DT01 WiFi/3G VoIP PBX / ATA User Manual

Document Version: 1.0

Firmware Version: v1.3.5

Version	Description	Date
1.0	Initiate	2015-Feb-26

Index:

1 Introduction

1.1 What is DT01

The DT01 is an Open Source appliance designed for VoIP application. DT01 has built-in Asterisk software and have a FXS port to connect normal phone. DT01 has a friendly Web UI, user can configure the DT01 to work as a VoIP ATA or PBX through the web browser easily.

DT01 has two RJ45 port, a WiFi 802.11 b/g/n interface and a USB port host port to provide flexible network connection via LAN cable/ wifi or 3G/4G network.

DT01 is fully open source, user can modify the inside Linux system or compile a firmware for their customized applications.

The goal for DT01 is to fulfill VoIP requirement on dedicate application or installations.

1.2 Specifications

Hardware System:

- Processor: 400MHz, 24K MIPS
- 64MB RAM
- 16MB Flash
- DC Input: 9 ~ 12v or 5V

Interface:

- 1 x FXS port
- 2 x RJ45 ports
- USB 2.0 Host port to connect 3G dongle or USB flash

WiFi Spec:

- IEEE 802.11b/g/n
- Frenquency Band: 2.4 ~ 2.462GHz
- Chip Antenna or External antenna

1.3 Features

- ✓ Open Source OpenWrt system
- ✓ Asterisk 1.8.10
- ✓ Support SIP / IAX2 server/client.
- ✓ Support multiply SIP / IAX2 entries
- ✓ Easy configure SIP/IAX2/dial-plan in Web UI
- ✓ Managed by Web GUI or SSH
- ✓ Firmware upgrade via Web

- ✓ Support WiFi AP, Client or Ad-Hoc(Mesh) mode
- ✓ Optional external antenna for long distance connection
- ✓ Support USB dongle for 3G/4G dial up
- ✓ Support USB flash for extend storage

2 Access DT01

2.1 Overview

DT01 has two separate RJ45 ports and a WiFi Interface. They have different IP addresses, user can use either of them to access the DT01 and configure it via Web or SSH.

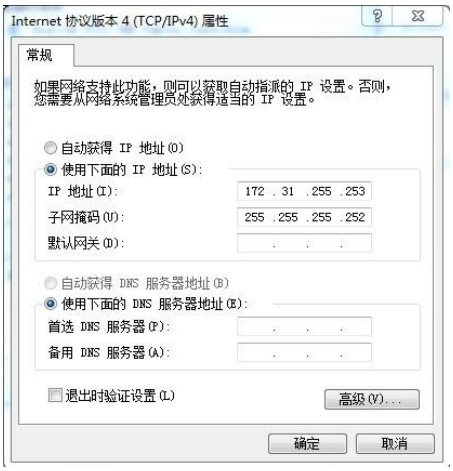
2.2 Find the ip addresses

Factory IP of WiFi port

At the first boot of Yun Shield, it will auto generate an secure WiFi network call *Dragino2-xxxxxx.* The WiFi password is *dragino-dragino* by default

User can use their laptop to join this WiFi network. The laptop will get an IP 10.130.1.xxx and the DT01 has the default IP 10.130.1.1

Fall Back IP



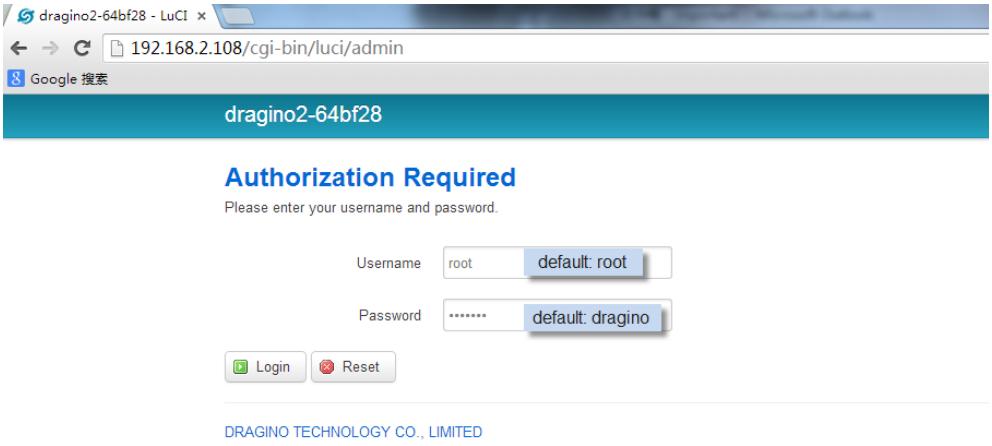
A fall back IP 172.31.255.254/255.255.255.252 is assigned to DT01's LAN port so user can always access DT01 with this ip if their laptop has the IP 172.31.255.253/255.255.255.252.

2.3 Configure Method

The DT01 runs Open Source Linux system. If user has a PC at the same network as DT01, user can access its system via either **Web Interface** or **Secure Shell (SSH)**.

2.3.1 Access via browser

The recommended browsers to configure DT01 are **Firefox** and **Chrome**. Simply type the IP address into your browser and you will see the log in page of DT01.



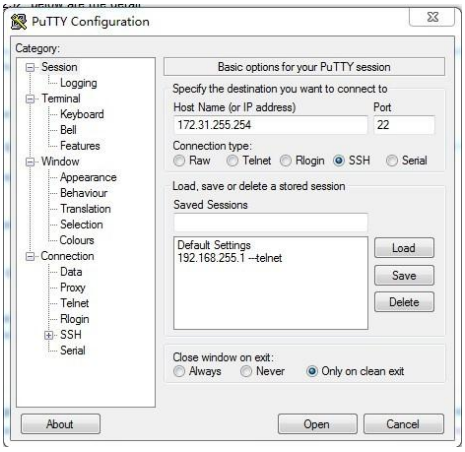
Default Web Login:

User name: root

Password: dragino

2.3.2 Access via SSH

Via SSH access, user can access to the Linux system directly and customized the system to support more features and applications.



