YL-800N

Spread spectrum communication Mesh self-organizing network module YL-800N specification

YL-800N                                   YL-800NS

## table of Contents

Shenzhen Nanshan Science and Technology Park West Industrial Zone 23 South 6002 Shenzhen Jiexun Yilian Technology Co., Ltd. 0755-26031631
www.rf-module.cn

YL-800N

First, the module introduction

YL-800N is a distributed MESH network wireless ad hoc network module, working in the 433M free frequency band (other Band customization), using the latest spread spectrum frequency hopping technology, internal automatic spread spectrum calculation and preamble CRC deal with. Standard transmit power is up to 100mW (20dBm), and the emission current is instantaneously <120mA, receiving current For <18mA, the operating voltage range is 3.3v~5v; the module's RF chip is based on spread-spectrum frequency hopping technology and is stable. Sex, anti-jamming capability and receiving sensitivity are beyond the existing GFSK modules.

MESH is a distributed peer-to-peer mesh network that can make full use of routing redundancy in the network. Different network self-healing, stability and excellent data throughput, the networking time is very short, all devices Electricity is working, supporting 7-level routing, and the network coverage is more than 7 kilometers. The physical layer uses a lot of Advanced wireless communication technologies such as frequency hopping, adaptive rate, secure and reliable network-wide self-organizing network tec Error coding, etc.; the link layer uses an intelligent collision avoidance algorithm with excellent anti-interference ability.

Second, the module features

➢ Medium power transmission, maximum 100mW (20dBm), adjustable;

➢ LoRa spread spectrum technology, TTL interface half-duplex communication, air receive/transmit conversion;

➢ Built-in MESH distributed ad hoc network protocol, each communication has multiple handshake confirmation to ensure data stability;

➢ Working frequency band: 433MHz application frequency band;

➢ The receiving sensitivity is at least -148dBm, and the open space is 1500-2500 meters;

➢ The transmitting working current is less than 100mA; the standby working current is 18mA;

➢ The communication frequency is set arbitrarily, 8 auxiliary channels, automatic frequency hopping, effectively avoiding interference;

➢ Communication protocol conversion and RF transceiver switching are automatically completed, users do not need to intervene, easy to use;

➢ Communication speed 1.2kbps -115.2kbps, users can configure through software;

➢ Production free debugging, wide voltage range operation: 3.3V-5V, industrial grade application;

Third, technical parameters

| parameter | Minimum value | | | unit |
|---|---|---|---|---|
| Operating Voltage | 3.3 | 5 | 5 | V |
| Operating temperature | -40 | 25 | 85 | °C |
| Carrier frequency | 410 | 433 | 480 | MHz |
| Output Power | 0 | | 20 | dBm |
| Receiving sensitivity | | -132 | -148 | dBm |
| Emission current | | | 100 | mA |
| stand-by current | | 18 | 20 | mA |
| Modulation rate | 2.4 | 9.6 | 115.2 | Kbps |
| Transceiver forwarding time | 300 | | | mS |

YL-800N

Fourth, the size structure

YL-800N size structure

Size structure PCB file download: http://www.rf-module.cn/updow/2016227113426415.rar

YL-800NS size structure diagram

PCB package drawing http://www.rf-module.cn/updow/YL-800S_Package_diagram.rar

YL-800N

Five, pin definition

| Serial number | name | Pin function |
|---|---|---|
| 1 | GND | Power ground (shared with user equipment) |
| 2 | VCC | 3.3~5V |
| 3 | EN | No connection required |
| 4 | RXD | UART input, 3.3TTL |
| 5 | TXD | UART output, 3.3TTL |
| 6 | ACT | No connection required |
| 7 | SET | Low level parameter restore default |

Sixth, parameter configuration software

Download address: http://www.rf-module.cn/updow/201656103052876.rar

Shenzhen Nanshan Science and Technology Park West Industrial Zone 23 South 6002 Shenzhen Jiexun Yilian Technology Co., Ltd. 0755-26031631
www.rf-module.cn

YL-800N

VII. **YL-800N** typical networking application

A basic MESH network consists of multiple nodes (SLAVE OR NODE) modules and a concentrator

(MASTER OR ROOT) module. Two-way data communication between the SLAVE module and the MASTER module

Mutual, the message can be relayed multiple times by the SLAVE module. The data flow from MASTER to SLAVE is called the next

Line, and vice versa. The downlink data transmission mode is broadcast (all data sent by MASTER can be received.

To); the uplink data transmission mode is unicast (the data sent by SLAVE to the nearest MASTER)

The selection is done automatically. Note that if there are multiple concentrators MASTER, SLAVE will transfer data from

Uploaded to the recently communicated MASTER, other MASTER can not receive.

MESH network data transfer diagram

With the YL-800N module, it is easy to set up a minimum of 2 points to thousands of MESH networks.

MESH is a fully distributed symmetric network. In theory, only a single device type is required. But for no

The seam is compatible with the user's existing protocol, and the message format is transparently transmitted.

