

# PeP' link

**PePLink Surf**

**User's Manual**

Document Version : 2.6

Firmware Version : 6.0.4

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## 3 Product Description

PePLink Surf, formerly known as MANGA Surf, is a Wi-Fi Station Mode (Client) Router with WPA, WPA2 and 802.1x supplicant support. It is designed to act as a Wireless router which connects to Wireless Broadband Internet Service and allows LAN users to access the Internet via it.

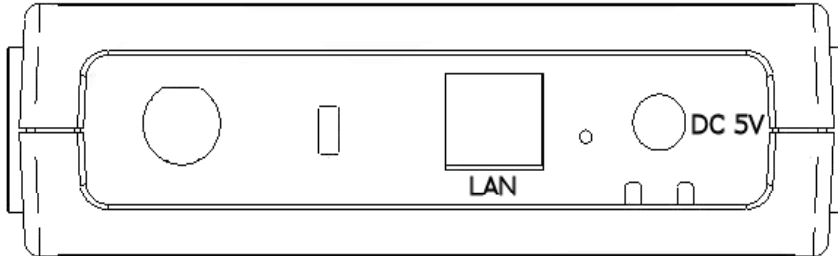
It associates to a service provider and authenticates using 802.1x (if needed) on start up. Upon successful association and authentication, it will acquire an IP address from the service provider using DHCP. A DHCP server is built-in on its LAN port. Network Address Translation is performed for all outbound connections. Thus it supports multiple terminals to access the Internet simultaneously.

### 3.1 Features

- 10/100 Ethernet interface with auto-crossover detection
- Reset button for restoring settings to factory defaults
- Signal strength LED for showing the current signal strength
- WPA/WPA2-Personal and WPA/WPA2-Enterprise support
- Network Address Translation (NAT) routing
- Built-in DHCP server
- Inbound port range forwarding

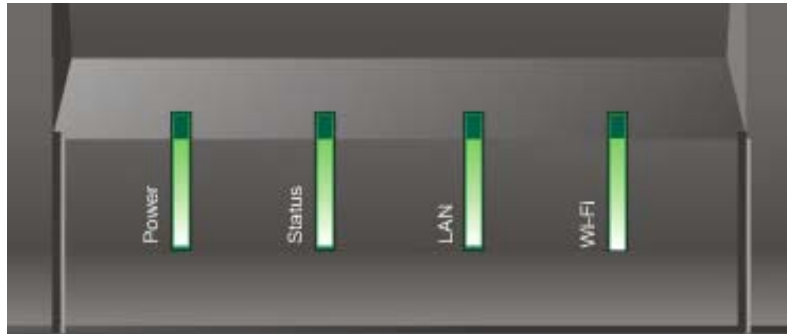


## 3.2 Hardware Setup



1. Attach the provided antenna to the left most antenna connector
2. Connect the LAN port to the computer's Ethernet port with an Ethernet cable.
3. Connect the end of the included power adapter to the power socket (labeled "DC 5V") on PePLink Surf.
4. Power on the power adaptor.

### 3.3 LED Description



		S t a t u s	Description
		C o n	Power is on
		C o f	Power is off
		S c i c l i c	Received signal is Excellent, Very Good and Good
		E l i n k i n c	Received signal is Low

		E l i r k i r g S	Received signal is Very Low
		c l i c C f f	No wireless signal is detected
		C r	Booting up / Upgrading firmware
		E l i r k i r g C f f	Ethernet is connected
		C r	Sending/Receiving data
		C f f	Ethernet is not connected
		C r	Associated with an access point

			E l i r k i r g C f f	Sending/Receiving data
				Not associated with any access point

This is the Signal Strength and Status LED state conversion table.

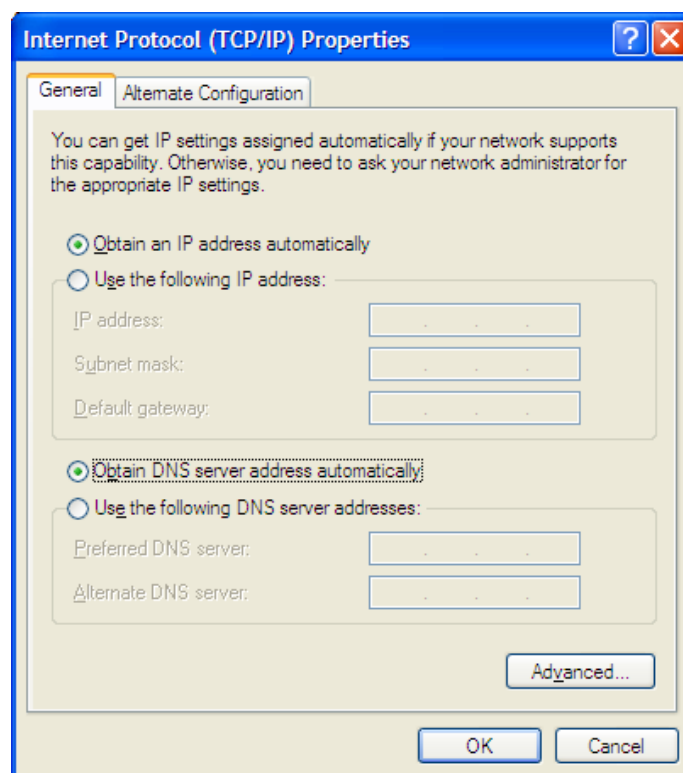
Received Signal Strength	Status LED	Indication on the web based power meter
> -70	Solid Green	Excellent
-70 to -74	Solid Green	Very good
-75 to -79	Solid Green	Good
-80 to -84	Blinking Green	Low
-85 to -87	Blinking Amber	Very Low
-87 to -89	Blinking Amber	Very Low
-89 <	Blinking Amber	Very Low



