



# Application Guide

## Hongdian Router-Linux-Bandwith Bonding



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## Revision History

Updates between document versions are cumulative. Therefore, the latest document version contains all updates made to previous versions.

Doc Version	Product	Release Data	Details
V1.0	Hongdian Router	2017.12.19	First release.

# 1 Overview

Hongdian Router supports different WAN interfaces to access the Internet, including dual modem, WiFi client, and Ethernet WAN, but mostly these WAN interface are independent for Internet accessing, only one gateway is available for the router at the same time.

For one WAN link, the transmission speed is not fast enough, if we can combine two or more WAN interface to increase the bandwidth, the transmission can be faster and more stable.

Hongdian router provides bandwidth bonding allows the Hongdian router access the Internet via multiple WAN, and the bandwidth can be superimposed.

The bandwidth bonding function can be also told as bandwidth aggregation, and also satisfy the load balancing.

With bandwidth bonding, the transmission is faster than a single modem link, it can provide the increasing at least 60% of the second link's rate; Support multiple links binding, and the router can be expanded to 4 modems; All the available links can be used for binding for increasing the bandwidth, not just for the modem; Support VPN link, including IPSec, L2TP, gre and etc.

## 2 Topology



In customer's application, the purpose is to make sure the terminal can send data to the server.

In this topology, the data package can be transmitted via modem1 and modem2 links of the Hongdian router, if the modem1 or modem2 is up to 1M, the router should be up to  $1M+1M*60\%$  (or higher).

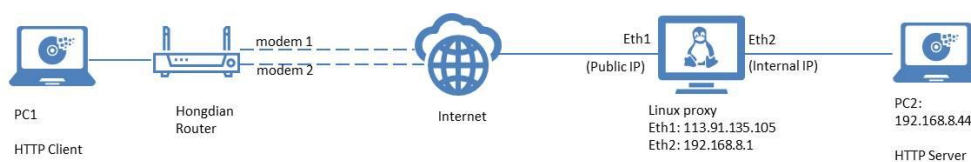
The Linux is the proxy for combining the data package with multiple links. It uses two Ethernet adapter, while Eth1 gets public IP, and Eth2 gets internal IP. The application server is in the same segment with the Eth2 of the linux proxy.

## 3 Deployment

Here we take an example to show you how to configure and test the bandwidth bonding function.

### 3.1 Networking

The demo networking is as below.



This demo requires the related software or tool as below:

- HFS.exe
- ubuntu-14.04-desktop-amd64.iso
- H8922S\_APP\_V7.0.2\_T1\_bonding\_1709061801.trx
- Dumeter.exe

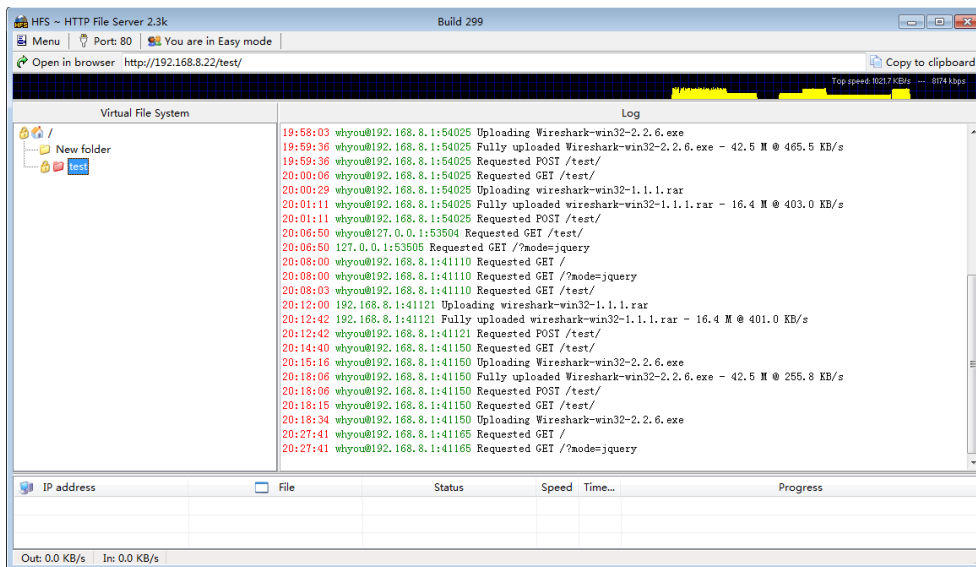
### 3.2 HTTP Server

In the demo networking, PC2 is http server.