In many applications, the user's message is
There is no information (upstream and downstream) that includes the flow of data, which can lead to some practical problems. Therefore, MESH

The network defines two types of networking devices: nodes and concentrators.

Nodes are generally referred to as controlled devices such as meters, sensors,
Switches, etc.; concentrators generally refer to control devices such as gateways, remote controls, and the like.

In this article, using nodes and concentrators.
Replace the device name of the specific application. A MESH network can contain multiple concentrators and multiple node settings

Ready. The YL-800N module can be used as both a node device and a gateway device. Power on all networking devices

Work, no network initialization process is required, routing will be automatically established on demand, automatic maintenance, no manual

Intervention. Its networking diagram is as follows:

YL-800N

YL-800N networking diagram

With the YL-800N module, it is easy to build a distributed, self-organizing network MESH with excellent performance and mature stability.
Network, representing the most advanced level of ad hoc networking technology, can replace wired, point-to-multipoint and centralized networking
Ways to greatly expand network coverage and network robustness, and can effectively reduce equipment costs and dimensions
Protect the cost.

The YL-800N module is used in the field of self-organizing networks such as sensor networks, wireless meter reading, smart homes, etc.
Has obvious technical advantages and price advantages. For example, using the YL-800N wireless meter reading solution, you can only
Need to send a broadcast message to achieve the collection of the entire network instrument in a short time, no need to
The instruments are read one by one, which greatly saves the time of reading. In the absence of external interference and isolated nodes
Under the circumstance, the single-network copying success rate of the MESH wireless meter reading program reaches 100%.

Eight, **MESH** distributed routing protocol introduction

Mobile Ad Hoc Network (MANET) is a multi-hop network composed of multiple mobile nodes with routing functions.
The transmission of the data requires the cooperation of multiple nodes to complete, so the routing protocol is crucial in MANET.
portion. Compared with traditional wired networks, MANET has its own characteristics, such as distributed control and dynamic change.
Network topology, limited wireless transmission bandwidth and node capabilities, poor security, short route life
Wait.
The ideal MANET routing protocol should have the following characteristics:

1. Distributed routing algorithm; distributed algorithm is more suitable for a distributed control network without center.
2. Strong adaptive ability; adapt to rapidly changing network topology.

YL-800N

3. No loop; no loop is the basic requirement of any routing protocol, avoiding routing errors and bandwidth waves

   fee.

4. Less routing calculation and maintenance control; the most complete and powerful work with minimal control overhead

   Can be the goal of all routing protocols working together.

5. Adapt to large-scale networks; robust and scalable.

The single path routing protocol is not suitable for MANET for the following reasons:

1. The wireless network node has high mobility, limited bandwidth resources, and high connection interruption rate, resulting in network points.

   The chance of splitting is high. The single-path routing algorithm has too much overhead and slow convergence.

2. The route needs to be established through flooding technology, and when the node moves to invalidate the original route,

   The maintenance of single-path routing also needs to be flooded, which will occupy network bandwidth. When there is a medium amount in the

   When a large number of routes need to be maintained, frequent network flooding makes the routing control of the on-demand routing protocol o

   The sales are very large.

3. Single-path routing protocols do not consider fairness and tend to distribute heavy load to the source-destination node.

   On the short path node, the topology information of the entire network cannot be well obtained and tracked.

4. Single-path routing protocol data is sent using only one path, and data cannot be sent in parallel or concurrently.

   As a result, the network transmission rate is low, the delay is increased, and the network load is unbalanced, causing network congestion.

There are usually multiple paths from any source node to the destination node in MANET, and the nodes have

With random mobility, the topology of the entire network changes frequently. Multipath routing protocol can overcome the above single

Insufficient routing protocols can fully utilize network resources, balance network load, improve communication performance, and avoid

Free of network shocks. MESH uses a private on-demand lightweight dynamic multipath routing protocol for hardware resources.

Designed for demanding mobile ad hoc networks, it is suitable for wireless networks with fast moving speed and fast topology changes.

Network. The routing protocol minimizes the overhead of the route establishment and maintenance process and can be in multiple paths.

Parallel data packet transmission, which can sense changes in network topology and update routing

To flood, seamlessly switch between different routes. The main features are: each node maintains as much as possible

Routing information; no routing loop; good routing stability, fast establishment; able to maintain full use of wireless

Redundancy of signals, maintenance and update of routes at all times, no additional overhead; routing algorithm rights

Balance many factors such as distance vector, signal energy, link quality and battery voltage; for network topology

The change is very sensitive, the route can be dynamically and quickly optimized; the network throughput is high; support 7-level routing, network

The scale of the network is large.

MESH multipath routing diagram

YL-800N

The MESH multipath routing diagram is shown above. The network topology diagram is shown on the left and the black line represents the section

The link between the points. On the right side, the data link is established between points A and B, and the red line is the path from point A to point B.

The blue line is the reverse path.

The establishment of the route is realized by flooding, and there is no closed loop between multiple routes, allowing more

The paths intersect. Each node will select as many nodes as its next hop route, datagram

Text can be dynamically switched between multiple paths and can be transmitted in parallel. Dead route detection, new route discovery,

The change of the network topology is sensed by listening to handshake packets between adjacent nodes, and no flooding is required.