## 4 Using the PePLink Surf

You should set up your computer's LAN interface to obtain an IP address automatically. If you do so, you should have set it up correctly.

In order to do so, select the "Start" menu, "Control Panel" and then "Network Connections". Right click on the "Local Area Connection" icon, choose "Properties", double click on the item "Internet Protocol (TCP/IP)" from the list. On the screen, just set it as follows:



Click the "OK" button to confirm the change.

## 4.1 First Time Setup

On your PC, start a web browser, e.g. Internet Explorer, Mozilla Firefox, etc. Visit an Internet web site. If you are not associated to an access point, you should be redirected to a logon page. Or you can go also go to this URL

`http://192.168.20.1/`

The page will look like this.



Once it is associated to an access point, you can also access the page from this URL:

`https://wan.ip.addr.here:8000/`

Login ID and password are “admin” and “MSurf000”.

Click the “Advanced Config” button to enter the parameters of the access point to associate to. You should see this screen:

Section	Field	Value
LAN interface	IP Address	192.168.20.1
	Subnet mask	255.255.255.0
DHCP server	<input checked="" type="radio"/> Enable	
	Start IP address	192.168.20.10
	Stop IP address	192.168.20.250
	Subnet mask	255.255.255.0
Wireless settings	<input type="radio"/> Disable	
	SSID	MySSID (MySSID)
	Radio Mode	802.11b/g
	Bit Rate	auto Mbps (auto)
	Authentication	WPA/WPA2-Personal (open)
	Encryption Key	My_WPA_PSK (empty) (at least 8 characters)
	Preferred AP	MAC (e.g. 00116E1014A0) Min Signal Strength (e.g. -75) dBm
WAI redirection	<input checked="" type="radio"/> Enable <input type="radio"/> Disable (Note: you need to reboot CPE for this change to take effect)	
Restore factory settings	<input type="button" value="Restore &amp; Reboot"/>	
Reboot CPE	<input type="button" value="Reboot"/>	
		<input type="button" value="Save"/>

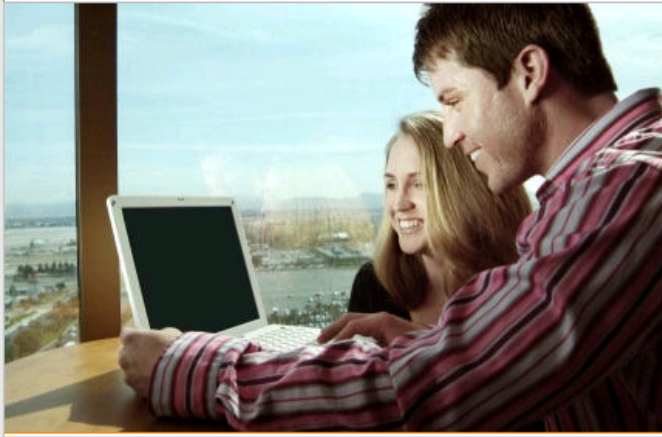
In the field “SSID” under Wireless Settings, input the access point’s SSID (sometimes it is called “network name”). According to the setting of the Access Point you are associating to, you may choose different “Authentication setting”.

If “Static WEP key” or “WPA/WPA2-Personal” is selected, input the Encryption Key field as well.

Click the “Save” button at the bottom to complete.

You can now click the “Connect” link on the top bar and then click the “Connect” button to associate with the access point.

