Project Master WIC

New OpenWrt Web interface

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1. Introduction

OpenWrt already has a web configuration interface, LuCI, but this is intended for advanced users. For beginning users, LuCI is difficult to use, and not very intuitive. A recent project called "OUI" offers an alternative interface that improves usability, but which retains certain shortcomings of LuCI. Another similar project, JUCI, was developed a few years ago but is no longer maintained.

The goal of the project is to design and create an intuitive web interface to configure a personal router type "Wifi Internet Box" and see the activity of this router, which focuses on non-expert users of the router.

This interface won't cover all the functionalities that LuCI has, but a few basic functionalities that meet the usual needs of beginning users. On the other hand, this interface will be added to the usual web interface of LuCI as a new part, in this case, users' advanced needs will be satisfied.

2. Analysis phase

2.1. User surveys

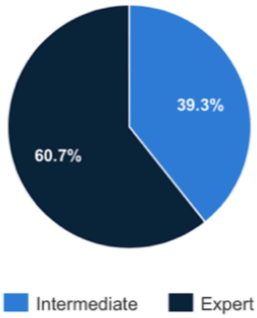
To find the most used functionalities, we surveyed the home router interface online. The participants are all Rézine[1] subscribers and other members of the FDN Federation[2].

The link to the questionnaire:
(English)
https://framaforms.org/survey-about-home-router-interface-1574189267

(French)
https://framaforms.org/questionnaire-sur-les-besoins-du-routeur-internet-1574062628

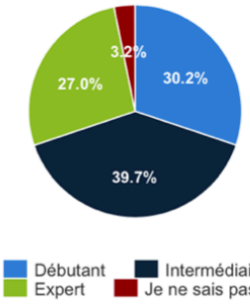
The participants of these two surveys are different, which leads to two different results. The final result of the survey is obtained by combining two studies.

User's level to configure a router



Intermediate	11
Expert	17

result of survey in English



Débutant	19
Intermédiaire	25
Expert	17
Je ne sais pas	2

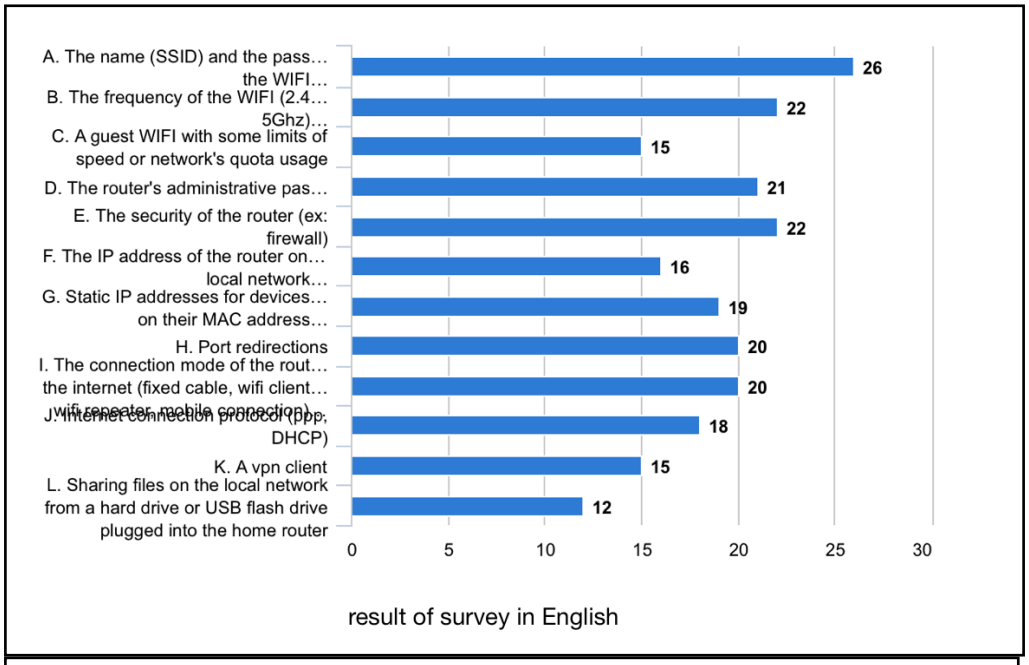
result of survey in French

[1] Rézine is a non-profit association which provides internet access and organizes workshops and discussions.