No extra overhead is required. All nodes, including the source node, only need to find their own next hop relay section.

Point, without determining the entire path, so the routing protocol has a small overhead and is suitable for rapid change of topology

The mobile network is able to quickly discover the best-in-class route and support large-scale networks with 7-level routing.

The MESH routing protocol combines multiple selection algorithms for routing, including distance vectors and signals.

Quality (link status) and node remaining power – Class MMBCR (Min-Max Battery Cost Routing).

The distance vector algorithm determines the path according to the distance of the destination, and each node maintains a vector table.

The table lists the currently known best distances to each target. The node can choose according to this vector table.

A node that is closer to the destination than itself is used as a forwarding route. Two nodes can be found according to the distance vector algorithm

The closest path between, but not necessarily the best path.

Unlike wired networks, wireless signals are susceptible to external interference for MANET.

The data link has the characteristics of short survival time and poor stability. Routing protocols must be able to correctly select signal quality

A good, stable link path can guarantee the stability, real-time, reliability and anti-interference ability of the network.

The MESH routing protocol can quickly detect the instantaneous link quality of multiple routes and can select it in a very short time.

The path with the best link quality is routed, and the next most recent path can be selected as the route if necessary. MESH

The link state algorithm routing diagram is as follows, A can relay through B to C both ABC but the clause

The path is disturbed by an unstable link, and A to C have another path ADEC with good link quality.

Selecting ABC This path is closer, but the success rate of receiving the link instability message is very high.

Low, it will greatly increase the probability of retransmission of the message and take a lot of time. And if you choose ADEC, although the distance

It will be farther away, but it can guarantee the reliability and real-time of message transmission.

MESH link state algorithm routing diagram

In addition, for MANET, routing needs to fully consider the power of the node battery, as far as possible

YL-800N

Avoid routing with low battery nodes. The MESH routing protocol uses the MMBCR-like algorithm and automatically

Select a node with a relatively large remaining capacity to route. Schematic diagram of the remaining power routing algorithm for MESH nodes

As shown below, A can relay through B to C, both ABC but the remaining power of the B node is low, while A to C have

Another slightly longer path, ADEC, has higher residual power in the nodes in the path. Choose ABC this road

Although the path is closer, it will quickly drain the power of the B node. If you choose ADEC, although the distance

Will be farther away, but increasing the life of the entire network reduces the maintenance cost of the system.

Schematic diagram of remaining battery routing for MESH nodes

MESH routing protocol is an ideal routing protocol designed for MANET, with distributed, robust and self-contained

The ability is strong, lightweight, multi-path, no loop, large network size, suitable for mobile networks.

Nine, module configuration instructions

1. The user interface mode of the module is divided into two types: hexadecimal command mode and transparent mode.

2. The device type of the module is divided into two types: the main module (concentrator module) and the slave module (node module).

    Can be modified by instructions

3. When the main module is in transparent mode, the data received by the serial port is transparently sent to all slave modules; the slave module

    In transparent mode, the data received by the serial port is transparently sent to the main module that sent the data.

4. In transparent mode, when "+++" is entered, it will not be sent transparently, but the user interface mode will be switched to

    Hexadecimal command mode, at which point the module can respond to commands

5. The default device type should be changed to the slave module type, because the user usually has a large number of modules.

    In the main module.

6. Users can use a variety of ways to network:

    1 fully peer-to-peer non-transparent networking mode

    There is no master-slave relationship between all modules, completely peer-to-peer, pure MESH network, the module type is the same,

User interface mode is consistent but all non-transparent mode; in this networking mode, all modules are available in 16

Command to send broadcast data or unicast data; need to provide the target module address when sending unicast data;

Send the broadcast data to the target address of 0xFFFF. Modules can be in hexadecimal command mode or AT command mode

YL-800N

Receive broadcast or unicast data in the specified protocol format, and know the source module address of the transmitted data.

If the user equipment needs to send unicast data, it needs to manage the communication short address of other modules.

2 fully peer-to-peer transparent networking mode

There is no master-slave relationship between all modules, completely peer-to-peer, pure transparent transmission network, which can completely re

Common transparent transmission module.

The module types are the same and are the main module type. The user interface mode is consistent and both are transparent.
Ming mode.

In this networking mode, each module receives data from the serial port and sends a transparent broadcast to other modules.

Module, the module receives data sent by other modules as pure transparent application data. User equipment can only be widely distributed

Broadcast data, no need to manage the communication short address of other modules.

3 master-slave non-transparent networking mode

One module is the main module, the other modules are slave modules, the master-slave modules communicate with each other, and between the mo

Communication is generally not required, and the user interface mode is consistent but all are non-transparent.

This networking mode is actually the same as the first one. Although there is no communication requirement between the modules, it can be phased

Mutual communication.

4 master-slave transparent networking mode

One module is the main module, the other modules are slave modules, the master-slave modules communicate with each other, and between the mo

Communication is generally not required, the user interface mode is consistent and both are non-transparent.

