5.8GHz Wireless Bridge/CPE/AP

Model: DH-PFM880

User Manual

Version： 1.0.1563

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🕮Versions

Table 1 Versions

Version	Date	History	Author
1.0.1563	2016-1-5	Created	Tian Jian Feng

🕮References

🕮Purpose

This document is proposed for the users of DH-PFM880 devices, helping them to configure the device and list the troubleshooting, so that the devices can be used successfully quickly.

This document mainly contains the following parts: hardware information, web configuration menu descriptions, network configuration examples, and troubleshooting. It can help the customers quickly be familiar with the devices and use them correctly.

🕮Notes

This document is to characterize the DH-PFM880 series of devices. Please read the document carefully before setting up device. Any damage which is caused by inappropriate use will not be covered under the warranty.

🕮Definitions

Table 2 Definitions

No.	Items	Description
1	DH-PFM880	Outdoor, long distance AP/CPE/Bridge devices
2	XTrans	XTrans is a series of wireless technologies, including TDMA, 5M/10M/20M/40MHz bandwidth support, intelligent rate control, Auto ACK Time-out adjust, having the advantage of long transmission range, high date rate and robust transmission.
3	AP	Access point
4	Station(Client)	WIFI station that can be associated to an access point.
5	CPE	Customer-premises equipment: it is any terminal and associated equipment located at a subscriber's premises and connected with a carrier's telecommunication channel at the demarcation point.

1 Product Overview

DH-PFM880 is a powerful WIFI Bridge/AP/CPE device, which allows WIFI access and video/audio/data transmission device, enables long-range, fast speed and robust wireless connections. XTrans technology, DH-PFM880 has the advantages of long-distance, high-throughput, and between point-to-multi-point performance.

XTrans technologies include TDMA, 5M/10M/20M/40MHz bandwidth, intelligent rate control, Auto ACK Time-Out Adjust and so on. TDMA technology solves the problems of hidden-node problem in the 802.11 network. 5M/10M/20M/40MHz bandwidth can be flexibly configured by the uses in different working scenario to achieve the best link quality. Intelligent rate control algorithm can be adapted to quick channel quality variations automatically, thus stabilizing the wireless throughput. ACK Time-Out Auto Adjust can automatically detect the distances of the DH-PFM880 devices, and thus adjust the wireless parameters to achieve the best wireless link quality.

The best transmission range and max speed of DH-PFM880 can be 0~15Km and 300Mbps, making it suitable for many applications of WIFI Bridge/AP/CPE, especially have advantages for point-to-multi-point communication.

1.1 Product Advantages

The DH-PFM880 has the industrial leading technology, owing the performance capability of a wireless base station with only a small form factor, furthermore, it has very attractive low cost.

DH-PFM880 has the following advantages compared to the competitors:

1. Embedded TDMA technology

DH-PFM880 devices is embedded with TDMA technology, including TDMA, 5/10/20/40MHz bandwidth, intelligent rate control, Auto ACK Time-out adjust. It makes the device have longer transmission distance, higher throughput and better point-to-multi-point performance.

2. Longer transmission distance, higher throughput

The longest transmission distance of DH-PFM880 can be as far as 25 km, and the max throughput can be 300Mbps，which satisfy the needs of most of the applications.

3. Embedded hardware watchdog

DH-PFM880 is embedded with hardware watchdog, which is used to monitor the working status of the device. Once the system is not working properly, the DH-PFM880 device can be rebooted to guarantee the stability of the system.

4. Software Ping watchdog function

DH-PFM880 software ping watchdog function enable the device periodically ping another device associated to, so that it can detect if the system is working well. If the wireless link is lost or there is any problem, the device is rebooted. This is important because the devices can be restored to work automatically if there is any problem, and avoid the extra human labour to maintain the outdoor devices.

5. More Non-standard channels availability

Currently most of the WIFI devices are working at standard 802.11 5.8GHz frequency. However, standard 802.11 5.8GHz only provide limited channels, and there is serious interference if there are a lot of 5.8G WIFI devices nearby.

DH-PFM880 support more channels near 5.8GHz band, and spread the band to non-standard frequency part: 4920MHz-6100MHz。The advantage of working at the non-standard band is to avoid the interference in the standard channels, and the wireless throughput can be improved.

Note: Please confirm whether those non-standard channels are permitted locally before using them.

6. Outdoor industrial product

DH-PFM880 device can work at all kinds of outdoor severe environments, including -30 to 70 degree temperature, 5% to 95% humidity, while maintain good performance.

1.2 Electrical Specifications

The electrical specifications are shown are the following table:

Table 3 Electrical Specifications

	Items	Specifications
WIRELESS	Standard	IEEE802.11 a/n（2T2R 300Mbps）
	Operation Frequency	5.745～5.825 GHz(More Non-standard channels is availability,4920MHz-6100MHz)
	Modulation Mode	802.11 a/n: OFDM
	Antenna	16dBi
	Antenna size	Device:212.6*212.6*55mm, ANT:450*140*35mm
	Weight	Device:2.8kg ANT:1.26kg
	Output power	＋27dBm
	Receive Sensitivity	-72dBm@65Mbps, -94dBm@6Mpbs
	Date rate	11n:13.5/15/27/30/40.5/45/54/60/81/90/108/120/121.5/135/150/162/180/216/240/270/300Mbps(HT40) 130/117/104/78/65/58.5/52/39/26/19.5/13/6.5Mbps(HT20)
		11a ： 54/48/36/24/18/12/9/6Mbps(adaptive)
	Distance	Outdoor open area: >=15 km
HARDWARE	Power supply	802.3at PoE+
	Interface	PoE
	Operation Temperature	-30℃～+70℃
	Storage Temperature	-40℃～+85℃
	Operation Humidity	5%～95%RH
SOF	Encryption	WPA-PSK/WPA2/CCMP(AES)/TKIP
	Network	Router/Bridge
	Operation	AP/Station/WDS AP/WDS Station/WDS Repeater

T W A R E	Mode	
	Security	MAC/IP filter, SSID hidden
	Network protocol	TCP/UDP/ARP/ICMP/DHCP/HTTP/NTP
	TDMA	Supported (Avoid 802.11 hidden-node problems, and improve the point-to-multi-point performance)
	Auto ACK timing Adjust	Supported
	Management and Logs	NTP, SNMP, Syslog, Telnet
	Web based Configuration	Supported
	Firmware Update	Supported
	Bandwidth supported	5M/10M/20M/40MHz

1.3 Features

- High performance 802.11n 2×2 MIMO chip
- Max transmission range: 0~3Km, and max transmission throughput: 300Mbps
- Integrated XTrans technology, including TDMA, intelligent rate control, Auto ACK Time-out adjust
- TDMA solves the problems of hidden-node problem in the 802.11 network, thus having better long-distance and PTMP performance
- Support five operation modes: Access Point, Station, WDS Access Point, WDS Station, WDS Repeater
- Support point-to-point, point-to-multipoint connection
- Unique RF and antenna design enables long-range transmission
- Wireless multimedia optimization technology guarantees video/audio transmission QoS

- Web based working scenario selection makes the installation and setting much easier
- Reliable PoE power supply, support 802.3af standard
- Web-based configuration, easy to use
- Waterproof housing and accessory kit protects

1.4 Using Example

The DH-PFM880 usage example are shown in Figure 1, it can be used as WIFI AP, CPE, or outdoor PTP, PTMP topology. Therefore, DH-PFM880 is suitable for various applications like wireless video transmission, and wireless signal coverage.

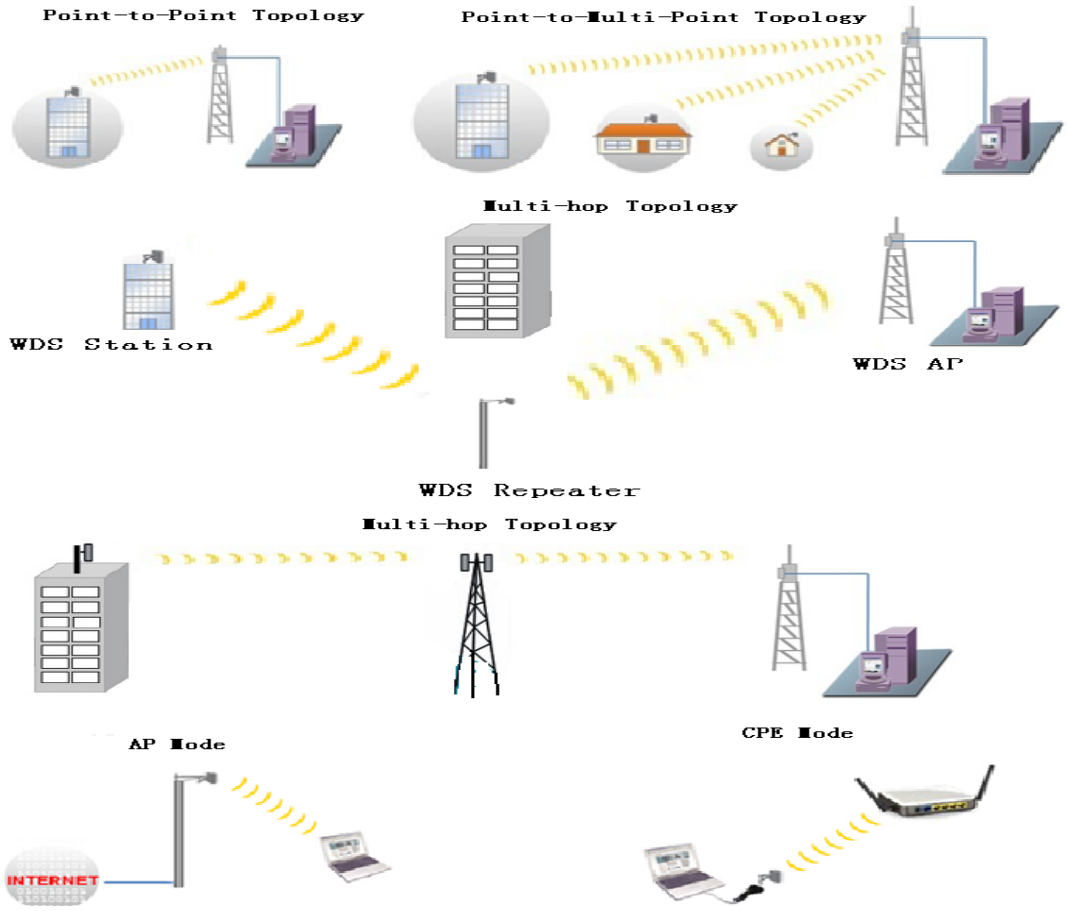

Figure 1 DH-PFM880 using examples

1.5 Applications

DH-PFM880 can be used widely in the following applications:

- Wireless video surveillance (free-way, city, police, oil pipeline, forest and etc.)
- Carrier wireless backhaul and rural area internet last-mile wireless solution
- Enterprise local area network inter-connection
- WIFI signal coverage and rural wireless coverage

1.6 Hardware Overview

DH-PFM880's hardware information is described in the following Table 4:

Table 4 Hardware information

Hardware Specifications	
CPU/Baseband Radio	Atheros AR9344
Memory	64MB DRAM, 8MB Flash
Physical Interface	1×10/100/1000M Base-TX (Cat. 5/5E, RJ-45) Ports
Power supply	802.3at PoE+

2 Installation

This chapter describes how to install DH-PFM880 device in the bridge mode, and the installation method of router mode can be seen in Chapter 7.