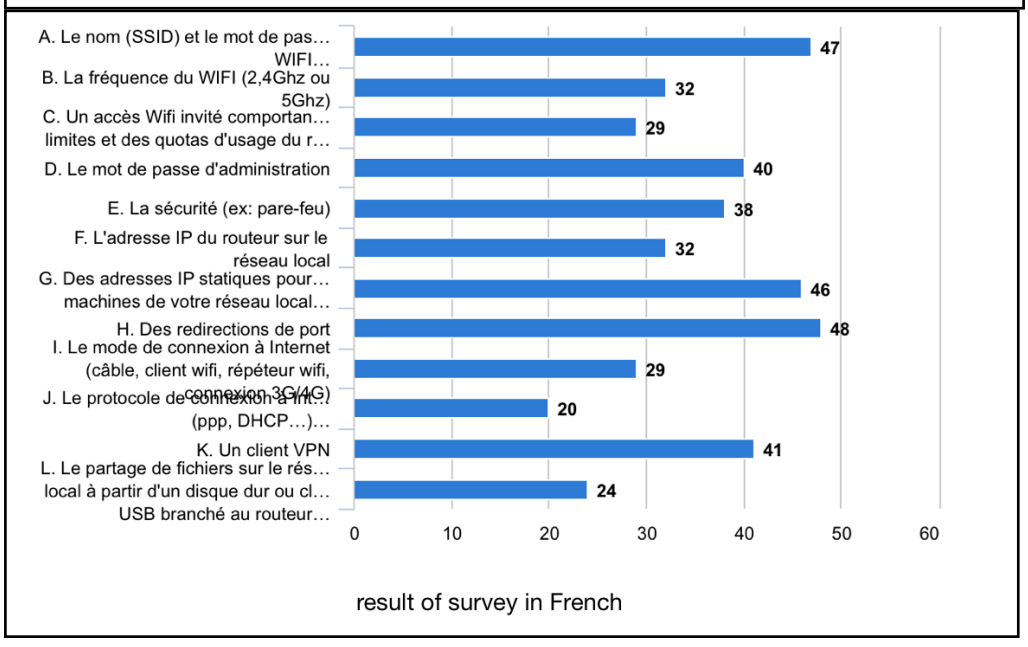
[2] FDN Federation brings together associative Internet access providers recognizing in common values: volunteering, solidarity, democratic functioning and non-profit. It provides its members with the tools to develop and respond to issues concerning the activity of access provider to the Internet.

By analyzing the final result of the questionnaire, we find that there is 24% of beginners and 32.9% of intermediary among 79 participants (56.9% of participants are non-expert). That is to say, our questionnaire is roughly targeted to non-expert users for routers.

Functionalities that users want to configure



result of survey in English



result of survey in French

Based on the result of the survey, we have chosen the first four popular functionalities for the configuration of the router:

1. The name (SSID) and the password of the WIFI (92.4%)

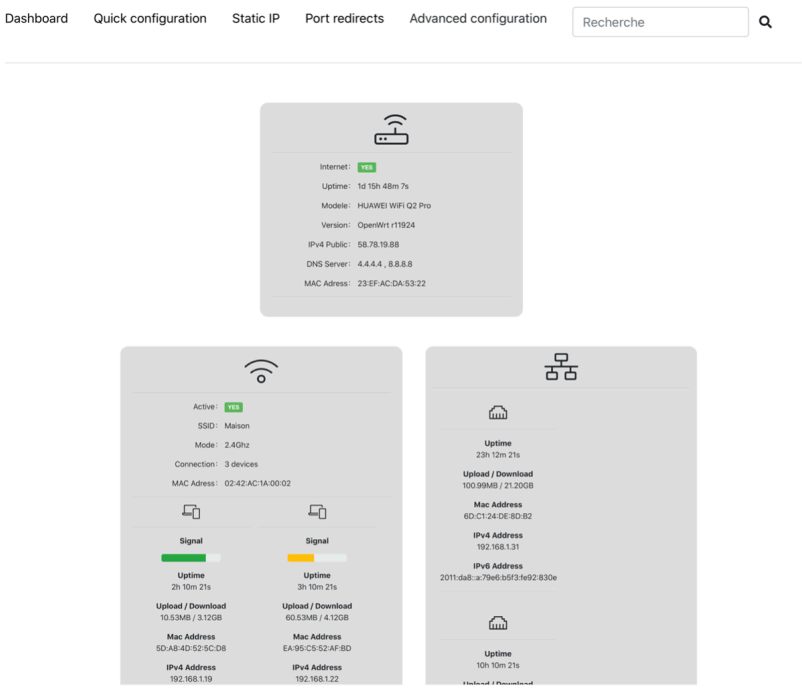
2. Port redirections (86%)
3. Static IP addresses for devices based on their MAC address (82.3%)
4. The router's administrative password (77.2%)

2.2. Mockup based on the survey

The interface is separated into four parts: Dashboard, Quick configuration, Static IP and Port forwards. Advanced configuration is a link to the usual interface of LuCI.

Dashboard:

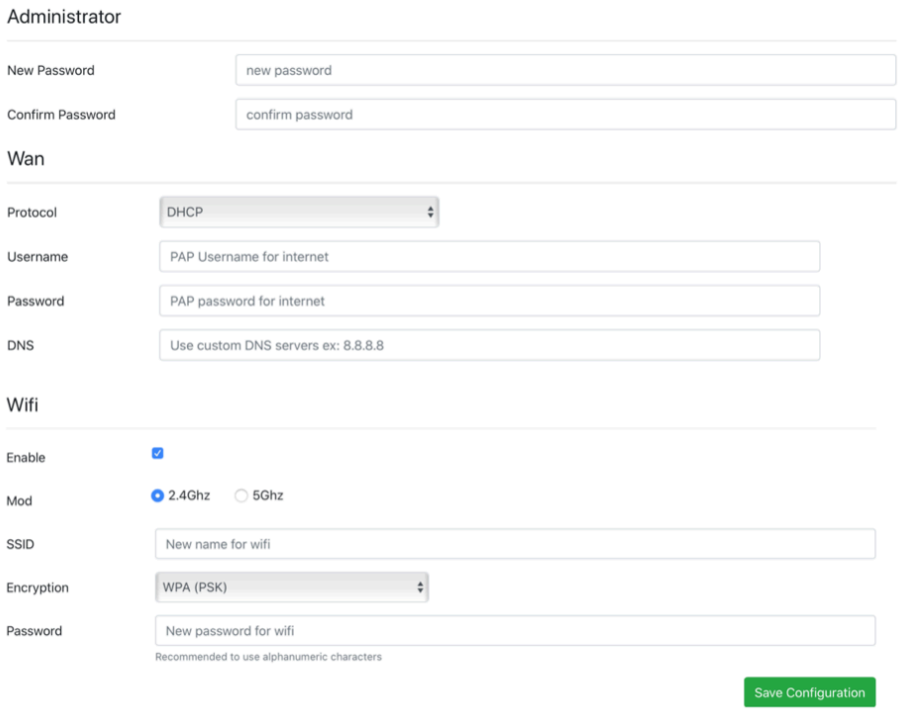
In the Dashboard, the information's presentation form is changed. We keep three main modules: router, wifi and cable, and we delete the pieces of information which are too complicated and professional for the beginning user. On the other hand, we show the information in a way more intuitive by using the icon.