In this networking mode, the data received by the serial port of the main module is transparently broadcasted to other modules.

The block, while the data received from the module's serial port, is transparently unicast to the main module. Module receives something else

The data sent by the module is purely transparent application data. User equipment does not need to manage communication shorts of other modules

site.

5 master-slave translucent networking mode

One module is the main module, the other modules are slave modules, the master-slave modules communicate with each other, and between the mo

Communication is generally not required. The main module user interface mode is non-transparent mode, and the slave user interface mode

Both are transparent modes.

In this networking mode, the master module can send broadcasts and send unicast numbers to each slave module.

According to the data, the slave module will be transparently sent out from the serial port, and the data received from the module serial port will be trans

The broadcast is sent to the main module, and after receiving the main module, it will be sent according to the specified protocol format according to the

No need to make any changes from the user equipment to the passive device, no need to manage what information remains; the primary user equipment

To manage the short address of the communication from the module.

X. test data transceiver **(hexadecimal** command mode)

Connect the YL-800N to the computer according to the typical application circuit. The data transmission and reception test can be set by soft.

Implementation, first read the module parameters, after reading the parameters successfully, you can send data normally, fill in the software

Good to send the target module address and data (hexadecimal, there must be spaces in the middle), point to send, if outside

If the target address exists, it will display the sending SUCCESS. If there is no corresponding address, it will be displayed and sent.

FAIL, as shown below:

YL-800N

Relay query test:

The module has the function of automatic routing, if there is a center and nodes in the network are 0005 and 0006 The module of the address, the central module does not communicate with the 0005 node, so just put 0006 between them, Then 0006 functions as a route, and the center and 0005 can communicate successfully.

You can also observe the following figure by setting the software command to find the source route:

Find 0005, the number of relays is 01, and the data is relayed through 0006:

YL-800N

XI, wireless upgrade program

The YL-800N/YL-800NS module integrates the wireless upgrade function from the V2.49 version, which is convenient for customers. Upgrade and modify the program online.

Need to prepare tools:

YL-800T standard module; PC computer and PC software and upgraded program bin file; module to be upgraded Blocks and connectors.

Upgrade process:

(1) Connect the YL-800T module to the computer. Open the upgrade software and select the YL-800T module to connect.

Serial port number. Load the program file to be upgraded and choose not to reset the upgrade. As shown below:

Upgrade tool software download address:

Http://www.rf-module.cn/updow/lora_module_update_tool.rar

Note: The table address above the software does not need to be taken care of, this is used to upgrade other modules.

(2) Set the module to be upgraded to the upgrade mode by sending commands to the module through the serial port.

Command code: 01 00 08 08 64 6F 77 6E 6C 6F 61 64 15

Module code: 64 6F 77 6E 6C 6F 61 64

At this point the module enters the download mode and the red light begins to flash.

(3) Click the Upgrade button. The module starts to upgrade, and the module red and blue lights flash alternately. Rise

After the level is completed, the module will start automatically and run the normal program.

Note: Module upgrade will not erase the parameters originally set, so the parameters after the upgrade are the same as before the upgrade.

of. If the upgrade is not successful, you can upgrade again. If the program upgrade is wrong, or the upgrade is not our public

The program provided by the company, then the module will return to the company for repair.

YL-800N

Applications XII **hexadecimal** mode of example and protocol analysis

**1** , automatic routing data frame format

| Byte **: 1** | 1 | 1 | 1 | 2 | 1 | 1 | 1 | N | becomes longer | 1 |
|---|---|---|---|---|---|---|---|---|---|---|
| frame | frame | command | load | aims | ACK | send | routing | data | user | effect |
| Types of | Serial number | Types of | length | address | request | radius | parameter | long | data | Test |
| Frame header | | | | | Frame load | | | | | |
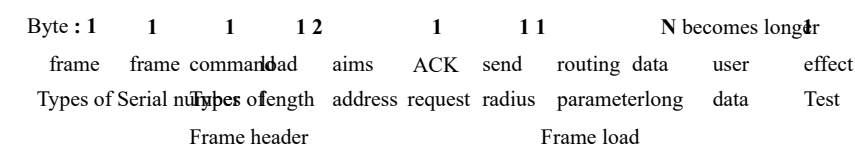
Example of data: 05 00 01 0A 02 00 00 07 01 04 12 34 56 78 01

Frame type: 05 means to send user data

Frame number: 00

Command type: 01 indicates application data sending request

Load length: 0A refers to the number of bytes from the length of the load to the number of bytes before the test

Destination address: 02 00 indicates that the destination address sent is 00 02

**ACK** request: 00 means no ACK response required

Send radius: 07 means maximum 7 hops

Discovery routing parameters: 01 indicates the way of automatic routing. The user does not need to intervene in the networking process.

Data length: 04 means the user has 4 bytes of data to send.

