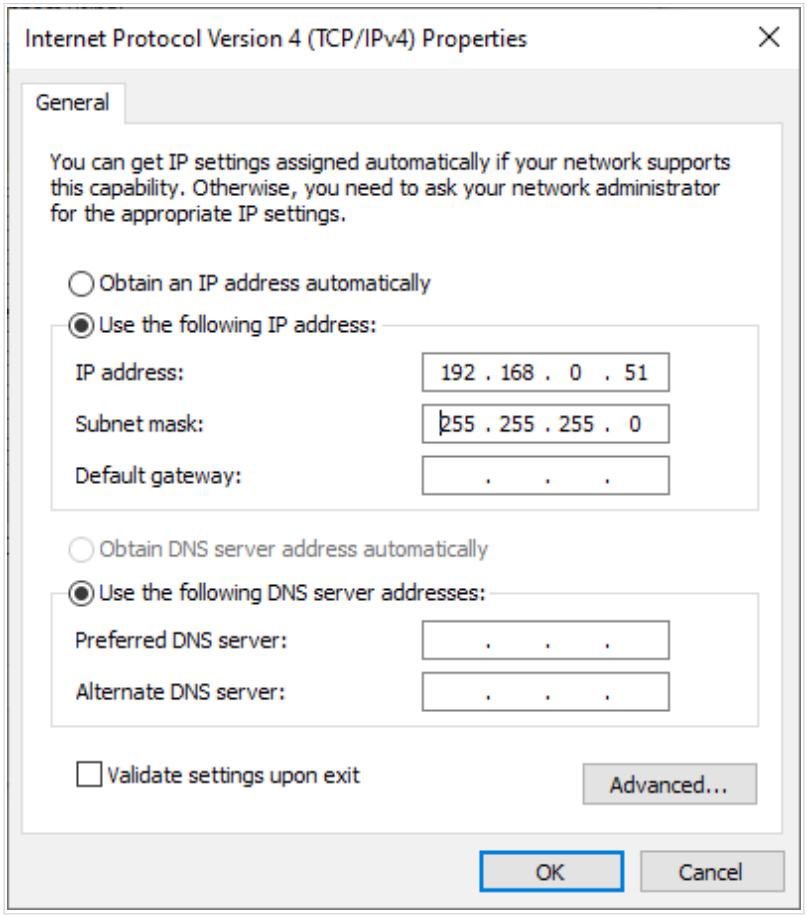

*Figure 18. The **Internet Protocol Version 4 (TCP/IPv4) Properties** window.*

7. Click the **Close** button in the connection properties window.
8. 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.

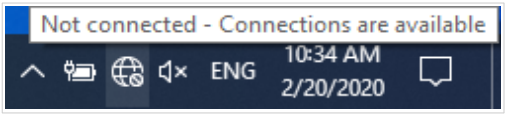

Figure 19. The notification area of the taskbar.

9. In the opened **Wireless Network Connection** window, select the wireless network **dlink-XXXX**[4] (for operating in the 2.4GHz band) or **dlink-XXXX-5GHz**[5] (for operating in the 5GHz band) and click the **Connect** button.

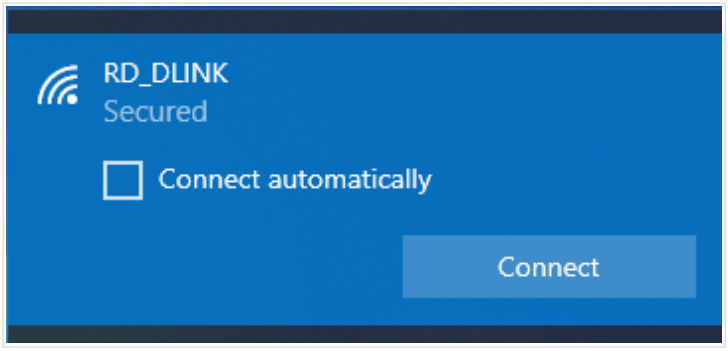

Figure 20. The list of available networks.

10. In the opened window, enter the network key (see the field **Password** on the back panel of the device) in the **Security key** field and click the **Next** button.
11. Allow or forbid your PC to be discoverable by other devices on this network (**Yes / No**).

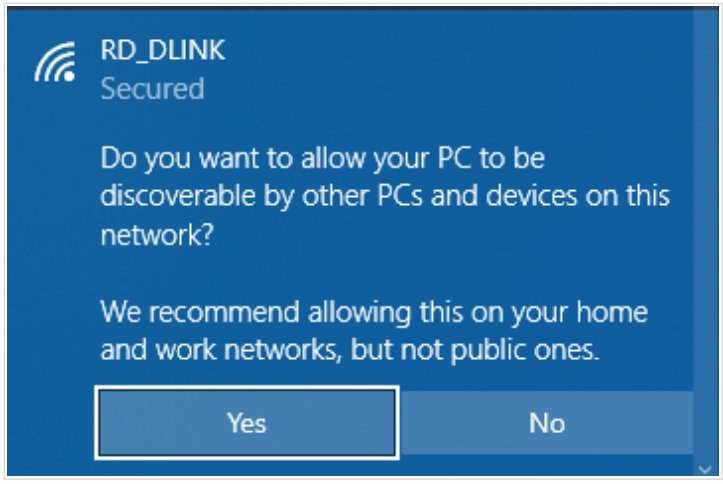

Figure 21. PC discovery settings.

12. Wait for about 20-30 seconds. After the connection is established, the network icon will be displayed as a dot with curved lines indicating the signal level.

Now you can connect to the web-based interface of DAP-1620 for configuring all needed parameters. To gain access to an external network (to the Internet), you also need to specify the default gateway and the addresses of DNS servers.

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

4 See the field **Wi-Fi Name (SSID) 2.4GHz** on the back panel of the device.
5 See the field **Wi-Fi Name (SSID) 5GHz** on the back panel of the device.

Connecting to Web-based Interface

When you have configured your computer, you can access the web-based interface and configure needed parameters (configure the wireless network, change the operating mode of the device, configure MAC-address-based filtering, etc.).

Start a web browser (see the ***Before You Begin*** section, page 14). In the address bar of the web browser, enter the IP address of the extender (by default, the following IP address is specified: `192.168.0.50`). Press the **Enter** key.

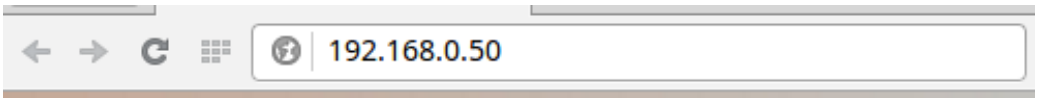

Figure 22. Connecting to the web-based interface of the DAP-1620 device.

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 extender, make sure that you have properly connected the extender to your computer.

If the device has not been configured previously or the default settings have been restored, after access to the web-based interface the Initial Configuration Wizard opens (see the ***Initial Configuration Wizard*** section, page 37).

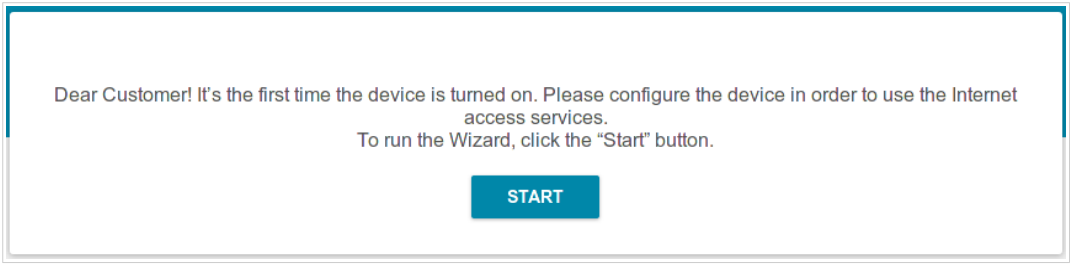

Figure 23. The page for running the Initial Configuration Wizard.

If you configured the device previously, after access to the web-based interface the login page opens. Enter the username (**admin**) in the **Username** field and the password you specified in the **Password** field, then click the **LOGIN** button.

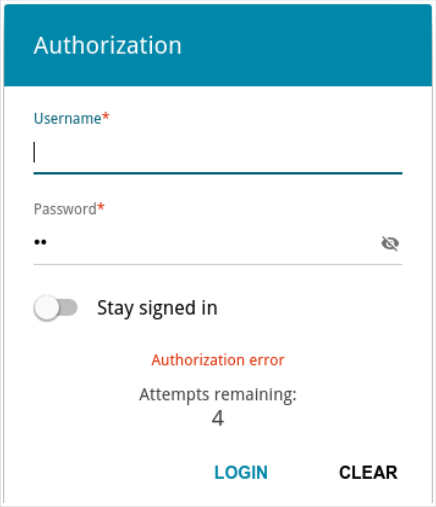

Figure 24. The login page.

In order not to log out, move the **Stay signed in** switch to the right. After closing the web browser or rebooting the device, you need to enter the username and the password again.

If you enter a wrong password several times, the web-based interface will be blocked for a while. Please wait for one minute and reenter the password you specified.

Web-based Interface Structure

Summary Page

On the **Summary** page, detailed information on the device state is displayed.

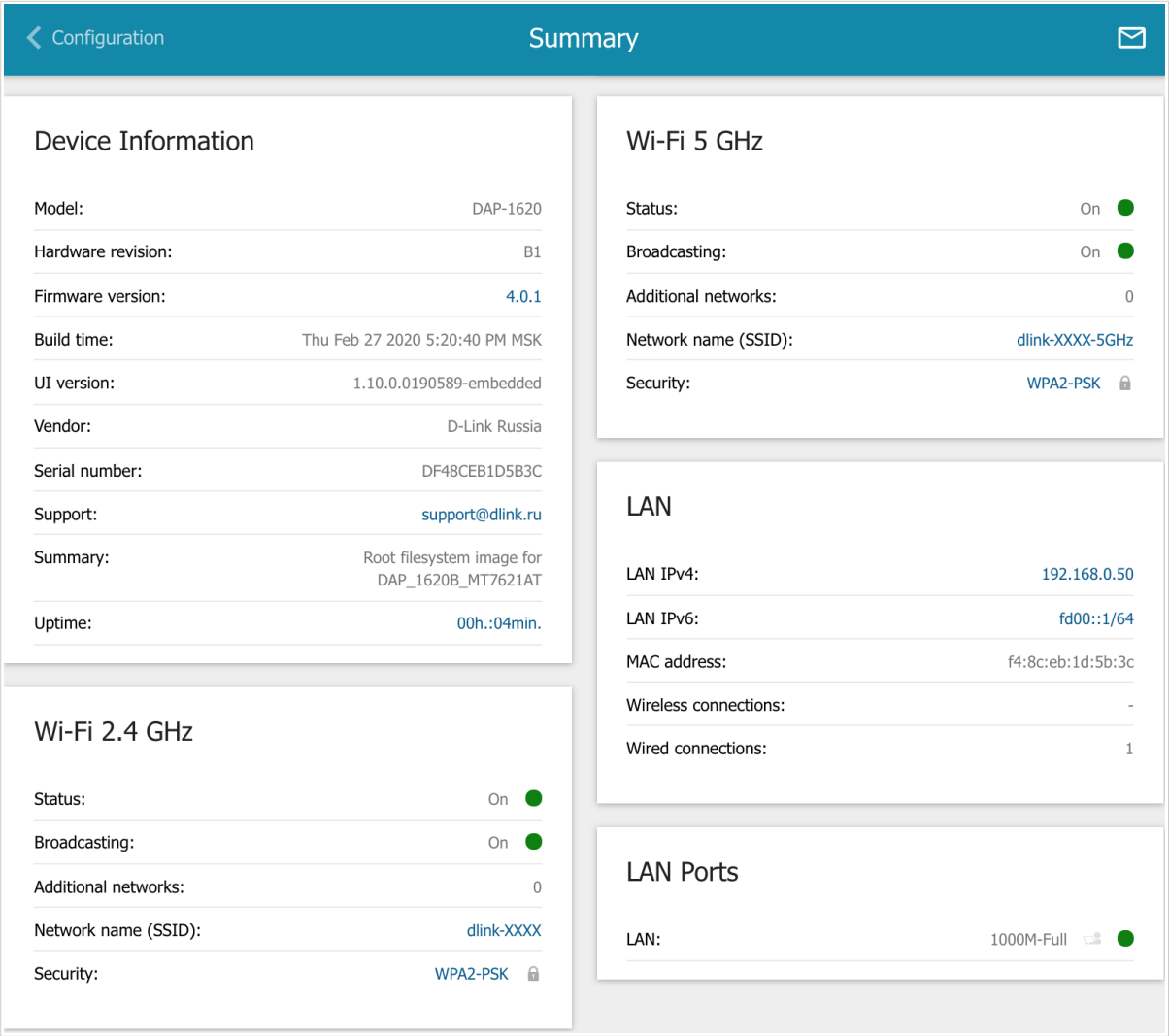

Figure 25. The summary page.

The **Device Information** section displays the model and hardware version of the extender, the firmware version, and other data.

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

The **Wi-Fi 2.4 GHz** and **Wi-Fi 5 GHz** sections display data on the state of the device's wireless network, its name and the authentication type, and availability of an additional wireless network in the relevant band.

In the **LAN** section, the IPv4 and IPv6 address of the extender, the LAN MAC address, and the number of wired and wireless clients of the device are displayed.

The **LAN Ports** section displays the state of the device's LAN port and its data transfer mode.

Other settings of the extender are available in the menu in the left part of the page.

Menu Sections

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

In the **Initial Configuration** section you can run the Initial Configuration Wizard. The Wizard allows you to configure the extender for operation in the needed mode and specify all parameters necessary for getting started (for the description of the Wizard, see the ***Initial Configuration Wizard*** section, page 37).

The pages of the **Statistics** section display data on the current state of the extender (for the description of the pages, see the ***Statistics*** section, page 47).

The page of the **Connections Setup** section is designed for configuring basic parameters of the LAN interface of the extender (for the description of the pages, see the ***Connections Setup*** section, page 52).

The pages of the **Wi-Fi** section are designed for specifying all needed settings of the extender's wireless network (for the description of the pages, see the ***Wi-Fi*** section, page 61).

The pages of the **Advanced** section are designed for configuring additional parameters of the extender (for the description of the pages, see the ***Advanced*** section, page 93).

The pages of the **System** section provide functions for managing the internal system of the extender (for the description of the pages, see the ***System*** section, page 100).

To exit the web-based interface, click the **Logout** line of the menu.

Notifications

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

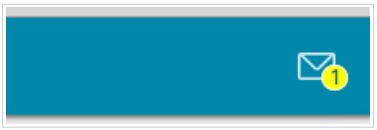

Figure 26. The web-based interface notifications.

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

CHAPTER 4. CONFIGURING VIA WEB-BASED INTERFACE

Initial Configuration Wizard

To start the Initial Configuration Wizard, go to the **Initial Configuration** section. On the opened page, click the **OK** button and wait until the factory default settings are restored.

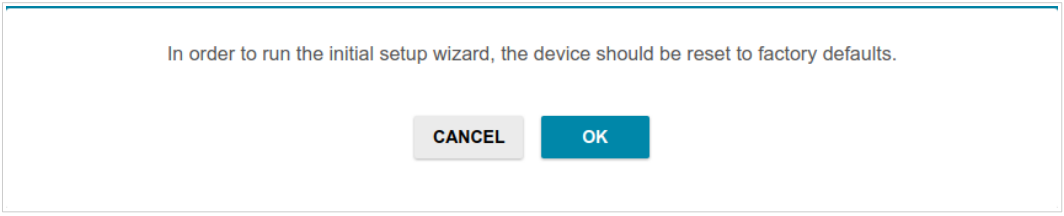

Figure 27. Restoring the default settings in the Wizard.

If you perform initial configuration of the extender via Wi-Fi connection, please make sure that you are connected to the wireless network of **DAP-1620** (see the WLAN name (SSID) on the back panel of the device) and click the **NEXT** button.

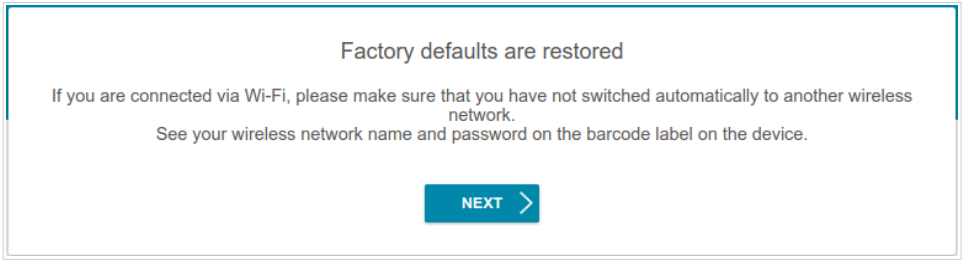

Figure 28. Checking connection to the wireless network.

Click the **START** button.

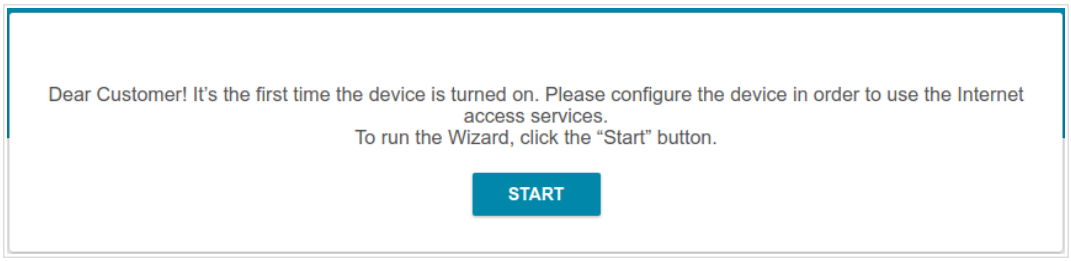

Figure 29. Starting the Wizard.

On the opened page, click **YES** in order to leave the current language of the web-based interface or click **NO** to select another language.

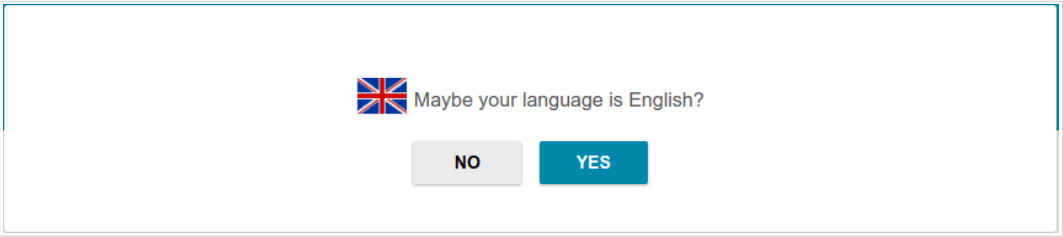

Figure 30. Selecting a language.

You can finish the wizard earlier and go to the menu of the web-based interface. To do this, click the **ADVANCED SETTINGS** button. On the opened page, change the default settings: specify the user's interface password in the **User's interface password** and **Password confirmation** fields and the name of the wireless network in the 2.4GHz and 5GHz bands in the **Network name 2.4 GHz (SSID)** and **Network name 5 GHz (SSID)** fields correspondingly. Then click the **APPLY** button.

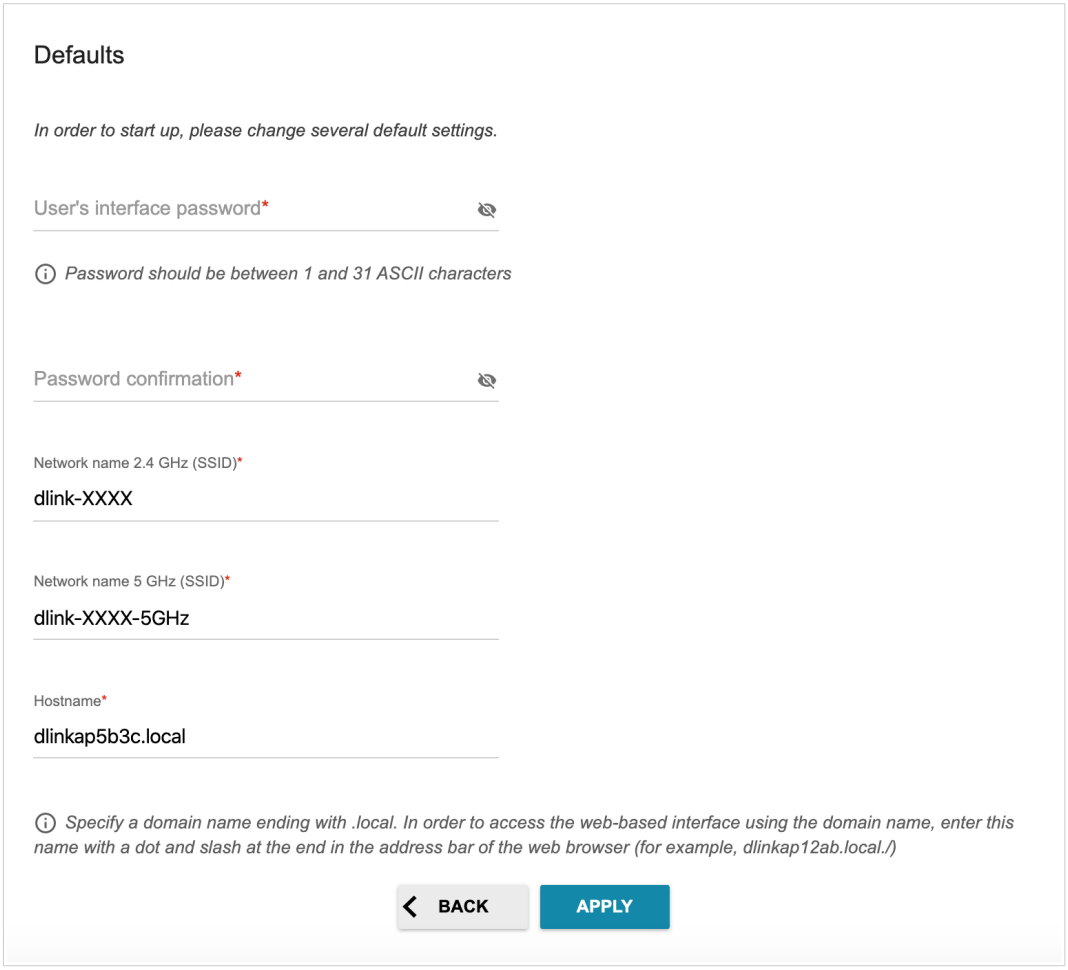

Figure 31. Changing the default settings.

To continue the configuration of the extender via the Wizard, click the **CONTINUE** button.

Selecting Operation Mode

Select the needed operation mode and click the **NEXT** button.

Access Point or Repeater

In order to connect your device to a wired router for adding a wireless network to the existing local network, on the **Device mode** page, from the **Connection method** list, select the **Autonomous** value. Then from the **Work mode** list, select the **Access point** value. In this mode you can change the LAN IP address, set your own settings for the wireless network in the 2.4GHz and 5GHz bands, and set your own password for access to the web-based interface of the device.

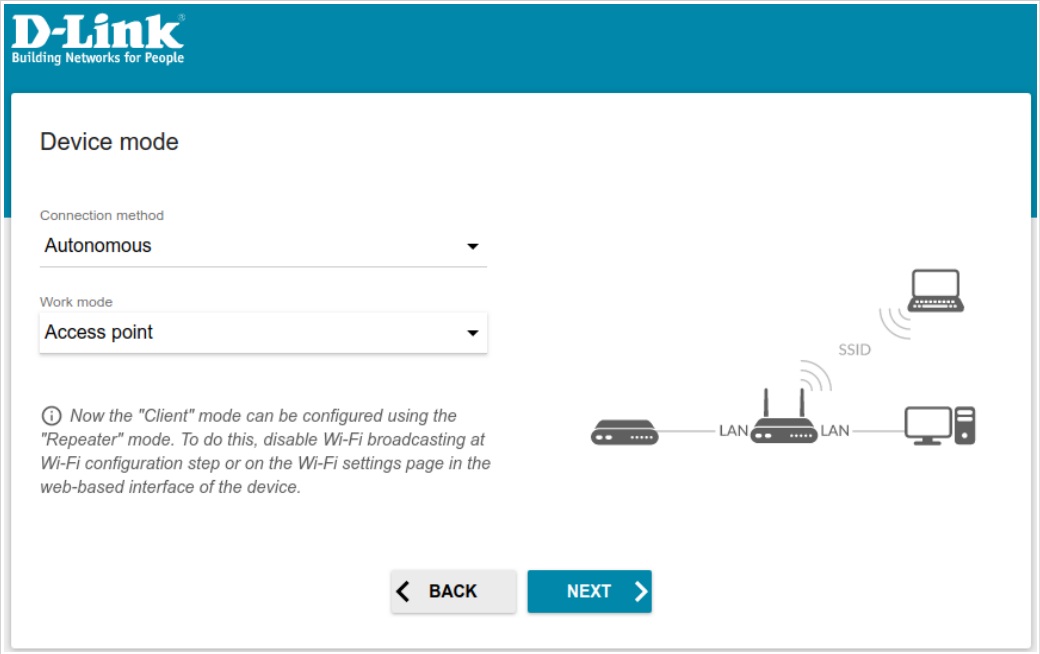

*Figure 32. Selecting an operation mode. The **Access point** mode.*

In order to connect your device to a wireless router for extending the range of the existing wireless network, on the **Device mode** page, from the **Connection method** list, select the **Autonomous** value. Then from the **Work mode** list, select the **Repeater** value. In this mode you can change the LAN IP address, connect your device to another access point, set your own settings for the wireless network in the 2.4GHz and 5GHz bands, and set your own password for access to the web-based interface of the device.

