



LoRa GateWay

RG915A11A

Version: V1.0

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1、 Overview

DAPU's RG915A11A is an outdoor type gateway based on LoRaWAN protocol. It's a bridge to connect the low-power terminals with the Internet. The communication frequency varies in different region and area, the frequency of RG915A11A is 902MHz-928MHz.

The gateway is equipped with SX1301 as the main concentrator chip, which can provide 8-channel parallel uplink and 1 channel downlink to communication. The main control chip adopts low-power-consumption and high-reliability Cortex-A7 kernel processor, to provide efficient and reliable operation environment for the communication.

The gateway supports the star topology; terminal device sends the data to the gateway by RF signal, the gateway upload the data to the server by 4G or Ethernet. This way can make communication area more wide, which can greatly reduce the usage numbers of repeaters, making the solution cost lower and the deployment more easier.

2、 Feature and Parameters

- LoRaWAN protocol, support ClassA 、 ClassC
- SX1301 support 8-channel parallel uplink and 1 channel downlink
- Low-power-consumption and high-reliability Cortex-A7 kernel processor
- Support frequency 902MHz~928MHz
- Stable Linux operation system
- Support Ethernet and 4G links
- Protection level:IP65

Description		Parameters	Unit	Remark
		Typ.		
Output Frequency		902~928	MHz	
Supply Voltage		18~75	V	
Tx Power		20	dBm	
Power	Start Current	35	mA	@48V
Feature	Working Current	75	mA	@48V

3、 Hardware introduction

3.1 Hardware composition

The gateway is made up of the main module, POE power, network cable, LoRa antenna(915MHZ), LoRa antenna extension wire, 4G antenna, installation fittings etc. Refer to the figure 3-1 as below:



Figure 3-1: Gateway

3.2 Gateway interface

The gateway has three interfaces:

LoRa antenna interface: this interface can directly connect to LoRa antenna, or the antenna extension cord.

4G antenna interface: RG915A11A has 4G communication by default, can directly connect to 4G antenna.

POE network and power interface: power supply, also used for Ethernet communication. Normally it can directly connect to 18-75V DC power supply.



White orange	1	TX+
orange	2	TX-
White green	3	RX+
blue	4	V+
White blue	5	V+
green	6	RX-
White brown	7	V-
brown	8	V-

Note: The sequence of the interior wire of the POE network cable can't be made reversed.

4、Parameter Setting

4.1 Router Setting

The gateway default IP is 192.168.0.120, if there is need to modify the setting, must have to modify it by connecting Ethernet. So the router IP must be set as 192.168.0.1 , or else the gateway cant be visited remotely.

4.2 Gateway Setting

In windows7 system, the gateway setting can be modified by Xshell or cmd.exe; In Ubuntu, can directly use command ssh or telnet 192.168.0.120 to login in. And introduce the remote login setting in Ubuntu.

Login setting

Open terminal, then input command: ssh 192.168.0.120 ,and password: root, shown in figure 4-1.