SSH Access:

IP address: **IP Address of DT01**

Port: **22**

User Name: **root**

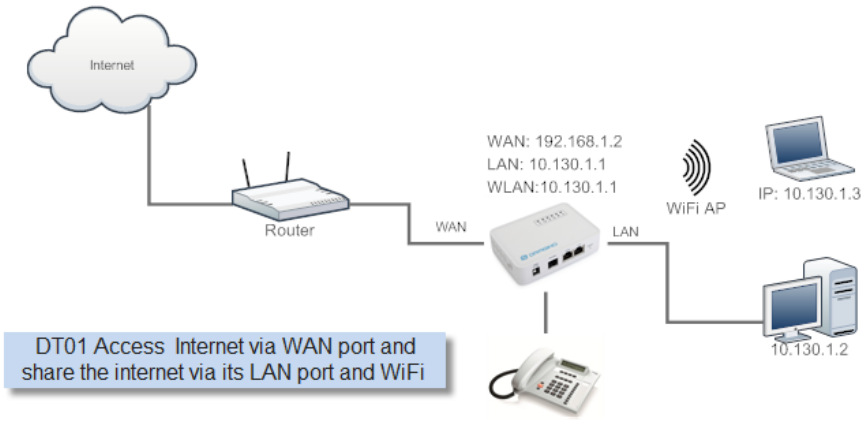
Password: **dragino (default)**

3 Typical Network Setup

User can configure DT01 to meet different network requirement. This chapter lists some typical network setup. Device are not limited to the network set up shows below, user can configure more advance network modes via the OpenWrt Linux system.

3.1 Connect Internet via WAN port

This is the default connection mode. System works like below:



Set Up in Web UI:

✓ Internet Access

Access Internet via WAN port

✓ LAN and DHCP:

Enable DHCP server in its LAN port

✓ Access Point(optional)

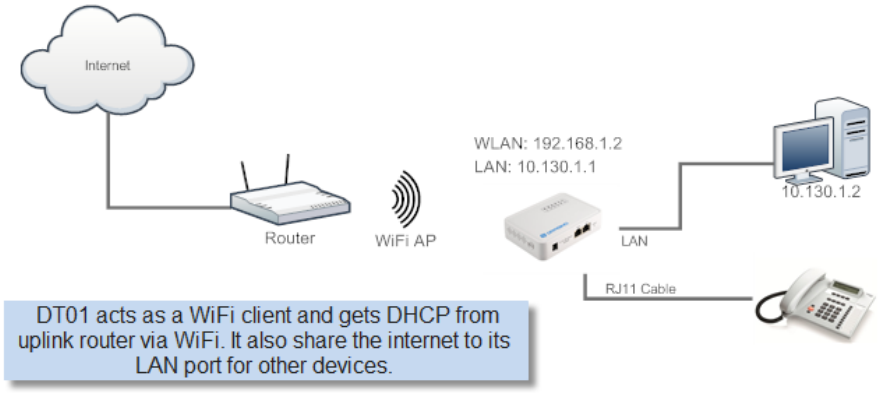
Enable WiFi AP

Input SSID/ Encryption/ Passphrase

✓ Mesh Network

Disable WiFi Mesh Network

3.2 Connect Internet via WiFi Client mode



Set Up in Web UI:

✓ Internet Access

Access Internet via WiFi Client

Way to Get IP: DHCP

Input correct SSID, Password and Encryption.

✓ LAN and DHCP

Enable DHCP server in its LAN port

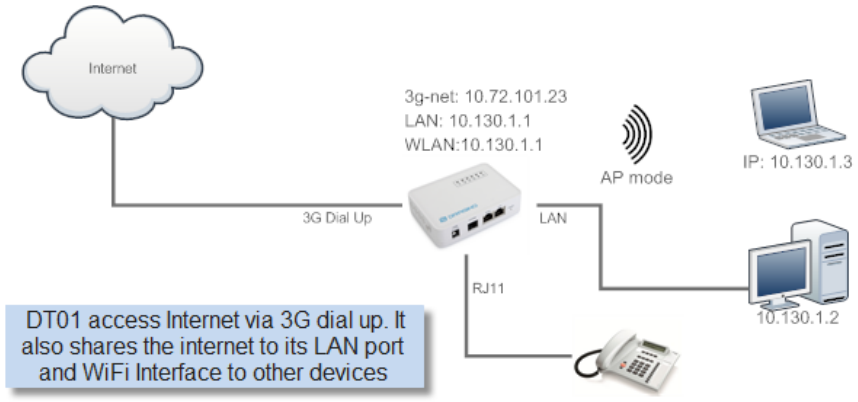
✓ Access Point

Disable WiFi AP

✓ Mesh Network

Disable WiFi Mesh Network

3.3 Connect Internet via USB dongle, 3G/4G/GPRS



Set Up in Web UI:

✓ Internet Access

Access Internet via USB Modem

✓ LAN and DHCP:

Enable DHCP server in its LAN port

✓ Access Point(optional)

Enable WiFi AP

Input SSID/ Encryption/ Passphrase

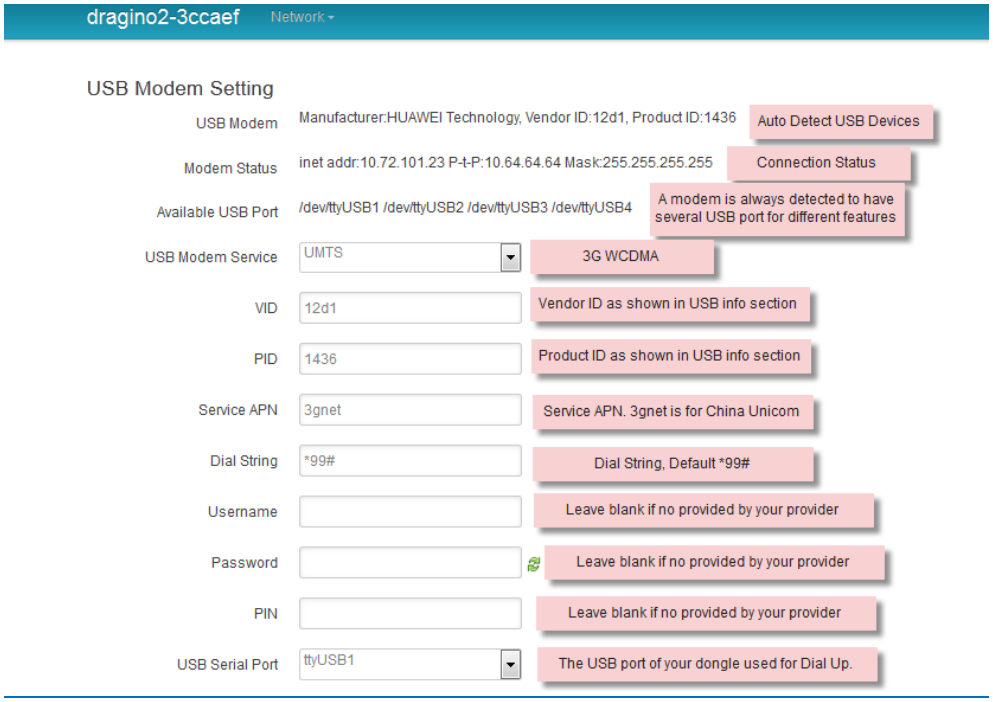
✓ Mesh Network

Disable WiFi Mesh Network

Below are USB 3G modem set up example:

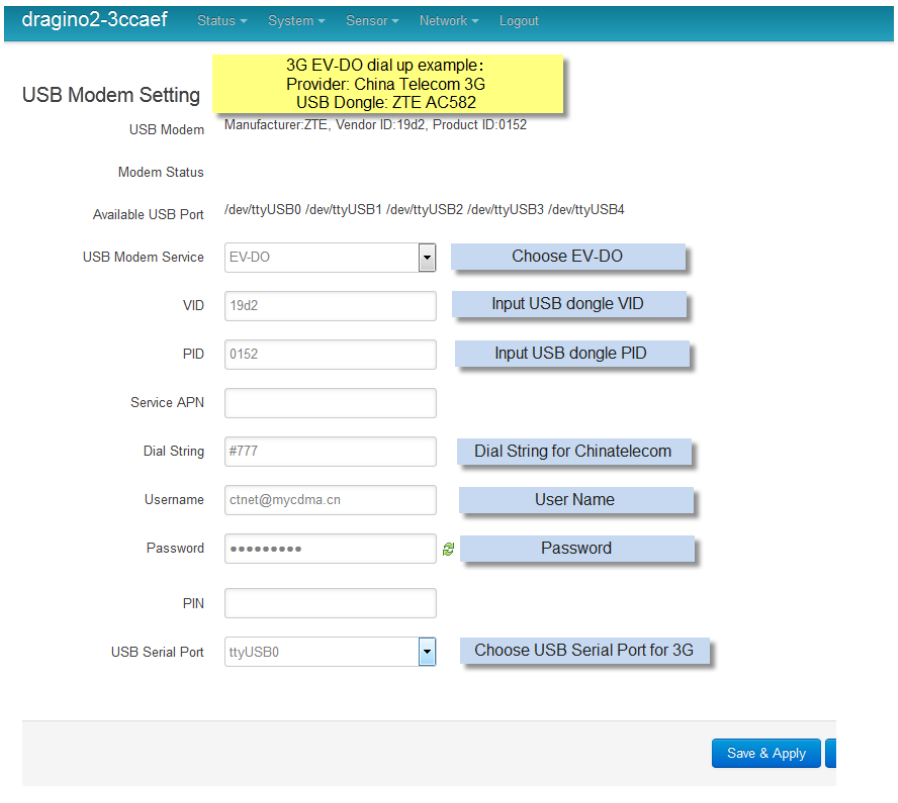
Service 3G WCDMA

Provider: China Unicom



Service: 3G EV-DO

Provider: China Telecom

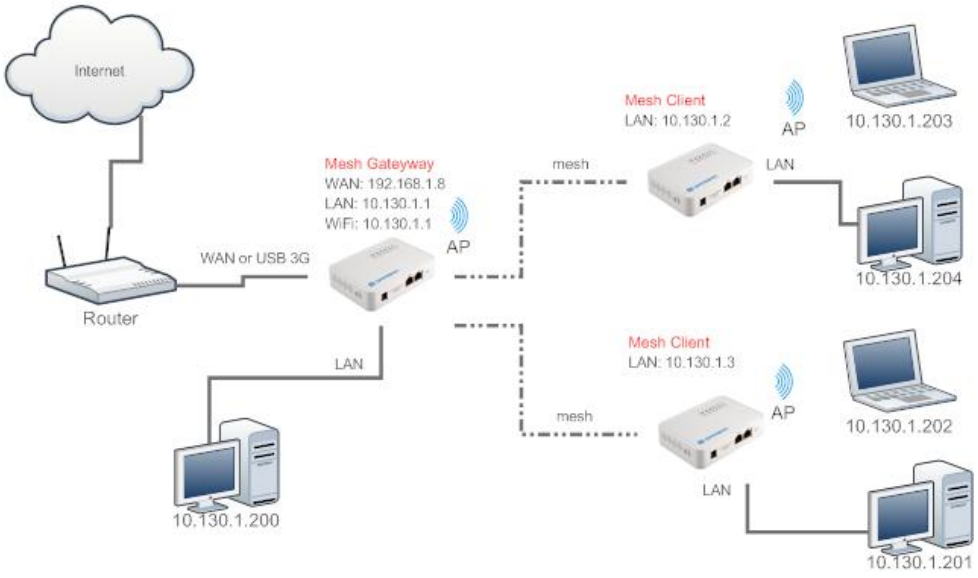


3.4 Set up WiFi mesh network

Brief: in this network topology, user should choose the device to be a mesh gateway node or mesh client node

- ✓ **Mesh Gateway**: use WAN port or USB 3G to get internet access from uplink router. It also shares the internet to its Mesh Network for other Mesh Clients. The Mesh Gateway also acts as a DHCP router for its mesh network.
- ✓ **Mesh Client**: Connects to the Mesh Gateway via mesh WiFi, it also bridge internet via the LAN and WiFi AP interface.

A mesh network with DT01.



3.4.1 Mesh Gateway Set Up via Web UI

✓ Internet Access

Access Internet via WAN port or USB Modem

✓ LAN and DHCP

Enable DHCP server in its LAN port

✓ Access Point

Enable WiFi AP

✓ Mesh Network

Enable WiFi Mesh Network

Mesh Mode: SERVER

BSSID: 02:CA:FF:EE:BA:BB //Note: (1) BSSID should start with 02: ; (2) Mesh Device with different BSSID can't communicate with each other.

3.4.2 Mesh Client Set Up via Web UI

✓ Internet Access

Access Internet via Mesh WiFi

✓ LAN and DHCP

Disable DHCP server in its LAN port

✓ Access Point

Enable WiFi AP (can use same SSID or difference SSID with other mesh node)

✓ Mesh Network

Enable WiFi Mesh Network

Mesh Mode: CLIENT

BSSID: 02:CA:FF:EE:BA:BB //Note: (1) BSSID should start with 02:; (2) Mesh Device with different BSSID can't communicate with each other.