Quick configuration:

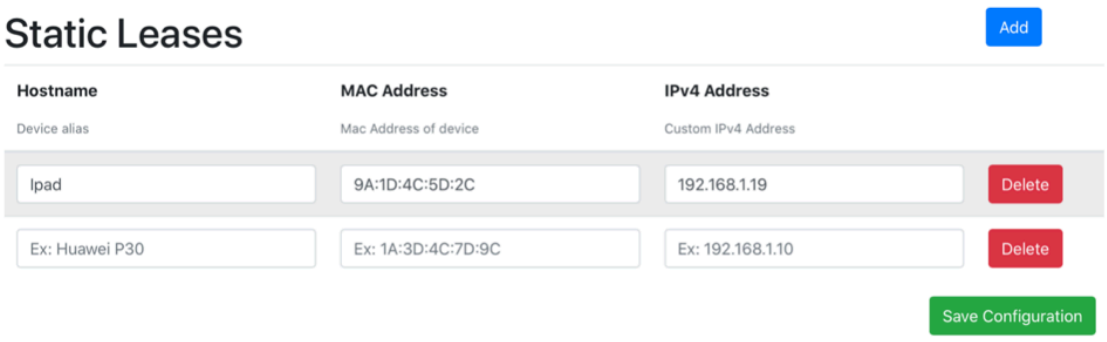
The quick configuration includes two functionalities on password which represent two modules: administrator and wifi. We add another module, Wan, to add a possibility of changing the connection type of internet cause the quick

configuration is designed to be used on the first time the router is installed. So we keep these three modules as the first step of the router's configuration.

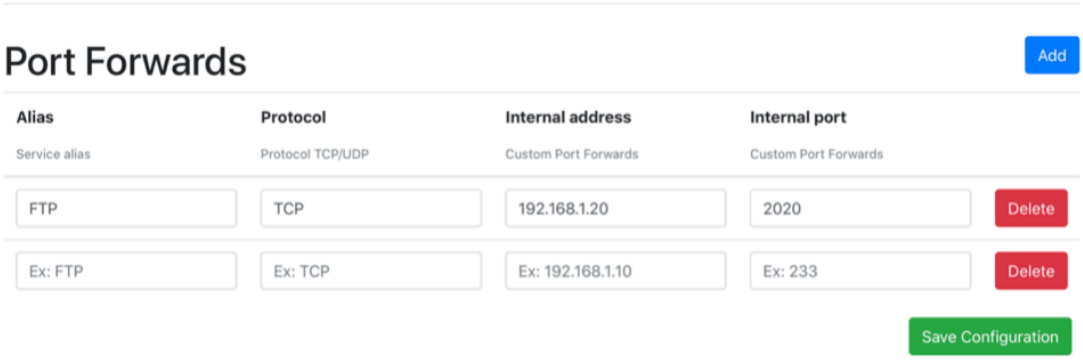


Static IP (Port forwards) is designed as a new module in the interface. The users don't have to enter a new window to create or modify a static lease (port), that means, they can manipulate on the showing page, which simplifies the use of the interface.

Static IP:



Port forwards:



2.3. Interviews

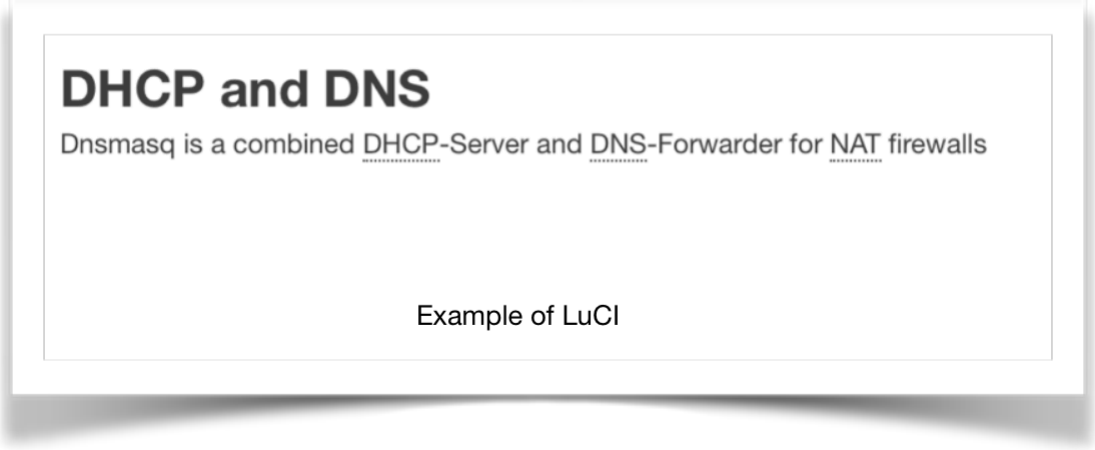
To deepen the demand analysis, we organized interviews with participants who agreed to bring their experiences and answer our questions regarding the use of LuCI.

