Working with Wi-Fi on Donyx Routers

When connecting a group of wired devices to a Wi-Fi network, a router in client mode (STA) is often used. But the operational scheme depends on how traffic is handled.

This article describes the operating mode where the Wi-Fi port is added to a bridge, and the IP interface is configured on that bridge. The WDS option is also enabled. As a result, all wired devices on the LAN ports receive IP addresses directly from the access point (AP) and reside in the same subnet.

In the standard mode, the client router obtains an IP address from the access point on its WAN interface. Wired clients connected to it are placed in their own local subnet and receive addresses from the client router itself. In this case, the IP interface is created directly on the Wi-Fi device, and there is no need to add the Wi-Fi port to a bridge. This method does not require bridge configuration or enabling the WDS option and is suitable for most use cases.

For all other parameters (network selection, encryption type, interface creation), the configuration is performed identically in both modes.

The objective is to ensure that wired clients connected to **R2** get their IP addresses from **R1**.

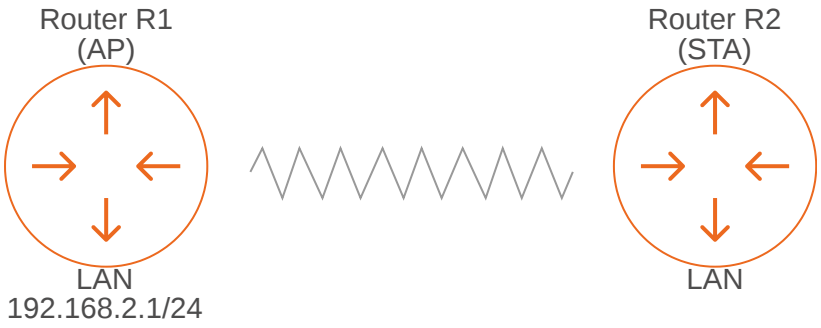


Figure 1. Passing IP addresses between routers

- **R1** acts as an *access point* and has a local network from which it hands out addresses in the *192.168.2.1/24* subnet.
- **R2** acts as a *client*.

Access Point (AP) mode – the router waits for clients to connect to its Wi-Fi network.

Station (STA) mode – the router does not create its own network but connects to a specified Wi-Fi network instead.

The configuration of the Wi-Fi interface on the router involves several steps. In **Access Point (AP)** mode, this includes network creation and its subsequent integration with a network bridge. In **Station (STA)** mode, it implies network creation followed by network interface configuration.

Adapter Configuration

The Wi-Fi adapter configuration is performed in the */wireless/adapter* section. For routers equipped with two Wi-Fi adapters, each module is configured independently.