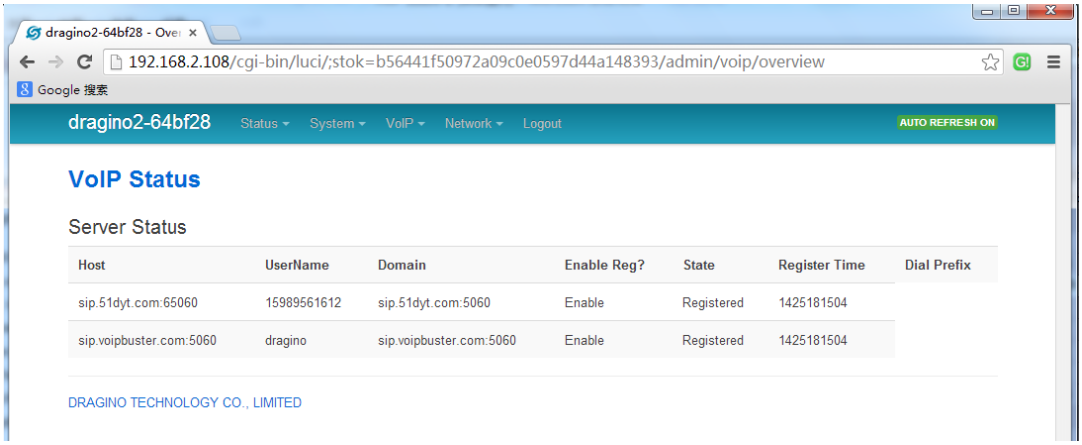
Note: Mesh set up need to reboot to take effect.

4 VoIP Settings

User can configure the VoIP settings in the Web UI or configure Asterisk advance settings via SSH access to the DT01.

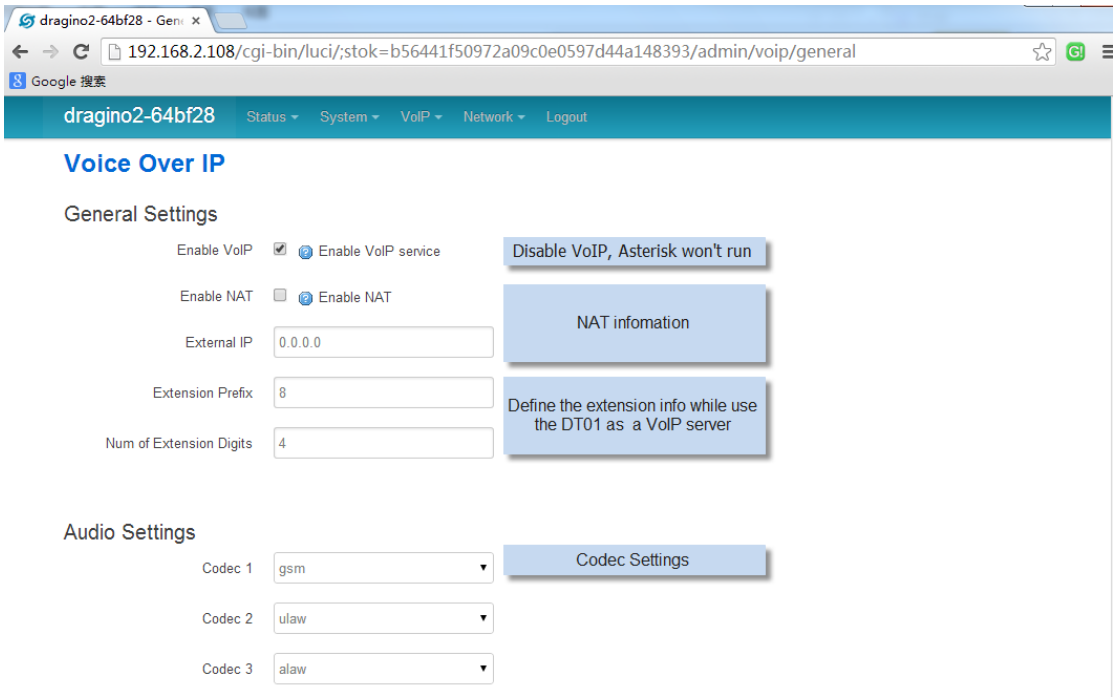
4.1 Overview

This page shows the servers register status.