User data: 12 34 56 78 four bytes

Validation: 01 XOR Validation Value

**2** , source routing data frame format ( <span style="color:red">source routing is mandatory routing, take a fixed path, generally recommended not to use</span> )

Table **1**

| Byte **: 1** | 1 | 1 | 1 | N |
|---|---|---|---|---|
| Frame type | frame number | command type | load length | Frame load |
| Frame header | | | | See Table 2 |

Table **2**

| Bytes: 2 | 1 | 1 | 1 | 1 | N*2 | 1 | lengthen |
|---|---|---|---|---|---|---|---|
| aims | Application | send | Discovery | Relay number N | relay list | User data | long user data |
| address | ACK request | radius | By parameter | Source routing domain | | | |
| Frame load | | | | | | | |

Example of data: 05 00 01 11 05 00 00 07 03 03 01 00 02 00 03 00 04 12 34 56 78 1F

Frame type: 05 means to send user data

Frame number: 00

Command type: 01 indicates application data sending request

Load length: 11 refers to the number of bytes from the length of the load to the first byte before the test

Shenzhen Nanshan Science and Technology Park West Industrial Zone 23 South 6002 Shenzhen Jiexun Yilian Technology Co., Ltd. 0755-26031631
www.rf-module.cn

YL-800N

Destination address: 05 00 means the destination address sent is 00 05

**ACK** request: 00 means no ACK response required
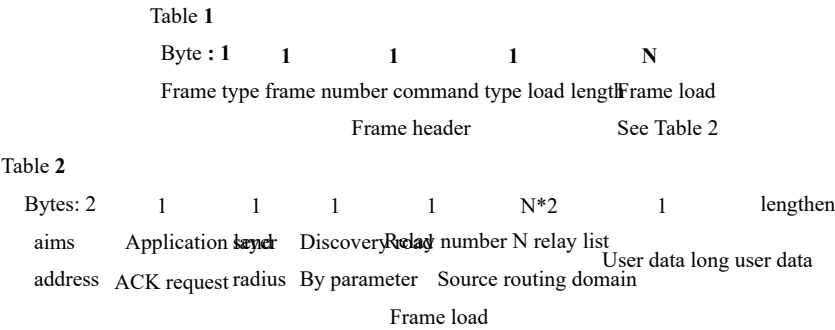
Send radius: 07 means maximum 7 hops
The discovery route parameter: 03 indicates the source route sending mode. You must specify the number of trunks and the relay list. Among them,
01 00
02 00 03 00 indicates the relay list

Data length: 04 means the user has 4 bytes of data to send.

User data: 12 34 56 78 four bytes

Validation: 01 XOR Validation Value

**2.** Receive data application format

| 05 00 | 82 | 08 | 10 00 | 43 | 04 EE EE EE EE D8 |
|---|---|---|---|---|---|
| should | frame | Command type | | Field strength | number |
| use | | long | Node address | The smaller the value | according to |
| number | sequence | Read configuration letter | Identification | The more the signal | DATA data |
| according to | number Interest response | degree | | Strong | degree |

school
Test

XIII, **hexadecimal** Instruction List (Related command set software directly generated)

**1** , general frame format

**1.1** frame format

| Byte: 1 | 1 | 1 | 1 | lengthen | 1 |
|---|---|---|---|---|---|
| Frame type | frame number | command type | load length | load data | frame check |
| | Frame header | | | Frame load | End of frame |

**1.2** frame header description

    1.2.1 Frame Type

      The frame type is used to identify different application frame types. The standard frame types are defined as follows:

| Type identifier | type name | Description |
|---|---|---|
| 0x01 | Module configuration | Configuration parameters for reading and writing modules, etc. |
| 0x02 | MAC layer test | is used to test the networking protocol MAC layer function. |
| 0x03 | NET layer test | is used to test networking protocol network layer function |
| 0x04 | Debug information | Used to set or read some debugging test information, etc. |
| 0x05 | Application data | Used by the networking protocol application layer to use the interface. |

Note: The "MAC Layer Test" and "NET Layer Test" type functions are only used during protocol stack development testing.

Closed in the finished module.

1.2.2 Frame number

The frame sequence number field is currently unused and the value is fixed at 0x00.

YL-800N

1.2.3 Command Type

The command type field has different definitions under various frame type identifiers, see "2, individual type frames.

format".

1.2.4 Load length

The load length field indicates the length of the frame payload portion of the upper frame format, that is, from the domain to the frame check.

The number of bytes in the previous part. The maximum load length of this protocol is 128 bytes.

**1.3** frame load

The format of the frame payload portion is determined by different frame types and different command types under the frame type. See

" **2.** Individual type frame format".

**1.4** frame tail

The frame end field is a 1-byte XOR check. This check value is the first byte from the frame header (frame type byte)

The result of an exclusive OR operation of all bytes before starting to check the byte. Check all bytes in the full frame XOR operation

If it is 0, the verification is correct.