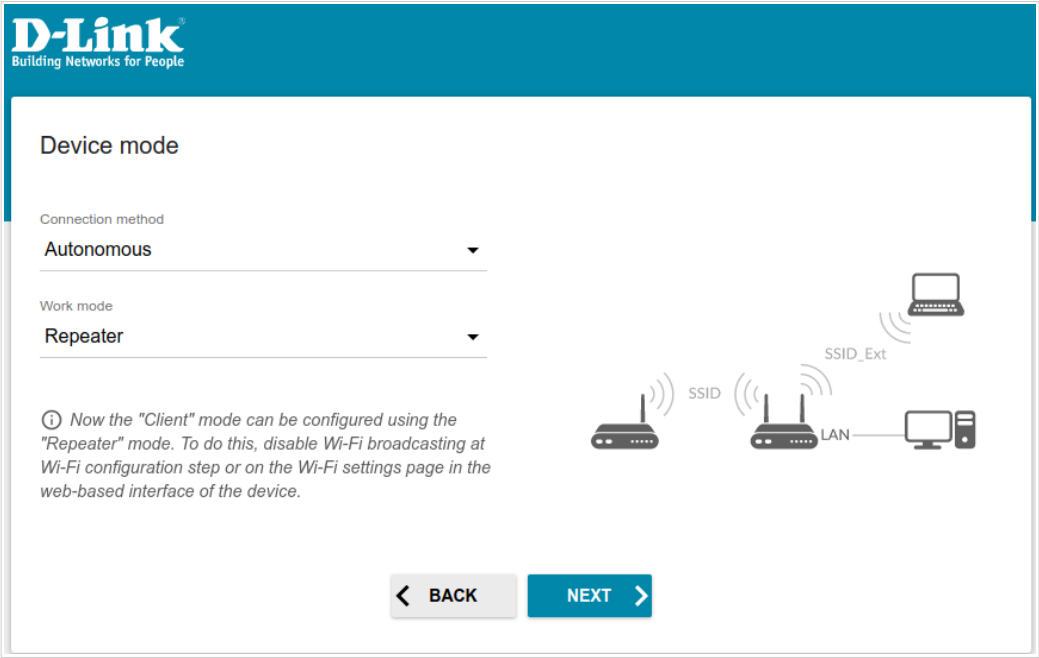

*Figure 33. Selecting an operation mode. The **Repeater** mode.*

Mesh Network Subordinate Device (Slave)

In order to configure DAP-1620 as a subordinate device of your Mesh network, from the **Connection method** list, select the **Super Mesh** value. Then from the **Device Role** list, select the **Slave** value. From the **Frequency band** list, select the band where your main device (in the Master role) operates.

Then a device in the Slave role is configured in the assess point mode. In this mode you can change the LAN IP address, set your own settings for the wireless network in the 2.4GHz and 5GHz bands, and set your own password for access to the web-based interface of the device.

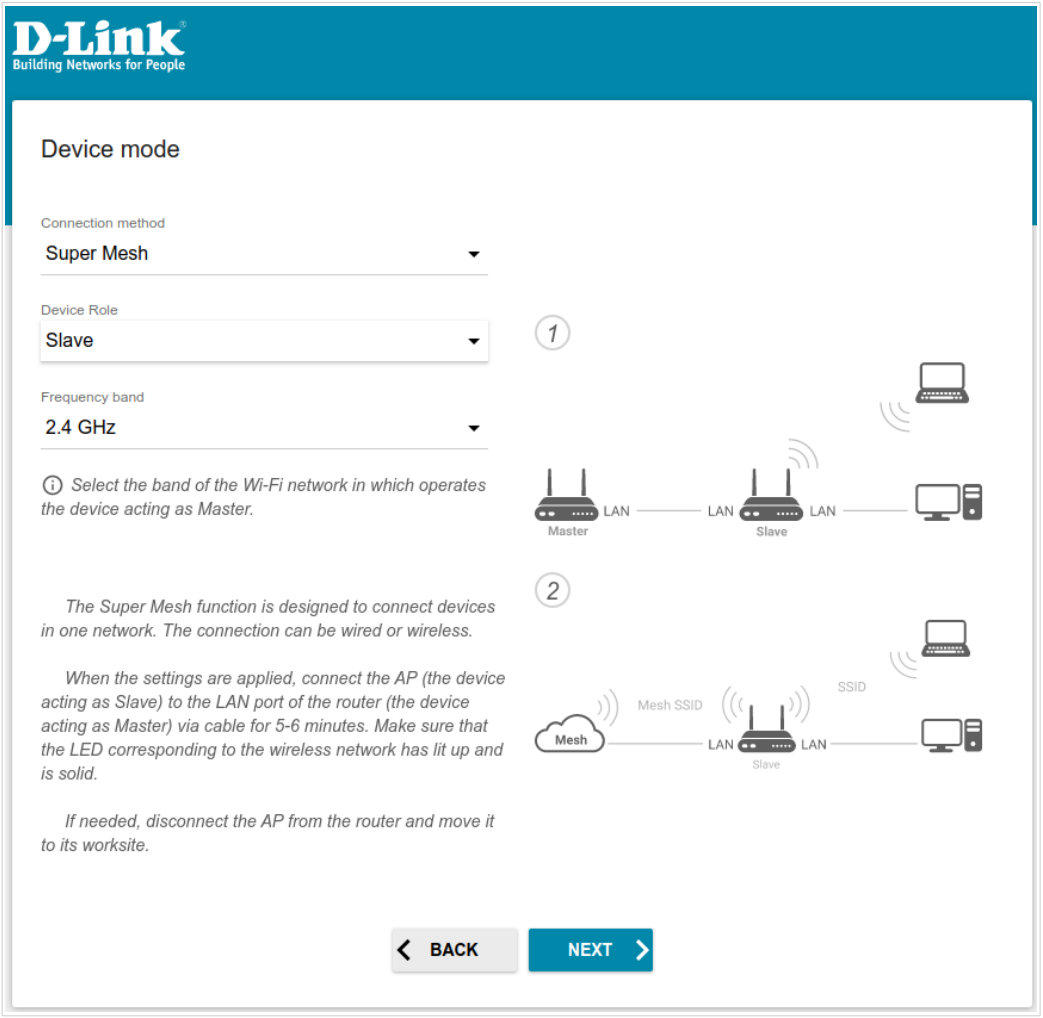

Figure 34. Configuring the Super Mesh function for a subordinate device.

Changing LAN IPv4 Address

1. Select the **Automatic obtainment of IPv4 address** to let the device automatically obtain the LAN IPv4 address.

If you want to manually assign the LAN IPv4 address for DAP-1620, do not select the **Automatic obtainment of IPv4 address** checkbox and fill in the **IP address**, **Subnet mask**, **DNS IP address**, **Hostname** fields and, if needed, the **Gateway IP address** field. Make sure that the assigned address does not coincide with the LAN IPv4 address of the router to which your device connects.

! If the LAN IPv4 address of DAP-1620 was changed, it may be necessary to change your PC's NIC settings.

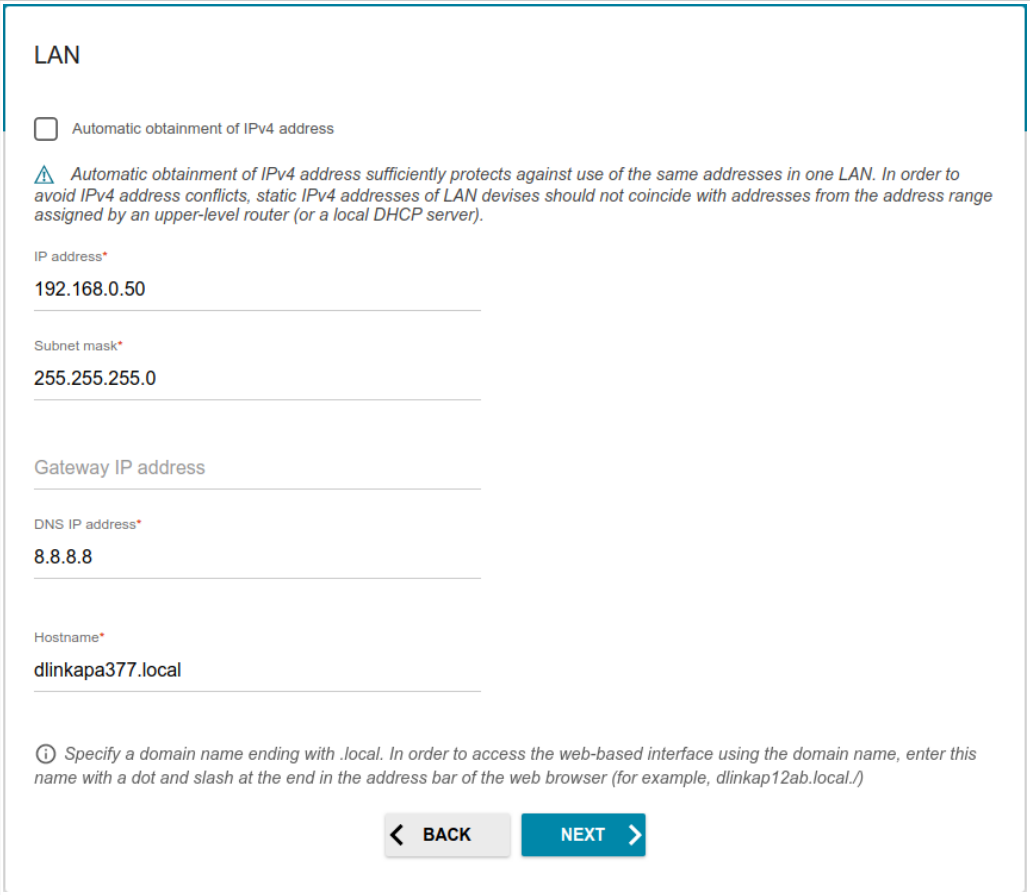

Figure 35. The page for changing the LAN IPv4 address.

2. Click the **NEXT** button to continue or click the **BACK** button to return to the previous page.

Wi-Fi Client

This configuration step is available for the **Repeater** mode.

1. On the **Wi-Fi Client** page, click the **WIRELESS NETWORKS** button and select the network to which you want to connect in the opened window. When you select a network, the **Network name (SSID)** and **BSSID** fields are filled in automatically.

If you cannot find the needed network in the list, click the **UPDATE LIST** icon ( ).

2. If a password is needed to connect to the selected network, fill in the relevant field. Click the **Show** icon ( ) to display the entered password.

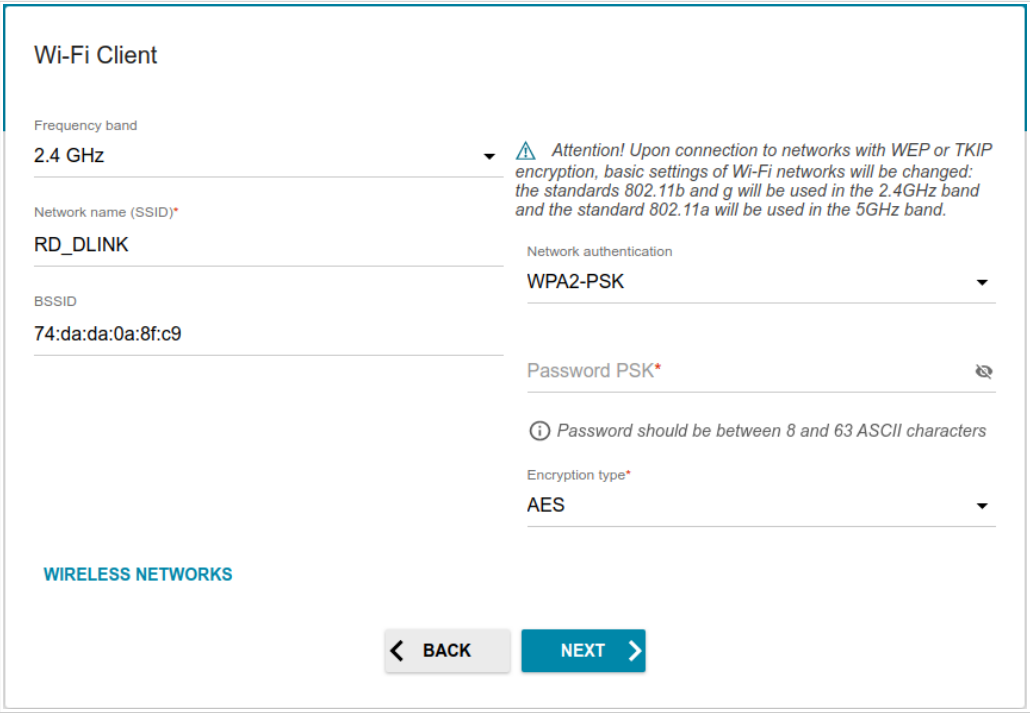

Figure 36. The page for configuring the Wi-Fi client.

If you connect to a hidden network, select the band where the hidden network operates from the **Frequency band** list and enter the network name in the **Network name (SSID)** field. Then select a needed value from the **Network authentication** list and then, if needed, enter the password in the relevant field.

When the **Open** authentication type is selected, the following settings are displayed on the page:

Parameter	Description
Enable encryption WEP	The checkbox activating WEP encryption. When the checkbox is selected, the **Default key ID** drop-down list, the **Encryption key WEP as HEX** checkbox, and four **Encryption key** fields are displayed on the page.
Default key ID	The number of the key (from first to fourth) which will be used for WEP encryption.

Parameter	Description
Encryption key WEP as HEX	Select the checkbox to set a hexadecimal number as a key for encryption.
Encryption key (1-4)	Keys for WEP encryption. The extender uses the key selected from the **Default key ID** drop-down list. It is required to specify all the fields. Click the **Show** icon ( ) to display the entered key.

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

Parameter	Description
Password PSK	A password for WPA encryption. Click the **Show** icon ( ) to display the entered password.
Encryption type	An encryption method: **TKIP**, **AES**, or **TKIP+AES**.

3. Click the **NEXT** button to continue or click the **BACK** button to return to the previous page.

Configuring Wireless Network

1. On the **Wireless Network 2.4 GHz** page, in the **Network name** field, specify your own name for the wireless network or leave the value suggested by the extender.
2. In the **Password** field, specify your own password for access to the wireless network or leave the value suggested by the extender (see the field **Password** on the back panel of the device).
3. If the extender is used as a Wi-Fi client, you can specify the same parameters of the wireless network as specified for the network to which you are connecting. To do this, click the **USE** button (available for the **Repeater** mode).
4. You can restore the parameters of the wireless network specified before resetting to factory defaults. To do this, click the **RESTORE** button.

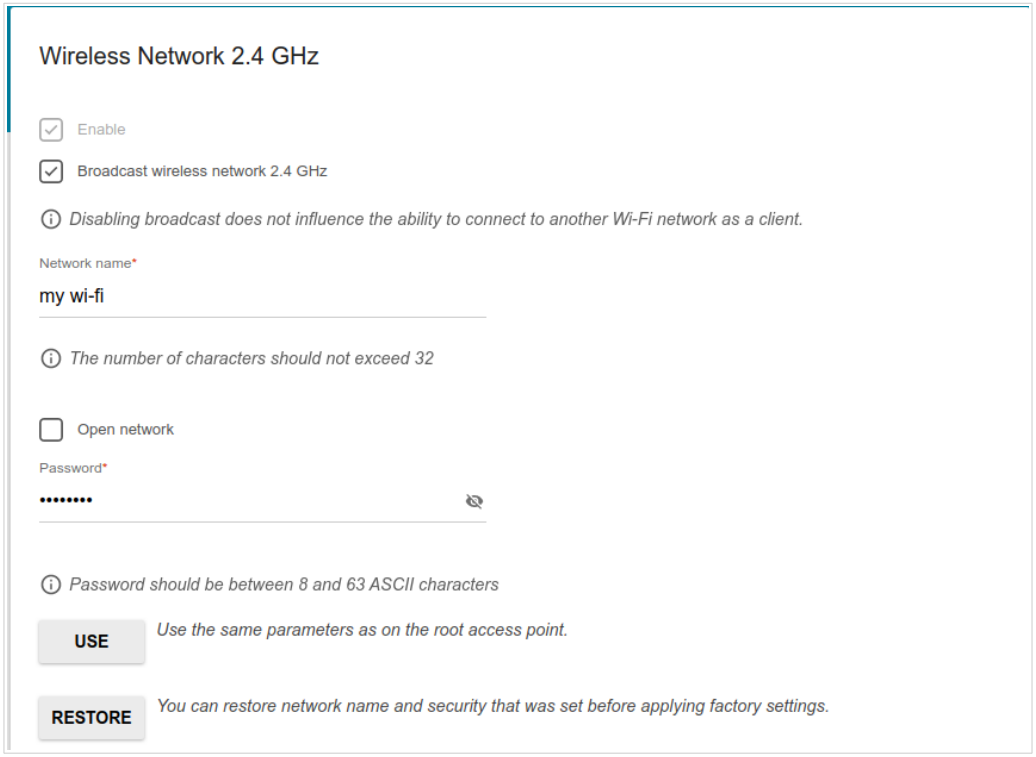

Figure 37. The page for configuring the wireless network.

5. Click the **NEXT** button to continue or click the **BACK** button to specify other settings.
6. On the **Wireless Network 5 GHz** page, specify needed settings for the wireless network in the 5GHz band and click the **NEXT** button.

Changing Web-based Interface Password

On this page, you should change the default user's interface password. To do this, enter a new password in the **User's interface password** and **Password confirmation** fields. You may set any password except **admin**. Use digits, Latin letters (uppercase and/or lowercase), and other characters available in the US keyboard layout.[6]

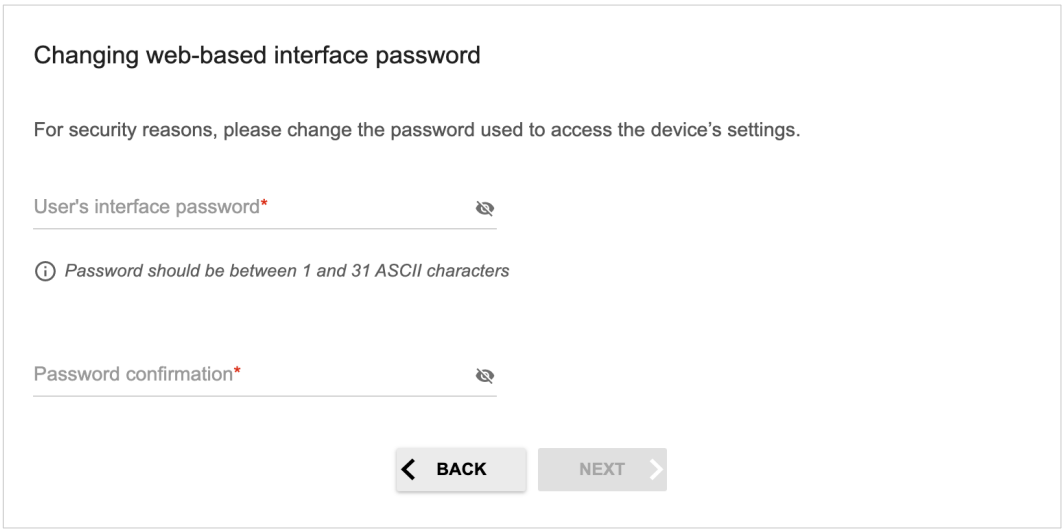

Figure 38. The page for changing the web-based interface password.

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

Click the **NEXT** button to continue or click the **BACK** button to return to the previous page.

On the next page, check all specified settings.

Also you can save a text file with parameters set by the Wizard to your PC. To do this, click the **SAVE CONFIGURATION FILE** button and follow the dialog box appeared.

To finish the Wizard, click the **APPLY** button. The extender will apply settings and reboot. Click the **BACK** button to specify other settings.

6 0-9, A-Z, a-z, space, !"#$%&'()*+,-./:;<=>?@[\]^_`{|}~.

Statistics

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

- network statistics
- IP addresses leased by the DHCP server
- data on devices connected to the extender's network and its web-based interface, and information on current sessions of these devices
- statistics for traffic passing through the port of the extender
- addresses of active multicast groups.

Network Statistics

On the **Statistics / Network Statistics** page, you can view statistics for all connections existing in the system (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), and volume of data received and transmitted (with increase of the volume the units of measurement are changed automatically: byte, Kbyte, Mbyte, Gbyte).

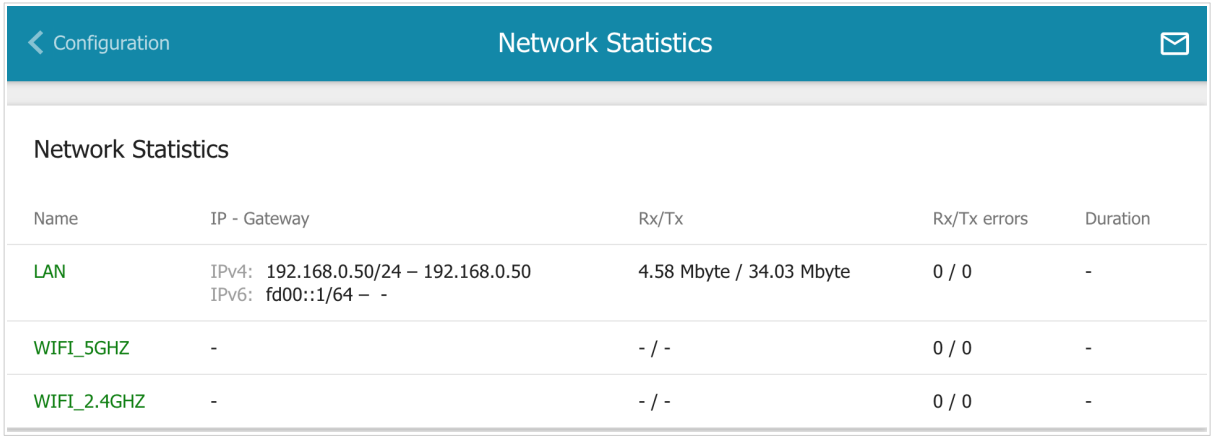

*Figure 39. The **Statistics / Network Statistics** page.*

To view detailed data on a connection, click the line corresponding to this connection.

DHCP

The **Statistics / 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).

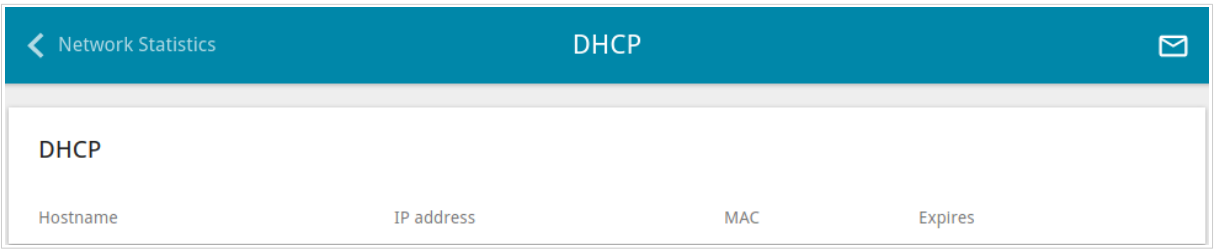

*Figure 40. The **Statistics / DHCP** page.*

Clients and Session

On the **Statistics / Clients and Session** page, you can view the list of devices connected to the local network of the extender and information on current sessions of each device.