Due to the limitation of the place and time, we were finally able to carry out three interviews with a beginner user, an intermediate user, and an expert user according to their knowledge at the routers level.

We separated the questions into five parts: the limitation of LuCI, then the functionalities, the state of the router, the quick configuration, and lastly, the mockup. First, the participants give the problems they have on OpenWrt and then give their needs on each functionality that we will develop in the next part. Finally, they look at the mockup and give their opinions.

2.3.1. Details of the difficulties linked to LuCI

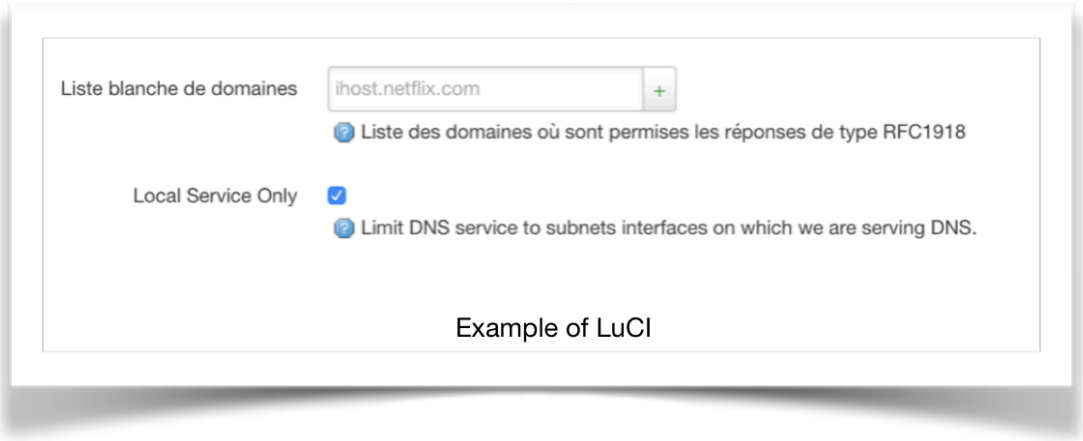
a)Lots of technical vocabulary



Solution:

1. Add an explanatory sentence for each functionality.
2. Display an explanation window for each technical word.

b)French and English mixed(The French version)



Example of LuCI

c)The menu is poorly organized.

In some cases, to perform a configuration, you have to go through several different places, which does not make the setup easy.

For exemple:

- The Firewall part and the switch part are separate even if these two parts are relative.
- DHCP and DNS are mixed while DNS is linked to Hostname.

2.3.2. Details of functionalities

We determine the purpose and the use of each functionality according to the participants' sharings. All the details are in the Wiki of LuCI.

Quick configuration: https://openwrt.org/docs/guide-user/luci/quick_setup
Static IP: https://openwrt.org/docs/guide-user/luci/static_ip
Dashboard:https://openwrt.org/docs/guide-user/luci/dashboard
Port forwards:https://openwrt.org/docs/guide-user/luci/port_forwards

2.3.3. Feedback on the mockup

a) Dashboard

1. Add Hostname for devices.
2. Reduce the space for each machine (e.g. one machine per line).
3. Bring up a small window for the explanation of a technical word.
4. Change the “cable” icon to make it clearer.

b)Menu

1. Add a FAQ item or a help page to know when and how to use functionality (the procedure to install one / more router (s)).
2. Add a lexicon item to explain the technical words.