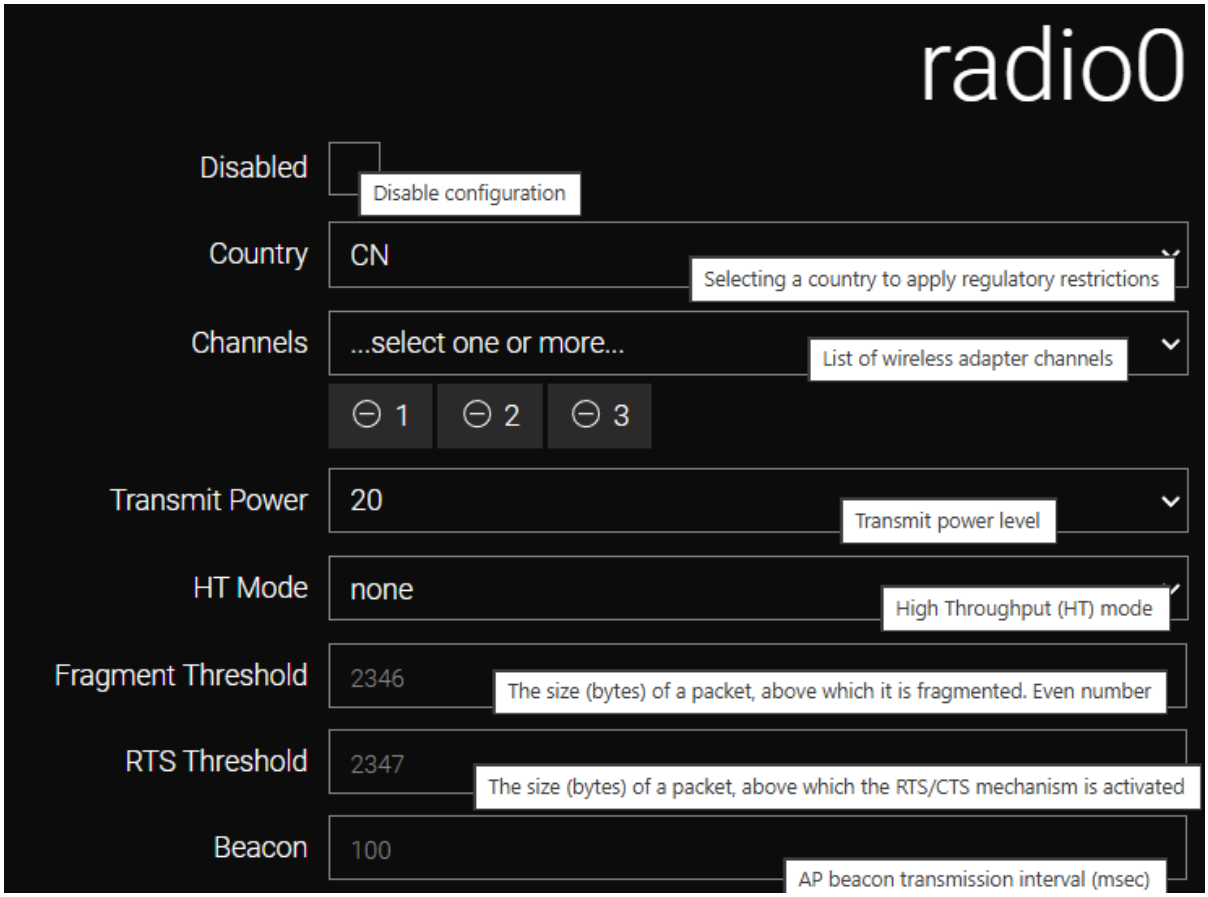


Figure 2. Adapter Configuration

The maximum number of Wi-Fi networks (AP/STA) that can be created on a single adapter depends on the router series:

- X Series: up to 8
- S Series: up to 4
- M Series: up to 16

Table 1. Adapter Parameters

Field	Description
Disabled	Enables or disables the adapter.
Country	The region defining the list of permitted channels.
Channels	Channel selection: • **none selected** — search across all available channels. • **single value selected** — no search is performed; the specified channel is used. • **multiple values selected** — search is performed only among the specified channels.

Apply the settings by clicking the **Apply** button.

Access Point Configuration

1. Navigate to the */wireless/network* section and click **Add**. In the displayed form, specify the system name, select the adapter (e.g., *radio0*), and click **OK**.