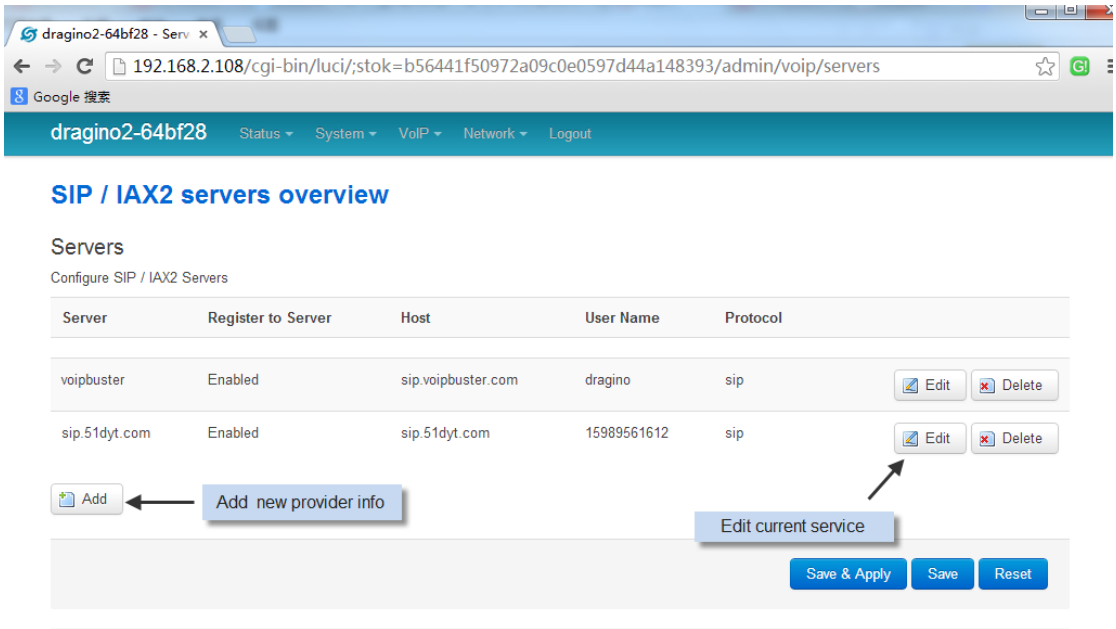
4.2 General Settings

Define the general info for Asterisk

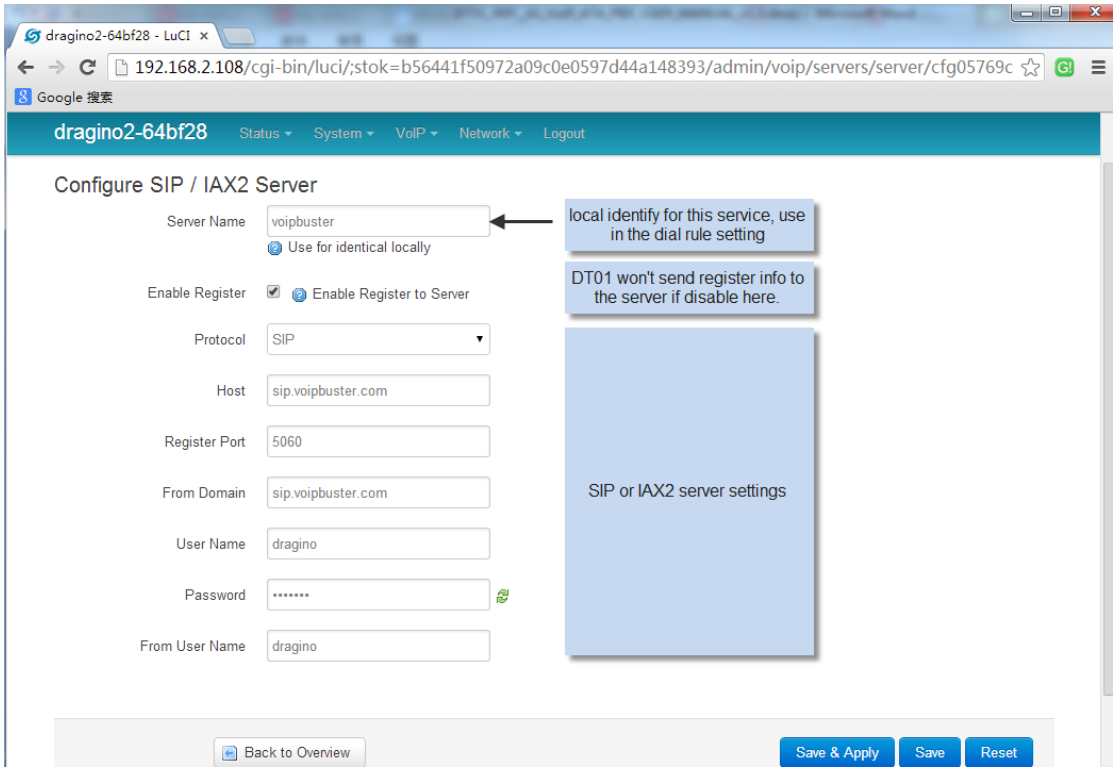


4.3 VoIP Server Settings

This page defines how DT01 connect to VoIP services.

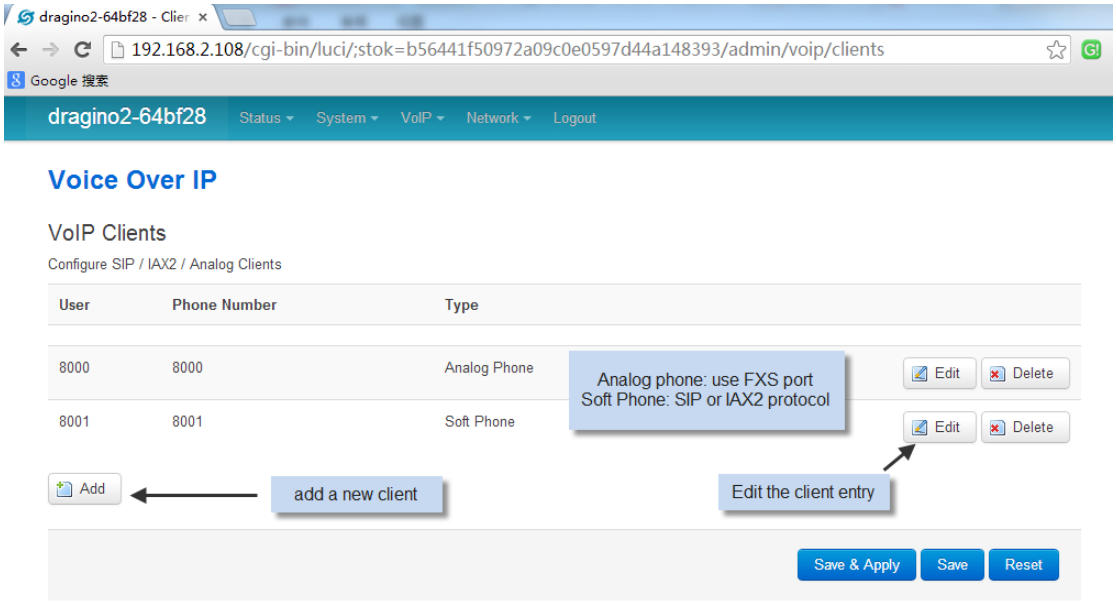


Configure each SIP/IAX2 service entry.

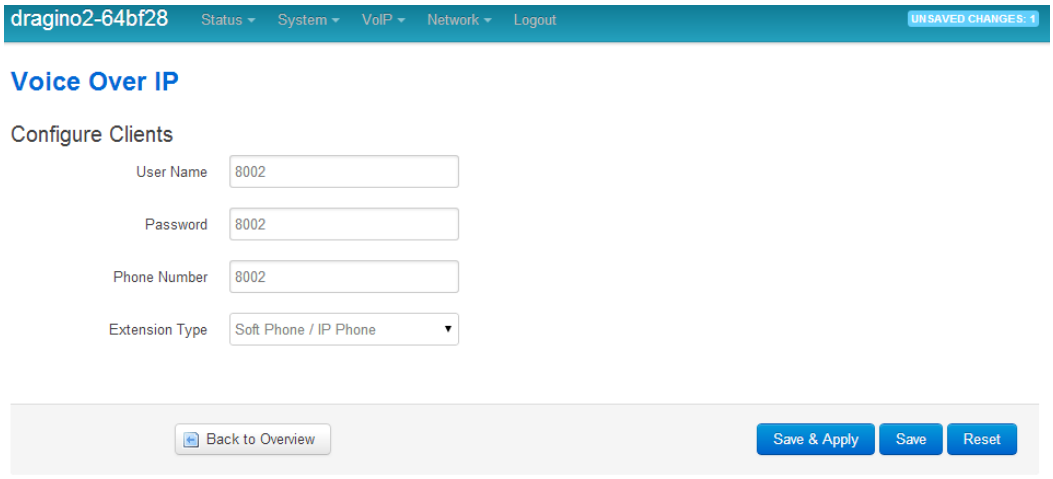


4.4 VoIP Clients

DT01 can act as a SIP/IAX2 server. This page defines the clients' info.