**2** , individual type frame format

**2.1** module configuration type

The module configuration type is identified as 0x01. The command types under the module configuration type are defined as follows:

Command Type Identification Command Function Description

| | |
|---|---|
| 0x01 | Write configuration information request |
| 0x81 | Write configuration information response |
| 0x02 | Read configuration information request |
| 0x82 | Read configuration information response |
| 0x06 | Read version information request |
| 0x86 | Read version information response |
| 0x07 | Module reset request |
| 0x87 | Module reset response |

2.1.1 Write configuration information request

The Write Configuration Information Request command is used to set some relevant operating parameters for the wireless module.
The Write configuration information.
The format of the frame payload portion of the request command is defined as follows:

Frame content

| Byte: 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Configuration Sign | channel number | RF emission power | User connection Port mode | device Types of | The internet Identification | node Identification | Guaran- tee stay | Inter- active parameter | Serial port rate | Aterial |

Frame load section

Configuration flag

It doesn't make sense. The module internally checks to see if there is an initial configuration that is initialized. The value is fixed at 0xA5A5.

YL-800N

Channel number

The working channel number of the wireless module ranges from 0 to 8. The default value is 1.

0=431M, 1= 432M, 2=429M, 3=433M, 4=436M, 5=434M, 6=437M, 7=435M

**RF** transmit power

The default is the maximum power.

User interface mode

The working mode of the module serial port interacting with the user, 0:16 command mode; 1: transparent mode;

Equipment type

The module works in the application mode, 0: slave device; 1: master device, the default value is 0 (slave device).

Network identification

The network identifier of the wireless module networking, the wireless modules of the same network identifier belong to the same network, only

Modules in the same network can communicate with each other. The value of the network identifier ranges from 0x0000 to 0xFFFE.

The default is 0x0000.

Node identifier

The wireless module acts as a network node and has a node identifier, or node address. Node identifier

The range of values is 0x0000~0xFFFE, and 0xFFFF is reserved for broadcast address. Node label when the module is shipped

The module is identified as the lower 2 bytes of the factory serial number, so the default node ID of the module is generally not repeated.

Air rate (determined by signal bandwidth and spreading factor)

The factory spread spectrum factor and signal bandwidth are both 9, which is equivalent to the module's air modulation rate of 7K.

Do not modify. Due to the large delay of the networking module, if the customer needs to calculate the air rate is greater than 7K, it is too low.

If the sending and receiving delay is too large, it will affect the judgment of the internal protocol of the networking, which will lead to network instability

Serial port parameter

The operating parameters of the module serial port. Its format is defined as follows:

Serial port parameter format:

Bit: 1      2      1      4

Stop bit check bit retention baud rate

Stop bit: 0:1 stop bit; 1:2 stop bit, default value is 0;

Check digit: 0: no parity; 1: odd parity; 2: even parity, the default value is 2;

Baud rate: 1:1200; 2: 2400; 3: 4800; 4: 9600 5: 14400; 6: 19200;

28800; 8:38400; 9:57600; 10:76800; 11:115200; 12:230400, default

Is 4.

2.1.2 Write configuration information response

Write configuration information response is a response replied by the module after sending a write configuration information request command to the

The frame load portion is defined as follows:

1

Return status

Frame load

YL-800N

Return status

Write the configuration information request command execution results, the status code is defined as follows:

User interface return status code definition

Status value      Definition

0x00 success

0x01 XOR check error

0x02 test frame transmission error

0x03 command error

0x04 Information setting error

0x05 length error

0x06 Write Flash failed error

2.1.3 Reading Configuration Information Request

The read configuration information request is used to read the configuration parameters in the module, and the frame payload portion of the comma

For the end of the frame, see "1. Common Frame Format". For the frame type identifier and command identifier of the command, see "2.1 Modules.

Set type."

2.1.4 Reading Configuration Information Response

The read configuration information response is the configuration information returned by the module after receiving the read configuration informa

The frame payload portion of the message response command is defined with the frame payload portion of the "2.1.1 Write Configuration Information R

All the same.

2.1.5 Read version information request

The read version information request is used to read the version information of the firmware in the module, and the frame load portion of the comm

For the end of the frame header, see "1. Common frame format". For the frame type identifier and command identifier of the command, see "2.1 Mode.

Defined in the block configuration type.

2.1.6 Read version information response

The read version information response is the firmware version information returned by the module after receiving the read version information requ

The frame payload portion is defined as follows:

| Byte: 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
|---|---|---|---|---|---|---|---|
| Major version number | Secondary version This number | revised edition This number | hardware type Code | Compilation day Date | Compilation day Period | Compilation day Year | device Types of |

Frame load

Note: The current hardware type code field and device type field are left unused.

2.1.7 Module Reset Request

YL-800N

The module reset request is used to soft reset the wireless module. The frame payload portion of this command is empty, the frame header For the end of the frame, see "1. Common Frame Format". For the frame type identifier and command identifier of the command, see "2.1 Modules. Defined in the type.

2.1.8 Module Reset Response

The module reset response is the execution status information returned by the module after receiving the module reset request command. Its frame is negative The load part is defined as follows:

1

Return status

Frame load

The return status code definition is the same as defined in the "2.1.2 Write Configuration Information Response" section.

Note: When the command executes the program, the module is reset and the external module does not receive the module reset response command.

