




Expansion port WIFI

USER'S GUIDE

Symbols used

Danger – important notice, which may have an influence on the user's safety or the function of the device.

Attention – notice on possible problems, which can arise in specific cases.

Information, notice – information, which contains useful advice or special interest.

Declared quality system
ISO 9001

CE

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1. Safety instructions

Please observe the following safety instructions:

- The expansion port must be used in compliance with all applicable international and national laws and in compliance with any special restrictions regulating the utilization of the communication module in prescribed applications and environments.
- Use only the original Vitriko company accessories. Thus you will prevent possible health risks and damage to the devices and ensure compliance with all relevant provisions. Unauthorised adjustments or use of unapproved accessories may result in damage to the expansion port and breach of applicable laws. Use of unapproved adjustments or accessories may lead to cancellation of guarantee, which has no effects on your legal rights.
- Do not expose the expansion port to extreme conditions. Protect it from dust, moisture and heat.

2. Product disposal instructions

The WEEE (Waste Electrical and Electronic Equipment: 2002/96/EC) directive has been introduced to ensure that electrical/electronic products are recycled using the best available recovery techniques to minimize the impact on the environment. This product contains high quality materials and components which can be recycled. At the end of it's life this product MUST NOT be mixed with other commercial waste for disposal. Check with the terms and conditions of your supplier for disposal information.

3. Expansion port description

The expansion port WiFi is created as an addition of router desk, that allows using of wireless interface in Vitriko v2 routers. This expansion port is provided as an internal part of the router.

WiFi module supports AP (Access Point) function. This module allows you to scan the neighboring networks. Due to WiFi module it is possible to perform automatic configuration of connected devices (maximum number is 2007) via DHCP server.

Expansion port WiFi supports these standards:

- 802.11b: 1, 2, 5.5, 11Mbps
- 802.11g: 6, 9, 12, 24, 36, 48, 54Mbps
- 802.11n:
  - (20MHz) MCS0-7, up to 72Mbps
  - (40MHz) MCS0-7, up to 150Mbps

Expansion port WiFi supports the following types of security:

- 64/128 WEP
- TKIP
- AES

Expansion port WiFi supports the following types of authentication:

- Shared
- WPA-PSK
- WPA2-PSK

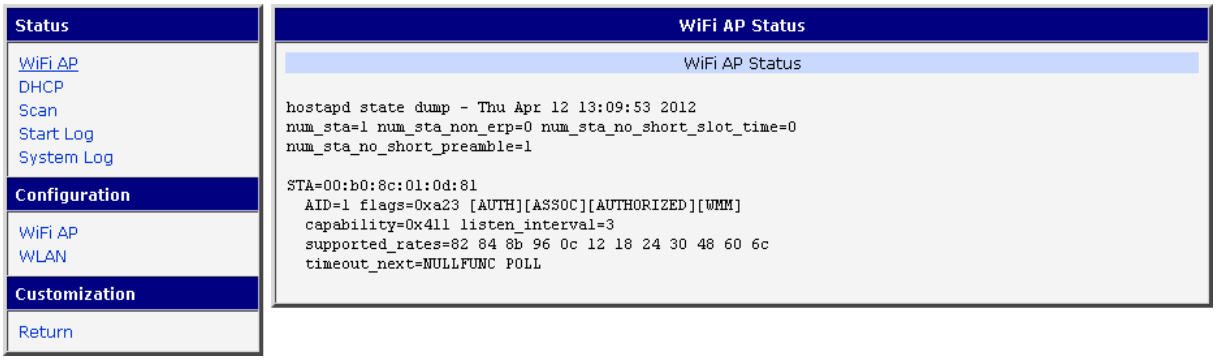

Fig. 1: WiFi modul

For putting WiFi network into operation in the place, where several wi-fi networks are already operated, it is recommended to set a new WiFi network to a different radio channel than other networks are running. Overlapping of more WiFi networks can cause occasional network outages or less communication speed of your network.

User information:

- Expansion port WiFi can be fitted only into PORT2.
- User module WiFi is not included in the standard router firmware. If expansion port WiFi is fitted to the router, user module WiFi is uploaded to the router during router production.