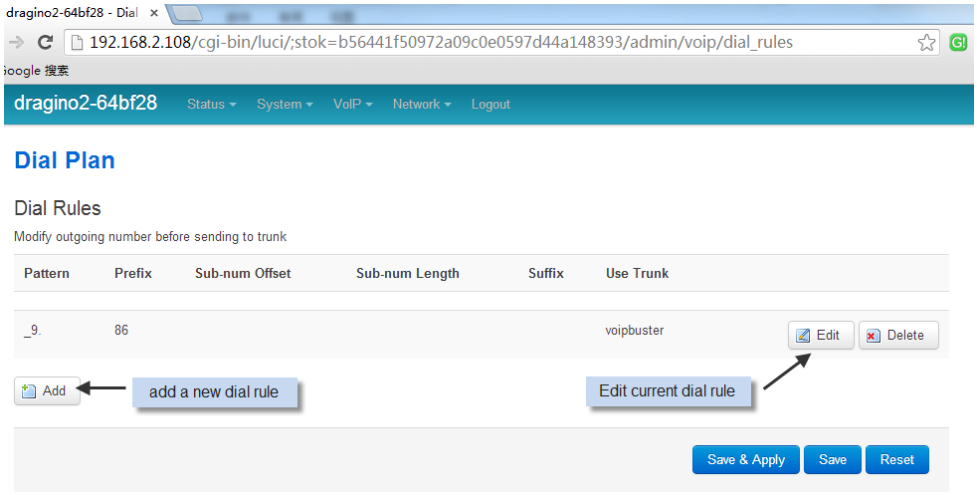


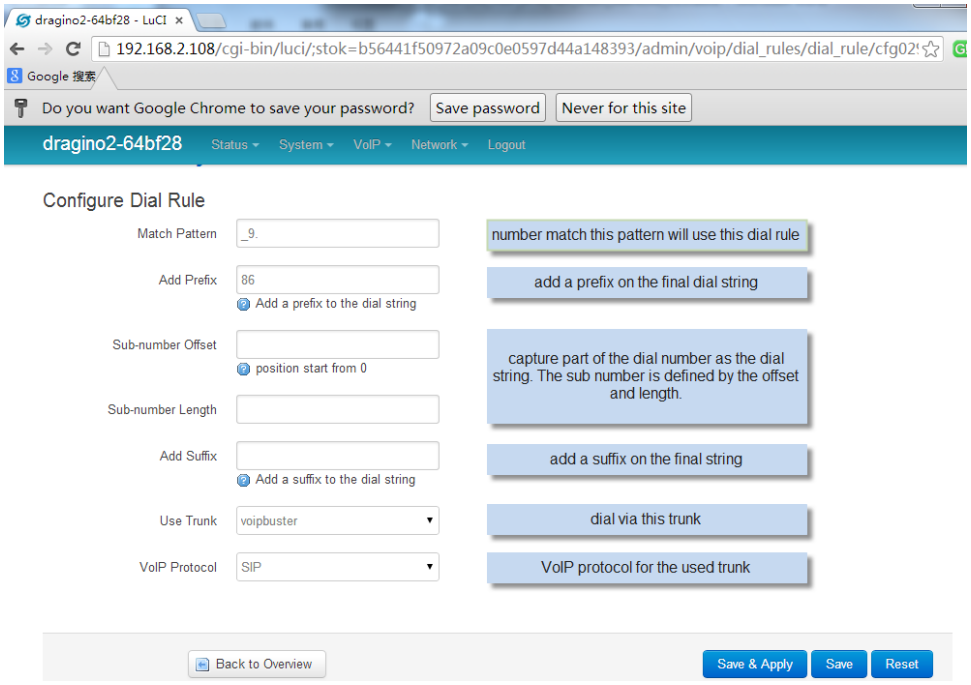
Client Entry:



4.5 Dial Plan

Here configure how to make calls via the service provide.





Definition of dial rule entry:

- **Match Pattern:** Define what number will use this dial rule. Same the extension pattern defined in Asterisk, it can be a complete number or a pattern.

  If extension name starts with '_', it is consider as pattern.

  When use the pattern, some characters have special meaning:

  - **X** - any digit from 0-9
  - **Z** - any digit from 1-9
  - **N** - any digit from 2-9
  - **[12679]** - any digit in the brakets (in the example: 1,2,6,7,9)
  - **.** - (dot) wildcard, matches everything remaining

(_1234. - matches anything starting with 1234 excluding 1234 itself).

Note: Do not use '_.', because it will match everything even the predefined extensions!!!

Example:

_359ZXXXXXX - This will match all dialed numbers that start with 359, and are 10 digits long(including 359)

_0XXX. - This will match all dialed numbers that begin with 0 and are minimum 5 digits long (including 0)

- **Sub Number Offset, Sub Number Length**

  These two setting is used to get a sub-number from the dialed number and use this sub-number as the number dial to the VoIP provider.

  The **offset** tells the position to get the sub-number and the **length** tells the length of this sub-number. If **Length** is blank, the sub-number will be the number from the offset to the end of dialed number.

  Example:

  If the dialed number is 9123456, while:

  Offset is 0, length is 4. → the real outgoing number 9123

  Offset is 1, length is blank → the real outgoing number is 123456

- **Add Prefix, Suffix**

  Add prefix or suffix to the real outgoing number.

- **Use trunk**

  Select the VoIP service provider to send the outgoing call.

