

Poster: Dandelion: Design of Online Large Scale LoRa Testbed

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Abstract

This paper presents Dandelion¹, a large-scale online LoRa testbed. Dandelion is an online platform, including large-scale LoRa nodes, gateways, central controller and web interfaces. It is designed to reduce the costs of deployment, maintenance and evaluation of LoRa network. Dandelion helps researchers to do experiment and collect data by providing online interface. Currently, there are 50 nodes in Dandelion, running for about 1 year to support LoRa network research.

1 Introduction

The Internet of Things is changing the lifestyle and having a significant impact. Long Range communication (LoRa) is supposed to be an important communication for Internet of things. It has attracted more and more research interest recently. However, experiments on LoRa is very difficult considering its large communication range and high cost in deployment. In this paper, we build Dandelion, a large-scale online LoRa testbed.

Dandelion provides easy to use interface to support online programming on the web. Users can program LoRa nodes and gateway, collect data from the network and send control information to the system. Overall, Dandelion provides a online platform to LoRa network for researchers.

2 System Design

2.1 Hardware

The Dandelion platform follows a three layer architecture consisting of node layer, gateway layer and cloud server layer. In the node layer, for the power supply and network communication, we use Raspberry Pi connected with the nodes. For the indoor Raspberry Pi, we use USB-hub power supply on an iron shelf, as shown in the figure 1. For

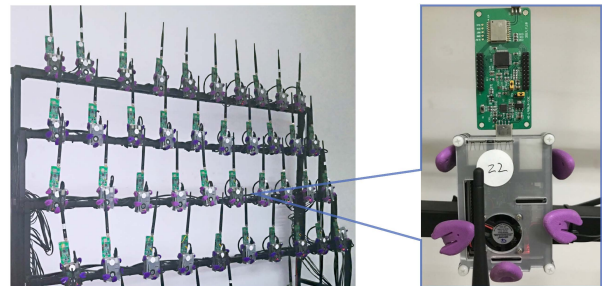


Figure 1. Indoor testbed and Raspberry Pi with nodes

the outdoor Raspberry Pi, we purchase a large number of power bank with solar energy. The gateway layer forward the packet from node to cloud server. We deploy the nodes with Sx1276 in different apartments and buildings, and the gateways with Sx1301 are deployed in the top of several high buildings. To maximum the coverage area, each gateway is installed with 5dbi antenna. As the nodes have solar energy, we can depoly nodes at anywhere user want.

2.2 Software

We use socket to connect Raspberry Pi. All of the Raspberry Pi are connected to a central server to schedule. Web server uses another socket connected to the central server, while provding web interface to the user. User could send command to the web server and web server would forward the command to the central server. Finally, central server would send the command to the Raspberry Pi. All of the pakcets were sent by socket.

We use tomcat and mysql as the web server. It contains the user management, job schedule, remote control and testbed infomation. User management is the foundation of the systemn. In job schedule, the using of system is called jobs. Dandelion divides the time as 24 segment corresponding to 24 hours. User must reserve system before their use. In remote control, user could control testbed online. In in-fomation part, dandelion returns the real time infomation to user.

3 Using Method

Dandelion is running at <http://thulpwan.net>. Vistor can register an account after confirmation. After logging in to the system with an account, user could look the system overview. To using the testbed, user should make an appointment in

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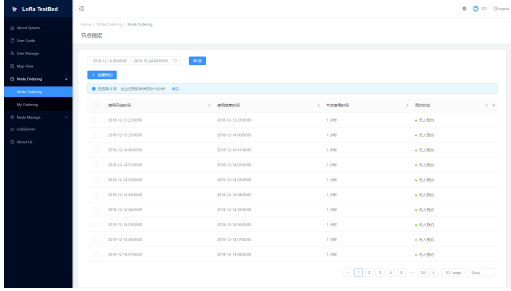


Figure 2. Web interface

system. In the time of reservation, user can control the whole testbed.

Firstly, as the basic function of LoRa testbed, user can start, stop and restart the node, programming the node remotely. User could see the running output on the web page, or download the data for all nodes. Secondly, user may also control the gateway to change the LoRa frequency to get the

radio. Finally, in the loraserver, user could see the Rssi, SF, payload in the package.

4 Conclusion

In this poster we introduce Dandelion, a LoRa experimentation testbed, in a large-scale and realistic environment. The testbed is based on LoRa network, composed of loraserver and web-interface. In the future, we will improve user experience, implement more types of hardware. We will open up the testbed for the outside user. To fit the development of Internet of Things, we will design multi-technology in our testbed.

5 References

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