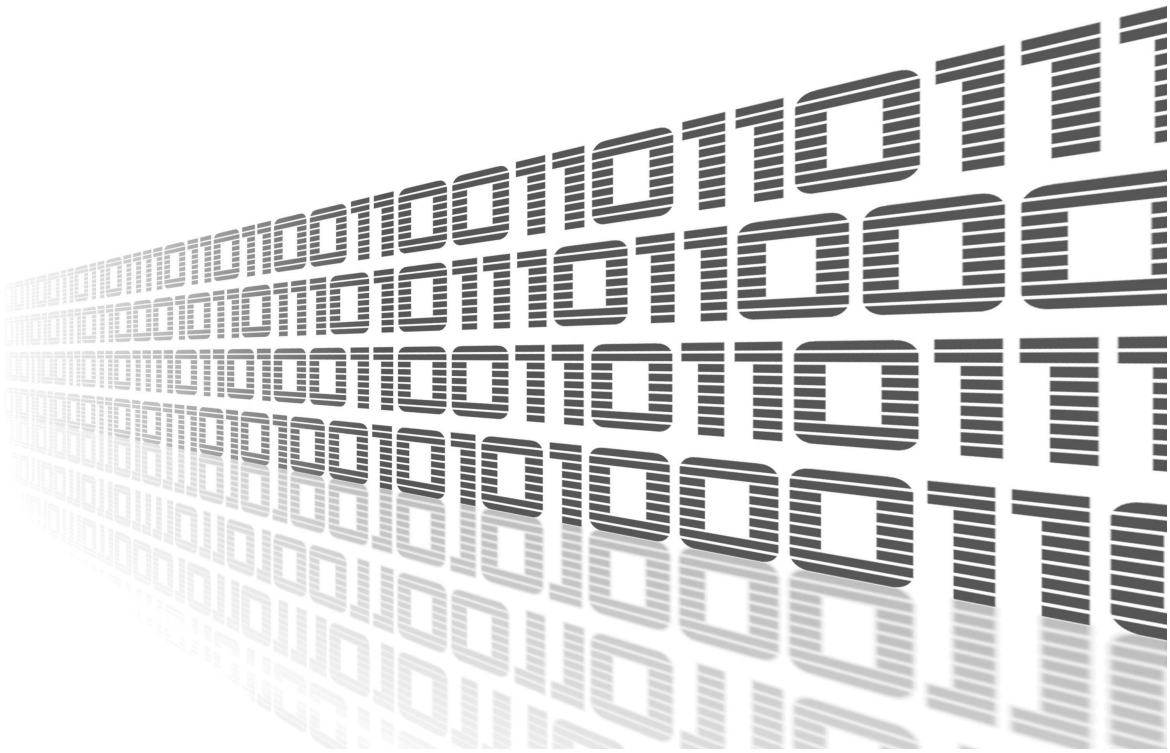
RouterApp

User Module

WiFi SSID Switch

APPLICATION NOTE



ADVANTECH

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Used symbols

Danger – Information regarding user safety or potential damage to the router.

Attention – Problems that may arise in specific situations.

Information or notice – Useful tips or information of special interest.

Example – example of function, command or script.

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1. User Module Description

The *WiFi SSID Switch* user module is an additional feature of Advantech B+B SmartWorx routers. This allows the router to switch automatically between up to four SSIDs – WiFi networks. It is also possible to configure different SSIDs, the types of authentication and encryption, security keys or passwords and DHCP Clients. This feature overrides the settings on the WiFi page in the router and switches among SSIDs (networks) as configured. Automatic switching between networks is decided according to set priorities. When the WiFi signal is weak, the switching is based on the signal level of the networks. This can be used for example when the router is moving among known locations to automatically connect to the WiFi networks – see Figure below.