4. Module configuration

4.1. WiFi status

4.1.1. WiFi AP

After selecting the **WiFi AP** item in **Status** section, information about WiFi access point in the router and associated stations is displayed.

Item	Description
hostapd state dump	Time stamp of actual WiFi status.
num_sta	Number of associated stations.
num_sta_non_erp	Number of associated Non-ERP stations (i.e., stations using 802.11b in 802.11g BSS)
num_sta_no_short_slot_time	Number of associated stations, that do not support Short Slot Time
num_sta_no_short_preamble	Number of associated stations, that do not support Short Preamble.

Table 1: State information about WiFi AP

Furthermore, there is displayed information for each connected client (see picture below). Lots of items are internal information of user module. Usable items are only the following:

Item	Description
STA	MAC address of associated station.
AID	STA's unique AID (1 .. 2007) or 0 if not yet assigned.

Table 2: State information about WiFi client

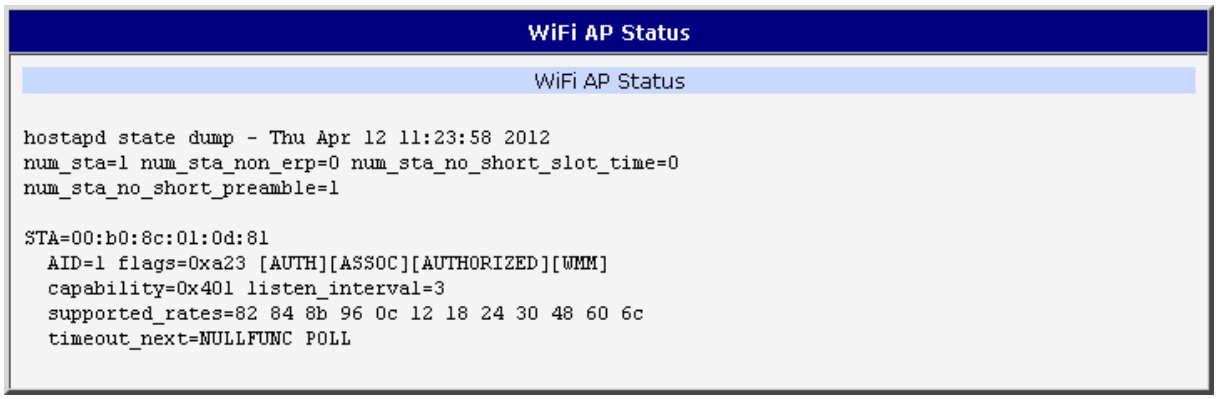

Fig. 2: WiFi AP Status

4.1.2. DHCP

Information about DHCP server activity can be accessed by selecting the **DHCP status** item. The DHCP server provides automatic configuration of devices connected to the network managed by router. DHCP server assigns IP address, netmask, default gateway (IP address of router) and DNS server (IP address of router) to each device.

The following table lists description of lines that are displayed in the *DHCP status* window for each configuration.

Item	Description
lease	Assigned IP address
starts	Time of assignation of IP address
ends	Time of termination IP address validity
hardware ethernet	Hardware MAC (unique) address
uid	Unique ID
client-hostname	Computer name