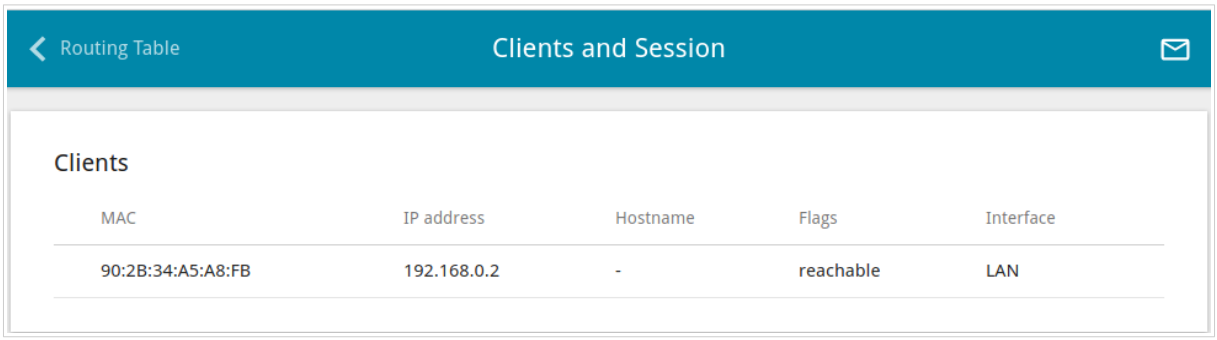

*Figure 41. The **Statistics / Clients and Session** page.*

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

To view the information on current sessions of a device, select this device in the table. On the opened page, the following data for each session of the selected device will be displayed: the protocol for network packet transmission, the source IP address and port, and the destination IP address and port.

Port Statistics

On the **Statistics / Port Statistics** page, you can view statistics for traffic passing through the port of the extender. The information shown on the page can be used for diagnosing connection problems.

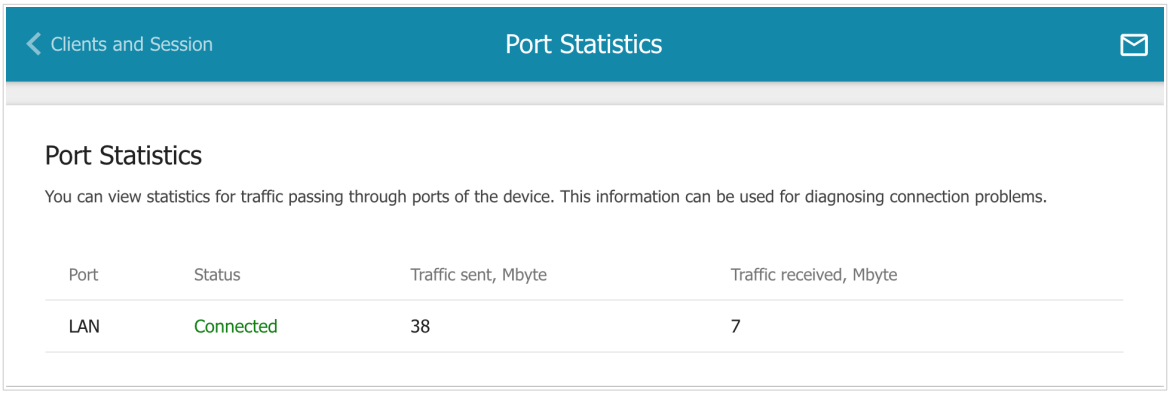

*Figure 42. The **Statistics / Port Statistics** page.*

To view the full list of counters for the port, click the line corresponding to the port.

Multicast Groups

The **Statistics / 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.

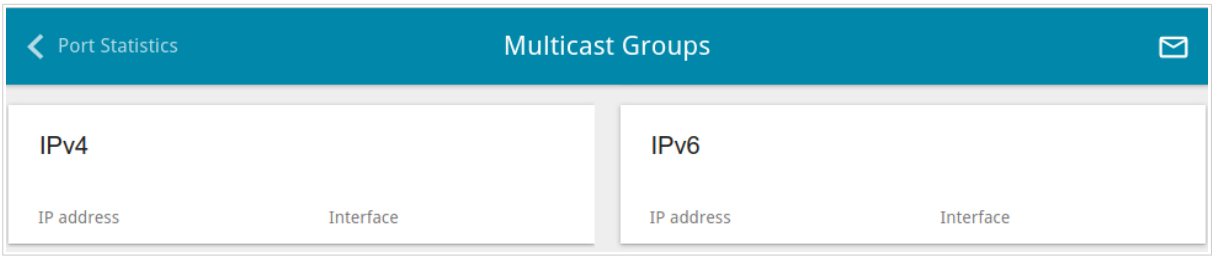

*Figure 43. The **Statistics / Multicast Groups** page.*

Connections Setup

In this menu you can configure basic parameters of the extender's local area network.

LAN

To configure the extender's local interface, go to the **Connections Setup / LAN** page.

IPv4

Go to the **IPv4** tab to change the IPv4 address of the extender, configure the built-in DHCP server, or specify MAC address and IPv4 address pairs.

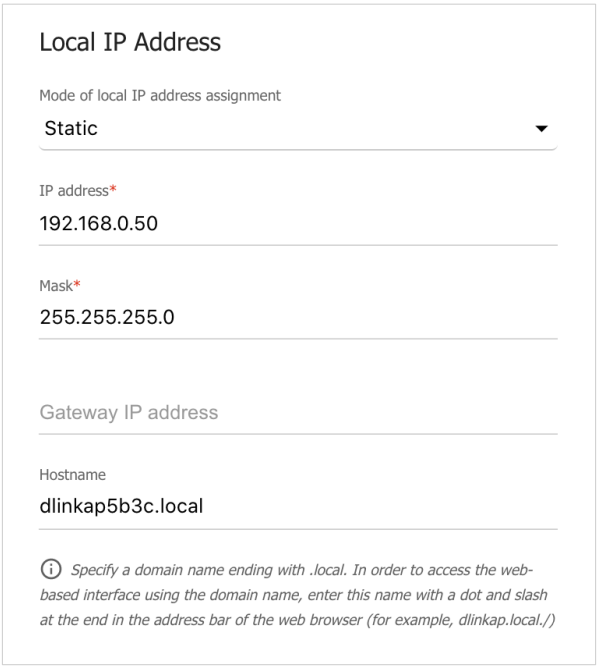

*Figure 44. Configuring the local interface. The **IPv4** tab. The **Local IP Address** section.*

Parameter	Description
Local IP Address	
Mode of local IP address assignment	Select the needed value from the drop-down list. • **Static**: The IPv4 address, subnet mask, and the gateway IP address are assigned manually. • **Dynamic**: The extender automatically obtains these parameters from the LAN DHCP server or from the router to which it connects.
IP address	The IPv4 address of the extender in the local subnet. By default, the following value is specified: `192.168.0.50`.
Mask	The mask of the local subnet. By default, the following value is specified: `255.255.255.0`.

Parameter	Description
Gateway IP address	The gateway IPv4 address which is used by the extender to connect to the Internet (e.g., for synchronizing the system time with an NTP server). *Optional*.
Hostname	The name of the device assigned to its IPv4 address in the local subnet.

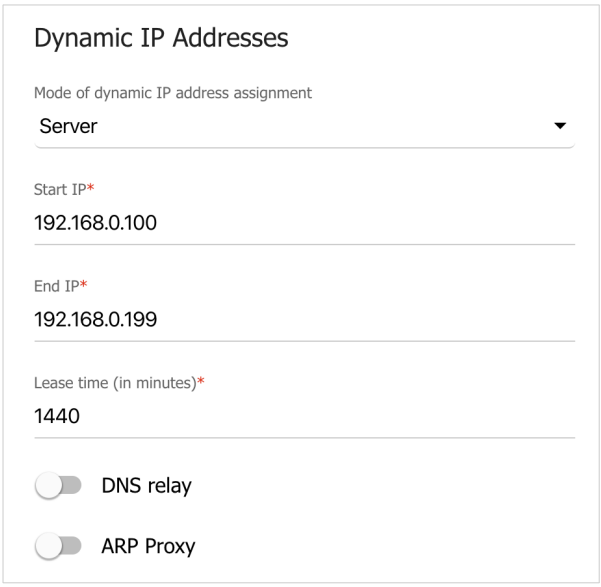

*Figure 45. Configuring the local interface. The **IPv4** tab. The **Dynamic IP Addresses** section.*

Parameter	Description
Dynamic IP Addresses	
Mode of dynamic IP address assignment	An operating mode of the extender's DHCP server. • **Disable**: The extender's DHCP server is disabled, clients' IP addresses are assigned manually. • **Server**: The extender assigns IP addresses to clients automatically in accordance with the specified parameters. When this value is selected, the **Start IP**, **End IP**, **Lease time** fields and the **DNS relay** and **ARP Proxy** switches are displayed on the tab. Also when this value is selected, the **DHCP Options** and **Static IP Addresses** sections are displayed on the tab.
Start IP	The start IP address of the address range used by the DHCP server to distribute IP addresses to clients.
End IP	The end IP address of the address range 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.

Parameter	Description
DNS relay	Move the switch to the right so that the devices connected to the extender obtain the address of the extender as the DNS server address. Move the switch to the left so that the devices connected to the extender obtain the address transmitted by the ISP or specified on the **Advanced / DNS** page as the DNS server address.
ARP Proxy	Move the switch to the right so that the extender uses its own MAC address to respond to ARP requests sent to devices in its LAN. Move the switch to the left so that the extender uses MAC addresses of devices in its LAN to respond to ARP requests sent to these devices.

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

In the **DHCP Options** section, you can change default values for some options of DHCP protocol (IP address, subnet mask, DNS servers) or specify additional parameters which the built-in DHCP server should send to clients to configure the local network.

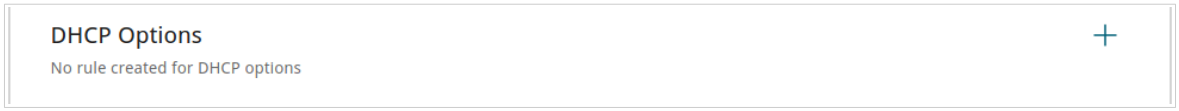

*Figure 46. Configuring the local interface. The **IPv4** tab. The section for configuring DHCP options.*

To do this, click the **ADD** button ( ).

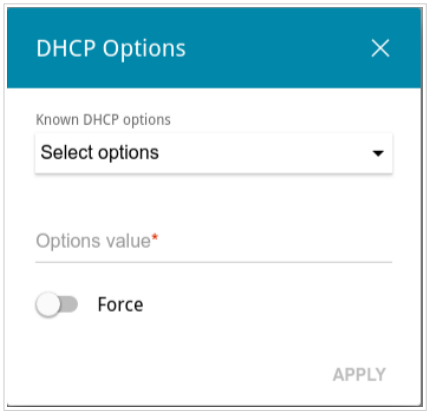

*Figure 47. Configuring the local interface. The **IPv4** tab. The window for configuring a DHCP option.*

In the opened window, you can specify the following parameters:

Parameter	Description
Known DHCP options	From the drop-down list, select an option which you want to configure.
Options value	Specify the value for the selected option.
Force	Move the switch to the right to let the DHCP server send the selected option regardless of the client's request. Move the switch to the left to let the DHCP server send the selected option only when the client requests it.

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

To edit the parameters of an option, left-click the relevant line in the table. In the opened window, change the needed parameters and click the **APPLY** button.

To remove the value of an option, 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 **Static IP Addresses** section, you can specify MAC address and IPv4 address pairs (set a fixed IPv4 address in the local area network for a device with a certain MAC address). The extender assigns IPv4 addresses in accordance with the specified pairs only when the DHCP server is enabled (in the **Dynamic IP Addresses** section, the **Server** value is selected from the **Mode of dynamic IP address assignment** drop-down list).

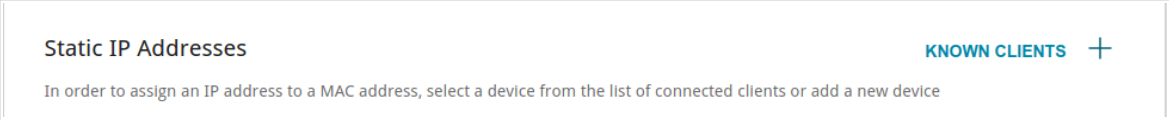

*Figure 48. Configuring the local interface. The **IPv4** tab. The section for creating MAC-IPv4 pairs.*

To create a MAC-IPv4 pair, click the **ADD** button ( ). In the opened window, fill in the **MAC address** field. You can choose a device connected to the extender's LAN at the moment. To do this, select the relevant MAC address from the drop-down list (the field will be filled in automatically). Then in the **IP address** field, enter an IPv4 address which will be assigned to the device with the specified MAC address. In the **Hostname** field, specify a network name of the device for easier identification (*optional*). Click the **APPLY** button.

To create MAC-IPv4 pairs for the devices connected to the extender at the moment, click the **KNOWN CLIENTS** button. In the opened window, select the needed device and click the **OK** button. To view the latest list of the connected devices, click the **REFRESH** button.

To edit the settings for an existing MAC-IPv4 pair, left-click the relevant line in the table. In the opened window, change the needed parameters and click the **APPLY** button.

To remove a MAC-IPv4 pair, select the checkbox located to the left of the relevant line in the table and click the **DELETE** button ( ). Then click the **APPLY** button. Also you can remove a pair in the editing window.

IPv6

Go to the **IPv6** tab to change the IPv6 address of the extender, configure IPv6 addresses assignment settings, or specify MAC address and IPv6 address pairs.

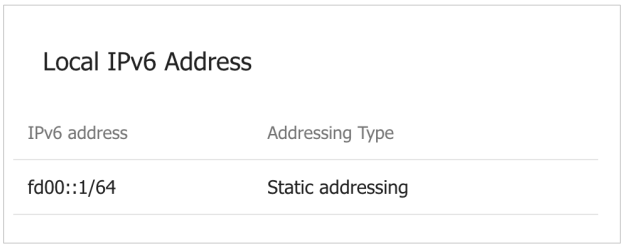

*Figure 49. Configuring the local interface. The **IPv6** tab. The **Local IPv6 Address** section.*

To change the IPv6 address of the extender, select it in the table.

*Figure 50. Configuring the local interface. The **IPv6** tab. The window for changing an IPv6 address.*

In the opened window, you can specify the following parameters:

Parameter	Description
Local IPv6 Address	
IPv6 address	The IPv6 address of the extender in the local subnet. By default, the following value is specified: `fd00::1`.
Prefix	The length of the prefix subnet. By default, the value `64` is specified.
Gateway IPv6 address	The gateway IPv6 address which is used by the extender to connect to the Internet (e.g., for synchronizing the system time with an NTP server). *Optional*.

Click the **APPLY** button.

In the **Dynamic IPv6 Addresses** section, you can configure IPv6 addresses assignment settings.

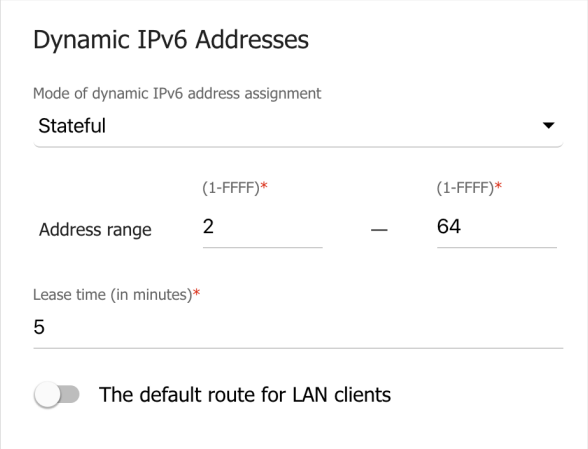

*Figure 51. Configuring the local interface. The **IPv6** tab. The **Dynamic IPv6 Addresses** section.*

Parameter	Description
Dynamic IPv6 Addresses	
Mode of dynamic IPv6 address assignment	Select the needed value from the drop-down list. • **Disable**: Clients' IPv6 addresses are assigned manually. • **Stateful**: The built-in DHCPv6 server of the extender allocates addresses from the range specified in the **Address range** fields. Also when this value is selected, the **Static IP Addresses** section is displayed on the tab. • **Stateless**: Clients themselves configure IPv6 addresses using the prefix.
Address range	The start and the end values for the latest hextet (16 bit) of the range of IPv6 addresses which the DHCPv6 server distributes to clients.
Lease time	The lifetime of IPv6 addresses provided to clients.
The default route for LAN clients	Move the switch to the right to let the clients, that received IPv6 addresses or configured them using the prefix, use the extender as the default IPv6 route.

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

In the **Static IP Addresses** section, you can specify MAC address and IPv6 address pairs (set a fixed IPv6 address in the local area network for a device with a certain MAC address). The extender assigns IPv6 addresses in accordance with the specified pairs only when the **Stateful** value is selected from the **Mode of dynamic IPv6 address assignment** drop-down list in the **Dynamic IPv6 Addresses** section.

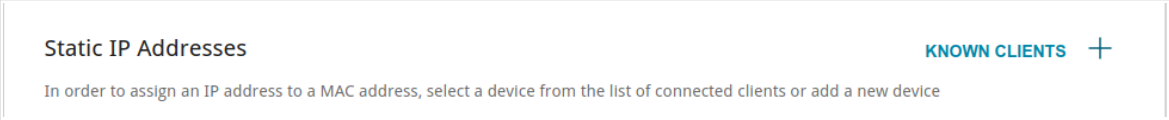

*Figure 52. Configuring the local interface. The **IPv6** tab. The section for creating MAC-IPv6 pairs.*

To create a MAC-IPv6 pair, click the **ADD** button ( ). In the opened window, fill in the **MAC address** field. You can choose a device connected to the extender's LAN at the moment. To do this, select the relevant MAC address from the drop-down list (the field will be filled in automatically). Then in the **IP address** field, enter an IPv6 address which will be assigned to the device with the specified MAC address. In the **Hostname** field, specify a network name of the device for easier identification (*optional*). Click the **APPLY** button.

To create MAC-IPv6 pairs for the devices connected to the extender at the moment, click the **KNOWN CLIENTS** button. In the opened window, select the needed device and click the **OK** button. To view the latest list of the connected devices, click the **REFRESH** button.

To edit the settings for an existing MAC-IPv6 pair, left-click the relevant line in the table. In the opened window, change the needed parameters and click the **APPLY** button.

To remove a MAC-IPv6 pair, select the checkbox located to the left of the relevant line in the table and click the **DELETE** button ( ). Then click the **APPLY** button. Also you can remove a pair in the editing window.

Wi-Fi

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

Basic Settings

In the **Wi-Fi / Basic Settings** section, you can change basic parameters for the wireless interface of the extender and configure the basic and additional wireless networks. To configure the 2.4GHz band or 5GHz band, go to the relevant tab.

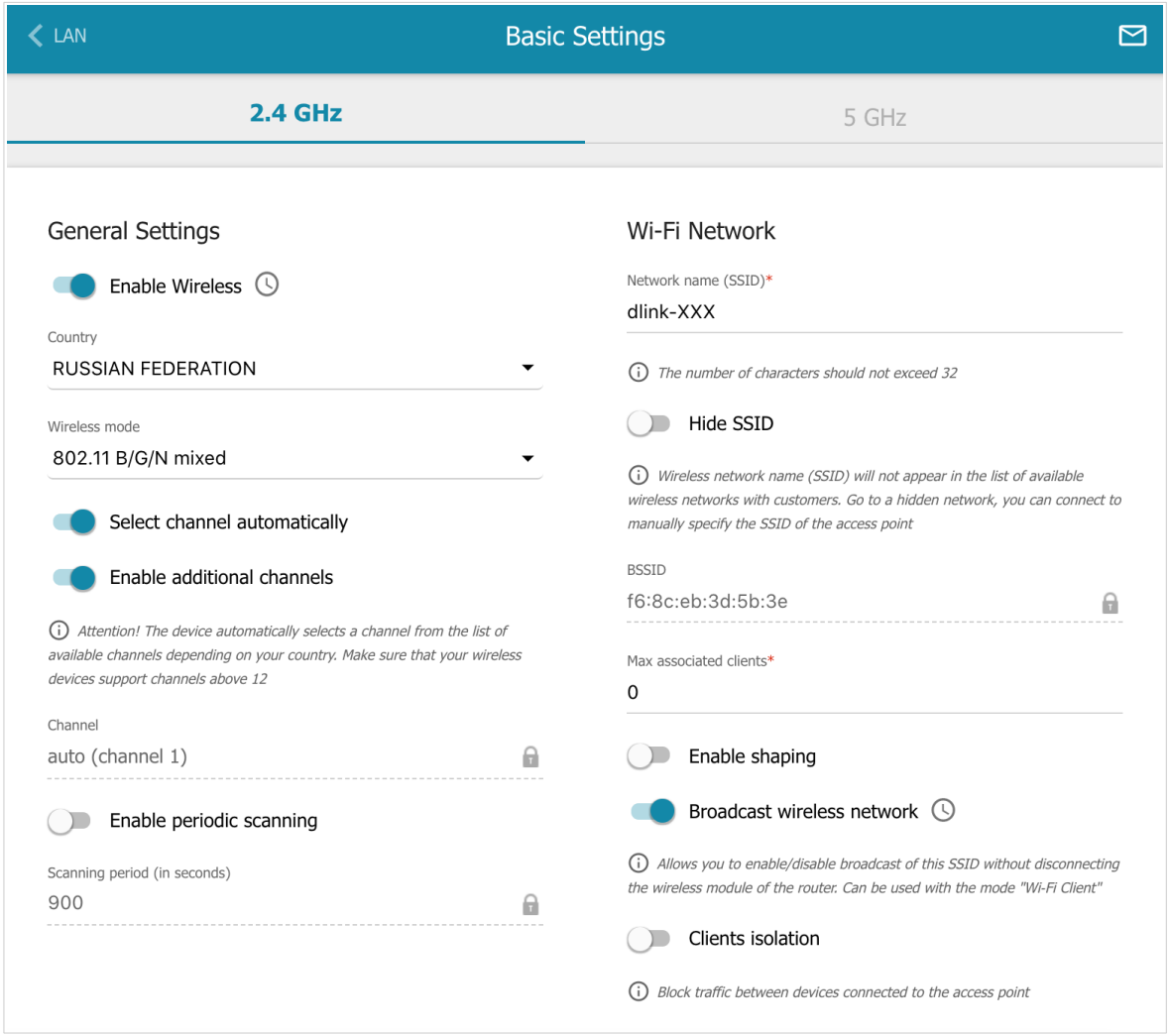

Figure 53. Basic settings of the wireless LAN in the 2.4GHz band.

In the **General Settings** section, the following parameters are available:

Parameter	Description
Enable Wireless	To enable Wi-Fi connection, move the switch to the right. To disable Wi-Fi connection, move the switch to the left. To enable/disable Wi-Fi connection on a schedule, click the **Set schedule** button ( ). In the opened window, you can create a new schedule (see the ***Schedule*** section, page 106) or use the existing one. Existing schedules are displayed in the **Interval of execution** drop-down list in the simplified mode. To enable Wi-Fi connection at the time specified in the schedule and disable it at the other time, select the **Enable wireless connection** value from the **Action** drop-down list and click the **SAVE** button. To disable Wi-Fi connection at the time specified in the schedule and enable it at the other time, select the **Disable wireless connection** value from the **Action** drop-down list and click the **SAVE** button. To change or delete the schedule, click the **Set schedule** button ( ). In the opened window, change the parameters and click the **SAVE** button or click the **DELETE FROM SCHEDULE** button.
Country	The country you are in. Select a value from the drop-down list.
Wireless mode	Operating mode of the wireless network of the extender. This parameter defines standards of the devices that will be able to use your wireless network. Select a value from the drop-down list.
Select channel automatically	Move the switch to the right to let the extender itself choose the channel with the least interference.
Enable additional channels	If the switch is moved to the left, the device automatically selects one of available standard channels. To use additional channels (the 12th and 13th – in the 2.4 GHz band, the 100th and higher – in the 5 GHz band), move the switch to the right.
Channel	The wireless channel number. Left-click to open the window for selecting a channel (the action is available, when the **Select channel automatically** switch is moved to the left).
Enable periodic scanning	Move the switch to the right to let the extender search for a free channel in certain periods of time. When the switch is moved to the right, the **Scanning period** field is available for editing.
Scanning period	Specify a period of time (in seconds) after which the extender rescans channels.

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

To edit the settings of the basic wireless network, in the **Wi-Fi Network** section, change the needed parameters and click the **APPLY** button.