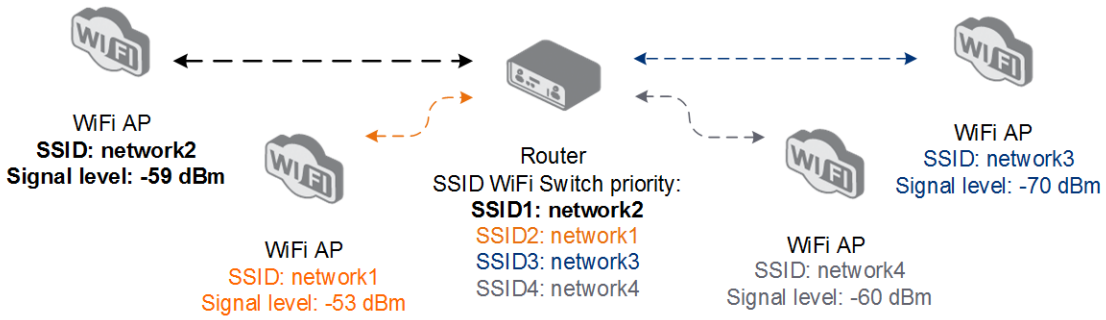

Figure 1: WiFi SSID Switch Principle

The user module *WiFi SSID Switch* is not part of the standard router firmware. See the *Configuration Manual* [1, 2] for the description of uploading this user module to the router. The user module is available for v2 and v3 router models with WiFi compatibility.

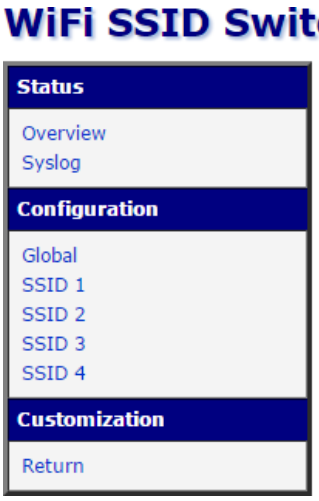

Figure 2: User Module Menu

To upload the user module archive file, go to the *User Modules* page in the *Customization* section of the router's Web interface. After uploading the user module to the router, go to its Web interface by clicking on the user module's name. On the left you will then see the user module's menu as in Figure 2. There is an *Overview* landing page and *Syslog* page in the *Status* section. In the *Configuration* section there is a *Global* page with global configuration followed by *SSID1* to *SSID4* pages where different WiFi network connections can be configured. You can return to the Web interface of the router and the main menu using *Return* button in the *Customization* section.

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2. Configuration

In this chapter, the configuration of the user module is described. Make sure that you know the following WiFi access points parameters – SSID, type of authentication and encryption and the security key or password. It is necessary to enable WLAN interface and WiFi in station mode before using the *WiFi SSID Switch* user module in the router:

Enable WLAN in STA mode Enable the wlan0 network interface on the *WLAN* page in the router's Web interface. Check the *Enable WLAN interface* check box, set the *Operating Mode* to *station (STA)*. The DHCP Client settings will be overridden by the user module. Click the *Apply* button to confirm the changes. See *Configuration Manual* [1, 2] for more details.

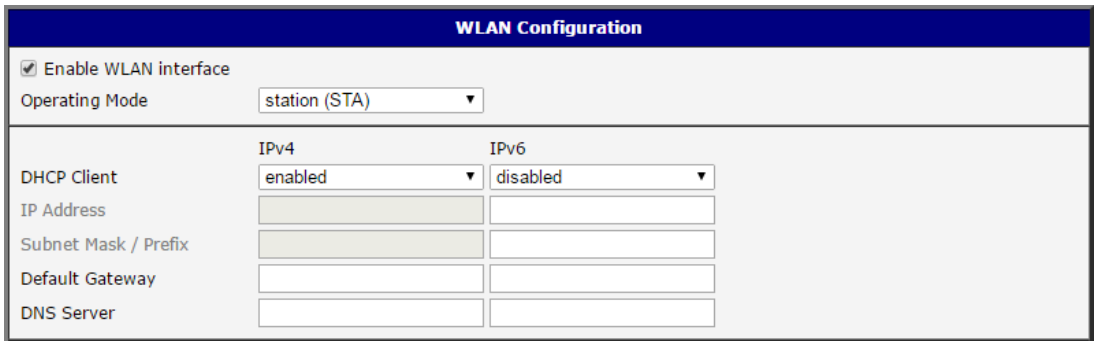

Figure 3: Enable WLAN Interface

Enable WiFi in STA mode Enable connection to a WiFi network on WiFi page. Check the *Enable WiFi* box and make sure that the *station (STA)* operating mode is selected. The SSID, security and password information will be overridden by the *WiFi SSID Switch* user module settings. Click the *Apply* button to confirm the changes. See *Configuration Manual* [1, 2] for more details.