Table 3: Information about lease address

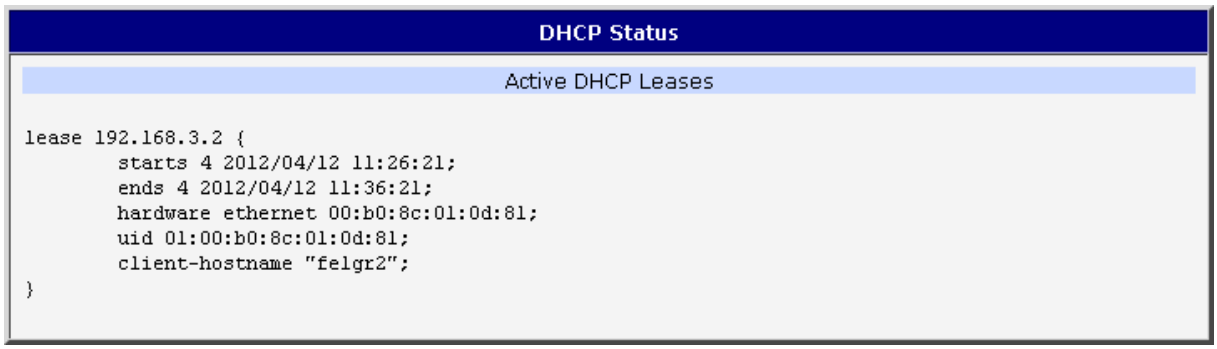

Fig. 3: WiFi DHCP status

4.1.3. Scan

If you want to scan neighboring WiFi networks, press **Scan** item. Scanning can be performed, if the access point (WiFi AP) is off.

Item	Description
BSS	MAC address of access point (AP).
TSF	A Timing Synchronization Function (TSF) keeps the timers for all stations in the same Basic Service Set (BSS) synchronized. All stations shall maintain a local TSF timer.
freq	Frequency band of access point (AP).
beacon interval	Period of time synchronization [kus] (1,024ms).
capability	List of access point (AP) characteristic.
signal	Signal level of access point (AP).
last seen	Last response time of access point (AP).
SSID	Identifier for access point (AP).
Supported rates	Supported rates of access point (AP).
DS Parameter set	The channel on which broadcast access point (AP).