Also you can create an additional wireless network. To do this, click the **ADD WI-FI NETWORK** button. On the opened page, specify the relevant parameters.

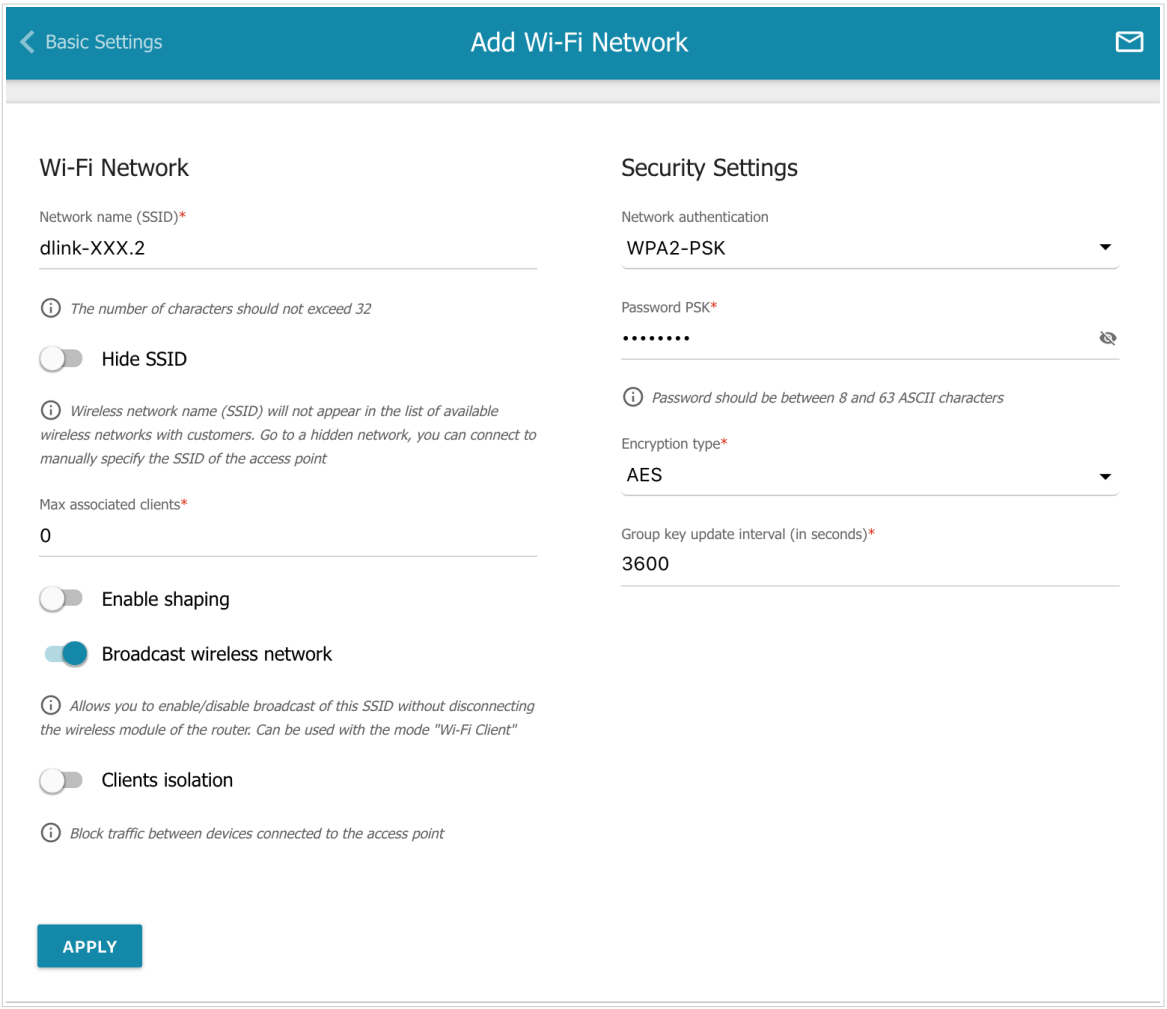

Figure 54. Creating a wireless network.

Parameter	Description
Wi-Fi Network	
Network name (SSID)	A name for the wireless network. The name can consist of digits and Latin characters.
Hide SSID	If the switch is moved to the right, other users cannot see your Wi-Fi network. It is recommended not to hide the network in order to simplify initial configuration of the wireless network.
BSSID	The unique identifier for this wireless network. You cannot change the value of this parameter, it is determined in the device's internal settings. The field is displayed in the settings of the existing wireless network.

Parameter	Description
Max associated clients	The maximum number of devices connected to the wireless network. When the value `0` is specified, the device does not limit the number of connected clients.
Enable shaping	Move the switch to the right to limit the maximum bandwidth of the wireless network. In the **Shaping** field displayed, specify the maximum value of speed (Mbit/s). Move the switch to the left not to limit the maximum bandwidth.
Broadcast wireless network	If the wireless network broadcasting is disabled, devices cannot connect to the wireless network. Upon that DAP-1620 can connect to another access point as a wireless client. To enable/disable broadcasting on a schedule, click the **Set schedule** button ( ). In the opened window, you can create a new schedule (see the ***Schedule*** section, page 106) or use the existing one. Existing schedules are displayed in the **Interval of execution** drop-down list in the simplified mode. To enable broadcasting at the time specified in the schedule and disable it at the other time, select the **Enable wireless network broadcasting** value from the **Action** drop-down list and click the **SAVE** button. When the wireless connection is disabled, the device will not be able to enable broadcasting of this wireless network on schedule. To disable broadcasting at the time specified in the schedule and enable it at the other time, select the **Disable wireless network broadcasting** value from the **Action** drop-down list and click the **SAVE** button. To change or delete the schedule, click the **Set schedule** button ( ). In the opened window, change the parameters and click the **SAVE** button or click the **DELETE FROM SCHEDULE** button. If you created an additional network, you can configure, change or delete a schedule for each network. To do this, click the button in the line of the network.
Clients isolation	Move the switch to the right to forbid wireless clients of this wireless network to communicate to each other.

In the **Security Settings** section, you can change security settings of the wireless network.

By default, the **WPA2-PSK** network authentication type of both bands of the wireless network is specified. The value of the **Password** field from the back panel is used as the network key.

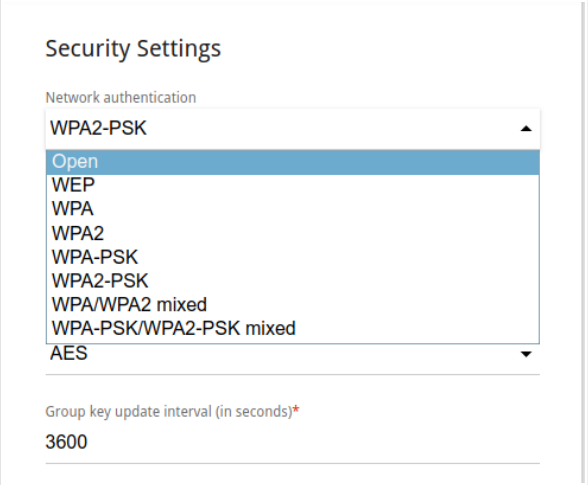

Figure 55. Network authentication types supported by the extender.

The extender supports the following authentication types:

Authentication type	Description
Open	Open authentication (with WEP encryption for wireless network modes not supporting 802.11n or 802.11ac devices).
WEP	Authentication with a shared key with WEP encryption. This authentication type is not available when a mode supporting 802.11n or 802.11ac devices is selected from the **Wireless mode** drop-down list on the **Wi-Fi / Basic Settings** page.
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 wireless network.
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 wireless network.

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

When the **Open** or **WEP** value is selected, the following settings are displayed on the page (unavailable for the wireless network operating modes which support the standard 802.11n or 802.11ac):

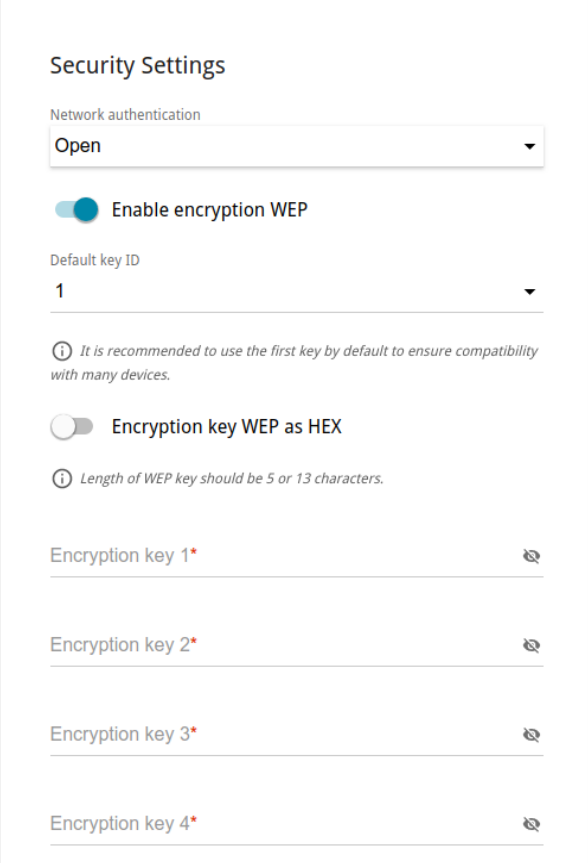

*Figure 56. The **Open** value is selected from the **Network authentication** drop-down list.*

Parameter	Description
Enable encryption WEP	*For **Open** authentication type only.* To activate WEP encryption, move the switch to the right. Upon that the **Default key ID** drop-down list, the **Encryption key WEP as HEX** switch, and four **Encryption key** fields are displayed on the page.
Default key ID	The number of the key (from first to fourth) which will be used for WEP encryption.
Encryption key WEP as HEX	Move the switch to the right to set a hexadecimal number as a key for encryption.
Encryption key (1-4)	Keys for WEP encryption. The extender uses the key selected from the **Default key ID** drop-down list. It is required to specify all the fields. Click the **Show** icon ( ) to display the entered key.

When the **WPA-PSK**, **WPA2-PSK**, or **WPA-PSK/WPA2-PSK mixed** value is selected, the following fields are displayed on the page:

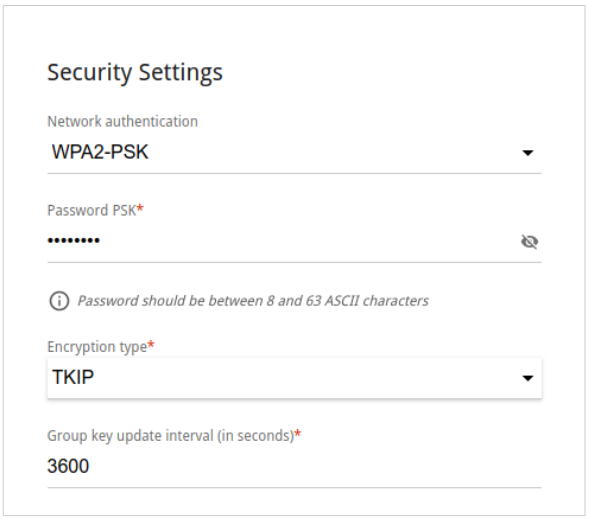

*Figure 57. The **WPA2-PSK** value is selected from the **Network authentication** drop-down list.*

Parameter	Description
Password PSK	A password for WPA encryption. The password can contain digits, Latin letters (uppercase and/or lowercase), and other characters available in the US keyboard layout.[7] Click the **Show** icon ( ) to display the entered password.
Encryption type	An encryption method: **TKIP**, **AES**, or **TKIP+AES**.
Group key update interval	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.

7 0-9, A-Z, a-z, space, !"#$%&'()*+,-./:;<=>?@[\]^_`{|}~.

When the **WPA**, **WPA2**, or **WPA/WPA2 mixed** value is selected, the following settings are displayed on the page:

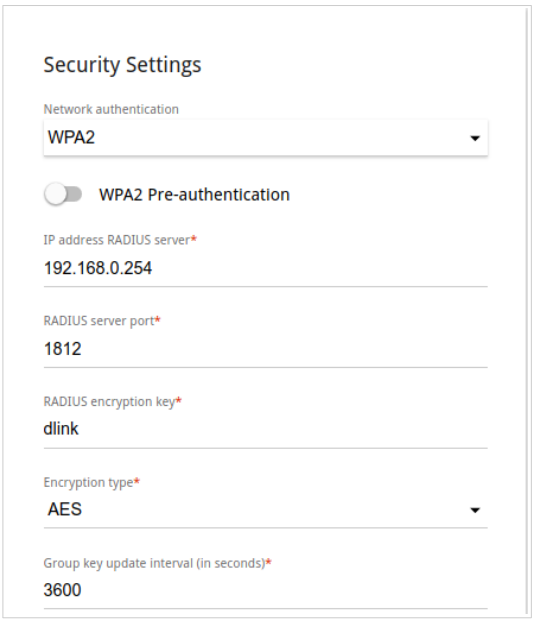

*Figure 58. The **WPA2** value is selected from the **Network authentication** drop-down list.*

Parameter	Description
WPA2 Pre-authentication	Move the switch to the right to activate preliminary authentication (displayed only for the **WPA2** and **WPA/WPA2 mixed** authentication types).
IP address RADIUS server	The IP address of the RADIUS server.
RADIUS server port	A port of the RADIUS server.
RADIUS encryption key	The password which the extender uses for communication with the RADIUS server (the value of this parameter is specified in the RADIUS server settings).
Encryption type	An encryption method: **TKIP**, **AES**, or **TKIP+AES**.
Group key update interval	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.

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

To edit the basic or additional wireless network, left-click the relevant line in the table. On the opened page, change the needed parameters and click the **APPLY** button.

To remove the additional network, select the checkbox located to the left of the relevant line in the table and click the **DELETE** button ( ). Then click the **APPLY** button.

Client Management

On the **Wi-Fi / Client Management** page, you can view the list of wireless clients connected to the extender.

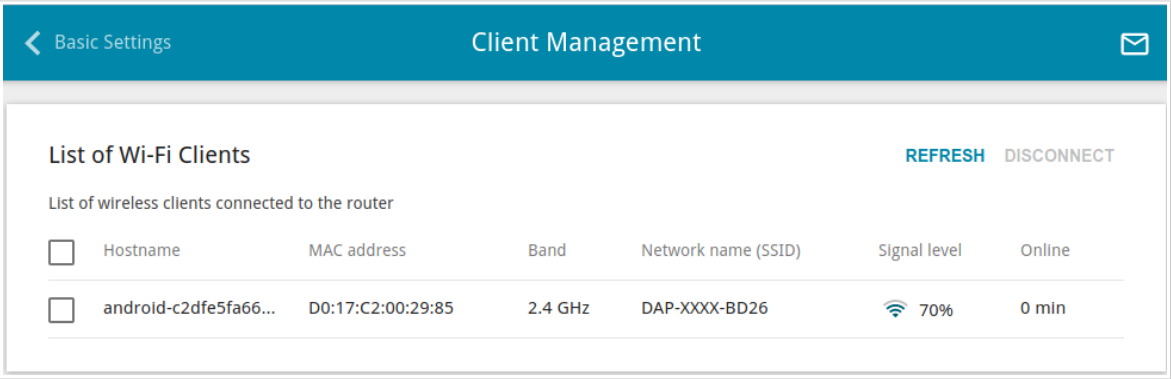

Figure 59. The page for managing the wireless clients.

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

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

To view the latest data on a connected device, left-click the line containing the MAC address of this device.

WPS

On the **Wi-Fi / WPS** page, you can enable the function for configuration of the WLAN and select a method for connection to the WLAN.

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

! The WPS function allows adding devices only to the basic wireless network of the extender.

! 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. When other security settings are specified, controls of the **WPS** page on the tab of the relevant band are not available.

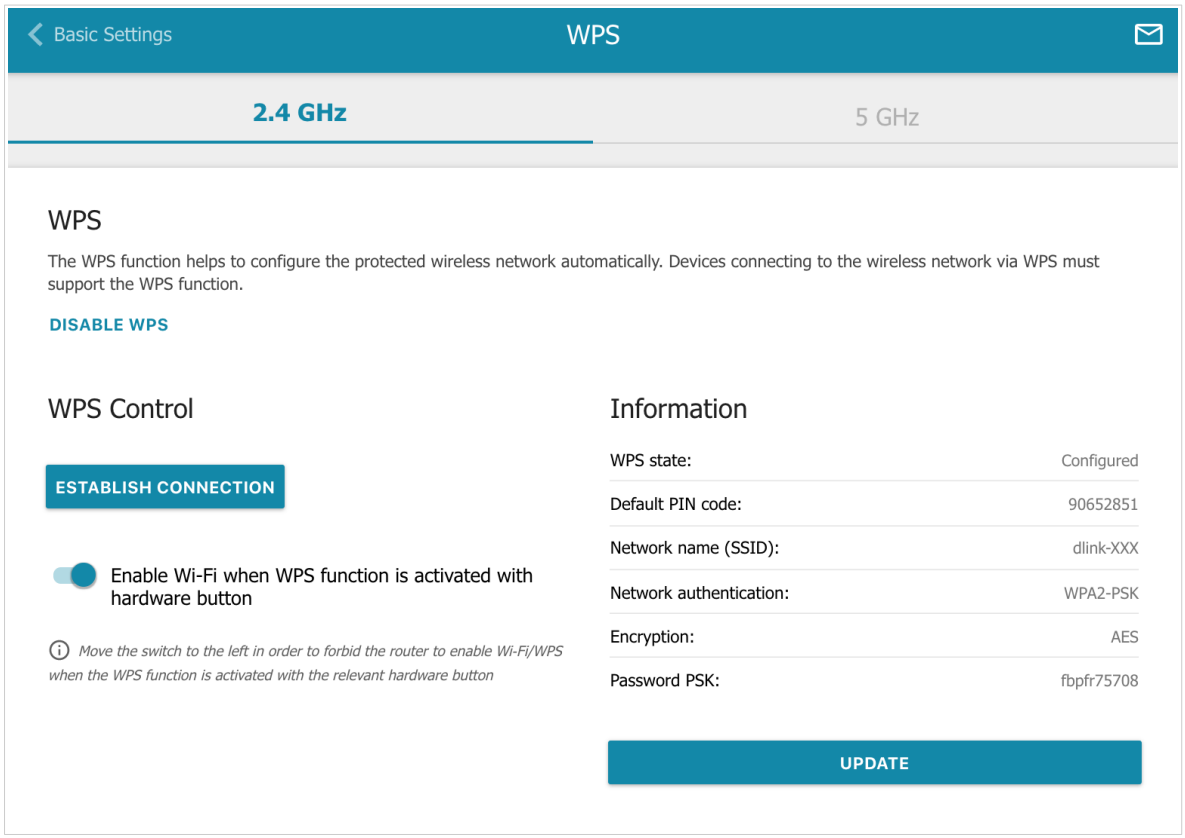

Figure 60. The page for configuring the WPS function.

To activate the WPS function, on the tab of the relevant band, click the **ENABLE WPS** button.

When the WPS function is enabled, the **Information** section is available on the page.

Parameter	Description
WPS state	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).
Default PIN code	The PIN code of the extender. This parameter is used when connecting the extender to a registrar to set the parameters of the WPS function.
Network name (SSID)	The name of the extender's wireless network.
Network authentication	The network authentication type specified for the wireless network.
Encryption	The encryption type specified for the wireless network.
Password PSK	The encryption password specified for the wireless network.
UPDATE	Click the button to update the data on the page.

Using WPS Function via Web-based Interface

To connect to the basic wireless network via the PIN method of the WPS function, follow the next steps:

1. Click the **ENABLE WPS** button.
2. In the **WPS Control** section, click the **ESTABLISH CONNECTION** button.
3. In the opened window, 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 extender'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 extender.

To connect to the basic wireless network via the PBC method of the WPS function, follow the next steps:

1. Click the **ENABLE WPS** button.
2. In the **WPS Control** section, click the **ESTABLISH CONNECTION** button.
3. In the opened window, 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 extender'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. Right after that, click the **CONNECT** button in the web-based interface of the extender.

Using WPS Function without Web-based Interface

You can use the WPS function without accessing the web-based interface of the extender. To do this, you need to configure the following extender's settings:

1. Specify relevant security settings for the wireless network of the extender.
2. Click the **ENABLE WPS** button.
3. Save the settings and close the web-based interface (click the **SAVE** button in the notification and then click the **Logout** line of the menu).

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

1. Select the PBC method in the software of the wireless device that you want to connect to the extender'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 extender, hold it for 2 seconds, and release. The **POWER/WPS** LED will start blinking.

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.

Select the needed action from the drop-down list in the **Work mode** section to configure the WMM function:

- **Auto**: the settings of the WMM function are configured automatically (the value is specified by default).
- **Manual**: the settings of the WMM function are configured manually. When this value is selected, the **Access Point** and **Station** sections are displayed on the page.

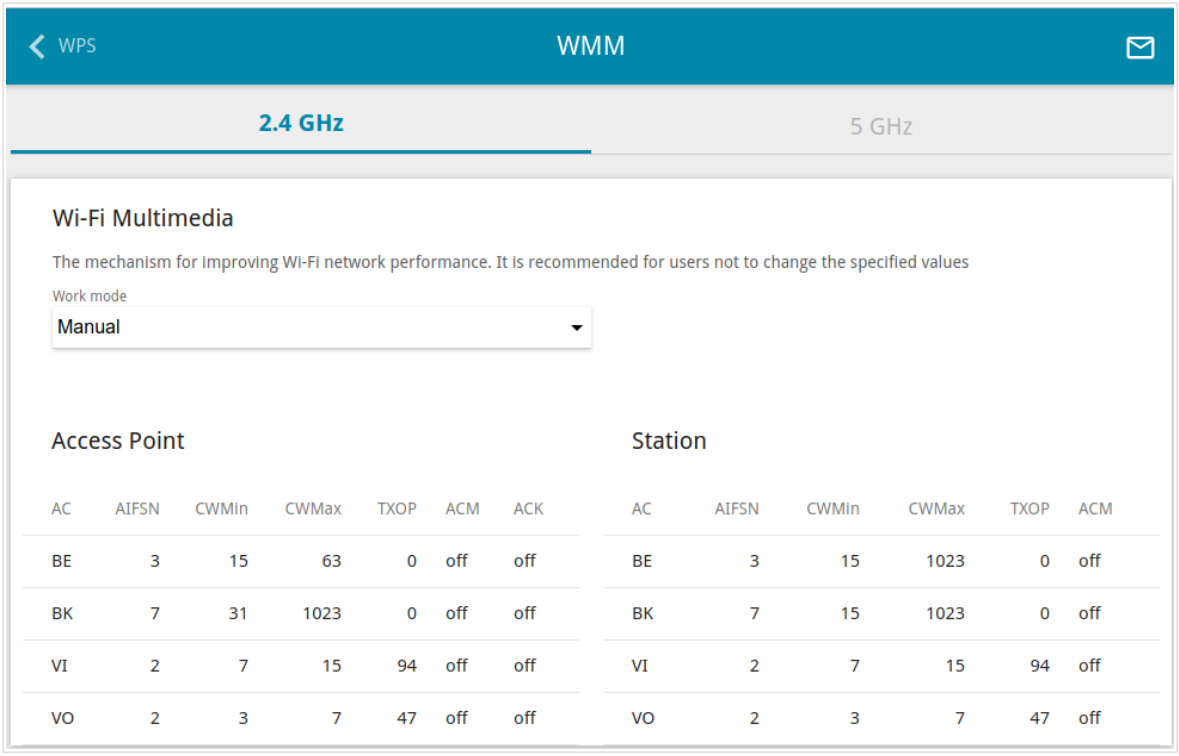

Figure 61. The page for configuring the WMM function.

! All needed settings for the WMM function are specified in the device's system. Changing parameters manually may negatively affect your WLAN!

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

- **BK** (*Background*), low priority traffic (print jobs, file downloads, etc.).
- **BE** (*Best Effort*), traffic from legacy devices or devices/applications that do not support QoS.
- **VI** (*Video*).
- **VO** (*Voice*).

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

To edit the parameters of an Access Category, left-click the relevant line. In the opened window, change the needed parameters.