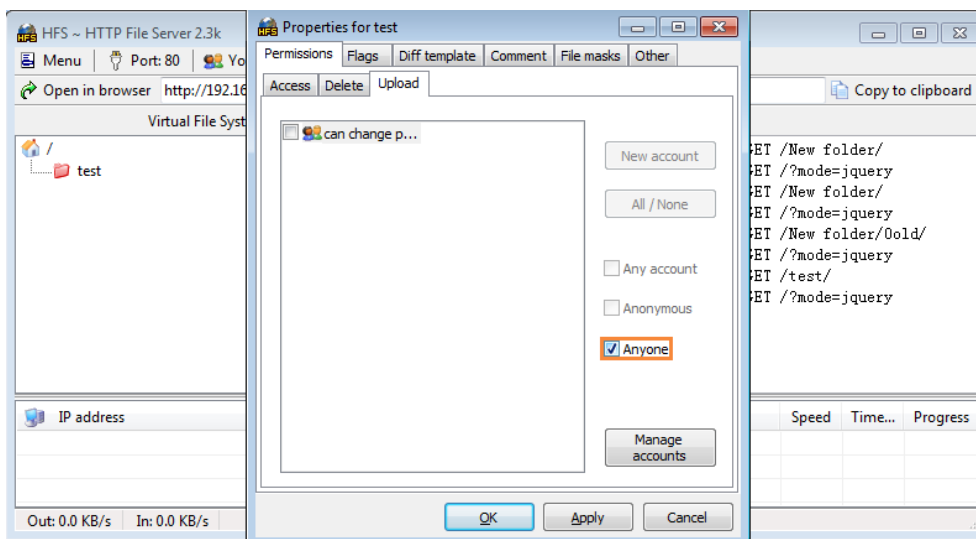
1. Download the "hfs.exe" and install it to the PC2, you can download it from Internet or from the URL:

<http://turekuba.cz/hfs/hfs.exe>

2. Open the HTTP File Server, Right click ->add a folder from disk, to add a folder "test" as below, which show in red color.



3. Focus on "test" folder, right click ->Properties->Permission->Upload, check the box to allow anyone to upload.



4. Configure the IP of the PC2, make it in the same segment of the Linux proxy, for example: PC2 IP is 192.168.8.44, and the Linux PC Eth2 IP is 192.168.8.1. (They can ping each other).

### 3.3 Linux Proxy

The OS is the Ubuntu 14.04 (64-bit) as the Linux proxy.

You can download the Ubuntu 14.04 iso file from the Internet, or the URL below:

<https://d1-sh-ctc-2.pchome.net/32/sc/ubuntu-14.04-desktop-amd64.iso?key=277233fa9a63caa43534b771b256971e&mp=1513390951154>

Install the Ubuntu 14.04 to your computer, and run it. The Ubuntu computer should install two Ethernet adapters, one for accessing the Internet, and is got the public IP (Eth1), the other is in the same segment with the PC2 and its IP can be 192.168.8.1 (Eth2).

After install the Ubuntu OS,

Open the terminal on the Ubuntu, login with the system administrator permissions, which start with the symbol "#"

```
henry@ubuntu:~$ su
Password:
root@ubuntu: /home/henry#
```



```
root@ubuntu: /home/henry
henry@ubuntu:~$ su
Password:
root@ubuntu: /home/henry#
```

Continue input the commands as below:

### 1. Install the "gpg-apt-key"

```
wget -q -O - http://multipath-tcp.org/mptcp.gpg.key | sudo apt-key add -
```

### 2. Add a new line " deb http://multipath-tcp.org/repos/apt/debian trusty main" to the end of the file "mptcp.list"

```
sudo vi /etc/apt/sources.list.d/mptcp.list
```

Add:

```
deb http://multipath-tcp.org/repos/apt/debian trusty main
deb http://multipath-tcp.org/repos/apt/debian wheezy main
```

Then save and quit.