Figure 4-1: Password Input

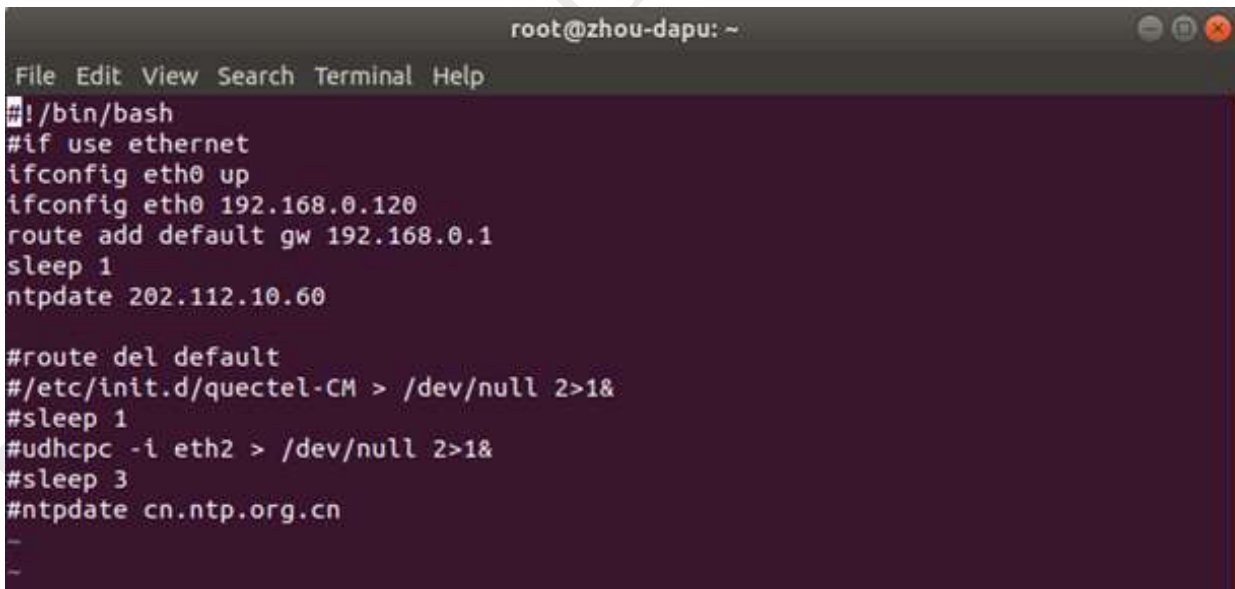
After inputting the password, it appears as the figure 4-2, then the remote login is successful.



```
root@zhou-dapu: ~  
File Edit View Search Terminal Help  
root@zhou-dapu:~# ssh 192.168.0.120  
root@192.168.0.120's password:  
  
The programs included with the Debian GNU/Linux system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/copyright.  
  
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent  
permitted by applicable law.  
Last login: Thu Jan  1 08:00:14 1970  
root@dapu-telecom:~#
```

Figure4-2: Successful Login

The gateway can be setting as Ethernet or 4G as needed. The default is Ethernet if no requirement. If it requires to modify the gateway IP address or 4G communication, input: vi /etc/init.d/ethor4g in the terminal, shown as the figure 4-3. If modify the gateway IP, make sure the gateway IP and router IP are on the same network segment. If required to communicate by 4G, have to modify as the Figure 4-4 shows, otherwise, the 4G communication will be abnormal. At same time, must modify the rc.local, input vi /etc/rc.local in the terminal. After inputting, it shows as in the Figure 4-5. Modify the content in the figure 4-5 to as shown in figure 4-6.



```
root@zhou-dapu: ~  
File Edit View Search Terminal Help  
#!/bin/bash  
#if use ethernet  
ifconfig eth0 up  
ifconfig eth0 192.168.0.120  
route add default gw 192.168.0.1  
sleep 1  
ntpdate 202.112.10.60  
  
#route del default  
#/etc/init.d/quectel-CM > /dev/null 2>1&  
#sleep 1  
#udhcpc -i eth2 > /dev/null 2>1&  
#sleep 3  
#ntpdate cn.ntp.org.cn  
~  
~
```

Figure4-3: Ethernet communication

```
root@zhou-dapu: ~
File Edit View Search Terminal Help
#!/bin/bash
#if use ethernet
ifconfig eth0 up
ifconfig eth0 192.168.0.120
#route add default gw 192.168.0.1
#sleep 1
#ntpdate 202.112.10.60

route del default
/etc/init.d/quectel-CM > /dev/null 2>1&
sleep 1
udhpcp -i eth2 > /dev/null 2>1&
sleep 3
ntpdate cn.ntp.org.cn
~
~
~
~
~
~
~
"/etc/init.d/ethor4g" 14 lines, 272 characters
```