Figure 3. Name and radio module selection

2. Configure the network parameters in the subsequent menu:



Figure 4. Network configuration in psk-mixed+ccmp mode

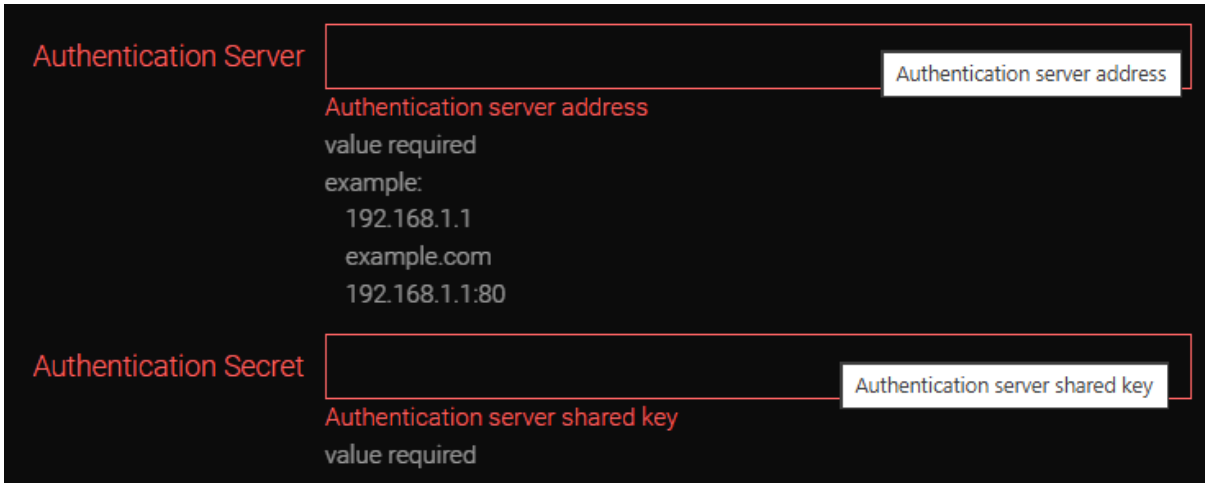


Figure 5. Additional fields for wpa-mixed-ccmp

- Set **Mode** to *AP*.
- In the **Encryption** list, select *None* for open networks, *psk-mixed+ccmp* for standard networks with a shared key, or *wpa-mixed-ccmp* for enterprise-level security.
- Enter the network identifier in the **SSID** field.
- For *psk-mixed+ccmp*, enter the network key in the **Key** field.
- Make sure to enable the **WDS** option.
- For *wpa-mixed-ccmp*, specify the RADIUS server address in the **Authentication server** field and the shared encryption key in the **Authentication secret** field.
- Other parameters may remain at their default values.

Table 2. Network Parameters

Field	Value
Adapter	Physical adapter (*radio0* is used for single-adapter configurations).
Mode	Operating mode: *ap* (Access Point) or *sta* (Station).
Encryption	Security and encryption settings: *None* (no security), *psk-mixed+ccmp* (standard security with a shared key), or *wpa-mixed-ccmp* (security with a RADIUS authentication server).
SSID	Wireless network identifier.
Key	Network key (password), applicable only to *psk-mixed+ccmp*.
WDS	Enables Ethernet Bridging.
WMM	Enables Wireless Multimedia QoS for multimedia traffic.
Hide SSID	Hides the network identifier.
MTU	Maximum frame size for the network.
Isolate Clients	Isolates wireless clients from one another (recommended for public networks).

Table 2. Network Parameters

MAC Filter	Enables MAC address filtering: *allow* (allowlist), *deny* (denylist), or *disable* (filtering off).
Authentication server	RADIUS server address (applicable only to *wpa-mixed-ccmp*).
Authentication secret	Shared encryption key for the RADIUS server (applicable only to *wpa-mixed-ccmp*).

3. In the */network/bridge* section, select the required bridge. In its settings, add the *wifi1* interface to the **Port** list and click **Apply**.