### 3. Turn to terminal shell and continue:

```
sudo apt-get update
sudo apt-get install linux-mptcp
```

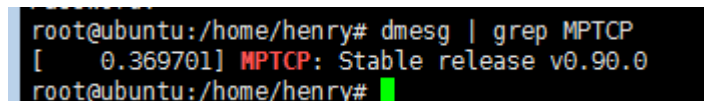
Reboot system

```
reboot
```

### 4. Check status after reboot

```
dmesg | grep MPTCP
```

If the installation is successful, the MPTCP version number will be printed as below, otherwise there will be no print.



```
root@ubuntu:/home/henry# dmesg | grep MPTCP
[ 0.369701] MPTCP: Stable release v0.90.0
root@ubuntu:/home/henry#
```

If it return null after the "dmesg | grep MPTCP" command, please try to install mptcp in other's way, as below

Refer to : <http://multipath-tcp.org/pmwiki.php/Users/AptRepository>

For the newest release, please follow the below steps:

First, add the gpg-apt-key with:

```
sudo apt-key adv --keyserver hkp://keys.gnupg.net --recv-keys 379CE192D401AB61
```

Then, just add the following line to your `/etc/apt/sources.list`:

```
deb https://dl.bintray.com/cpaasch/deb jessie main
```

Now, install MPTCP with the following:

```
sudo apt-get update
```

```
sudo apt-get install linux-mptcp
```

And reboot your machine.

## 5. Enable the routing rule of the Ubuntu.

Change the file `"/etc/sysctl.conf"`. Find the line `"net.ipv4.ip_forward=1"`, remove the front `"#"` to enable it, as shown below.

```
# Uncomment the next line to enable TCP/IP SYN cookies
# See http://lwn.net/Articles/277146/
# Note: This may impact IPv6 TCP sessions too
#net.ipv4.tcp_syncookies=1

# Uncomment the next line to enable packet forwarding for IPv4
net.ipv4.ip_forward=1

# Uncomment the next line to enable packet forwarding for IPv6
# Enabling this option disables Stateless Address Autoconfiguration
# based on Router Advertisements for this host
#net.ipv6.conf.all.forwarding=1
```

Use below command to make it work (or reboot the system)

```
sudo sysctl -p
```

## 6. Install TCP proxy

Get the `tcpproxy-1.1.tar.gz` from Internet or the URL:

```
tar xzf tcpproxy-1.1.tar.gz
cd tcpproxy-1.1/src
chmod 777 configure
./configure
make
sudo make install
```

**#note:** if it requires to install `ragel` tool after `make` command, install it as below.

```
sudo apt-get install ragel
make
```

7. Now the tcp proxy is installed, run the command to enable the proxy function:

```
tcp-proxy -l 0.0.0.0 -p 5678 -r 192.168.8.44 -o 80
```

Command description:

```
-l: local IP address monitor, 0.0.0.0 means all matches;
-p: local port monitor, e.g. specified as 5678;
-r: monitor remote IP address of the connection, which is the IP address of the http server in before setting.
-o: monitor connected remote port, which is the previously configured port of the http server.
```

8. Check if it works

```
ps -ef | grep tcp-proxy
```

It should print the info, if commands work:

```
tcp-proxy -l 0.0.0.0 -p 5678 -r 192.168.8.44 -o 80
```

```
root@ubuntu:/home/henry/tcp-proxy-1.1/src# ps -ef | grep tcp-proxy
root      2960      1   0  20:10 ?        00:00:00 tcp-proxy -l 0.0.0.0 -p 5678 -r 192.168.8.44 -o 80
```

## 3.4 Hongdian Router Config

1. Prepare a Hongdian router with dual modem, it should have use the the custom firmware such as:

H8922S\_APP\_V7.0.2\_T1\_bonding\_1709061801.trx

This version has enabled the MPTCP function in default, which is for the bandwidth bonding.

Insert 2 SIM card of the router, and make sure the two SIM card network are online.