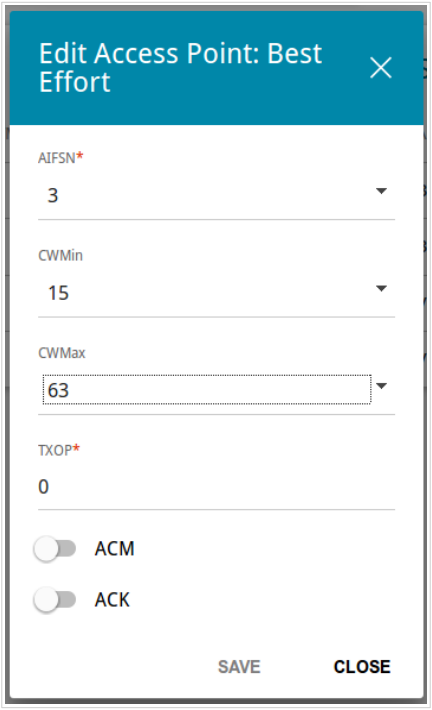

Figure 62. The window for changing parameters of the WMM function.

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.

Parameter	Description
ACM	*Admission Control Mandatory*. If the switch is moved to the right, the device cannot use the relevant Access Category.
ACK	*Acknowledgment*. Answering response requests while transmitting. Displayed only in the **Access Point** section. If the switch is moved to the left, the extender answers requests. If the switch is moved to the right, the extender does not answer requests.

Click the **SAVE** button.

Client

On the **Wi-Fi / Client** page, you can configure the device as a client to connect to a wireless access point or to a WISP. To configure the 2.4GHz band or 5GHz band, go to the relevant tab.

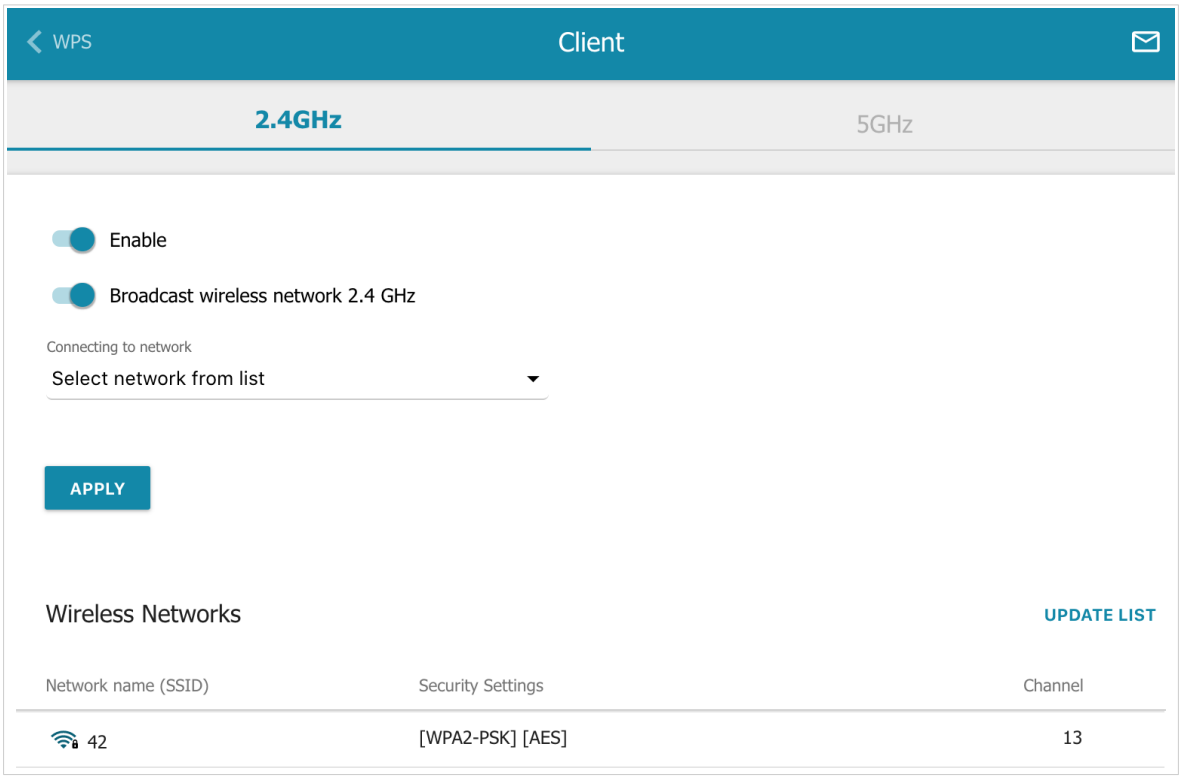

Figure 63. The page for configuring the client mode.

To configure the extender as a client, move the **Enable** switch to the right. Upon that the following fields are displayed on the page:

Parameter	Description
Broadcast wireless network 2.4 GHz / Broadcast wireless network 5 GHz	If the switch is moved to the left, devices cannot connect to the extender's WLAN. Upon that the extender can connect to another access point as a wireless client.
Connecting to network	A method for connecting to another access point.

In the **Wireless Networks** section, the list of available wireless networks is displayed. To view the latest data on available wireless networks, click the **UPDATE LIST** button.

To connect to a wireless network from the list, select the needed network. Move the **Network options** switch to the right to view more detailed information on the network to which the extender connects. If a password is required, enter it in the relevant field. Click the **CONNECT** button.

To connect to a hidden network, select the **Connect to hidden network** value from the **Connecting to network** drop-down list. Enter the name of the network in the **Network name (SSID)** field. If needed, fill in the **BSSID** field. Then select the needed type of authentication from the **Network authentication** drop-down list.

When the **Open** or **WEP** authentication type is selected, the following settings are displayed on the page:

Parameter	Description
Enable encryption WEP	*For **Open** authentication type only.* To activate WEP encryption, move the switch to the right. Upon that the **Default key ID** drop-down list, the **Encryption key WEP as HEX** switch, and four **Encryption key** fields are displayed on the page.
Default key ID	The number of the key (from first to fourth) which will be used for WEP encryption.
Encryption key WEP as HEX	Move the switch to the right to set a hexadecimal number as a key for encryption.
Encryption key (1-4)	Keys for WEP encryption. The extender uses the key selected from the **Default key ID** drop-down list. It is required to specify all the fields. Click the **Show** icon ( ) to display the entered key.

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

Parameter	Description
Password PSK	A password for WPA encryption. Click the **Show** icon ( ) to display the entered key.
Encryption type	An encryption method: **TKIP**, **AES**, or **TKIP+AES**.

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

When connecting to a wireless access point, the wireless channel of DAP-1620 will switch to the channel of the access point to which you have connected.

In addition, the **Connection Information** section in which you can view the connection status and the network basic parameters is displayed.

Additional

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

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

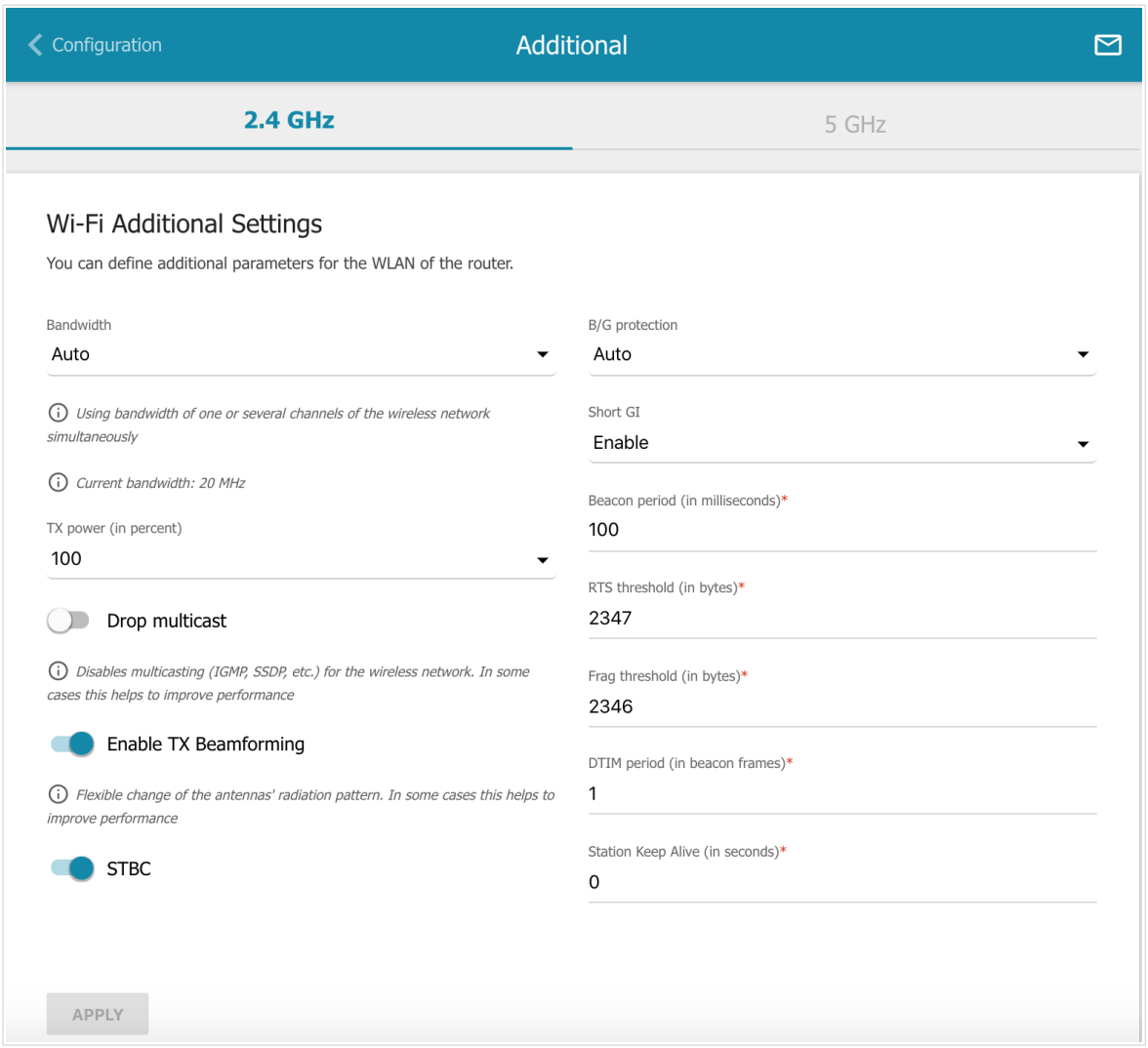

Figure 64. Additional settings of the WLAN.

The following fields are available on the page:

Parameter	Description
Bandwidth	The channel bandwidth for 802.11n standard in the 2.4GHz band (the **2.4 GHz** tab). **20 MHz**: 802.11n clients operate at 20MHz channels. **20/40 MHz**: 802.11n clients operate at 20MHz or 40MHz channels. **Auto**: the extender automatically chooses the most suitable channel bandwidth for 802.11n clients. The channel bandwidth for 802.11n and 802.11ac standards in 5GHz band (the **5 GHz** tab). **20 MHz**: 802.11n and 802.11ac clients operate at 20MHz channels. **20/40 MHz**: 802.11n and 802.11ac clients operate at 20MHz or 40MHz channels. **20/40/80 MHz**: 802.11ac clients operate at 20MHz, 40MHz, or 80MHz channels. **Auto**: the extender automatically chooses the most suitable channel bandwidth for 802.11n and 802.11ac clients.
Autonegotiation 20/40 (Coexistence)	*Available on the **2.4 GHz** tab.* Move the switch to the right to let the extender automatically choose the channel bandwidth (20MHz or 40MHz) depending on availability of other APs within its operational range (this setting can substantially lower the data transfer rate of your wireless network). The switch is displayed when the **20/40 MHz** value is selected from the **Bandwidth** drop-down list.
TX power	The transmit power (in percentage terms) of the extender.
Enable DFS	*Available on the **5 GHz** tab.* Move the switch to the right to enable the DFS (*Dynamic Frequency Selection*) mechanism. Upon that the extender uses the channels at which radars and other mobile or stationary radio systems can operate, but switches to other channels if these devices require this. In order to use the DFS mechanism, the automatic channel selection should be enabled (on the **Wi-Fi / Basic Settings** page). Move the switch to the left not to let the extender use the channels at which radars and other mobile or stationary radio systems can operate.
Drop multicast	Move the switch to the right to disable multicasting for the extender's WLAN. Move the switch to the left to enable multicasting.

Parameter	Description
Enable TX Beamforming	TX Beamforming is the signal processing/directing technique which helps to support a high enough transfer rate in the areas with difficult conditions for the signal propagation. Move the switch to the right to improve the signal quality.
STBC	The STBC (*Space-time block coding*) technique allows increasing data transfer reliability even for portable devices equipped with poor antennas (smartphones, pads, etc.) due to using several data streams and processing several versions or received data. Move the switch to the right if you need to use the STBC technique.
B/G protection	*Available on the **2.4 GHz** tab.* The 802.11b and 802.11g protection function is used to minimize collisions between devices of your wireless network. Select a value from the drop-down list. **Auto**: The protection function is enabled and disabled automatically depending on the state of the network (this value is recommended if your wireless local area network consists of both 802.11b and 802.11g devices). **Always On**: The protection function is always enabled (this setting can substantially lower the efficiency of your wireless network). **Always Off**: The protection function is always disabled.
Short GI	Guard interval (in nanoseconds). This parameter defines the interval between symbols transmitted when the extender is communicating to wireless devices. **Enable**: the extender uses the 400 ns short guard interval. Only for the wireless network operating modes which support 802.11n and 802.11ac standards (see the value of the **Wireless mode** drop-down list on the **Wi-Fi / Basic Settings** page). **Disable**: the extender uses the 800 ns standard guard interval.
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).
DTIM period	The number of beacon frames between sending DTIM messages (messages notifying on broadcast or multicast transmission).

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.

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

MAC Filter

On the **Wi-Fi / MAC Filter** page, 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.

! It is recommended to configure the Wi-Fi MAC filter through a wired connection to DAP-1620.

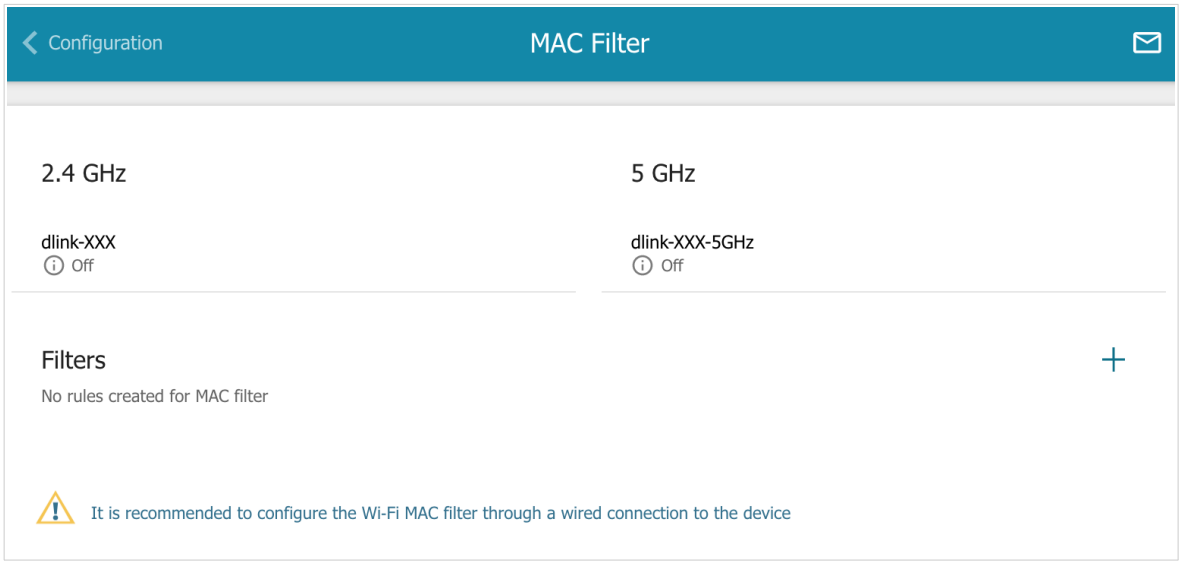

Figure 65. The page for configuring the MAC filter for the wireless network.

By default, the Wi-Fi MAC filter is disabled.

To configure the MAC filter, first you need to create rules (specify MAC addresses of devices for which the specified filtering modes will be applied). To do this, click the **ADD** button (+).

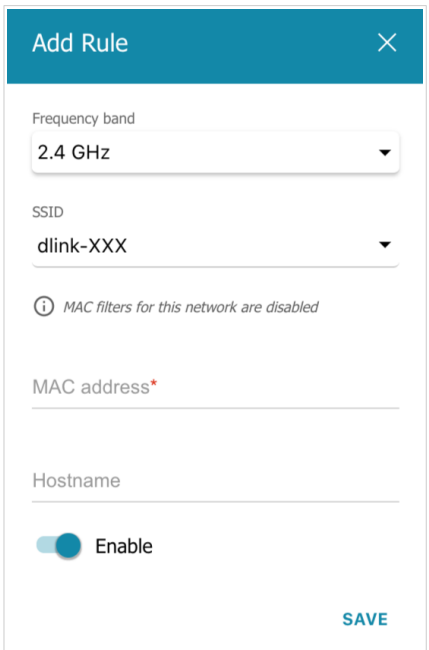

Figure 66. The window for adding a rule for the MAC filter.

You can specify the following parameters:

Parameter	Description
Frequency band	From the drop-down list, select a band of the wireless network.
SSID	A wireless network to which the rule will be applied. Select the needed value from the drop-down list.
MAC address	In the field, enter the MAC address to which the selected filtering mode will be applied.
Hostname	The name of the device for easier identification (*optional*). You can specify any name.
Enable	If the switch is moved to the right, the rule is active. Move the switch to the left to disable the rule.

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

To edit the parameters of the existing rule, in the **Filters** section, left-click the needed rule. In the opened window, change the settings and click the **SAVE** button.

To remove the rule from the page, in the **Filters** section, select the checkbox located to the left of the relevant rule and click the **DELETE** button ( ).

After creating the rules you need to configure the filtering modes.

To open the basic or additional wireless network for the devices which MAC addresses are specified on this page and to close the wireless network for all other devices, in the section corresponding to the band (**2.4 GHz** or **5 GHz**), left-click the line of the wireless network. In the opened window, move the **Enable MAC filter** switch to the right. Upon that the **MAC filter restrict mode** drop-down list will be displayed. Select the **Allow** value from the drop-down list and click the **SAVE** button.

To close the 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 **SAVE** button.

To set a schedule for the MAC filter rule, click the **Add Schedule** button ( ) in the line corresponding to this rule. In the opened window, you can create a new schedule (see the ***Schedule*** section, page 106) or use the existing one. Existing schedules are displayed in the **Interval of execution** drop-down list in the simplified mode.

To enable the MAC filter rule at the time specified in the schedule and disable it at the other time, select the **Enable rule** value from the **Action** drop-down list and click the **SAVE** button.

To disable the MAC filter rule at the time specified in the schedule and enable it at the other time, select the **Disable rule** value from the **Action** drop-down list and click the **SAVE** button.

To change or delete the schedule for a rule, click the **Select schedule** button ( ) in the line corresponding to this rule. In the opened window, change the parameters and click the **SAVE** button or click the **DELETE FROM SCHEDULE** button.

Super Mesh

On the **Wi-Fi / Super Mesh** page, you can enable the Super Mesh function. This function is designed to quickly connect multiple devices into one transport network for providing high-quality Wi-Fi coverage in living units of complicated planning or for creating a large temporary Wi-Fi network for an outdoor event.

A Mesh network consists of a main device (the Master role) and subordinate devices (the Slave role). Devices connect to each other via wireless or wired connection. Settings are transmitted from the main device to a subordinate one at the final step of configuring the Super Mesh function while the devices are connected via an Ethernet cable (you don't need to manually specify all the parameters on subordinate devices).

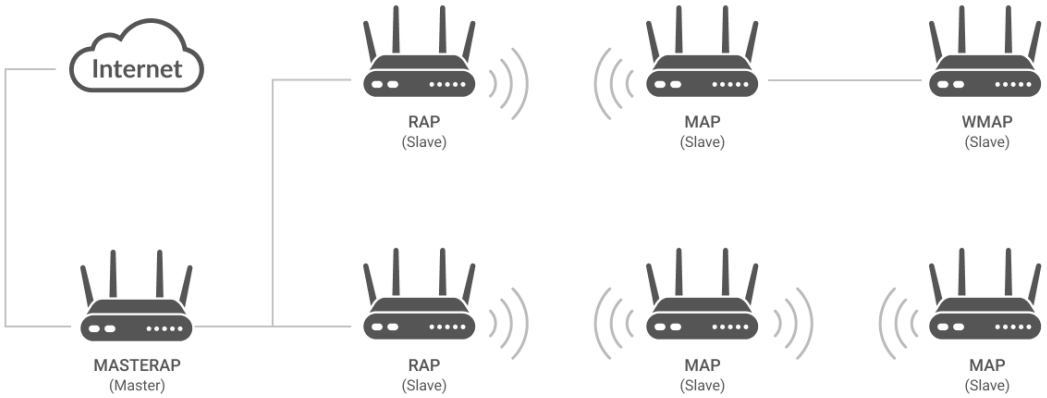

Figure 67. A Mesh network structure.

You can configure the repeater as a subordinate device (the Slave role).

! The Super Mesh function cannot operate in both bands simultaneously. Select one of the bands (2.4GHz or 5GHz) for all devices of the configured network.

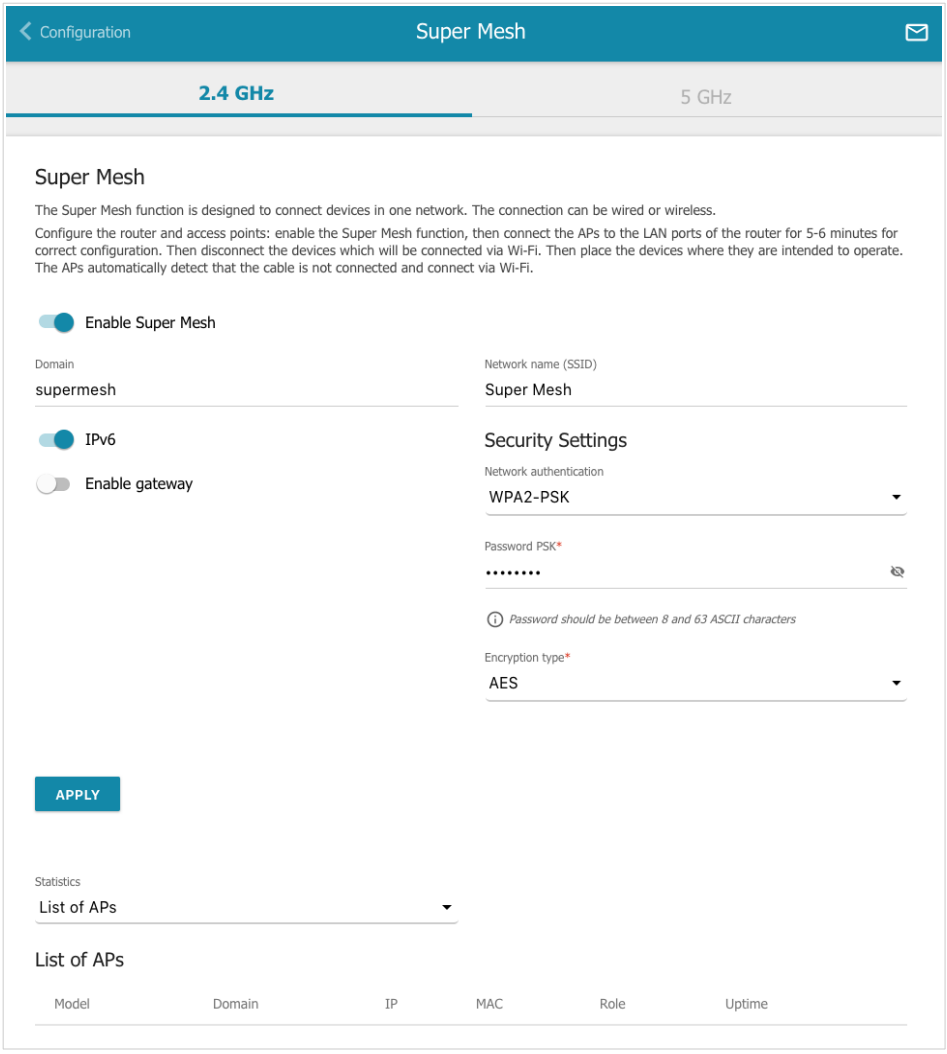

*Figure 68. The **Wi-Fi / Super Mesh** page.*

To activate the Super Mesh function, on the tab of the relevant band, move the **Enable Super Mesh** switch to the right. You can specify the following parameters:

Parameter	Description
Domain	An identifier which shows that the device belongs to a certain Mesh network. This value should be the same for all devices of your Mesh network.
IPv6	If you need to use IPv6 for configuring the Mesh network, move the **IPv6** switch to the right.
Enable gateway	Move the switch to the right to allow devices of the Mesh network to use this device for connecting to the Internet. It is recommended to move the switch to the left when configuring a subordinate device.
Network name (SSID)	A name of the Mesh network. This value should be the same for all devices of your Mesh network. Clients connected to devices of a Mesh network cannot see the Mesh network and cannot connect to it.