2.1 DH-PFM880 installation

DH-PFM880 is an outdoor product, and it has the aluminium shell, has the IP67 water-proof capability, and can operate at -30℃～+70℃ temperature.

To make DH-PFM880 work well in all kinds of complicated outdoor environment, the installation is very important. If it's not installed well, the wireless link quality will be affected, and the long-term working stability cannot be guarantee too.

Package contents:

Open the package carefully, and make sure that none of the following items listed are missing：

- One DH-PFM880 device
- One 802.3at PoE+ power adapter
- One RJ45 water-proof connector
- One antenna
- Metal Mast-Mount Set, shown in Figure 2, and this set contains 3 components.
- One quick user manual

Figure 2 Metal Mast-Mount Sets

All the components in the package are shown in Figure 3:

Figure 3 Package contents

Installation steps:

Installation of DH-PFM880 can follow the below steps:

1. Take all the contents from the package

2. Mount DH-PFM880 in a mast, and then fix the device on the mast as shown in Figure 5.

3. After the DH-PFM880 is fixed on the mast, protect the Ethernet cable using the water-proof connector.

Figure 4 Water-proof connector and the Ethernet cable

4. Screw the water-proof connector well on the DH-PFM880 shell.

Figure 5 DH-PFM880 installation on a mast

2.2 Connections

The connection of DH-PFM880 device to PoE and power supply is shown in Figure 6. TurobBridge5F has 1 RJ45 ports, and please connect the device with the PoE power adaptor as shown in the Figure.

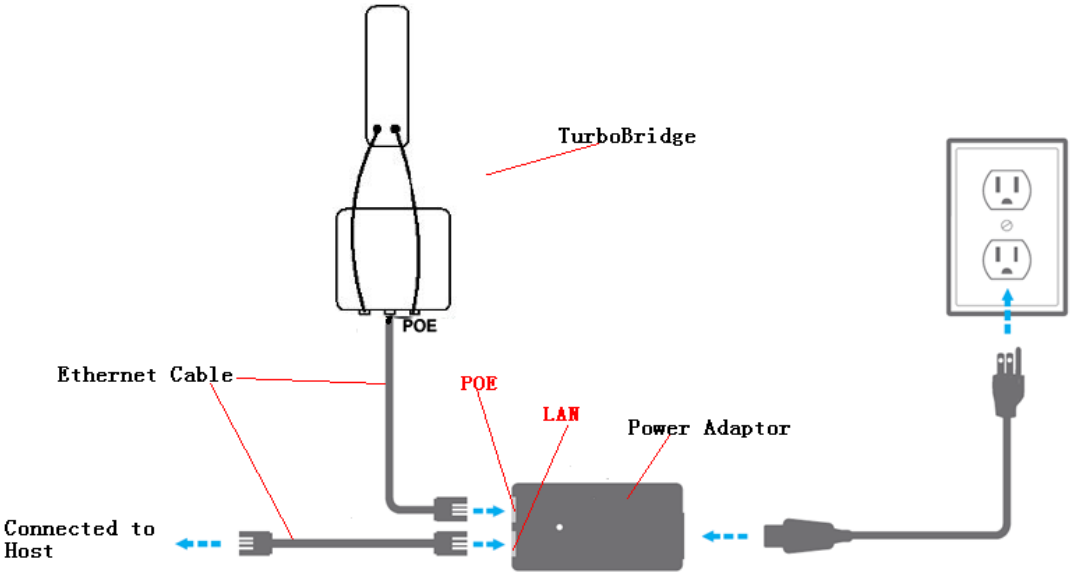

Figure 6 Connections at Bridge mode

3 Quick Configuration

This chapter describe how to configure the device quickly.

3.1 Log in

To log in the DH-PFM880 device, user needs to configure the TCP/IP of your computer first as the following steps:

1、Right click Local Area Connection icon of your computer and click properties, then click Continue, the Local Area Connection Properties dialog box appears as Figure 7.

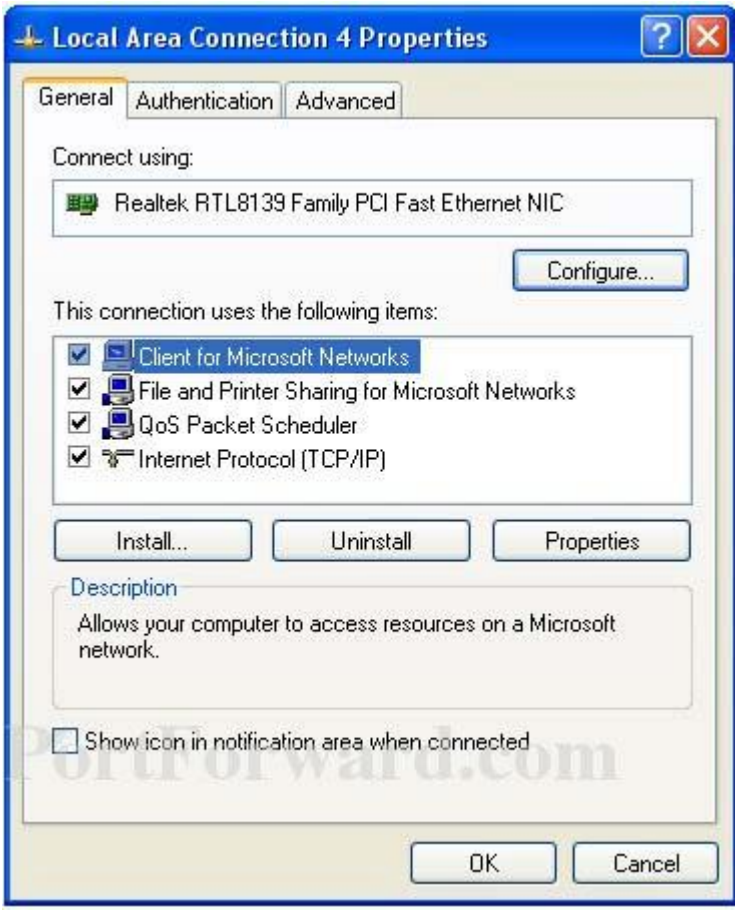

Figure 7 Local Area Connection Properties

2、Select Internet Protocol (TCP/IP) and click Properties button, and the following dialog box appears：

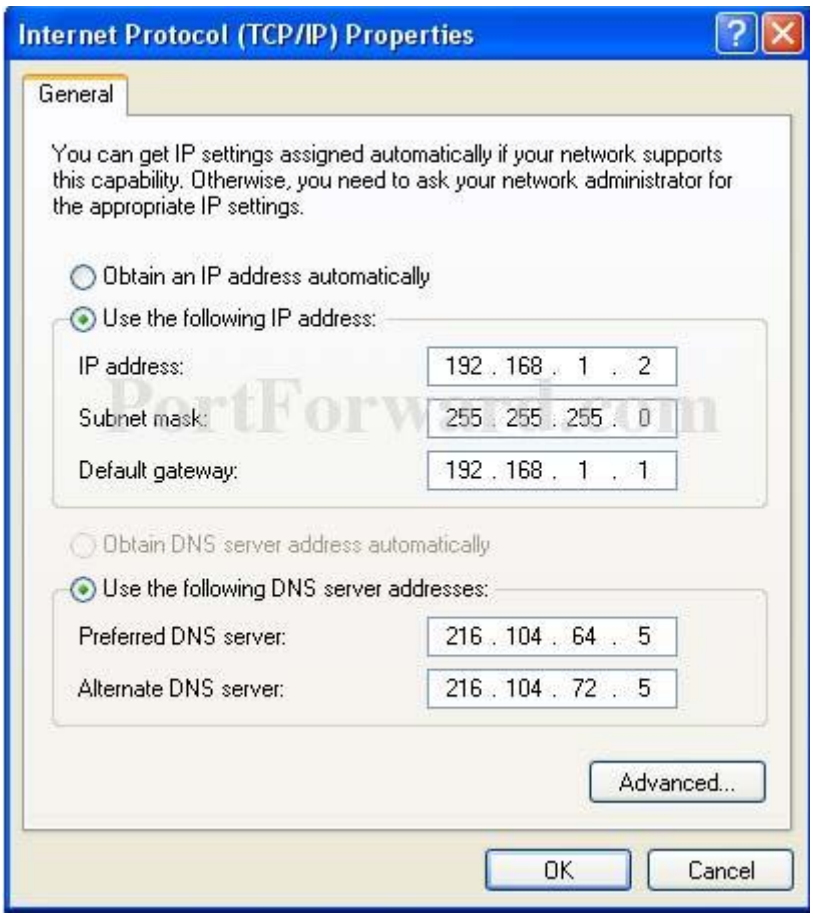

Figure 8 IP settings

3、In the above Figure 8, IP address should be set to 192.168.1.*, here * can be a number between 1-255 (but not 36) since the DH-PFM880 default IP address is 192.168.1.36.

4、When the above IP setting is done, input the default IP 192.168.1.36 into the address bar of your web browser, and the following log in interface appears as shown in Figure 9.

5、In Figure 9, input the user name and password (default is admin/admin), click Confirm, then you can log in to the web configuration menu of the DH-PFM880 device.

Figure 9 Log in interface

3.2 Quick Configuration of the Device

The users will see how to configure the DH-PFM880 device quickly in this chapter.

1、 The first page shown after log in is the **Status** page, which indicates the working status, current setting, software version and other information of the DH-PFM880 device. User can switch to other pages by clicking the left main menus in Figure 10.