2. Config

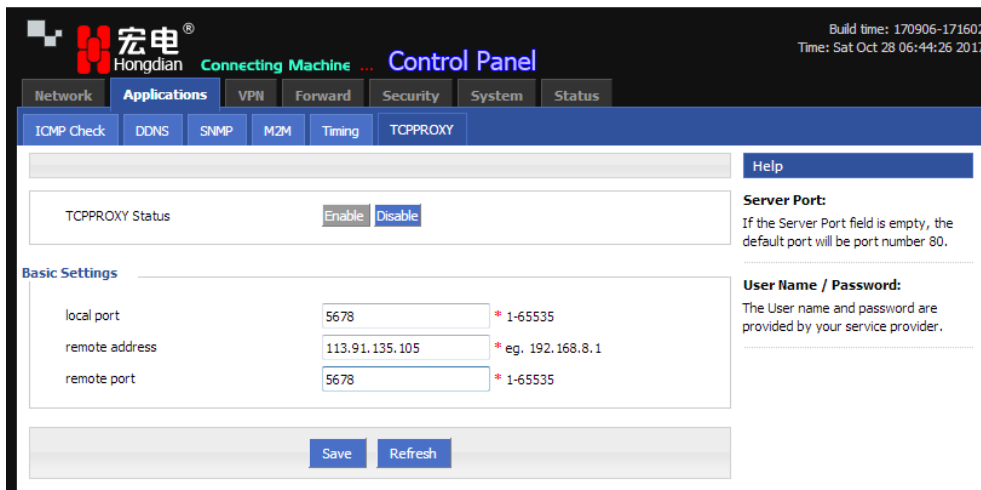
Login the Web UI of the router. Input public IP of the Ubuntu(Eth1 IP) and the mapping port as below.

Local port: router's local port

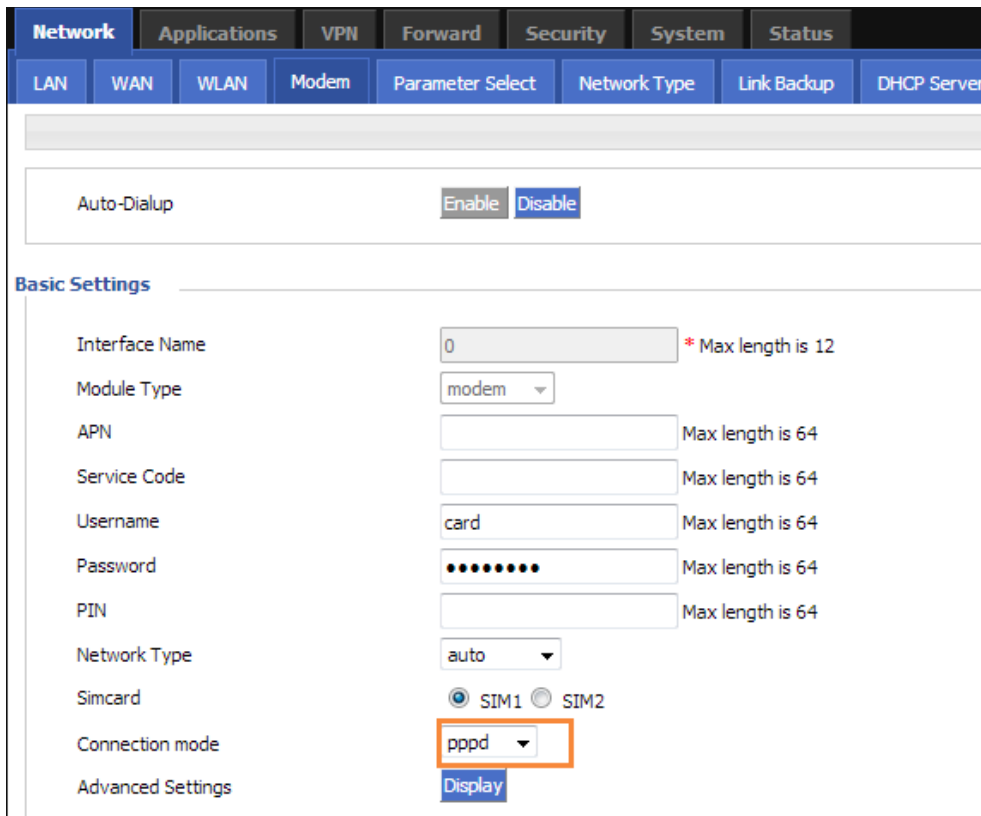
Remote address: public IP of the Ubuntu(Eth1 IP)

Remote port: remote service port (the mapping port of Ubuntu)