In the **Security Settings** section, specify security settings of your Mesh network.[8] To do this, select the needed type of authentication[9] from the **Network authentication** drop-down list.

When the **WPA2-PSK** authentication type is selected, the following fields are displayed:

Parameter	Description
Password PSK	A password for WPA encryption. Click the **Show** icon ( ) to display the entered key. By default, the value of the field **Password** on the back panel of the device is used.
Encryption type	An encryption method: **AES**.

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

To complete your Mesh network configuration, connect the subordinate device to a LAN port of the main device using an Ethernet cable. Wait for about 5-6 minutes. When all the settings are applied, the **POWER/WPS** LED should be solid red. Then, if needed, disconnect the Ethernet cable and move the subordinate device to its workplace.

To view data on the current state of your Mesh network, select the needed value from the **Statistics** drop-down list.

- **List of APs**: When this value is selected, information on all devices of your Mesh network is displayed on the page.
- **List of Clients**: When this value is selected, information on all clients connected to the devices of your Mesh network is displayed on the page.
- **Neighbours**: When this value is selected, a connection scheme of your Mesh network devices is displayed on the page.

Parameter	Description
Network Overview / List of APs	
Model	The model of a device.
Domain	The identifier which shows that a device belongs to the Mesh network.
IP	The IPv4 and/or IPv6 address of a device.
MAC	The MAC address of a device.
Role	The short name for a Mesh network device. **MASTERAP** (Master Access Point): The main device which provides connection to the Internet. **RAP** (Router Access Point): A subordinate device connected to the main device via a cable (directly to the main one or via some subordinate devices connected via a cable).

8 Security settings should be the same for all devices of your Mesh network.

9 The full list will be available in the next firmware version.

Parameter	Description
	MAP (Mesh Access Point): A subordinate device with a wireless connection. **WMAP** (Wired Mesh Access Point): A subordinate device connected via a cable to another subordinate device with a wireless connection.
Uptime	The operational time of a device.
List of Clients	
AP MAC	The MAC address of the Mesh network device to which a client is connected.
Client MAC Address	The MAC address of a client.
Bandwidth	The bandwidth at which a client operates.
Wireless mode	The operating mode of a client's wireless connection.
Status	Information on a client's current state.
Neighbours	
MAC	The MAC address of the device to which a Mesh network node is connected. The MAC address of this node is displayed in the **Neighbour MAC Address** field.
Neighbour MAC Address	The MAC address of the device connected to a Mesh network node. The MAC address of this node is displayed in the **MAC** field.
Role	The short name for the Mesh network device which MAC address is displayed in the **Neighbour MAC Address** field. **MASTERAP** (Master Access Point): The main device which provides connection to the Internet. **RAP** (Router Access Point): A subordinate device connected to the main device via a cable (directly to the main one or via some subordinate devices connected via a cable). **MAP** (Mesh Access Point): A subordinate device with a wireless connection. **WMAP** (Wired Mesh Access Point): A subordinate device connected via a cable to another subordinate device with a wireless connection.
Connection status	The current connection state of the Mesh network node which MAC address is displayed in the **Neighbour MAC Address** field.
Hops	The number of intermediate Mesh network nodes from the device which MAC address is displayed in the **Neighbour MAC Address** field to the main device.

Parameter	Description
	If the MAC address of the main device is displayed in the **Neighbour MAC Address** field, the number of intermediate nodes is 0.
Rate at path to upper-level host	The maximum allowed value of connection speed from the device which MAC address is displayed in the **Neighbour MAC Address** field to the device which MAC address is displayed in the **MAC** field.
Host capacity	The capacity of the device which MAC address is displayed in the **MAC** field.

To view detailed data on a device, click the line corresponding to this device.

Roaming

On the **Wi-Fi / Roaming** page, you can enable the function of smart adjustment of Wi-Fi clients.

This function is designed for wireless networks based on several access points or routers. If the function is enabled for all access points (routers) which establish a wireless network, then wireless clients will always connect to the device with the highest signal level.

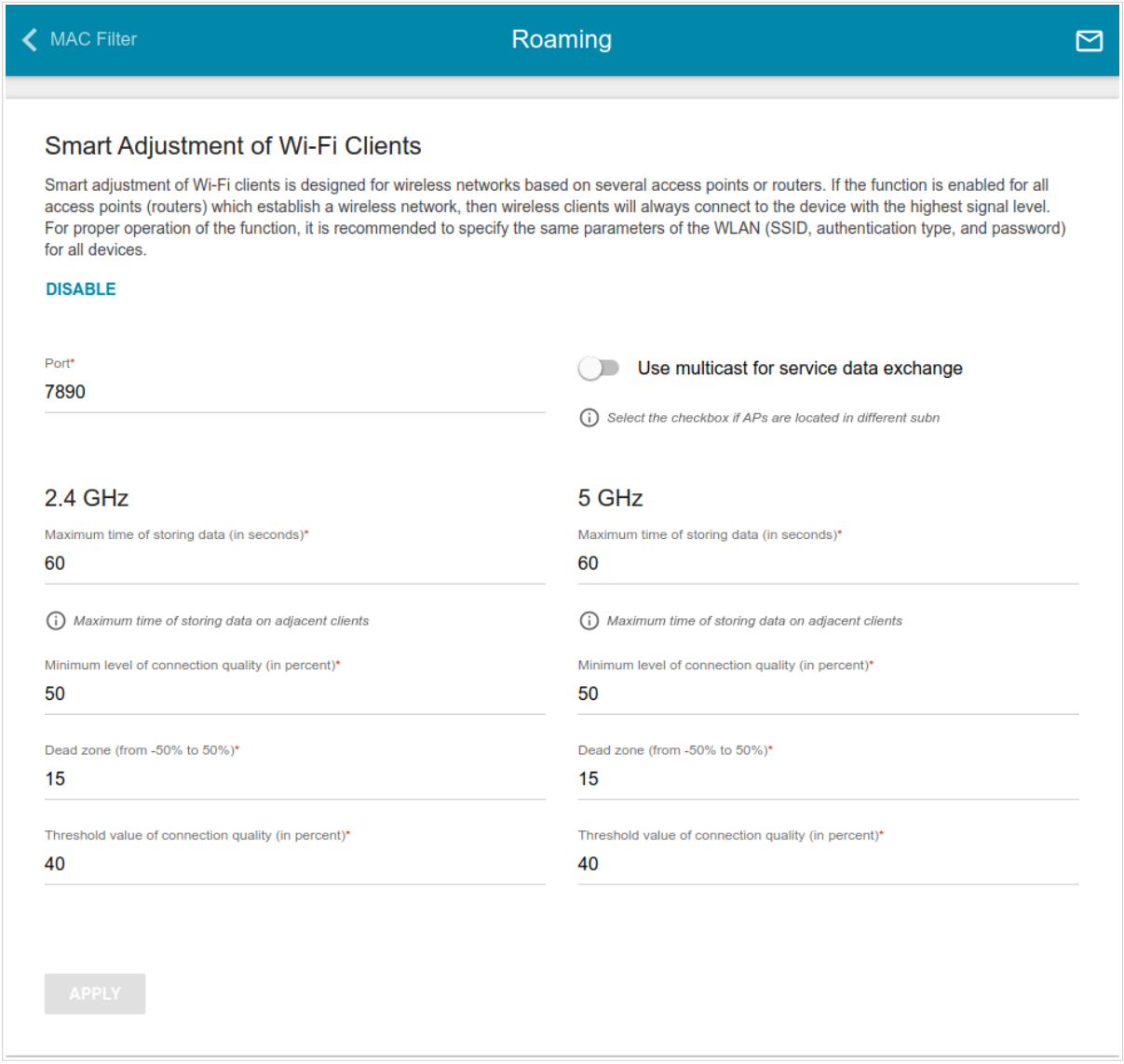

*Figure 69. The **Wi-Fi / Roaming** page.*

To enable the function, click the **ENABLE** button. Upon that the following settings are available on the page.

Parameter	Description
Port	The number of the port used for data exchange between access points (routers, extenders).

Parameter	Description
Use multicast for service data exchange	Move the switch to the right in order to use multicast traffic for service data exchange between access points (routers, extenders). This setting is needed if the devices which support the smart adjustment function are located in different subnets. If the switch is moved to the right, the **Multicast TTL** and **Multicast group address** fields are displayed on the page. If the switch is moved to the left, broadcast traffic is used for service data exchange.
Multicast TTL	Specify the TTL (*Time to live*) parameter value. The recommended value is **4**.
Multicast group address	Specify the address of the multicast group (from the subnet 239.255.0.0/16).
2.4 GHz / 5 GHz	
Maximum time of storing data	The maximum time period (in seconds) during which the extender (access point) stores data on the signal strength of the client located on its coverage area.
Minimum level of connection quality	The signal strength upon which the extender (access point) starts scanning other devices in order to find a device with a higher signal level.
Dead zone	This parameter is used for calculation of the signal strength upon which the smart adjustment function goes off. If the signal strength provided by another device is less than the sum of the **Minimum level of connection quality** field value and the **Dead zone** field value, then the client disconnects from the extender (access point). You can specify the values from **-50%** to **+50%**.
Threshold value of connection quality	The signal strength upon which the extender (access point) disconnects the client from its wireless network regardless of the signal levels of other devices. This value should not be greater than the value specified in the field **Minimum level of connection quality**.

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

To disable the function of smart adjustment of Wi-Fi clients, click the **DISABLE** button.

Advanced

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

- add name servers
- configure autonegotiation or manually configure speed and duplex mode for the Ethernet port of the extender
- configure the MAC filter.

DNS

On the **Advanced / DNS** page, you can add[10] DNS servers to be used by the LAN clients.

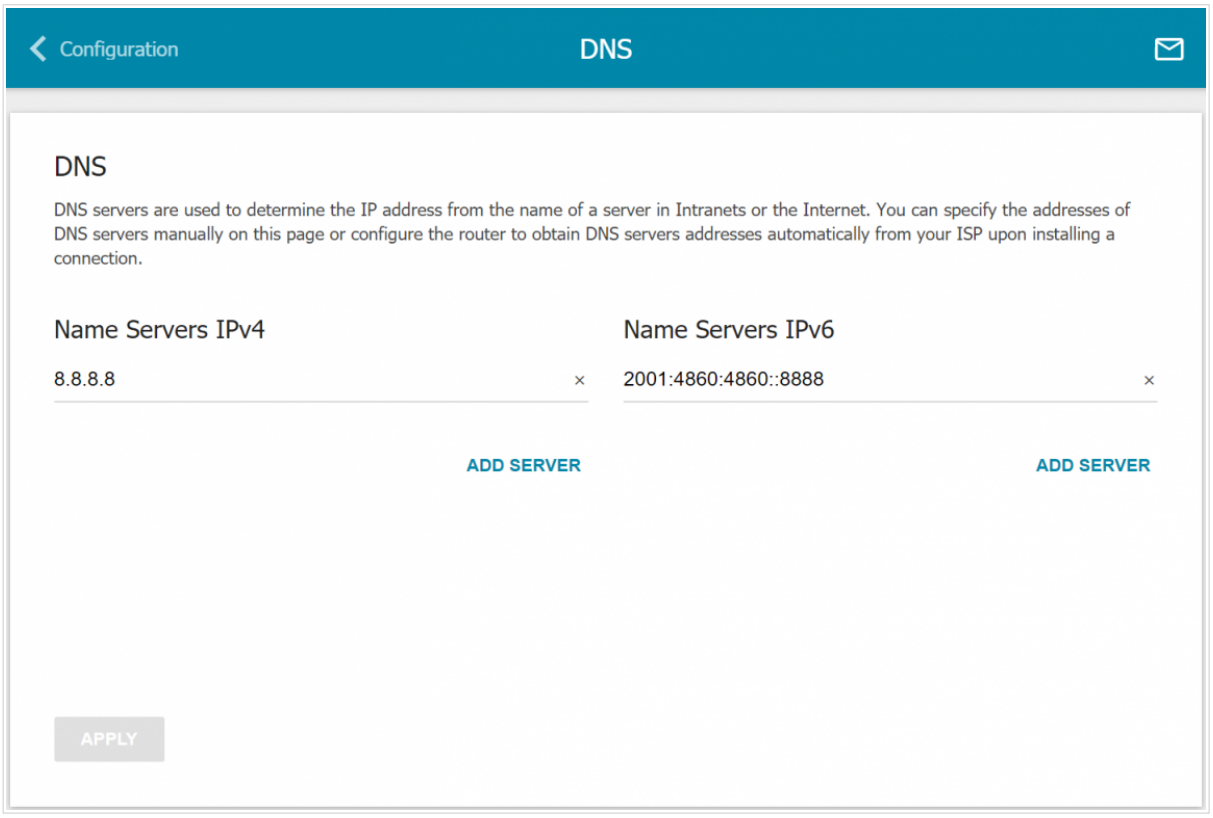

*Figure 70. The **Advanced / DNS** page.*

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 extender 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.

Specify needed settings for IPv4 in the **Name Servers IPv4** section and for IPv6 in the **Name Servers IPv6** section.

To remove a DNS server from the page, click the **Delete** icon (×) in the line of the address.

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

10 Correct operation of the page will be implemented in the next firmware version.

Ports Settings

On the **Advanced / Ports Settings** page, you can configure or disable autonegotiation of speed and duplex mode or manually configure speed and duplex mode for the Ethernet port of the extender.

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.

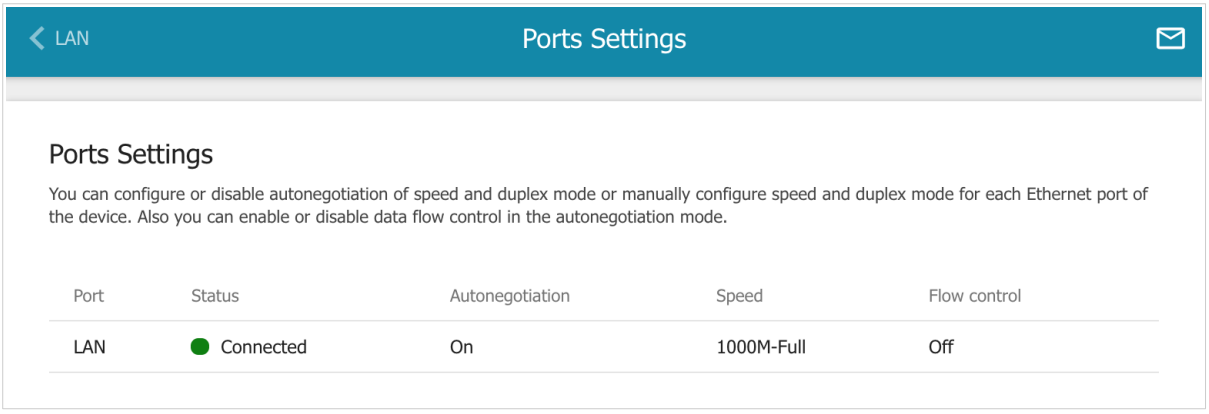

*Figure 71. The **Advanced / Ports Settings** page.*

In order to configure autonegotiation or configure speed and duplex mode manually for the Ethernet port, select it 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.

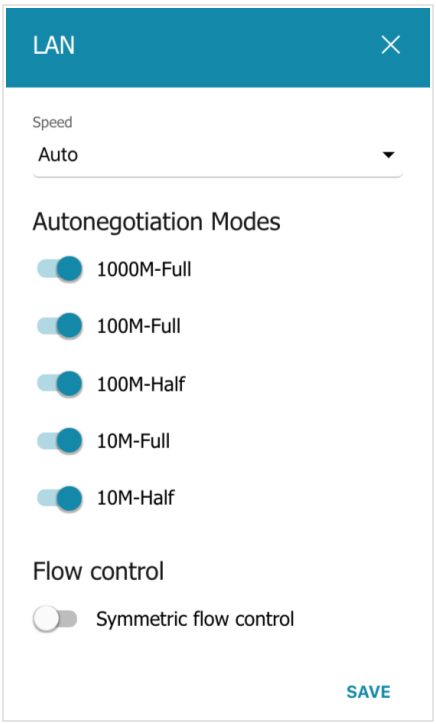

Figure 72. The window for changing the settings of the extender's port.

In the opened window, specify the needed parameters:

Parameter	Description
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**, or **100M-Full** value to manually configure speed and duplex mode for the 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. • **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.

Parameter	Description
Autonegotiation Modes	
To enable the needed data transfer modes, move relevant switches to the right.	
Flow control	
Symmetric flow control	Move the switch to the right to enable the flow control function for the port. Move the switch to the left to disable the flow control function for the port.

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

If in the future you need to edit the parameters of the extender's port, select the port in the table. In the opened window, change the needed parameters and click the **SAVE** button.

MAC Filter

On the **Advanced / MAC Filter** page, you can configure MAC-address-based filtering for computers of the extender's LAN.

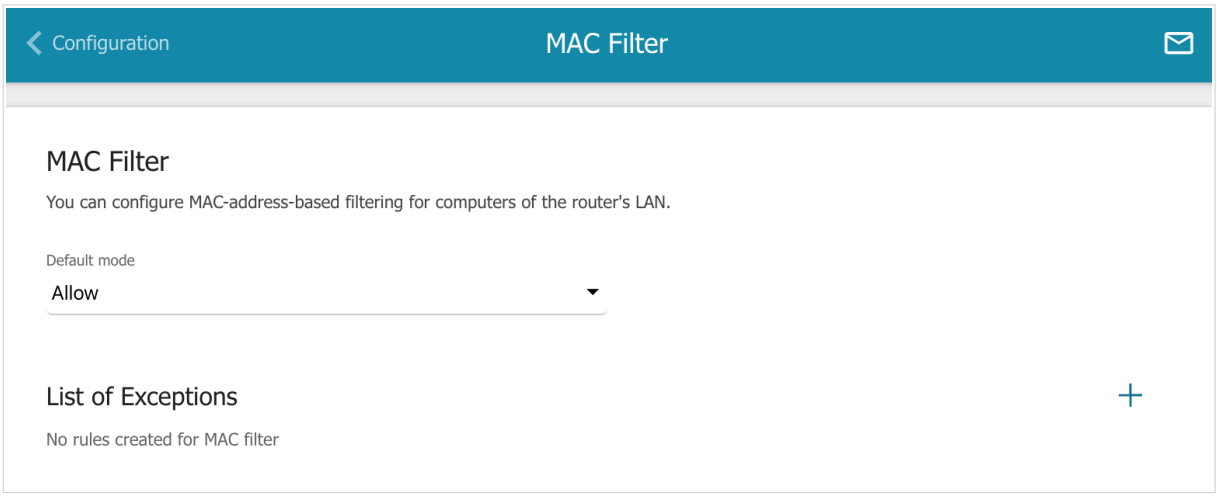

*Figure 73. The **Advanced / MAC Filter** page.*

Select the needed action from the drop-down list in the **Default mode** section to configure filtering for all devices of the extender's network:

- **Allow**: Allows access to the extender's network and to the Internet for devices (the value is specified by default);
- **Deny**: Blocks access to the extender's network for devices.

! You can use the **Deny** mode only if an active rule which allows access to the device's network is created on the page.

To create a rule (specify a MAC address of a device for which the specified filtering mode will be applied), click the **ADD** button (**+**).

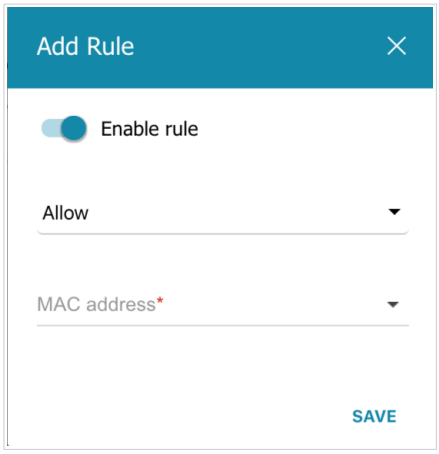

Figure 74. The window for adding a rule for the MAC filter.

In the opened window, you can specify the following parameters:

Parameter	Description
Enable rule	Move the switch to the right to enable the rule. Move the switch to the left to disable the rule.
Action	Select an action for the rule. • **Deny**: Blocks access to the Internet for the device with the specified MAC address even if the default mode allows access for all devices. • **Allow**: Allows access to the extender's network and to the Internet for the device with the specified MAC address even if the default mode denies access for all devices.
MAC address	The MAC address of a device from the extender's LAN. You can enter the MAC address of a device connected to the extender's LAN at the moment. To do this, select the relevant device from the drop-down list (the field will be filled in automatically).

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

To edit a rule, select the relevant line in the table. In the opened window, change the needed parameters and click the **SAVE** button.

To remove a rule, select the checkbox located to the left of the relevant line of the table and click the **DELETE** button ( ). Also you can remove a rule in the editing window.

System

In this menu you can do the following:

- change the password used to access the extender's settings
- restore the factory default settings
- create a backup of the extender's configuration
- restore the extender's configuration from a previously saved file
- save the current settings to the non-volatile memory
- reboot the extender
- change the web-based interface language
- update the firmware of the extender
- configure automatic notification on new firmware version
- enable/disable Wi-Fi connection and configure automatic reboot of the device on a schedule, and set a schedule for different filter rules
- view the system log; configure sending the system log to a remote host
- check availability of a host on the Internet through the web-based interface of the extender
- trace the route to a host
- allow or forbid access to the extender via TELNET and SSH
- configure automatic synchronization of the system time or manually configure the date and time for the extender
- enable the Auto Provision function.

Configuration

On the **System / Configuration** page, you can change the password for the administrator account used to access the web-based interface of the extender and to access the device settings via TELNET and SSH, restore the factory defaults, backup the current configuration, restore the extender's configuration from a previously created file, save the changed settings to the non-volatile memory, reboot the device, or change the web-based interface language.

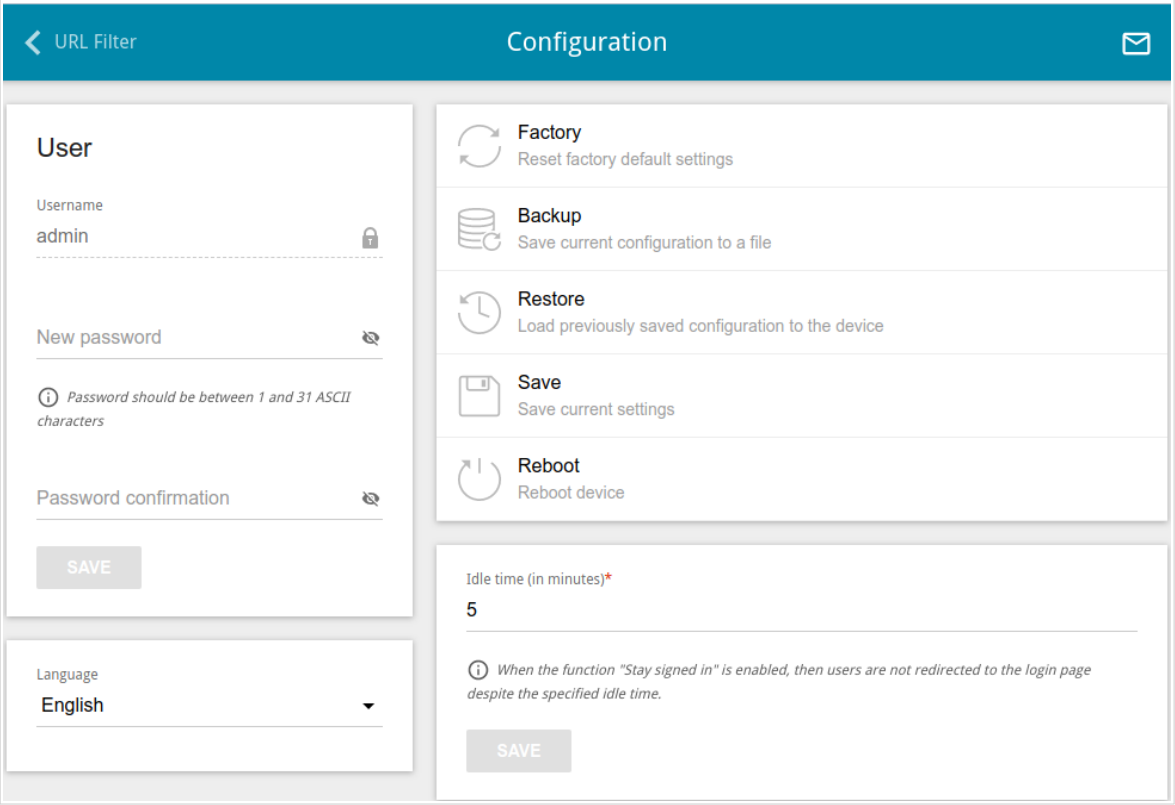

*Figure 75. The **System / Configuration** page.*

In order to change the password for the administrator account, in the **User** section, enter a new password in the **New password** and **Password confirmation** fields. Use digits, Latin letters (uppercase and/or lowercase), and other characters available in the US keyboard layout.[11] Click the **Show** icon ( ) to display the entered values. Then click the **SAVE** button.