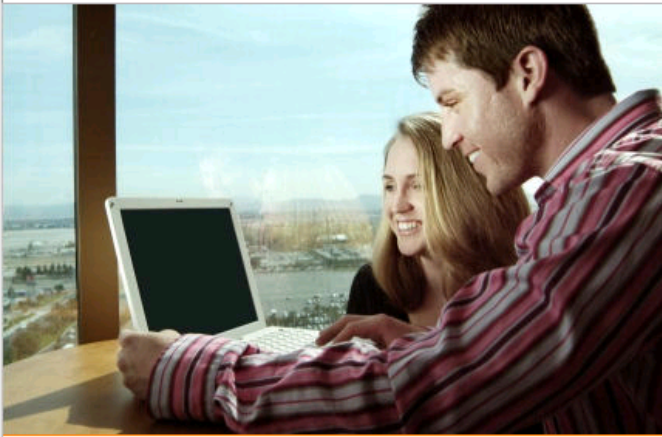
There are also options of “802.1x with dynamic WEP key” and “WPA/WPA2-Enterprise”. For their details, please refer to chapter 4.4 .



Please wait...

Establishing connection to the Internet


Associating to Access Point



Please wait...

Establishing connection to the Internet

Acquiring Network Address



Connected to the Internet

**Internet Connection Established**

Note: Please close this web browser and open a new one to start web browsing.

Signal

Signal strength: Excellent

Advanced Config

At this point, you are associated with the access point. You may now close the web browser and open a new one to start web browsing.

## 4.2 Settings Details

<b>LAN interface</b>	IP Address	<input type="text" value="192.168.20.1"/>
	Subnet mask	<input type="text" value="255.255.255.0"/>
<b>DHCP server</b>	<input checked="" type="radio"/> Enable	
	Start IP address	<input type="text" value="192.168.20.10"/>
	Stop IP address	<input type="text" value="192.168.20.250"/>
	Subnet mask	<input type="text" value="255.255.255.0"/>
	<input type="radio"/> Disable	

**LAN Interface:** To configure the LAN interface's IP address and subnet mask.

**DHCP Server:** To configure to enable the built-in DHCP server or not. If enabled, the IP address range can be configured.

<b>Wireless settings</b>	SSID	<input type="text" value="MySSID"/> (MySSID)
	Radio Mode	<input type="text" value="802.11b/g"/> ▼
	Bit Rate	<input type="text" value="auto"/> ▼ Mbps (auto)
	Authentication	<input type="text" value="WPA/WPA2-Personal"/> ▼
	Encryption Key	<input type="text" value="Open"/> <input type="text" value="Static WEP Key"/> <input type="text" value="802.1x with dynamic WEP key"/> <input type="text" value="WPA/WPA2-Enterprise"/> <input checked="" type="text" value="WPA/WPA2-Personal"/>
	Preferred AP	<input type="text" value="(e.g. 0011021017A0)"/> Min Signal Strength <input type="text"/> dBm (e.g. -75)

### Wireless Settings:

**SSID:** To configure the SSID / ESSID / Network Name of the wireless network to associate to.

**Radio Mode:** It allows the user to choose between radio modulations support. E.g. 802.11b/g, 802.11g only, 802.11b, etc. The available settings depend on the Wi-Fi module installed on the device.

Note: Under 802.11g only mode, 802.11b rates are used during access point association.

**Bit Rate:** To fix the 802.11 transmit bit rate. Available options depend on the Radio Mode chosen. If “auto” is chosen, the device will choose the best bit rate dynamically and automatically.

**Authentication:** Available options are Open, Static WEP Key, 802.1x with dynamic WEP key, WPA/WPA2-Enterprise and WPA/WPA2-Personal. The selection should be according to the setting of the access point you are associating to. Data transferred are encrypted under all modes except the Open mode. When Static WEP Key or WPA/WPA2-Personal is chosen, you should enter an encryption key in the Encryption Key field. For 802.1x and WPA/WPA2-Enterprise options, please refer to chapter 4.4 .

**Preferred AP:** The MAC address of a preferred access point can be entered here. When the preferred access point is found and its signal strength is higher than the “Min Signal Strength”, it will connect to this preferred access point, no matter the other access points are found even they have higher signal strength or the same SSID.

<b>WAI redirection</b>	<input checked="" type="radio"/> Enable <input type="radio"/> Disable <small>(Note: you need to reboot CPE for this change to take effect)</small>
<b>Restore factory settings</b>	<input type="button" value="Restore &amp; Reboot"/>
<b>Reboot CPE</b>	<input type="button" value="Reboot"/>
<input type="button" value="Save"/>	

**WAI redirection:** If the device is not connected to an access point, and the user is accessing an Internet web site, the settings control whether to redirect the web access to the web admin interface page or not. If this is disabled and the device is not connected, the browser will then show web access error. The user can still access the web admin interface by accessing to the device’s LAN IP address. By default, it’s http://192.168.20.1 .

**Restore factory settings:** To restore the device to factory default settings. After clicked, the settings will be restored to factory defaults and the device will be restarted.

**Reboot:** To restart the device.

### 4.3 Advanced Settings: Port Forward

The PePLink Surf supports forwarding inbound TCP and UDP connections to servers on the LAN.