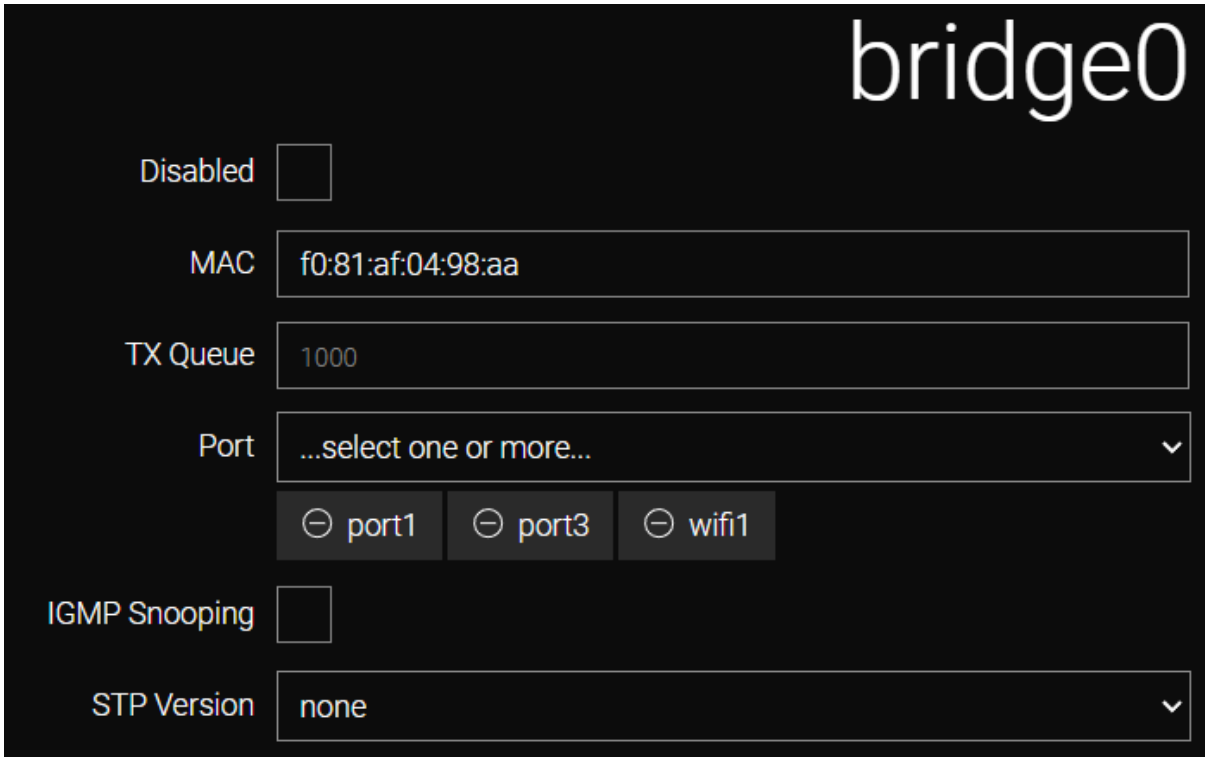


Figure 6. Bridging the wireless network with the local network

When creating a new *bridge*, you also need to create a new *interface*.

4. Navigate to the */ip/interface* section and click **Add**. In the displayed form add *bridge0* to the **Device** list and *static* to the **Type** list. Click **OK**.



Figure 7. Configuring the new interface

5. In the displayed form, assign *192.168.2.1/24* to the **IP Address** field and click **Apply**.



Figure 8. Configuring a static IP address

6. Navigate to the */service/dhcp-server* section to configure the DHCP server on **R1**, which will allow connected clients to obtain an IP address automatically. Click **Add**. In the displayed form, select the *bridge0* interface and click **OK**.

Configure the settings as shown in the example.



Figure 9. Configuring DHCP server on R1

Apply the settings by clicking the **Apply** button.

Connecting to a Wireless Network

1. Navigate to the */wireless/network* section and click **Add**. In the displayed form, specify the system name (e.g., *wifi2*) and select the hardware module in the **Adapter** field.
2. Configure the network parameters in the displayed menu.

psk-mixed+ccmp mode



Figure 10. Client configuration for a psk-mixed+ccmp network

Table 3. Parameters for psk-mixed+ccmp

Field	Value
Adapter	Selected radio adapter. **In this example: *radio0*.**
Mode	Operating mode: ***sta***.
Encryption	Security and encryption: *None* (no security), *psk-mixed+ccmp* (standard security with a shared key), or *wpa-mixed-ccmp* (security with a RADIUS authentication server). **In this example: *psk-mixed+ccmp*.**
SSID	Wireless network identifier. **In this example: *dnx-123456*.**
Key	Network key (password), used only for *psk-mixed+ccmp*.
WDS	Enables Ethernet Bridging.
WMM	Enables Wireless Multimedia QoS for multimedia traffic.
MTU	Maximum frame size.