! 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 extender only after restoring the factory default settings via the hardware **RESET** button. This procedure wipes out all settings that you have configured for your extender.

To change the web-based interface language, select the needed value from the **Language** drop-down list.

11 0-9, A-Z, a-z, space, !"#$%&'()*+,-./:;<=>?@[\]^_`{|}~.

The following buttons are also available on the page:

Control	Description
Factory	Click the button to restore the factory default settings. Also you can restore the factory defaults via the hardware **RESET** button (see the ***Bottom Panel*** section, page 12).
Backup	Click the button to save the configuration (all settings of the extender) to your PC. The configuration backup will be stored in the download location of your web browser.
Restore	Click the button and follow the dialog box appeared to select a previously saved configuration file (all settings of the extender) located on your PC and upload it.
Save	Click the button to save settings to the non-volatile memory. The extender saves changed settings automatically. If changed settings have not been saved automatically, a notification is displayed in the top right part of the page.
Reboot	Click the button to reboot the device. All unsaved changes will be lost after the device's reboot.

In the **Idle time** field specify a period of inactivity (in minutes) after which the extender completes the session of the interface. By default, the value **5** is specified. Then click the **SAVE** button.

Firmware Update

On the **System / Firmware Update** page, you can update the firmware of the extender and configure the automatic check for updates of the extender's firmware.

! Update the firmware only when the extender is connected to your PC via a wired connection.

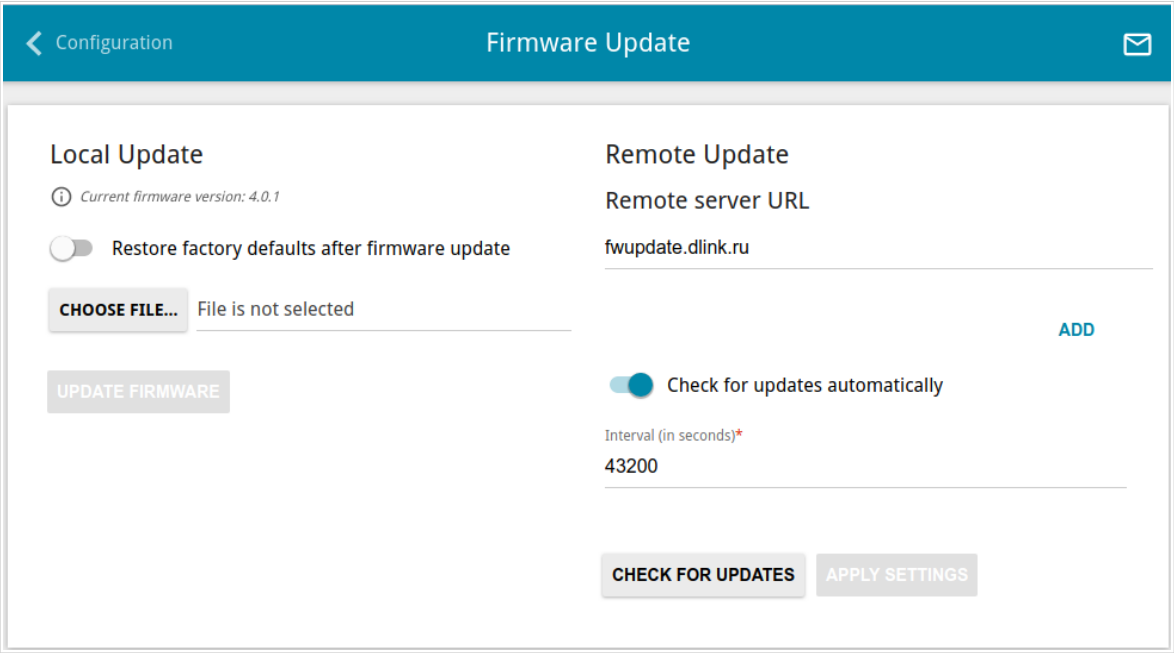

*Figure 76. The **System / Firmware Update** page.*

The current version of the extender's firmware is displayed in the **Current firmware version** field.

By default, the automatic check for the extender's firmware updates is enabled. If the **Static** value is selected from the **Mode of local IP address assignment** list on the **Connections Setup / LAN** page, the **Gateway IP address** field should also be filled in on order to realize automatic check.

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, move the **Check for updates automatically** switch to the left and click the **APPLY SETTINGS** button.

To enable the automatic check for firmware updates, in the **Remote Update** section, move the **Check for updates automatically** switch to the right. In the **Interval** field, specify the time period (in seconds) between checks or leave the value specified by default (`43200`).

By default, in the **Remote server URL** field, the D-Link update server address (`fwupdate.dlink.ru`) is specified. To add one more address, click the **ADD** button and enter the address in the displayed line. To remove the address, click the **Delete** icon (×) in the line of the address.

Click the **APPLY SETTINGS** button.

You can update the firmware of the extender locally (from the hard drive of your PC) or remotely (from the update server).

Local Update

> ! Attention! Do not turn off the extender before the firmware update is completed. This may cause the device breakdown.

To update the firmware of the extender locally, follow the next steps:

1. Download a new version of the firmware from www.dlink.ru.
2. Click the **CHOOSE FILE** button in the **Local Update** section on the **System / Firmware Update** page to locate the new firmware file.
3. If you want to restore the factory default settings immediately after updating the firmware, move the **Restore factory defaults after firmware update** switch to the right.
4. Click the **UPDATE FIRMWARE** button.
5. Wait until the extender is rebooted (about one and a half or two minutes).
6. Log into the web-based interface using the login (`admin`) and the current password.

If after updating the firmware the extender doesn't work correctly, please restore the factory default settings. To do this, click the **Factory** button on the **System / Configuration** page. Wait until the extender is rebooted.

Remote Update

> ! Attention! Do not turn off the extender before the firmware update is completed. This may cause the device breakdown.

To update the firmware of the extender remotely, follow the next steps:

1. On the **System / Firmware Update** page, in the **Remote Update** section, click the **CHECK FOR UPDATES** button to check if a newer firmware version exists.
2. Click the **UPDATE FIRMWARE** button (the button is displayed if a newer version of the firmware is available).
3. Wait until the extender 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.

If after updating the firmware the extender doesn't work correctly, please restore the factory default settings. To do this, click the **Factory** button on the **System / Configuration** page. Wait until the extender is rebooted.

Schedule

On the **System / Schedule** page, you can enable/disable Wi-Fi connection and configure automatic reboot of the device on a schedule, and set a schedule for different filter rules.

! Before creating a schedule you need to configure automatic synchronization of the system time with a time server on the Internet (see the ***System Time*** section, page 117).

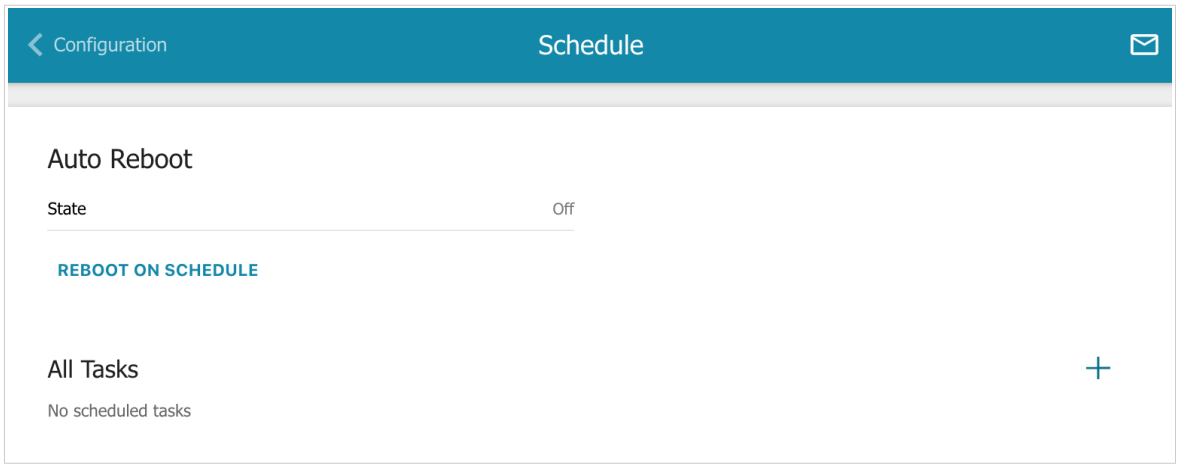

*Figure 77. The **System / Schedule** page.*

To configure automatic reboot of the device on a schedule, click the **REBOOT ON SCHEDULE** button in the **Auto Reboot** section.

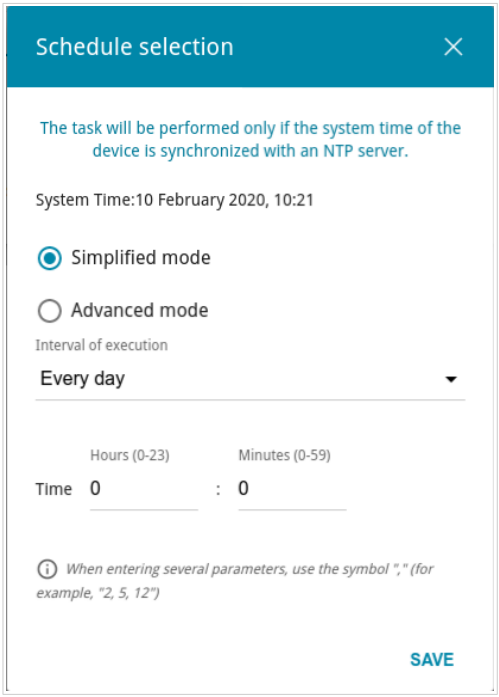

Figure 78. The window for configuring automatic reboot on a schedule.

In the opened window, in the **System Time** field, the system time of the device is displayed. You can select the **Simplified mode** choice of the radio button and specify the following parameters:

Parameter	Description
Simplified mode	
Interval of execution	Specify the time period for the device's reboot. **Every day**: When this value is selected, the **Time** field is displayed in the section. **Every week**: When this value is selected, the names of days of the week and the **Time** field are displayed in the section. **Every month**: When this value is selected, the **Day of month** and **Time** fields are displayed in the section.
Time	Specify the time for the device's reboot.
Days of week	Select a day or days of the week when the device will be automatically rebooted. To do this, select the checkbox located to the left of the relevant value.
Day of month	Specify a day of the month. You can specify one value or several values separated by a comma.

In the advanced mode, you can specify more parameters for the schedule using a cron expression. To do this, select the **Advanced mode** choice of the radio button and specify the needed values in the fields displayed. You can specify one value or several values separated by a comma. You can use the character * (asterisk) to specify the entire range of possible values. Upon that the **Schedule** field will be filled in automatically.

Click the **SAVE** button.

To edit the automatic reboot schedule, click the **EDIT** button in the **Auto Reboot** section. In the opened window, change the needed parameters and click the **SAVE** button.

To disable automatic reboot of the device on a schedule, click the **EDIT** button in the **Auto Reboot** section. In the opened window, click the **DISABLE** button.

To set a schedule for a task which will be applied to a filter rule or will enable/disable Wi-Fi connection, click the **ADD** button (+) in the **All Tasks** section.

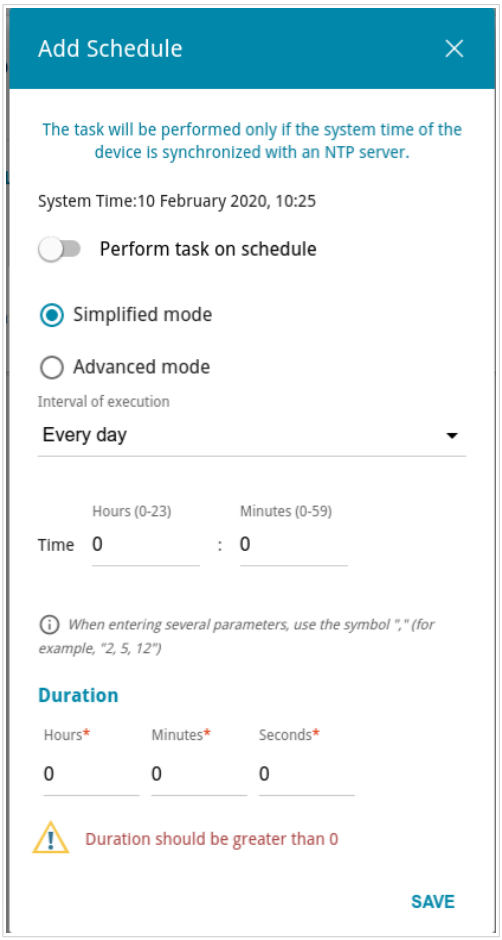

Figure 79. The window for adding a schedule for a task.

In the opened window, in the **System Time** field, the system time of the device is displayed. You can select the **Simplified mode** choice of the radio button and specify the following parameters:

Parameter	Description
Perform task on schedule	Move the switch to the right to enable the schedule. Move the switch to the left to disable the schedule.

Parameter	Description
Simplified mode	
Interval of execution	Specify the time period for performing a task. **Every minute**. **Every hour**: When this value is selected, the **Time** field is displayed in the section. **Every day**: When this value is selected, the **Time** field is displayed in the section. **Every week**: When this value is selected, the names of days of the week and the **Time** field are displayed in the section. **Every month**: When this value is selected, the **Day of month** and **Time** fields are displayed in the section.
Duration	Specify the interval during which the task will be performing.
Time	Specify the time when the task should start running.
Days of week	Select a day or days of the week when the task will be performing. To do this, select the checkbox located to the left of the relevant value.
Day of month	Specify a day of the month. You can specify one value or several values separated by a comma.

In the advanced mode, you can specify more parameters for the schedule using a cron expression. To do this, select the **Advanced mode** choice of the radio button and specify the needed values in the fields displayed. You can specify one value or several values separated by a comma. You can use the character * (asterisk) to specify the entire range of possible values. Upon that the **Schedule** field will be filled in automatically.

Click the **SAVE** button.

To edit a schedule, in the **All Tasks** section, select the relevant line in the table. In the opened window, change the needed parameters and click the **SAVE** button.

To remove a schedule, in the **All Tasks** section, select the checkbox located to the left of the relevant line in the table and click the **DELETE** button ( ).

To assign a created schedule to a task which will be applied to a filter rule or will enable/disable Wi-Fi connection, go to the relevant page of the web-based interface of the device.

Log

On the **System / Log** page, you can set the system log options and configure sending the system log to a remote host.

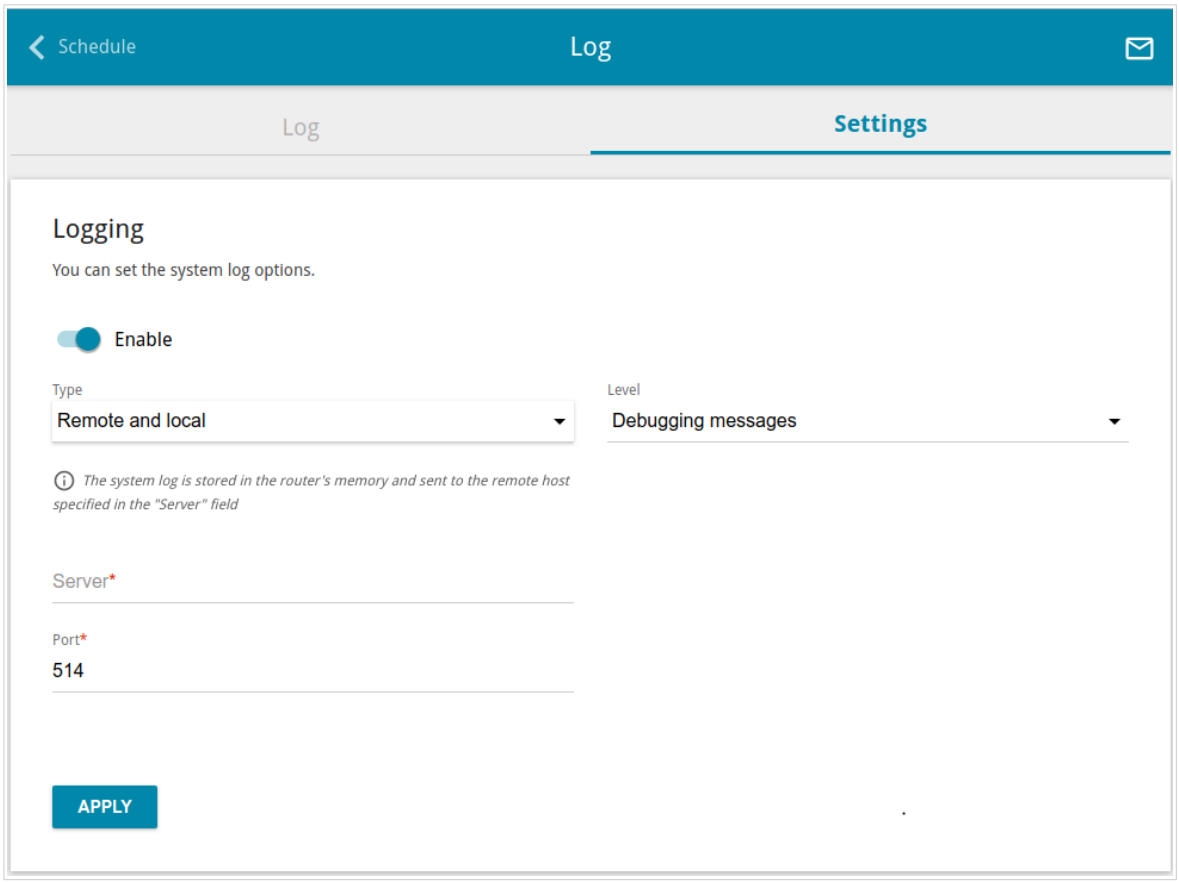

*Figure 80. The **System / Log** page. The **Settings** tab.*

To enable logging of the system events, go to the **Settings** tab and move the **Enable** switch to the right. Then specify the needed parameters.

Parameter	Description
Type	Select a type of logging from the drop-down list. • **Local**: the system log is stored in the extender's memory. 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. • **Remote and local**: the system log is stored in the extender's memory and sent to the remote host specified in the **Server** field.
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.

Parameter	Description
Port	A port of the host specified in the **Server** field. By default, the value `514` is specified.

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

To disable logging of the system events, move the **Enable** switch to the left and click the **APPLY** button.

To view the system log, go to the **Log** tab.

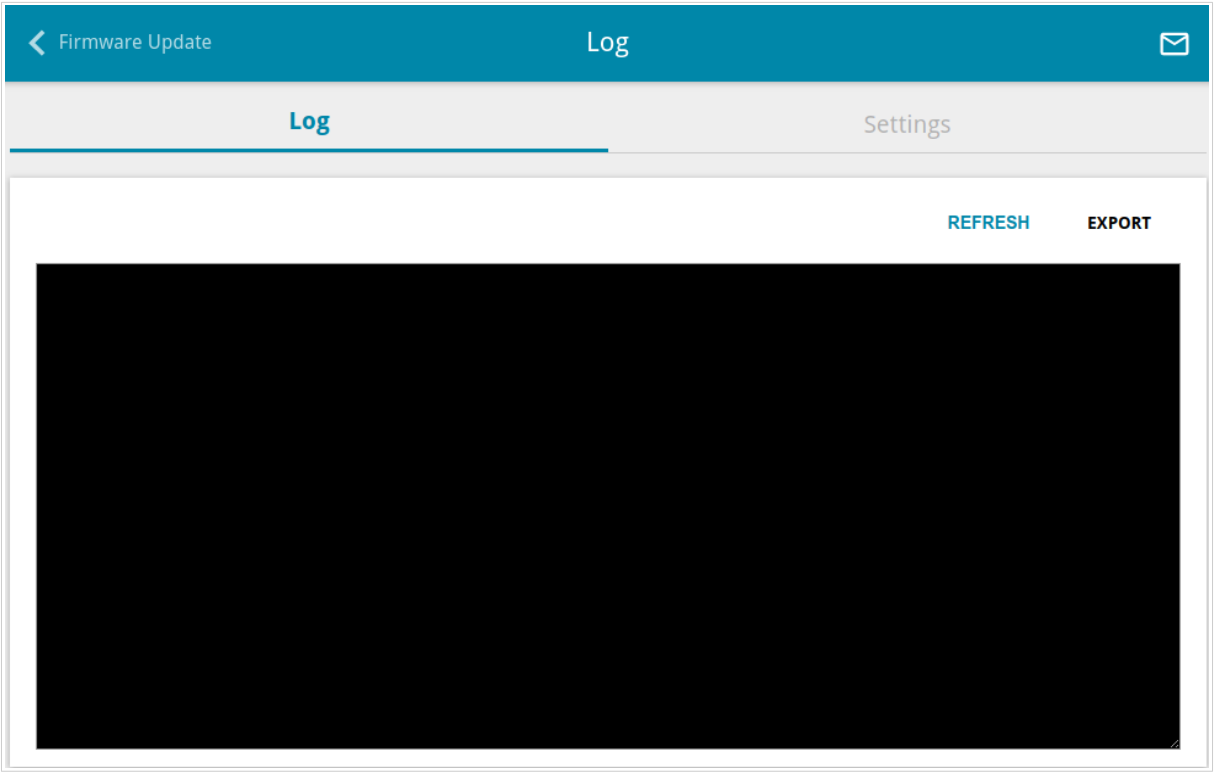

*Figure 81. The **System / Log** page. The **Log** tab.*

To view the latest system events, click the **REFRESH** button.

To save the system log to your PC, click the **EXPORT** button. The file will be stored in the download location of your web browser.

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.

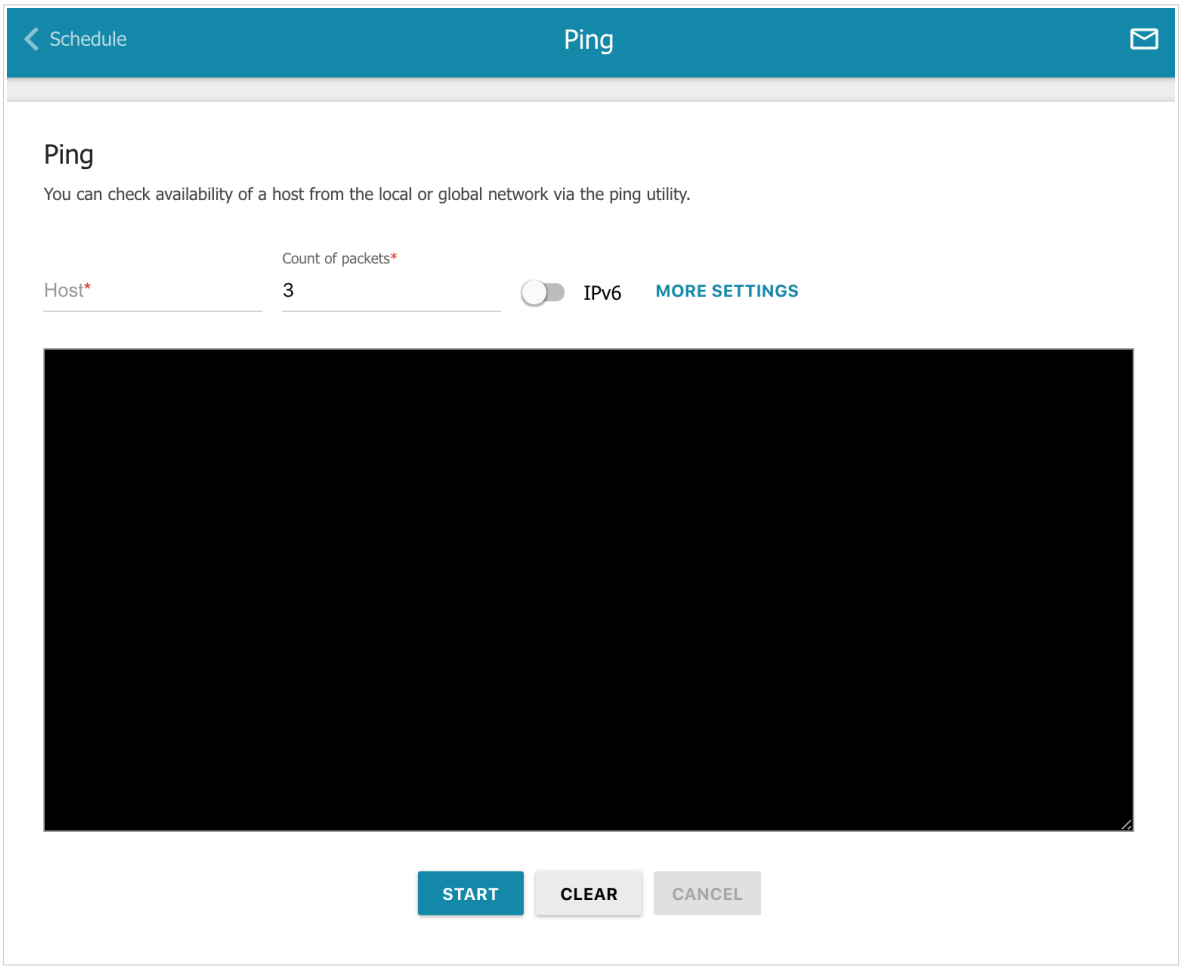

*Figure 82. The **System / Ping** page.*

To check availability of a host, enter the IP address or name of this host in the **Host** field and specify a number of requests that will be sent in order to check its availability in the **Count of packets** field. If availability check should be performed with IPv6, move the **IPv6** switch to the right.