Figure 4-4: 4G communication

```
root@zhou-dapu: ~
File Edit View Search Terminal Help
#!/bin/sh -e
#
# rc.local
#
# This script is executed at the end of each multiuser runlevel.
# Make sure that the script will "exit 0" on success or any other
# value on error.
#
# In order to enable or disable this script just change the execution
# bits.
#
# By default this script does nothing.

if [ -f "/usr/local/src/openssh-server_7.4p1-10+deb9u1_armhf.deb" ]; then
    dpkg -i /usr/local/src/openssh-server_7.4p1-10+deb9u1_armhf.deb
    rm -rf /usr/local/src/openssh-server_7.4p1-10+deb9u1_armhf.deb
fi

/etc/init.d/ethor4g &
/etc/init.d/gw-ethernet &
#/etc/init.d/gw-4g &

exit 0
```

Figure4-5: Ethernet choice

```
root@zhou-dapu: ~
File Edit View Search Terminal Help
#!/bin/sh -e
#
# rc.local
#
# This script is executed at the end of each multiuser runlevel.
# Make sure that the script will "exit 0" on success or any other
# value on error.
#
# In order to enable or disable this script just change the execution
# bits.
#
# By default this script does nothing.

if [ -f "/usr/local/src/openssh-server_7.4p1-10+deb9u1_armhf.deb" ]; then
    dpkg -i /usr/local/src/openssh-server_7.4p1-10+deb9u1_armhf.deb
    rm -rf /usr/local/src/openssh-server_7.4p1-10+deb9u1_armhf.deb
fi

/etc/init.d/ethor4g &
#/etc/init.d/gw-ethernet &
/etc/init.d/gw-4g &

exit 0
```

Figure4-6: 4G choice

Server IP, Gateway ID and Port Setting

When the gateway is powered on, it can start relatively program automatically, and directly connect to DAPU's LoRaTM server cloud platform. The command to modify the server IP and gateway ID is [vi /home/global_conf.json](#) . The setting document is shown as in figure 4-7.

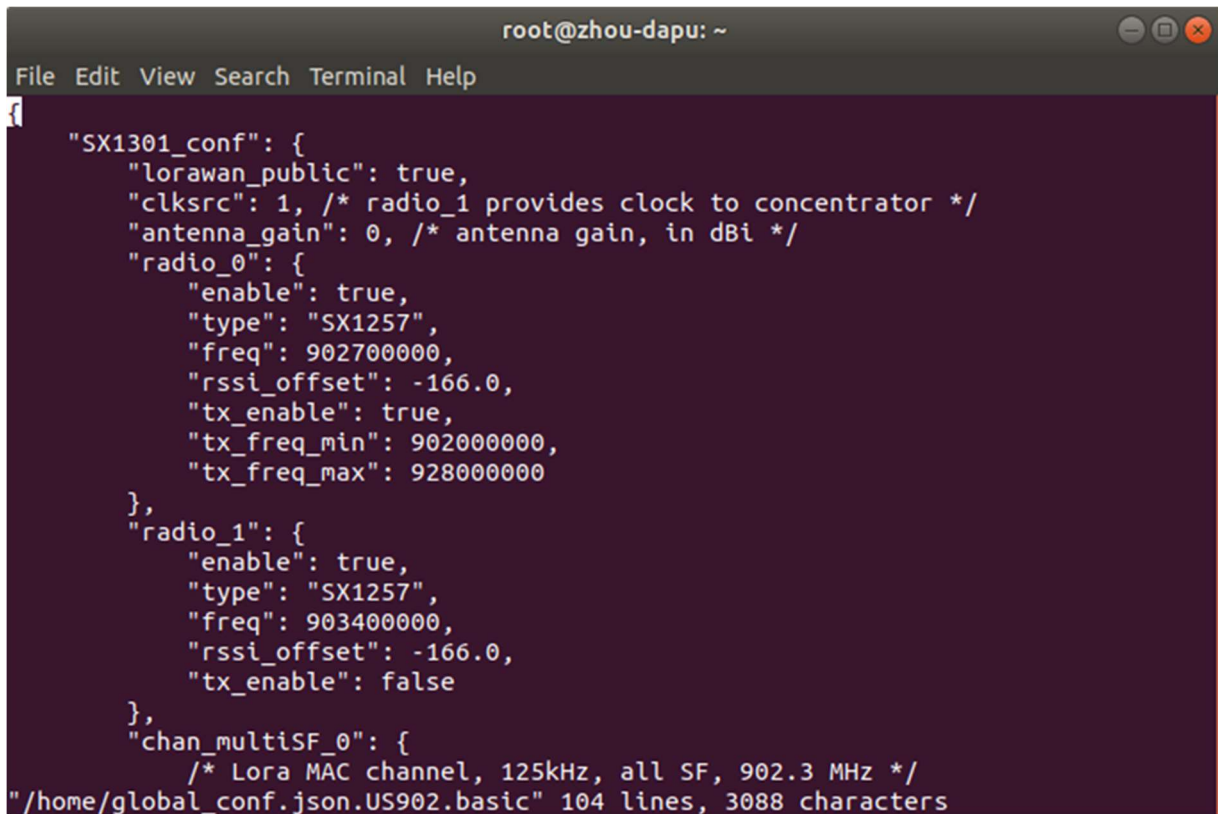
```
root@zhou-dapu: ~
File Edit View Search Terminal Help
},
"gateway_conf": {
  "gateway_ID": "DA03000018010200",
  /* change with default server address/ports, or overwrite in local_conf.
json */

  "server_address": "61.145.190.213",
  "serv_port_up": 1780,
  "serv_port_down": 1780,
  /* adjust the following parameters for your network */
  "keepalive_interval": 10,
  "stat_interval": 30,
  "push_timeout_ms": 100,
  /* forward only valid packets */
  "forward_crc_valid": true,
  "forward_crc_error": false,
  "forward_crc_disabled": false
}
}
```