3. Production

3.1. Division of work

The interface is separated into four parts.

WANG Biyun: Quick configuration, Static IP, Port forwards.

ZHANG Zhao: Dashboard.

3.2. Code understanding

LuCI is a grand and complex project. It is necessary to learn the structure of the code and read the documentation before coding. However, to run the project, it is also essential to place the files that we create correctly in LuCI's server.

Unfortunately, the latest version of LuCI has been modified not long ago. The articles online which help to understand the code of LuCI are not up to date.

To understand the essence, we imitated the structure we found online at first, and then, changed it into the mode of the latest version.

3.3. Coding phase

Even if all the functionalities already exist, our job is not just put the code corresponding together in a new page. Cause these codes have already fused with their logic in the original script.

We started by copying the simplest existing code, with the help of documentation, we modified the modules to what we want to create, finally, filled the content corresponding.

It took probably two weeks to finish the first part (Quick configuration/ Dashboard), for the remaining part, which is more simple than the first part, two days is enough, cause we knew well how to code after two week's study.

3.4. Merging phase

After coding, we send a pull request in Github to demand the developer group of LuCI to merge our code.

The developer will verify our code and send the feedback to us.

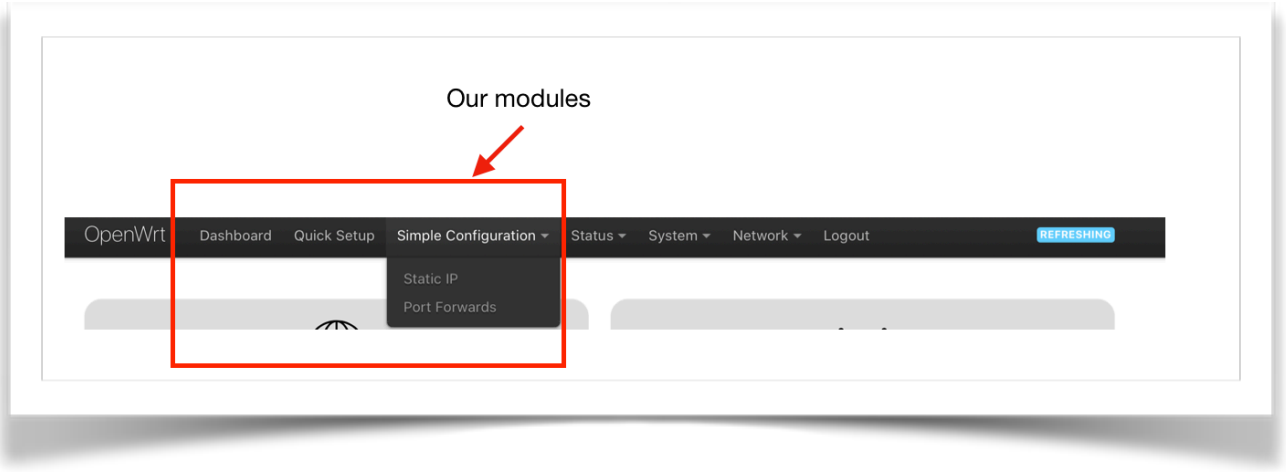
The liens of pulling request:
Quick Setup:https://github.com/openwrt/luci/pull/4141
Dashboard:https://github.com/openwrt/luci/pull/4185
Simple configuration(Static IP and Port forwards):https://github.com/openwrt/luci/pull/4186

4. Result

During the coding phase, we understand LuCI more deeply. Based on this, the mockup on the beginning was improved.