Table 4: Information about neighboring WiFi networks

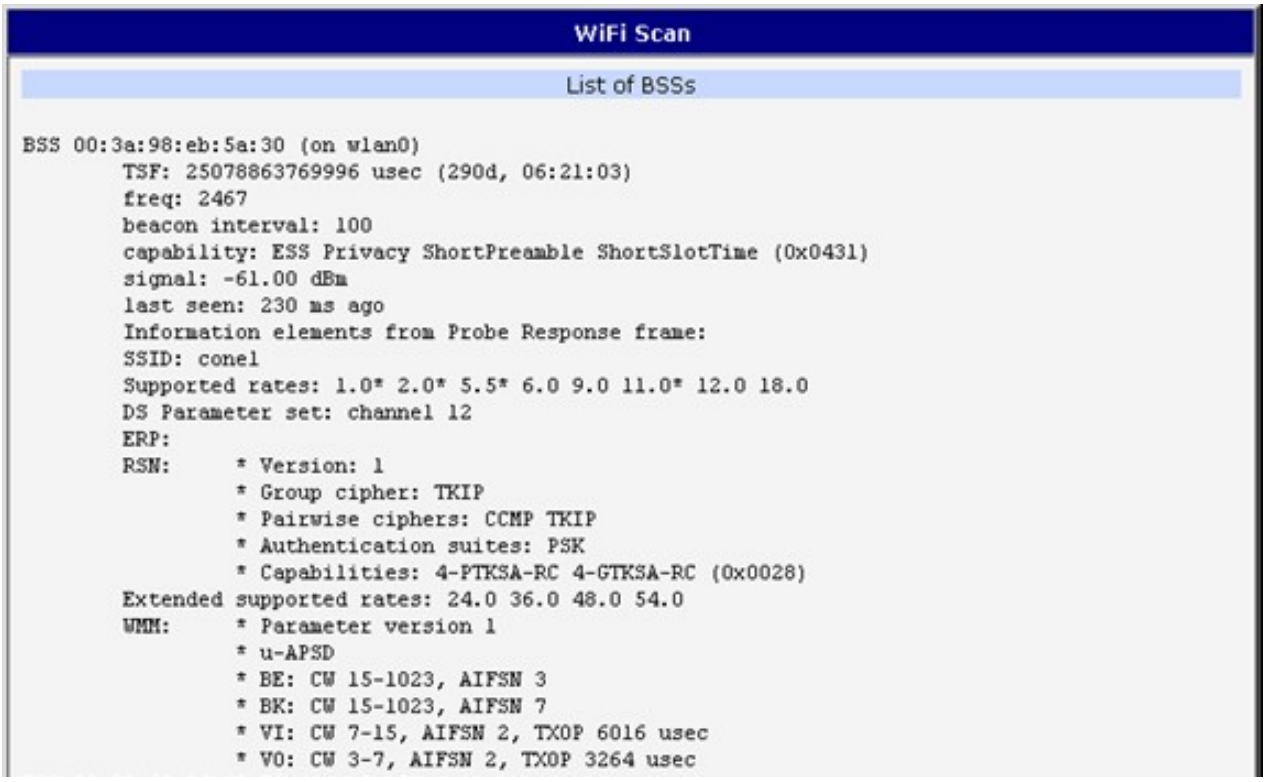

Fig. 4: WiFi Scan

4.1.4. Start Log

If there is some problem during starting WiFi connections, you can cause **Start Log** in the **Status** section. There can be displayed error reports that correspond to one or more components of WiFi AP. Basic component WiFi AP (hostapd) is exception. This component writes every report to the **System Log**.

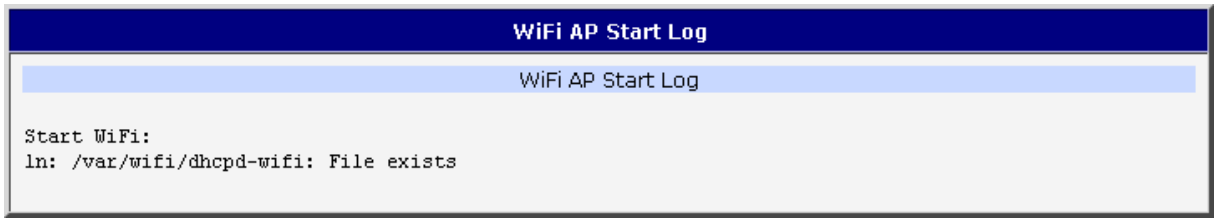

Fig. 5: WiFi AP Start Log

4.1.5. System Log

In case of any problems with WiFi connection it is possible to view the system log by pressing the ***System Log*** menu item. In the window are displayed detailed reports from individual applications running in the router. WiFi AP activity is indicated in rows starting "hostapd" or "dhcpd-wifi". Press *Save* button to save the system log to the computer.

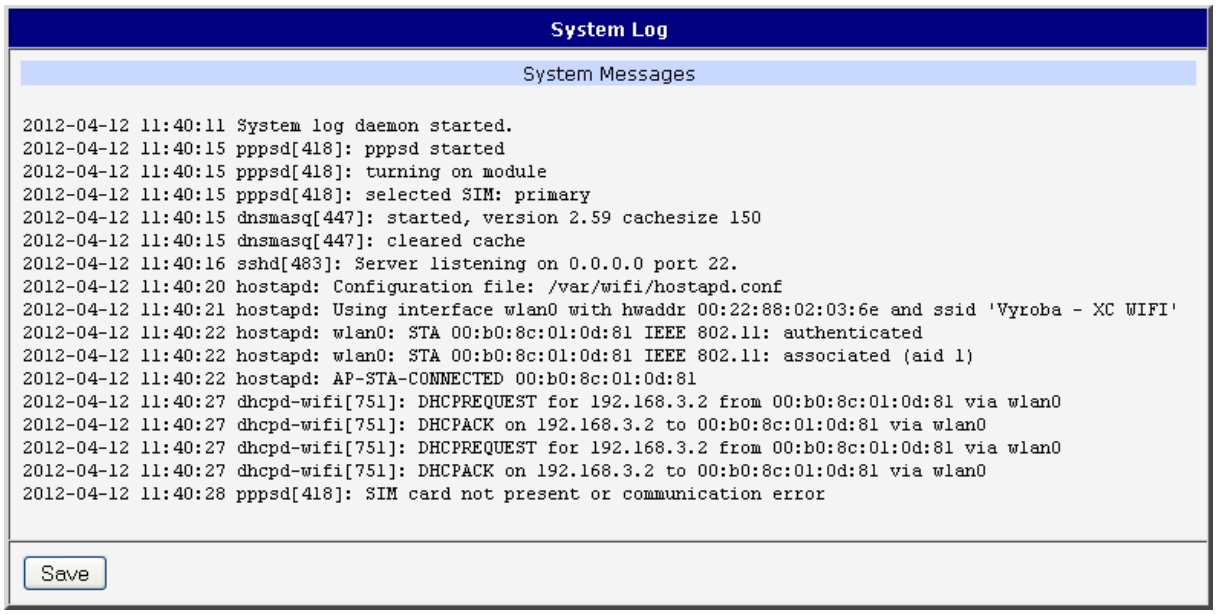

Fig. 6: System Log

4.2. WiFi configuration

4.2.1. WiFi AP configuration

Page with configuration of WiFi access point is displayed by selecting **WiFi AP** item in **Configuration** section.