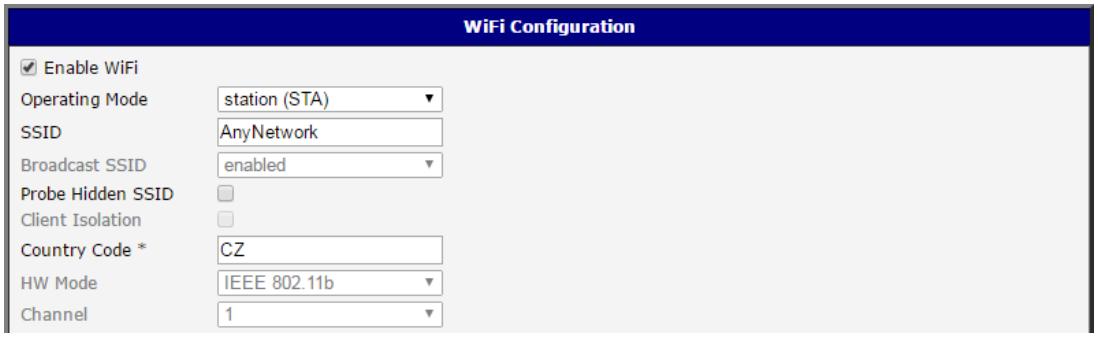

Figure 4: Enable WiFi STA

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2.1 Global

Go to *User Modules* page and go to *WiFi SSID Switch* user module's interface. Navigate to the *Global* page in the *Configuration* section – see Figure 5. The configuration items are explained in the table below.

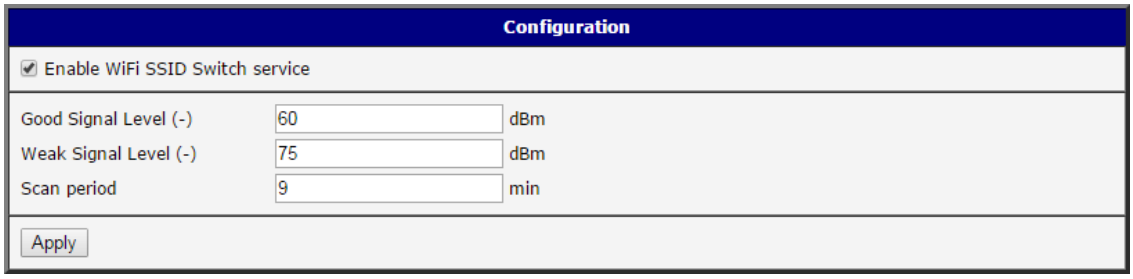

Figure 5: Global Configuration

Item	Description
Enable WiFi SSID Switch service	Check this box to enable this user module. When enabled, the configuration on WiFi page of the router is overridden with multiple SSID configurations set on the *SSID1* to *SSID4* pages.
Good Signal Level (-)	Negative value of signal level in dBm. The default is -60 dBm. If a positive number is entered, it will be taken as a negative. Networks detected above this level are switched based on priority only.
Weak Signal Level (-)	Negative value of signal level in dBm. The default is -70 dBm. If a positive number is entered, it will be taken as a negative. Networks detected with between Good and Weak signal level are switched based on signal strength only – the one with the strongest signal is chosen. Networks detected with below Weak signal level are also switched based on signal strength.
Scan period	How often the WiFi networks are scanned for their signal strength. Switching to different networks (if required) is also carried out at these intervals. The default value is 10 minutes. Values ranging from 1 to 60 minutes are allowed.

Table 1: Global Configuration

Changes in this configuration will take effect after pressing the *Apply* button.

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2.2 SSID1 – SSID4 Configuration

The user module switches among networks configured on pages *SSID1* to *SSID4*. SSID1 has the highest priority, SSID4 has the lowest priority. (Priority goes from top to the bottom.) When the signal strength is above good level, the network is chosen based on this priority list only. The configuration items are described in the table below. These settings will override the configuration on the *WiFi* page in the router. The DHCP Client will override the DHCP Client on *WLAN* configuration page in the router.