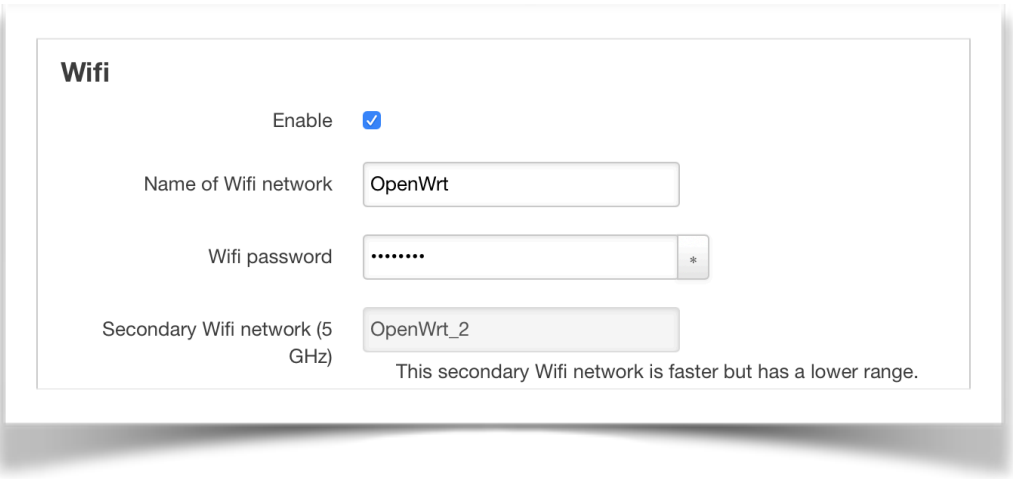
Menu

We abandon the module “Advanced Configuration”, and determine to add our new interface on the usual interface of LuCI. In addition, we combine module Static IP and Port Forwards as a new module “Simple Configuration”.



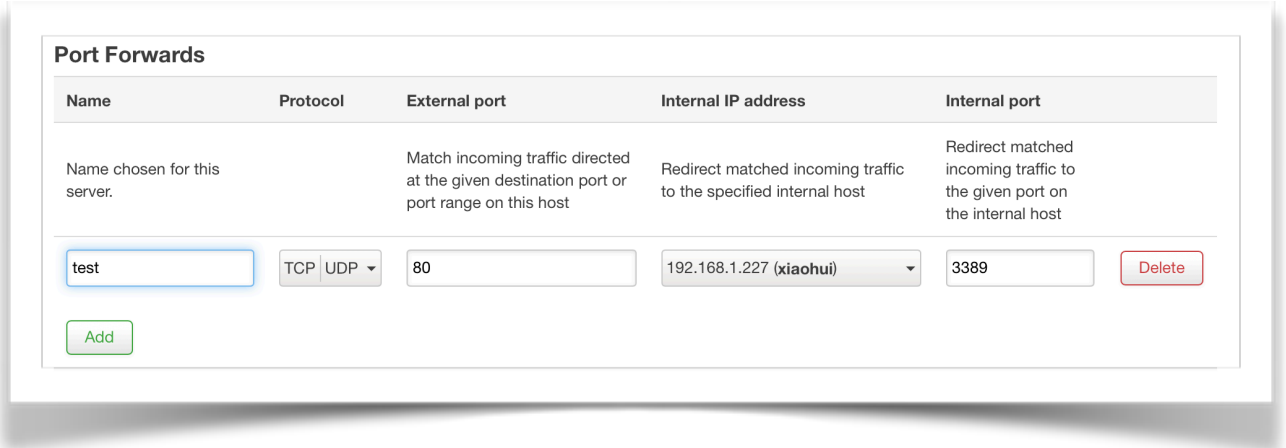
Quick Setup —Wifi

We provide two wifis at the same time, one with a frequency of 2.4GHz, and another with 5GHz. They share the same password. When the user modifies the ID of the wifi with 2.4GHz, the ID of the wifi with 5GHz will be modified automatically with a suffix "_2".



Port Forwards

We add external port to complete this function.



Dashboard

According to the return of the mockup, we modified the mockup of Dashboard. In addition, We have changed the icons and add name for each part to help understanding.