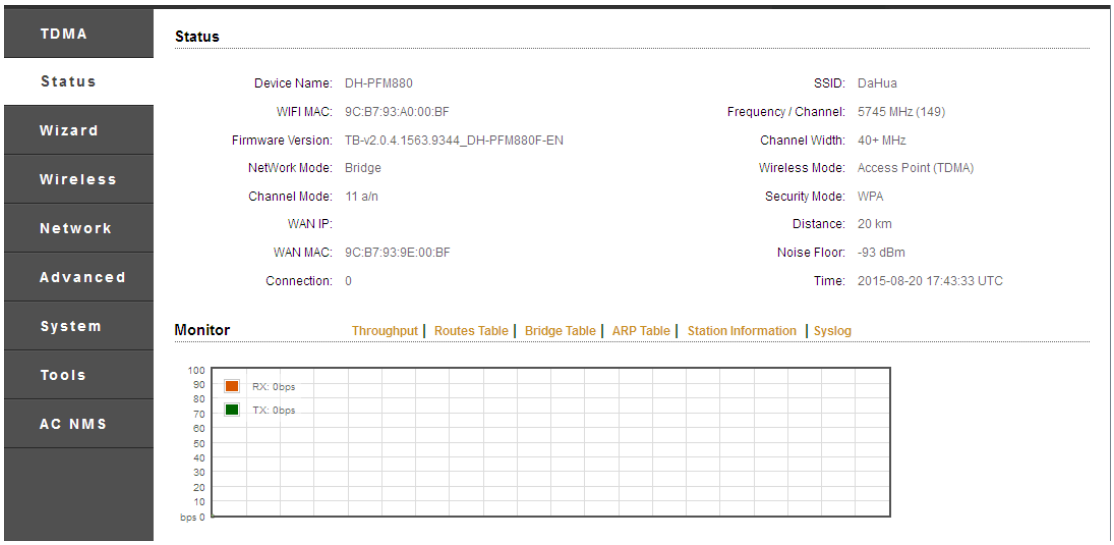

Figure 10 Status Page

2、Click **Wizard** main menu, The page goes to **Wizard-Network** page as shown in Figure 11, and this page helps to set the basic network parameters. The default mode is Bridge mode, and the default LAN IP address is 192.168.1.36. If the user

wants to configure the device to Router mode, please click **Network** in the main menu.

Note: If several DH-PFM880 devices are connected in the Point-to-Point or Point-to-Multi-Point topologies, they must be configured to different IP address to avoid collisions.

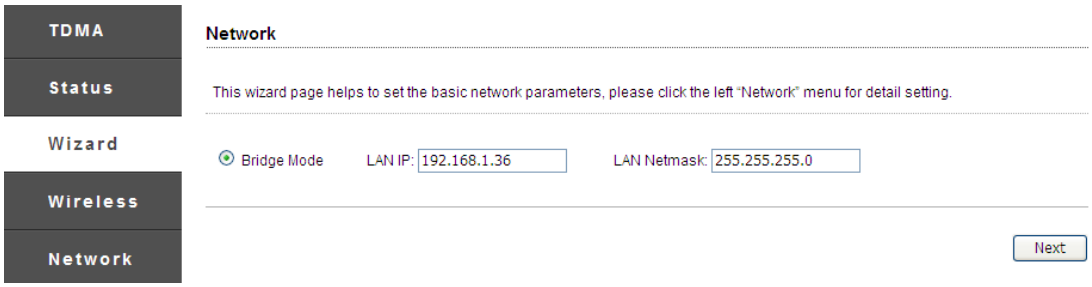

Figure 11 Wizard-Network

3、After finishing the **Wizard-Network** settings, click next and it goes to **Wizard-Wireless** page shown in Figure 12. The most used wireless mode are **Access Point** and **Station**.

Station mode： The device acts as a WIFI station, and it can be connected to a normal home access point or DH-PFM880 access point.

Access Point mode： The DH-PFM880 device acts as an access point, which allows normal WIFI stations access. For detail settings of wireless mode, please click **Wireless** in the main menu.

Note: If two DH-PFM880 devices need to be connected in point-to-point topology, one of the device need to be configured as Access Point, and the other one need to be configured as Station, and both of them should have the same Encryption method.

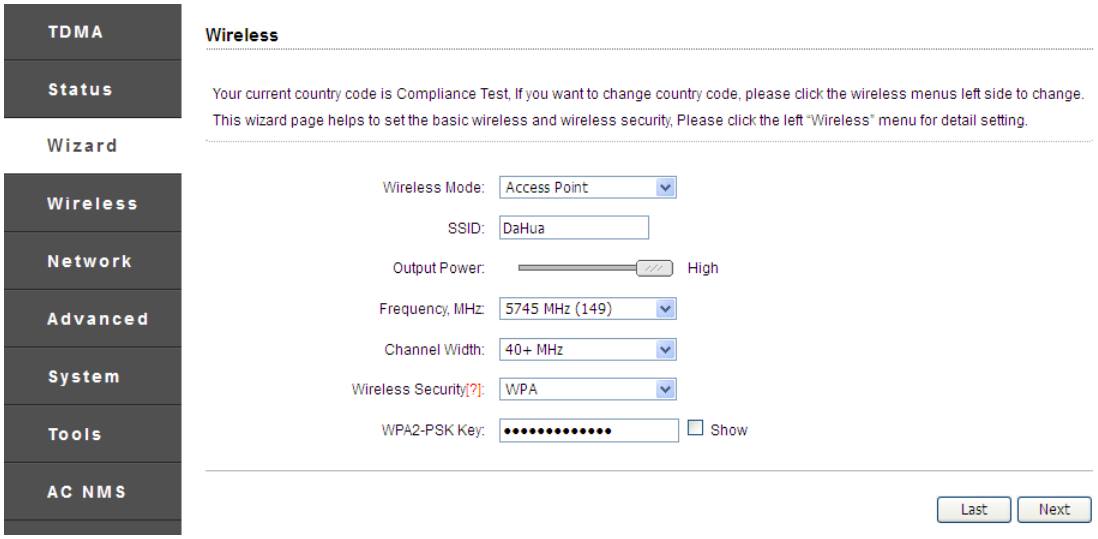

Figure 12 Wizard-Wireless

3、click "Next", The last page of Wizard is shown in Figure 13. User can click **Change** to save all the settings, and then click **Apply** the make the setting effective, or click **Last** to modify the previous settings.

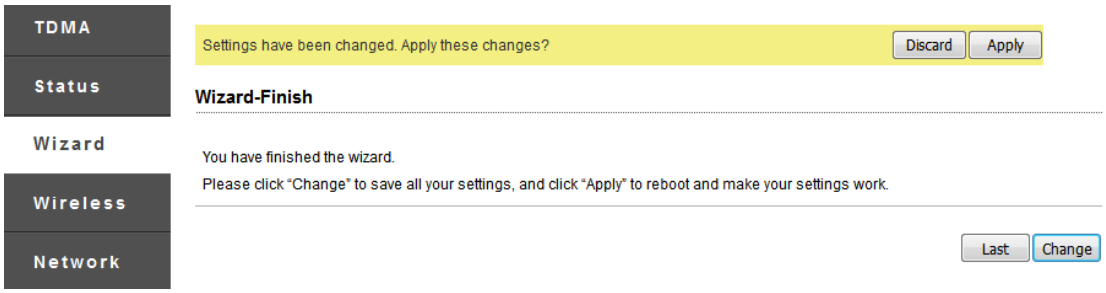

Figure 13 Wizard-Finish

4 TDMA

Currently, most of the outdoor bridge products are developed based on 802.11 protocols, however, it has the limitations of short-distance, hidden node problems, and poor point-to-multi-point performance.

The TDMA technology utilizing a series of advanced technologies such as TDMA, 5M/10M/20M/40MHz bandwidth support, intelligent rate control, Auto ACK Time-out Adjust, having the advantage of long transmission range, high date rate and robust transmission.

TDMA technology solves the problems of hidden-node problem in the 802.11 network infra-structure. 5M/10M/20M/40MHz bandwidth can be flexibly configured by the uses in different working scenario to achieve the best link quality. Intelligent rate control algorithm can be adapted to quick channel quality variations, while stabilize the wireless throughput, thus suitable for long-distance transmission. ACK Time-out Auto Adjust can automatically detect the distances of the DH-PFM880 devices, and adjust the wireless parameters to achieve the best link quality.

The TDMA settings is shown in the following Figure 14.

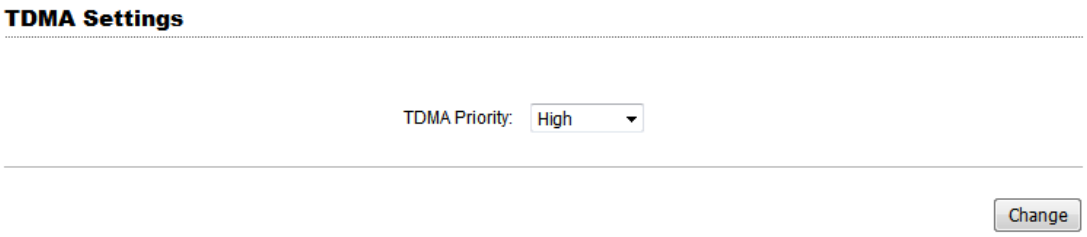

Figure 14 TDMA setting

To use the TDMA, the user needs to enable TDMA mode in the AP device, and set a priority level in the station device. When several stations are connected to one AP, different stations demand different throughput. If the station demands higher throughput, its priority level can be set to High, otherwise set to Low. When the stations demand the same throughput, their priority level can be set to the same level.

Note: When using TDMA mode, the TDMA button need to be enabled at both AP and station devices in the web-based configuration menu. The devices from other vendors can not be connected to DH-PFM880 in the TDMA mode.

5 Status

Status is the first page shown after logging in. It shows the current configuration and real-time monitoring of the device, seen in the following Figure 15. This page is divided into 2 parts: **Status** and **Monitor**.