**2.2** Debug information type

The identifier of the debug information type is 0x04. The command types under the debug information type are defined as follows:

| Command type identifier | Command function description |
|---|---|
| 0x01 | Write access control list request |
| 0x81 | Write access control list response |
| 0x02 | Read access control list request |
| 0x82 | Read access control list response |

2.2.1 Write Access Control List Request

2.2.2 Write Access Control List Reply

2.2.3 Reading Access Control List Requests
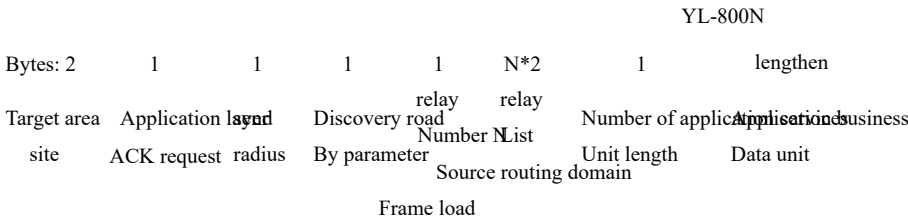
2.2.4 Read Access Control List Response

**2.3** Application Data Type

The identifier of the application data type is 0x05. The command types under the application data type are defined as follows:

| Command type identifier | Command function description |
|---|---|
| 0x01 | Application data sending request |
| 0x81 | Application data sending response |
| 0x82 | Application data reception indication |
| 0x08 | Source route discovery request |
| 0x88 | Source route discovery response |

2.3.1 Application Data Send Request

The application data sending request command is used by an external device to send data through the wireless networking module. The order of this command. The frame payload portion is defined as follows:

YL-800N

| Bytes: 2 | 1 | 1 | 1 | 1 | N*2 | 1 | length | then |
|---|---|---|---|---|---|---|---|---|
| Target area site | Application layer ACK request | send radius | Discovery road By parameter | relay Number N | relay List | Number of applications Unit length | Application business Data unit | |
| | | | | | Source routing domain | | | |
| | | | | Frame load | | | | |

target address

The 2-byte short address of the data transmission destination node (lower byte first), if it is 0xFFFF, it is wide

Broadcast to send.

Application layer **ACK** request

When 1, the end-to-end acknowledgment retransmission mechanism of the protocol APS layer is used; if it is 0, it is not used. Recommended in

This feature is not used when the application layer peer device responds.

Send radius

The maximum number of hops for data forwarding. The maximum hop value of the current networking protocol is 7 (customizable).

Discover routing parameters

0: Route discovery is disabled. If there is no route to the destination node in the routing table, the transmission fails.

1: Automatic route discovery, if there is a route to the destination node in the routing table, it is used automatically.

Looking for a route;

2: Forced route discovery; look for new routes regardless of whether there is a route to the destination node in the routing table;

3: Use source routing.

Source routing domain

If the current route is found to be 3, the source routing domain exists. Otherwise, the source routing domain does not exist.

Number of relays **N** : number of relay nodes (excluding source and destination) that pass from the source node to the destination node,

The range of value is 0~6;

Relay list: The short address of the relay node that passes from the source node to the destination node. a section close to the target

The dot address is in the front, the node address close to the source is after, and the short address low byte is first.
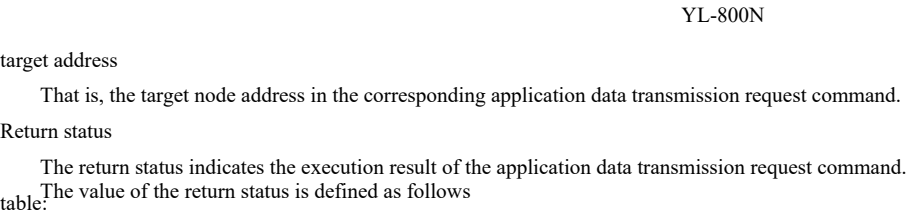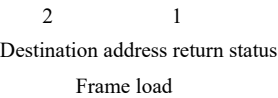
Application business data unit length:

That is, the length of the application data unit to be sent. Since the current physical layer has a maximum load length of 127,

This length is used when the source route is not used after removing the header length of the MAC layer, NET layer, and APS layer.

The maximum value is 111; when using source routing, the maximum length is 109-N*2 (N is the number of relays).

Application business data unit

The application data unit to be sent to the target node.

2.3.2 Application Data Send Reply

After the module receives the application data to send the post-command command, after the data transmission command is executed, the external r

answer. Its frame load part format is defined as follows:

| 2 | 1 |
|---|---|
| Destination address | return status |
| Frame load | |

YL-800N

target address

That is, the target node address in the corresponding application data transmission request command.

Return status

The return status indicates the execution result of the application data transmission request command. The value of the return status is defined as follows
table:

| Status value | Definition |
|---|---|
| 0x00 | success |
| 0xE1 | XOR check error |
| 0xE4 | security check failed |
| 0xE5 | MAC frame long error |
| 0xE6 | invalid parameter |
| 0xE7 | did not receive ACK |
| 0xEA | transmitter is busy |
| 0xC1 | network layer invalid parameter |
| 0xC2 | invalid request |
| 0xC7 | no route found |
| 0xD1 | buffer busy |
| 0xD2 | APS layer did not receive ACK |
| 0xD3 | APS frame is too long |

0xEx returns the error code of the MAC layer, 0xCx returns the error code of the network layer, 0xDx returns the APS Layer error code.