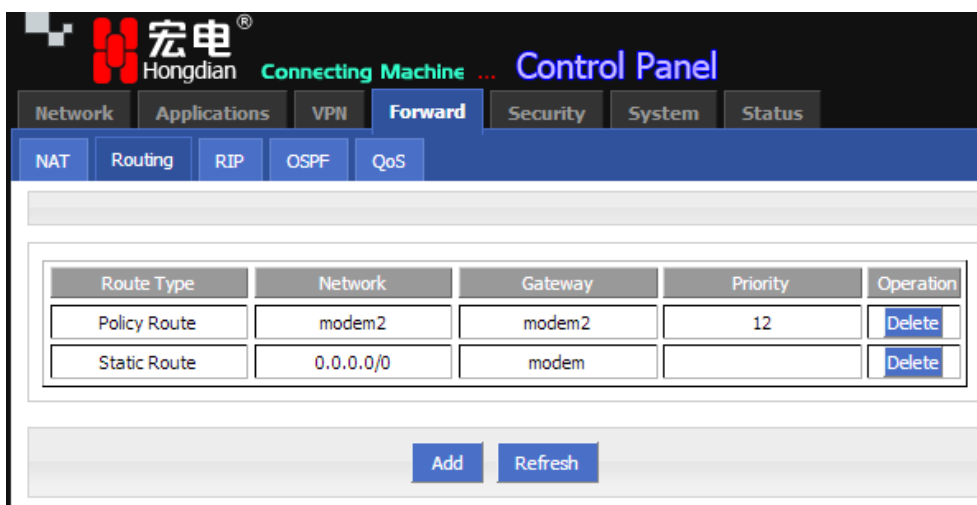




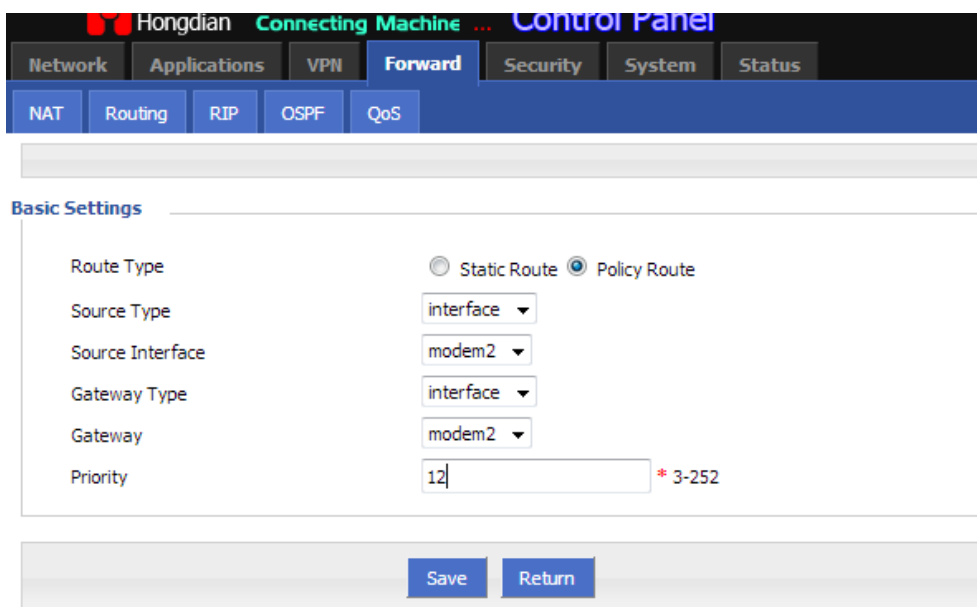
3. Configure dual modem dialing rules. Make sure both are using pppd mode, as below.