To specify additional settings, click the **MORE SETTINGS** button.

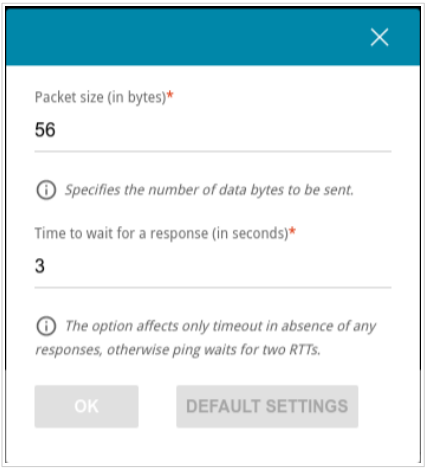

*Figure 83. The **System / Ping** page. The additional settings window.*

In the opened window, in the **Packet size** field, specify the volume of data sent in a request. In the **Time to wait for a response** field, specify the response waiting period in seconds. To restore the default field values, click the **DEFAULT SETTINGS** button.

After specifying the additional parameters, click the **OK** button.

To run the check, click the **START** button. After a while, the results will be displayed on the page.

If you need to interrupt the check, click the **CANCEL** button (the button is available from the moment the check starts).

To remove the check result from the page, click the **CLEAR** button.

Traceroute

On the **System / Traceroute** page, you can determine the route of data transfer to a host via the traceroute utility.

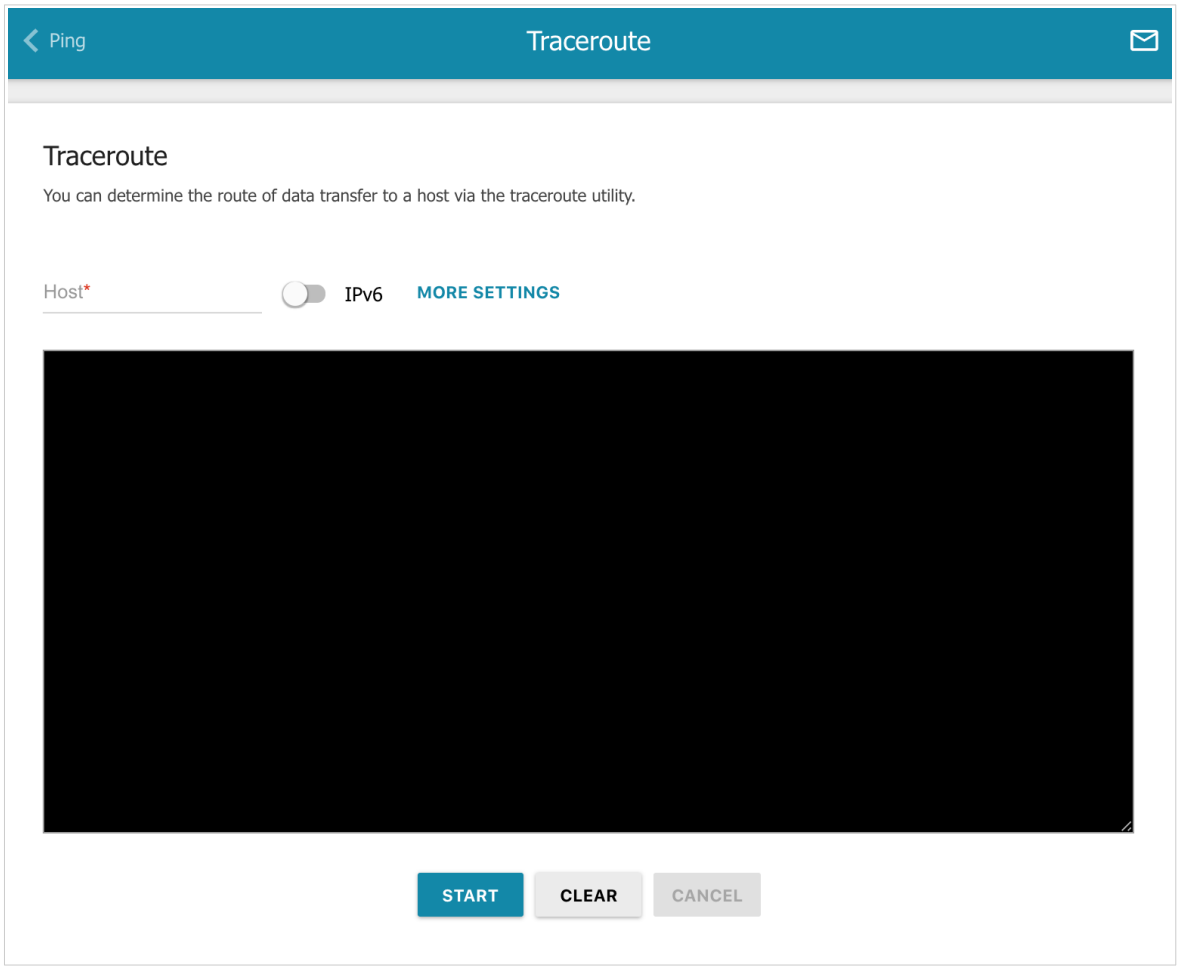

*Figure 84. The **System / Traceroute** page.*

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, move the **IPv6** switch to the right.

To specify additional settings, click the **MORE SETTINGS** button.

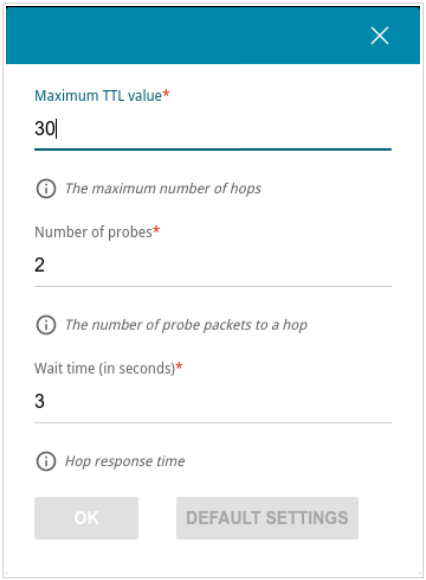

*Figure 85. The **System / Traceroute** page. The additional settings window.*

In the opened window, you can specify the following parameters:

Parameter	Description
Maximum TTL value	Specify the TTL (*Time to live*) parameter value. The default value is `30`.
Number of probes	The number of attempts to hit an intermediate host.
Wait time	A period of waiting for an intermediate host response.

To restore the default field values, click the **DEFAULT SETTINGS** button.

After specifying the additional parameters, click the **OK** button.

To run the check, click the **START** button. After a while, the results will be displayed on the page.

If you need to interrupt the check, click the **CANCEL** button (the button is available from the moment the check starts).

To remove the check result from the page, click the **CLEAR** button.

Telnet/SSH

On the **System / Telnet/SSH** page, you can enable or disable access to the device settings via TELNET and/or SSH from your LAN. By default, access is disabled.

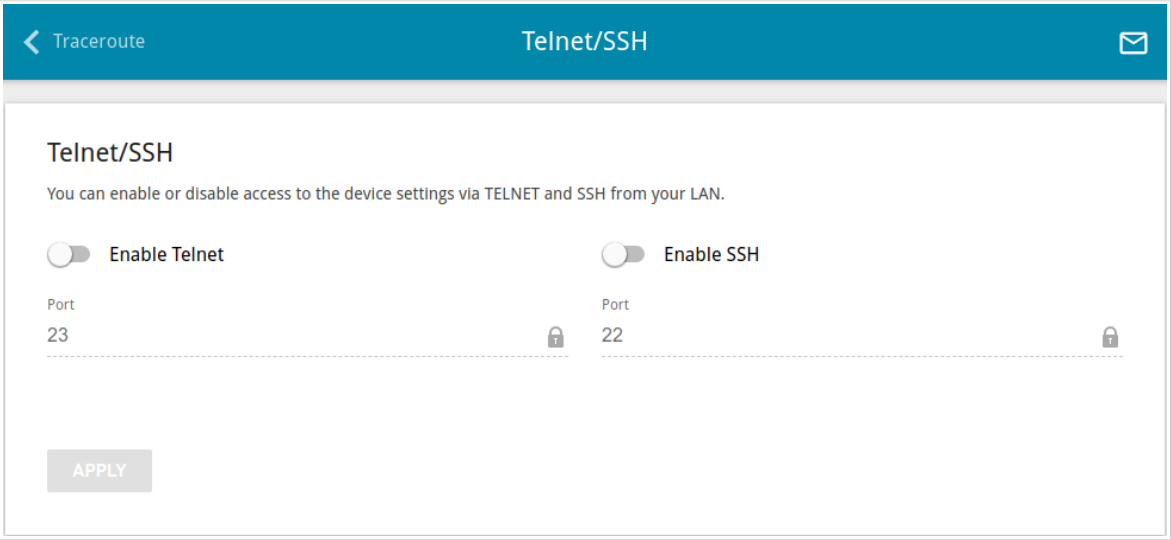

*Figure 86. The **System / Telnet/SSH** page.*

To enable access via TELNET and/or SSH, move the **Enable Telnet** switch and/or **Enable SSH** switch to the right. In the **Port** field, enter the number of the extender's port through which access will be allowed (by default, the port `23` is specified for Telnet and the port `22` is specified for SSH). Then click the **APPLY** button.

To disable access via TELNET and/or SSH again, move the **Enable Telnet** switch and/or **Enable SSH** switch to the left and click the **APPLY** button.

System Time

On the **System / System Time** page, you can manually set the time and date of the extender or configure automatic synchronization of the system time with a time server on the Internet.

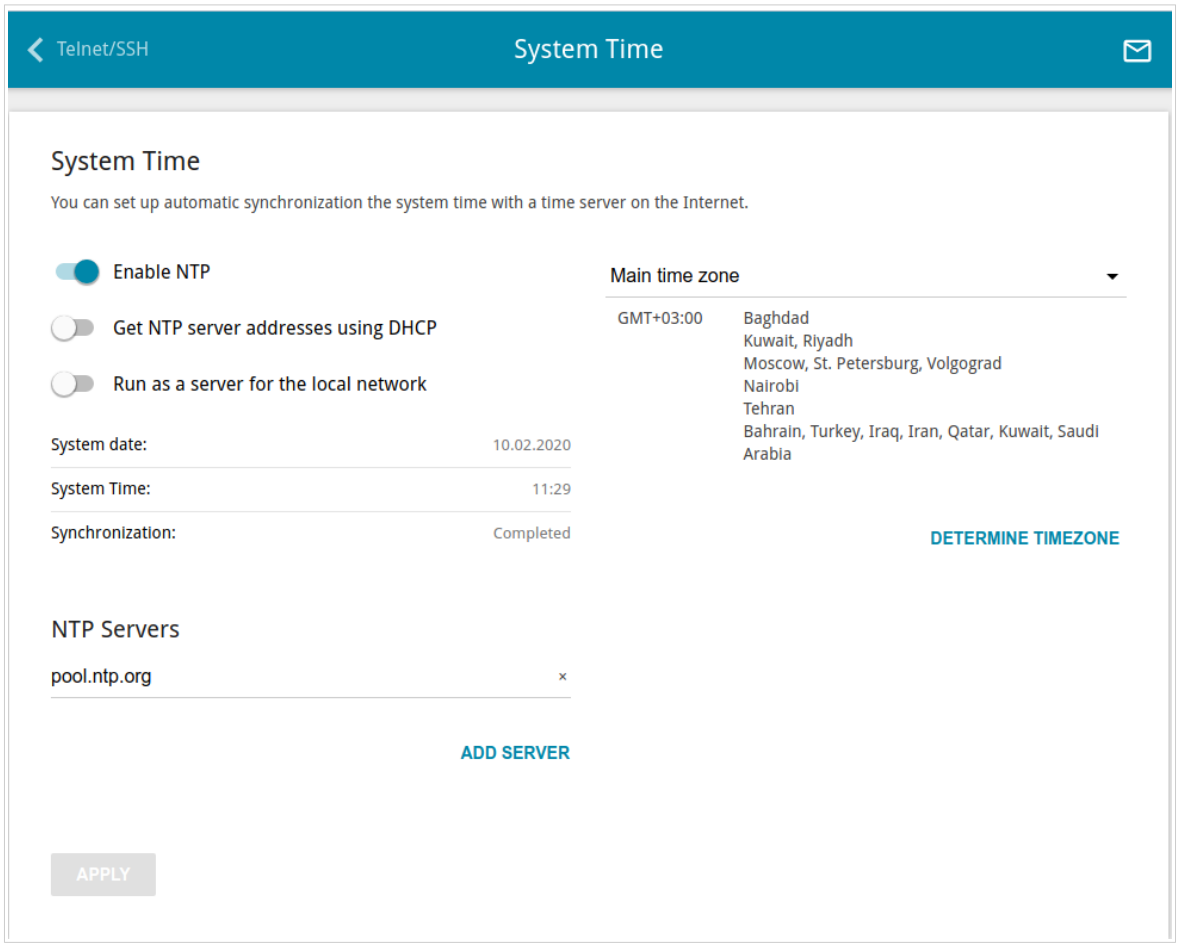

*Figure 87. The **System / System Time** page.*

To set the system time manually, follow the next steps:

1. Move the **Enable NTP** switch to the left.
2. In the **Time Settings** section, specify needed values. To specify the time set up your PC or portable device, click the **SET LOCAL TIME** button.
3. Click the **APPLY** button. The **System date** and **System time** fields will be filled in automatically.

To enable automatic synchronization with a time server, follow the next steps:

1. Move the **Enable NTP** switch to the right.
2. Specify the needed NTP server or leave the value specified by default in the **NTP Servers** section. If you need to specify several servers, click the **ADD SERVER** button.
3. Select your time zone from the **Main time zone** drop-down list. To set the time zone in accordance with the settings of your operating system or portable device, click the **DETERMINE TIMEZONE** button.
4. Click the **APPLY** button. The **System date** and **System time** fields will be filled in automatically.

In some cases NTP servers addresses are provided by your ISP. In this case, you need to move the **Get NTP server addresses using DHCP** switch to the right and click the **APPLY** button. Contact your ISP to clarify if this setting needs to be enabled. If the **Get NTP server addresses using DHCP** switch is moved to the right, the **NTP Servers** section is not displayed.

To allow connected devices to use the IP address of the extender in the local subnet as a time server, move the **Run as a server for the local network** switch to the right and click the **APPLY** button.

! When the extender 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).

Auto Provision

On the **System / Auto Provision** page, you can enable the Auto Provision function.

The Auto Provision function allows your ISP to manage the device's settings remotely: DAP-1620 connects to the ISP's server, compares the current configuration file with the configuration file stored on this server, and updates its settings if the files are different.

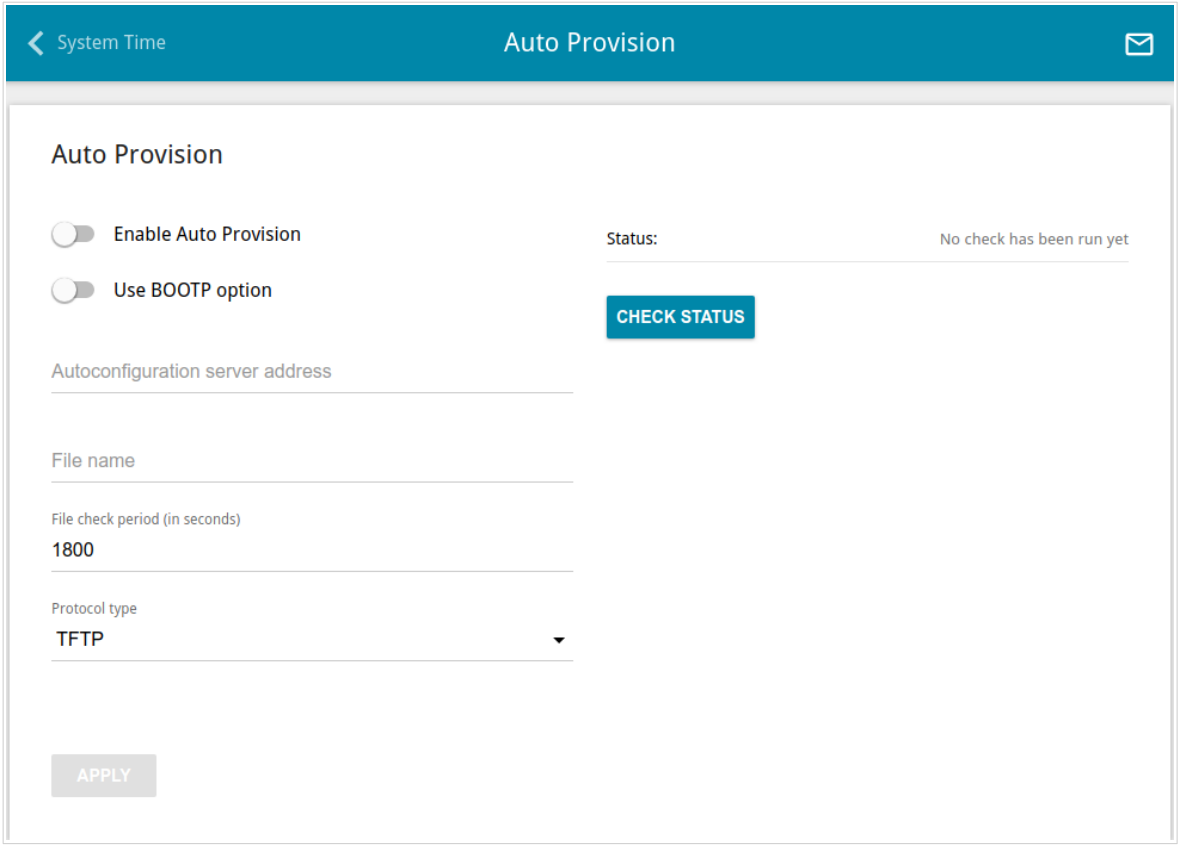

Figure 88. The page for configuring the Auto Provision function.

You can specify the following parameters:

Parameter	Description
Enable Auto Provision	Move the switch to the right to enable the Auto Provision function. If the **Static** value is selected from the **Mode of local IP address assignment** list on the **Connections Setup / LAN** page, the **Gateway IP address** field should also be filled in. Move the switch to the left to disable the Auto Provision function.

Parameter	Description
Use BOOTP option	If the switch is moved to the right, the parameters of your ISP's server (the address, the location of the configuration file, and the protocol) are automatically specified using DHCP options 66 and 67. Upon that the **Dynamic** value should be selected from the **Mode of local IP address assignment** list on the **Connections Setup / LAN** page. If the switch is moved to the left, the parameters of your ISP's server should be specified manually.
Autoconfiguration server address	The IP or URL address of your ISP's server where the configuration file is stored.
File name	The location of the configuration file on the ISP's server.
File check period	A time period (in seconds) between attempts to compare the current configuration file with the configuration file on the ISP's server.
Protocol type	A protocol for communication with the ISP's server where the configuration file is stored.

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

If you need to check manually if the current configuration file corresponds to the configuration file on the ISP's server, click the **CHECK STATUS** button. The check result will be displayed in the **Status** field. If the files are different, the device's settings will be updated.

CHAPTER 5. OPERATION GUIDELINES

Safety Rules and Conditions

Please carefully read this section before installation and connection of the device. Make sure that the device is 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.

Do not plug in the device if it is damaged. Plug the device only into working electrical outlets with parameters indicated on the device.

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.

The service life of the device is 2 years.

Wireless Installation Considerations

The DAP-1620 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 DAP-1620 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 extender and wireless network devices 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 extender 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.

CHAPTER 6. ABBREVIATIONS AND ACRONYMS

AC	Access Category
AES	Advanced Encryption Standard
AP	Access Point
ARP	Address Resolution Protocol
BPSK	Binary Phase-shift Keying
BSSID	Basic Service Set Identifier
CCK	Complementary Code Keying
DBSK	Differential Binary Phase-shift Keying
DDNS	Dynamic Domain Name System
DDoS	Distributed Denial of Service
DES	Data Encryption Standard
DHCP	Dynamic Host Configuration Protocol
DMZ	DeMilitarized Zone
DNS	Domain Name System
DPD	Dead Peer Detection
DQPSK	Differential Quadrature Phase-shift Keying
DSL	Digital Subscriber Line
DSSS	Direct-sequence Spread Spectrum
DTIM	Delivery Traffic Indication Message
GMT	Greenwich Mean Time
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
ICMP	Internet Control Message Protocol
ID	Identifier
IGD	Internet Gateway Device
IGMP	Internet Group Management Protocol
IKE	Internet Key Exchange
IP	Internet Protocol

IPTV	Internet Protocol Television
IPsec	Internet Protocol Security
ISP	Internet Service Provider
L2TP	Layer 2 Tunneling Protocol
LAN	Local Area Network
LCP	Link Control Protocol
LED	Light-emitting diode
MAC	Media Access Control
MBSSID	Multiple Basic Service Set Identifier
MIB	Management Information Base
MIMO	Multiple Input Multiple Output
MPPE	Microsoft Point-to-Point Encryption
MS-CHAP	Microsoft Challenge Handshake Authentication Protocol
MTU	Maximum Transmission Unit
NAT	Network Address Translation
NIC	Network Interface Controller
NTP	Network Time Protocol
OFDM	Orthogonal Frequency Division Multiplexing
PBC	Push Button Configuration
PFS	Perfect Forward Secrecy
PIN	Personal Identification Number
PoE	Power over Ethernet
PPP	Point-to-Point Protocol
pppd	Point-to-Point Protocol Daemon
PPPoE	Point-to-point protocol over Ethernet
PPTP	Point-to-point tunneling protocol
PSK	Pre-shared key
QAM	Quadrature Amplitude Modulation
QoS	Quality of Service

QPSK	Quadrature Phase-shift Keying
RADIUS	Remote Authentication in Dial-In User Service
RIP	Routing Information Protocol
RIPng	Next Generation Routing Information Protocol
RTS	Request To Send
RTSP	Real Time Streaming Protocol
SA	Security Association
SIP	Session Initiation Protocol
SNMP	Simple Network Management Protocol
SSH	Secure Shell
SSID	Service Set Identifier
STBC	Space-time block coding
TCP	Transmission Control Protocol
TKIP	Temporal Key Integrity Protocol
UDP	User Datagram Protocol
UPnP	Universal Plug and Play
URL	Uniform Resource Locator
VLAN	Virtual Local Area Network
VPN	Virtual Private Network
WAN	Wide Area Network
WEP	Wired Equivalent Privacy
Wi-Fi	Wireless Fidelity
WISP	Wireless Internet Service Provider
WLAN	Wireless Local Area Network
WMM	Wi-Fi Multimedia
WPA	Wi-Fi Protected Access
WPS	Wi-Fi Protected Setup