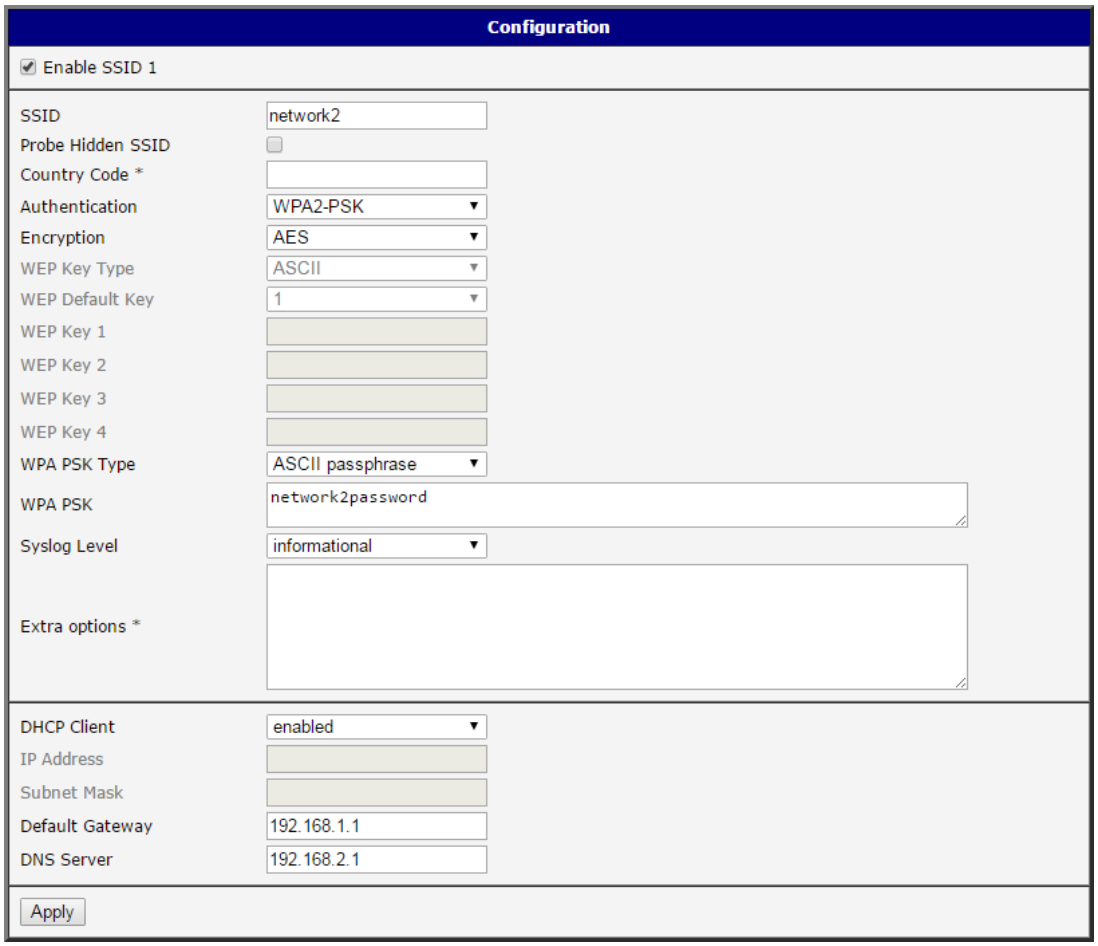

Figure 6: SSID1–SSID4 Configuration

Item	Description
Enable SSID1 (SSID2, SSID3, SSID4)	Add this SSID (network) to the selected networks to switch among. By default there is shown 'disabled' notice on the *Overview* page for the configured SSID.

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Item	Description
SSID	The unique identifier of the WiFi network.
Probe Hidden SSID	Probes hidden SSIDs.
Country Code	Code of the country where the router is installed. This code must be entered in ISO 3166-1 alpha-2 format. If a *country code* isn't specified, "US" code will be used as the default *country code*. If no *country code* is specified or if the wrong country code is entered, the router may violate country-specific regulations for the use of WiFi frequency bands.
Authentication	Access control and authorization of users in the WiFi network. • **Open** – Authentication is not required (free access point). • **Shared** – Basic authentication using WEP key. • **WPA-PSK** – Authentication using higher authentication methods PSK-PSK. • **WPA2-PSK** – WPA-PSK using newer AES encryption.
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 key 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 specifies the default WEP key.