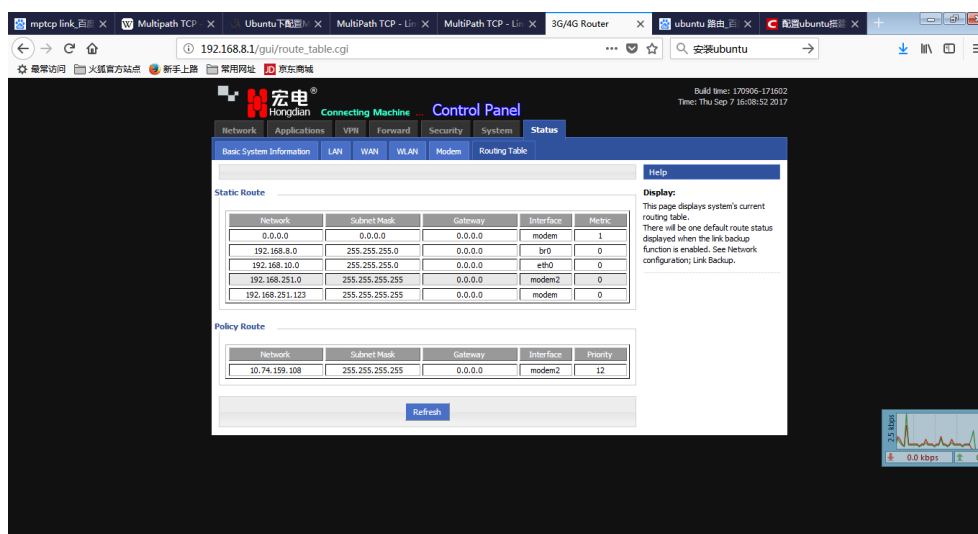
4. Configure the routing rules, modem 1 is the default routing, and modem 2 is the policy routing.



Wherein, the policy route detail setting for modem2 is shown below.



Check the routing table as below

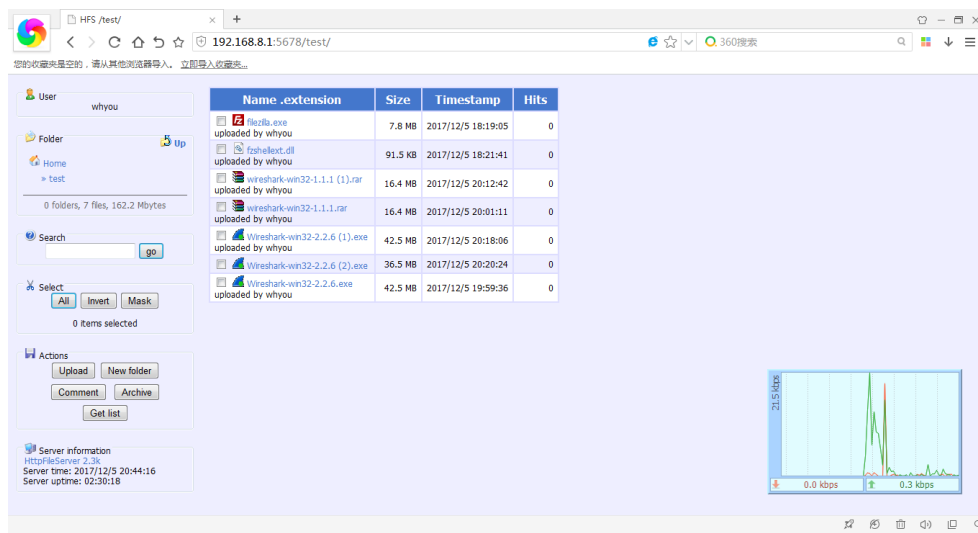


## 3.5 HTTP Client

1. It is the PC1 that directly connect to the LAN of the Hongdian r outer. Configure the PC1 access the Internet via Hongdian Router.

Currently in this test the router LAN IP is 192.168.8.1, the PC1's IP should be 192.168.8.X, and its gateway is 192.168.8.1.

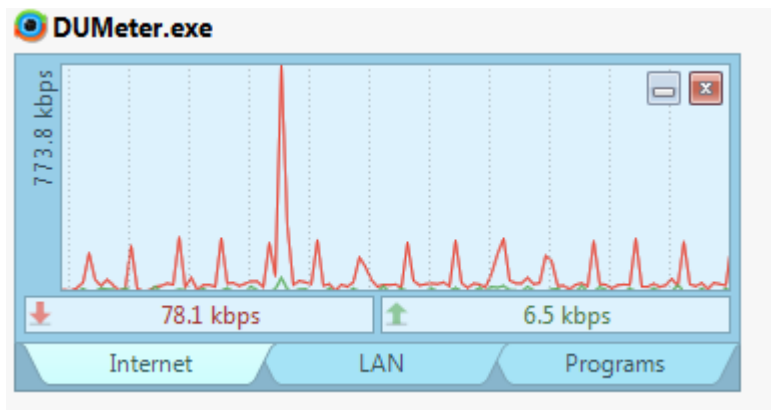
2. Open browser on PC1, visit the URL: 192.168.8.1:5678, so as to visit the HTTP File Server page,as below:



## 3.6 Test

1. Download a data rate tool on PC1 for viewing the bit rate, which is named "Dumeter.exe". You can download it from the Internet, or from the URL:

[http://dsw.baidu.com/sw-search-sp/soft/ea/18621/DUMeter\\_V7.8.4749.0\\_Install.1436351295.exe](http://dsw.baidu.com/sw-search-sp/soft/ea/18621/DUMeter_V7.8.4749.0_Install.1436351295.exe)



2. In order to reflect the test results, we can make the bit rate limit operation for the modem1 and modem2 in the router.

Enter Hongdian Router's web UI, enter "Forward->QoS" and set the QoS rules as below, which is limite modem and modem2 with 2000kbit/s

宏电® Connecting Machine Control Panel

Build time: 170916-171602  
Time: Mon Nov 20 15:02:56 2017

Network Applications VPN Forward Security System Status

NAT Routing RIP OSPF QoS

Rule Name	Control Interface	Network	Rate	Operation
2	modem2	113.91.187.26/32	2000	Mod Del En Dis
1	modem	113.91.187.26/32	2000	Mod Del En Dis

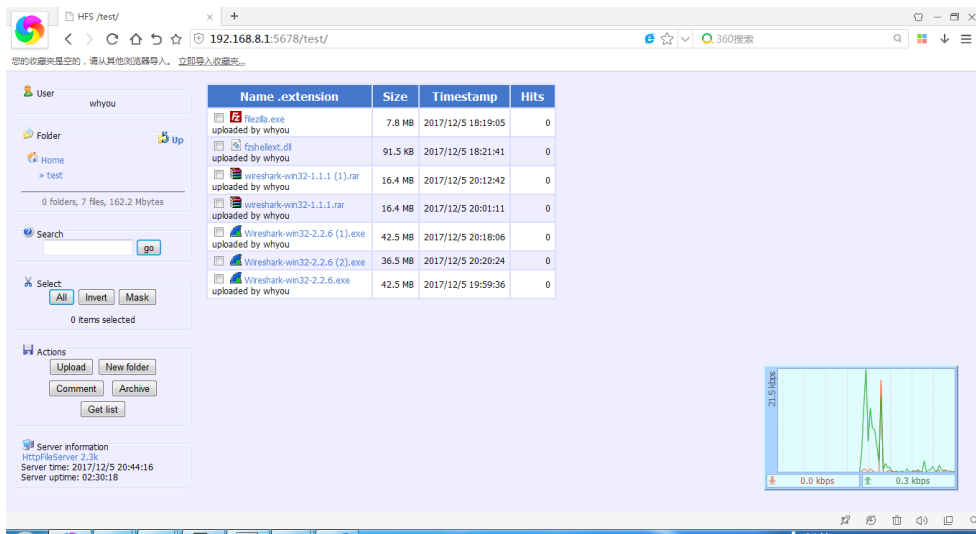
Add Refresh

Note:  
You can configure 50 rules at most.

4.9 Mbps

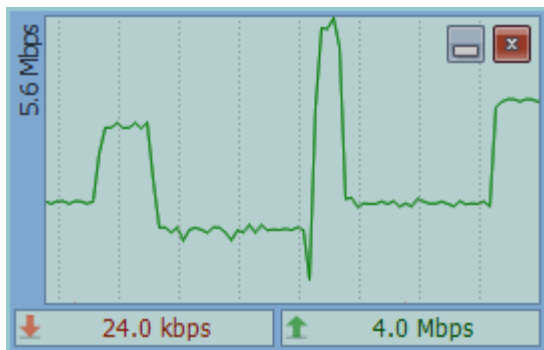
0.2 kbps 0.2 kbps

3. Click "upload" button to upload a file to the HTTP File Server on PC1.



#### 4. View the upload rate:

The modem and modem2 have been limited to 2Mbps, and the actual upload rate is 4Mbps, as below.





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## **Contact us**

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