wpa-mixed+ccmp mode

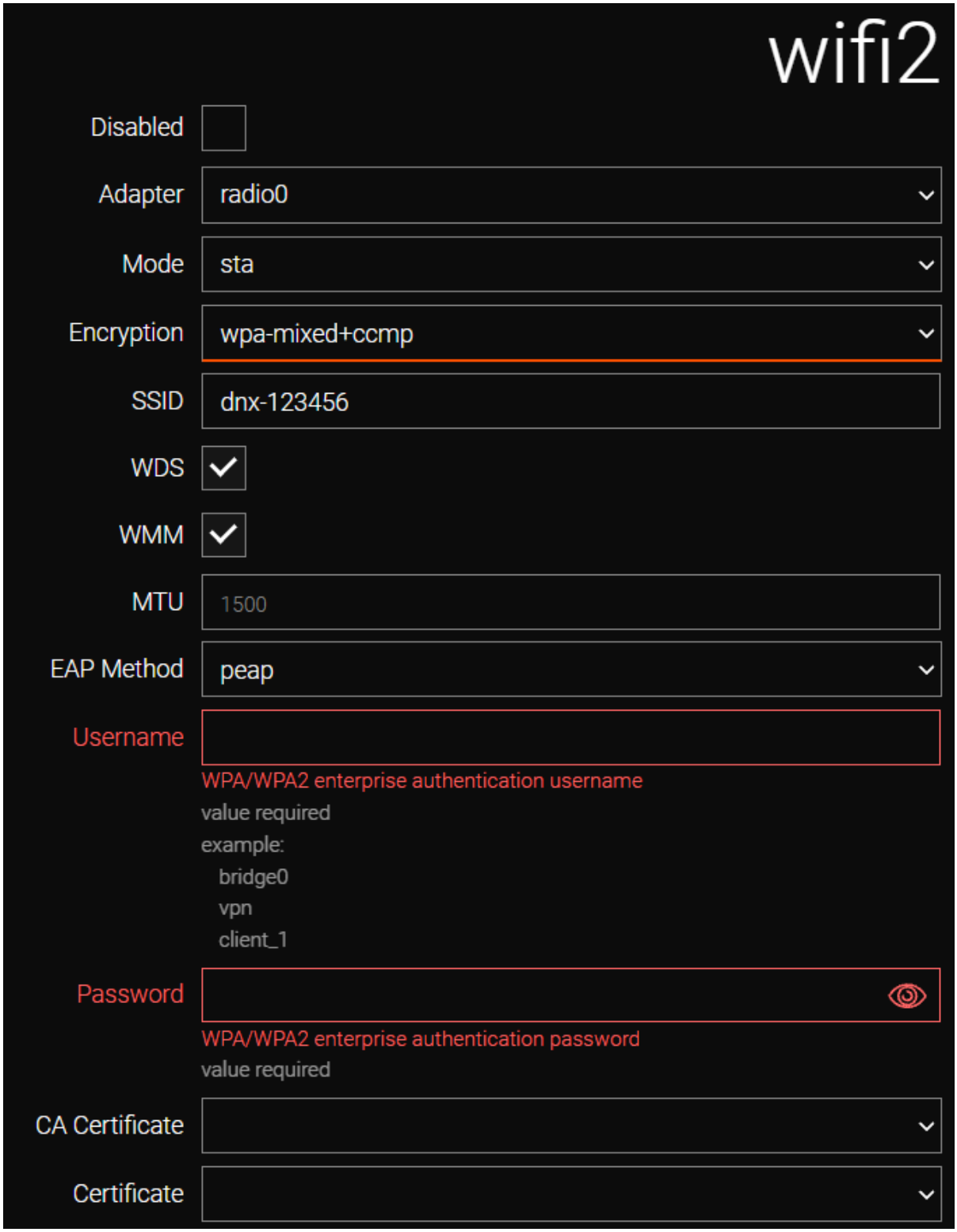


Figure 11. Client configuration for a wpa-mixed+ccmp network

Table 4. Parameters for wpa-mixed+ccmp

Field	Value
Adapter	Selected radio adapter. **In this example: *radio0*.**
Mode	Operating mode: ***sta***.
Encryption	Security and encryption. **In this example: *wpa-mixed+ccmp*.**
SSID	Wireless network identifier. **In this example: *dnx-123456*.**
WDS	Enables Ethernet Bridging.
WMM	Enables Wireless Multimedia QoS for multimedia traffic.
MTU	Maximum frame size.
EAP Method	EAP method. Available: *peap*, *tls*, *ttls*. Select the **EAP Method** parameter from the list that corresponds to the network requirements.
Username	User name.
Password	User password.
CA Certificate *	The certificate of the Certification Authority (CA) used to authenticate the RADIUS server certificate.
Certificate *	Client certificate.

* Select the required certificates from the **CA Certificate** and **Certificate** lists. Certificates must be pre-uploaded to the */storage/file* section and subsequently imported in the */storage/certificate* section.