Item	Description
Enable WiFi AP	If this item is checked, WiFi AP is enabled.
SSID	Identifier of WiFi network.
Broadcast SSID	Method of broadcasting the unique identifier of SSID network in beacon frame and type of response to a request for sending the beacon frame. • Enabled – SSID is broadcasted in beacon frame. • Zero length – Beacon frame does not include SSID. Requests for sending beacon frame are ignored. • Clear – Every SSID character in beacon frame is replaced by 0. Original length is kept. Requests for sending beacon frame are ignored.
Country code	Code of the country, where the router is used with WiFi. This code must be entered in format **ISO 3166-1 alpha-2**. If country code isn't specified and the router has implemented no system to determine this code, it is used "US" as default country code . If no country code is specified or is entered the wrong country code, then it may come a pass a breach of regulatory rules for the using of frequency bands in the particular country.
HW model	HW mode of WiFi standard that will be supported by WiFi access point. • IEE 802.11b • IEE 802.11b+g • IEE 802.11b+g+n
Channel	The channel, where the WiFi AP is transmitting.
BW 40 MHz	The choice for HW mode 802.11n that allows using of two standard 20MHz channels simultaneously.
WMM	Basic QoS for WiFi networks is enabled by checking this item. This version doesn't guarantee network throughput. It is suitable for simple applications that require QoS.
Authentication	Access control and authorization of users in the WiFi network. • Open - Authentication is not required. Free access point. • Shared – Base authentication using WEP key. • WPA-PSK - Authentication using better authentication methods PSK-PSK. • WPA2-PSK - WPA-PSK using new encryption AES.
Encryption	Type of data encryption in the WiFi network • None – No data encryption. • WEP – Encryption using static WEP keys. This encryption can be used for Shared authentication. • TKIP – Dynamic encryption keys management, that can be used for WPA-PSK and WPA2-PSK authentication.

	• AES - Improved encryption used for WPA2-PSK authentication.
WEP Key Type	Type of WEP key for WEP encryption. • ASCII – WEP key in ASCII format • HEX – WEP key in hexadecimal format
WEP Default Key	This item specifies default WEP key.

WEP Key X	Items for different 4 WEP keys.
	• WEP key in ASCII format must be entered in quotes. This key can be specified in the following lengths.
	  ○ 5 ASCII characters (40b WEP key)
	  ○ 13 ASCII characters (104b WEP key)
	  ○ 16 ASCII characters (128b WEP key)
	• WEP key in hexadecimal format must entered only in hexadecimal digits. This key can be specified in the following lengths.
	  ○ 10 hexadecimal digits (40b WEP key)
	  ○ 26 hexadecimal digits (104b WEP key)
	  ○ 32 hexadecimal digits (128b WEP key)

WPA PSK Type	Type of key for WPA-PSK authentication. • 256-bit secret • ASCII passphrase • PSK File
WPA PSK	Key for WPA-PSK authentication. This key must be entered according to the selected WPA PSK type as follows. • 256-bit secret - 64 hexadecimal digits • ASCII passphrase – 8 to 63 characters; Then these characters are converted to PSK. • PSK File – absolute path to the file containing the list of pairs (PSK key, MAC address)
Access List	Mode of Access/Deny list. • Disabled – Accept/Denny list is not used. • Accept – Clients in Accept/Denny list access to the network. • Deny – Clients in Access/Denny list don't access to the network.
Accept/Deny List	Accept or Denny list of client MAC addresses that set network access. Each MAC address is separated by new line.
Syslog Level	Communicativeness level, when system writes to the system log. • Verbose debugging – The highest level of communicativeness. • Debugging • Informational – Default level of communicativeness that is used for writing standard events. • Notification • Warning – The lowest level of communicativeness.