Service Port Range	Protocol	IP Address
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	
0 ~ 0	<input type="checkbox"/> TCP <input type="checkbox"/> UDP	

Well-known ports (commonly used ports)

- 7 (Echo)
- 21 (FTP)
- 23 (TELNET)
- 25 (SMTP)
- 53 (DNS)
- 79 (finger)
- 80 (HTTP)
- 110 (POP3)
- 119 (NNTP)
- 161 (SNMP)
- 162 (SNMP Trap)

Save

For example, if your PC is hosting a web server and you want to let Internet users access it, you should define a rule on a role. Enter “80” and “80” for the Port Range. Select “TCP” for the protocol. Enter the PC’s IP address to the “IP Address” field.

Click the “Save” button to save and apply the changes.

## 4.4 WPA/WPA2 with 802.1x Authentication

The PePLink Surf supports authentication and encryption methods of “802.1x with dynamic WEP key encryption” and WPA/WPA2-Enterprise. A radius server can be used to perform authentication based on the IEEE standard 802.1x with EAP-TTLS.

To set it up, you have to configure the PePLink Surf, the access point and a radius server.

By default, EAP-TTLS/CHAP is used as the EAP authentication method. You can change this setting in the System Settings page. Please refer to chapter 4.9.3 .

### 4.4.1 Configure the PePLink Surf

To enable the 802.1x authentication, you can go to the CPE Setup page, choose “WPA” for the Authentication setting and leave the WEP key setting empty.

#### Certificate checking

By default, the PePLink Surf does not verify the radius server's certificate. If you would like to check the certificate, you can use a command-line based FTP client to upload your certificate to the PePLink Surf.

1. ftp to the PePLink Surf (default IP is 192.168.20.1)
2. Type the login ID and password: “root” and “MSurf000”
3. cd /etc/1x
4. put root.pem
5. bye



## 4.4.2 Access Point

Access point set up procedure is different from one brand to the others. Here are some necessary configuration parameters to be configured in the access point:

- Enable WPA2 with 802.1x authentication
- Enter the radius server IP address, port number and the secret (for the provided radius server config mentioned in 4.4.3 , the secret is "testing123")

## 4.4.3 Radius Server

The commercial radius server, Radiator, is used in the set up. It is a product of Open System Consultants Pty Ltd.

Radiator version 3.9 is known to be interoperable. Any version above 3.9 should work too. Just follow the server's installation guide to install it on a server.

After installed, you should put the root cert file and server cert file to a directory, update radiator's configuration file and the users files.

A demo CA cert file (`cacert.pem`), a server cert file (`server_cert.pem`) and a server key file (`/etc/radiator/server_key.pem`) are pre-generated and attached. You can generate them by yourself by following the instructions in the Appendix. Put the files to the directory `/etc/radiator`.

A sample Radiator configuration file is as follows. Save it as `radius.cfg` and put it under `/etc/radiator`.

```
AuthPort      1812
AcctPort      1813
LogDir        /var/log/radius
DbDir         /etc/radiator
Trace         4
<Client DEFAULT>
    Secret testing123
    DupInterval 0
</Client>
<Realm DEFAULT>
    <AuthBy FILE>
        Filename /etc/radiator/users
        EAPType TTLS
        EAPTLS_CAFfile /etc/radiator/cacert.pem
        EAPTLS_CertificateFile /etc/radiator/server_cert.pem
        EAPTLS_CertificateType PEM
```

To change user login name and password, just edit the file `/etc/radiator/users`. A sample user entry is like this:

```
demoid1
User-Password=demopass1
```

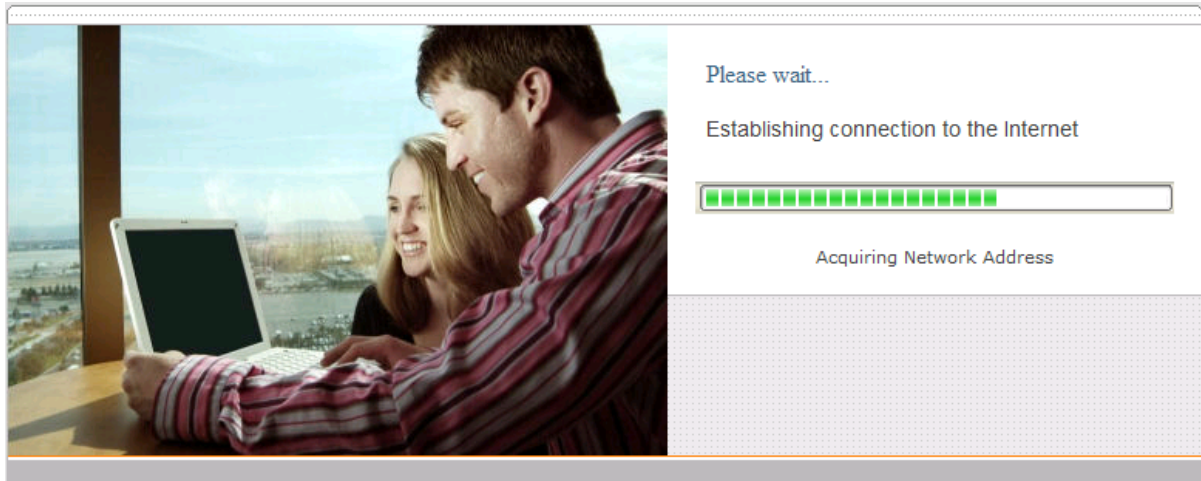
Then start the radius server by executing this:

```
/usr/bin/radiusd -config_file
```