Note: In the data transmission without the APS layer ACK request mechanism, even if the return code is successful, it is not

Means that the data is successfully transferred to the target address, but only means that the data is sent to the next one.

jump.


2.3.3 Application data receiving indication

The application data receiving indication is used, and the application module of the wireless module protocol stack is sent from the air to the node.

Use this command to send data frames from the serial port to an external device. The format of the frame payload portion of this command is:

| 2 | 1 | lengthen |
|---|---|---|
| Source address | application service data unit length | application service data unit |

Frame load

source address

The source address of the application data received.

Application service data unit length

The length of the application service data unit received.

Application service data unit

The received application service data unit.

YL-800N

2.3.4 Source Route Discovery Request

 The source route route discovery request command is used to initiate a lookup of the source route that can reach the destination node (relay)

Address list). The format of the frame payload portion of this command is as follows:

| 2 | 1 | 1 |
|---|---|---|
| Destination address | sending radius | discovery routing parameter |

Frame load

target address

 Find the address of the destination node of the route.

Send radius

 Maximum number of hops for route relay forwarding. This protocol defines a maximum of 7 (customizable).

Discover routing parameters

 Same as the definition in the "Application Data Send Request" command, but fixed to 3 in this command, that is, the source road

Discovered by.

2.3.5 Source Route Discovery Response

 The source route discovery response command is sent to the external device after the wireless module executes the source route discovery request c

Returns the execution result. The format of the frame payload portion of this command is as follows:

| 2 | 1 | 1 | 1 | N*2 |
|---|---|---|---|---|
| Destination address | return status | discovery routing parameters | Relay number N | relay list |
| | | | Source routing | |

Frame load

target address

 Returns the destination address of the source route entry.

Return status

 The return status indicates the execution result of the source route discovery request command. Return status value with "2.3.2 application

The value of the return status in the Data Send Reply is the same.

Discover routing parameters

 Same as the definition in the "Application Data Send Request" command, but fixed to 3 in this command, that is, the source road

Discovered by.

Source routing

 The source routing domain exists when the value of the current edge return status is 0x00 (success).

 Number of Relays **N** : The number of relay nodes that return the source route.

 Relay list: The address of the relay node that returns the source route. The closer to the address of the target node, the more

After the address near the source node is followed, the address is the low byte first and the high byte later.

Fourteen, antenna matching

 The antenna system is an important part of wireless communication, a good antenna system can greatly improve wireless

The communication effect is twice the result with half the effort.

YL-800N

| Spring antenna | Glue stick antenna | Folding glue stick antenna | Small suction cup antenna |
|---|---|---|---|
| 1.5dBi | 2.0dBi | 3.0dBi | 3.5dBi |
| Length 4cm | Length 5cm | Length 6cm | 12cm high, line length 1~5m |

Tip: When it is allowed to install, it is recommended to use a high-gain antenna as much as possible.

Line vertical effect is best.

If you configure the antenna yourself, you need to pay attention to the frequency matching, the impedance is 50Ω, and the smaller the standing wave r antenna Specifications are subject to the actual product.

When using the built-in spring antenna, users can provide a complete set of products to our company to match the dedicated spring days.

line.

Fifteen, application areas

✓ Four-table copy: wireless meter reading such as water meter, electric meter, gas meter, heat meter;

✓ Smart agriculture: irrigation control, farmland data collection, greenhouse greenhouse monitoring;

✓ Smart home: wireless switch, smart light bulb, home appliance control, smart lock;

✓ Handheld equipment: a la carte machine, hand-held machine, scanner, walkie-talkie;

✓ Intelligent transportation: wireless remote control of traffic lights, centralized control system for street lights;

✓ Data transmission: electronic signage, LED display, oil price screen, shelf label;

✓ Data collection: electronic weighing, grain monitoring and control, hydrology and water monitoring;

✓ Security system: wireless alarm, electronic fence, camera pan/tilt control;

✓ Smart City: Building energy saving, HVAC control, manhole cover anti-theft monitoring, parking space management;

✓ Medical management: elderly callers, baby monitors, medical equipment instrumentation monitoring;

✓ Conference equipment: voting device, rating evaluator, responder, wireless speaker;

✓ Asset management: personnel location monitoring, material equipment positioning monitoring;

✓ Wireless sensing: wireless sensing such as temperature, humidity, pressure, liquid level, vibration, etc.;

✓ Industrial control system: PLC data transmission, automatic control;

✓ Energy management: maintenance of substations such as firepower, hydropower, wind power, and photovoltaic power generation;

✓ Wearable equipment: watches, dog rings, ear tags, badges, pendants;

Disclaimer: The company reserves the right to interpret and modify the manual of this product at any time without notice!