Table 5: Description of WiFi AP parameter

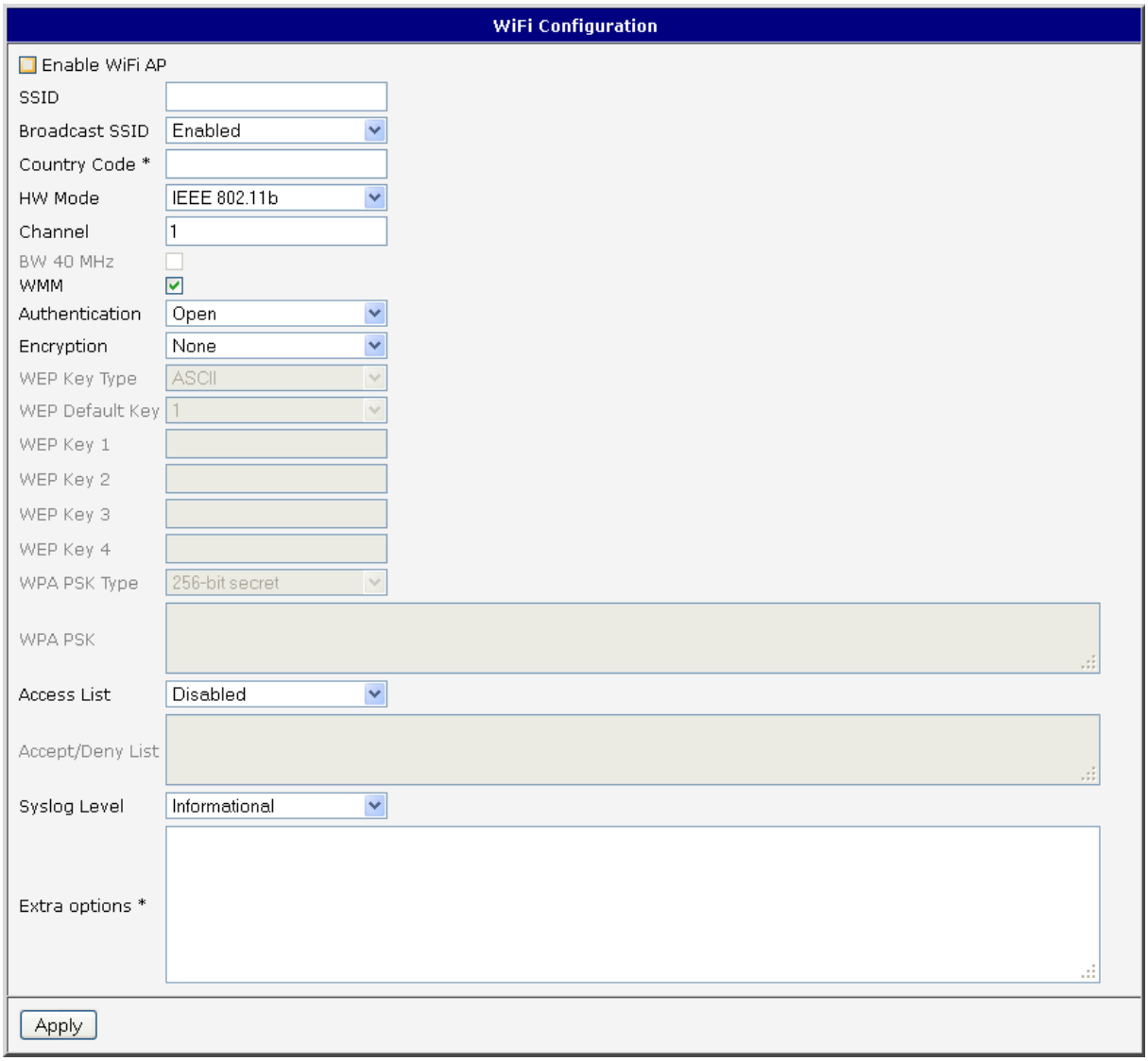

Fig. 7: WiFi AP configuration

4.2.2. WLAN configuration

Page with configuration WiFi LAN and DHCP server is displayed by selecting **WLAN** in configuration section.