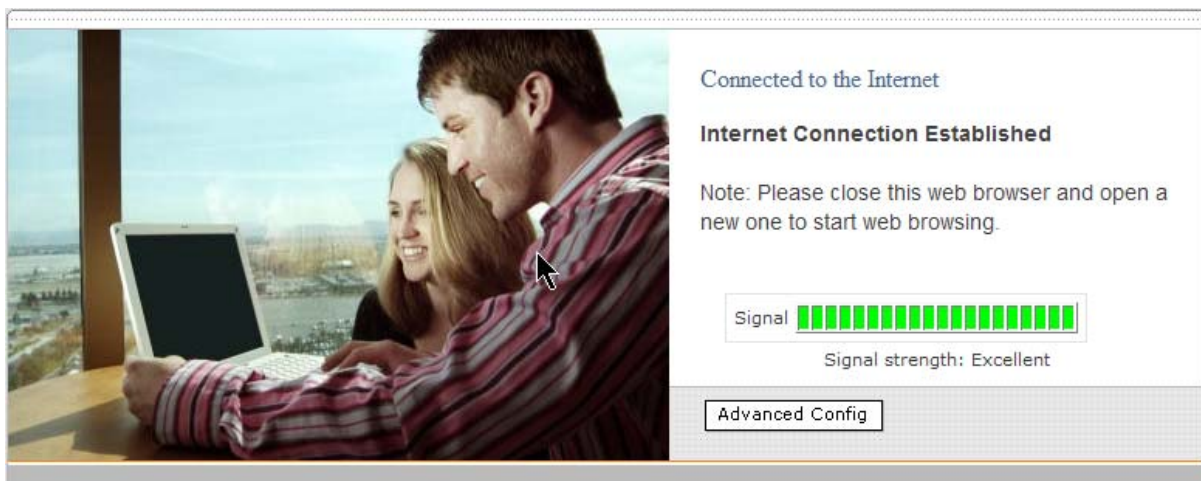
Now the Radiator server's setup completed.

## 4.5 Test the Setup

To test to setup, you can now go to the PePLink Surf's Main page, enter the user name and password. The realm (the text box next to the "@" sign) value can be left empty. Then click the Connect button.

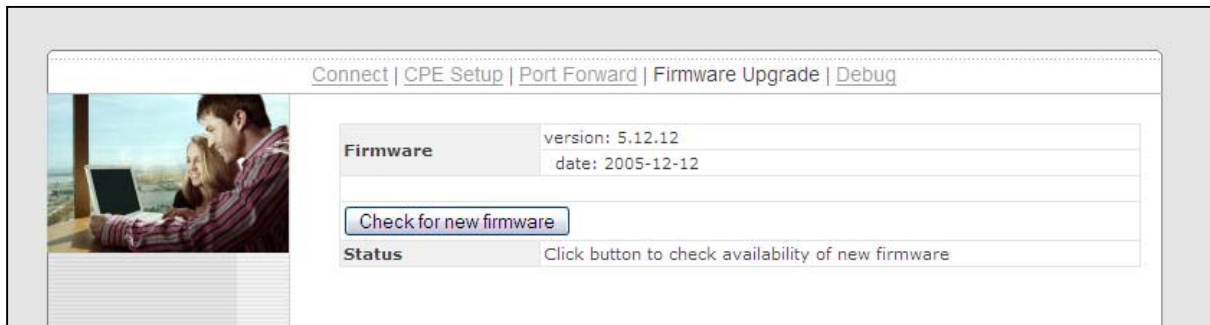


After connected, you should see:



## 4.6 Firmware Upgrade

The PePLink Surf is able to check whether a newer firmware (the software running on the PePLink Surf) is available. To do so, click the link “Firmware Upgrade” on the top bar. You will see this screen:



Click the “Check for new firmware” on the screen. If there is a firmware available, you can simply click a “Download and Upgrade” button.

During an upgrade, please do not interrupt the process.