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Item	Description
WEP Key 1–4	Allows entry of four different 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 be entered 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	The possible key option 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 • PSK File – absolute path to the file containing the list of pairs (PSK key, MAC address)
Syslog Level	Logging level, when system writes to the system log. • **Verbose debugging** – The highest level of logging. • **Debugging** • **Informational** – Default level of logging. • **Notification** • **Warning** – The lowest level of system communication.
Extra options	Allows the user to define additional parameters.

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Item	Description
DHCP Client	Activates/deactivates DHCP client.
IP Address	If DHCP Client is disabled only. The fixed IP address of the WiFi interface.
Subnet Mask	If DHCP Client is disabled only. Specifies a Subnet Mask for the IP address.
Default Gateway	Specifies the IP address of a default gateway. If filled-in, every packet with a destination not found in the routing table is sent here.
DNS Server	Specifies the IP address of the DNS server. When the IP address is not found in the Routing Table, this DNS server is requested.

Table 2: SSID1 – SSID4 Configuration

Changes to this configuration will take effect after pressing the *Apply* button.

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3. Status

The status of the user module – *Overview* and *System Log* pages are described in this chapter.

3.1 Overview and Behavior

To see an overview and the status of the WiFi SSID switching, go to the *Overview* page of the user module (this is also the home page of the user module). When the user module is enabled (on the *Global* page), information will be displayed as in the Figure below. The parts of this overview are explained in the table below.

Switching Behavior If the signal level is above *Good Signal Level*, the networks are switched according to priority only. If the signal level is between *Good* and *Weak*, the networks are switched according to signal strength only. The only exception is this: it remains connected to the prioritized network when the signal level is above *Good* level and then drops to the *Good/Weak* interval – as is shown in the Figure below (see *network2*). This is to prevent useless frequent switching – once the network is associated with Good signal level, it is switched only when the signal level drops below the Weak signal level. In such a case, the system switches to the network with the strongest signal level. Switching to the other SSID takes approximately 3 seconds (WiFi service is restarted).