Item	Description
Enable WLAN interface	If this item is checked, WiFi LAN is enabled.
IP Address	Fixed set IP address of WiFi network interface.
Subnet mask	IP address of Subnet Mask.
Bridged	• No - Bridged mode is not allowed. WLAN network is not connected with LAN router. • Yes - Bridged mode is allowed. WLAN network is connected with one or more LAN network in router. In this case, the setting of most items in this table is ignored. Instead, it takes setting of selected network interface (LAN).
Enable dynamic DHCP leases	If this option is checked, dynamic DHCP server is enabled.
IP Pool Start	Start IP addresses space.
IP Pool End	End IP addresses space
Lease Time	Time in seconds, which the client can use IP address.

Table 6: Description of WLAN parameter

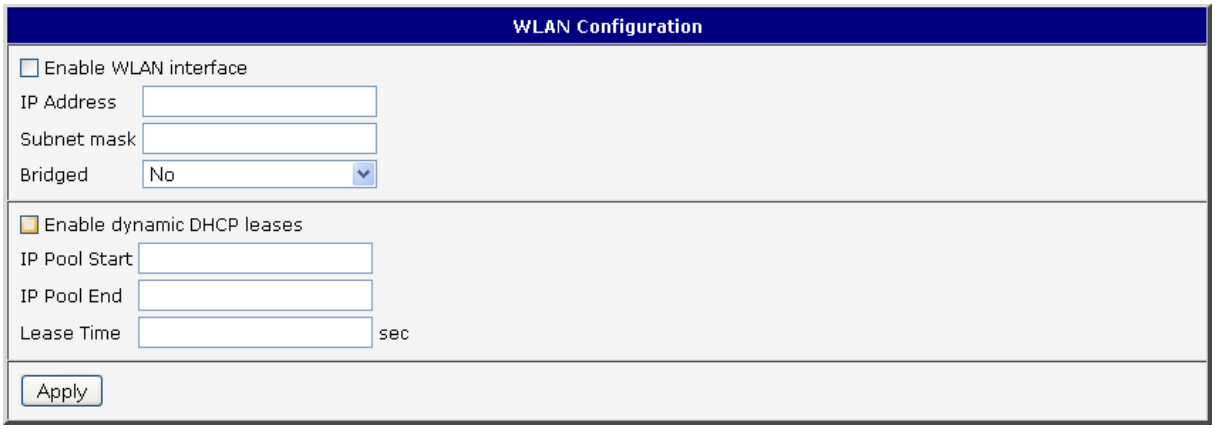

Fig. 8: WLAN configuration

5. State indication of port

LED port indicator	
Green LED	WiFi port is power on.
Yellow LED	Permanent off.

Table 7: State indication

6. Delivery Identification

Trade name	Type name	Power supply
XC-WIFI	XC-WIFI	Internal supply

Table 8: Delivery identification

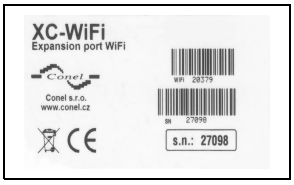

Fig. 9: Label of expansion port

7. Technical specification

Name of product	Expansion port WIFI		
Power supply	Internal		+3,3V
Environment	Operating temperature		-15 .. +65 C
	Storage temperature		-20 .. +85 C
Standards	Emission		EN 55022/B
	Immunity		ETS 300 342
	Safety		EN 60950
	Isolation		EN 60747
WIFI specifications (802.11 b/g/n)	RX Sensitivity	11b, 11Mbps 11g, 54Mbps (HT20) 11n, MSC7 (HT20) 11n, MSC7	-85 dBm -70 dBm -66 dBm -62 dBm
	TX Output power	11b, 11Mbps 11g, 54Mbps 802.11n (HT20) 802.11n (HT20)	19 dBm 16 dBm 15 dBm 15 dBm
	Internal Antenna Impedance		50 Ω
	Frequency band		2,4GHz

Table 9: Technical specification

8. Recommended literature

[1] : **Application guide – Expansion port mounting,**

[2] : **Configuration manual.**