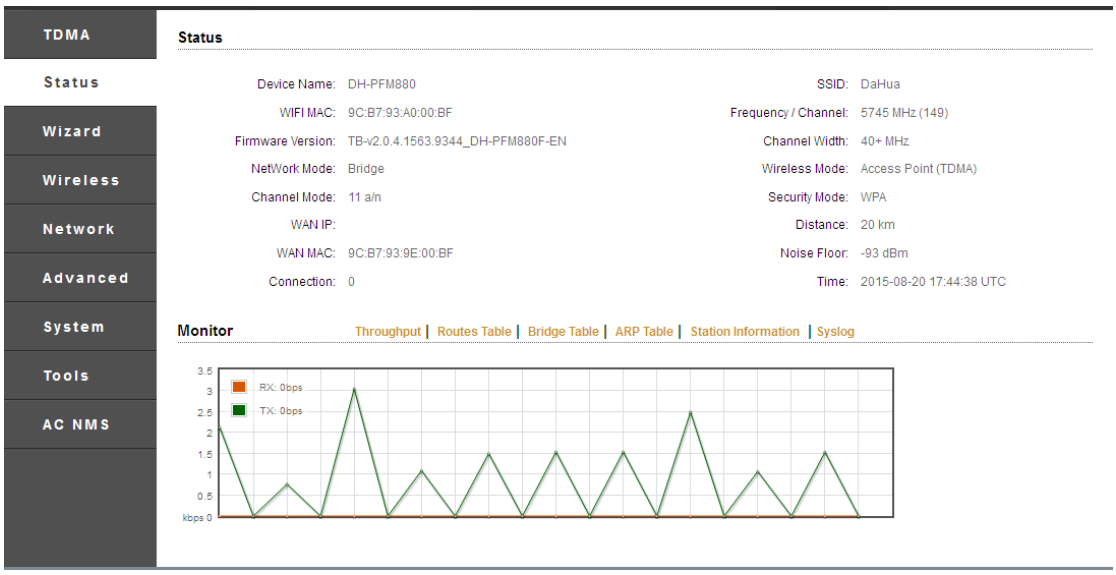

Figure 15 Status

5.1 Status

All the configurations in Status page is shown in Table 5.

Table 5 Configurations shown in Status

Items	Description	Items	Description
Device	Name of the device , for example: DH-PFM880	WIFI MAC	WIFI MAC of this device
Firmware Version	Software version number	Channel mode	Wireless communication protocol, for example, 802.11b/g/n
WAN IP	WAN IP address	WAN MAC	MAC of the WAN port
Network Mode	Network mode: Router or Bridge	SSID	The name of the wireless network
Frequency/Channel	Wireless channel chosen	Channel Width	5M、10M、20M、20/40 M AUTO
Wireless Mode	Access Point, Station, WDS Station, WDS Access Point, WDS Repeater	Security	Wireless encryption method
Distance	The distance	Noise Floor	Noise Floor value

	between two associated devices		
Signal level	It indicates the signal strength of the device	Link Quality	Quality of the connection link
Tx/Rx Rate	The date rate of current device during sending and receiving data.	Time	The real-time

5.2 Monitor

Throughput： The figure here monitors the real-time throughput of the wireless link, shown in the following Figure 16.

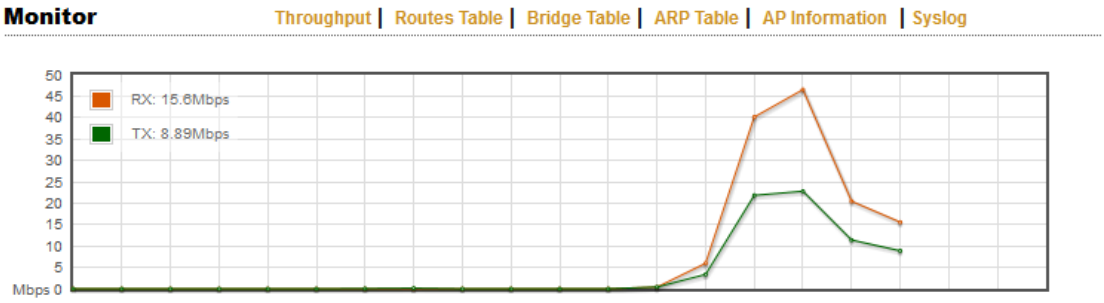

Figure 16 Throughput monitor

Route Table： It is stored in a router that lists the routes to particular network destinations, and in some cases, metrics (distances) associated with those routes. The route table contains information about the topology of the network immediately around it.

Figure 17 Route table

Bridge Table： It lists all the devices that communicate through the DH-PFM880 device.

ARP Table： It lists the IP address and MAC address of the devices that communicate through the LAN port of the DH-PFM880 device.

AP/Station Information: Showing the status information of the associated devices.

For example, if the DH-PFM880 device is an AP, and the associated device is a Station, and this Station Information shows the related information of the Station device in the Figure 18.

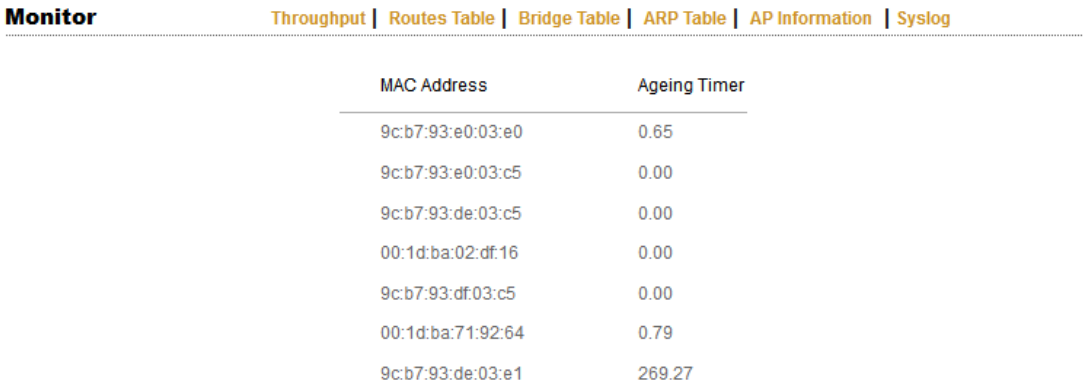

Figure 18 STA Information of an AP

If the DH-PFM880 is a Station, and AP Information shows the associated AP device's information, seen in Figure19.

Figure 19 AP Information of a Station

6 Wireless

Wireless is shown in Figure 20.

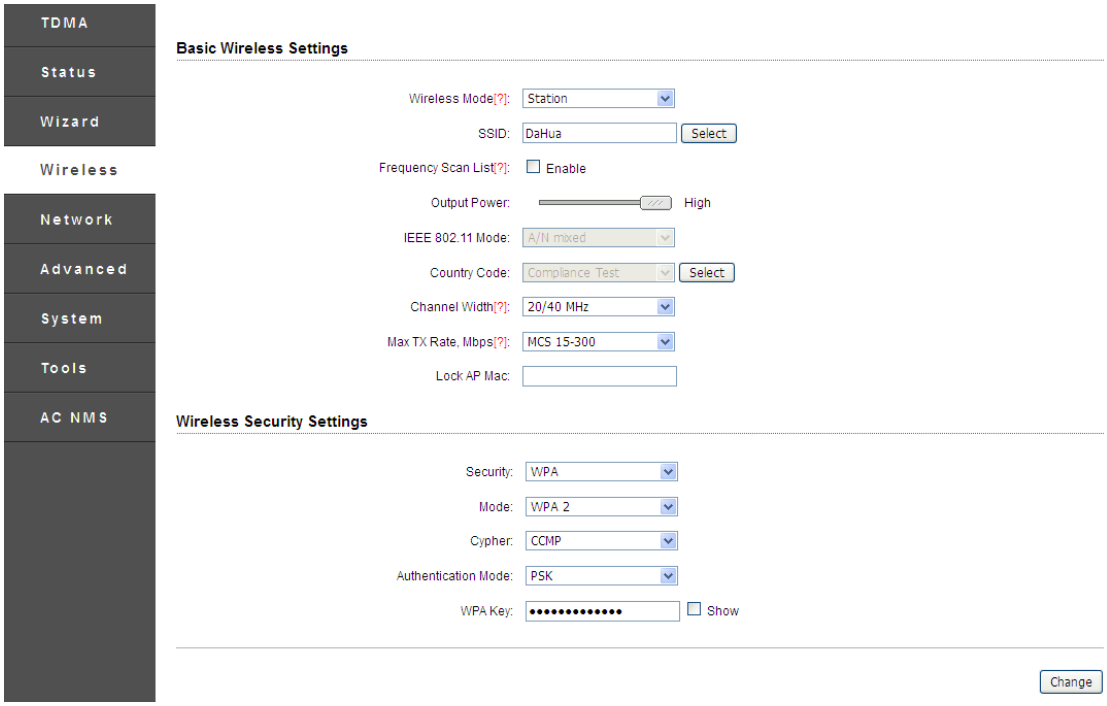

Figure 20 Wireless

Wireless Mode: There are totally 5 wireless modes, including: Station, Access Point, WDS Station, WDS Access Point and WDS Repeater.

Access Point: Access point.

Station (or Client): A client device that can connected to an AP.

WDS Station: Use WDS feature to link multiple APs in a network, all associated stations from any AP can communicate with each other like in ad-hoc mode. WDS station means this device is a station in WDS mode.

WDS AP： Use WDS feature to link multiple APs in a network, all associated stations from any AP can communicate with each other like in ad-hoc mode. WDS AP means this device is an AP in WDS mode.

WDS Repeater： A DH-PFM880 device can be configured to WDS Repeater mode, so that it can connected to another WDS Station or WDS Repeater.

SSID: Name of a wireless.

Shown in Figure 20, the user can click the **Select** button to list all the SSIDs that can be associated, and then choose the one need to be associated.

Frequency MHz： This only appears when the device is configured to Access Point mode or WDS Access Point mode. The device can only work on one channel at the same time.

Frequency Scan List： This only appears when the device is configured to Station mode or WDS Station mode. If it's not enabled, the station will scan all the channels which both the device and the country code allowed and then choose the same channel as the associated AP. If it's enabled, click select, another window will pop up and let the user to choose the working channels, and the channels should include the associated AP's channel, which can fasten the association process between the AP and the Station

Output Power： Output power of the device.

Country Code： Different countries allows different channels, use can choose the country code to only allow the device works at the channels permitted in the particular country.

Channel Width： Channel width selection, and DH-PFM880 device supports 5MHz/10MHz/20MHz/40MHz bandwidth.

Max TX Rate： Max transmission rate, and it can be used to limit the max transmission rate of a device.

Lock AP MAC： In Station, WDS Station, and WDS Repeater modes, users can use this to limit the APs associated to.

Security： User can set the security based on needs to guarantee the wireless security.

WPA： Encryption method supported by 802.11 Protocols.

7 Network

7.1 Router mode

DH-PFM880 acts as a router when configured to Router mode. In router mode, the connection is shown in Figure 21. User needs to connect the PoE port of PoE adaptor to the PoE port of the DH-PFM880.

After the above connection, the DH-PFM880 can work as a router. The LAN port of PoE adaptor acts as the WAN port of the router.