## 4.7 Debug Page

Connect | CPE Setup | Port Forward | Firmware Upgrade | Debug

**Firmware version:** 6.0.4  
**Hardware version:** 2.4

**Serial Number:** 182E-C016-AC2B  
**LAN MAC Address:** 00:11:6E:80:C5:C0  
**Wi-Fi MAC Address:** 00:11:6E:80:C5:C4  
**Supported modes:** 802.11b/g

**Scanned APs:**

ESSID	BSSID	Channel	Signal Level	Encryption	Bit Rates
asopen2	00:11:6E:00:B6:AA	5	-56	off	All 802.11a/b/g bit rates
PL_DOTLX	00:11:6E:00:B6:A9	5	-57	on	All 802.11a/b/g bit rates
PePLink	00:11:6E:00:B6:AB	5	-47	on	All 802.11a/b/g bit rates

Note: Archived scan result

**WAN Connection Info:**

Signal level:	-52 dBm	IP address:	10.8.8.245
Bit Rate:	12Mb/s	Subnet mask:	255.255.0.0
Missed beacon:	1	Gateway:	10.8.8.1
ESSID:	PePLink	DNS servers:	10.8.8.2
MODE:	802.11g	DHCP server IP addr:	10.8.8.2
Frequency:	2.432GHz	DHCP server HW addr:	00:01:03:B9:EF:0D
Channel:	5	DHCP lease time:	7200
AP BSSID:	00:11:6E:00:B6:AA	DHCP renewal time:	3600
Encryption:	off	Rx packets:	597
Rx invalid crypt:	0	Rx errors:	9273
Rx invalid frag:	0	Rx dropped:	0
Tx excessive retries:	0	Rx overruns:	0
Invalid misc:	0	Rx frame:	9273
		Tx packets:	222
		Tx errors:	0
		Tx dropped:	0
		Tx overruns:	0
		Tx collisions:	0
		Tx queue length:	200

[Click here to download the configuration file](#)  
[Click here to download a debug dump](#)

A debug page is provided for advanced network troubleshooting.

This page shows the unit's firmware version, hardware version, serial number, LAN MAC address, Wi-Fi MAC address, supported Wi-Fi modes, scanned access points' information and WAN connection information.

For the Scanned AP section, the scanned result may not be up to date. You can click the "Scan again" button to update the scanned AP list. But note that, while it is connected to an AP, clicking the button may drop the connection.

On the page bottom, you are allowed to download a debug dump file and configuration file. In case you need to contact PePLink for technical support, you can send the debug dump file to [support@peplink.com](mailto:support@peplink.com).

## 4.8 Restore to Factory Defaults

To restore the PePLink Surf to factory defaults, there are two methods.

If you are able to access the web admin interface, go to the “CPE Setup” page, and click the “Restore and Reboot” button.

Otherwise, you can also power up the unit and wait for about 1 min. Then press the Reset button at the rear side of the unit using a pin and then hold it for 5 secs. The unit will restore the settings to factory defaults and reboot.

## 4.9 System Settings

Some system settings are hidden from the end users. They are for the service provider to change some system specific settings

To access the page, type this URL on your browser:

`http://192.168.20.1/ss/`

The page's login ID and password are "admin" and "MSurf000".

The page is like this:

Connect | CPE Setup | Port Forward | Firmware Upgrade | System Settings | Debug

**Web administration via WAN with HTTPS**  
 Enable  
 Port:   
 Disable

**Web administration password**

**EAP method**

**SNMP setup**

v1  Enable  Disable  
 v2c  Enable  Disable  
 Read only community name   
 Read and write community name

v3  Enable  Disable  
 Read only user:  
 User name:   
 Authentication protocol:  MD5  SHA  
 Password:   
 Privacy protocol:  none  DES  
 Password:

Read and write user:  
 User name:   
 Authentication protocol:  MD5  SHA  
 Password:   
 Privacy protocol:  none  DES  
 Password:

**Admin network**

	Network address	Network mask
1	<input type="text" value="172.0.0.0"/>	<input type="text" value="255.0.0.0"/>
2	<input type="text" value="10.0.0.0"/>	<input type="text" value="255.0.0.0"/>
3	<input type="text" value="192.168.20.0"/>	<input type="text" value="255.255.255.0"/>
4	<input type="text"/>	<input type="text"/>
5	<input type="text"/>	<input type="text"/>

**Firmware upgrade**

Firmware Server   
(firmware.peplink.com)  
 Retry interval  seconds (86400)  
 Status Server   
(status.peplink.com)

**PMS server settings**

Configuration Server   
(config.peplink.com)  
 Custom Message Server   
(dyninfo.peplink.com)

**Wireless setup**

CTS/RTS threshold  (2347)  
 Up stream bandwidth limit(byte/s)  (Enter "0" to disable)  
 Down stream bandwidth limit(byte/s)  (Enter "0" to disable)

### 4.9.1 Web via WAN with HTTPS

This is to enable or disable the secure web administration server to be accessible from WAN (wireless side) or not. If enabled, the HTTPS port number is entered here. It must be between 1024 and 65535. The default port number is 8000.