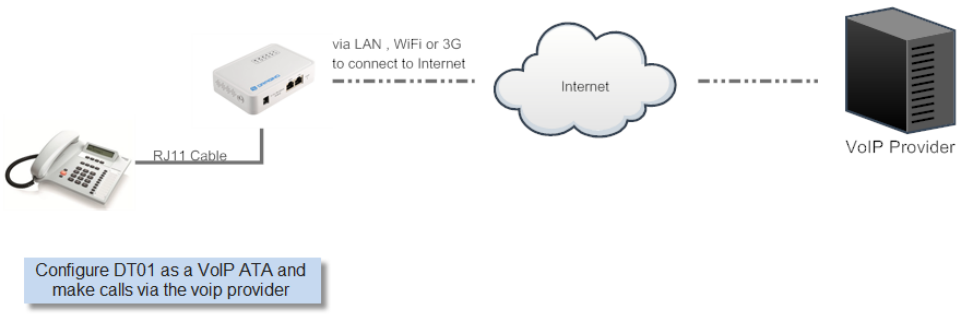
- **VoIP Protocol**

  The dial out voip protocol , SIP or IAX2.

5 VoIP Set up example:

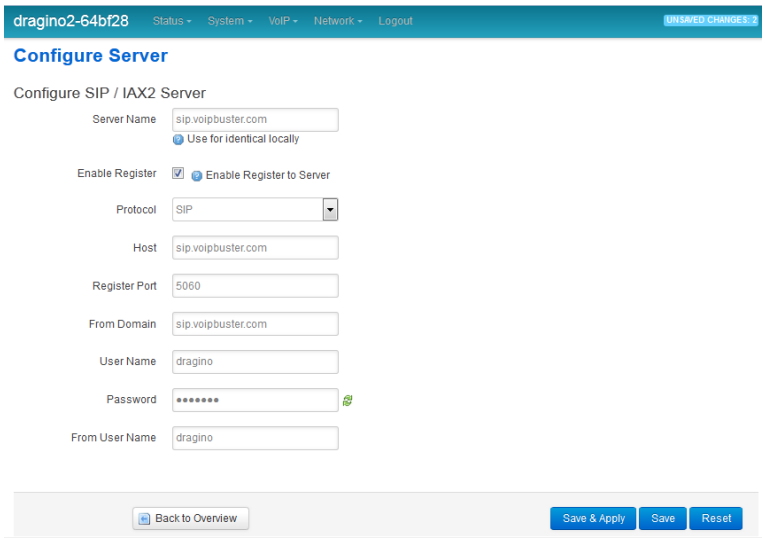
5.1 Configure as SIP ATA

This is the most normal configuration for DT01, the structure is as below:

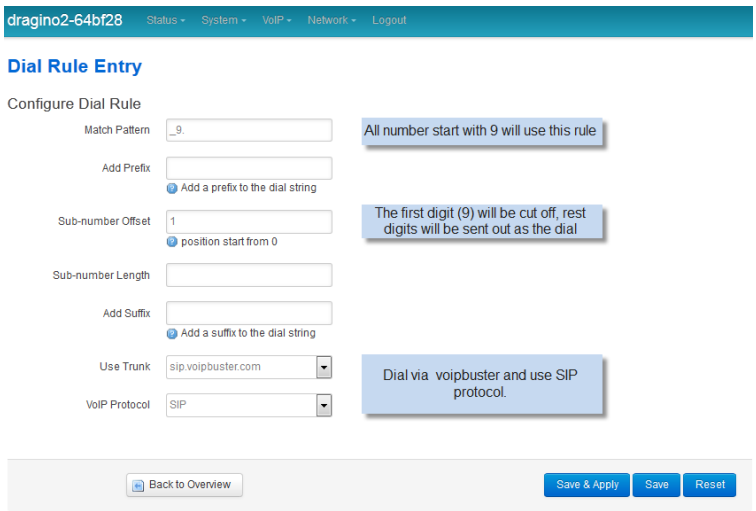


Below is the configure example for Voipbuster service:

Step 1: Input Service Provider info



Step 2: Configure Dial Plan

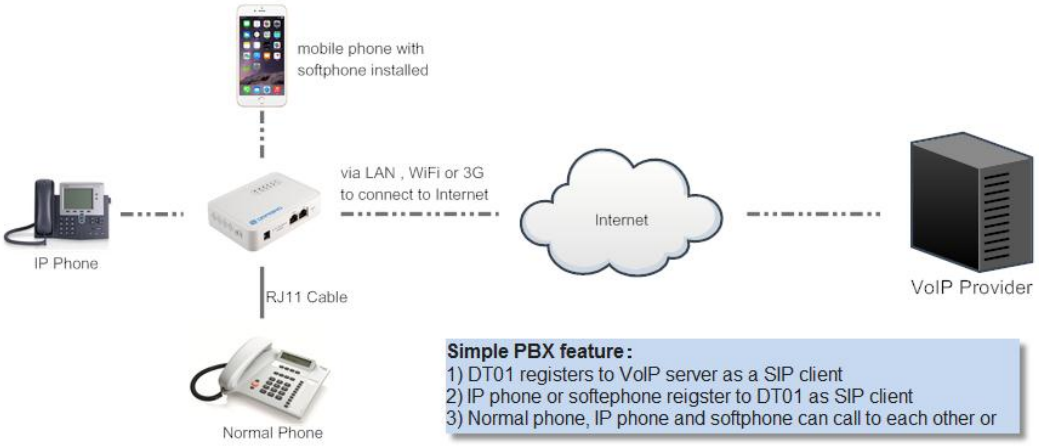


After above configure, user will be able to use the normal phone to dial out via VoIP Buster.

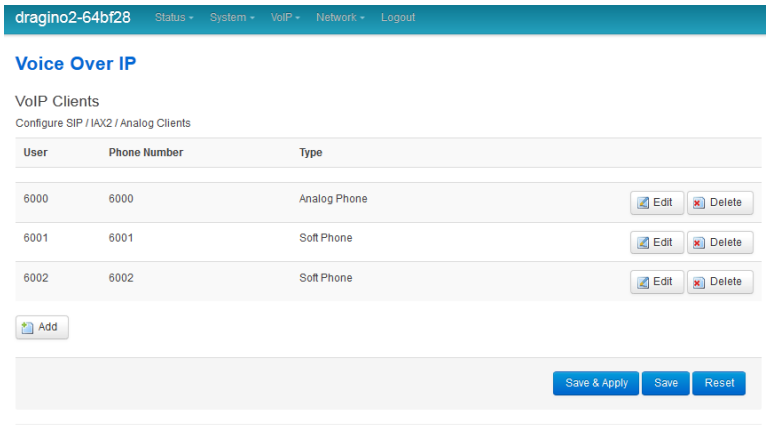
5.2 Configure as SIP server

In this application, DT01 connect to SIP provider like section 5.1. Besides that, DT01 also acts as a SIP server. So softphones or IP phones can register to DT01 and make outbound calls via DT01's trunks.