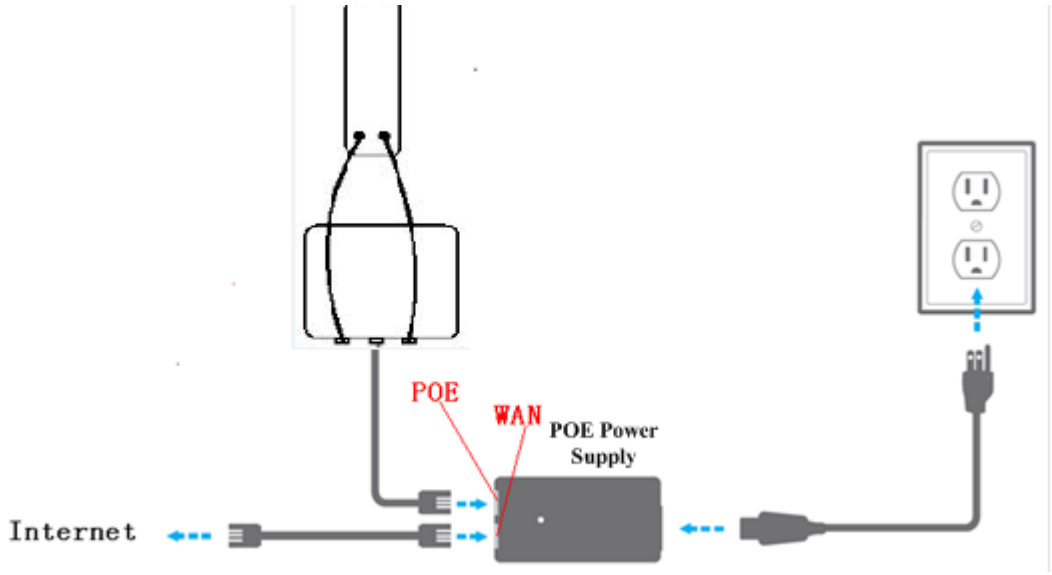

Figure 21 Connection figure of router mode

The Network page is shown in Figure 22.

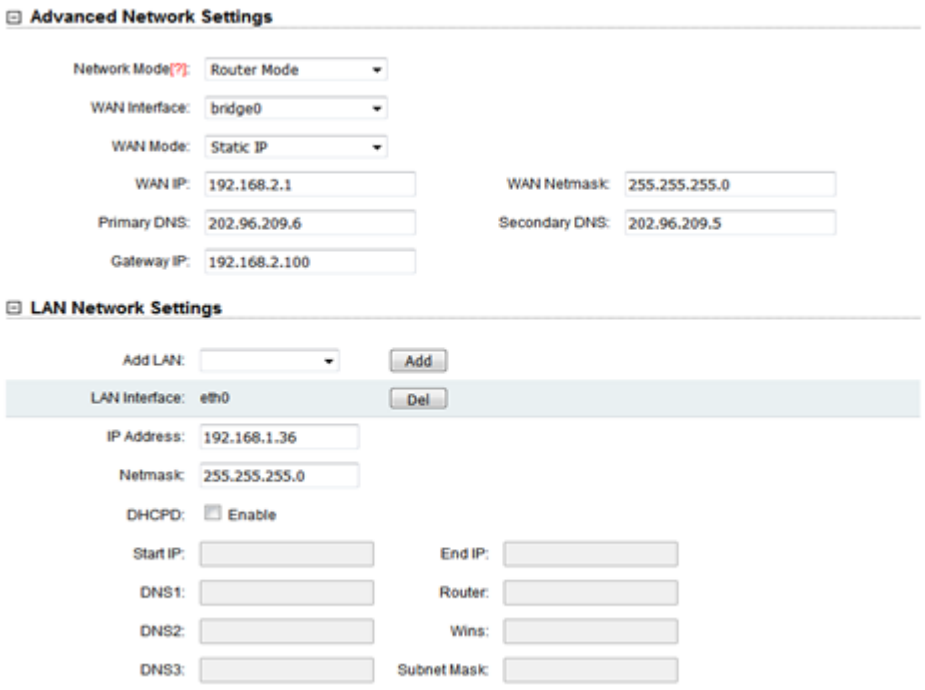

Figure 22 Network-Router mode

WAN Mode：WAN mode can be configured to DHCP, Static IP or PPPoE. When set to DHCP, the device can dynamically get the IP address. When set to Static IP, user needs to manually set the IP address, Netmask, Gateway IP and other information.

WAN IP： WAN IP address. It should be set to the same segment of IP address of the internet provided by ISP, please check with the ISP for this information.

WAN Netmask： WAN Netmask, use can check with the ISP for this information.

Note: WAN IP address should not be the same as the IP devices of the internet to avoid collision.

LAN IP： LAN IP address.

LAN Netmask： LAN Netmask information.

Primary DNS and Secondary DNS: Please check with the ISP for the information.

7.2 Bridge mode

In Bridge mode, there is no WAN port. The LAN port of the PoE adaptor, and the LAN2 port of the DH-PFM880 device can all be the LAN port, and the user can choose one of them to use as LAN port. Please refer to Figure 6 for the connections in Bridge mode, and the IP address/Netmask information setting is the same as Router mode.

7.3 Management

The IP address of the device can be modified, and the management of the device can be performed by setting the specified management interface.

7.4 Firewall

When the firewall is enabled, the device can allow only some devices to be associated to. Shown in Figure 23, and there are 4 cases of Firewall filtering.

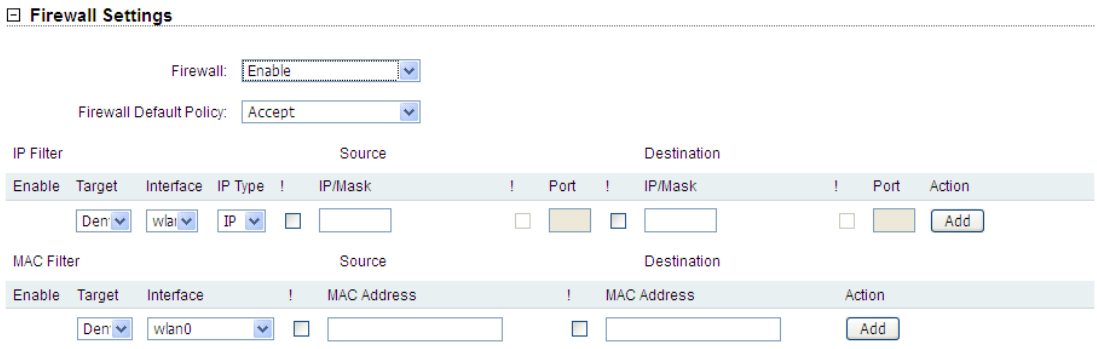

Figure 23 Firewall

1. Accept one or several devices with particular MAC address.
2. Deny one or several devices with particular MAC address.
3. Accept one or several devices with particular IP address.
4. Deny one or several devices with particular IP address.

7.5 IP Aliases

Add multiple IP to a network interface.

7.6 Static Routes

This feature can be set to static routing.

7.7 Traffic Shaping

Traffic shaping is used to control the traffic of ingress/egress based on each network port. As shown in figure 24, the ingress of wlan0 is limited to 1024Kbps, and the egress is limited to 2048Kbps. That means the receiving rate of the wireless link is limited within 1Mbps, the sending rate is limited to less than 2Mbps. But usually, the input limited effect is not obviously, that's because we could not control how quickly the traffic arrives. However, when a port sends out egress traffic, it can control how quickly the traffic exits.
Burst defines the how many bytes allowed for downloading/uploading during a quick time. That leads to momentary throughput can greater than the limit value.

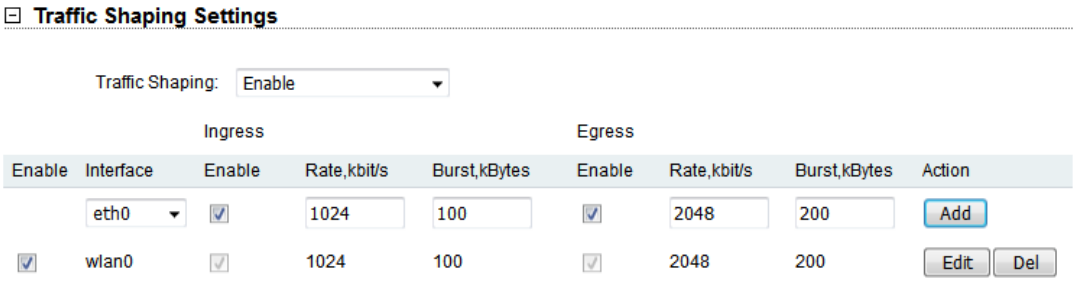

Figure 24 Traffic Shaping

- Ingress traffic entering wlan0, control the input rate
- Egress traffic exiting wlan0, control the output rate

The relationship of rate and burst for ingress:

- Set burst to 0, the rate of ingress is unlimited
- Set burst to about 1/10 of rate limit, the rate curve is stable
- Set burst larger than rate limit, the rate curve will hold a high value for a while then down to stable

Below is the table that reflects the relationship between ingress rate limit and burst.

Ingress		Throughput when reach stable	
Rate Limit(kbps)	Burst(kBytes)	(Mbps)	Description
10000	0	29.587	Unlimited
10000	10	4.286	Stable
10000	100	8.037	Oblique up to stable
10000	1000	8.825	From 9.5 down to stable
10000	10000	8.6	From 28.5 down to stable
10000	40000	8.6	Hold on 10 seconds at 29.6, then suddenly down to stable

The relationship of rate and burst for egress:

- Set burst less than 1/10 of rate limit, the rate curve is stable totally
- Set burst larger than rate limit, the rate curve will hold a while at a higher value then down to stable

Below is the table that reflects the relationship between egress rate limit and burst.

Egress		Throughput when reach stable	
Rate Limit(kbps)	Burst(kBytes)	(Mbps)	Description
20000	0	18.853	Stable
20000	20	19.021	Stable
20000	200	19.205	Stable
20000	2000	19.437	From 23.5 down to stable
20000	20000	19.2	Hold on 20 seconds at 24.5, then suddenly down to stable
20000	80000	19.2	Hold on several minutes at 24.5, then suddenly down to stable

7.8 VLAN Settings

The VLAN function allows user to create multiple virtual local area network. As shown in figure 25, we add a VLAN on port wlan0. The VLAN ID is 10. The range of VLAN ID is 2~4094. Each VLAN ID represents a different VLAN.