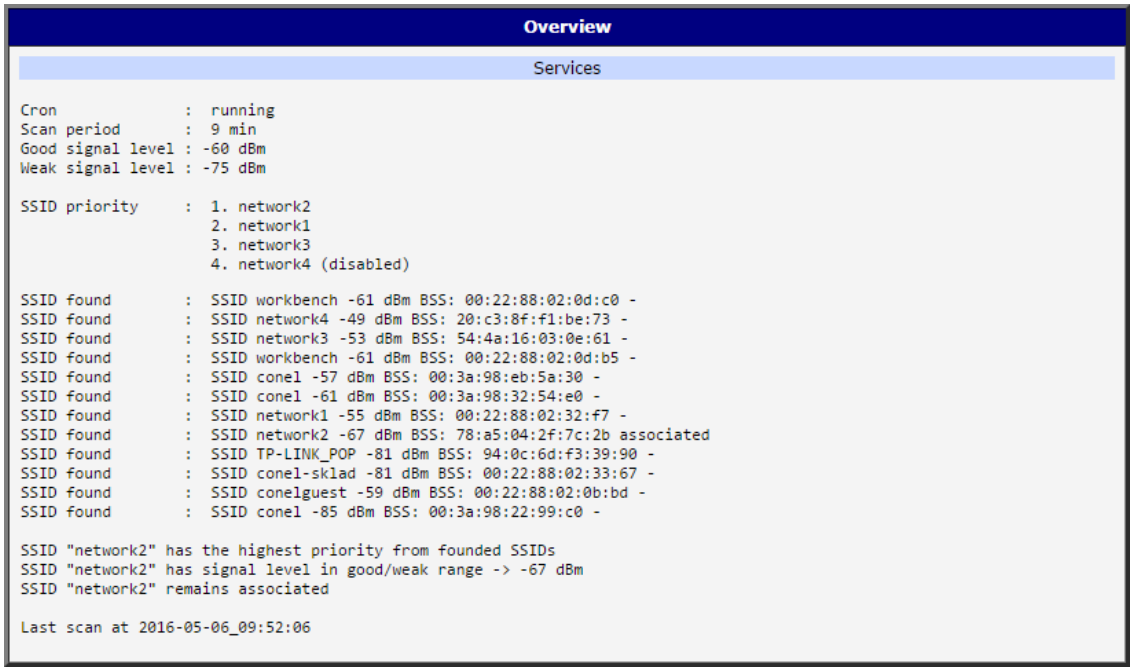

Figure 7: WiFi SSID Switch Overview

Item	Description
Cron	Th status of the cron – job scheduler – of the WiFi scan which runs repeatedly at set intervals. This can be either *running* or *stopped*.
Scan period	The *Scan period* as set on *Configuration* page.
Good signal level	The *Good Signal Level* as set on *Global* page.
Weak signal level	The *Weak Signal Level* as set on *Global* page.
SSID priority	The priority for the networks as set on *SSID1* to *SSID4* pages (the lower the number the higher priority). A *disabled* notice is shown for disabled networks.
SSID found	The list of SSIDs found on a scheduled scan. This listing additionally contains signal strength and MAC address information. At a selected network there is shown an *associated* notice, so you can see the actual connected network.
Other status entries	Below all other information are shown log messages concerning switching decisions and the time of the last scan. If the WiFi is not enabled in the router, there is a notice at the top.

Table 3: Overview Items

3.2 System Log

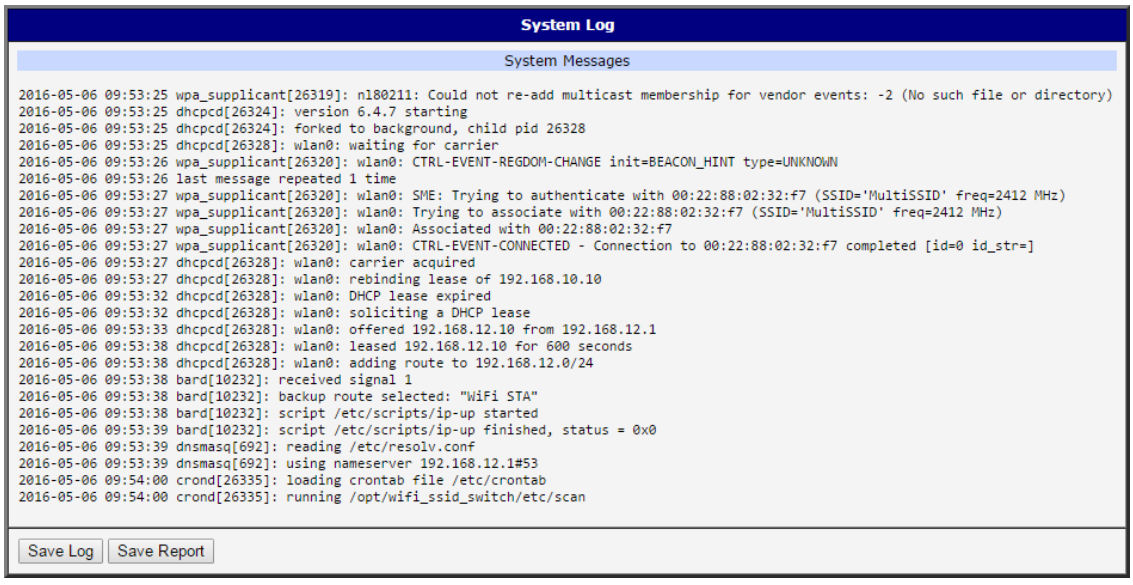

Figure 8: System Log

The *Syslog* page displays System Log messages. It is the same system log as the one in the main menu of the router. User module messages are indicated by `wpa_supplicant` and `crond` strings. You can check the operation of the user module in the log or view messages in the event of configuration problems. You can download these messages and save them to a computer as a text file (.log) by clicking the *Save Log* button. You can also download a detailed report (.txt) for communication with support by clicking the *Save Report* button.

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4. Related Documents

[1] Advantech Czech: **v2 Routers Configuration Manual** (MAN-0021-EN)
[2] Advantech Czech: **SmartFlex Configuration Manual** (MAN-0023-EN)
[3] Advantech Czech: **SmartMotion Configuration Manual** (MAN-0024-EN)
[4] Advantech Czech: **SmartStart Configuration Manual** (MAN-0022-EN)
[5] Advantech Czech: **ICR-3200 Configuration Manual** (MAN-0042-EN)

Product related documents can be obtained on *Engineering Portal* at www.ep.advantech-bb.cz address.

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