<b>Web administration via WAN with HTTPS</b>	<input checked="" type="radio"/> Enable
	Port: <input type="text" value="8000"/>
	<input type="radio"/> Disable

### 4.9.2 Web Administration Password

This is to change the web administration interface's access password when accessing to `http://ip.addr/ss/` (from LAN) or `https://wan.ip.addr/` (from WAN). The login name is "admin".

<b>Web administration password</b>	<input type="text" value="MSurf000"/>
------------------------------------	---------------------------------------

### 4.9.3 EAP Types

For the authentication methods "802.1x with dynamic WEP key" and "WPA/WPA2-Enterprise", the EAP type can be chosen here. Available options are CHAP, MSCHAP, MSCHAPV2 and PAP.

<b>EAP method</b>	<input type="text" value="EAP-TTLS/CHAP"/>
	<input type="text" value="EAP-TTLS/CHAP"/> <input type="text" value="EAP-TTLS/MSCHAP"/> <input type="text" value="EAP-TTLS/MSCHAPV2"/> <input type="text" value="EAP-TTLS/PAP"/>
	v1
	v2c



## 4.9.4 SNMP Settings

The unit has a built-in SNMP agent. It allows the administrator to get some basic system information and to toggle the unit's Status LED for troubleshooting. The agent can only be accessed from administration network only. Please refer to chapter 4.9.5 .

This section is for configure the SNMP agent's access permission.

<b>SNMP setup</b>	v1	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
	v2c	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
		Read only community name <input type="text"/>
		Read and write community name <input type="text" value="MSurf000"/>
	v3	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
		Read only user:
		User name: <input type="text"/>
		Authentication protocol: <input checked="" type="radio"/> MD5 <input type="radio"/> SHA
		Password: <input type="text"/>
		Privacy protocol: <input type="radio"/> none <input checked="" type="radio"/> DES
	Password: <input type="text"/>	
	Read and write user:	
	User name: <input type="text" value="admin"/>	
	Authentication protocol: <input checked="" type="radio"/> MD5 <input type="radio"/> SHA	
	Password: <input type="text" value="MSurf000"/>	
	Privacy protocol: <input type="radio"/> none <input checked="" type="radio"/> DES	
	Password: <input type="text" value="MSurf000"/>	

### Toggle the LED

The unit's Status LED can be toggled by using SNMP. The purpose is for

### 4.9.5 Admin Network Settings

Admin network		Network address	Network mask
1	<input type="text" value="172.0.0.0"/>	<input type="text" value="255.0.0.0"/>	
2	<input type="text" value="10.0.0.0"/>	<input type="text" value="255.0.0.0"/>	
3	<input type="text" value="192.168.20.0"/>	<input type="text" value="255.255.255.0"/>	
4	<input type="text"/>	<input type="text"/>	
5	<input type="text"/>	<input type="text"/>	

This section is for configuring which network's IP addresses are allowed to access the ssh server and the SNMP agent.

### 4.9.6 PePLink Management System settings

<b>Firmware upgrade</b>	Firmware Server	<input type="text" value="firmware.peplink.com"/> (firmware.peplink.com)
	Retry interval	<input type="text" value="86400"/> seconds (86400)
<b>PMS server settings</b>	Status Server	<input type="text" value="status.peplink.com"/> (status.peplink.com)
	Configuration Server	<input type="text" value="config.peplink.com"/> (config.peplink.com)
	Custom Message Server	<input type="text" value="dyninfo.peplink.com"/> (dyninfo.peplink.com)

The Surf units can be managed by the PePLink Management System (PMS). The PMS is divided into several sub systems. This section is for configuring which sub system the Surf should communicate to. They include Firmware server, Status Server, Configuration Server and Custom Message Server.

## 4.9.7 Wireless Settings

<b>Wireless setup</b>	CTS/RTS threshold	<input type="text" value="2347"/>	(2347)
	Up stream bandwidth limit(byte/s)	<input type="text" value="0"/>	(Enter "0" to disable)
	Down stream bandwidth limit(byte/s)	<input type="text" value="0"/>	(Enter "0" to disable)
			<input type="button" value="Save"/>

The CTS/RTS threshold value 2347 means this setting is disabled. If the packet that the Surf is transmitting is larger than the threshold, it will initiate the CTS/RTS function.

The up stream and down stream bandwidth are for controlling the maximum up link and down link bandwidth that the user can consume. The unit is bit per second. Setting them to "0" will disable the bandwidth control. The default value is "0".

## 5 Appendix - Demo CA and Server Certification Generation Instructions

### 5.1 Prerequisite

OpenSSL v0.9.7a or above

Note: The illustration below is based on Linux.