3. Navigate to the */network/bridge* section and click **Add**. Select the *bridge1* interface and click **OK**.

4. In the displayed form, add *wifi2* in the **Port** field and click **Apply**.



Figure 12. Selecting ports

5. After connecting to the network, an interface must be created in the */ip/interface* section. Navigate to */ip/interface* and click **Add**.

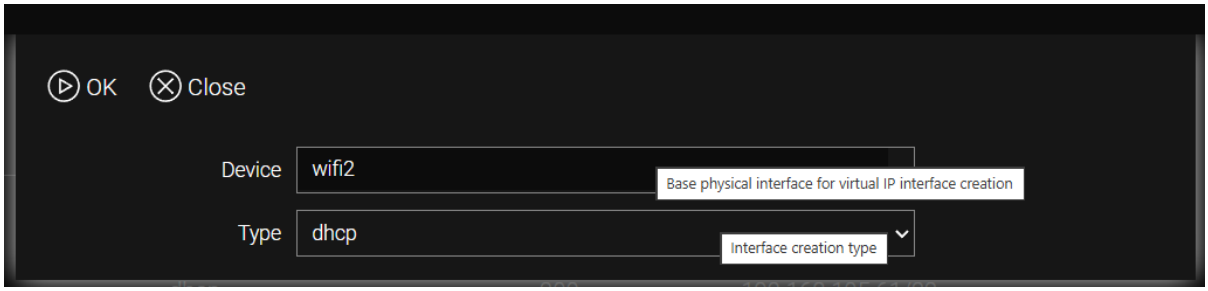


Figure 13. Configuring the virtual interface

6. Configure parameters in the displayed form if required, or leave them at their default values.



Figure 14. Configuring DHCP settings

7. If a static IP address is required:

- Navigate to the */ip/interface* section, click the **Add** button, and select *static* in the **Type** field.



Figure 15. Configuring a static IP address

- Specify the IP address with the subnet mask (e.g., *158.0.0.10/24*) and enter the gateway address in the **Gateway** field.

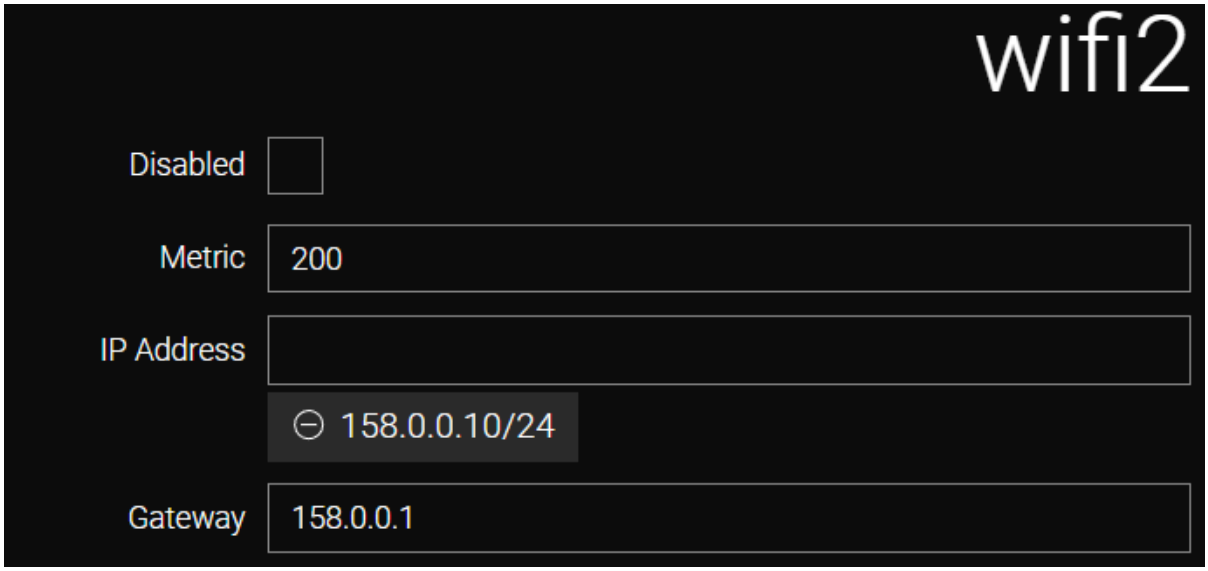


Figure 16. Configuring a static IP address

8. Click **Apply** and save the configuration using the */system config commit* command.

Donyx routers support concurrent **Access Point (AP)** and **Station (STA)** operation on a single radio module. This configuration is implemented by defining two wireless networks—one for each mode—sharing a common hardware adapter. Due to technical constraints, the broadcasted **AP** functions only while an active **STA** connection to an upstream Wi-Fi network is maintained. Should the router lose its connection to the remote access point, the local wireless network will also cease to function.