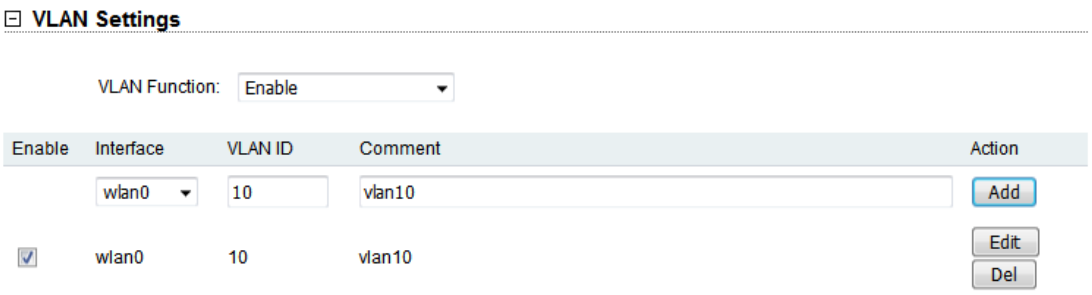

Figure 25 VLAN Setting(1)

Bridge function is needed to use together with VLAN. As show below, we add VLAN 10 on port eth0 and wlan0, they are eth0.10 and wlan0.10, and put them into the same bridge. The packets from eth0.10 or wlan0.10 will be added a VLAN label which ID is 10. That requires: the opposite wireless connection side must support VLAN 10, the device which connects with eth0 is also need to support VLAN 10.

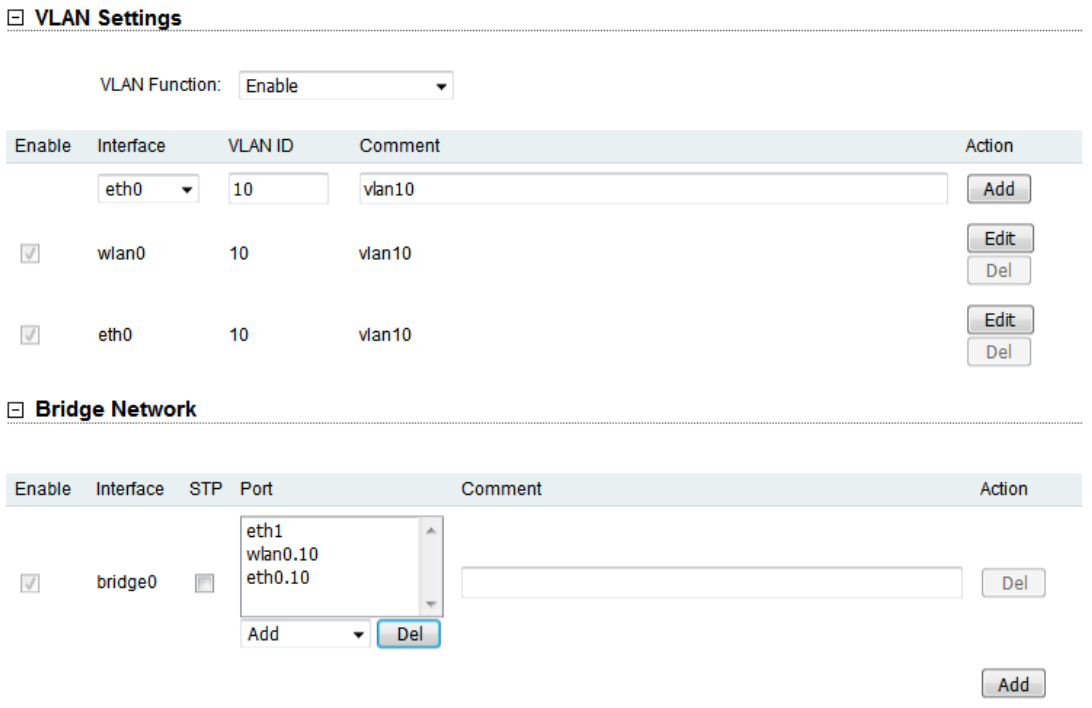

Figure 26 VLAN Setting (2)

Below is a common usage:

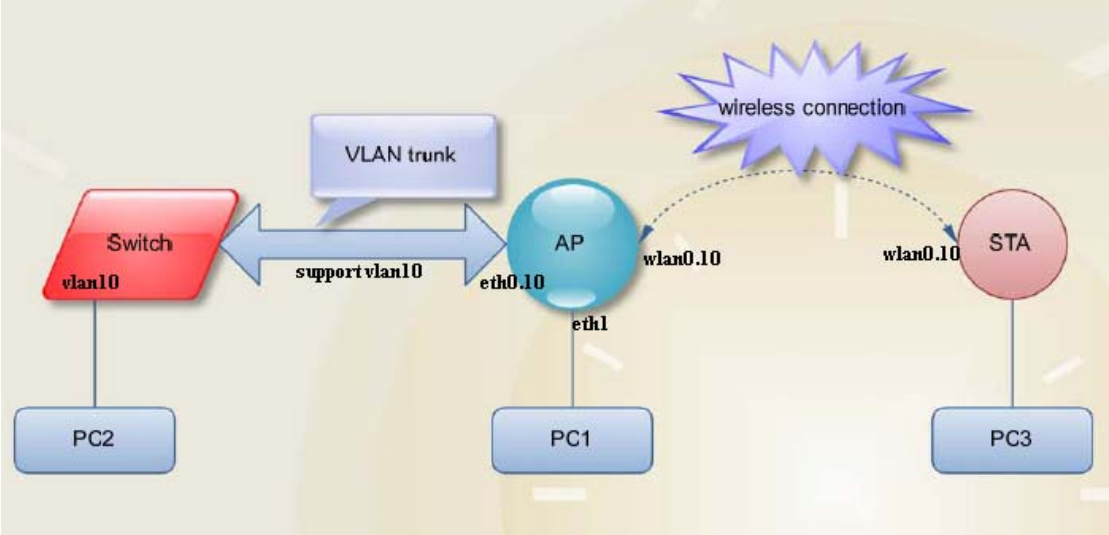

Figure 27 Common Usage

8 Advanced

The Advanced page is shown in Figure 28.

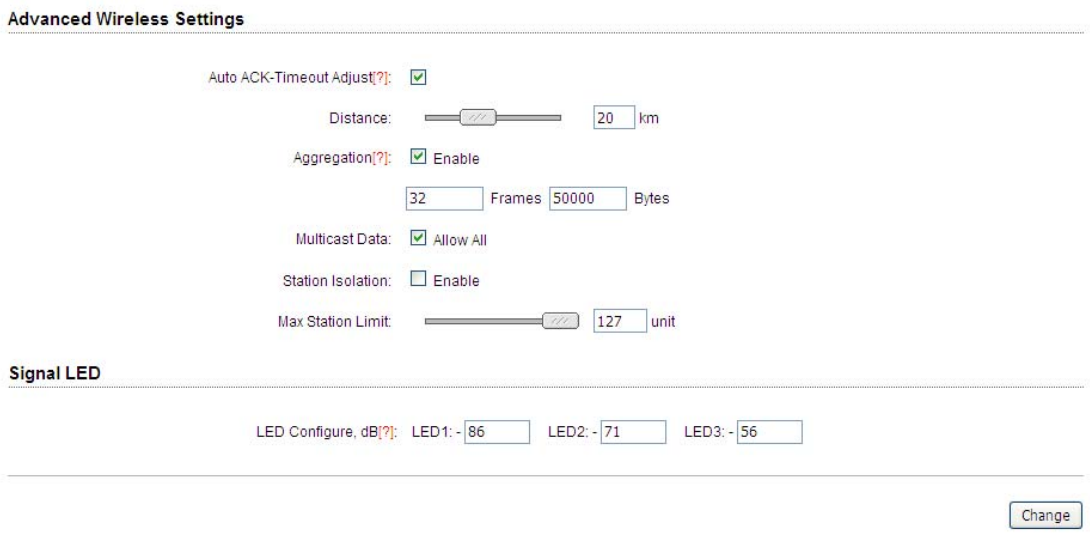

Figure 28 Advanced

Auto ACK-Timeout Adjust: It is suggested to enable this function, so that the distance between 2 DH-PFM880 devices can be detected and all the related parameters can be optimized to achieve the best link quality.

Distance: The distance can be set manually if the Auto ACK-Timeout Adjust is disabled, otherwise, the distance parameter is not allowed to be set. It is suggested the distance is set automatically by enabling Auto ACK-Timeout Adjust parameter.

Aggregation: It enables several data frames of 802.11 to be aggregated and transmitted out, thus improve the throughput. In default, it's enabled.

Multicast Data: When it's enabled, DH-PFM880 devices allow multicast function.

LED configure： This is to configure the signal strength value needed to light on.

There are 3 LEDs on DH-PFM880 devices (LED3 value > LED2 value > LED1 value). The default values are -86dBm, -71dBm and -56dBm. When LED1 value < signal strength < LED2 value, LED1 is lighted on; When LED2 value < signal strength < LED3 value, both the LED1 and LED2 are lighted on; When signal strength > LED3 value, all three LEDs are lighted on.

9 System

System page is shown in Figure 29 and it is divided into the following 4 parts: Configuration Management, Firmware, Device Setting, Accounts.