Structure is as below:

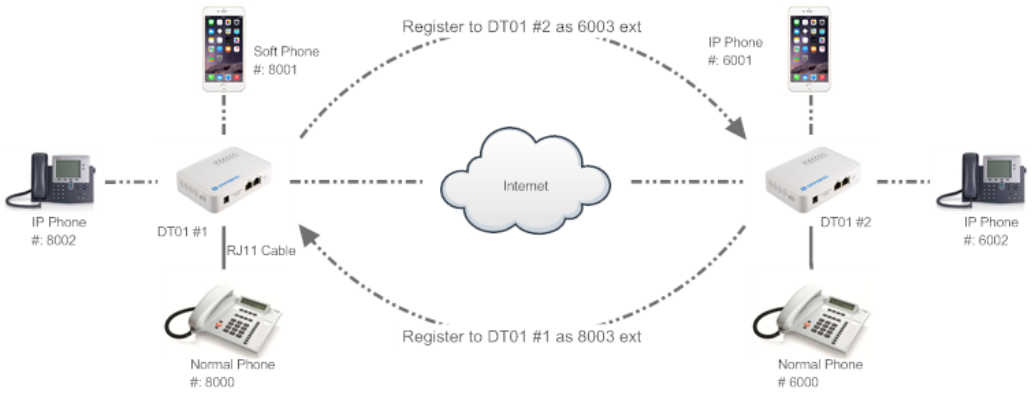


User can add clients via the VoIP → Clients page. VoIP client uses the type soft phone while create.



5.3 Link two DT01s via IAX2 protocol.

Two DT01 can link to each other so extension behind them looks like in the same office and calls between all extensions are free.



Two DT01 are in different locations. They register to each other as an extension and able to call to extension in the other DT01.

Set up example:

Step 1:

- Create a softphone client 8003 in DT01 #1,
- create a softphone client 6003 in DT01 #2

Step 2: In DT01 #1:

- In VoIP → Servers, set up an IAX2 account to register to **DT01 #2's** account 6003.
- In VoIP → Dial Plan, create a dial rule with below info:
  - Match Pattern: _6.
  - Use Trunk: Select DT01 #2 trunk
  - Protocl: IAX2

Step 3: In DT01 #2:

- In VoIP → Servers, set up an IAX2 account to register to **DT01 #1's** account 8003.
- In VoIP → Dial Plan, create a dial rule with below info:
  - Match Pattern: _8.
  - Use Trunk: Select DT01 #1 trunk
  - Protocl: IAX2

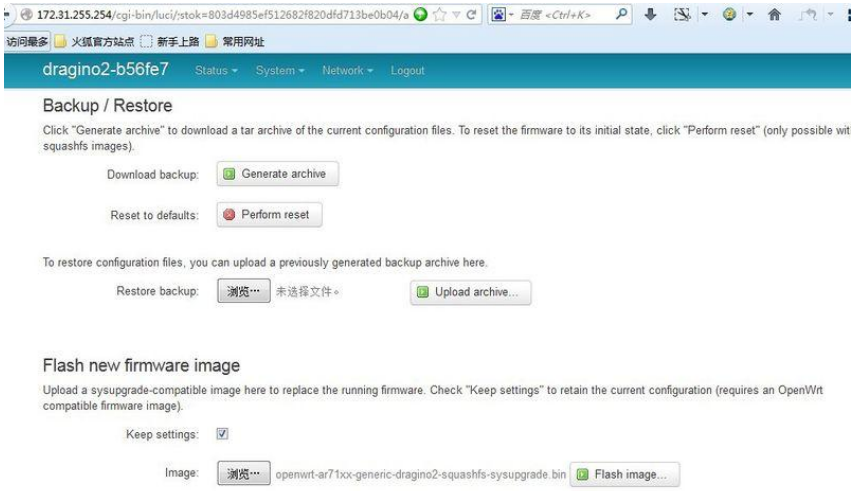
After above configure, all the extensions in DT01 #1 (8xxx) is able to reach the DT01 #2 extensions (6xxx) by simple dial the number 6xxx. Inverse for 6xxx to call to 8xxx.

6 Upgrade Firmware

User can upgrade the firmware of DT01 for new features or bugs fix. Below are the method to upgrade via Web UI, there are more other upgrade methods can refer: Upgrade DT01 firmware

Upgrade via Web UI:

Goto Web UI → System → Flash Firmware: Choose the xxx--squashfs-sysupgrade.bin image and process update:



7 FAQ

7.1 How to get long distance WiFi range?

The DT01 are equipped with chip antenna by default this antenna is mainly for indoor use and have a range 20~50 meters depends on the real environment. It is possible to change the DT01 to use a high gain (15dB etc) external antenna to reach a long distance range in WiFi.

The change can be done via the instruction from this link:
Change the resistor to use external antenna.

7.2 How to reset DT01 to factory default?

User can go to the configure page: system→ flash firmware to reset the device to factory default.

7.3 How to recover DT01 if firmware crash?

In case the device is power off during a firmware upgrade which causes it can't boot or access. User is still able to recover the device by the web failsafe mode, by below procedures:

Recover Procedure:

- Use a RJ45 cable to connect the PC to DT01's Ethernet port directly.
- Set the PC to ip 192.168.255.x, netmask 255.255.255.0
- Pressing the toggle button and power on the DT01
- All LEDs of the DT01 will start blink, release the toggle button after four blinking.
- Then all LEDs will blink very fast, this means device detect a network connection and DT01 is in the web-failsafe mode. Your PC should be able to ping 192.168.255.1 after device enter this mode.
- Open 192.168.255.1 in web browser.
- Select a **squashfs-sysupgrade** type firmware and update firmware.

8 Reference

- DT01 firmware link:
  http://www.dragino.com/downloads/downloads/DT01/Firmware/

- MS14 (mother board for DT01) Official wiki
  http://wiki.dragino.com/index.php?title=IoT_Mesh_Firmware_User_Manual

- OpenWrt official website:
  http://www.openwrt.org/

- Asterisk official site
  http://www.asterisk.org/

- Things about Asterisk.
  http://www.voip-info.org/wiki/view/Asterisk