Wi-Fi Configuration via CLI

Adapter Configuration

```
/wireless adapter radio0
  beacon 100
  channels 1 2 3
  country default
  disabled -
  frag-threshold 2346
  htmode none
  rts-threshold 2347
  txpower auto

/wireless adapter apply
```

Access Point Mode

To create a network in *psk-mixed+ccmp* mode:

```
/wireless network add name=wifi1 adapter=radio0
    disabled -
    encryption psk-mixed+ccmp
    hidden -
    isolate -
    key password
    mac-filter disable
    mode ap
    mtu 1500
    ssid wifi1-AP
    wds true
    wmm true

/wireless network apply
```

To create a network in *wpa-mixed+ccmp* mode, using *example.com* as the RADIUS server address and *sharedkey* as the common encryption key:

```
/wireless network add name=wifi1 adapter=radio0
    auth-secret sharedkey
    auth-server example.com
    disabled -
    encryption wpa-mixed+ccmp
    hidden -
    isolate -
    mode ap
    mtu 1500
    ssid wifi1-AP
    wds true
    wmm true

/wireless network apply
```

To create a bridge, using *wifi1* as a **Port**:

```
  /network bridge add name=bridge0
    disabled -
    igmp-snooping -
    port port1,port2,wifi1
    stp-version none
    tx-queue-len 1000

  /network bridge apply
```

To create a interface in static *type*, using *192.168.2.1/24* as a **IP-Address**:

```
  /ip interface add device=bridge0 type=static
    disabled -
    gateway -
    ip-address 192.168.2.1/24
    metric -

  /ip interface apply
```

Start the **DHCP server** on the *bridge0* interface:

```
/service dhcp server add interface=bridge0
    disabled -
    dns-server 192.168.2.1
    flags -
    leasetime 12h
    mode server
    ntp-server 192.168.2.1
    option -
    pool 192.168.2.100-192.168.2.200
    router 192.168.2.1

/service dhcp server apply
```

Station (STA) Mode

To connect to the *dnx-123456* network using *password* as the shared key in *psk-mixed+ccmp* mode:

```
/wireless network add name=wifi2 adapter=radio0
    disabled -
    encryption psk-mixed+ccmp
    key password
    mode sta
    mtu 1500
    ssid dnx-123456
    wds true
    wmm true

/wireless network apply
```

To establish a connection to the *dnx-123456* network using the *username* and *password* credentials in *wpa-mixed+ccmp* (WPA/WPA2 Enterprise) mode:

```
/wireless network add name=wifi2 adapter=radio0
    ca -
    cert -
    disabled -
    eap-method peap
    eap-password password
    eap-username username
    encryption wpa-mixed+ccmp
    mode sta
    mtu 1500
    ssid dnx-123456
    wds true
    wmm true

/wireless network apply
```

To create *bridge1* with ports 3 and 4 and bind it to the Wi-Fi network:

```
/network bridge add name=bridge1
    disabled -
    igmp-snooping -
    port port3,port4,wifi2
    stp-version none
    tx-queue-len 1000

/network bridge apply
```

To configure a **DHCP** connection:

```
/ip interface add device=wifi2 type=dhcp
    defaultroute true
    dhcp-clientid -
    dhcp-vendorid -
    disabled -
    metric 200
    peer-dns true

/ip interface apply
```

To configure a static IP connection (where *158.0.0.1* is the gateway and *158.0.0.10/24* is the assigned IP address and subnet mask):

```
/ip interface add device=wifi2 type=static
    disabled -
    gateway 158.0.0.1
    ip-address 158.0.0.10/24
    metric 200

/ip interface apply
```



All modifications are permanently saved to the router configuration only after executing the */system config commit* command or clicking the **commit** button in the web interface.