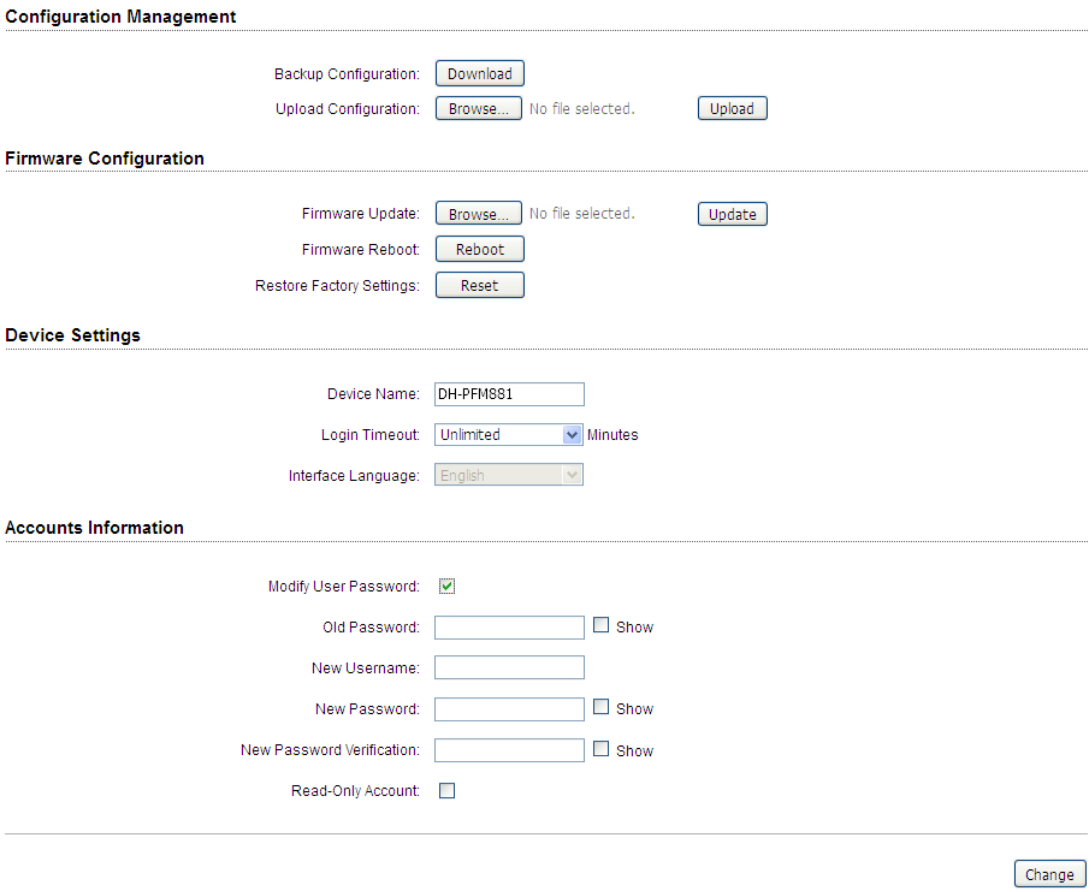

Figure 29 System

Backup configuration：When clicking Download button, the current configuration can be backed up to a file.

Upload configuration：When clicking browse, user can choose the backup configuration file and then click upload, so that the configuration stored in the backup file can be applied.

Firmware update：Click browse button and choose the file, and then click update button, the firmware can be updated to the latest version.

Firmware reboot：Click the Reboot button to reboot the device.

Reset to Defaults：Click the Reset button to restore to the factory default settings.

For default, all the factory settings are shown in the following table.

Table 6 Main parameters at the factory settings

Items	**Default Settings**
IP address	192.168.1.36
User name	admin
Password	admin
Wireless mode	AP
SSID	DaHua
Output power	27dBm
Encryption	WPA->WPA2->CCMP->Password：1234567890abc
Network mode	Bridge Mode

Device name： It can be set to any name needed.

Login Timeout： Login Timeout setting.

Interface Language： Language setting。

Accounts： The user can modify the user name and password here.

10 Tools

The Tools page is shown in Figure 30. This page is divided into six parts: **Ping IP**, **Time to Restart, Ping Watchdog, Telnet/Syslog, NTP/SNMP** and **IPERF**.

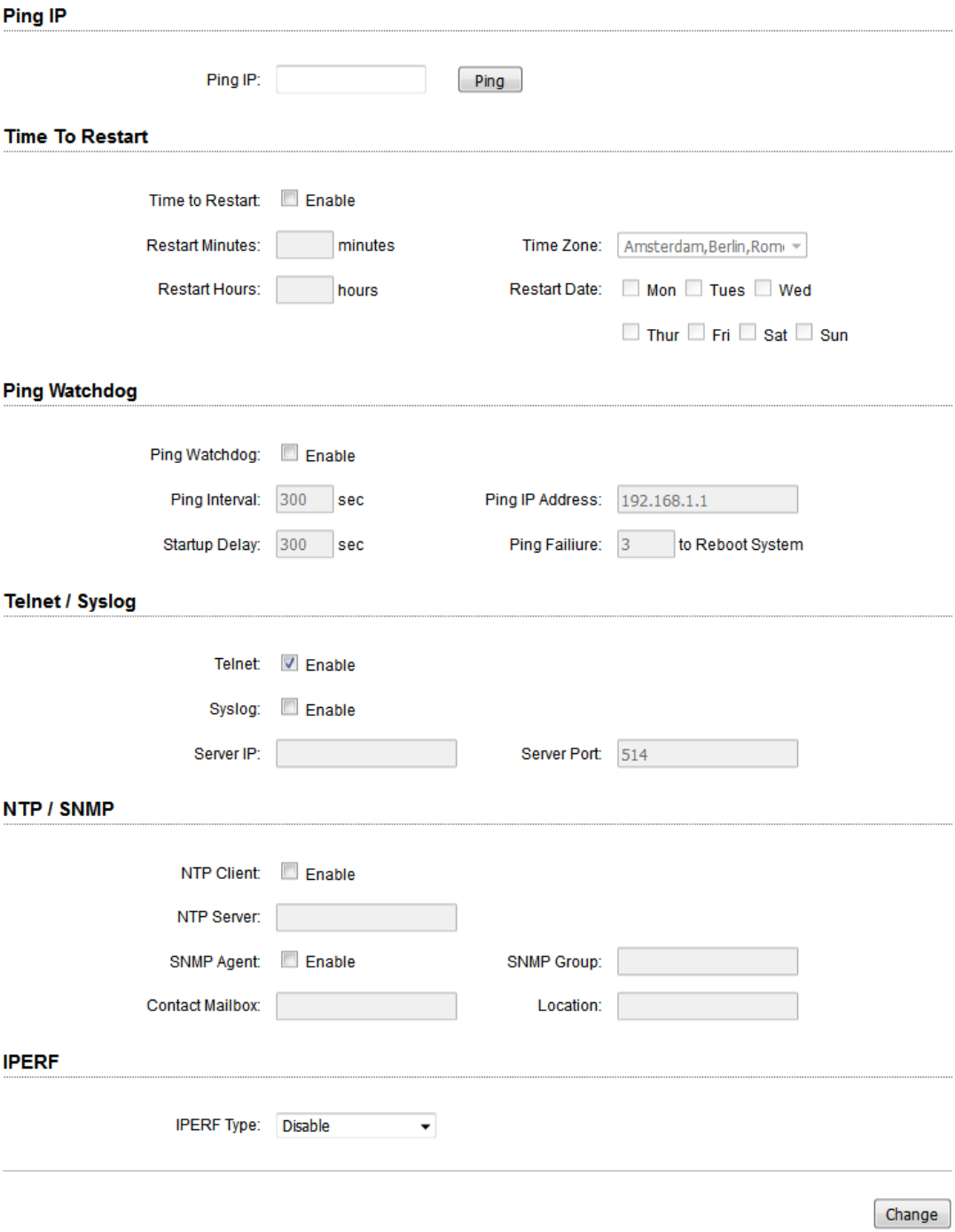

Figure 30 Tools

Ping IP： User can input the destination IP address of another device, and click Ping button. If that destination device is successfully connected to the DH-PFM880 device, the result shows Alive, otherwise shows Not Alive.

Ping Watchdog： The ping watchdog sets the DH-PFM880 Device to continuously

ping a user-defined IP address (for example, it can be the IP address of the AP the Client is connecting to). If it is unable to ping under the user defined constraints, the DH-PFM880 device will automatically reboot. It is highly recommended that users enable this feature at the side of "Wireless Station" and disable this feature at the side of "Access Point".

Ping IP Address：Specify an IP address of the target which will be monitored by Ping Watchdog. If this feature is enabled at the side of "Wireless Station", Ping IP Address should be the IP address of the AP the Client is connecting to.

Ping Interval：Specify time interval (in seconds) between the ping requests are sent by the Ping Watchdog

Start up Delay: specify initial time delay (in seconds) until first ping request is sent by the Ping Watchdog

Ping Failure：Specify the number of ping replies. If the specified number of ping replies is not received continuously, the Ping Watchdog will reset the WIFI only.

Telnet： When telnet is enabled, the user can input command "Telnet 192.168.1.36" in the DOS window of Windows XP or Windows 7 PC, and then telnet to the DH-PFM880 and manipulate the DH-PFM880 device. When telnet is disabled, this operation is disabled.

Syslog: When it's enabled, and the System Log server's IP is also set here, the log information will be output to the System Log server automatically.

NTP Server： If this NTP server is set, and the DH-PFM880 device can access to this NTP server. DH-PFM880 device automatically calibrate the time and date information with the NTP server and show the time information in the Status page.

SNMP Group： When this function is enabled, use can check the working condition and information of the DH-PFM880 device.

IPERF: it is used to test network throughput. User can configure it to server or

client

Server: when it is a server, it waits client to connect.

Client: when it is a client, it sends connect request to server.

IPERF dual: client sends and receive signal at same time.

IPERF Server: Server IP address.

IPERF Thread: the number of iperf thread. If using more thread, the throughput is high.

IPERF Time: how long the iperf run.

IPERF Interval: the time between two results show.

Note：If users want to modify the parameters of Ping Watchdog, please disable it first and then apply. When the web page shows that Ping Watchdog is really disabled, users can now re-enable it with modified parameters.

11 AC NMS

The AC NMS page is shown in Figure 31.If you want the device to join the AC management you need **AC management** at first and then go to the AC NMS page to enable the AC control.

WTP name: indicates the name of the device to show on the AC management.
WTP location: indicates the location information of the device to show on the AC management.
AC IP: AC IP is the IP address of the AC management witch this device should be joining in. It can be added up to eight.

When the AC control is enabled and the IP address is matched, the device can be on-line in AC management, a client device must be associated to an access point device which is on-line on the AC, and then it can be on-line on the AC management.

When AC control is enabled, users can not configure the device through the device pages except the AC NMS.

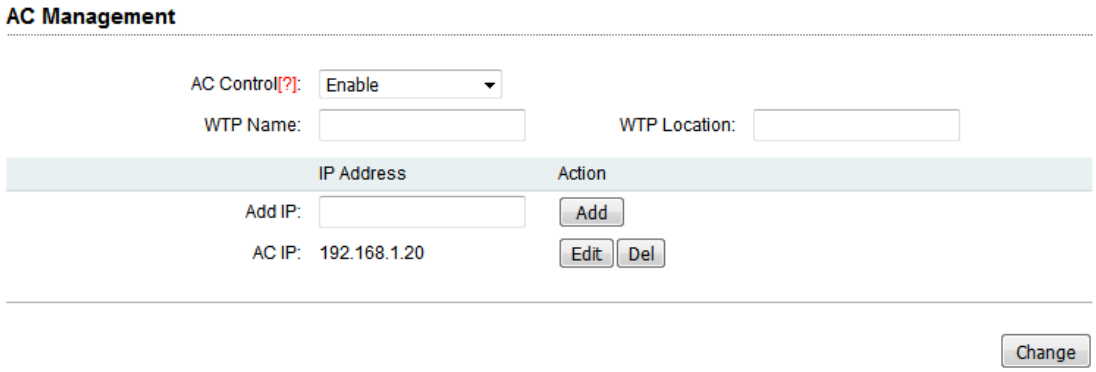

Figure 30 AC NMS

12 Logout

Click the logout button, it will logout the device and return to the login page.