### 5.2 Create your own Certificate Authority (CA)

#### 1. Create a working directory (e.g. ~/demoCA)

```
mkdir ~/demoCA
chmod 700 ~/demoCA
cd ~/demoCA
mkdir private certs newcerts
echo -n 01 > serial
touch index.txt
```

#### 2. Create a private key for your CA, for example:

```
openssl genrsa -des3 -passout pass:democa -out private/cakey.pem 2048
```

(A CA private key called "cakey.pem" is then created in the directory "private". This is a 2048bit RSA private key with pass phrase 'democa'.)

#### 3. Create the server certificate for your CA, for example:

```
openssl req -new -x509 -days 8000 -key private/cakey.pem -passin
pass:democa -out cacert.pem
```

Then a series of questions will be asked:

You are about to be asked to enter information that will be incorporated into your certificate request.

What you are about to enter is what is called a Distinguished Name or a DN.

There are quite a few fields but you can leave some blank

For some fields there will be a default value,

If you enter '.', the field will be left blank.

-----

Country Name (2 letter code) [GB]:US

State or Province Name (full name) [Berkshire]:US

Locality Name (eg, city) [Newbury]:US

Organization Name (eg, company) [My Company Ltd]:

Organizational Unit Name (eg, section) []:

Common Name (eg, your name or your server's hostname) []:demoCA

Email Address []:

(The CA server certificate is now generated in "cacert.pem")

4. In some applications (e.g. Microsoft Windows), DER version of server certificate is needed:

```
openssl x509 -outform DER -in cacert.pem -out cacert.der
```

(The CA server certificate in DER format is now ready in "cacert.der")

### 5.3 Create a server certificate request from your servers

1. Create your working directory (e.g. ~/myCert)

```
mkdir ~/myCert
```

```
chmod 700 ~/myCert
```

```
cd ~/myCert
```

2. Create the private key of your server, for example:

```
openssl genrsa -des3 -passout pass:demoserver -out server_key.pem 2048
```

(The private key for CA called "server\_key.pem" is then created.

This is 2048bit RSA private key with pass phrase 'demoserver'.)

### 3. Create the certificate signing request of your server, for example:

```
openssl req -new -key server_key.pem -passin pass:demoserver -out
server_req.pem
```

Then a series of questions will be asked:

You are about to be asked to enter information that will be incorporated into your certificate request.

What you are about to enter is what is called a Distinguished Name or a DN.

There are quite a few fields but you can leave some blank

For some fields there will be a default value,

If you enter '.', the field will be left blank.

-----

Country Name (2 letter code) [GB]:US

State or Province Name (full name) [Berkshire]:US

Locality Name (eg, city) [Newbury]:US

Organization Name (eg, company) [My Company Ltd]:

Organizational Unit Name (eg, section) []:

Common Name (eg, your name or your server's hostname) []:myserver.com

Email Address []:

Please enter the following 'extra' attributes

to be sent with your certificate request

A challenge password []:

An optional company name []:

(Your server certificate request for "myserver.com" is now generated in "server\_req.pem")

## 5.4 Sign the server certificate with your own CA

Assume server request is also in the same server's  
~/myCert/server\_req.pem

```
openssl ca -policy policy_anything -passin pass:democa -in  
~/myCert/server_req.pem -days 8000 -out ~/myCert/server_cert.pem
```

Then a series of questions will be asked (details will vary in your case):

Using configuration from /usr/share/ssl/openssl.cnf

Check that the request matches the signature

Signature ok

Certificate Details:

Serial Number: 1 (0x1)

Validity

Not Before: Aug 24 04:58:01 2005 GMT

Not After : Jul 20 04:58:01 2027 GMT

Subject:

countryName = US

stateOrProvinceName = US

localityName = US

organizationName = My Company Ltd

commonName = myserver.com

X509v3 extensions:

X509v3 Basic Constraints:

CA:FALSE

Netscape Comment:

OpenSSL Generated Certificate

X509v3 Subject Key Identifier:

0E:D5:E9:F6:A5:B6:88:51:EB:22:8C:ED:C3:AA:17:A1:A8:FC:EC:92

X509v3 Authority Key Identifier:

keyid:85:B5:08:F3:21:1B:99:5D:E1:4B:D1:57:2C:EC:9C:00:A2:F4:24:9B

DirName:/C=US/ST=US/L=US/O=My Company Ltd/CN=demoCA

serial:00

Certificate is to be certified until Jul 20 04:58:01 2027 GMT (8000 days)

Sign the certificate? [y/n]:y

1 out of 1 certificate requests certified, commit? [y/n]y

Write out database with 1 new entries

(The signed server certificate is now in "~/myCert/server\_cert.pem")

### **Federal Communication Commission Interference Statement**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

### **IMPORTANT NOTE:**

#### **FCC Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

IEEE 802.11b or 802.11g operation of this product in the U.S.A. is firmware-limited to channels 1 through 11.