Figure4-7: server configuration

Modify the setting of the server, move the cursor to the end of the file. The “gateway_ID” is the gateway ID, that is the two-dimension code on the enclosure; “Server address” is the server IP, the default server IP is “61.145.190.213”; Port number is 1780, save it after the modification, it will be effective after restart the gateway.

If need to modify the communication frequency, at the start of the file, refer to the figure 4-8. Modify 902700000 and 903400000 to the frequency what you want. The 8 channels can be adjusted according to the need.



```

root@zhou-dapu: ~
File Edit View Search Terminal Help
{
  "SX1301_conf": {
    "lorawan_public": true,
    "clksrc": 1, /* radio_1 provides clock to concentrator */
    "antenna_gain": 0, /* antenna gain, in dBi */
    "radio_0": {
      "enable": true,
      "type": "SX1257",
      "freq": 902700000,
      "rssi_offset": -166.0,
      "tx_enable": true,
      "tx_freq_min": 902000000,
      "tx_freq_max": 928000000
    },
    "radio_1": {
      "enable": true,
      "type": "SX1257",
      "freq": 903400000,
      "rssi_offset": -166.0,
      "tx_enable": false
    },
    "chan_multiSF_0": {
      /* Lora MAC channel, 125kHz, all SF, 902.3 MHz */
    }
  }
}
/home/global_conf.json.US902.basic" 104 lines, 3088 characters

```

Figure 4-8: LoRa communication frequency setting

5、 Gateway installation notice

Figure 5-1: Holding rod fittingsThe gateway holding rod fittings is shown as the figure 5-1:



Figure 5-1: Holding rod fittings

Refer to the installation diagram as the figure 5-2:



Figure 5-2: Gateway Installation diagram

5.1 Note

Don't connect to the power supply when installing the gateway until complete the installation.

Tighten all the screws to guarantee the leakproofness before the installation of the gateway.

Handle it gently in the process of installation, preventing from the crash and drop.

Fiber-glass antenna shall be perpendicular to the ground as much as possible.

The placement of the fiber-glass antenna shall be as far as possible to the obstacles.

The placement altitude of the fiber-glass antenna shall be as high as possible.