13 Network Configuration Examples

13.1 AP and Station Network

In the point-to-point working scenario, user can configure one DH-PFM880 device to AP, and another to station mode, shown in Figure 32.

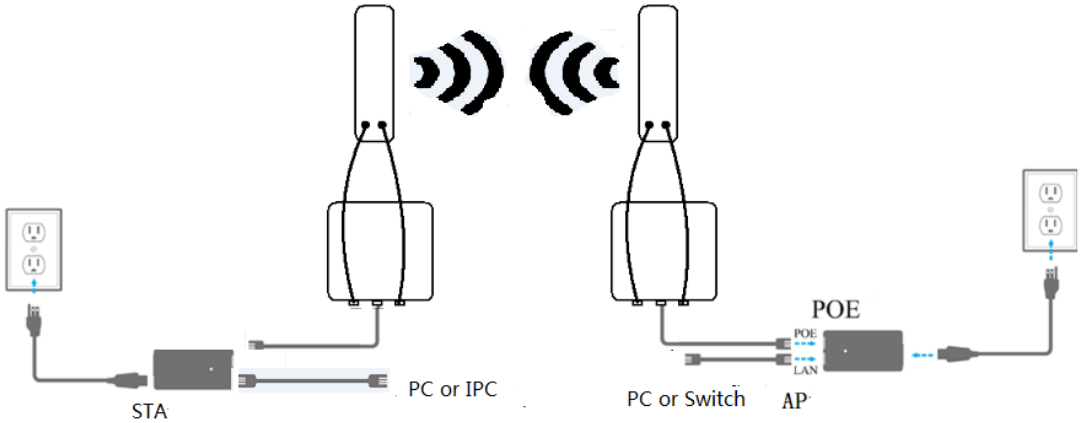

Figure 31 AP and Station network

To make the above network working, user need to configure the two devices to be associated. The detail configurations are described in the following:

1. Configure the two devices to bridge mode, disable the firewall, and set different LAN IP for the two devices, the LAN IP should be on the same segment.

2. In wireless menu, configure one device to AP mode and the other one to station mode, set the same SSID, the same channel bandwidth (20MHz for default), and set the same encryption and password for both of the devices.

3. After the above setting is done, wait for a while. Using one computer to ping the other one. If the devices are configured correct, they will be associated and the ping will get the reply.

13.2 WDS AP, WDS Station, WDS Repeater Network

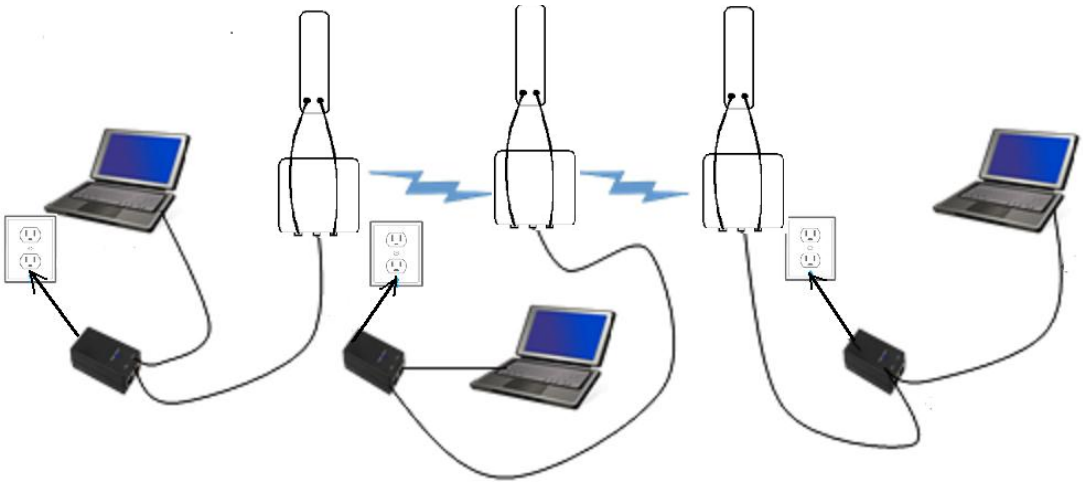

Figure 32 WDS Network

If there is a block, such as a building is in between the point-to-point connection, one TuroBridge5F device can be put between the PTP connection as a relay, which is "WDS AP, WDS Station, WDS Repeater" network, shown in the above Figure33.

Three DH-PFM880 devices need to be configured as shown in Figure 33:

1. Configure the 3 devices to be bridge mode.

2. In the wireless menu, make the following configurations:

- Configure the 3 devices to WDS AP/WDS Repeater/WDS Station separately

- Configure the 3 devices' SSID to be the same

- Configure WDS AP and WDS Repeater frequency to be the same, for example: 5825MHz

- Configure the encryption method and password to be the same.

3. To verify if the network is correctly setup, please use the computer connected to one of the three devices to ping the IP of any of the other two devices. If the ping is successfully, the network connection works correctly.

13.3 Router Mode

In the Router mode, the DH-PFM880 works as a router and the network connection is shown in Figure 32. The PoE port of the PoE adaptor is connected to the DH-PFM880 device's PoE port, and the LAN port of the PoE adaptor is connected to the internet. Meanwhile, the LAN port of DH-PFM880 device is connected to one computer, and then user can configure the device.

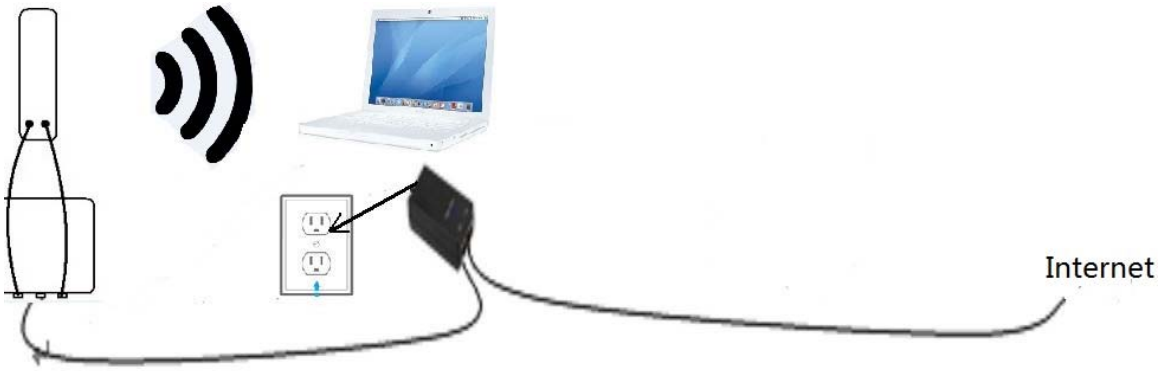

Figure 33 Route mode

After the above connection is done, configure the DH-PFM880 device using the web based configuration menu.

1. In wireless page, set the device to route mode, disable the firewall. If the internet provided by the ISP (DH-PFM880 connected to) has a DHCP server, user can set DH-PFM880's WAN mode to DHCP (Dynamic IP) so that it can obtain the IP address automatically.

   If the internet provided by the ISP(DH-PFM880 connected to) doesn't have a DHCP server, user need to manually configure all the parameters given by the ISP, such as the WAN IP, WAN Netmask, LAN IP, LAN Netmask, Default gateway, Primary DNS, Secondary DNS.

Note: LAN IP address and WAN IP address can not be in the same IP segment. For example, if LAN IP is 192.168.1.*, then WAN IP must be set to 192.168.2.* or 192.168.3.*.

2. In wireless page, set wireless mode to Access Point, set SSID to a random name, and set output power to a value needed(Max output power is recommended in the outdoor long distance environment). Then the user needs to choose a wireless channel and an encryption method.

3. Enable DHCPD at the Tools page. Please refer to chapter 10 for DHCPD setting.

4. When the above settings are done, use a computer to connect to DH-PFM880 device, and then check whether the connection is successfully.

   Note: Users can check whether the connection is successfully by ping DH-PFM880 device's WAN IP address. If the ping is successfully, this connection is successfully.

Appendix-A Troubleshooting

1. The device cannot be started after power on.

1. The Ethernet cable between the DH-PFM880 device and the PoE adaptor is more than 40 meters long.

2. The Ethernet cable quality is not good enough, and it should be Cat 5e or even Cat 6 cable.

3. The RJ-45 plugs are not well connected.

2. Can not be restored to the factory setting

Please manually push the Reset button for 5S~10S, then the user can log in the device by typing the default IP address 192.168.1.36.

3. My computer cannot be connected to the DH-PFM880 Access Point.

Please try the following method to solve the problem:

1. Adjust the direction of the DH-PFM880 device.

   Please rotate the DH-PFM880 device since the antenna inside the device is directional.

2. Switch to other wireless channel

   Switch to other wireless channel 'cause there are much interferences in this channel.

3. Turn off the other interference sources

   Maybe there are other WIFI devices nearby and cause interferences. Try to turn off other WIFI devices nearby, or move DH-PFM880 to another clean environment.

4. The signal strength between 2 DH-PFM880 devices is too weak, and throughput is low.

1. The DH-PFM880 AP and Station devices are not Line-of-Sight, or there are blocks like a building in between the AP and Station devices.

2. The Station device and AP device is not aligned very well, including both horizontally and vertically, since the antenna of the DH-PFM880 is directional.

3. The Station device is installed in the windows, and the windows glass shields the wireless signal.

4. The distance between the AP and Station devices is too far.

5. The signal strength is high, but the throughput is low

1. There are two much interferences, or multi-path interferences. For example, there are two much 2.4GHz or 5.8GHz WIFI device working nearby.

2. The RJ45 ports of the DH-PFM880 device don't work well.

6. During the point-to-point or point-to-multi-point

connection, when ping from one device to another, the latency is too long or the packet is lost.

1. Isolate the several APs if they are connected to one PoE switch.
2. The RJ45 ports are not connected very well.

7. The internet access is lost and the internet speed is low.

1. There are too much stations connected to one AP.
2. AP signal is too week.
3. There are interference source nearby.
4. Check the number of users and the max internet speed provided by the ISP.

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.

Please take attention that changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This product 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 product 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 product 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 or more 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 equipment should be installed and operated with a minimum distance 20cm between the radiator and your body